# WILLIAM C. BAXTER

**CONCRETE CONTRACTOR**

**LOCAL OFFICE**
**FOR CATSKILL AQUEDUCT OPERATION**

PLEASANTVILLE, N. Y., January 27th, 1913

Messrs. H. W. Bell & Co.,

Yonkers. N. Y.

Dear Sirs:-

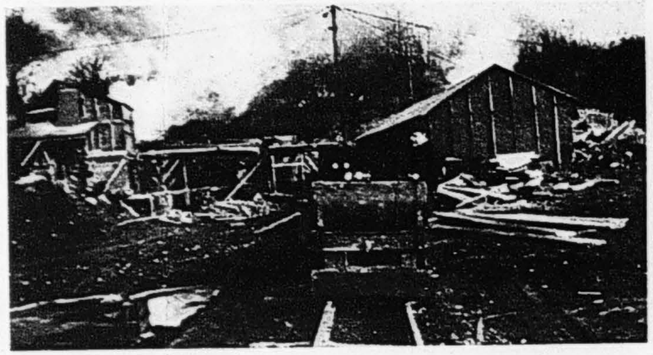
Replying to your inquiry of recent date relative to my two locomotives of your manufacture will say that same are giving excellent service.

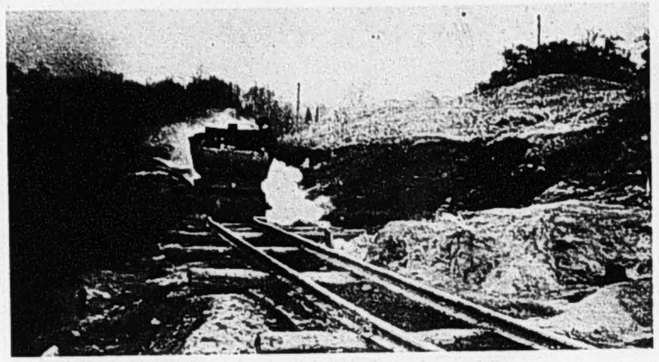
The first machine which was delivered to me in October is operating on the high line hauling concrete. I find it burns about ten gallons of gasolene per day and will run half a day on a tank of water. The second machine is now hauling lumber but I expect to start it hauling concrete in about a month.

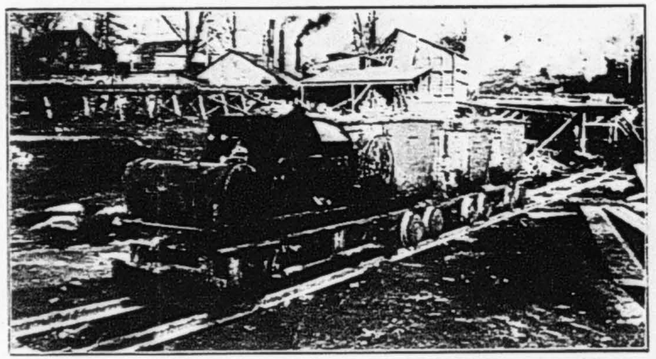
Your machine will handle about three times the work of my old gasoline locomotives, are more reliable and less expensive to operate, and I believe they are the best light haulage locomotives made.

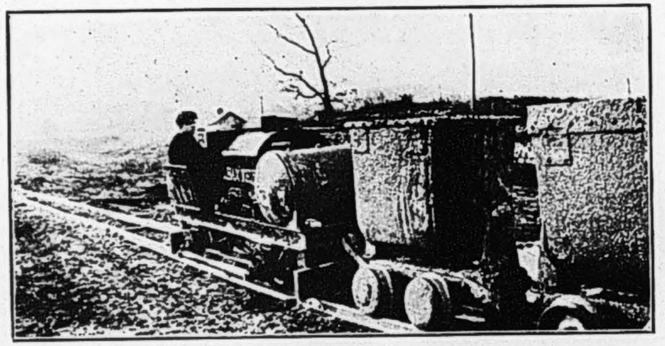
Yours very truly.

(signed) WM. C. BAXTER.









5,000 lb., 24 in. Gauge, Oil Burning Locomotive at work on New York-Catskill Aqueduct Construction.

H. W. BELL & CO., Yonkers, N. Y.

Form L-12. 1M. 2-13.

# DATA SHEET
# H. W. BELL & COMPANY
## YONKERS, N. Y.

***Information Necessary for Intelligent Quotation on Purchasers' Requirements.***

Name of Company....Meesrs. A. Guthrie & Co.....

Location .....Lewistown, Mont.....

Name of Plant.....Railroad construction.....

Length of Haul..2500feet...Miles / Feet Working day consists of..10...hours.

Gauge of Track...24"...Inches. [Give exact distance between heads of rails.]

Weight of rail..40.....pounds per yard. Radius of sharpest curve..3 degrees...

Material to be hauled.....excavated material.....

Is mine shaft slope or drift. XXXXXXXXX.....

Is grade in favor of load..Yes.....

Steepest up-grade for empty cars..1.5%.....Length of same..2500ft...

Steepest up-grade for loaded cars..XXXXXXX.....Length of same..XXXXX....

Steepest down-grade for loaded cars..1.5%.....Length of same..2500ft...

Can run be made for grade...NO.....If so, how long....XXX.....

Must train be started on grade or curve..NO.....Is outer rail of curves elevated..Yes...

It is desired to haul...600.....tons of 2000 pounds per working day.

Net weight of car....1200.....pounds.

Net weight of freight per car..3800.....pounds.

Gross weight of freight and car.....5000.....pounds.

State type of car.....W. W. S. Co. side dump.....

Number of cars desirable per train...5.....Loaded or empty..XXXXXX.....

Do journals of cars run in oil boxes.....Yes.....

Height of coupling from top of rail to center of drawhead is....17.5"....inches.

Type of coupler.....Linek and pin.....

If shaft mine give dimensions of shaft....XXXXX..... Give width and height at most restricted opening where locomotive will be operated....6' x 6'.....

Do you wish cab or mining type locomotive.....Mining.....

Kind of liquid fuel available.....gasoline.....price per gallon.$0.30.

Altitude...4500ft....feet.

If for tunnel or mine service, state ventilating conditions ....For tunnel service..
..maximum distance from open air 700'..in a 7x7 drift.....
.....
.....

Is track well ballasted.med...Distance, center to center of ties...30"..Size of ties.5"face

Blue prints of cars, track lay-out and profile will greatly assist us in determining proper locomotive for your haulage.

Remarks: .....
.....
.....

Date.....  Signed.....

## *Specifications of 6500 lb. Dinkey*

Weight, 6500 lbs.

Heighth, 54 inches.

Wheel Base, 50 inches.

Wheels, 20 inches dia., 3½ inch face.

Axles, 3 3-16 inches.

Length over all, 9 feet.

Engine: 2 cyl. high pressure, double acting, of the regular locomotive type. Cyl. 4½"x6½". Cranks run in oil bath.

Boiler: Vertical type, 26 in. dia., with 156 sq. ft. heating surface. Tested to high pressure before shipment.

Tractive Effort, not figuring slippage, 2215 lbs. Actual 1000 lbs.

Speed: Maximum with load, 15 to 20 miles per hour depending on track conditions.

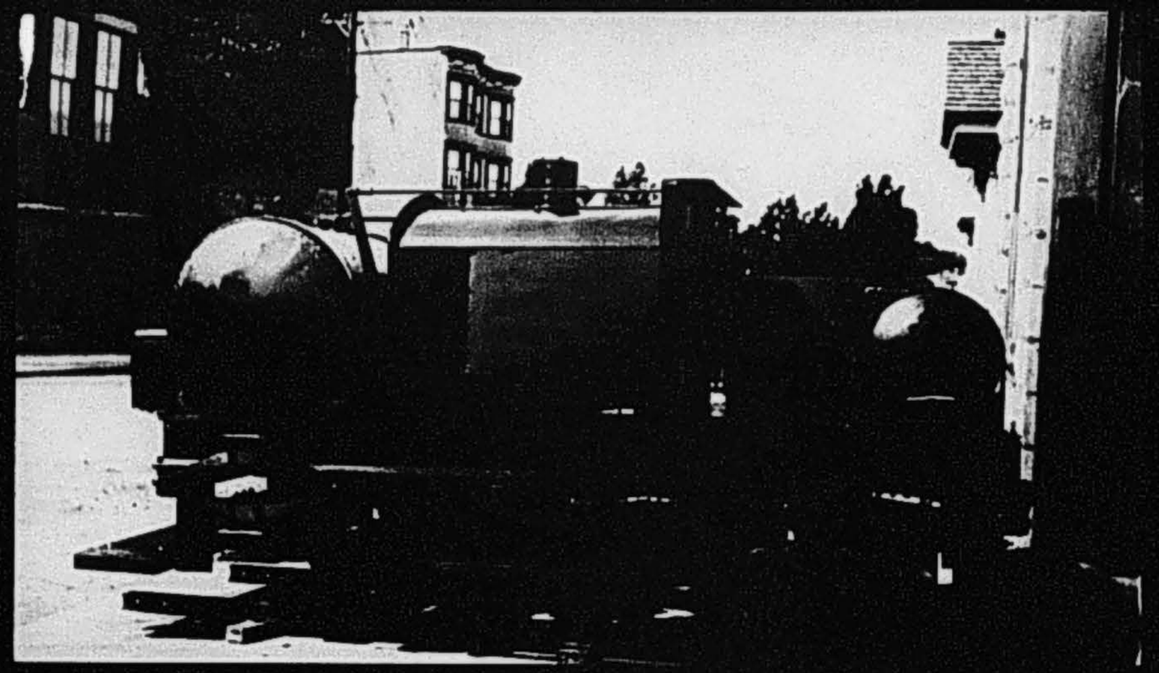
Burner: Gasolene or crude oil as ordered.

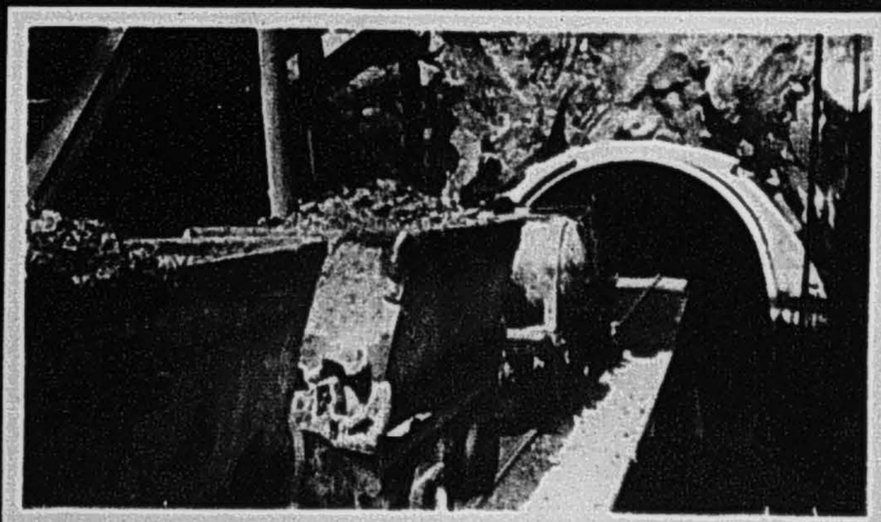
Fuel cost per mile with load approximately four cents.

Haulage table in tons and on different grades:

Level 47, 1% 22, 2% 13, 3% 9, 4% 6.5, 5% 4.8.

*Prices on Application.*





24" gauage 3¼ ton machine sold to Messrs. A. Guthrie & Co. for tunnel work.

3' gauge machine sold to Mesrrs. Rinehart & Dennis Co. for Tunnel work.

3' gauge 3¼ ton machine sold to Messrs. Rinehart & Dennis Co.

2½ ton machine sold to Mr. W. C. Baxter. Hauling concrete on one mile tunnel. Fastest concrete work on Catskill aquaduct.

PACIFIC COAST STEEL COMPANY'S

STANDARD CLASSIFICATION OF EXTRAS ON STEEL BARS AND SHAPES IN OPEN HEARTH STEEL

SAN FRANCISCO

—ADOPTED AND BASED ON PRESENT CAPACITY—

APRIL 1, 1915

# PACIFIC COAST STEEL CO.

OFFICES
RIALTO BLDG., SAN FRANCISCO
UNION OIL BLDG., LOS ANGELES

MILL
SOUTH SAN FRANCISCO

## OPEN HEARTH STEEL

STANDARD CLASSIFICATION OF EXTRAS ON STEEL BARS AND SHAPES

### PRESENT CAPACITY OF MILLS

**CORRUGATED SQUARES AND ROUNDS**

| | | | | |
|---|---|---|---|---|
| 3/4" to 2" Base | | 7/16" | $ .40 | Extra |
| 5/8" to 11/16" | 10c Extra | 3/8" | .50 | " |
| 1/2" to 9/16" | 20c " | 1/4" | 1.00 | " |

**PLAIN SQUARES AND SQUARE COLD TWISTED**

| | | | | |
|---|---|---|---|---|
| 3/4" to 1 5/8" Base | | 7/16" | $ .40 | Extra |
| 5/8" to 11/16" | 10c Extra | 3/8" | .50 | " |
| 1/2" to 9/16" | 20c " | 1/4" | 1.00 | " |

**PLAIN ROUNDS**

| | | | | |
|---|---|---|---|---|
| 3/4" to 3" Base | | 7/16" | $ .40 | Extra |
| 5/8" to 11/16" | 10c Extra | 3/8" | .50 | " |
| 1/2" to 9/16" | 20c " | 1/4" | 1.00 | " |

**PLAIN ROUND**
(WILL ROLL AFTER JUNE 1, 1915)

1 5/8" to 3"

**SPECIAL SIZES**

ROUNDS, SQUARES, FLATS, RIVET, BOLT STEEL AND OTHER SHAPES—TIME OF DELIVERY UPON APPLICATION

### FLATS
STANDARD SIZES

| | | | |
|---|---|---|---|
| * 1" to 6" x 3/8" to 1", | - - - | Base | |
| 1" to 6" x 1/4" to 5/16" | - - | $ .20 | Extra |
| 1 1/8" to 6" x 1 1/16" to 1 3/16" | | .10 | " |
| 1 1/8" to 6" x 1 1/4" | - - - | .20 | " |
| 3/4" x 1/8" | - - - - - | 1.20 | " |
| 3/4" x 3/16" | - - - - | 1.00 | " |
| 3/4" x 1/4" to 5/16" | - - - | $ .50 | Extra |
| 1" to 1 3/8" x 3/16" | - - - | .50 | " |
| 1" to 1 3/8" x 1/8" | - - - | .70 | " |

*Thickness graduated by sixteenths, in widths as follows:

1", 1 1/4", 1 3/8", 1 1/2", 1 3/4", 2", 2 1/4", 2 1/2", 2 3/4", 3", 3 1/2", 4", 4 1/2", 5", 6".

(4 1/4" to 6" x 1/4" and 5/16" Time of delivery on application)

**SPECIAL SIZES**

ROUNDS, SQUARES, FLATS, RIVET, BOLT STEEL AND OTHER SHAPES—TIME OF DELIVERY UPON APPLICATION

### ANGLES (EQUAL LEGS)

| | | |
|---|---|---|
| 3" x 3" and 4" x 4" x 1/4" and heavier (base) | | |
| 1 1/2" x 1 1/2" to 2 1/2" x 2 1/2" x 3/16" and heavier | 20c | Extra |
| 1 1/2" x 1 1/2" to 1 3/4" x 1 3/4" x 1/8" | 30c | " |
| 1" x 1" to 1 1/4" x 1 1/4" to 3/16" and heavier | 30c | " |
| 1" x 1" to 1 1/4" x 1 1/4" x 1/8" | 40c | " |

### ANGLES (UNEQUAL LEGS)

3 1/2" x 2 1/2" x 1/4" to 5/8" Base

4" x 3" x 3/8" to 11/16" Base

6" x 4" x 3/8" to 3/4" Base

### CHANNELS

| | | |
|---|---|---|
| 3/4" x 3/32" to 1/8" | 60c | Extra |
| 1" x 1 1/8" to 5/32" | 40c | " |

**EQUAL ANGLES**
(WILL ROLL AFTER APRIL 10, 1915)

2 1/2" x 2 1/2" and 3" x 3"
(WILL ROLL AFTER MAY 20, 1915)

3 1/2" x 3 1/2" and 4" x 4"

**UNEQUAL ANGLES**
(WILL ROLL AFTER APRIL 10, 1915)

3 1/2" x 2 1/2"
(WILL ROLL AFTER JUNE 20, 1915)

4" x 3" and 6" x 4"

**CHANNELS**
(WILL ROLL AFTER APRIL 15, 1915)

1"
(WILL ROLL AFTER MAY 15, 1915)

3/4"

**SPECIAL SIZES**

ROUNDS, SQUARES, FLATS, RIVET, BOLT STEEL AND OTHER SHAPES—TIME OF DELIVERY UPON APPLICATION

MANUFACTURERS OF

# OPEN HEARTH STEEL

SQUARE AND ROUND CORRUGATED BARS

COLD TWISTED SQUARE BARS

PLAIN ROUND AND SQUARE BARS

FLATS AND BANDS

ANGLES AND CHANNELS

PLATES, TIE PLATES

RAILS, SPIKES AND BOLTS

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# PACIFIC COAST STEEL COMPANY

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## OFFICES

GENERAL OFFICES, - RIALTO BLD'G, S. F.

BRANCH OFFICE, - - - SEATTLE, WASH.

BRANCH OFFICE, UNION OIL BLD'G., L. A.

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## MILLS

SOUTH SAN FRANCISCO

PORTLAND, ORE.

SEATTLE, WASH.

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## DISTRICT SALES OFFICES

| | |
|---|---|
| PORTLAND, ORE.<br>TACOMA, WASH.<br>SPOKANE, WASH.<br>VANCOUVER, B. C. | F. T. CROWE & CO. |
| HONOLULU, T. H. | H. S. GRAY CO. |

# Reinforced Concrete

# Building Ordinance

of the

# City of Los Angeles, Cal.

Adopted By the City Council
May 25, 1914.

In Effect July 1, 1914.

ALSO AMENDMENTS TO THE
BUILDING ORDINANCE
(Ordinance No. 28,700, New Series.)
ADOPTED SINCE JANUARY, 1, 1914,
UP TO JUNE 18, 1914.

Published by
THE BUILDER AND CONTRACTOR
122 North Broadway

# REINFORCED CONCRETE BUILDING ORDINANCE

**NOTE BY THE PUBLISHER.**

This ordinance amends Sections, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183 and 190, and repeals Sections 184, 185, 186, 187 and 189 of the Building Ordinance (Ordinance No. 28,700, New Series).

This ordinance was prepared by the Building Ordinance Commission and according to their report to the City Council on the subject, it was the unanimous opinion of the Commission that all interests would be best served if the ordinance was adopted then rather than to await the final revision of the entire building ordinance, for the reason that the present ordinance was very inadequate in its provision governing Reinforced Concrete Construction, resulting in not only handicapping the Building Department, who is charged with the enforcement of the law, but owners, architects and contractors, who have to do with same.

Further, the adoption of the ordinance at the time would permit it to enter into general practice and be scrutinized by the general public thereby affording the Commission an opportunity to submit in the final draft of the entire ordinance, any corrections that might be deemed essential.

Any suggestions or recommendations that will assist the Building Ordinance Commission in their work will be very much appreciated. Address all communications to the office of the secretary, Mark C. Cohn, Room 24, City Hall, Los Angeles, California.

**ORDINANCE No. 29,974 (New Series).**

**Adopted by the Mayor and Council of the City of Los Angeles,, May 23th, 1914.**

## PLANS, SPECIFICATIONS AND INSPECTION.

**(Concrete Construction).**

**Sec. 174. (a)** Before a permit is granted to construct, erect, alter, or repair any reinforced concrete building or other structure, or for any reinforced concrete construction in or upon any building or other structure, the applicant for such permit shall file with the Board of Public Works, complete plans, drawings, specifications and details showing the size, position and reinforcement of structural members and schedules of the loads for all columns, girders, beams and joists.

Such plans, drawings and specifications shall exhibit the approval and signature of a licensed architect.

**(b)** The figured dimensions of all walls, columns, girders, beams and slabs as shown on said plans, shall indicate and denote the full solid thickness of the concrete only, exclusive of plastering or cement finish.

**(c)** The architect, owner, builder, or other person immediately in charge of the construction of any reinforced concrete building or other structure shall at all times during the placing of the reinforcing iron or steel and the mixing and depositing of concrete, maintain an inspector duly qualified and competent, to see that the provisions of this ordinance, regulating the construction of reinforced concrete buildings or other structures, are properly complied with. Every such inspector who shall fail, refuse or neglect to immediately stop the construction of any such reinforced concrete work which fails to comply with the requirements of this ordinance or the approved plans and specifications and immediately report any such violation to his employer and to the Board of Public Works of the City of Los Angeles, shall be deemed guilty of misdemeanor and upon conviction thereof shall be punishable by a fine of not more than Five Hundred ($500.00) Dollars or by imprisonment in the city jail for not more than six (6) months, or by both such fine and imprisonment.

**Sec. 175 (a) Concrete.** For the purpose of this ordinance, concrete shall be deemed to be a mixture of Portland cement, sand, rock and fresh water.

**(b) Plain or Non-reinforced Concrete.** Plain or non-reinforced concrete shall be deemed to be concrete in which no iron or steel is imbedded, and shall be used only in compression.

**(c) Reinforced Concrete.** Reinforced concrete shall be deemed to be concrete in which iron or steel is imbedded in such a manner that the combined concrete and iron or steel do sustain all the stresses imposed thereon.

**(d) Cement.** Cement shall be deemed to be Portland Cement.

**(e) Portland Cement.** Portland cement shall be deemed to be the finely pulverized product resulting from the calcination to incipient fusion of an intimate mixture of properly proportioned argillaceous and calcareous materials to which no addition greater than three (3%) per cent has been made subsequent to calcination.

**(f) Sand.** Sand shall be deemed to be bank or river sand, or finely divided rock of any hard variety, passing a quarter (¼) inch screen, which shall not contain more than five (5%) per cent by volume of loam, silt, mica and organic matter and not more than thirty (30%) per cent shall pass a thirty (30) mesh screen. The gradation from coarse to fine shall be reasonably uniform.

**(g) Unscreened Gravel.** Unscreened bank or river gravel shall be well

graded and contain not more than fifty (50%) per cent of sand, which sand shall meet the requirements of this ordinance.

(h) **Screened Gravel.** Screened gravel shall be hard and clean, and a well graded mixture running from a quarter (¼) inch diameter to sizes hereinafter specified for crushed rock. The gravel shall be free from any coating of clay, oil or other material.

(i) **Crushed Rock.** Granite boulders or any hard rock, except rock carrying a large amount of mica may be crushed for use in concrete.

For reinforced concrete floor slabs, thin partitions, beams, girders, and for columns, the rock shall be a well graded mixture running from one-quarter (¼) inch diameter to rock passing through a seven-eighths (⅞) inch ring.

For reinforced concrete walls, footings and piers, the rock shall be a well graded mixture running from one-quarter (¼) inch diameter to rock passing through a one and one-half (1½) inch ring.

For heavy walls, piers and mass concrete work the rock shall be a well graded mixture running from one-quarter (¼) inch diameter to rock passing through a two and one-half (2½) inch ring.

(j) **Reinforcing Steel.** For the purpose of this ordinance "Billet steel concrete reinforcement bars" shall be deemed to be bars made by the Bessemer or open-hearth process and all such bars shall be rolled from new billets.

"Rail steel concrete reinforcement bars" shall be deemed to be bars rolled from standard section Tee rails.

"Rerolled steel concrete reinforcement bars" shall be deemed to be bars made by a semi-open-hearth process from selected steel scrap rolled



into bars or billets, which having been cut to the proper lengths and reheated to the proper temperature, are rolled into the finished bar.

### TESTS OF CEMENT.

Sec. 176. All cement used for reinforced concrete construction shall be tested as herein provided.

All cement for plain or non-reinforced concrete construction where the required total for one building exceeds one hundred barrels, shall be tested as herein provided.

One complete test shall be made of each two hundred barrels of cement or fractional part thereof. The test shall be made on a properly mixed sample, composed of portions which have been drawn from every tenth barrel.

All cement shall be stored in such manner as to permit of easy access for the proper inspection and identification of each shipment.

All cement shall be delivered in suitable packages with the brand and name of the manufacturer plainly marked thereon.

Cement may be sampled at the mill or on the work.

No brand of cement shall be used for reinforced concrete work until such cement shall have been satisfactorily in use in non-reinforced concrete work in the city of Los Angeles for the period of one (1) year.

All tests of cement, except as otherwise herein provided, shall be made in accordance with the methods adopted August 16th, 1909, by the American Society for Testing Materials and all subsequent amendments thereto or thereof, and the cement shall conform to all of the following requirements:

(a) **Specific Gravity.** The specific gravity shall not be not less than three and ten hundreths (3.10). Should the test fall below this requirement, a second test may be made on a sample ignited at a low red heat. The loss in

weight of this ignited cement shall not exceed four (4%) per cent.

**(b) Fineness.** A residue of not more than eight (8%) per cent by weight shall be left on the No. 100 (one-hundred) sieve, and not more than twenty-five (25%) per cent on the No. 200 (two-hundred) sieve.

**(c) Time of Setting.** It shall not develop initial set in less than one (1) hour, and hard set in less than two (2) hours nor more than ten (10) hours.

**(d) Tensile Strength.** The minimum requirements for tensile strength for briquettes one (1) square inch in cross section shall be as follows, and the cement shall show no retrogression in strength within the periods specified.

| Age. | Strength. |
|---|---|
| Neat cement, 24 hours in moist air | 200 lbs. |
| Neat cement, 1 day in moist air, 6 days in water | 500 lbs. |
| 1 part cement, 3 parts Standard Ottawa sand, 1 day in moist air, 6 days in water | 200 lbs. |

**(e) Constancy of Volume.** Pats of neat cement about three (3) inches in diameter, one-half (½) inch thick at center, tapering to a thin edge shall be kept in moist air for a period of twenty-four (24) hours then subjected to the following tests:

1. A pat shall be kept in air at normal temperature and observed at intervals for at least six (6) days.

2. A second pat shall be kept in water maintained as near seventy (70) degrees F. as practicable and observed at intervals for at least six (6) days

3. A third pat shall be exposed in an atmosphere of steam above boiling water, in a loosely closed vessel, for five (5) hours.

To pass the requirements satisfactorily, these pats shall remain firm and hard and show no signs of checking, cracking, distortion or disintegration.

(f) Sulphuric Acid and Magnesia. The cement shall not contain more than one and seventy-five hundredths (1.75%) per cent of anhydrous sulphuric acid ($SO_3$), nor more than four (4%) per cent of magnesia (MgO).

(g) Test Reports. Every test of cement required by this ordinance shall be made by a recognized, qualified expert who shall file in the office of the Chief Inspector of Buildings a certified copy of all tests made by him. Such test reports shall be made on blanks furnished for that purpose by the Board of Public Works and shall, in addition to such other data as might be deemed necessary by the Board of Public Works, allege, "that the test was made personally or under the supervision or direction of a recognized, qualified expert and that the said test was made in accordance with the provisions of this ordinance and the methods adopted by the American Society for Testing Materials."

Cement tests made by manufacturer or by any one in his employ will not be accepted.

**REINFORCING STEEL TESTS.**

Sec. 177. All steel used for concrete reinforcement shall be either billet-steel concrete reinforcement bars, rail steel concrete reinforcement bars, or rerolled steel concrete reinforcement bars, and conform to the physical properties by this ordinance hereinafter provided.

(a) Billet-Steel. These specifications cover three grades of billet-steel concrete reinforcement bars, namely, plain, deformed and cold-twisted. The plain and deformed bars are of two (2) grades, namely: structural steel and hard grade. Cold twisted bars shall be twisted cold with one completed twist in a length not over twelve (12) times the thickness of the bar.

The bars shall conform to the following requirements as to tensile properties.

TENSILE PROPERTIES.

| PROPERTIES CONSIDERED. | PLAIN BARS. | | DEFORMED BARS. | | |
|---|---|---|---|---|---|
| | Structural Steel Grade | Hard Grade | Structural Steel Grade. | Hard Grade | Cold Twisted Bars. |
| Tensile strength, lb. per sq. in..... | 55,000—70,000 | 80,000 min. | 55,000—70,000 | 80,000 min. | Recorded only. |
| Yield point, minimum lbs. per sq. in. ..... | 33,000 | 50,000 | 33,000 | 50,000 | 55,000 |
| Elongation in 8 in., minimum per cent | 1,400,000 / Tens. str. | 1,200,000 / Tens. str. | 1,250,000 / Tens. str. | 1,000,000 / Tens. str. | 5 |

The yield point shall be determined by the drop of the beam of the testing machine.

For plain and deformed bars over three-quarters (¾) inch in thickness or diameter, a deduction of one (1) from the percentages of elongation specified in "Tensile Properties" shall be made for each increase of one-eighth (⅛) inch in thickness or

be made for each decrease of one-sixteenth (1-16) inch in thickness or diameter below seven-sixteenths (7-16) inch.

The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

BEND TEST REQUIREMENTS.

| THICKNESS OR DIAMETER OF BAR. | PLAIN BARS. | | DEFORMED BARS. | | Cold-twisted Bars. |
|---|---|---|---|---|---|
| | Structural Steel Grade | Hard Grade | Structural Steel Grade | Hard Grade | |
| Under ¾ inch..... | 180 deg. d=t | 180 deg. d=3t | 180 deg. d=2t | 180 deg. d=4t | 180 deg. d=3t |
| ¾ inch or over... | 180 deg. d=t | 90 deg. d=3t | 90 deg. d=2t | 90 deg. d=4t | 180 deg. d=3t |

Explanatory Note: d = the diameter of pin about which the specimen is bent; t = the thickness or diameter of the specimen.

diameter above three-quarters (¾) inch.

For plain and deformed bars under seven-sixteenths (7-16) inch in thickness or diameter, a deduction of one (1) from the percentages of elongation specified in "Tensile Properties" shall

Tension and bend test specimens for plain and deformed bars shall be taken from the finished bars, and shall be of the full thickness or diameter of material as rolled; except that the specimens for deformed bars may be machined for a length of at least nine (9) inches, if necessary, to obtain uniform cross-section.

Tension and bend test specimens for cold-twisted bars shall be taken from the finished bars.

The finished bars shall be free from injurious defects and shall have a workmanlike finish.

(b) **Rail-Steel.** These specifications cover three classes of rail-steel concrete reinforcement bars, namely, Plain, Deformed and Hot-twisted.

The bars shall be Rolled from Standard Section Ted rails. The Hot-twisted bars shall have one complete twist in a length not over twelve (12) times the thickness of the bar.

The bars shall conform to the following minimum requirements as to tensile properties:

TENSILE PROPERTIES.

| PROPERTIES CONSIDERED. | PLAIN BARS. | DEFORMED AND HOT-TWISTED BARS. |
|---|---|---|
| Tensile strength, lb. per sq. in..... | 80,000 | 80,000 |
| Yield point, lb. per sq. in..... | 50,000 | 50,000 |
| Elongation in 8 in., per cent..... | 1,200,000 | 1,000,000 |
| | Tens. str. | Tens. str. |

The yield point shall be determined by the drop of the beam of the testing machine.

For bars over three-quarters (¾) inch, in thickness or diameter, a deduction of one (1) from the percentages of elongation specified in "Tensile Properties" shall be made for each increase of one-eighth (⅛) inch in thickness or diameter above three-quarters (¾) inch.

For bars under seven-sixteenths (7-16) inch in thickness or diameter, a deduction of one (1) from the percentages of elongation specified in "Tensile Properties" shall be made for each decrease of one-sixteenth (1-16)

inch in thickness or diameter below seven-sixteenths (7-16) inch.

The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

BEND TEST REQUIREMENTS.

| THICKNESS OR DIAMETER OF BAR. | PLAIN BARS. | DEFORMED AND HOT-TWISTED BARS. |
|---|---|---|
| Under ¾ inch | 180 deg. d=3t | 180 deg. d=4t |
| ¾ in. or over | 90 deg. d=3t | 90 deg. d=4t |

Explanatory Note: d = the diameter of pin about which the specimen is bent; t = the thickness or diameter of the specimen.

Tension and bend test specimens for plain and deformed bars shall be taken from the finished bars, and shall be of the full thickness or diameter of bars as rolled; except that the specimens for deformed bars may be machined for a length of at least nine (9) inches, if necessary to obtain uniform cross-section.

Tension and bend test specimens for hot-twisted bars shall be taken from the finished bars, without further treatment.

The finished bars shall be free from injurious defects and shall have a workmanlike finish.

(c) Rerolled Steel. These specifications cover three (3) classes of rerolled steel concrete reinforcement bars, namely: Plain, Deformed and Cold-twisted. Cold twisted bars shall be twisted cold with one (1) complete twist in a length not over twelve (12) times the thickness of the bar.

The bars shall conform to the following minimum requirements as to tensile properties.

—15—

TENSILE PROPERTIES.

| PROPERTIES CONSIDERED. | PLAIN BARS AND DEFORMED. | | COLD-TWISTED BARS. | |
|---|---|---|---|---|
| | ⅜" to ¾" | Over ¾" | ⅜" to ¾" | Over ¾" |
| Tensile strength lb. per sq. in. | 52,000 | 45,000 | 60,000 | 52,000 |
| Yield point lbs. per sq. in. | 30,000 | 30,000 | 35,000 | 35,000 |
| Elongation in 8 in. per cent. | 1,000,000 Tens. Str. | 1,000,000 Tens. Str. | 5% | 5% |

be made for each increase of one-eighth (⅛) inch in thickness or diameter above three-quarters (¾) inch.

The test specimen shall bend cold around a pin without cracking on the outside of the bent portion, as follows:

BEND TEST REQUIREMENTS.

| THICKNESS OR DIAMETER OF BAR. | PLAIN AND DEFORMED BARS. | COLD TWISTED. |
|---|---|---|
| Under ¾ in | 180 deg. d=t | 180 deg. d=2t |
| ¾ in. and over | 180 deg. d=t | 180 deg. d=3t |

Explanatory Note: d = the diameter of pin about which the specimen is bent; t = the thickness or diameter of the specimen.

The yield point shall be determined by the drop of the beam of the testing machine.

For plain bars over three-quarters (¾) inch in thickness or diameter, a deduction of one (1) from the percentages of elongation specified, shall

Tension and bend test specimens for both plain and cold-twisted bars shall be taken from the finished bars, and shall be the full thickness or diameter of material as rolled; except that specimens for deformed bars may be machined for a length of at least nine (9) inches if necessary, to obtain uniform cross-sections.

Tension and bend test specimens for cold-twisted bars shall be taken from the finished bars, without further treatments.

The finished bars shall be free from injurious defects and shall have a workmanlike finish.

(d) **Test Reports.** All reinforcing iron or steel used in concrete construction, where the required total for one (1) building exceeds five (5) tons, shall be tested as herein provided.

A tensile test and a bending test of one (1) bar, selected at random from every ten (10) tons or fractional part thereof, of each size and kind of reinforcing metal.

Such tests shall be made by a recognized, qualified expert who shall file in the office of the Chief Inspector of Buildings, a certified copy of all tests made by him. Such test reports shall be made on blanks furnished for that purpose by the Board of Public Works and shall in addition to such other data as might be deemed necessary by the said Board of Public Works, allege, "that the test was made personally or under the supervision or direction of a recognized qualified expert and that the said test was made in accordance with the provisions of this ordinance and the methods adopted by the American Society for Testing Mater'als."



## CONCRETE PROPORTIONS AND MIXING.

**Sec. 178. (a) Proportions.** The proportions for concrete used in concrete construction, shall be of three (3) grades of mixtures, which are herein defined and consist of the following proportions of cement and aggregate:

**Grade 1 Concrete.** Grade 1 concrete shall be a mixture of one (1) part cement; two and one-half (2½) parts sand, and three and one-half (3½) parts of crushed rock or screened gravel.

**Grade 2 Concrete.** Grade 2 concrete shall be a mixture of one (1) part cement, three (3) parts sand and four and one-half (4½) parts of crushed rock or screened gravel.

**Grade 3 Concrete.** Grade 3 concrete shall be a mixture of one (1) part cement and seven (7) parts river or bank gravel

**(b) Unit Measure and Weights.** The unit measure for proportions shall be the cubic foot. A sack containing ninety-four (94) pounds net of cement, shall be deemed to be one (1) cubic foot. Four (4) such sacks of cement shall be deemed to be a barrel of cement.

The fine and coarse aggregates shall be measured separately, as loosely thrown into the measuring receptacle and shall be used in such relative proportions as will insure maximum density.

Plain concrete shall be deemed to weigh one-hundred-forty-four (144) pounds per cubic foot. Reinforced concrete shall be deemed to weigh one-hundred-fifty (150) pounds per cubic foot.

**(c) Mixing.** Whenever the amount of concrete in any one building equals or exceeds one hundred (100) cubic yards, the concrete shall be mixed in

a "Batch mixer." If the amount of concrete be under one-hundred (100) cubic yards, it may be mixed in a "Continuous mixer" or it may be mixed by hand, in which latter case it shall be turned over at least twice dry and at least twice during the addition of water.

If for any reason the concrete mixture separates, it shall be re-mixed before being deposited. No concrete shall be used after it has acquired its initial set.

### UNIT STRESSES.

**Sec. 179 (a)** Concrete construction shall be so designed that the following unit working stresses shall not be exceeded.

**(b) Compression:**

Grade 1 Concrete: Extreme fibre stress under flexure, 650 lbs. per sq. in.

Extreme fibre stress in compression at support of continuous beams, 750 lbs. per sq. in.

Axial compression (on effective area) in columns with vertical reinforcement and horizontal ties, 550 lbs. per sq. in.

Axial compression (on effective area) in hooped columns with vertical reinforcement, 800 lbs. per sq. in.

Grade 2 Concrete:

Grade 2 concrete when used in retaining walls and foundations, shall not exceed eighty (80%) per cent of the stresses provided for in grade 1 concrete. In direct compression three-hundred-fifty (350) lbs. per square inch.

Grade 3 Concrete:

Grade 3 concrete, in direct compression, two-hundred-fifty (250) lbs. per square inch.

**(c) Shear.** The maximum shearing stress in a section shall be used as a means of measuring the resistance to

diagonal tension stress and the following values for the maximum vertical shearing stress shall be used.

(1) For beams with horizontal bars only and without web reinforcement the shearing stress shall not exceed forty (40) lbs. per sq. in.

(2) For beams thoroughly reinforced with web reinforcement the value of the shearing stress shall not exceed one-hundred-twenty (120) lbs. per sq. in.

(3) Where punching shear occurs, i. e., shearing stress uncombined with compression normal to the shearing surface and with all tension normal to the shearing plane provided for by reinforcement; the shearing stress shall not exceed one-hundred-twenty (120) lbs. per sq. in.

When reinforcement is used to increase the unit shear, the proportion of the unit shear taken by the concrete shall not exceed forty (40) lbs. per square inch and the reinforcement shall be sufficient to take the remainder. Stirrups shall not be placed further apart than two-thirds (2-3) of the effective depth of the beam if they are considered as adding to the shearing resistance. If unattached stirrups are used they shall pass under the main reinforcing bars. There shall be sufficient anchorage in the compression portion of the beam to develop the stirrups without exceeding the bond stresses by this ordinance provided. If stirrups are attached to the reinforcing bars the connection must be sufficient to develop the elastic limit of the steel without causing slipping along the main bars. For beams of Tee section the web of the beam only shall be assumed to be effective for resisting shear.

**(d) Adhesion.**

Bond stress for plain hard grade bars, sixty (60) lbs. per sq. in.



Bond stress for plain structural steel grade bars, eighty (80) lbs. per sq. in.

Bond stress for twisted or deformed bars, one-hundred-twenty (120) lbs. per sq. in.

**(e) Steel in Tension.**

**(1) Billet-Steel Concrete Reinforcement Bars.** Structural steel grade, plain or deformed, forty-five (45%) per cent elastic limit but not to exceed sixteen-thousand (16,000) lbs. per sq. in.

Cold twisted, forty-five (45%) per cent elastic limit but not to exceed eighteen thousand (18,000) lbs. per sq. in.

Hard grade steel plain bars, forty-five (45%) per cent elastic limit but not to exceed sixteen thousand (16,000) lbs. per sq. in.

Hard grade steel deformer bars, forty-five (45%) per cent elastic limit, but not to exceed seventeen thousand (17,000) lbs. per sq. in.

**(2) Rail-Steel Concrete Reinforcement bars.** Plain, hot twisted or deformed bars, forty (40%) per cent elastic limit but not to exceed fifteen thousand (15,000) lbs. per sq. in.

**(3) Rerolled Steel Concrete Reinforcement Bars.** Plain, hot twisted or deformed, forty (40%) per cent elastic limit but not to exceed fourteen thousand (14,000) lbs. per sq. in.

Cold twisted, forty (40%) per cent elastic limit, but not to exceed sixteen thousand (16,000) lbs. per sq. in.

**(4) Iron Concrete Reinforcement Bars.** Wrought-iron may be used in lieu of steel for concrete reinforcement, providing its unit stress does not exceed forty-five (45%) per cent of its elastic limit or fourteen thousand (14,000) lbs. per sq. in.

**(f) Steel in Compression.** The compressive stress in the steel shall not

exceed fifteen (15) times the compressive stress of the encasing concrete.

**(g) Steel in Shear.** The shearing stress of the reinforcing steel shall not be cons'dered in the design of Reinforced Concrete Construction.

**DESIGN.**

**Sec. 180. (a)** Reinforced concrete construction shall be so designed that the resultant stresses (either single or combined) in the concrete and in the steel shall not exceed the unit stresses in this ordinance provided.

**(b)** All reinforcing steel shall be completely encased by the concrete. The steel 'n columns shall be placed so as to be not less than one and one-half (1½) inches from the exterior surface. The steel in slabs, beams and girders shall be placed so that the depth of the concrete below the center of the lower layer of steel be not less than one-tenth (1-10) of the depth of such slab, beam or girder, but in no case shall the depth of the concrete below the reinforcing steel be less than the diameter of the reinforcing steel and not less than one-half (½) inch but need not be more than four (4) inches. The lateral spacing of parallel bars shall be not less than two and one-half (2½) diameters from center to center nor shall the distance from the side of the beam or girder to the center of the nearest bar be less than one and one-half (1½) diameters. The clear spacing between layers of bars shall not be less than the diameter of the bars, or the bars may be staggered and if so placed, shall be not less than two and one-half (2½) times the diameter of the bars center to center. Reinforcing steel in footings shall be encased by not less than three (3) inches of concrete.

**(c) Assumptions for Design.** The following assumptions shall form the basis of design:



(1) That there is no initial stress in either the steel or the concrete.

(2) That the bond between the concrete and steel is assumed to be sufficient to cause the two (2) materials to act together as a unit.

(3) That the tensile stress in concrete is not to be considered.

(4) That the moduli of elasticity of concrete and steel remain constant within the limit of their respective unit working stresses.

(5) That the ratio of the moduli of elasticity of concrete and steel shall be taken as one (1) to fifteen (15).

(6) That the steel in compression and the concrete immediately surrounding it are stressed in proportion to their moduli of elasticity.

**(d) Members Subject to Bending.**

(1) The straight line formula shall be used in the design of reinforced concrete construction.

(2) The stress in any fibre is directly proportionate to the distance of that fibre from the neutral axis.

(3) The moment of resistance of any structural member shall be determined by using the unit stresses elsewhere in this ordinance provided.

(4) In case the moment of resistance of a structural member, as determined by the unit stresses herein provided, (including all the allowable area of concrete in compression), is not equivalent to the bending moment on that member, additional steel may be introduced—either in tension or compression or both—to meet the deficiency, provided however, that in no case shall the area of the steel in compression exceed the area of the steel in tension, and that in all cases the steel in compression shall be securely tied to the steel in tension as provided for in vertically reinforced concrete columns.

(5) All structural members subject to bending shall be reinforced for both positive and negative bending moments.

(6) All reinforcement must be of sufficient length to develop the calculated stress in the steel at any point by its bond with the encasing concrete.

(7) All structural members subject to bend'ng shall be reinforced for shear when necessary in accordance with the unit stresses elsewhere in this ordinance provided.

(8) Shear shall be computed on the right cross section of a structural member, and no shear shall be allowed upon any flange thereof.

**(e) Girders and Beams:**

(1) Girders and beams under uniformly distributed loads shall be designed to resist positive and negative bending moments not less than those given below:

W=Total live and dead load on member.

L=The span between centers of supports, or may be taken not less than the clear span plus the depth of the beam or girder. Brackets or corbels shall not be considered as reducing the clear span.

M=Total bending moment.

Simply supported and single spans —

M at center of span=$\frac{WL}{8}$

Continuous for two spans:

M at center of span=$\frac{WL}{10}$

M over center support=$\frac{WL}{8}$

Continuous for three or more spans:

M at center of end spans=$\frac{WL}{10}$

M at center of intermediate spans = $\frac{WL}{12}$

M over all intermediate supports = $\frac{WL}{13}$



All end spans must be reinforced for a negative bending moment at end support of at least $\frac{WL}{20}$

Provided that in continuous girders and beams where the ratio of length of adjacent spans is greater than 3:2, the moment at center of span and over support shall be taken as $\frac{WL}{10}$ and the spans shall be reinforced for negative bending moment if necessary.

(2) Girders and beams under concentrated loads, shall be designed for actual moments.

(3) No girder or beam shall project more than three (3) inches on either side beyond the supporting column, reinforced concrete column cap, or bracket.

(4) **Tee Beams.** Concrete beams and floor slabs when cast as a unit, and where the thickness of the slab is at least one-seventh (1-7) of the total depth of the beam or girder, the beam and a portion of the slab may be designed as a Tee beam. In Tee beams, the width of the flange on each side measured outside the web of the beam, shall not exceed four (4) times the thickness of the slab, nor be greater than one-half (½) of the clear span of the slab, and the total width of the Tee head shall not exceed one-fifth (1-5) of the span of the beam measured from center to center of supports.

(5) When concrete beams and floor slabs are cast as a unit and where the thickness of the slab is less than one-seventh (1-7) of the total depth of the beam, the beam shall be designed as a rectangular section except that that portion of the floor slab usually figured as the flanges of a Tee beam may be used in compress on.

(f) **Tile and Other Fillers.** Concrete members of floor construction in which

hollow tile, concrete blocks or other similar fillers are used, shall be designed in accordance with the provisions of this ordinance, provided, that when the slab portion on top of such fillers acts in flexure in combination with the beam such slab shall not be less than two (2) inches in thickness and in no case shall the clear distance between the beams for such construction exceed sixteen (16) inches.

Floor and roof slabs shall be not less than three (3) inches in total thickness for clear spans in excess of thirty (30) inches, and not less than two and three-quarter (2¾) inches, for clear spans less than thirty (30) inches. Provided, where the live load is less than eighty (80) pounds per square foot such minimum thickness may be two and one-half (2½) inches for clear spans of thirty (30) inches or less.

Exposed metal centering, or exposed metal of any kind, will not be considered as a factor in the strength of any part of any concrete structure. For the purposes of this paragraph, metal centering, metal pans or forms, having a plaster or cement finish applied on, over, or in any manner inclosing same, shall be deemed to be exposed metal.

(g) **Slabs.** All slabs, whose ratio of length to breadth is greater than 3:2 shall be designed with one-way reinforcement.

(1) **One-way Reinforcement.** All slabs with one-way reinforcement shall have distributing bars not less than one-fourth (¼) inches round, eighteen (18) inches on centers.

Slabs under uniformly distributed loads shall be designed to resist positive and negative bending moments not less than those given below:
W=Total live and dead load on slab.

L=The span between centers of supports, or may be taken not less than the clear span plus three (3) times the depth of the slab. Brackets or corbels shall not be considered as reducing the clear span.

M=Total bending moment.

Simply supported and single spans, M at center of span=$\frac{WL}{8}$

Continuous for two (2) spans:

M at center of span=$\frac{WL}{10}$

M over all supports=$\frac{WL}{10}$

Continuous for three (3) or more spans:

M at center of end spans=$\frac{WL}{10}$

M at center of intermediate spans=$\frac{WL}{12}$

M over end supports=$\frac{WL}{10}$

M over all intermediate supports=$\frac{WL}{12}$

**(2) Two-way Reinforcement.** Square and rectangular slabs with two-way reinforcement under uniformly distributed loads shall be designed for the same bending moments in each direction at the center of spans and over supports as specified for one-way reinforcement, whether simply supported, continuous over two (2) spans, or continuous over three (3) or more spans.

For rectangular slabs, the distribution of loads in the two (2) directions shall be inversely as the fourth power of their two (2) dimensions. All two-way reinforcement shall be placed at right angles to girders and beams supporting the slab.

**(h) Columns.**

(1) All concrete columns shall have vertical reinforcing steel.

(2) No concrete column shall be reinforced with less than four (4), three-quarters (¾) round bars or four



(4), five-eighths (⅝) inch square bars.

(3) The effective area or section of a reinforced concrete column is that portion of the area of the column within the wrapping of the longitudinal steel: The area of the concrete outside of the vertical steel shall be considered as fire protection only.

(4) The least dimension of effective area of columns supporting floor and roof loads shall be seven (7) inches.

(5) All columns eccentrically loaded or columns with structural caps, braces or brackets or columns carrying girders or beams with clear spans of thirty (30) feet or more shall be designed for flexure due to such loading in addition to the vertical load.

(6) When the vertical steel in columns is not continuous, the load carried by the steel shall be transferred at any joint in the bars either by lapping of the steel or by dowels or splice bars of equivalent area. The laps, dowels or splice bars shall be of sufficient length to transfer the load of the upper steel. No dowel or splice bar shall be of less area than is herein provided for column reinforcement. In lieu of the above method of transferring the stress in the vertical steel, tight fitting pipe sleeves may be used in which case the ends of the vertical steel shall be milled. In all cases splices shall occur at or near floor levels or points of lateral support.

(7) The vertical steel of columns shall extend into either footings or other supports far enough to develop the stress in the steel through adhesion as in this ordinance allowed for unit bond stress or the load in the steel may be transferred by dowels as else where in this ordinance provided.

(8) Columns whose unsupported length does not exceed fifteen (15) times the least dimension of effective section shall be designed according to unit stresses elsewhere in this ordinance allowed.

(9) Columns whose unsupported length does exceed fifteen (15) times the least dimension of effective section shall be designed for working stresses given by the following reduction formula:

L=Unsupported length.

D=Minimum dimension of effective section.

P=Permissible working stress in columns with L/D less than 15.

P'=P (1.6 - L/25D).

P'=Permissible working stress when L/D is less than 30 and greater than 15.

No reinforced concrete columns shall be used whose unsupported length exceeds thirty (30) times the least dimension of effective section.

(10) Columns with longitudinal reinforcement only shall contain steel of not less than one (1%) per cent nor more than five (5%) per cent of the effective area. The reinforcement shall be thoroughly tied at intervals not greater than the least dimension of the effective section; nor greater than fifteen (15) times the least dimension of the reinforcement used. Column ties shall be not less than three-sixteenths (3-16) of an inch in diameter for vertical steel of less than one (1) inch in least dimension. Column ties for longitudinal reinforcement of one (1) inch and larger shall be not less than one-quarter (¼) of an inch in diameter. Circular bands or spirals of equivalent dimensions and spacings may be used in lieu of column ties.

(11) Hooped or banded columns having longitudinal reinforcement surrounded by circular spirals or bands, or columns with vertical reinforcement, spirally wrapped (the steel being arranged to form a circular core) shall contain reinforcement in the form of spirals or bands not less than one-half (½) of one (1%) per cent of the



effective area. The spirals and bands shall be so spaced and be of such section as will develop the strength of the concrete. This spacing shall not exceed three (3) inches.

(12) Longitudinal reinforcement in hooped or banded columns shall be not less than six (6) bars symmetrically arranged about the axis of the column and of area not less than one (1) per cent nor more than seven and one-half (7½) per cent of effective section. Columns with core of diameter of sixteen (16) inches or more shall have not less than eight (8) bars nor shall any bar be spaced more than eight (8) inches apart along the circumference of bands or spirals.

## WALLS

Sec. 181 (a) Bearing walls of brick, stone or concrete in buildings having reinforced concrete columns, girders, beams or floor slabs, shall be of the same thickness as brick walls as in this ordinance provided.

(b) Exterior walls in a reinforced concrete building of skeleton construction, which are built as filler walls and carried solely upon girders, may be built of brick, stone or plain concrete and shall be not less than twelve (12) inches thick—or, filler walls may be built of reinforced concrete and shall be not less than eight (8) inches thick and they shall have vertical and horizontal steel reinforcement on both sides not less than one (1) inch from the surface, capable of resisting an inward or an outward pressure of thirty (30) pounds per square foot of area. In no case shall the reinforcing steel be less than six-one-hundredths (6-100) square inch per lineal foot in each direction.

### FORMS.

Sec. 182 (a) Forms and centering for concrete work shall be amply strong and well braced so as not to deform, and all shoring or props shall be sufficiently strong and rigid to prevent any undue jarring of concrete while setting.

(b) All forms must be so built as to allow thorough cleaning before concrete is deposited.

(c) Columns and walls shall not be stripped in less than five (5) days; floor slabs in not less than seven (7) days; and beams and girders in not less than fifteen (15) days; but in no case shall the forms or centering be removed until the concrete is capable of sustaining its own load and the added load of construction.

### TESTS OF BUILDINGS.

Sec. 183 (a) Load tests shall be made by the owner or contractor on any portion of any reinforced concrete building or structure in the course of erection or alteration that may be designated by the Board of Public Works. Such load tests must be made within ten (10) days from date of notice so to do, but in no case shall the test be required by the Board of Public Works until the concrete (to be tested) is at least thirty (30) days old.

(b) Such portion of the building or structure being tested shall sustain without sign of failure twice the live load for which it is designed.

Sec. 190. Concrete for Foundations: The mixture for concrete for plain or non-reinforced concrete foundations shall consist of the proportions of cement and aggregate as set forth by Section 178 of this ordinance for grade one, grade two or grade three concrete.

## NOTICE.

In order to facilitate the obtaining of a permit for any reinforced concrete building or structure under the provisions of the new ordinance, which becomes effective July 1st, 1914, the Building Department makes the following suggestions to architects, engineers, cement and reinforcing iron and steel testers, inspectors, and others whom it may concern:

1. All applications must be accompanied by two complete sets of plans and specifications showing the size and position of reinforcement of structural members, together with a schedule of the loads for all columns, girders, beams and joists.

2. Each sheet of drawings and details must be "approved" and "signed" by a licensed architect; i. e., it must bear the wording ::Approved by" and signed personally by the architect. Printed name or rubber stamps will not be considered sufficient, although if the architect signs the tracings and the blue prints show the print of the original signature, the same will be accepted. Specifications for this class of work must also bear the wording "Approved by" and signed by the architect.

3. Each sheet of drawings on which reinforced concrete construction is detailed must specify the kind and grade of reinforcing steel and the grade of concrete to be used. Also the unit stress used in the design.

4. In addition to the regular beam and girder schedule indicate by sketch or otherwise, the location of bars and stirrups, their shape, distance on centers, and distance from side and top or bottom of beams.

5. State the number of barrels of cement and the tonnage of steel to be used for the job.



6. For the Department of Buildings' records, state who is to test the cement and prepare the specifications, so that they carry the specific statement that there will be maintained at all times during the placing of the reinforcing iron or steel and the mixing or depositing of concrete, an inspector duly qualified and competent to see that the provisions of the building ordinance regulating the construction of reinforced concrete buildings or other structures are complied with.

Note. Every inspector who shall fail or refuse or neglect to immediately stop the construction of any reinforced concrete work which fails to comply with the requirements of the ordinance or the approved plans and specifications and immediately report such violation to his employer and to the Board of Public Works of the City of Los Angeles, shall be deemed guilty of a misdemeanor and upon conviction thereof, shall be punishable by a fine of not more than Five Hundred ($500.00) Dollars, or by imprisonment in the city jail for not more than six (6) months, or by both such fine and imprisonment.

7. All reports of cement or reinforcing iron or steel tests, (where required by ordinance), shall be made on blanks furnished for that purpose by the Department of Buildings.

8. All tested cement must be stored and tagged or marked in such a manner as to permit of easy access for proper inspection and identification. (As a suggestion, one tag attached to approximately twenty-five barrels of cement will be considered satisfactory to the Department).

# AMENDMENTS

## to the

# BUILDING ORDINANCE

(Ordinance No. 28,700, New Series)

Adopted Since January 1, 1914, up to June 18, 1914.

**Sec. 20. Class "B" Buildings—Definition and Limit of Height.** Class "B" buildings shall not exceed one hundred feet in height except that spires, domes, or towers on houses of religious worship may be erected to a height not to exceed one hundred and twenty-five (125) feet; nor contain more than eight stories; the exterior walls and piers of which shall be constructed of masonry, or of masonry and steel, and all interior loads (except those transmitted to exterior walls) shall be carried to the foundations by columns and girders of iron or steel or masonry.

All wooden joists, furring, studding or soffits of stairs shall be metal lathed and plastered. No studding shall be less than 2x4 inches in cross section.

**Sec. 30. Class "C" Buildings—Definition and Limit of Height.** Class "C" buildings shall include every building having its outside walls of masonry or reinforced concrete, wherein all floors and internal loads are not wholly carried and transmitted to the founda-

tions by metal columns and girders, or by reinforced concrete or masonry .

No building of Class "C" shall exceed in height eighty-five feet, except that spires, domes or towers on houses of religious worship may be erected to a height not to exceed one hundred and ten (110) feet; and the number of stories thereof shall not exceed six; exclusive of basements.

**Sec. 40. Class "D" Buildings—Definition. Construction and Limit of Height.** Class "D" buildings shall include every building not included in Classes "A", "B" or "C."

Class "D" buildings shall not exceed fifty feet in height, except that spires, domes or towers on houses of religious worship may be erected to a height not to exceed seventy-five (75) feet; nor contain more than four stories; except that buildings of Class "D" construction intended for the housing of trees, plants or vines, may be erected to a height not to exceed sixty (60) feet, provided that such buildings are constructed entirely of masonry, steel and glass.

The studs of the exterior walls of Class "D" buildings over three stories in height shall be sheathed diagonally with boards not less than seven-eighths of an inch thick, exclusive of the weather covering. All exterior or bearing walls below the sidewalk level at the highest point of the sidewalk adjacent to such building shall be constructed of masonry, except that interior partitions may in lieu of masonry, be constructed as hereinbefore provided for the construction of such partition in Class "B" buildings.

**Sec. 52. Terra Cotta Buildings Outside Fire Districts Numbers 1, 2 and 3.** Buildings not exceeding four stories or fifty feet in total height may be erected and constructed of hollow terra cotta blocks in the City of Los Ange-



les, except in that portion of said city included within Fire Districts Numbers 1, 2 and 3. The exterior walls of such buildings may be of reinforced terra cotta blocks of such thickness as is prescribed for masonry walls in Sections 112 and 115 of this ordinance, and all interior bearing walls or partitions, and non-bearing partitions shall be of the same thickness, height and general construction as provided for such walls elsewhere in this ordinance, and such structures shall, in all other details of arrangement and construction, conform to the requirements of this ordinance.

Buildings not exceeding one story in height used or intended for use as a private dwelling, private stable, private garage, and the necessary outbuildings used or intended to be used in connection therewith, may be erected and constructed of hollow terra cotta tile blocks in the City of Los Angeles, except in that portion of said city included within Fire Districts Numbers 1, 2 a d 3. The exter'or walls of any such building constrcted of hollow terra cotta tile blocks shall be not less than 6 inches in thickness; the interior bearing walls thereof shall be not less than 4 inches in thickness, and the interior non-bearing walls thereof shall be not less than 3 inches in thickness. No such wall shall exceed 20 feet in length, if unsupported laterally, and shall not exceed 10 feet in height measured from the floor level to the wall plate, provided that a fire wall not less than 6 inches in thickness may be constructed above the adjoining roof line of any such building not to exceed a height of 2 feet 6 inches. Every such wall shall be laid up in cement mortar containing not less than one part of Portland Cement to three parts of good lime mortar, and shall be carried directly on foundations of br'ck or concrete. Every such foundation wall shall be continuous, and shall be

not less than 8 inches in thickness, with a footing not less than 16 inches in width, and shall extend up to the floor line. Every such footing shall be not less than 12 inches below the surface of the ground. In all other respects every building constructed of hollow terra cotta tile blocks shall conform to the requirements of this ordinance for the construction of brick buildings.

**Sec. 109. Foundation Walls.** No foundation walls in buildings of Classes "A", "B" or "C" shall rest upon any made or filled ground; except that foundation walls in buildings of said classes "A", "B" or "C" may rest upon filled or made ground in that part of the City of Los Angeles formerly included within the boundaries of the City of Wilmington and the City of San Pedro, as the said cities of Wilmington and San Pedro existed prior to the consolidation of the cities of Wilmington, San Pedro and Los Angeles; provided, however, that before a permit is granted to any person, firm or corporation for the erect'on or construction of any building of said Class "A," "B" or "C" upon such filled or made ground tests shall be made and filed with the Board of Public Works by the person, firm or corporation applying for said permit showing the load that said ground is capable of sustaining to the square foot. No permit shall be granted for the construction or erection of any such building upon said filled or made ground unless such test shows that the ground upon which such building is proposed to be erected or constructed will sustain the maximum load allowed for each square foot of ground, as provided in Section 128 of this ordinance. The depths of foundations of buildings of Classes "A", "B" or "C" shall be not less than the depth prescribed in the following schedule:

One story buildings not less than one foot below natural surface ground; in two or three story buildings not less than two feet below the natural surface of the ground; in four story buildings not less than three feet below the natural surface of the ground; in five or six-story buildings not less than four feet below the natural surface of the ground; in seven story buildings not less than five feet below the natural surface of the ground; in eight, nine or ten story buildings, not less than six feet below the natural surface of the ground.

Provided, however, that nothing in this section contained shall prevent the Board of Public Works from requiring a greater depth for foundations, if, in the judgment of said Board; it is necessary for the stability of said foundation and the structure proposed to be erected thereon. The width of the foundations of the several parts of any building shall be proportionate to the load to be carried, as in this ordinance specified.

No course of brick footings shall project more than two inches from the footing or wall above; and if formed of stone or concrete no course shall be less than twelve inches thick, nor shall any course project more than six inches.

The width of the footings of every foundation wall shall be not less than 75 per cent. greater than that of the wall resting thereon.

Foundations shall be proportionate to the actual loads they shall be required to sustain in the complete and occupied building.

**Sec. 130. Floor and Roof Loads.** The floors of every building shall be constructed to carry not less than the following live loads per square foot, with a factor of safety of four:

Warehouse, wholesale houses, factories and store bu'ldings, one hundred fifty (150) pounds;



Assembly halls, dancing halls, corridors of public buildings and hotels, one hundred twenty-five (125) pounds;

Office buildings, seventy-five (75) pounds;

Apartment, tenement, hotel and lodging house buildings, dwellings, flats and hospitals, sixty (60) pounds;

The roof of every bu'lding shall be constructed to carry not less than the following live loads per square foot, with a factor of safety of four; thirty (30) pounds;

(except in dwellings, sheds and out-buildings);

Dwellings, sheds and out-buildings, twenty (20) pounds;

The roof of any buildi .g designed or intended to be used for any purpose other than ordinary roof usage shall be constructed to carry a live load per square foot, with a factor of safety of four, sufficient to sustain all loads designed or intended to be carried thereon.

The Board of Public Works shall designate the classification in which the floors and roof of any buildings shall be included in the event that any such building is nct specifically enumerated in this section.

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**Sec. 161. Specifications for the Erection and Construction of Fire Escapes.** The materials and mode of construction for fire escapes shall be as follows.

The balcony of every fire escape shall be not less than forty-four inches in width, and not less than nine feet in length; provided, however, that where structural features of a building will not permit the erection of a fire escape balcony of the length or width herein required, then and in that event the Board of Public Works may issue a permit in writing allowing such balcony to be constructed of a length less

than nine feet or of a width less than forty-four inches, provided that in no event shall any such balcony contain less than thirty-three square feet in floor area.

The frame of the platform of the balcony shall be made of steel or wrought iron angles of the following dimensions, to wit: For buildings of Classes "A", "B" and "C" not less than three inches by three inches by five sixteenth inch, for buildings of Class "D", not less than two inches by two inches by five-sixteenths inch, except on the building side of the platform, where the dimensions shall be not less than two inches by three inches by five sixteenths inch. The angles at the ends of the platform shall extend at least eight inches into the wall where such wall is constructed of brick or concrete, and shall be securely anchored in the wall by means of a pin or bolt not less than three fourth inch in diameter and not less than eight inches in length, such pin or bolt shall be welded onto or shall be riveted to or shall be passed through each angle, and shall be at right angles to the angle forming the frame of the platform; or such fire escape platform may be fastened to the building in the following manner: the angles at the end of the platform shall extend through the wall and shall be securely fastened on the inside of such wall by nuts and four inch square washers not less than one fourth inch thick, or the angles at the ends of the platform may be spliced with three-fourths inch round iron or steel bars, welded, bolted or riveted to such angle at a point not less than eight inches from the building side of the platform, and each such angle so spliced shall be extended through the wall to the inner side thereof, and securely fastened by nuts and four inch square washers not less than one fourth inch thick. Where a fire escape is to be erected on buildings other than buildings of Class "D"



construction, erected prior to the adoption of this ordinance, the balcony of such fire escape may be fastened to the building in the following manner: The angles at the ends of the platform of the balcony of such fire escape shall enter the wall of such building for a distance of not less than eight inches, and such platform shall be securely fastened to said wall by means of not less than three bolts not less than three fourths inch in diameter extending through the frame of such platform and through such wall and secured on the inside of said wall with nuts and four inch square washers not less than one fourth inch thick. On buildings of Class "D" construction the platform shall be securely fastened to the wall of such building by means of not less than three bolts not less than three fourths inch in diameter extending through the frame of such platform and through the studding of wall and secured on the inside of said wall with nuts and four inch square washers not less than one fourth inch thick.

The floor of the platform shall be made of 5-16 inch by two inch wrought iron or steel slats, running at right angles to the face of the building, and placed not more than one inch apart and well secured at each bearing by rivets or bolts. Such slats shall be supported at the center by a wrought iron or steel angle not less than three inches by three inches by five sixteenths inch, securely bolted or riveted at each end to the outer frame of the platform.

The balcony shall be provided with an outside top rail made of wrought iron or steel angles, each such rail shall be not less than one and one half inches by one fourth inch in dimensions, and such rail shall not be less than thirty-four inches above the floor of the balcony. The ends of said rail shall extend at least eight inches into the wall where such wall is construct-

ed of brick or concrete, and such rail shall be securely anchored in the wall by means of a pin or bolt, not less than one inch in diameter, and not less than six inches in length, such pin or bolt shall be welded onto or shall be riveted to or shall be passed through such angle forming the top rail of the balcony, or the angles forming the ends of such top rail shall extend through the wall of such building and shall be securely fastened on the inside of such wall by nuts and four inch square washers not less than one fourth inch thick; or the angles forming the ends of such top rail may be spliced with five eighth inch round iron or steel bars, welded, bolted or riveted to such angle, and extended through said wall to the inner side thereof and securely fastened by nuts and four inch square washers not less than one fourth inch thick; provided, that such space shall be so made as to permit at least eight inches of such angle to enter said wall.

The top rail of such balcony shall be securely fastened to the building by means of a bolt not less than five eighth inch in diameter passing through each end of such rail and through the studding of the wall of such building. Each end of such top rail shall be bent in such manner as to permit the same to lie flat against the side of the building.

In the space between the rail and the frame of the platform there shall be placed upright standards, or filling-in bars not less than one half inch round or square wrought iron or steel, which shall be firmly riveted to the top rail and to the frame of the platform, and shall be placed not more than eight inches apart.

The opening in the floor of the balcony for the stairway shall be not less than twenty inches by forty inches, provided that no such opening shall be made in any lowest balcony. The stairway shall be not less than eighteen

inches in width and shall be constructed as follows:

The stringers shall be of steel not less than one fourth inch by four inches,, the treads shall have a rise of not more than twelve inches and shall be of one fourth-inch by four inch steel, with flanges at the ends of each tread, and shall be riveted at each end to the stringers with two five sixteenth inch rivets. The stairway shall have an inclination of four inches horizontal to twelve inches vertical height, and there shall be a landing not less than twenty inches wide at the top and at the bottom of the stairway. Where the height of a story is such as to preclude the possibility of obtaining four inch inclination to each twelve inch vertical height and still have the top and bottom of such stairway in proper location within such balconies, the balconies shall be long enough to accommodate the stairway. In all cases where the length of the stairway between balconies exceeds twelve feet, such stairway shall be braced in the center thereof. Such stairway shall be prov'ded with a hand rail at each side of the iron pipe not less than one inch diameter, which shall be continuous from the topmost balcony to the lowest balcony.

Each platform shall be braced and supported at each end by a strut made of two inches by two inches by five sixteenths inch wrought iron or steel angles, or of wrought iron or steel pipe of not less than two inches in diameter, the upper end of which shall be riveted or bolted to the frame of the platform and the lower end securely embedded in the wall; provided, that where the platform is more than nine feet in length there shall be an additional support of the description aforesaid for each additional four feet or fraction thereof. Such support shall be placed as nearly as practicable equidistant. In the event that structural features of



a building will not permit a balcony of a fire escape to be supported by means of struts as above provided, such balcony shall be supported by not less that two chains, each of which shall be not less than six feet in length. Such chains shall be securely fastened by means of a welded eyebolt not less than five eighths inch in diameter at each end of the platform of such balcony, stretched taut and securely fastened at a point directly ab ve the end of such balcony to the wall of such building by means of a welded eyebolt not less than five eighth inch in diameter; each such eyebolt shall pass through the wall and be securely fastened by means of a nut and four inch square washer not less than one fourth inch thick. The links of each such chain shall be of steel or wrought iron and shall be not less than seven sixteenths inch in diameter. Steel or wrought iron bars not less than three fourth inch in diameter may be substitute for such ains, such bars shall be fastened in the same manner as herein provided for the fastening of chains.

There shall be an iron gooseneck ladder extending from the balcony at the top floor, to and above the roof of the building. The portion of the ladder from the balcony to the top of the wall shall be parallel to the general face of the wall. Such ladder shall be not less than fifteen inches wide. The sides of such ladder shall be made of one-half inch by two inch wrought iron or steel. The rungs thereof shall be made of five-eighths inch round wrought iron or steel, placed not more than fourteen inches apart, the base of the ladder shall be securely riveted or bolted to the floor of the balcony. The upper end of the ladder shall be fastened with bolts to the roof of the building. The ladder shall be well braced with wrought iron or steel brackets, built into or bolted to the wall of the building. These brackets

shall be placed not more than four feet apart.

All parts and details of the construction of balconies, ladders, stairways and hand rails shall be firmly supported and stiffened so as to be perfectly rigid, durable and secure.

Each balcony shall be tested by the owner or builder thereof at his own expense whenever required so to do by the Board of Public Works, with a dead load of one hundred pounds per square foot or floor area. If the balcony shows any weakness in construction or anchorage, it shall be strengthened at once by the owner or builder and made in every way satisfactory to the Board of Public Works.

That whenever in this section the size, shape or arrangement of "angles," "standards" or "filling in bars" is specified, other shapes of equal strength and other arrangement of equal sufficiency may be used in the construction of a fire escape balcony: provided, however, that nothing contained in this section shall permit the use of material other than wrought iron or steel in the construction of any fire escape or any part thereof; and provided further, that detailed plans or drawings showing the size and shape of the material proposed to be used and the arrangement thereof shall be first submitted to and approved by the Board of Public Works prior to the construction and erection of such fire escape balcony.

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**FLOOR AREA OF BUILDINGS.**

Sec. 198. In buildings of Classes "A", "B" and "C", the area of any floor between exterior party or division walls shall not exceed the following:

Class "A" buildings, 75,000 square feet;

Class "B" buildings, 10,000 square feet;



Class "C" buildings, 7,500 square feet;

provided, however, that where a separate and distinct system of pipes and automatic sprinklers, approved by the Board of Public Works, supplied with water from a separate and direct connection with a city main, are installed, the size of which connection and pipe shall be regulated by the number of sprinklers installed in accordance with the following table, to wit:

| Size of Pipe. | Maximum number of Sprinklers Allowed. |
|---|---|
| ¾ inch | 1 Sprinkler |
| 1 inch | 2 Sprinklers |
| 1¼ inch | 3 Sprinklers |
| 1½ inch | 5 Sprinklers |
| 2 inch | 10 Sprinklers |
| 2½ inch | 20 Sprinklers |
| 3 inch | 36 Sprinklers |
| 3½ inch | 55 Sprinklers |
| 4 inch | 80 Sprinklers |
| 5 inch | 140 Sprinklers |

In the event that more than one hundred and forty (140) sprinklers are installed and connected with a water supply pipe not less than six inches in diameter in the manner hereinabove provided, or are installed in accordance with the above table, and such sprinkler heads are of a capacity and so placed in or near the ceiling above the floor so that each head shall sprinkle or discharge not less than eighty square feet(8'x10') and are placed eight feet apart in one direction and ten feet apart in the other direction, as nearly as may be, then the area of such floor space between such exterior, division or party walls shall not exceed the following:

Class "A" buildings, 75,000 square feet;

Class "B" buildings, 30,000 square feet;

Class "C" buildings, 22,500 square feet;

and provided further that in buildings

of Class "C" not exceeding one story in height, such floor area shall not exceed 10,000 square feet;

Provided further that in buildings of Class "C" not exceeding one story in height and having the entire floor constructed of concrete not less than four inches in thickness laid on the ground, or of concrete so laid and overlaid with a hard wood floor on sleepers, a portion of such building to be used for skating rink or dance hall and for no other purpose, may have a floor area not to exceed 20,000 square feet between exterior, party or division walls without a sprinkler system; and provided further, that such skating rink or dance hall may contain a balcony with a floor area not to exceed ten per cent. (10%) of the floor area of such skating rink or dance hall, such balcony to have metal lath and plaster underneath and to be provided with stairways in accordance with the provisions of this ordinance.

For the purpose of this section in computing the size and supply pipe to be used, each floor, the basement, subbasement or cellar, of the building, and each separate space between exterior division or party walls, shall be considered as a separate unit or fire area, and the water supply for any such unit or fire area may be taken off one main supply pipe connecting directly with the city water main, the diameter of such main supply pipe to be determined by the number of sprinklers to be used in the largest unit of fire area.

There shall be provided and installed on the supply pipe to each unit or fire area a gate valve of the same diameter and capacity as the supply pipe. The sprinklers installed under the provisions of this section shall be of a kind approved by the Underwriters' Laboratories, Incorporated; of Chicago, or approved by the Associated Factory Mutual Laboratories of Boston.



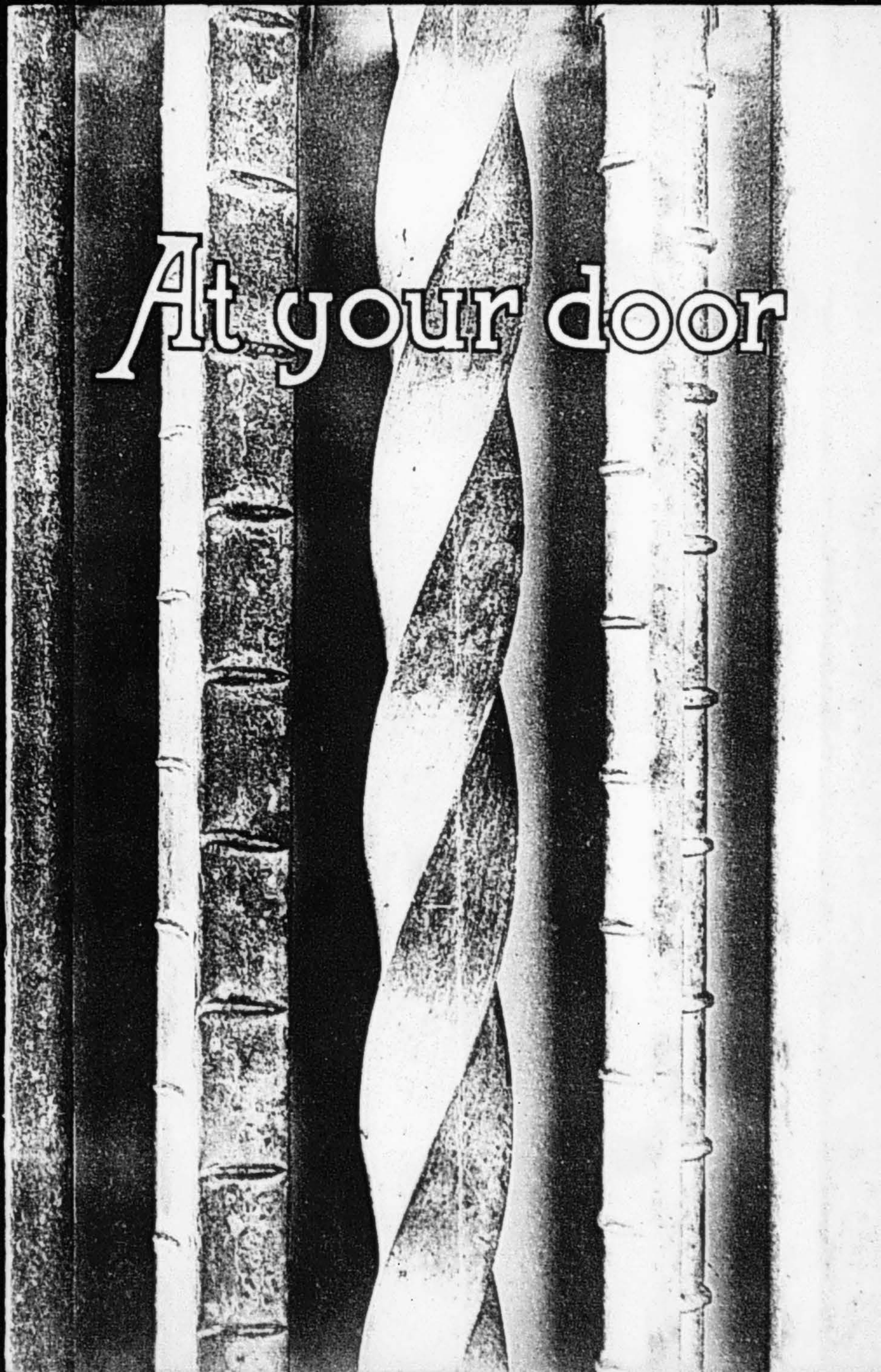
**SPRINKLER PIPES IN BASEMENT AND CELLARS OF HOTELS, OFFICE BUILDINGS, HOSPITALS, SANITORIUMS, SANITARIUMS, ASYLUMS, WAREHOUSES, FACTORIES AND STORE BUILDINGS.**

Sec. 202. In all buildings hereafter erected in Fire Districts Nos. 1, 2, 3 and 4, containing a basement, sub-basement, or cellar, and such buildings are used for hotel, office, hospital, sanitarium, sanitorium, warehouse, factory, or for store purposes, such basements, sub-basements and cellars shall be equipped with automatic sprinklers in accordance with the provisions of Section 198 of this ordinance; such automatic sprinklers to be supplied with water from the street water main connecting with the city water system, the size of the supply pipes to be dependent on the number of sprinkler heads attached to the water pipes in said buildings. A steamer connection supply pipe not less than four (4) inches in diameter shall be provided for each sprinkler system. Such steamer connection supply pipe shall be connected to such sprinkler system and at the inlet shall be equipped with Siamese inlet connection and check valves of the same size and kind as elsewhere in this ordinance is specified for outside standpipes, provided, however, that for any sprinkler system not requiring more than twenty-five (25) sprinkler heads such four (4) inch pipe and Siamese inlet connections and check valves shall not be required. Such Siamese inlet connections and check valves shall be located not more than twelve (12) inches above the sidewalk level. An iron plate or plates not less than four (4) inches in width shall be securely attached to the wall of said building above the center line of each of said Siamese inlet connections and not more than three (3) inches above the Siamese inlet connection, with

raised letters on each such iron plate or plates bearing the inscription, "Basement Sprinklers", or "Cellar Sprinklers", as the case may be, the location and number of all such steamer connections and Siamese inlets shall be designated by the Board of Public Works, provided that the provisions of this section shall not apply to boiler rooms, bank vaults or safety deposit vaults in basements, sub-basements, or cellars, nor to any room or rooms in the basement, sub-basement, or cellar of any building of Class "A" construction, used or designated or intended to be used as a dining room, club room, cafe, gymnasium, lavatory or class room, nor to any building or buildings heretofore constructed or erected, or for which a permit to construct or erect has been granted by the Board of Public Works, before the adoption of this ordinance and said permit has not been cancelled or revoked.

For the purpose of this section the basement, sub-basement, or cellar, or the space between exterior, division, and party walls, shall be considered as separate units or fire areas. The water supply for any separate unit or fire area may be taken off one main supply pipe connected directly to the city water main, the diameter of such main supply pipe to be determined by the number of Sprinklers to be used in the largest unit of fire area. Where the number of sprinklers to be used does not exceed twenty-five (25) the supply pipe may be connected to the domestic water service of the building; provided that the diameter of said domestic supply pipe is not less than the diameter of the supply pipe for twenty-five sprinkler heads as provided in Section 198 of this ordinance.

There shall be provided and installed on the supply pipe to each unit or fire area a gate valve of the same diameter and capacity as the supply pipe.



CATALOG A

# *OPEN HEARTH*

# REINFORCING STEEL

*Manufacturers of*

CORRUGATED SQUARES
CORRUGATED ROUNDS
TWISTED SQUARES
PLAIN SQUARES
PLAIN ROUNDS

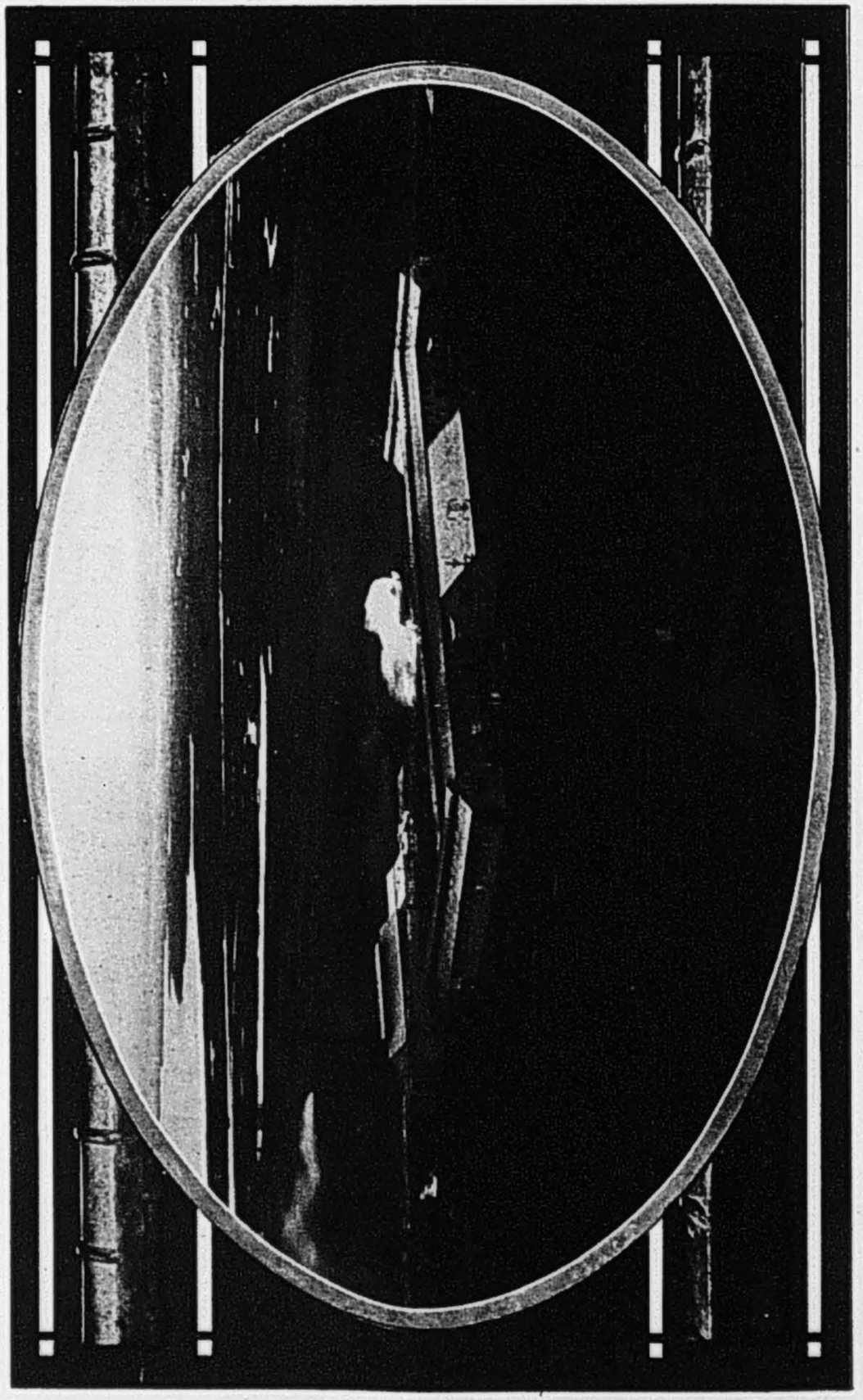
## PACIFIC COAST STEEL COMPANY

*Rialto Building*

SAN FRANCISCO

*Mills*

SOUTH SAN FRANCISCO



PACIFIC COAST STEEL COMPANY, SOUTH SAN FRANCISCO
CAPACITY, 10,000 TONS PER ANNUM

# At Your Door

*IN presenting this pamphlet it is our aim to inform you in a brief way of a California industry equal in quality of product to any in the world.*

In response to the increasing demand and the tremendous consumption of reinforced steel, we have constructed mills in South San Francisco, completely equipped for the manufacture of OPEN HEARTH STEEL in any quantity.

In establishing this plant it was our intention to make a specialty of the manufacture of reinforcing steel, and to make this of such a quality as would command beyond question the confidence of constructors in reinforced concrete. In order that we might be certain of accomplishing this result, we made very thorough and complete investigations of the several methods of manufacturing this grade of steel. The result of these investigations, combined with years of experience in the steel business, was that the most uniform product could be obtained only by the basic open hearth process. We are confident that whoever investigates this subject will arrive at the same conclusion.

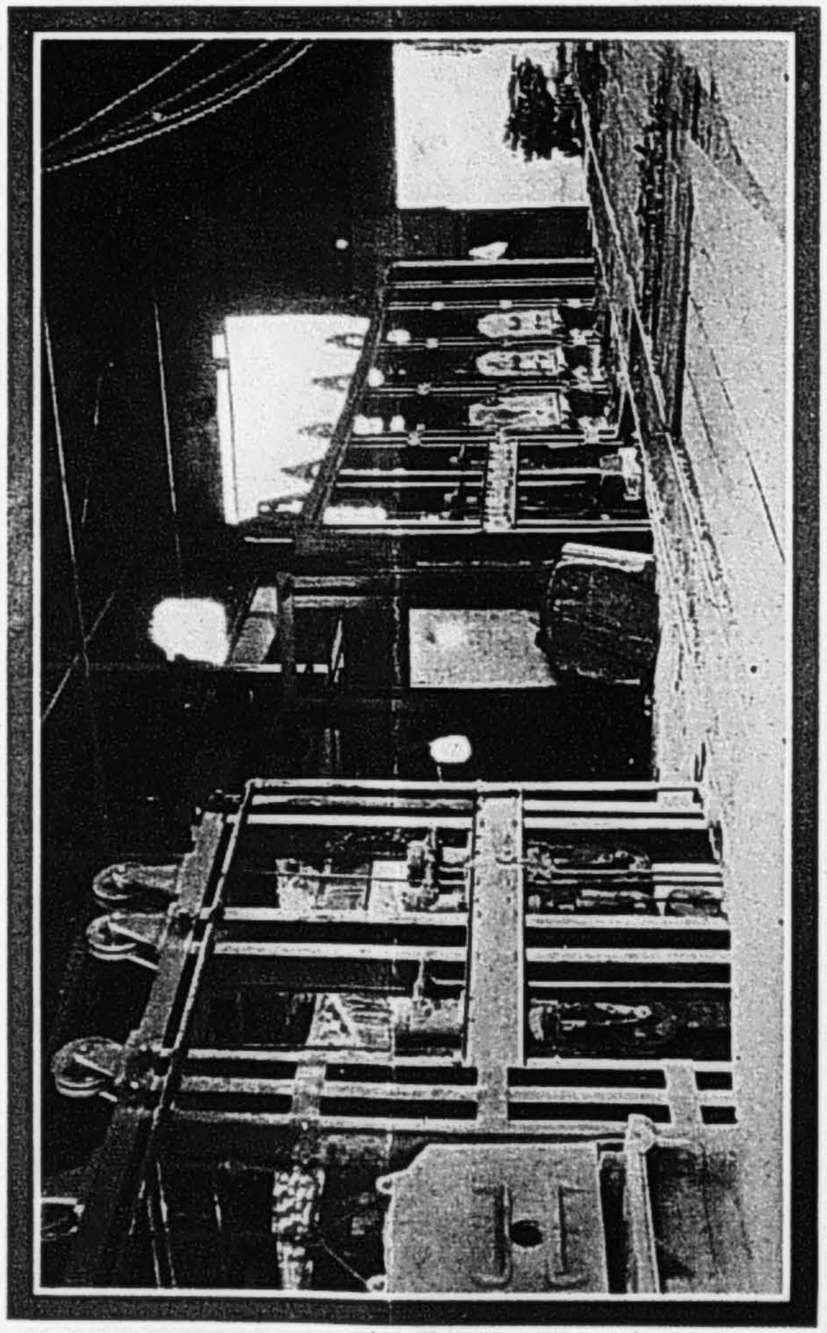
Having decided upon the open hearth method of manufacture, we sought the most modern ideas of constructing reinforced concrete structures, so far as the element of reinforcing was concerned. Upon the conclusion of our efforts in this direction, we sought and successfully perfected an arrangement with the Corrugated Bar Company of St. Louis, Mo., under which we are able to manufacture a type of reinforcing bar known as the "Johnson Corrugated Bar," which is controlled by them under patents. This agreement further gives us the right to fabricate a collapsible unit frame which was invented by them.

That we might completely cover the field of bar reinforcement we have constructed the plant so as to be able to roll plain rounds, plain squares, and cold-twist the latter, should the purchaser so desire. Our ability to furnish all of these types of bars places us in a position to supply the reinforcing elements of the best concrete construction.

Furnaces

**Pacific Coast Steel Company**

# Open Hearth Steel



FURNACE ROOM, PACIFIC COAST STEEL COMPANY

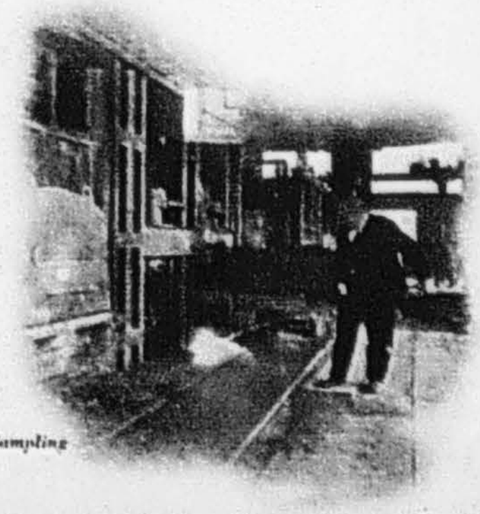
**Pacific Coast Steel Company**

# The Method

*BELIEVING that our readers will be interested in a brief description of the Open Hearth process of manufacturing steel, we will attempt to outline, in a very general manner, this method.*

The furnace is constructed of structural steel sections and masonry. Its interior lining is of Silica Brick, the shape of the furnace being selected so as to utilize the heat to the best advantage. Into this furnace is charged the raw material, which is reduced by heat to a liquid mass. The appearance of the metal at this time is very similar to that of a pot of boiling water, owing to the escaping gases, which keep the metal constantly agitated. From time to time the operator takes a sample and determines by tests its physical characteristics.

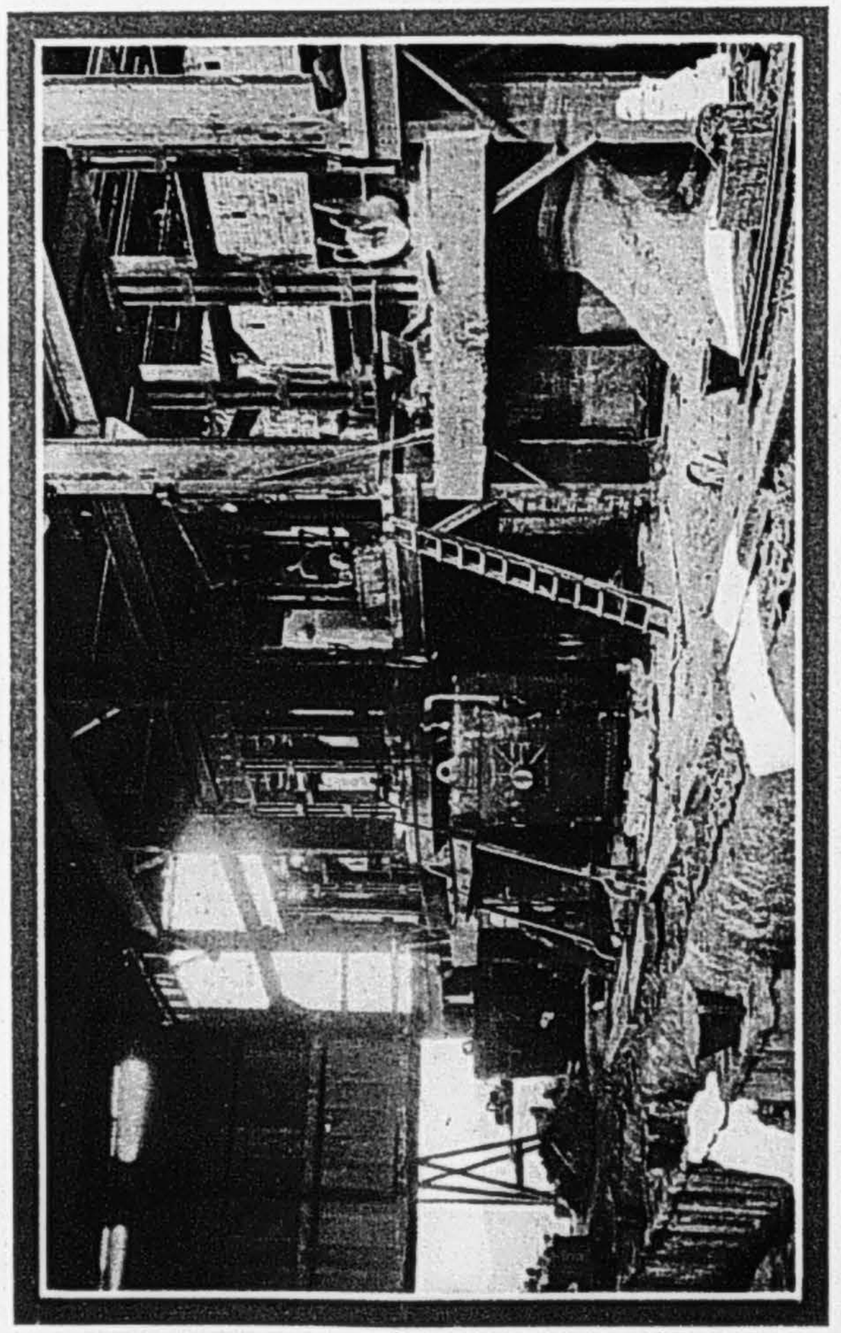
When the constituent elements have been brought to the proper proportions—and this method of manufacture enables this result to be accomplished in a more perfect and reliable manner than can be done by any other process—the furnace is tapped. The metal then flows from the furnace into a large ladle of twenty-five tons capacity, in a stream from 6 to 8 inches in diameter. From the ladle the metal is poured into molds and when sufficiently cooled these molds are removed. The metal in this form is described as "ingots." The ingots are then in turn taken to a reheating furnace and their temperature raised to the desired degree. From the reheating furnace the ingots are transported to the ingot mill, which is immediately adjoining the furnace, and rolled down into billets. These billets in turn are taken to another reheating furnace, and when properly reheated are taken from this furnace and rolled into the desired finished form.



Sampling

**Mills:**
**South San Francisco**

# Reinforcements



CASTING SIDE OF MOULDING ROOM, PACIFIC COAST STEEL COMPANY

**Pacific Coast Steel Company**

# Specifications

There has been a very chaotic condition in the past in specifications for reinforcing steel. This condition has necessarily incurred delays in delivery and consequently imposed additional expense on the consumer. Architects, engineers and manufacturers have sought a solution of this problem and have appointed joint committees for this purpose, with the result that the following specifications have been adopted, as representing the highest grade of reinforcing material that can be manufactured on a commercial scale, insuring prompt deliveries. The universal demand in this market is for structural grade, and steel of this character we can supply on short notice.

## MANUFACTURERS' STANDARD SPECIFICATIONS

**Adopted 1910 — Revised 1912**

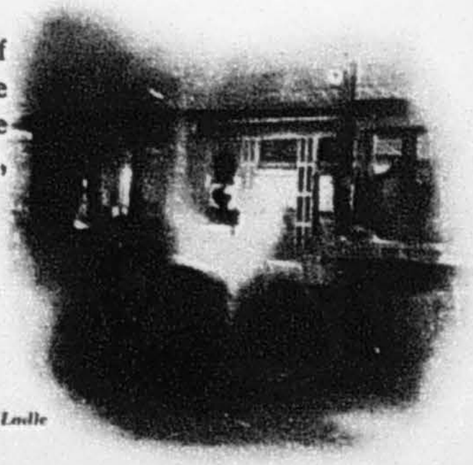
**Standard Specifications for Concrete Reinforcement Bars Rolled from Billets**

1. MANUFACTURE—Steel may be made by either the open hearth or Bessemer process. Bars shall be rolled from standard new billets.

2. CHEMICAL AND PHYSICAL PROPERTIES—The chemical and physical properties shall conform to the limits prescribed in table on following page.

3. CHEMICAL DETERMINATIONS—In order to determine if the material conforms to the chemical limitations prescribed in paragraph 2 herein, analysis shall be made by the manufacturer from a test ingot taken at the time of the pouring of each melt or blow of steel, and a correct copy of such analysis shall be furnished to the engineer or his inspector.

4. YIELD POINT—For the purposes of these specifications, the yield point shall be determined by careful observation of the drop of the beam of the testing machine, or by other equally accurate method.



*Filling Ladle*

**Office:**
**Rialto Building**

# Specifications

| PROPERTIES CONSIDERED | STRUCTURAL STEEL GRADE | | HARD GRADE | | COLD TWISTED BARS |
|---|---|---|---|---|---|
| | Plain Bars | Deformed Bars | Plain Bars | Deformed Bars | |
| Phosphorus, maximum, Bessemer | .10 | .10 | .10 | .10 | .10 |
| Open Hearth | .06 | .06 | .06 | .06 | .06 |
| Ultimate tensile strength, pounds per sq. in. | 55 70,000 | 55 70,000 | 80,000 min. | 80,000 min. | Recorded only |
| Yield point, minimum, pounds per sq. in. | 33,000 | 33,000 | 50,000 | 50,000 | 55,000 |
| Elongation, per cent in 8 in., minimum | 1,400,000 / T. S. | 1,250,000 / T. S. | 1,200,000 / T. S. | 1,000,000 / T. S. | 5 % |
| Cold bend without fracture: | | | | | |
| Bars under ¾ inch in diameter or thickness | 180°d.=1 t. | 180°d.=1t. | 180°d.=3t. | 180°d.=4t. | 180°d.=2t. |
| Bars ¾ inch in diameter or thickness and over | 180°d.=1t. | 180°d.=2t. | 90°d.=3t. | 90°d.=4t. | 180°d.=3t. |

The hard grade will be used only when specified.

5. FORM OF SPECIMENS—(a) Tensile and bending test specimens may be cut from the bars as rolled, but tensile and bending test specimens of deformed bars may be planed or turned for a length of at least 9 inches if deemed necessary by the manufacturer in order to obtain uniform cross-section.

(b) Tensile and bending test specimens of cold-twisted bars shall be cut from the bars after twisting, and shall be tested in full size without further treatment, unless otherwise specified as in (c), in which case the conditions therein stipulated shall govern.

(c) If it is desired that the testing and acceptance for cold-twisted bars be made upon the hot rolled bars before being twisted, the hot rolled bars shall meet the requirements of the structural steel grade for plain bars shown in this specification.

6. NUMBER OF TESTS—At least one tensile and one bending test shall be made from each melt of open hearth steel rolled, and from each blow or lot of ten tons of Bessemer steel rolled. In case bars differing ⅜-inch and more in diameter or thickness and rolled from one melt or blow, a test shall be made from the thickest and thinnest material rolled. Should either of these test specimens develop flaws, or should the tensile test

# Specifications

specimen break outside of the middle third of its gauged length, it may be discarded and another test specimen substituted therefor. In case a tensile test specimen does not meet the specifications, an additional test may be made.

(d) The bending test may be made by pressure or by light blows.

7. MODIFICATIONS IN ELONGATION FOR THIN AND THICK MATERIAL—For bars less than ⅛-inch and more than ¾-inch nominal diameter or thickness, the following modifications shall be made in the requirements for elongation:

(e) For each increase of ⅛-inch in diameter or thickness above ¾-inch, a deduction of 1 shall be made from the specified percentage of elongation.

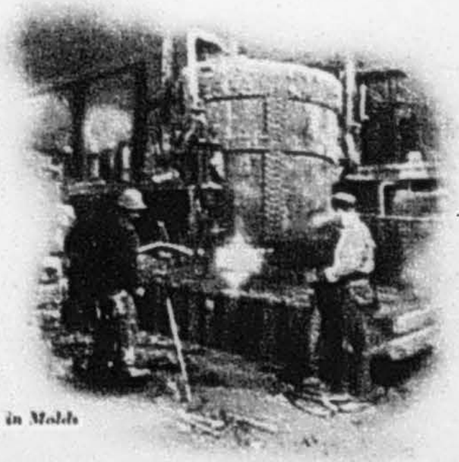
(f) For each decrease of ⅛-inch in diameter or thickness below ⅛-inch, a deduction of 1 shall be made from the specified percentage of elongation.

(g) The above modifications in elongation shall not apply to cold-twisted bars.

8. NUMBER OF TWISTS—Cold-twisted bars shall be twisted cold with one complete twist in a length equal to not more than 12 times the thickness of the bar.

9. FINISH—Material must be free from injurious seams, flaws, or cracks, and have a workmanlike finish.

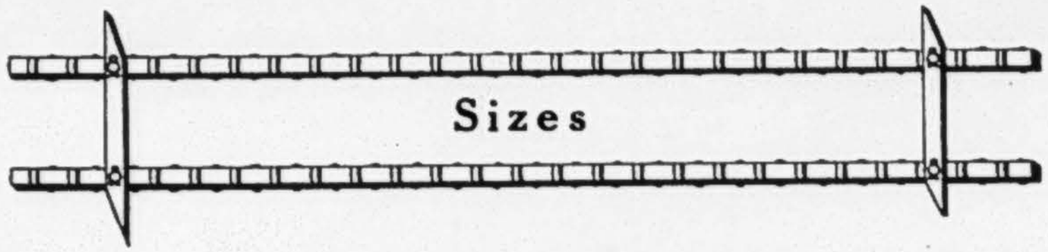
10. VARIATION IN WEIGHT—Bars for reinforcement are subject to rejection if the actual weight of any lot varies more than 5 per cent over or under the theoretical weight of that lot.



*Pouring in Molds*

**Pacific Coast Steel Company**

**Mills:**
**South San Francisco**




## CORRUGATED ROUNDS

### STANDARD SIZES

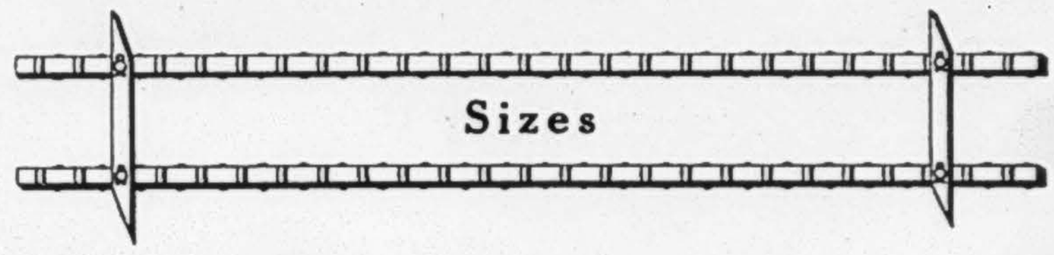
| Size in inches | ¼ | ⅜ | ½ | ⅝ | ¾ | ⅞ | 1 | 1⅛ | 1¼ |
|---|---|---|---|---|---|---|---|---|---|
| Net area in square inches | .11 | .19 | .30 | .44 | .60 | .78 | .99 | 1.22 | |
| Weight per ft. in lbs. | .38 | .66 | 1.05 | 1.52 | 2.06 | 2.69 | 3.41 | 4.21 | |
| Extras in cents per 100 lbs | .25 | .10 | .05 | | | Base | | | |

## CORRUGATED SQUARES

### STANDARD SIZES

| Size in inches | ¼ | ⅜ | ½ | ⅝ | ¾ | ⅞ | 1 | 1⅛ | 1¼ |
|---|---|---|---|---|---|---|---|---|---|
| Net area in square inches | .06 | .14 | .25 | .39 | .56 | .76 | 1.00 | 1.26 | 1.55 |
| Weight per ft. in lbs. | .22 | .49 | .86 | 1.35 | 1.94 | 2.64 | 3.43 | 4.34 | 5.35 |
| Extras in cents per 100 lbs | .50 | .25 | .10 | .05 | | | Base | | |

**Pacific Coast Steel Company**

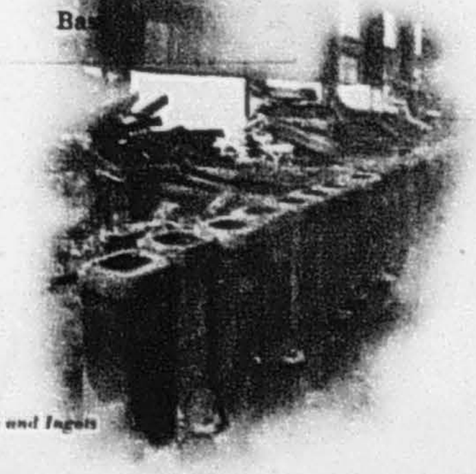



## PLAIN SQUARE OR TWISTED

| Size in inches | ¼ | ⅜ | ½ | ⅝ | ¾ | ⅞ | 1 | 1⅛ | 1¼ | 1⅜ | 1½ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net area in square inches | .06 | .14 | .25 | .39 | .56 | .77 | 1.00 | 1.27 | 1.56 | 1.89 | 2.25 |
| Weight per ft. in lbs | .21 | .48 | .85 | 1.33 | 1.91 | 2.60 | 3.40 | 4.30 | 5.31 | 6.43 | 7.65 |
| Extras in cents per 100 lbs | .50 | .25 | .10 | .05 | | | Base | | | | |

## PLAIN ROUNDS

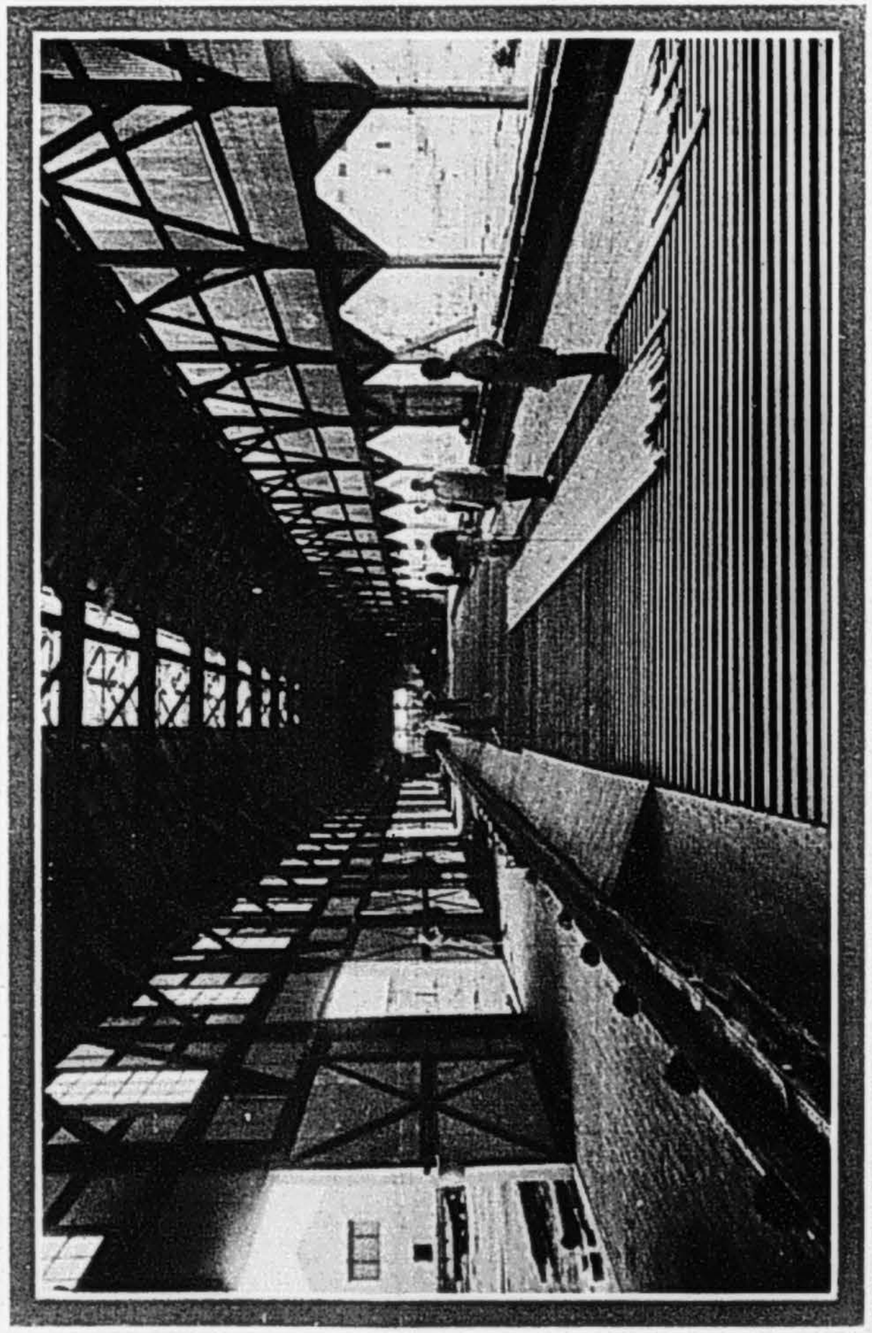
| Size in inches | ¼ | ⅜ | ½ | ⅝ | ¾ | ⅞ | 1 | 1⅛ | 1¼ | 1⅜ | 1½ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Net area in square inches | .05 | .11 | .20 | .30 | .44 | .60 | .79 | .99 | 1.23 | 1.48 | 1.77 |
| Weight per ft. in lbs | .17 | .38 | .67 | 1.04 | 1.50 | 2.00 | 2.67 | 3.[illegible] | [illegible]17 | 5.05 | 6.00 |
| Extras in cents per 100 lbs | .50 | .25 | .10 | .05 | | | | Ba[illegible] | | | |



*Moulds and Ingots*

**Office:**
**Rialto Building**

# Reinforcing Bars



ROLLING ROOM, PACIFIC COAST STEEL COMPANY

**Pacific Coast Steel Company**

# Reinforcing Bars

MATERIAL—The necessity of permanent mechanical bond between reinforcing bars and concrete is no longer open to question. Most architects and engineers prefer a mechanical bond bar that furnishes the bond normal to the axis of the bar, and this condition is perfectly fulfilled with the Corrugated bar. There are many, however, who assign equal merit to the twisted bar, and still some who prefer the plain. We are in a position to furnish all of these types.

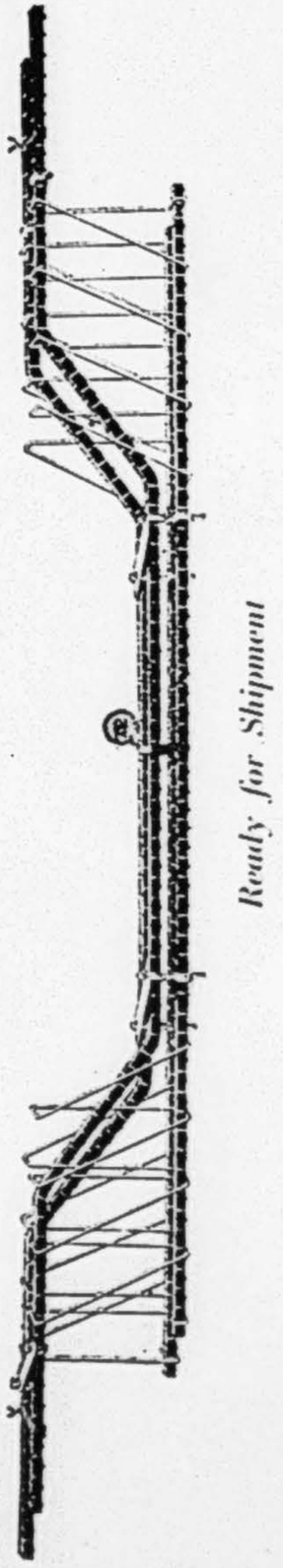
SERVICE—Accuracy and speed are prime qualities an organization must possess if success is to attend their efforts. We have established an organization with these qualifications, and are certain that today we are in the best position to relieve the purchaser of the many complicated problems confronting him in securing prompt service, correct material, and accuracy in the work.

ENGINEERING—Our engineering department, at our general offices on the Fifth Floor of the Rialto Building, at San Francisco, is thoroughly equipped for offering all necessary assistance in special line of reinforced concrete.

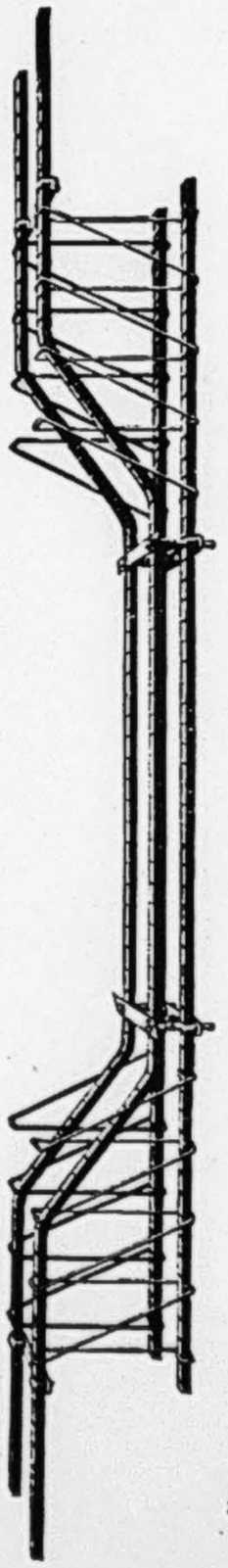
**Mills:**
**South San Francisco**

*Rolling*

# Unit Frames



*Ready for Shipment*



*Ready for Placing*

**Pacific Coast Steel Company**

**Office: Rialto Building**

# Unit Frames

It has been the continuously expressed desire of architects and engineers to have the manufacturers supply them with reinforcing beam units, ready to be placed in position. This wish is undoubtedly founded on experiences with the loose bar system, wherein slight carelessness of the workmen very materially affects the strength of the beam. When unit frames are made up in the usual manner they are too bulky for shipping purposes, and involve considerable extra expense in cartage, freight and handling.

This unit frame is collapsible so that it becomes compact for shipping purposes, and is easily handled. It insures the placing of the bars accurately in the work, and is what we believe can truthfully be designated as fool-proof. It offers the advantage of vertical and diagonal stirrups, thus greatly increasing the shearing strength of the beam. The spacing of the stirrups, and their size, are made in accordance with the designer's wishes.

We manufacture unit frames, by special arrangement with the Corrugated Bar Company, at our plant in South San Francisco.

Requests for estimates and further information cheerfully furnished on application.

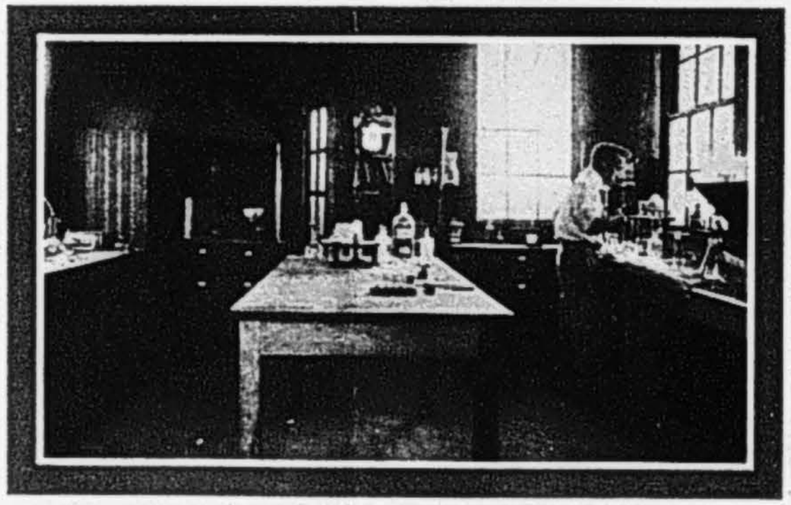
PACIFIC COAST STEEL COMPANY

Office 5th Floor, Rialto Building

San Francisco, Cal.

*Ready for Shipment*

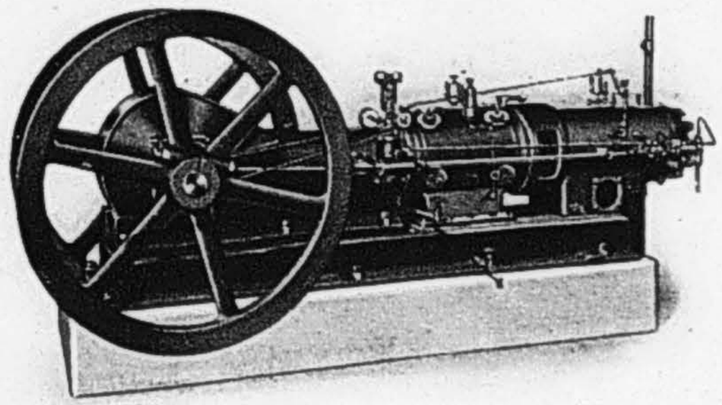
# Laboratory



*CHEMICAL LABORATORY, PACIFIC COAST STEEL COMPANY*

# Fuel Oil Driven Compressors

Chicago Pneumatic Tool Co.
925 Title Insurance Building
Los Angeles, Cal.



BULLETIN 34-K

**Chicago Pneumatic Tool Company**

**Chicago** **New York**

# "Chicago Pneumatic" Fuel Oil Engine Driven Compressors Class N-SO

While the success that our Gasoline Driven Air Compressors have enjoyed for the past twelve years has been extremely gratifying, we have appreciated the fact that power ends designed to utilize low grade fuel oils would greatly increase the economy and sphere of usefulness of such machines.

Recognizing this demand we have employed our exceptional facilities and wide experience in the painstaking development of a new line of fuel oil driven compressors that are now offered with the positive assurance that they are unique. No compressors of a comparable type have ever been marketed.

All of the essential features of our gasoline driven units are embraced in the present construction; but, in addition to the utilization of our distinctive fuel oil power ends, extensive and important modifications have been made wherever our experience and knowledge of service conditions have demonstrated that such were desirable. Delicate mechanisms and adjustments cannot be successfully employed on compressors for field work and the simplicity of our Class N-SO machines should be investigated to be fully appreciated.

Unquestionable reliability, sustained low operating costs, indestructible flat disc air valves, totally enclosed construction and efficient automatic lubrication and regulation of these compressors are the features which combine to give them an individuality that justifies their selection by discriminating purchasers.

Class N-SO compressors are made in six standard strokes, 8, 10, 12, 14, 18 and 21 inches, with air and power cylinders, capacities, speeds and general dimensions as given in the following tables. The 8, 10 and 12 inch strokes only may be arranged for portable and skid mounted (semi-portable) use.

*34-K, 3rd Edition, Sept. 1, 1916.*





Class N-SO compressors being developed primarily to produce operating economies heretofore considered unobtainable, it follows logically that the range of fuel to which they are adapted should embrace practically all low grade distillates.

They will operate successfully on any of the following:

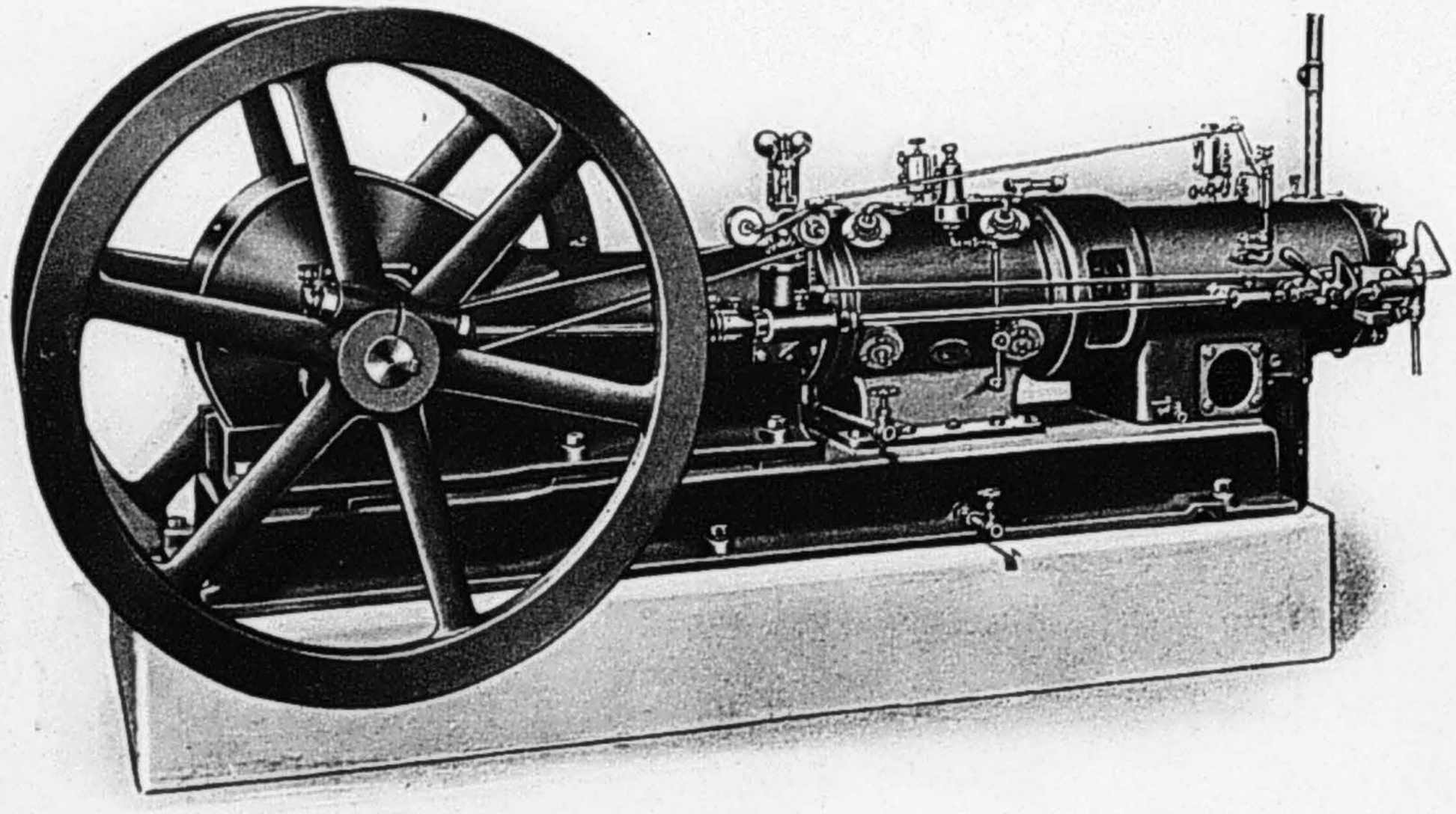
| | |
|---|---|
| Crude Oil | Diesol |
| Fuel Oil | Solar Oil |
| Residuum | Gas Oil |
| Stove Oil | Coal Oil |
| Star Oil | Kerosene |
| Calol | |

Several of the above fuels being obtainable for 3c per gallon, we can guarantee any N-SO compressor to compress air to 100 pounds pressure at a cost not exceeding 54 cents per day of nine hours for each 100 cubic feet per minute of free air displacement.

Sustained low operating costs represent, however, only one feature of these machines. Others are the absence of valves, gearing, carburetors, mixers, magnetos, batteries, timers, coils, switches, wires, and spark plugs.

Briefly described, the power ends are of the valveless, two-cycle, low compression type, operating without electrical firing devices and having fuel injection and water supply to the combustion chamber simply and positively governed.

The simplicity of these machines, their portability and their adaptability to severe service conditions render them particularly attractive to contractors, but they are equally suitable for shop uses, for pumping water, for railroads and the numberless arts and industries in which cheap compressed air can be utilized.



Class N-SO Fuel Oil Driven Compressor (Stationary Type)

# Single Tandem Fuel Oil Driven Compressors

## Class N-SO—Stationary Type

### General Dimensions

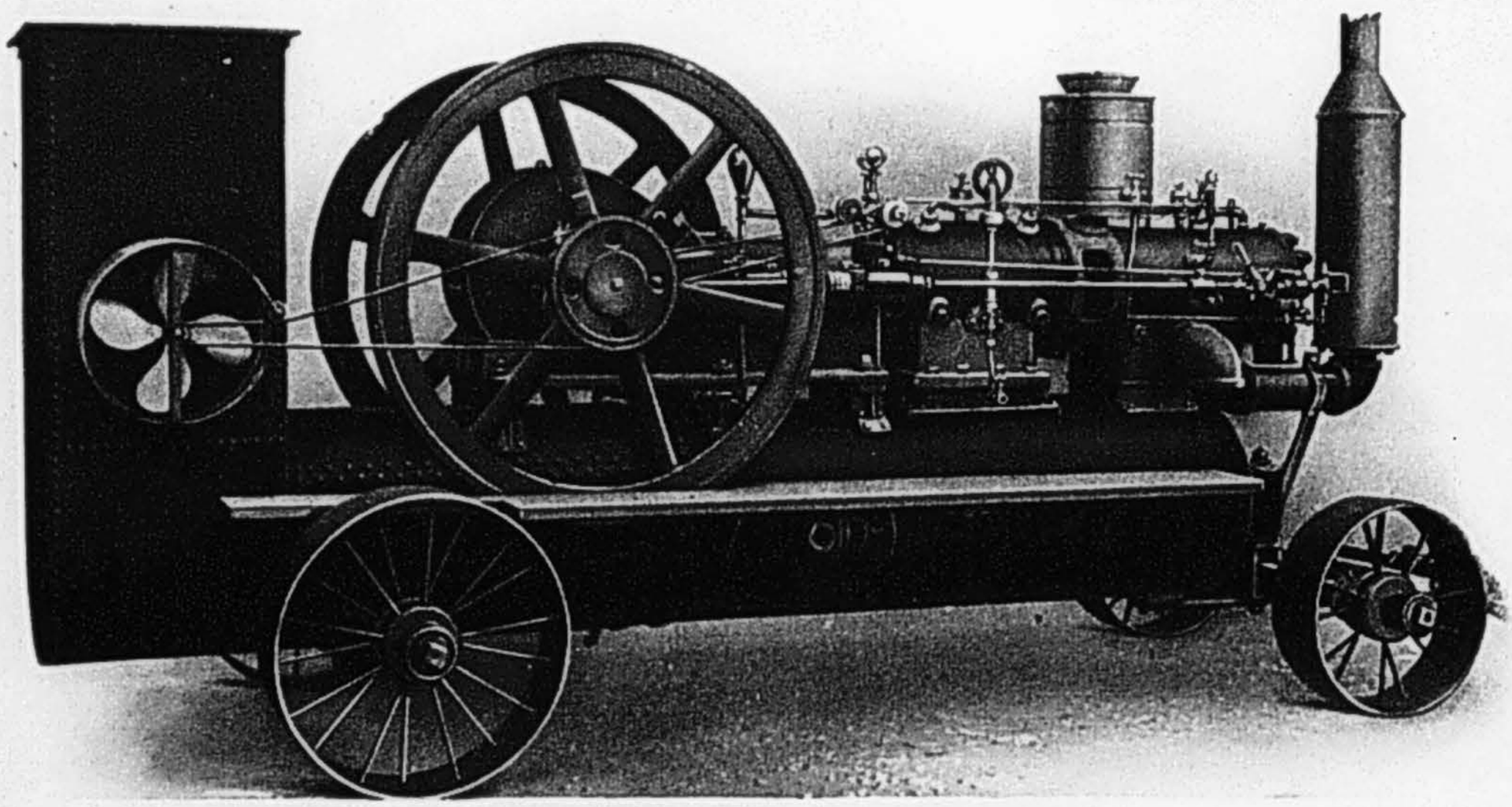
| Code Name | Piston Displacement | R. P. M. | Piston Speed | Cylinders | | | Maximum Developed H. P. | Air Pressure | Size Air Pipes | | Water Supply | | Flywheels | | Floor Space | | Approximate Weights |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Diameter | | Stroke | | | Inlet | Discharge | Air Cyl. | Oil Cyl. | Diam. | Weight | Length | Width | |
| | | | | Oil | Air | | | | | | | | | | | | |
| Avanotto..... | 125 | 300 | 500 | 10½ | 7 | 10 | 19½ | 100 | 5 | 3½ | ¾ | 1¼ | 52 | 1300 | 11'4" | 3' 5" | 5000 |
| Avantic e..... | 184 | 300 | 600 | 12 | 7¾ | 12 | 27 | 100 | 5 | 4 | ¾ | 1¼ | 62 | 2000 | 13'1" | 3' 8" | 7400 |
| Avantreno..... | 290 | 300 | 700 | 14 | 9 | 14 | 47 | 100 | 6 | 6 | ¾ | 1½ | 60 | 3300 | 14'11" | 4' 7" | 10500 |
| *Avantrip..... | 344 | 250 | 750 | 14½ | 9½ | 18 | 57 | 100 | 6 | 6 | ¾ | 1½ | 63 | 4200 | 17'5" | 4'11" | 15700 |
| *Avantula..... | 461 | 230 | 805 | 16½ | 10¾ | 21 | 77 | 100 | 6 | 6 | ¾ | 2 | 72 | 5200 | 19'2" | 6' 0" | 20000 |

### General Dimensions of Compressors for Pressures up to 50 Pounds

| Code Name | Piston Displacement | R. P. M | Piston Speed | Cylinders | | | Maximum Developed H. P. | Air Pressure | Size Air Pipes | | Water Supply | | Flywheels | | Floor Space | | Approximate Weights |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Diameter | | Stroke | | | Inlet | Discharge | Air Cyl. | Oil Cyl. | Diam. | Weight | Length | Width | |
| | | | | Oil | Air | | | | | | | | | | | | |
| Avanzando.... | 166 | 300 | 500 | 10½ | 8 | 10 | 25 | 50 | 5 | 4 | ¾ | 1¼ | 52 | 1300 | 11'4" | 3' 5" | 5100 |
| Avanzare..... | 237 | 300 | 600 | 12 | 8¾ | 12 | 35 | 50 | 6 | 6 | ¾ | 1¼ | 62 | 2000 | 13'1" | 3' 8" | 7500 |
| Avanzato..... | 381 | 300 | 700 | 14 | 10¼ | 14 | 62 | 50 | 6 | 6 | ¾ | 1½ | 60 | 3300 | 14'11" | 4' 7" | 10700 |
| *Avanzers..... | 467 | 250 | 750 | 14½ | 11 | 18 | 77 | 50 | 6 | 6 | ¾ | 1½ | 63 | 4200 | 17'5" | 4'11" | 15900 |
| *Avanzesca..... | 613 | 230 | 805 | 16½ | 12¼ | 21 | 102 | 50 | 6 | 6 | ¾ | 2 | 72 | 5200 | 19'2" | 6' 0" | 20200 |

*A special bulletin describing the design and construction of these sizes will be furnished upon request.

CHICAGO PNEUMATIC TOOL COMPANY



Class N-SO Fuel Oil Driven Compressor (Tank Mounted)

# Single Tandem Fuel Oil Driven Compressors

## Class N-SO—Tank Mounted

### General Dimensions

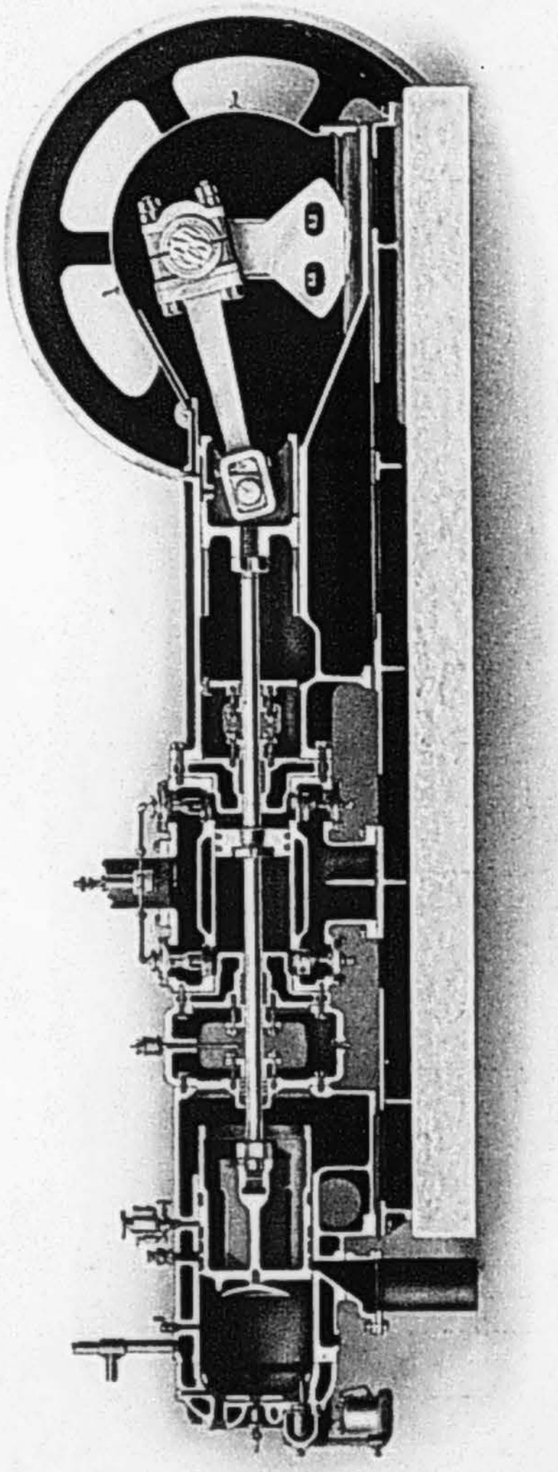
| Code Name | Piston Displacement | R. P. M. | Piston Speed | Cylinders | | | Maximum Developed H. P. | Air Pressure | Size Air Pipes | | Water Supply | | Flywheels | | Receiver | | TRUCK | | | | | | Approximate Weights |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Diameter | | Stroke | | | | | | | | | | | Wheels | | | | Wheel Base | Wheel Tread | Complete Mounted on Truck with Receiver |
| | | | | Oil | Air | | | | Inlet | Discharge | Air Cylinder | Oil Cylinder | Diam. | Weight | Diam. | Length | Front Diam. | Front Face | Rear Diam. | Rear Face | | | |
| Avampies.. | 125 | 300 | 500 | 10½ | 7 | 10 | 19½ | 100 | 5 | 3½ | [illegible] | 1¼ | 52 | 1300 | 30 | 12'8" | 30 | 8 | 34 | 8 | 10'6" | 5'2" | 9700 |
| Avanzaig.. | 184 | 300 | 600 | 12 | 7¾ | 12 | 27 | 100 | 5 | 4 | [illegible] | 1¼ | 62 | 2000 | 30 | 14'4" | 30 | 10 | 36 | 10 | 12'0" | 5'2" | 10800 |

The above Compressors can also be furnished with power cylinders suitable for natural or producer gas and so constructed are designated as "Class N-SG".

### General Dimensions of Compressors for Pressures up to 50 Pounds

| Code Name | Piston Displacement | R. P. M. | Piston Speed | Cylinders | | | Maximum Developed H. P. | Air Pressure | Size Air Pipes | | Water Supply | | Flywheels | | Receiver | | TRUCK | | | | | | Approximate Weights |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Diameter | | Stroke | | | | | | | | | | | Wheels | | | | Wheel Base | Wheel Tread | Complete Mounted on Truck with Receiver |
| | | | | Oil | Air | | | | Inlet | Discharge | Air Cylinder | Oil Cylinder | Diam. | Weight | Diam. | Length | Front Diam. | Front Face | Rear Diam. | Rear Face | | | |
| Avanzevole | 166 | 300 | 500 | 10½ | 8 | 10 | 25 | 50 | 5 | 4 | [illegible] | 1¼ | 52 | 1300 | 30 | 12'8" | 30 | 8 | 34 | 8 | 10'6" | 5'2" | 9800 |
| Avanzo.... | 237 | 300 | 600 | 12 | 8¼ | 12 | 35 | 50 | 6 | 6 | [illegible] | 1¼ | 62 | 2000 | 30 | 14'4" | 30 | 10 | 36 | 10 | 12'0" | 5'2" | 11000 |

CHICAGO PNEUMATIC TOOL COMPANY



Class N-SO Chicago Pneumatic Simplate Valve Compressor
Longitudinal Section Showing Details of Construction

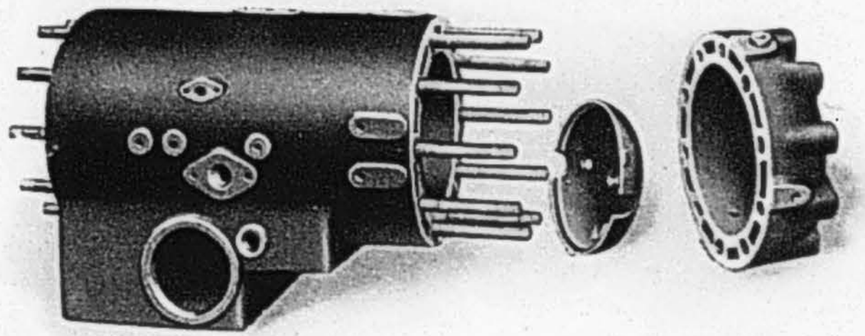




# Details of Construction

**Power Cylinder and Head:**

The cylinder of Class N-SO compressors is of the valveless, two-cycle low compression type and exceptional care has been exercised in its design. Metal is generously used and is carefully distributed to withstand the stresses of hard service and at the same time maintain castings of as even thickness as possible. Water jackets are cast integral with the cylinders, but cover only that portion in which the combustion takes place. This construction simplifies the cylinder casting and facilitates the equalization of temperatures at all points.



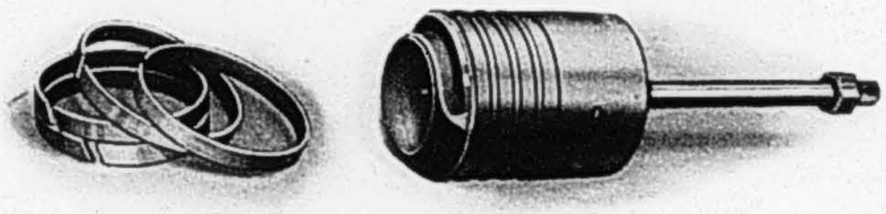
Power Cylinder and Head

Like the cylinder the head is made of the best close-grained cast-iron obtainable and is a single piece casting thoroughly water jacketed. Studs and nuts hold the head to the cylinder and permit internal inspection of the same.

**Power Piston and Rings:**

The trunk type of piston is employed and as shown in the illustration we provide four self-adjusting eccentric spring rings. These are wider than the admission and exhaust ports, cannot catch or break, and effectually secure the compression which accounts for the efficiency of our power ends.

The deflector is of a form that we have adopted after exhaustive experimental research and tests; it absolutely insures perfect scaveng-

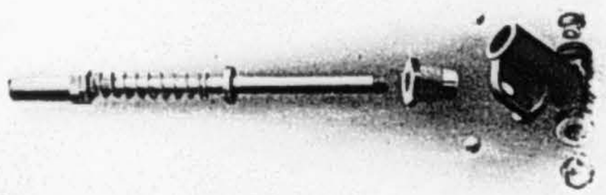


Power Piston and Rings

ing of the cylinder at each stroke. This latter result is also due to the relatively high compression obtained in the crank end of our power cylinders, this compression only being possible with constructions similar to ours. This is explained by reference to the sectional drawing on page 8, which shows the small size of the compression chamber.

**Ignition:**

Our method of igniting the fuel charge is positive and extremely simple, with no delicate parts involved and no sensitive adjustments necessary. A thin circular plate is rigidly secured to the piston and after the compressor is started fuel injected against this hot plate is instantly gasified and ignited. By this system air only is compressed in the power cylinders, the fuel is injected at the proper time and high sustained operating economies are possible.



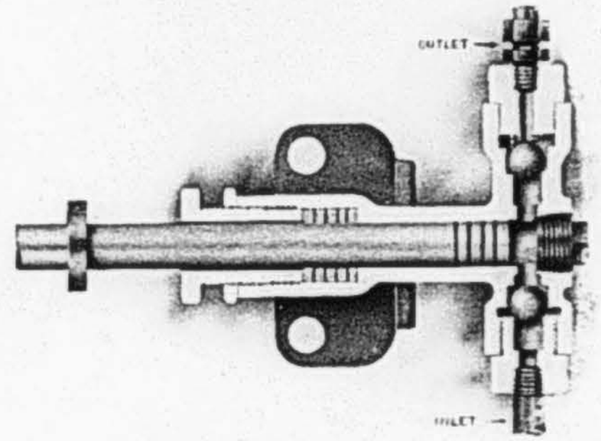
Component Parts of Fuel Pump

**Fuel Pump:**

A glance at the illustration of the fuel pump of Class N-SO compressors confirms our contention that no simpler construction is possible and simplicity and efficient stroke regulation are essential features of successful fuel pumps.








Sectional View of Fuel Pump

Our method of regulating the stroke of the pump plunger is extremely efficient and meets all conditions imposed by varying loads. A cam under the control of the governor rests against the collar on the plunger rod, the position of the cam determining and regulating the stroke of the pump and consequently the quantity of fuel injected. A hand-operated lever, also acting upon the plunger, is provided for stopping the compressor. All of these features are clearly shown in the following illustration:

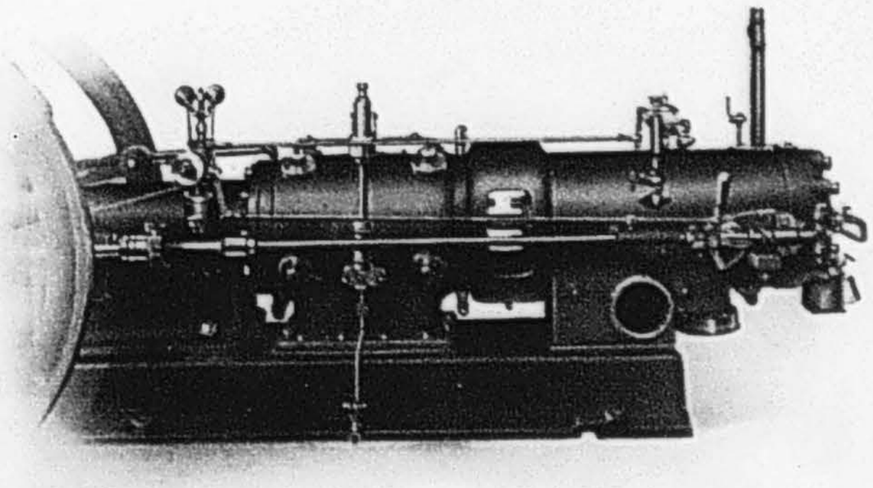
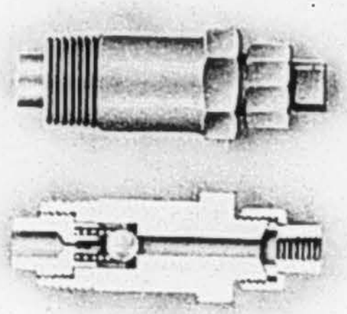


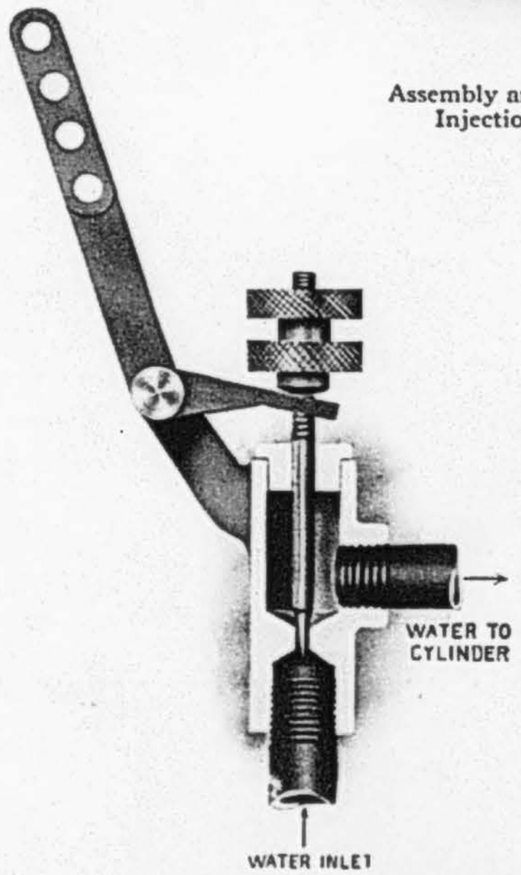
Fig. 11. Cylinder, Pump and Governor Connections

**Injection Nozzle:**

Our fuel nozzle is a combination ball check valve and nozzle, is made of steel and screwed into the center of the power cylinder head.



Assembly and Section of Injection Nozzle




Section of Water Regulator

**Water Regulator:**

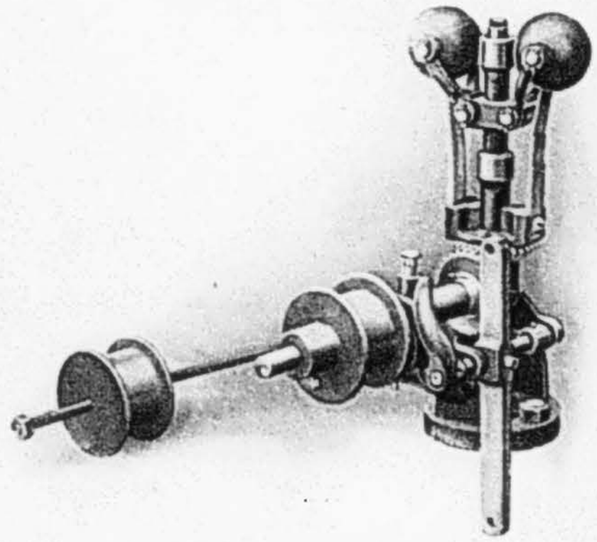
The value of a proper quantity of water mixed with the fuel in the combustion space has long been recognized, but the attempts to utilize it and to efficiently regulate the quantity to suit varying





fuels and loads have not in general been satisfactory. Fuel oil power engines have usually been equipped with hand controlled water valves but the undesirability of devices requiring the constant attention of the operator must be apparent.

Particular attention is invited to the simplicity of our water regulator. It is nothing more than a needle valve which is at all times under the control of the governor and automatically varies the admission of water to meet load requirements. By thus proportioning water supply to the quantity of fuel injected we are able to obtain an appreciable increase in power and economy, to prevent overheating of the cylinder head and burning of the lubricating oil, to eliminate shocks in the compressor and to insure freedom from carbon deposits.



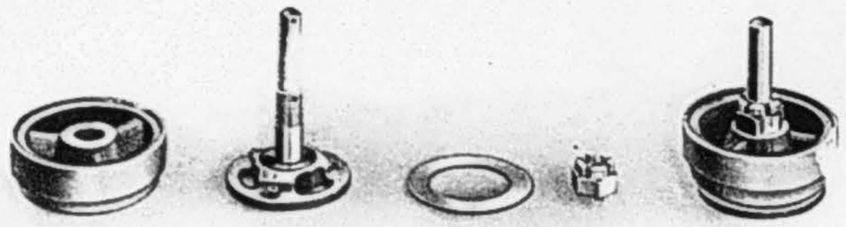
Speed Governor

**Governor:**

A detailed description of the speed governor of Class N-SO compressors is superfluous. Its simplicity is evident and its connections and functions are shown by the illustration of cylinder, pump and governor connections on a previous page. No better governor can be provided.

**Air Cylinder:**

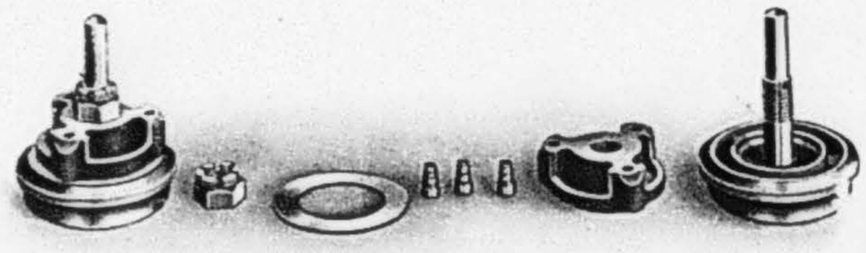
The air cylinder is made of the very best cast iron, is designed so as to permit of reboring with safety, and together with the heads is completely water jacketed. Piston is carefully fitted and is provided with two cast iron spring rings. Discharge valves are located at the bottom of the cylinder and permit the escape of lubricating oil which is often carelessly supplied in greater amounts than necessary.



Component Parts of Inlet Valve

**Air Valves:**

The valves are the heart of an air compressor and the value of many an otherwise good design is nullified by the attempts to employ older types of valves at the speeds demanded by present day practice. The results of years of practical experience and prolonged tests under severe conditions are reflected in our patented "Simplate" flat disc type of inlet and discharge valves. These are set radially in the cylinder, are arranged to give a minimum clearance and afford a higher volumetric efficiency than is usually obtainable with small compressors. No cages are employed and the openings for air are consequently very large and direct. This feature eliminates the necessity of lubrication and assures a minimum power consumption to discharge air from the cylinder.



Component Parts of Discharge Valve

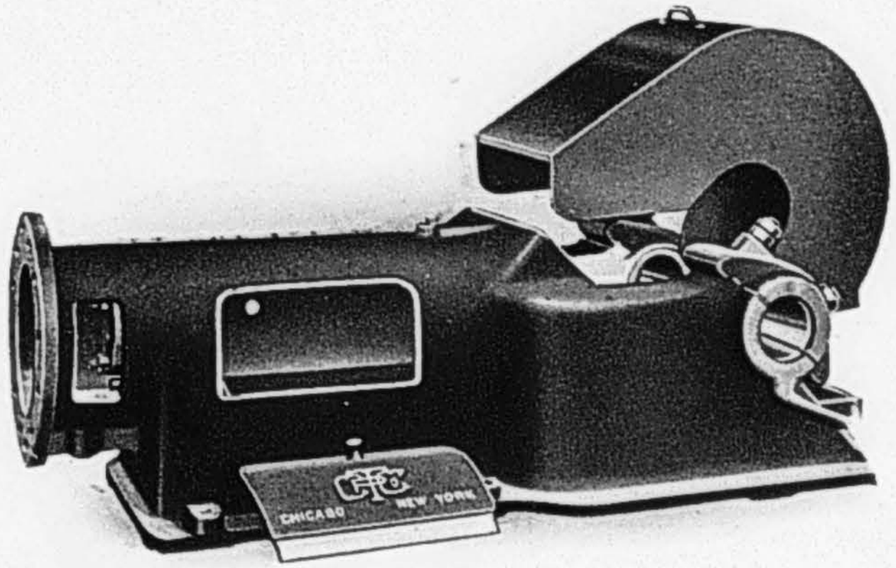
The valves being designed for high speeds are naturally very light but specially selected materials and small lift combine to render them practically indestructible. We guarantee them against defects or breakage for a period of one year.





**Frame:**

The frame is completely enclosed, and, as shown in the illustration, removable oil-tight covers for the side and crank case give ready access for inspection of parts and necessary adjustments. The pleasing lines, strength and solidity of the frame are apparent.

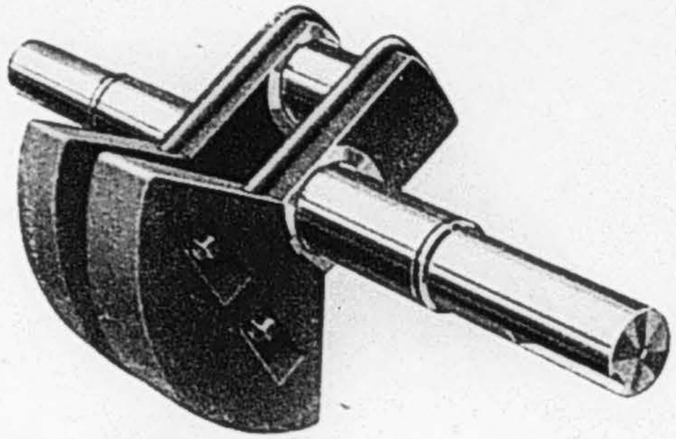



Frame and Covers

**Bearings:**

Main bearings are of extra large proportions, are cast integral with the frame and well supported by a proper distribution of metal. They are of the diagonal box type, lined with the best grade of babbitt metal and provided with grooves for the conveyance of oil. Necessary means of adjustment of the bearing caps to compensate for wear is provided.

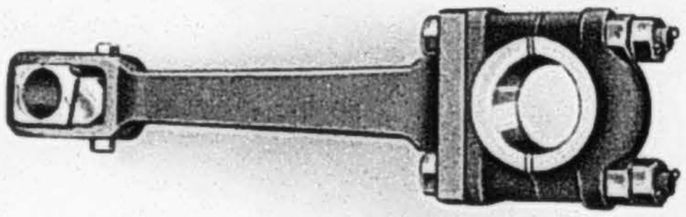
Oil lips are cast on the frame and caps and serve to catch and return to the interior of the frame any oil leaking through the bearings.



Crank Shaft

**Shaft:**

The crank shaft is of the center crank type, made of the best open hearth steel forging (not cast) and of exceptionally liberal proportions throughout. Adequate counterbalance weights are provided, these insuring steady operation of the compressor at the highest speeds.



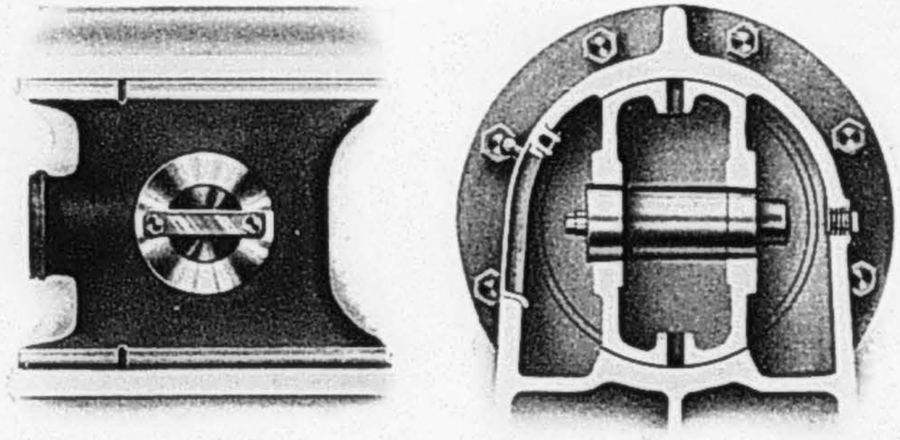
Connecting Rod

**Connecting Rod:**

Connecting rods are not cast, but are of the best steel forgings procurable. The wrist pin end is of the solid type, fitted with bronze boxes, while the crank end is of the marine type lined with the best grade of babbitt metal.







Two Views of Crosshead

**Crosshead:**

The crosshead used in Class N compressors and engines is of the box type; that is, without adjustable shoes, and is turned to perfectly fit the bore of the crosshead guide. This construction is much better than one with loose shoes for the following reasons:

(1) It is properly fitted before leaving the factory, therefore will never heat or pound.

(2) It cannot be tampered with.

(3) It is about twice the length of the ordinary adjustable shoe crosshead; hence it overtravels the guide nearly half its length at each end of the stroke, on account of which the wear on the crosshead and guide is always in a straight line.

(4) The bearing pressure per square inch is less than half that on the ordinary short adjustable shoe crosshead, consequently mechanical losses and wear are much less.

(5) It is better to have the shoe cast integral, because it can never become loose when running, and wedge in guide, causing damage; it is also more rigid and firm, and, on account of this, furnishes a complete and uniform bearing over its entire length, resulting in little or no wear.

(6) It is better solid for the reason that the center of the crosshead always remains in the center of the guide, as it cannot be adjusted out of center like the ordinary loose shoe type.

(7) The solid feature is of great advantage as there are no joints, adjustable shoes, or parts fitted together to become

distorted from being improperly fitted, incorrectly adjusted, or sprung out of shape through incompetent handling.

(8) The cost of upkeep is nothing, as there is nothing to get out of order.

The life of this crosshead will be greater than that of any other part on the machine, as from actual service, it has been found that after five years' running the tool marks are still present on the wearing surface, and if properly lubricated and the bath of oil in which it runs is kept clean, it is guaranteed for any length of time the purchaser wishes.

**Fly-wheels and Pulleys:**

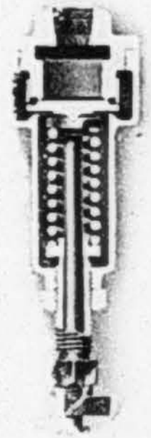
Fly-wheels are of extra large diameter to facilitate starting and are of sufficient weight to insure steady operation.

**Unloading Device:**

Our standard unloading device as applied to our single belt-driven compressors is employed to always maintain within very close limits the air pressure to which it is adjusted.

The unloading action is obtained by holding the inlet valves from their seats, thus reducing the work required during the unloaded period to a minimum.

This makes for a cool running machine and promotes fuel economy.



Sectional View
of Unloading Device

**Lubrication:**

Friction and wear are reduced to a minimum and heating and cutting of bearings absolutely prevented through the medium of a positive self-oiling system of lubrication for the main bearings, crank and crosshead pins and crosshead guides. The enclosed frame allows oil to be carried at a sufficient height in the case to enable the balance weights to dip at each revolution, this action splashing oil into distributors to every bearing. Lubrication is positive and copious. Sight feed oilers of ample size are furnished for the air and power cylinders. Force feed lubricators are provided when specially ordered and at an extra price.





# The Unit System for Air Power Plants

This chapter is addressed to those contemplating the installation of large steam or electrically driven compressors and we respectfully request careful consideration of the same. The operating cost figures for the fuel oil driven compressors are real (not assumed) and are guaranteed by a company which for sixteen years has concentrated its exceptional facilities upon the production of air compressors.

We can furnish steam or power driven units of any required capacity but as such machines are necessarily accompanied by more or less closely related prime movers the overall efficiency and hence the operating cost is variable between very wide limits, being dependent of course upon the distinctive conditions surrounding each installation.

Class N-SO compressors being self-contained readily lend themselves to the unit system for air power plants of large capacity and operate at heretofore unattainable economies, independent of boilers, engines, shafts, belts, gears, dynamos or motors. The low cost of power production and the elimination of costly losses makes for cheap compressed air and consequently broadens the field of application of the same to a corresponding degree.

In the installation of new compressors, however, the consideration of first cost is too often regarded as of paramount importance with the ultimate result that the owner pays dearly for overlooking the saving resulting from the employment of more efficient and economical equipment.

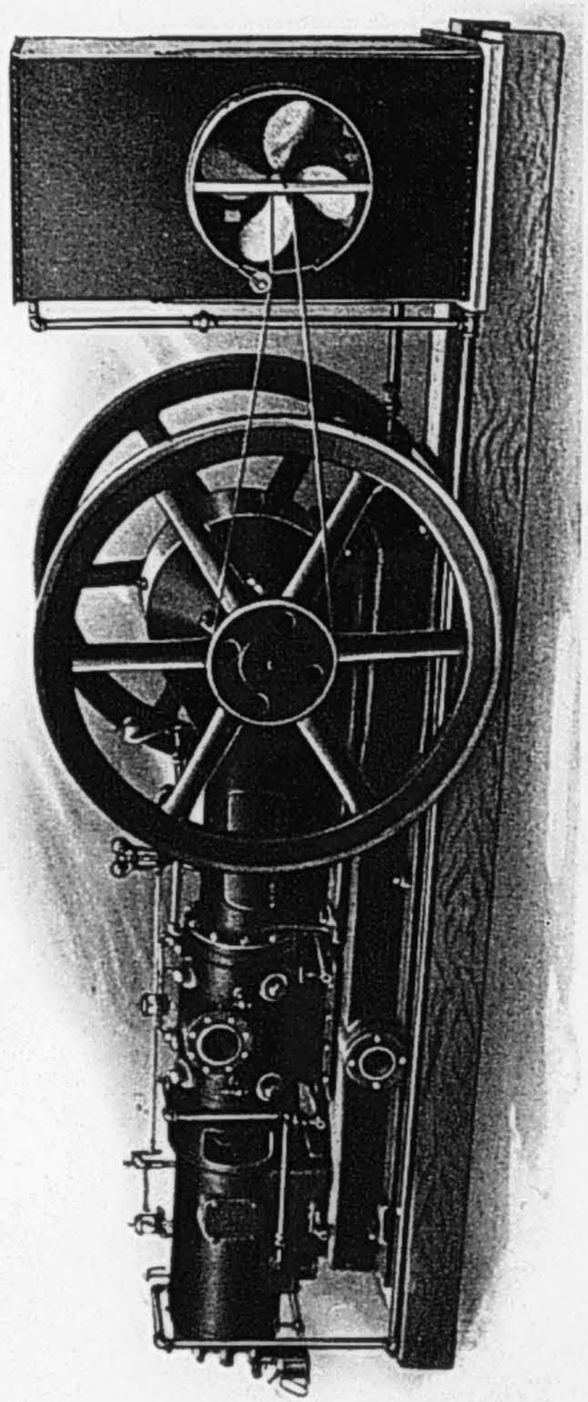
Assume a concrete instance involving a plant having a capacity of 1200 cubic feet of free air per minute.

4—300 cubic foot compressors cost to operate as follows:
(Fuel at 3c per gallon):

1 day (9 hours).....$6.48
1 year (300 days).....$1944.00

1—1200 cubic foot cross compound steam driven compressor costs approximately as follows (coal $3 per ton):

1 day (9 hours).....$11.34
1 year (300 days).....$3402.00



Class N-SO Fuel Oil Driven Compressor on skids for semi-portable use





1—1200 cubic foot electrically driven compressor costs approximately as follows (current 1¾c per K.W.):

1 day (9 hours).....$24.00
1 year (300 days).....$7200.00

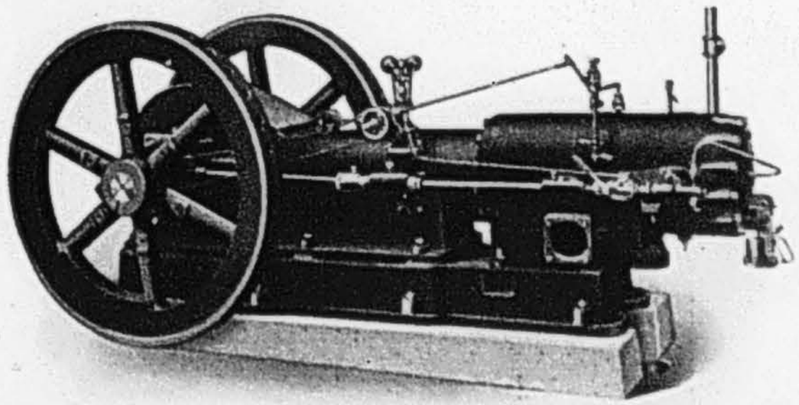
Saving in use of oil over steam per year....$1458
Saving in use of oil over electricity per year.$5256

This calculation shows the remarkable saving attending the use of oil driven compressors. The flexibility of the battery of compressors to meet partial load conditions, the standardization of parts and the freedom from entire shut downs due to breakages, are further conclusive arguments on behalf of the unit system.

The unit system is particularly desirable for large plants in inaccessible localities, the relatively small parts of each unit permitting of ready transportation to points which bar heavy machinery. Also the salvage value of a unit system plant is much greater than that of the plant containing a single large machine. Contractors and others having work of a temporary nature will at once understand and appreciate this feature.

Brief mention only has been made of the merits of the unit system but the services of our engineering department are at the command of those interested and this department is at all times ready to extend the co-operation so essential to mutually satisfactory results.

Tell us your air capacity requirements, your cost of coal or electrical current and we shall gladly submit comparative operating costs that cannot fail to prove interesting.



"Giant" Class A-O Fuel Oil Driven Engine for All Power Purposes
Fully described in our Bulletin 34W.

# Air Receivers—Vertical and Horizontal Types

| Code Word | Torrefy | Tripid | Terebine | Trocar | Saltant | Sodium | Stannary | Struma | Secant | Storax | Sectile | Septic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Diameter ... Inches | 20 | 24 | 24 | 24 | 30 | 36 | 36 | 42 | 42 | 48 | 54 | 60 |
| Height or Length ... Feet | 5 | 5 | 6 | 8 | 6 | 6 | 8 | 8 | 10 | 12 | 12 | 14 |
| Contents ... Cubic Feet | 10.9 | 15.7 | 18.8 | 25.0 | 29.4 | 42.4 | 56.5 | 76.8 | 96.2 | 152 | 191 | 275 |
| Thickness of Shell ... Inches | 3/16 | 3/16 | 3/16 | 3/16 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 5/16 | 5/16 | 3/8 |
| Thickness of Heads ... Inches | 1/4 | 1/4 | 1/4 | 1/4 | 5/16 | 3/8 | 3/8 | 3/8 | 3/8 | 3/8 | 1/2 | 9/16 |
| Weight (about) ... Pounds | 300 | 350 | 425 | 550 | 600 | 1000 | 1200 | 1600 | 1900 | 2900 | 3400 | 5200 |
| Diameter of Safety Valve ... Inches | 1 | 1 | 1 | 1 | 1½ | 1½ | 1½ | 2 | 2 | 2½ | 2½ | 3 |
| Diam. of Inlet and Disch. Open'gs. ... Inches | 3* | 4½ | 5 | 5 | 6 | 6 | 6 | 8 | 10 | 10 | 10 | 12 |
| Diameter Flange ... Inches | ..... | ..... | ..... | ..... | ..... | 11 | 11 | 13½ | 16 | 16 | 16 | 19 |
| Compressor Capacity for which best adapted Cubic Feet Free Air per Minute | 90 | 110 | 120 | 130 | 150 | 150 to 200 | 200 to 300 | 300 to 500 | 500 to 700 | 700 to 1200 | 1200 to 2000 | 2000 to 3500 |

Sizes 1, 2, 3 and 4 suitable for 100-lb. working pressure and for compressors of small capacity.

Sizes 5 to 12, inclusive, suitable for air compressors of medium and large capacity. For working air pressures not exceeding 110 pounds per square inch.

Made of the best 60,000 pounds tensile-strength steel; side seams double riveted and tested up to 165 pounds water pressure; warranted safe and tight under 110 pounds working pressure. Fixtures include safety valve, pressure gauge, drain cock and flanges for inlet and discharge pipes.

The above sizes of receivers, 5 to 12, can be furnished to rest vertically or horizontally as may be preferred, and will be constructed with connections and fittings arranged in any manner desired.

Special prices on air receivers for higher pressures will be quoted upon application.

Size of tapped hole in flange can be reduced to suit conditions.

20" and 24" diameter Receivers are brazed.

*Inlet and outlet openings tapped in reinforced shell; all other sizes have flanged air openings.



## Partial List of Users of N-SO "Chicago Pneumatic" Compressors

| | |
|---|---|
| Alaska Copper Corp'n (2 units) | Strelna, Alaska. |
| B. F. Aldrich | E. Douglas, Mass. |
| American Steel Window Co. | Chicago Heights, Ill. |
| Bethlehem Steel Co. | Bethlehem, Pa. |
| Bethlehem Steel Co. | Steelton, Pa. |
| Bull Run Granite Co. | Gloverville, N. Y. |
| Cape Ann Granite Corporation | Rockport, Mass. |
| Chief Consolidated Mining Co. (2 units) | Eureka, Utah. |
| City of El Paso | El Paso, Texas. |
| Hy. Goldner Tank & Boiler Works | Philadelphia, Pa. |
| Imperial Oil Co. (4 units) | Peru, S. A. |
| Jerome Oatman Mining Company | Jerome, Ariz. |
| Lake View Mining Co. | Saline, Utah. |
| W. G. La Rue | Duluth, Minn. |
| Macon & Birmingham Ry. | Sefkee, Ga. |
| McClintic-Marshall Co. (2 units) | Pittsburgh, Pa. |
| Mineral Products Corporation (3 units) | Marysvale, Utah. |
| Minneapolis Gas & Electric Co. | Minneapolis, Minn. |
| Mt. Nebo Marble Co. | Thistle, Utah. |
| Nevada Mining, Milling & Power Co. | Rogerson, Idaho. |
| Nevada Regent Mining Co. | Schurz, Nevada. |
| Pittsburgh Des Moines Steel Co. | Pittsburgh, Pa. |
| Plattsmouth Ice & Cold Storage Co. | Plattsmouth, Nebr. |
| Quaker City Iron Works | Philadelphia, Pa. |
| Riter-Conley Mfg. Co. (8 units) | Pittsburgh, Pa. |
| Edgar Roggenbucke | El Paso, Texas. |
| Sheridan Mining Co. | Burnet, Texas. |
| Sperin & Preston | New York, N. Y. |
| Standard Boiler & Plate Iron Works | Pittsburgh, Pa. |
| Michael Staub | High Falls, N. Y. |
| Henry Steers | New York, N. Y. |
| Superstition Mining Co. | Price, Ariz. |
| Tonopah Midway Mining Company | Tonopah, Nev. |
| Tortillita Copper Company | Red Rock, Ariz. |
| Travertine-Onyx Co. of America | Low, Utah. |
| United Eastern Mines | Oatman, Ariz. |
| United Marine Contracting Co. | New York, N. Y. |
| U. S. Government, Lighthouse Dept. (2 units) | Ketchikan, Alaska. |
| U. S. Government, War Dept. | Yellowstone Park, Wyo. |
| U. S. Government, Lighthouse Dept. (2 units) | Ashtabula, Ohio. |
| U. S. Government, Lighthouse Dept. (2 units) | Cleveland, Ohio. |
| U. S. Government, Lighthouse Dept. | Petit Manan, Me. |
| T. F. Welch | West Roxbury, Mass. |

# Chicago Pneumatic Tool Company

**General Office - Fisher Building, CHICAGO**
**Eastern Office, 52 Vanderbilt Ave., NEW YORK**


## BRANCH OFFICES

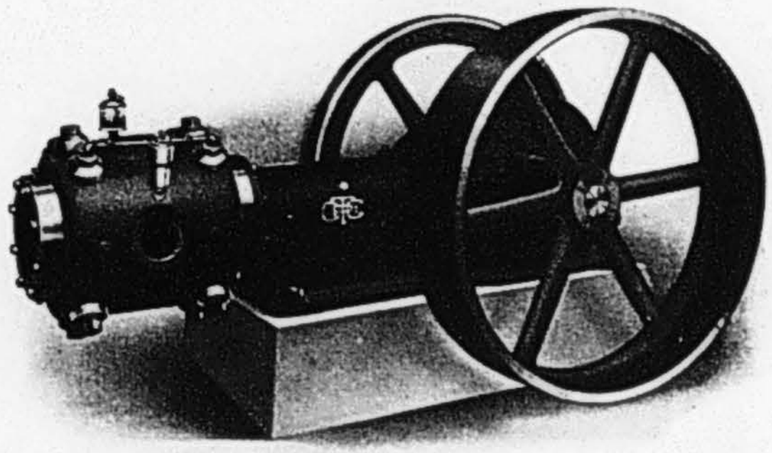
| | |
|---|---|
| BOSTON | 185 Pleasant Street |
| BIRMINGHAM | 834 Brown-Marx Building |
| BUFFALO | 503 Ellicott Square Building |
| CINCINNATI | 1008 Mercantile Library Building |
| CLEVELAND | 2122 Euclid Ave. and 1241 E. 49th Street |
| DETROIT | Second Ave. and Amsterdam Street |
| DULUTH, MINN. | Torrey Building |
| EL PASO | 303 San Francisco Street |
| ERIE, PA. | 12th and Cranberry Street |
| FRANKLIN, PA. | North 13th Street |
| JOPLIN, MO. | 308 Wall Street |
| LOS ANGELES | 925 Title Insurance Building |
| MILWAUKEE | 1310 Majestic Building |
| NEW ORLEANS | 513 Carondelet Street |
| OMAHA, NEBR. | 1023 W. O. W. Building |
| PHILADELPHIA | 1740-42 Market Street |
| PITTSBURGH | 10 and 12 Wood Street |
| PORTLAND, ORE. | 46-48 Front Street |
| RICHMOND, VA. | 1004 Mutual Building |
| SALT LAKE CITY | 117-19 West 2nd South Street |
| SEATTLE | 122 King Street |
| ST. LOUIS | 813-15-17-19 Hempstead Street |
| ST. PAUL | Pioneer Building |
| SAN FRANCISCO | 71 First Street |

## FOREIGN

| | |
|---|---|
| Canada: | Montreal, Canadian Pneumatic Tool Co. Montreal, Toronto, Winnipeg, The Holden Co., Ltd. |
| British Columbia: | Vancouver, Holden Co., Ltd. 542 Pendar Street, West |
| Mexico: | Mexico City, The General Supply Company, Av. Isabel La Catolica No. 51. |
| Northern Mexico: | (Sonora and Chihuahua), D. A. Carpenter & Co., El Paso, Texas. |
| Great Britian: Spain: Portugal: | London, The Consolidated Pneumatic Tool Co., Ltd., 9 Bridge Street, Westminster, S. W. |
| France: | Paris, Anciens Etablissement Glaenzer & Perreaud, 18-20 Faubourg du Temple. |
| Italy: | Milan, The Consolidated Pneumatic Tool Co., Ltd., via A Capellini 7. |
| Belgium: | Brussels, The Consolidated Pneumatic Tool Co., Ltd., 22 Chaussee de Forest, Porte de Hal. |
| Russia: | Petrograd, Phoenix Engineering Works, Ltd., Polustrovskaya Quay No. 39. |
| South America: | Buenos Aires, Argentina, Evans, Thornton & Co. |
| Germany: Austria Hungary: Balkan States: Norway: Sweden: Holland: Switzerland: Denmark: | Berlin, Internationale Preasluft & Elektricitats-Gesellschaft m.b. H. Berlin, C54. Weinmeisterhof, Weinmeisterstrasse No. 14. |
| India: | Bombay, Consolidated Pneumatic Tool Co., Ltd., Rampart Row, Fort. |
| Japanese Empire: | Tokyo, Osaka, Seoul, Darien The F. W. Horne Co. |
| Phillipine Islands: | Manila, F. L. Strong Machinery Co., 64-68 Calle Echague. |
| Hawaii | Honolulu, H. S. Gray & Co., 832 Fort St. |
| Cuba | Havana, J. F. Berndes & Co., Box 349. |
| Australia: | Sydney, Henry W. Peabody & Co. |
| New Zealand: | Wellington, Henry W. Peabody & Co. |
| South Africa: | Johannesburg, The Consolidated Pneumatic Tool Co., Ltd., 190 Main Street. |

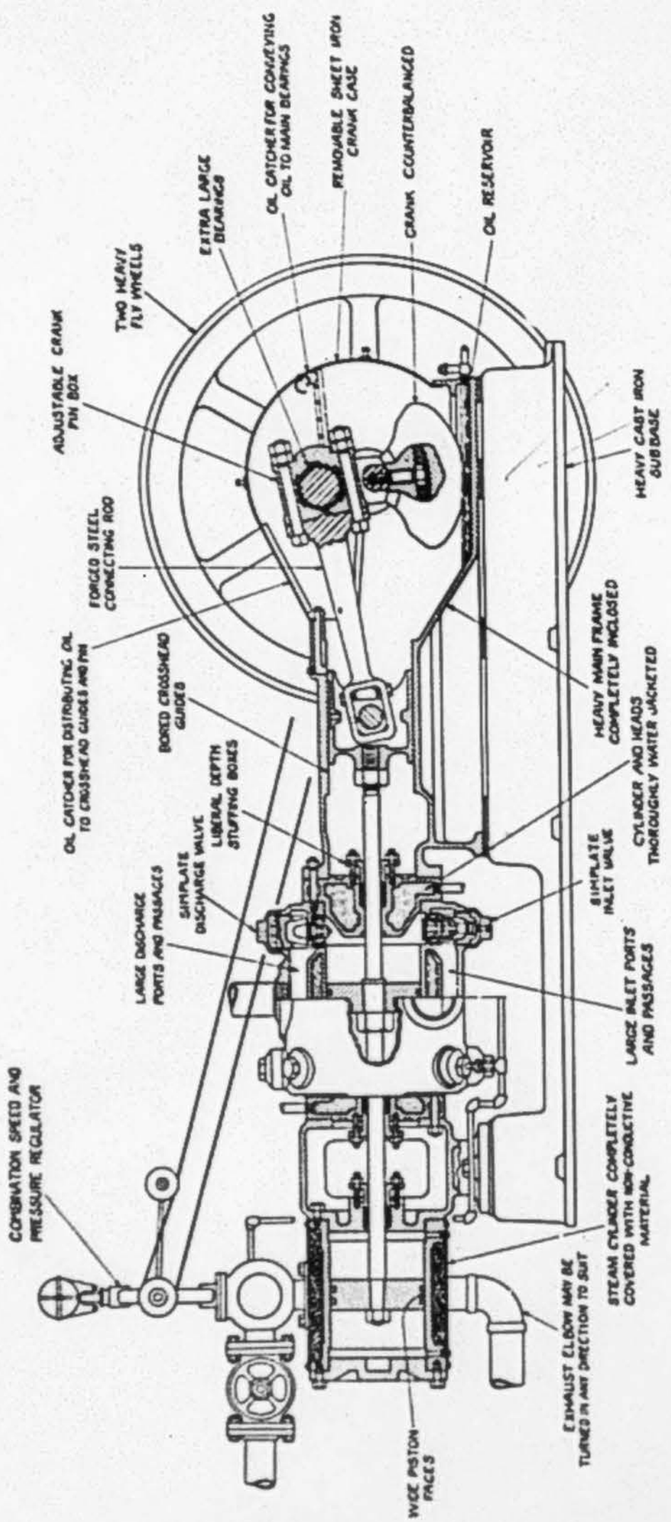
# Single Compressors Steam and Power Driven





## BULLETIN 34-N


**Chicago Pneumatic Tool Company**
**Chicago New York**




Class N-SS. Longitudinal Section Showing Details of Construction





# Single Enclosed Self-Oiling Steam and Belt Driven Compressors

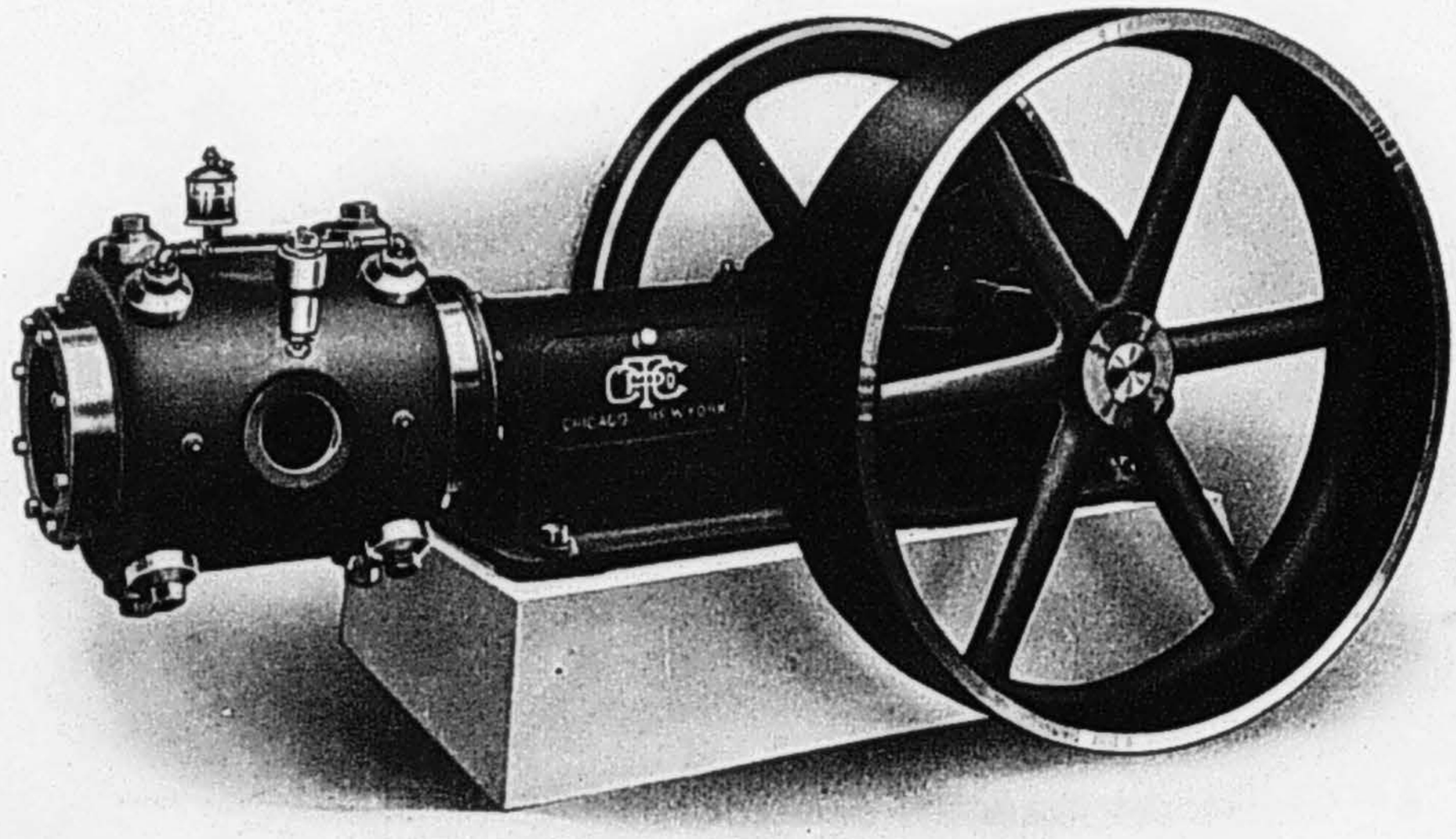
While we have been engaged in the business of manufacturing air compressors for sixteen years and have a range of patterns for machines suited to every possible requirement, our policy has always been broad and progressive toward the adoption and application of any new features of proven and permanent value.

Many such features are incorporated in the design of our Class N-SB and N-SS single enclosed self-oiling compressors, which today reflect the highest point of development yet attained in the construction of compressors of small and medium capacities.

Compressed air is today employed in such an extreme variety of services that a universal demand exists for compressors of unquestioned reliability, combining maximum capacity with minimum weight and developing the highest attainable efficiency in operation without the necessity of expert attendance.

Simplicity, rigidity, exceptionally large bearing surfaces, automatic lubrication and indestructible flat disc valves are the salient features of Class N Compressors and represent the points of superiority over older designs which have been recognized by a large and rapidly growing list of users.

*Third Edition*
August 1, 1916



Class N-SB. Single Belt Driven Self-Oiling Air Compressor

# Single Belt Driven Air Compressors

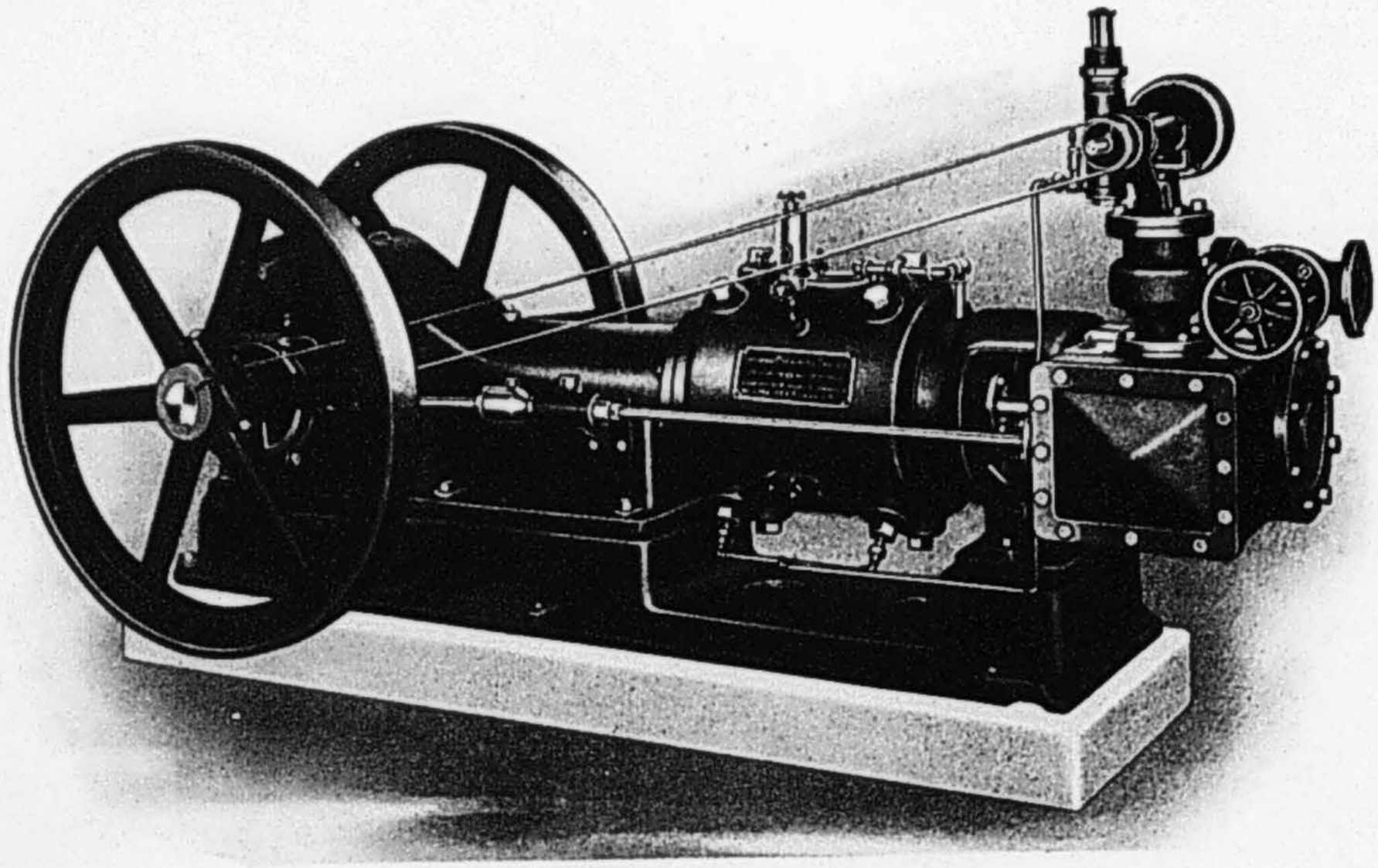
## Class N-SB

| Code Name | Cylinder | | Piston Displacement per Revolution | Capacity cubic feet Free Air per Minute Piston Displacement | R. P. M. | H. P. Required | Air Pressure Suited for | Air Inlet Pipe | Air Discharge Pipe | Water Jacket Supply Pipe | Belt Wheel | | | Fly Wheel | | Floor Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diameter | Stroke | | | | | | | | | Diameter | Face | Weight | Diameter | Weight | Width | Length |
| **Nababsom** | 6 | 6 | .189 | 52 | 275 | 7 – 9 | 80–125 | 2 | 2 | ½ | 36 | 5¼ | 200 | 36 | 200 | 2′ 2″ | 5′ 4″ |
| Nabacrid | 7½ | 6 | .302 | 83 | 275 | 10 – 13 | 50–100 | 2½ | 2 | ½ | 36 | 5¼ | 200 | 36 | 200 | 2′ 2″ | 5′ 4″ |
| **Nabadora** | 8 | 8 | .452 | 113 | 250 | 17 – 22 | 80–125 | 3 | 3 | ½ | 46 | 7½ | 400 | 42 | 400 | 3′ 1″ | 6′ 8″ |
| Nebaegger | 9 | 8 | .580 | 145 | 250 | 20 – 25 | 70–100 | 3 | 3 | ½ | 46 | 7½ | 400 | 42 | 400 | 3′ 1″ | 6′ 8″ |
| Nebaffling | 10 | 8 | .716 | 179 | 250 | 20 – 26 | 40– 70 | 3 | 3 | ½ | 46 | 7½ | 400 | 42 | 400 | 3′ 1″ | 6′ 8″ |
| Nebaggot | 12 | 8 | 1.032 | 258 | 250 | 16 – 28 | 15– 40 | 4 | 4 | ½ | 46 | 7½ | 400 | 42 | 400 | 3′ 1″ | 6′ 8″ |
| **Nebahia** | 10 | 10 | .891 | 214 | 240 | 34 – 42 | 80–125 | 4½ | 4½ | ¾ | 50 | 11½ | 800 | 48 | 600 | 3′ 10″ | 7′ 9″ |
| Nibajirn | 12 | 10 | 1.295 | 311 | 240 | 39 – 54 | 50–100 | 4½ | 4½ | ¾ | 50 | 11½ | 800 | 48 | 600 | 3′ 10″ | 7′ 9″ |
| Nibajos | 15 | 10 | 2.045 | 488 | 240 | 46 – 56 | 30– 50 | 5 | 5 | ¾ | 50 | 11½ | 800 | 48 | 600 | 3′ 10″ | 7′ 9″ |
| Nibaklet | 17 | 10 | 2.629 | 628 | 240 | 39 – 59 | 15– 30 | 6 | 6 | ¾ | 50 | 11½ | 800 | 48 | 600 | 3′ 10″ | 7′ 9″ |
| **Nibalena** | 12 | 12 | 1.548 | 356 | 230 | 59 – 74 | 80–125 | 5 | 5 | ¾ | 60 | 12¼ | 1350 | 52 | 800 | 4′ 1″ | 9′ 0″ |
| Nobampo | 14 | 12 | 2.117 | 487 | 230 | 65 – 88 | 50–100 | 5 | 5 | ¾ | 60 | 12¼ | 1350 | 52 | 800 | 4′ 1″ | 9′ 0″ |
| Nobandis | 17 | 12 | 3.152 | 720 | 230 | 70 – 95 | 30– 50 | 6 | 6 | ¾ | 60 | 12¼ | 1350 | 52 | 800 | 4′ 1″ | 9′ 0″ |
| Nobaola | 20 | 12 | 4.363 | 998 | 230 | 59 – 97 | 15– 30 | 8 | 8 | ¾ | 60 | 12¼ | 1350 | 52 | 800 | 4′ 1″ | 9′ 0″ |
| **Nobaptist** | 14 | 14 | 2.463 | 542 | 220 | 90 –115 | 80–125 | 6 | 6 | ¾ | 78 | 14¼ | 1850 | 60 | 1400 | 5′ 0″ | 10′ 5″ |
| Nobaqua | 17 | 14 | 3.677 | 802 | 220 | 94 –132 | 40– 80 | 6 | 6 | ¾ | 78 | 14¼ | 1850 | 60 | 1400 | 5′ 0″ | 10′ 5″ |
| Nubaron | 20 | 14 | 5.059 | 1113 | 220 | 70 –127 | 15– 40 | 8 | 8 | ¾ | 78 | 14¼ | 1850 | 60 | 1400 | 5′ 0″ | 10′ 5″ |





CHICAGO PNEUMATIC TOOL COMPANY



Class N-SS. Single Steam Driven Self-Oiling Air Compressor

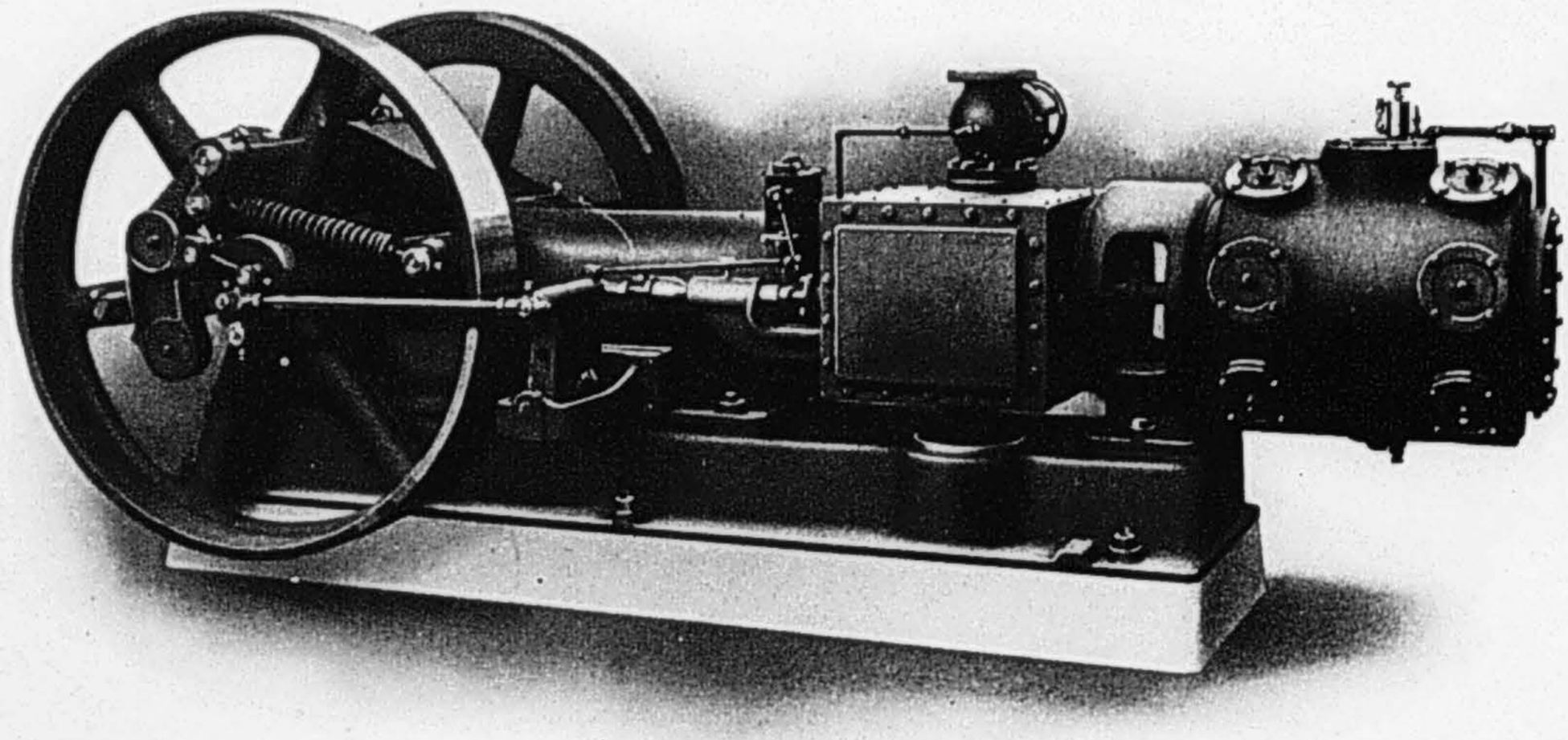
# Single Steam Driven Air Compressors

## Class N-SS

| Code Name | Cylinders | | | Piston Displacement per Revolution | Capacity cubic feet Free Air per Minute Piston Displacement | R. P. M. | I. H. P. | Boiler H. P. Required | Air Pressure Suited for | Steam Supply Pipe | Steam Exhaust Pipe | Air Inlet Pipe | Air Discharge Pipe | Water Jacket Supply Pipe | Fly Wheel | | Floor Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diameter | | Stroke | | | | | | | | | | | | Diameter | Weight Both Wheels | Width | Length |
| | Steam | Air | | | | | | | | | | | | | | | | |
| **Nasbrel** | 6 | 6 | 6 | .189 | 52 | 275 | 7 – 9 | 9– 12 | 80–125 | 1¼ | 1½ | 2 | 2 | ½ | 36 | 400 | 2′ 4″ | 6′ 9″ |
| Nasdick | 6 | 7½ | 6 | .302 | 83 | 275 | 10 – 13 | 13– 17 | 50–100 | 1¼ | 1½ | 2½ | 2 | ½ | 36 | 400 | 2′ 4″ | 6′ 9″ |
| **Nasenna** | 8 | 8 | 8 | .452 | 113 | 250 | 17 – 22 | 22– 28 | 80–125 | 2 | 2½ | 3 | 3 | ½ | 42 | 800 | 3′ 0″ | 9′ 2″ |
| Neseptor | 8 | 9 | 8 | .580 | 145 | 250 | 20 – 25 | 25– 32 | 70–100 | 2 | 2½ | 3 | 3 | ½ | 42 | 800 | 3′ 0″ | 9′ 2″ |
| Nesfento | 8 | 10 | 8 | .716 | 179 | 250 | 20 – 26 | 25– 33 | 40– 70 | 2 | 2½ | 3 | 3 | ½ | 42 | 800 | 3′ 0″ | 9′ 2″ |
| Nesgrip | 8 | 12 | 8 | 1.032 | 258 | 250 | 16 – 28 | 20– 35 | 15– 40 | 2 | 2½ | 4 | 4 | ½ | 42 | 800 | 3′ 0″ | 9′ 2″ |
| **Neshole** | 10 | 10 | 10 | .891 | 214 | 240 | 34 – 42 | 40– 50 | 80–125 | 2½ | 3 | 4½ | 4½ | ¾ | 48 | 1200 | 3′ 5″ | 10′ 5″ |
| Nisimule | 10 | 12 | 10 | 1.295 | 311 | 240 | 39 – 54 | 47– 64 | 50–100 | 2½ | 3 | 4½ | 4½ | ¾ | 48 | 1200 | 3′ 5″ | 10′ 5″ |
| Niskine | 10 | 15 | 10 | 2.045 | 488 | 240 | 46 – 56 | 53– 66 | 30– 50 | 2½ | 3 | 5 | 5 | ¾ | 48 | 1200 | 3′ 5″ | 10′ 5″ |
| Nislake | 10 | 17 | 10 | 2.629 | 628 | 240 | 39 – 59 | 41– 69 | 15– 30 | 2½ | 3 | 6 | 6 | ¾ | 48 | 1200 | 3′ 5″ | 10′ 5″ |
| **Nismurk** | 12 | 12 | 12 | 1.548 | 356 | 230 | 59 – 74 | 68– 85 | 80–125 | 3 | 4 | 5 | 5 | ¾ | 52 | 1600 | 3′ 8″ | 11′10½″ |
| Nosnacco | 12 | 14 | 12 | 2.117 | 487 | 230 | 65 – 88 | 75–100 | 50–100 | 3 | 4 | 5 | 5 | ¾ | 52 | 1600 | 3′ 8″ | 11′10½″ |
| Nosomula | 12 | 17 | 12 | 3.152 | 720 | 230 | 70 – 95 | 80–108 | 30– 50 | 3 | 4 | 6 | 6 | ¾ | 52 | 1600 | 3′ 8″ | 11′10½″ |
| Nosostris | 12 | 20 | 12 | 4.363 | 998 | 230 | 59 – 97 | 66–110 | 15– 30 | 3 | 4 | 8 | 8 | ¾ | 52 | 1600 | 3′ 8″ | 11′10½″ |

NOTE.—6″ to 12″ Strokes, inclusive, have plain slide steam valve. 14″ Stroke has balanced steam valve and Automatic Fly Wheel Governor. See Bulletin 34-Z.

CHICAGO PNEUMATIC TOOL COMPANY



Class N-SS Steam Driven Self-Oiling Air Compressor, with Balanced Steam Valve and Automatic Fly Wheel Governor

# Single Steam Driven Air Compressors

## Class N-SS

### with Balanced Steam Valve and Automatic Fly Wheel Governor

| Code Name | Cylinders | | | Displacement, Cu. Ft. per Min. | R. P. M. | I. H. P. | Air Pressure Suited for | Fly-Wheels | | Floor Space | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Diameter | | Stroke | | | | | Dia. | Wght. Both | Width | Length |
| | Steam | Air | | | | | | | | | |
| Nautabbot | 13½ | 12 | 12 | 356 | 230 | 59–74 | 80–125 | 52 | 1600 | 3′ 8″ | 11′ 10½″ |
| Nautacton | 13½ | 14 | 12 | 487 | 230 | 65–88 | 50–100 | 52 | 1600 | 3′ 8″ | 11′ 10½″ |
| Nautadver | 13½ | 17 | 12 | 720 | 230 | 70–95 | 30–50 | 52 | 1600 | 3′ 8″ | 11′ 10½″ |
| Nautaftex | 13½ | 20 | 12 | 998 | 230 | 59–97 | 15–30 | 52 | 1600 | 3′ 8″ | 11′ 10½″ |
| Nautagger | 15 | 14 | 14 | 542 | 220 | 90–115 | 80–125 | 60 | 2800 | 4′ 7″ | 13′ 6″ |
| Nautajole | 15 | 17 | 14 | 802 | 220 | 94–132 | 40–80 | 60 | 2800 | 4′ 7″ | 13′ 6″ |
| Nautalco | 15 | 20 | 14 | 1113 | 220 | 70–127 | 15–40 | 60 | 2800 | 4′ 7″ | 13′ 6″ |

See Bulletin 34-Z

CHICAGO PNEUMATIC TOOL COMPANY

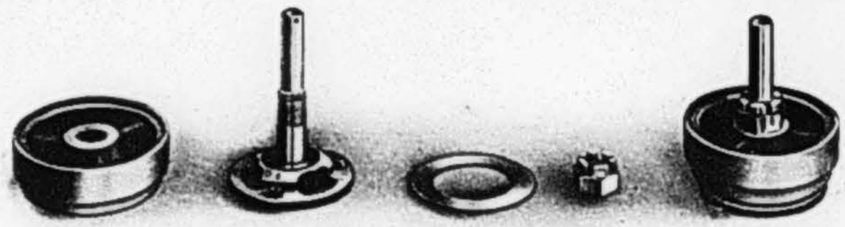
# Details of Construction

**Air Cylinder:**

The air cylinder is made of the very best cast iron, is designed so as to permit of reboring with safety, and together with the heads, is completely water jacketed. Piston is carefully fitted and is provided with two cast iron spring rings.

**Air Valves:**

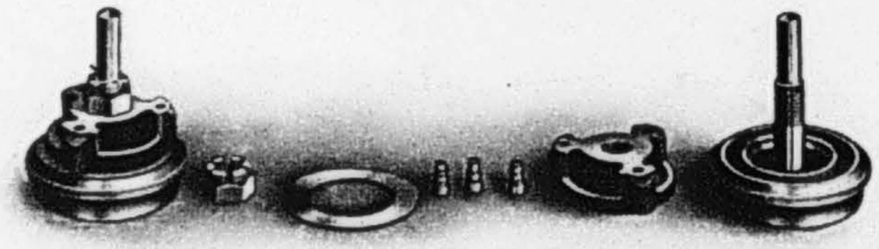
The valves are the heart of an air compressor and the value of many an otherwise good design is nullified by the attempts to



Inlet Valve

employ older types of valves at the speeds demanded by present day practice. The results of years of practical experience and prolonged tests under severe conditions are reflected in our patented "Simplate" flat disc type of inlet and discharge valves. These are set radially in the cylinder, are arranged to give a minimum clearance and afford a higher volumetric efficiency than is usually obtainable with small compressors. No cages are employed and the openings for air are consequently very large and direct. This feature eliminates the necessity of lubrication and assures a minimum power consumption to discharge air from the cylinder.

The valves being designed for high speeds are naturally very light but specially selected materials and small lift combine to render them practically indestructible. We guarantee them against defects or breakage for a period of one year.



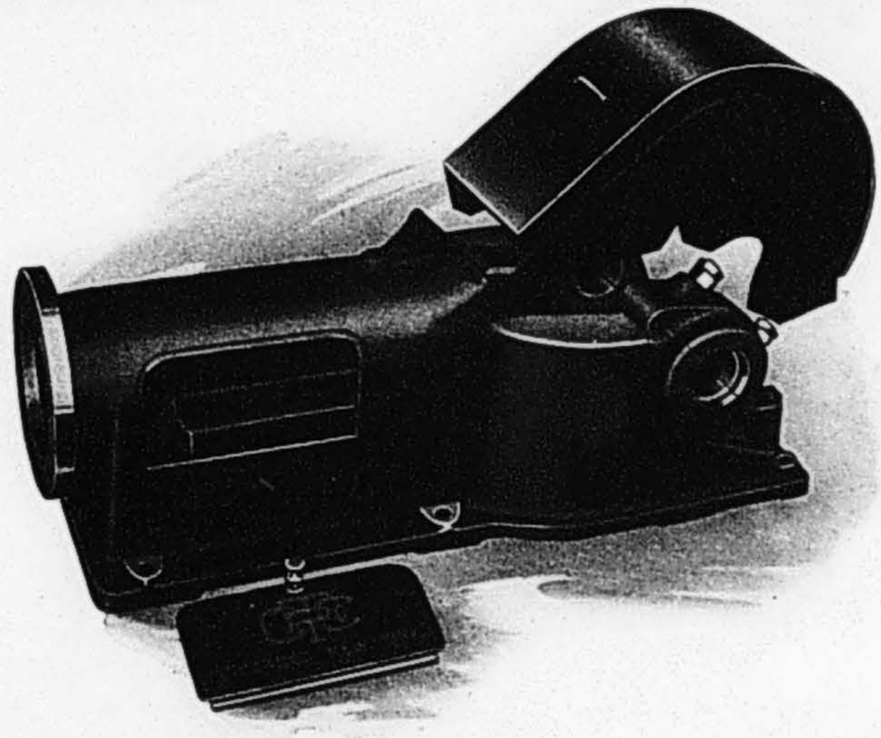
Discharge Valve





**Frame:**

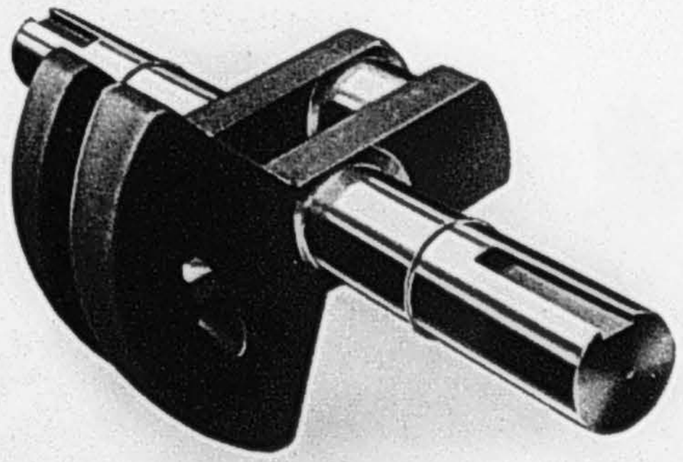
The frame is completely enclosed, and as shown in the illustration, removable tight covers for the side and crank case give ready access for inspection of parts and necessary adjustments. The pleasing lines, strength and solidity of the frame are apparent.



Frame and Covers

**Shaft:**

The crank shaft is of the center crank type, made of the best open hearth steel forging and of exceptionally liberal proportions throughout. Adequate counterbalance weights are provided. These insure steady operation of the compressor at the highest speeds.

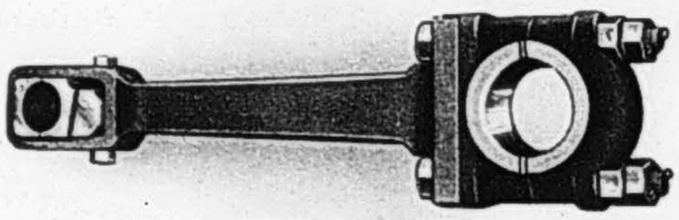


Crank Shaft

**Bearings:**

Main bearings are of extra large proportions, are cast integral with the frame and well supported by a proper distribution of metal. They are of the diagonal box type lined with the best grade of Babbitt metal and provided with grooves for the conveyance of oil. Provision is made for suitable adjustment of bearing cap to compensate for wear.

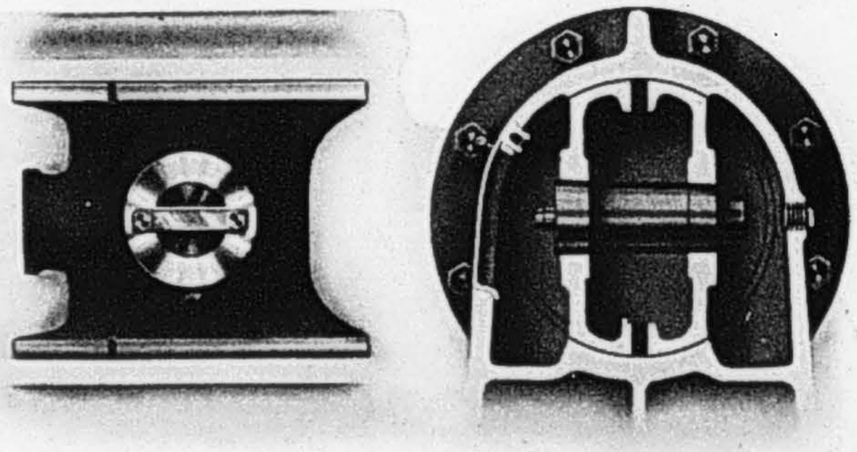
Oil lips are cast on the frame and caps and serve to catch and return to the interior of the frame any oil leaking through the bearings.



Connecting Rod

**Connecting Rod:**

Connecting rods of Class N compressors are not cast, but are of the best steel forgings procurable. The wrist pin end is of the solid type, fitted with bronze boxes, while the crank end is of the marine type lined with the best grade of Babbitt metal. No better rod is obtainable.



Two Views of Crosshead

**Crosshead:**

The crosshead used is of the box type; that is, without adjustable shoes, and is turned to perfectly fit the bore of the





crosshead guide. This construction is much better than the one with loose shoes for the following reasons:

(1) It is properly fitted before leaving the factory, therefore will never heat or pound.

(2) It cannot be tampered with by a fussy engineer.

(3) It is about twice the length of the ordinary adjustable shoe crosshead; hence it overtravels the guide nearly half its length at each end of the stroke, on account of which the wear on the crosshead and guide is always in a straight line.

(4) The bearing pressure per square inch is less than half that on the ordinary short adjustable shoe crosshead, consequently mechanical losses and wear are much less.

(5) It is better to have the shoe cast integral, because it can never become loose when running, and wedge in guide, causing damage; it is also more rigid and firm, and, on account of this, furnishes a complete and uniform bearing over its entire length, resulting in little or no wear.

(6) It is better solid for the reason that the center of the crosshead always remains in the center of the guide, as it cannot be adjusted out of center like the ordinary loose shoe type.

(7) The solid feature is of great advantage because there are no joints, adjustable shoes or parts fitted together to become distorted from being improperly fitted, incorrectly adjusted, or sprung out of shape through incompetent handling.

(8) The cost of upkeep is nothing as there is nothing to get out of order.

The life of this crosshead will be greater than that of any other part on the machine, as from actual service it has been found that after five years' running the tool marks are still present on the wearing surface, and if properly lubricated and the bath of oil in which it runs is kept clean, it is guaranteed for any length of time the purchaser wishes.

**Lubrication:**

Friction and wear are reduced to a minimum and heating and cutting of bearings absolutely prevented through the medium of a positive self-oiling system of lubrication for the main bearings, crank and crosshead pins and crosshead guides. The enclosed frame allows oil to be carried at a sufficient height in the case to enable the crank and connecting rod to dip at each revolution, this action splashing oil into distributors to every bearing. Lubrication is positive and copious regardless of the speed.

Sight feed oilers of an ample size are furnished for the steam and air cylinders.

**Regulation:**

Both steam and belt driven machines are equipped with a simple unloading mechanism by means of which the air inlet valves are held from their seats when the desired receiver pressure is obtained. This relieves the compressor of all load and proportions power consumption to air capacity requirements.

Steam compressors are provided with a combined speed governor and air pressure regulator of approved design, this automatically controlling the speed of the machine in accordance with the demand for air.

**Sizes and Capacities:**

Class N-SB and N-SS compressors are built in five standard strokes, 6-8-10-12 and 14 inches with steam and air cylinders, capacities, speeds and general dimensions as given in the preceding tables. See pages 5, 7 and 9.

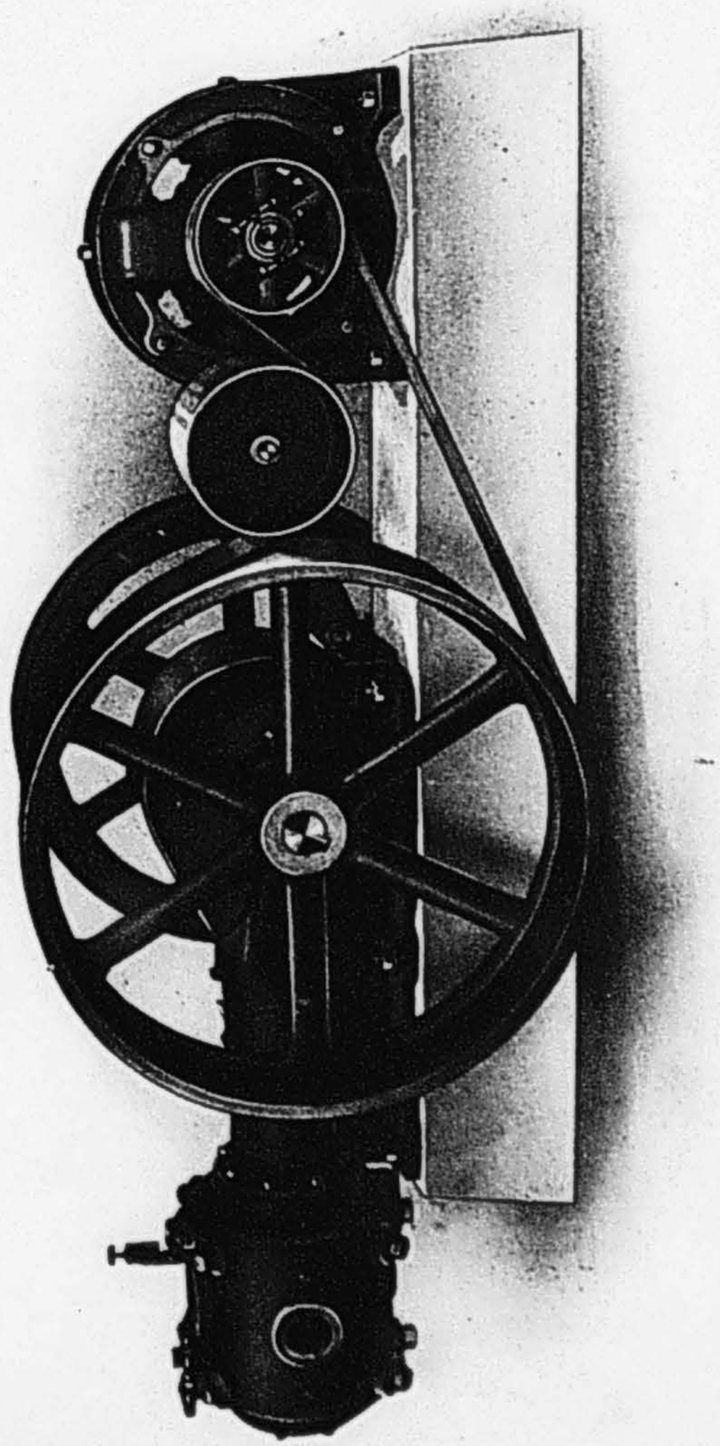
Where motor driven units are desired and where space is limited we recommend our N-SBE short belt driven machine, as illustrated on page 15. This type of drive is flexible, allows a maximum belt contact, relieves initial belt tension and is far preferable to gear or silent chain drives which are never desirable and which we never recommend.

## Materials, Tests and Guarantee

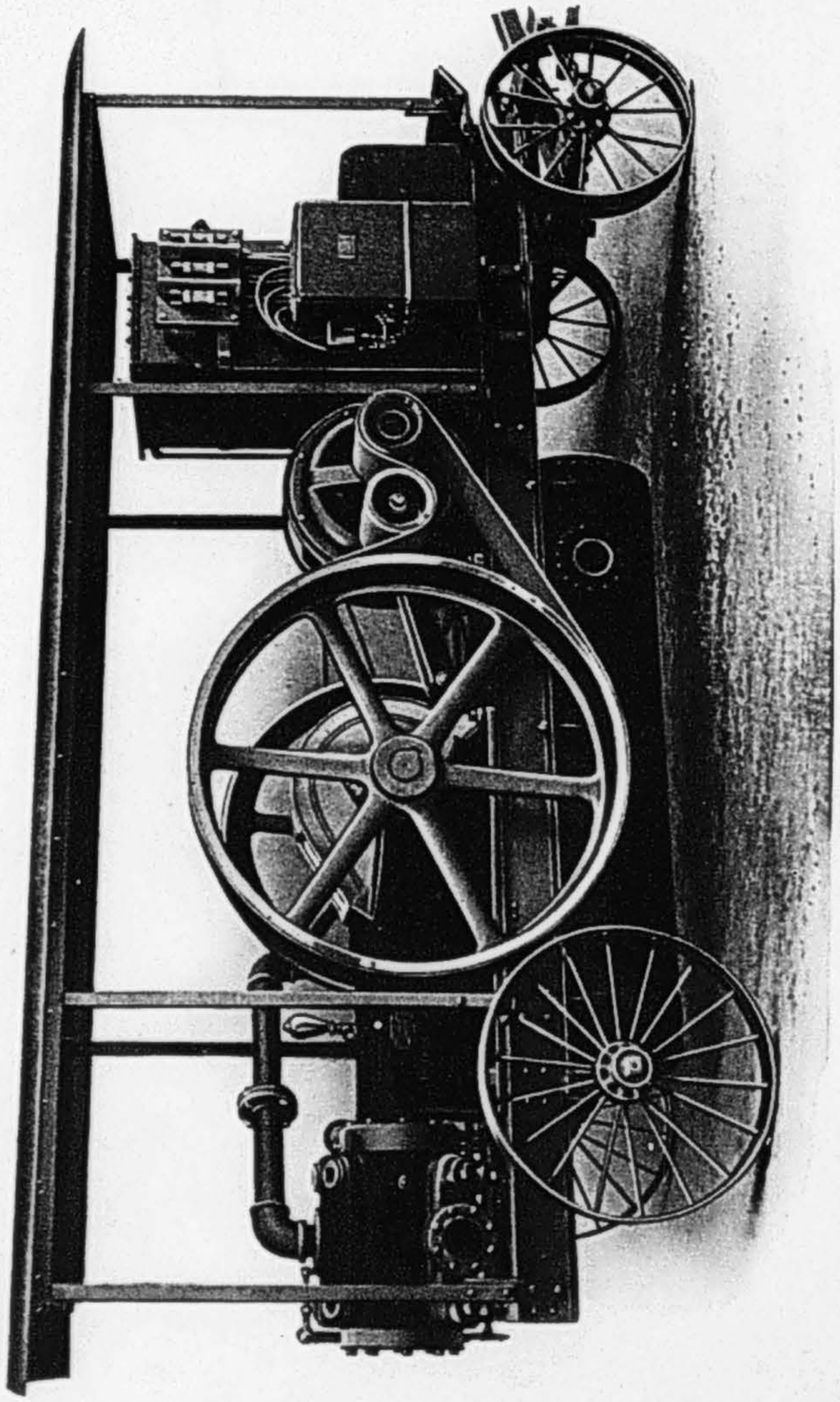
High grade materials, first class workmanship and durable construction are essential features of efficiency. The materials entering into "Chicago Pneumatic" compressors are the best obtainable, many of them being specially prepared and treated for the service to which the parts are subjected. An efficient system of shop inspection and tests of both raw and finished material is a further guarantee that our standards are maintained. Dimensional uniformity of parts is assured by a thorough system of jigs and fixtures. Duplicate parts may be ordered with the knowledge that they will be strictly interchangeable. Shop tests under full rated speed and pressure conditions, insure the satisfactory performance of all compressors, and we guarantee to replace within one year any parts that may become worn or broken, because of imperfect material or workmanship.







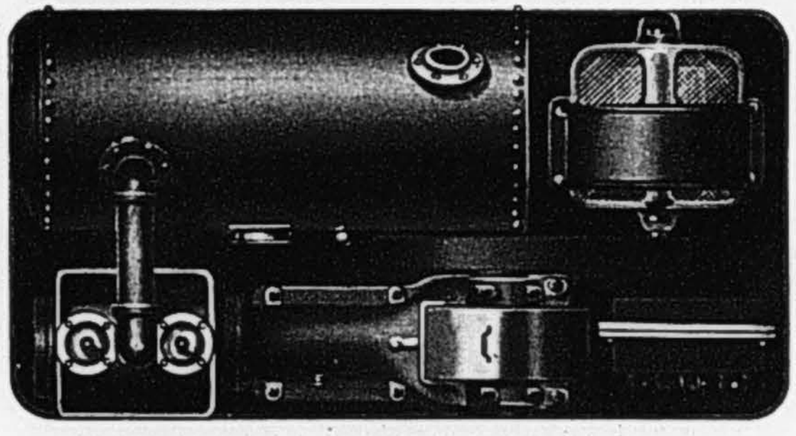
Class N-SBE. Single Short Belt Motor Driven Air Compressor



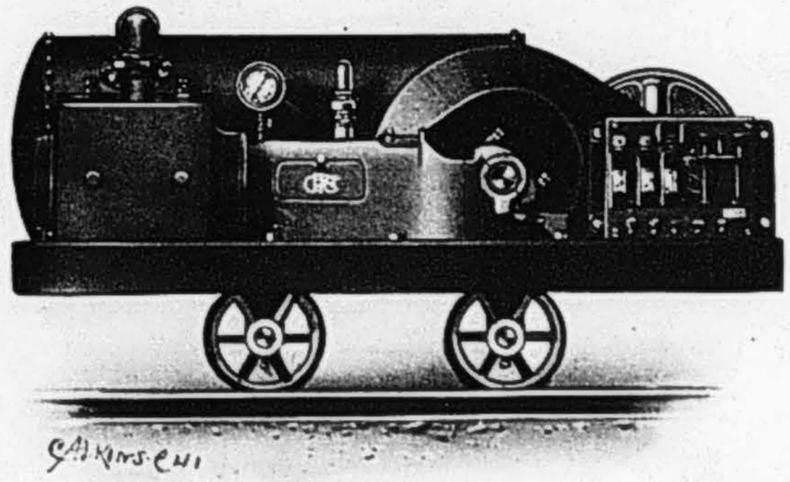
Class N-SBE. Single Short Belt Motor Driven Air Compressor Mounted on Steel Truck for Portable Use







Top View



Side View

**Class N-SBE Compressor Gear Driven with Motor and Receiver Mounted on Mine Car**

| Code | Size | Height | Width | Length |
|---|---|---|---|---|
| Nyabner | 7½ x 6 | 3'—6" | 4'— 2" | 6'—10" |
| Nyacton | 9 x 8 | 4'—0" | 4'—11" | 8'— 4" |
| Nyadlet | 10 x 10 | 4'—7" | 4'—11" | 9'— 0" |

For capacities and other details see page 5

# Air Receivers—Vertical and Horizontal Types

| Code Word | Torrefy | Tripid | Terebine | Trocar | Saltant | Sodium | Stannary | Strumn | Secant | Storax | Sectile | Septic |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Size No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Diameter, Inches | †20 | 24 | 24 | 24 | 30 | 36 | 36 | 42 | 42 | 48 | 54 | 60 |
| Height or Length, Feet | 5 | 5 | 6 | 8 | 6 | 6 | 8 | 8 | 10 | 12 | 12 | 14 |
| Contents, Cubic Feet | 10.9 | 15.7 | 18 8 | 25.0 | 29.4 | 42.4 | 56.5 | 76.8 | 96.2 | 152 | 191 | 275 |
| Thickness of Shell, Inches | 3/16 | 3/16 | 3/16 | 3/16 | 1/4 | 1/4 | 1/4 | 1/4 | 1/4 | 5/16 | 5/16 | 3/8 |
| Thickness of Heads, Inches | 1/4 | 1/4 | 1/4 | 1/4 | 5/16 | 3/8 | 3/8 | 3/8 | 3/8 | 7/16 | 1/2 | 9/16 |
| Weight (about), Pounds | 300 | 350 | 425 | 550 | 600 | 1000 | 1200 | 1600 | 1900 | 2900 | 3400 | 5200 |
| Diameter of Safety Valve, Inches | 1 | 1 | 1 | 1 | 1½ | 1½ | 1½ | 2 | 2 | 2½ | 2½ | 3 |
| Diam. of Inlet and Disch. Open'gs, Inches | 3* | 4½ | 5 | 5 | 6 | 6 | 6 | 8 | 10 | 10 | 10 | 12 |
| Diameter Flange, Inches | ..... | ..... | ..... | ..... | ..... | 11 | 11 | 13½ | 16 | 16 | 16 | 19 |
| Compressor Capacity for which best adapted Cubic Feet Free Air per Minute | 90 | 110 | 120 | 130 | 150 | 150 to 200 | 200 to 300 | 300 to 500 | 500 to 700 | 700 to 1200 | 1200 to 2000 | 2000 to 3500 |

Sizes 1, 2, 3 and 4 suitable for 100-lb. working pressure and for compressors of small capacity.

Sizes 5 to 12, inclusive, suitable for air compressors of medium and large capacity. For working air pressures not exceeding 110 pounds per square inch.

Made of best 60,000 pounds tensile-strength steel; side seams double riveted and tested up to 165 pounds water pressure; warranted safe and tight under 110 pounds working pressure. Fixtures include safety valve, pressure gauge, drain cock and flanges for inlet and discharge pipes.

The above sizes of receivers, 5 to 12, can be furnished to rest vertically or horizontally as may be preferred, and will be constructed with connections and fittings arranged in any manner desired.

Special prices on air receivers for higher pressures will be quoted upon application.

Size of tapped hole in flange can be reduced to suit conditions.

*Inlet and outlet openings tapped in reinforced shell; all other sizes have flanged air openings.

†20 inches x 5 feet are brazed tanks.

**Our Bulletin 34-G gives full information on Air Receivers, Aftercoolers, Air Line Drain Traps, Reheaters and Economizers**



The Chicago Pneumatic Tool Company issues the following bulletins any of which will be sent on request if the number of the bulletin is stated:

## Air Compressors

| Bulletin Number | |
|---|---|
| 34-A | Class "G" "Chicago Pneumatic" Steam Driven Compressors. |
| 34-B | "Chicago Pneumatic" Power Driven Compressors. |
| 34-C | "Chicago Pneumatic" Gasoline Driven Compressors. |
| 34-F | Design and Construction Class "G" "Chicago Pneumatic" Compressors. |
| 34-G | Air Receivers, Aftercoolers, Reheaters, etc. |
| 34-H | General Instructions for Installing and Operating "Chicago Pneumatic" Compressors. |
| 34-I | Instructions for Installing and Operating Class "N" Compressors. |
| 34-J | Instructions for Installing and Operating Class "O" Compressors. |
| 34-K | "Chicago Pneumatic" Fuel Oil Driven Compressors. |
| 34-L | General Pneumatic Engineering Information. |
| 34-M | "Chicago Pneumatic" Class "O" Steam and Power Driven Compressors. |
| 34-N | "Chicago Pneumatic" Class N-SS and N-SB Single Enclosed Compressors. |
| 34-O | Instructions for the Installation and Care of "Chicago Pneumatic" Gasoline Driven Air Compressors. |
| 34-Q | A Few Applications of Giant Gas and Fuel Oil Engines. |
| 34-S | Small Power Driven Compressors. |
| 34-T | Class "M" Corliss Enclosed Type Self-Oiling, Four Valve "Chicago Pneumatic" Steam Driven Compressors. |
| 34-U | Instructions for Installing and Operating Class N-SO Fuel Oil Compressors. |
| 34-V | Instructions for Installing and Operating Giant Gas and Fuel Oil Engines. |
| 34-W | "Giant" Class "A-O" Fuel Oil Engines. |
| 34-X | Class A-G Gas and Gasoline Engines. |
| 34-Y | "Chicago Pneumatic" Gas and Gasoline Driven Air Compressors. |
| 34-Z | "Chicago Pneumatic" Class N-SS Automatic Balanced Steam Valve Compressors. |

## Rock Drills and Hand Drills

| | |
|---|---|
| 148 | Chicago Valveless Hand Drills. |
| 149 | Chicago Portable Mine Hoist. |
| 150 | Chicago Coal Drills. |
| 151 | Chicago Slogger Rock Drills. |
| 152 | Chicago Gatling Drills. |
| 153 | Chicago Sinker. |
| 154 | Chicago Stoper. |
| 172 | Chicago Plug and Feather Drill. |
| | Stone Tools, etc. |
| 216 | Hummer Hammer Drills. |

# Chicago Pneumatic Tool Co.

General Office, - Fisher Building, CHICAGO
Eastern Office, 52 Vanderbilt Ave., NEW YORK

## BRANCH OFFICES

| | |
|---|---|
| BOSTON: | 185 Pleasant Street |
| BIRMINGHAM: | 834 Brown-Marx Building |
| BUFFALO: | 503 Ellicott Square Building |
| CINCINNATI: | 1008 Mercantile Library Building |
| CLEVELAND: | 2122 Euclid Ave. and 1241 E. 49th Street |
| DETROIT: | Second Ave. and Amsterdam Street |
| DULUTH, MINN.: | Torrey Building |
| EL PASO: | 303 San Francisco Street |
| ERIE, PA.: | 12th and Cranberry Streets |
| FRANKLIN, PA.: | No. 13th Street |
| JOPLIN, MO.: | 308 Wall Street |
| LOS ANGELES: | 925 Title Insurance Building |
| MILWAUKEE: | 1310 Majestic Building |
| NEW ORLEANS: | 513 Carondelet Street |
| OMAHA, NEB.: | 1023 W. O. W. Building |
| PHILADELPHIA: | 1740-42 Market Street |
| PITTSBURGH: | 10 and 12 Wood Street |
| PORTLAND, ORE.: | 46-48 Front Street |
| RICHMOND, VA.: | 1004 Mutual Building |
| SALT LAKE CITY: | 117-19 West 2nd South Street |
| SEATTLE: | 122 King Street |
| ST. LOUIS: | 813-15-17-19 Hempstead Street |
| ST. PAUL: | Pioneer Building |
| SAN FRANCISCO: | 71 First Street |

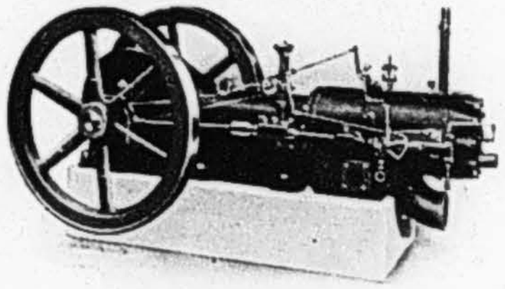
## FOREIGN

| | |
|---|---|
| Canada: | Montreal, Canadian Pneumatic Tool Co. Montreal, Toronto, Winnipeg, The Holden Co., Ltd. |
| British Columbia: | Vancouver, Holden Co., Ltd., 542 Pendar Street, West. |
| Mexico: | Mexico City, The General Supply Company, Av. Isabel La Catolica No. 51. |
| Northern Mexico: | (Sonora and Chihuahua). D. A. Carpenter & Co., El Paso, Texas. |
| Great Britain: Spain: Portugal: | London, The Consolidated Pneumatic Tool Co., Ltd., 9 Bridge Street, Westminster, S. W. |
| France: | Paris, Anciens Etablissement Gisenzer & Perreaud, 18-20 Faubourg du Temple. |
| Italy: | Milan, The Consolidated Pneumatic Tool Co., Ltd., via A Capellini 7. |
| Germany: Austria Hungary: Balkan States: Norway: Sweden: Holland: Switzerland: Denmark: | Berlin, Internationale Pressluft & Elektricitats-Gesellschaft m. b. H. Berlin, C 54. Weinmeisterhof, Weinmeisterstrasse No. 14. |
| Belgium: | Brussels, The Consolidated Pneumatic Tool Co., Ltd., 22 Chaussee de Forest, Porte de Hal. |
| Russia: | Petrograd, Phœnix Engineering Works Co., Ltd., Polustrovskaya Quay No. 39. |
| India: | Bombay, Consolidated Pneumatic Tool Co., Ltd., Rampart Row, Fort. Calcutta, The Consolidated Pneumatic Tool Co., Ltd., 8 Lal Bazar St. |
| Japanese Empire: | Tokyo, Osaka, Seoul, Dairen. The F. W. Horne Co. |
| Philippine Islands: | Manila, F. L. Strong Machinery Co., 64-68 Calle Echague. |
| Australia: | Sydney, Henry W. Peabody & Co. |
| New Zealand: | Wellington, Henry W. Peabody & Co. |
| South America: | Buenos Aires, Argentina, Evans, Thornton & Co. |
| South Africa: | Johannesburg, The Consolidated Pneumatic Tool Co., Ltd., 190 Main St. |
| Hawaiian Islands: | Honolulu, H. S. Gray & Co., 832 Fort Street. |
| Cuba: | Havana, J. F. Berndes & Co., Box 349. |



# Giant Fuel Oil Engines

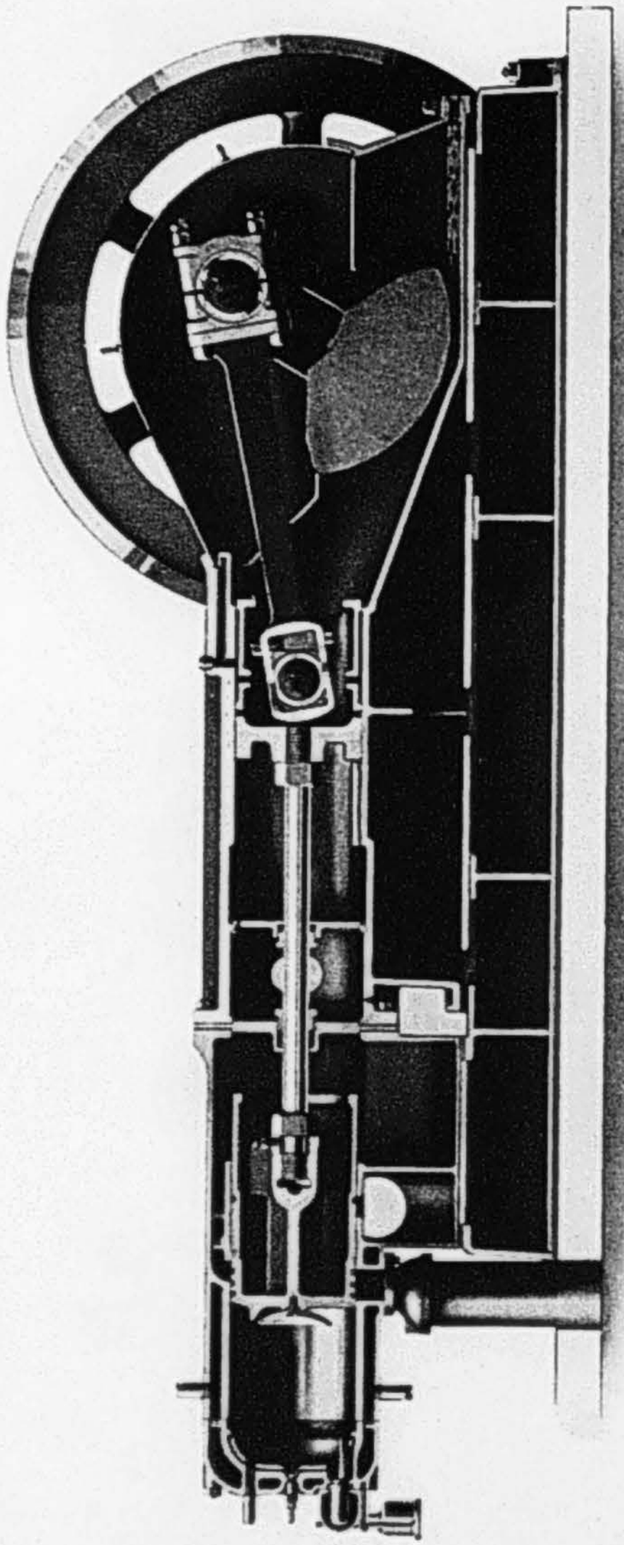




# Bulletin No. 34-W

## Chicago Pneumatic Tool Company

Chicago New York



Sectional View of Giant Fuel Oil Engine Showing Details



CHICAGO PNEUMATIC TOOL COMPANY

# The Giant Low Grade Fuel Oil Engine

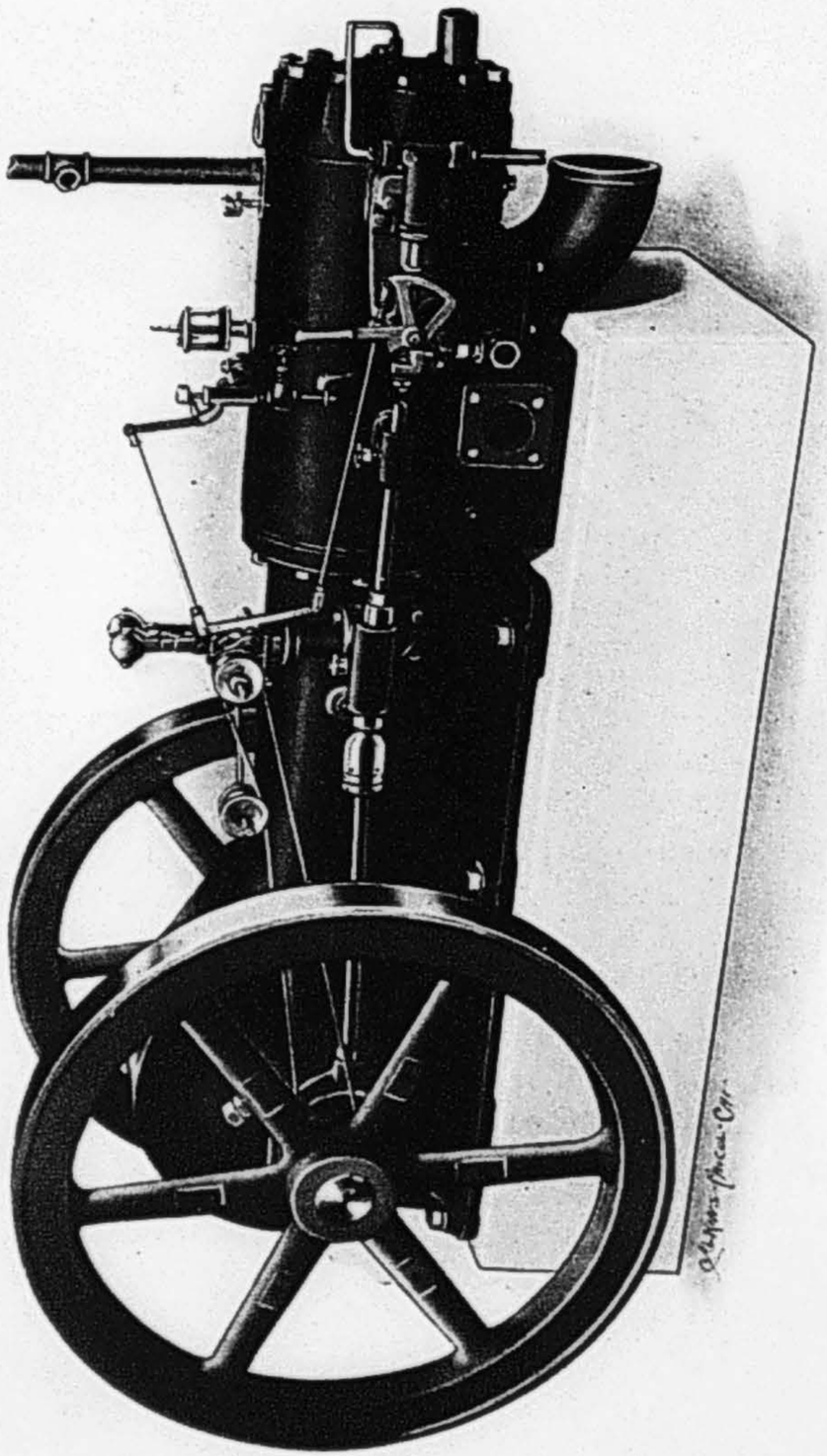
More than twelve years have passed since we first entered the internal combustion engine field with our type H-SG Chicago Pneumatic Gasoline Engine Driven Air Compressor for portable and stationary service in the operation of Pneumatic Riveting, Chipping, Caulking and Drilling Tools. Subsequently our Rockford Gasoline Driven Section Car and later our Little Giant Commercial Motor Truck were designed and successfully marketed. All of these have gained success by reason of their correct design and the exceptional quality of the materials and workmanship of which they are made.

Realizing the widespread demand existing for a low grade fuel engine, correct in principle and built to endure the severe usage that such engines must withstand, we have employed our broad experience and exceptional facilities in the design and production of the Giant Low Grade Fuel Oil Engine, described in the pages following.

The severity of the service and the widely varying degree and quality of fuels employed imposes requirements in an engine of this character that must be met with an intelligent knowledge of service conditions only obtainable through broad observation and thorough tests. Intricate mechanism and delicate adjustments have no place in an engine for this work.

The Giant Low Grade Fuel Oil Engine is the result of several years of painstaking development, and we offer it with the confidence that it will share the reputation of our other products.

34-W—*Second Edition*
May 1, 1916



Class A-O Giant Fuel Oil Engine





# Giant Fuel Oil Engines

**General Operating Conditions:**

**GIANT** engines are guaranteed to run on any mineral oil of 28° Beaume scale or lighter, containing not over one per cent sulphur. There are a number of oils well below 28° Beaume scale on which they will operate satisfactorily, but this depends upon the characteristics of the particular oil, such as its asphaltum content, freedom from sand etc., so that a general guarantee cannot be given, though recommendations for heavy oils can and will be made.

Most of the common crude oils, fuel oils, and residuums are naturally included in the above guarantee. A few of the well-known oils particularly suited to the operation of the engines are as follows: Star Oil, Diesol, Calol, Stove Oil, Solar Oil, Gas Oil, Kerosene, and all of the distillates between Kerosene and Lubricating Oil.

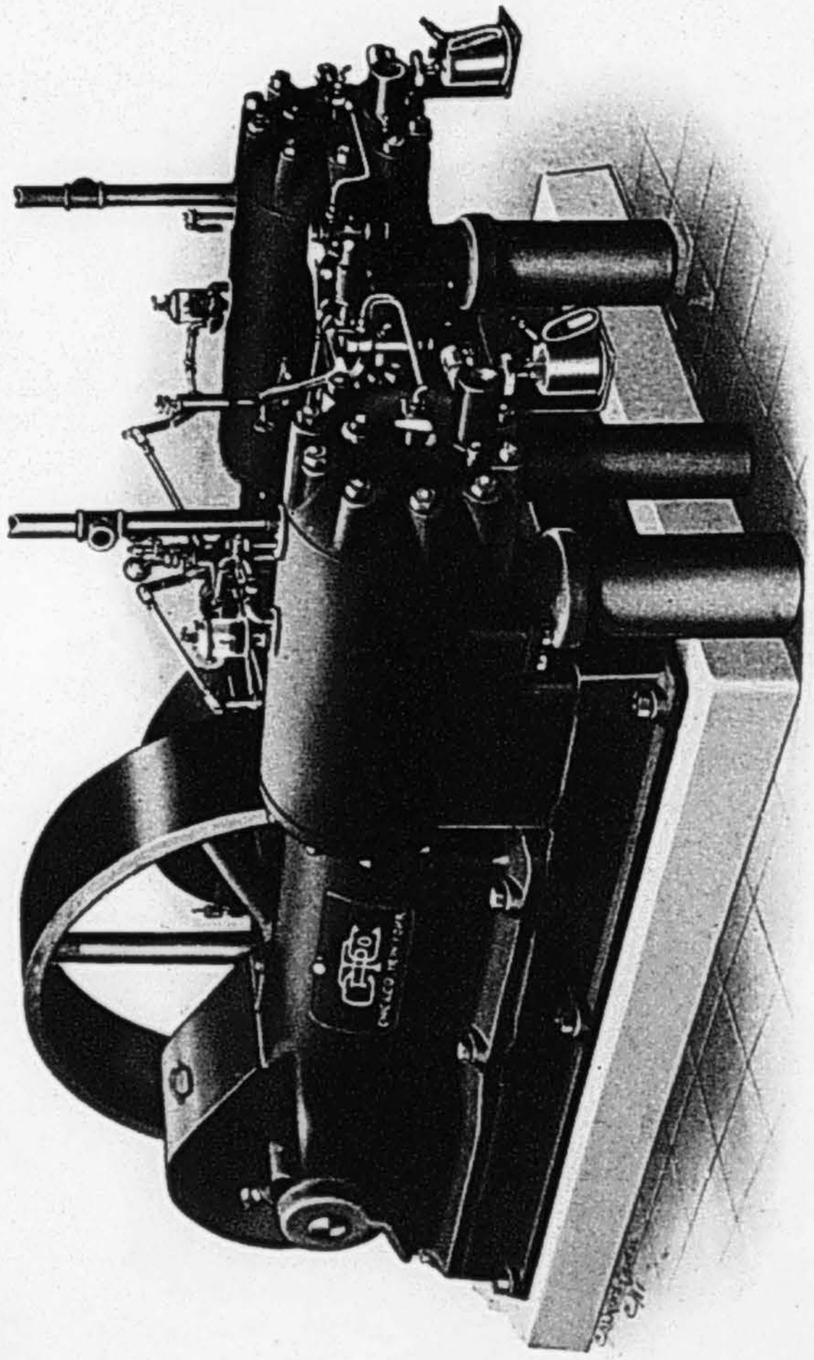
A number of the above fuels are obtainable for three cents per gallon. To the power user this means opportunity. Records of many Giant engines are available, showing, to take a typical example the fifty horsepower size, fuel costs per hour of from 12 to 15 cents.

**General Type:**

The engine is of the horizontal, straight line, single cylinder type with crosshead. In the larger sizes it is mounted on a substantial sub-base so designed that when the machine is in operation it is free from vibrations. Parts are relatively few in number and the engine is well suited to rough heavy duty under conditions that prevent the employment of a highly trained attendant. In operation it requires little attention. Economy and durability are its characteristics. The general design is strong, compact and graceful, and the symmetry of every feature indicates the care used in its development.

**Main Frame:**

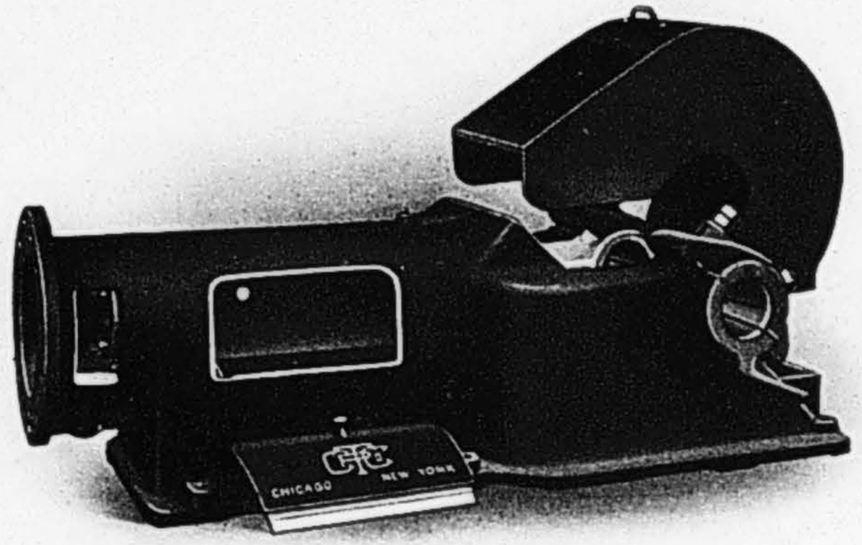
The main frame is of pleasing appearance and rugged construction. It is completely inclosed. Crosshead guides are bored in absolute alignment with cylinder centers, thus insuring perfect operation of running gear. Removable oil tight cover plates and shields, as shown, give ready access for inspection and all neccessary adjustments.



Class A-DO Duplex Giant Fuel Oil Engine



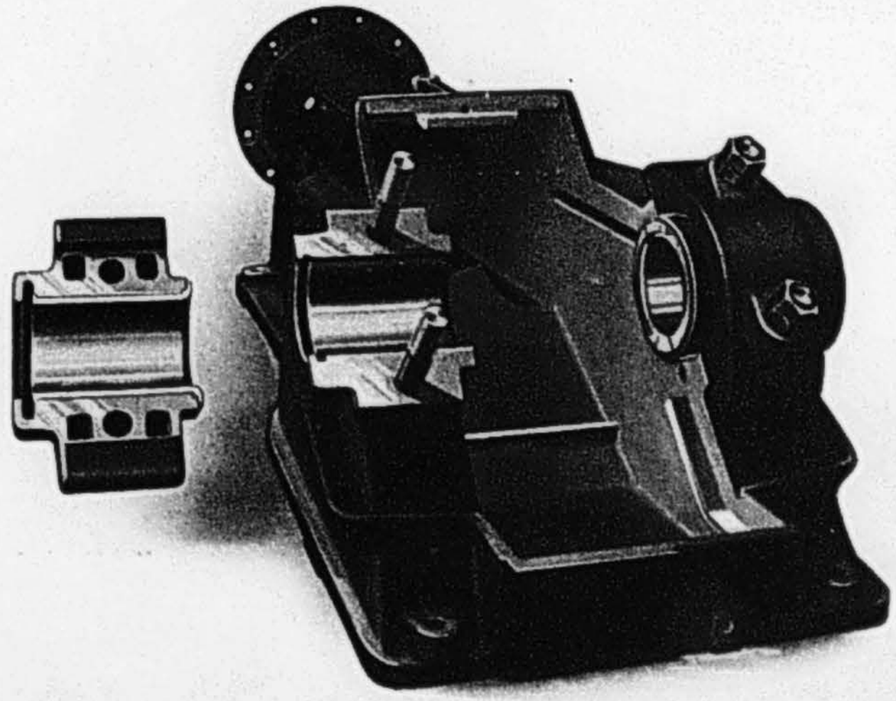





Main Frame

## Main Bearings:

On machines of 12-inch and 14-inch stroke main bearings of extra large proportions are cast integral with the frame. They are of the diagonal box type, lined with the best grade of babbitt metal and properly oil grooved. The bearing caps are adjustable. Oil lips



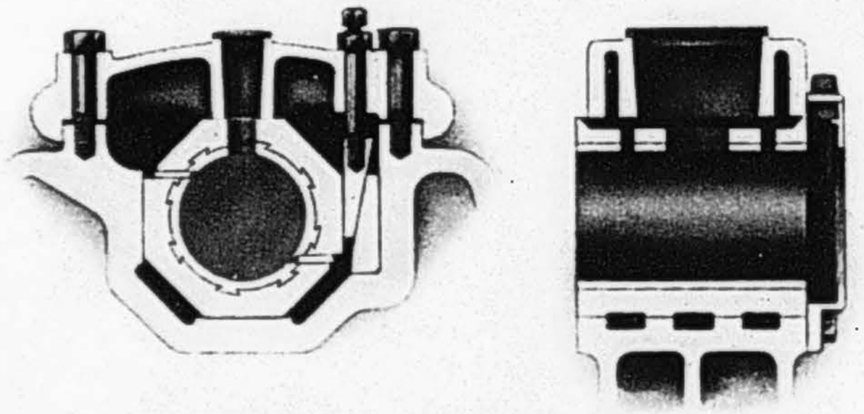
Main Bearings for 12-inch and 14-inch Stroke

cast on the frame and caps serve to catch and return to the interior of the frame any oil leakage from the bearings.

The position of the bearing on the frame (see illustration) possesses several noteworthy advantages. The arrangement transmits the stresses due to the thrust of the piston to the bearing cap. This is logical. When, as happens in all engines, it becomes necessary to take up the bearings the action forces the shaft back to its original alignment—an effect not possible when a diagonal bearing in reversed position is mounted on the frame. The bearing caps are provided with lugs which grip the frame.

Should anything go wrong it is the bearing cap which will receive the effects of any added strain, and should fracture occur it will be through the lugs. It is significant that we never have replaced a frame or a bearing cap of this type.

Engines of 18 inch and 21 inch stroke are equipped with the highly developed type of bearing used in our large duplex compressors. The design of the jaws and boxes is such that the latter



Main Bearings for 18-inch and 21-inch Stroke

may at any time be removed by simply raising the shaft enough to relieve the pressure due to its weight.

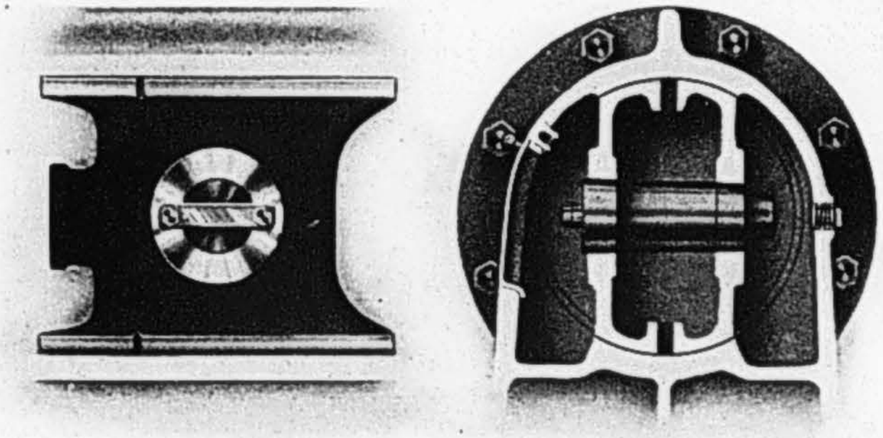
The best quality of babbitt is employed for lining the boxes and suitable oil channels are provided. Adjustments to compensate for wear are made by means of wedges. As will be seen, the design employed gives great strength with delicate and secure adjustment.

**Crosshead:**

The crosshead is of the single piece, box pattern, without adjustable shoes which is standard on all our engines and compressors. This type has come into common use throughout Europe almost







Two Views of Crosshead

entirely replacing the older designs with adjustable shoes. We were the first builders to adopt it in America, and it is a matter of pride that in the ten years during which we have been using this type of crosshead we never have had any trouble with it nor a complaint from any purchaser. Many of our early machines are running now, with crossheads in perfect adjustment and with tool marks still visible on the wearing surfaces.

The superiority of this form of construction over the type with loose shoes is in part as follows:

It is properly fitted before leaving the factory; therefore will never heat nor pound.

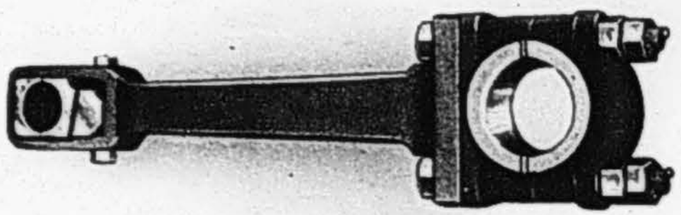
It is over twice the length of the ordinary adjustable shoe crosshead, hence the bearing pressure per square inch is less than half that on the older, complicated type.

It over travels the guide nearly half its length at each end of the stroke, hence the longitudinal wear on the guide is in an even straight line throughout its length.

It is always rigid and firm, furnishing a complete and uniform bearing. As Professor Sweet says, "Things that do not wear out of true do not wear much."

It cannot be tampered with. The crosshead is always in the center of the guide. There are no joints or adjustable parts to become distorted. The cost of up-keep is nothing, as there is nothing to get out of order.

The crosshead is of close-grain cast iron. The end of the connecting rod is centrally placed in the crosshead, thus obviating any tendency to side thrust. Wrist pin is of the best carbon steel, accurately finished, fitted into the crosshead on a taper and secured by a steel strap and screws. If properly lubricated **we guarantee the crosshead for the life of the machine.**



Connecting Rod

**Connecting Rod:**

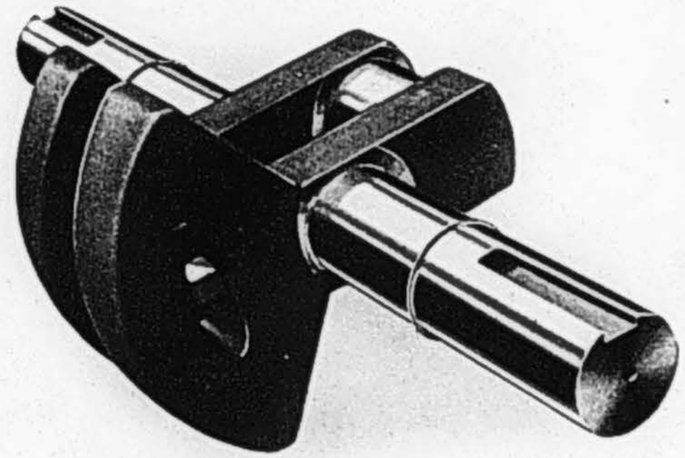
Connecting rod is an open hearth, high grade, steel forging. The wrist pin end is of the solid type, fitted with bronze boxes having wedge adjustment. The crank end is of the marine type lined with the best grade of babbitt metal.

**Lubrication:**

The lubricating system employed on the engine is the simplest and most efficient yet devised for machines of this character. It is a positive self-oiling system for the main bearings, crank and crosshead pin and crosshead guide, preventing friction and wear and the heating and cutting of bearings. The counterweights dip in a bath of oil at each revolution, the action flushing distributing channels which lead to every bearing. Circulation is continuous; the bearings are constantly flooded with oil which runs through them and is returned to the crank-case to be used again. No attention is needed, the system is practically automatic, requiring merely the addition of a very small amount of oil each week to replace losses. The cylinder is lubricated by a sight feed oiler of large size except on machines of 18-inch and 21-inch stroke which are provided with mechanical forced feed lubricators of approved design.







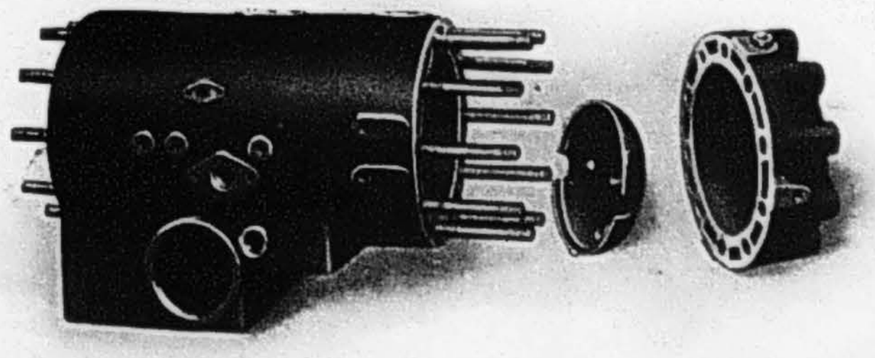
Crank Shaft

**Crankshaft:**

The crank shaft is forged from the best grade of open hearth steel obtainable, and carefully turned to proper size. It is conservative in design. Proportions are large. It is counterbalanced to insure smooth running of the engine.

**Cylinder and Head:**

The three port cylinder shown in the illustration has been developed to its present high state of efficiency by our engineers. It is particularly well adapted for fuel oil engine service, and in this direction our design can hardly be improved upon. It is of the



Power Cylinder and Head

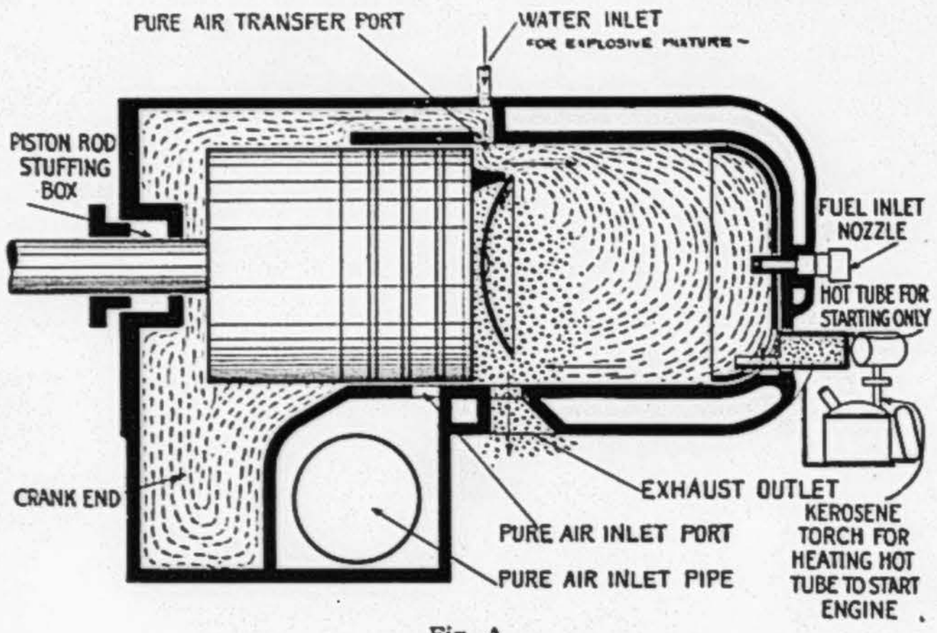



Fig. A

Position of Piston at Time of Scavenging and Exhaust

The compressed air from the crank end of the cylinder is shown rushing through the pure air transfer port into the combustion chamber sweeping out the burned gases through the exhaust outlet—pure air inlet port is closed by the piston.

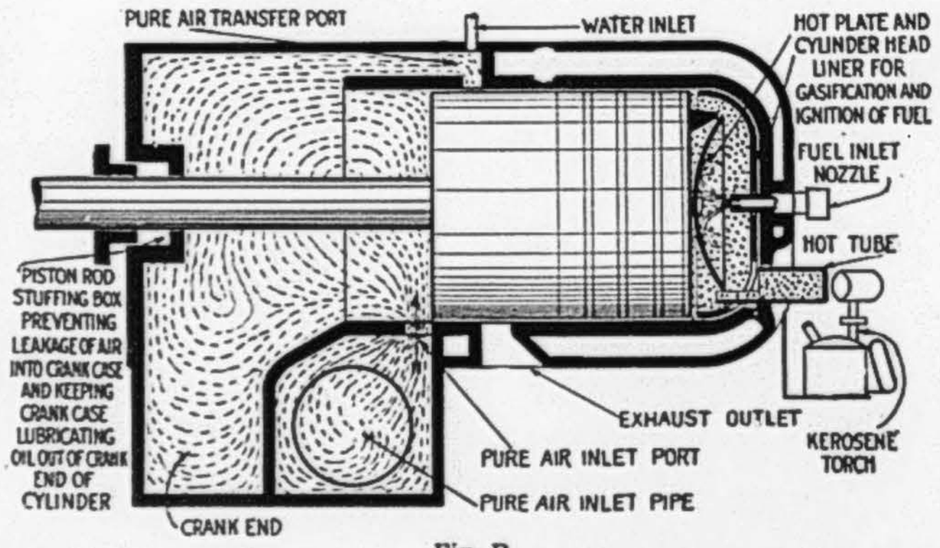



Fig. B

Position of Piston at Time of Combustion

Showing the fuel entering the combustion chamber and pure air entering crank end of cylinder through pure air inlet port. The exhaust outlet and pure air transfer port are closed by the piston.

Note. Dashes represent pure air; dots represents burned gases.



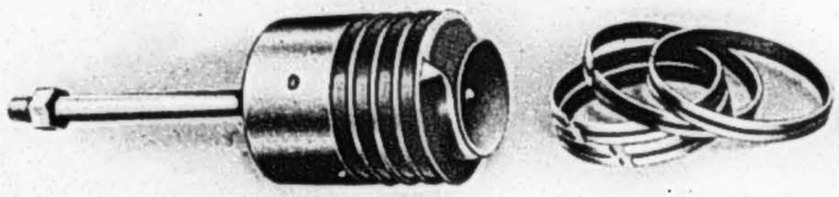


valveless, two-cycle, low compression type. Water jackets are cast integral with the cylinder and cover only that portion in which combustion takes place. This construction eliminates unequal expansion with its resulting stresses. The bore is accurately finished and wears to a fine polish with use.

The cylinder head is a separate casting, completely water jacketed. Mounted inside the head is a concave malleable iron hothead forming the rear wall of the combustion chamber. When the engine is in operation this plate is kept hot and it is, therefore, of great importance in vaporizing both the oil and water used in combustion and in maintaining a more stable heat condition in the combustion chamber than would be possible if the explosion acted directly against the water cooled walls of the head.

## Piston and Rings:

Piston is of the trunk type, made of cast iron and fitted with four self-adjusting spring rings. These are wider than the admission and exhaust ports and, therefore, cannot catch or break. Deflector on the piston is of an especial form adopted as the result of some two hundred experimental tests, which insures thorough scavenging of the cylinder at each stroke. Fitted to the head of



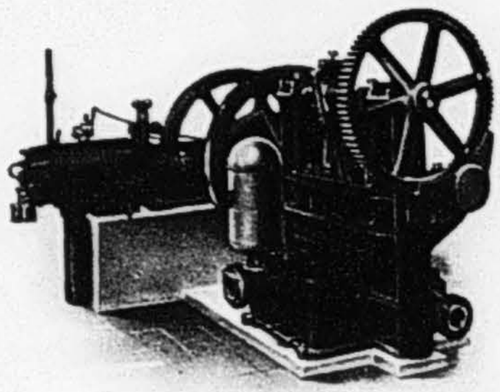
Power Piston and Rings

the piston is a malleable iron hot plate which serves as an igniter for the oil. This plate forms the front wall of the combustion chamber and is so designed that the fuel charge is spread smoothly over its surface in a thin film which vaporizes instantly.

## Ignition and Regulation:

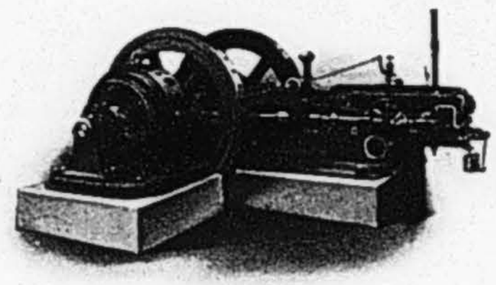
The ignition system is perfect. A small oil pump injects the fuel against a hot plate on the piston, as it approaches the end of the compression stroke.

# Let GIANT Engines Do Your Work

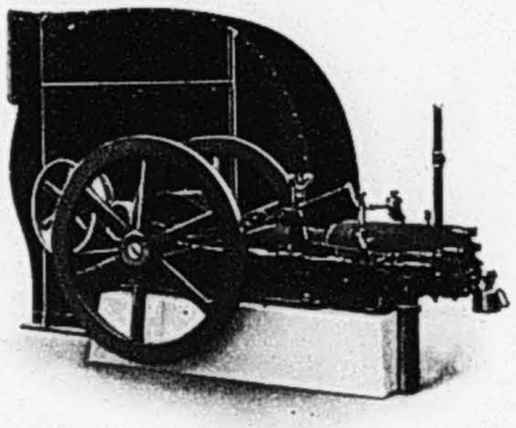


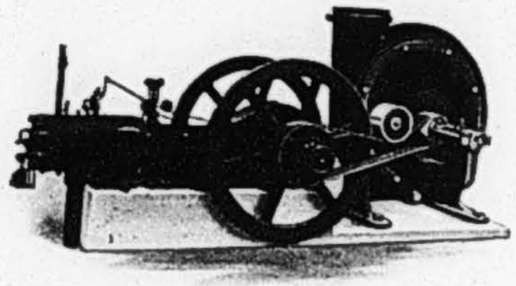
Giant Oil Engine
Operating
Goulds Triplex Pump

Giant Oil Engine
Direct Connected
to Generator

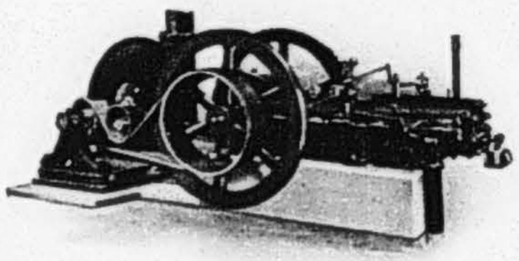


Giant Oil Engine
Operating
Planoidal Fan



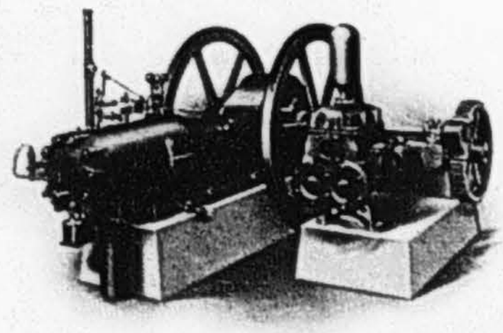


Giant Oil Engine
Operating
Volume Exhauster



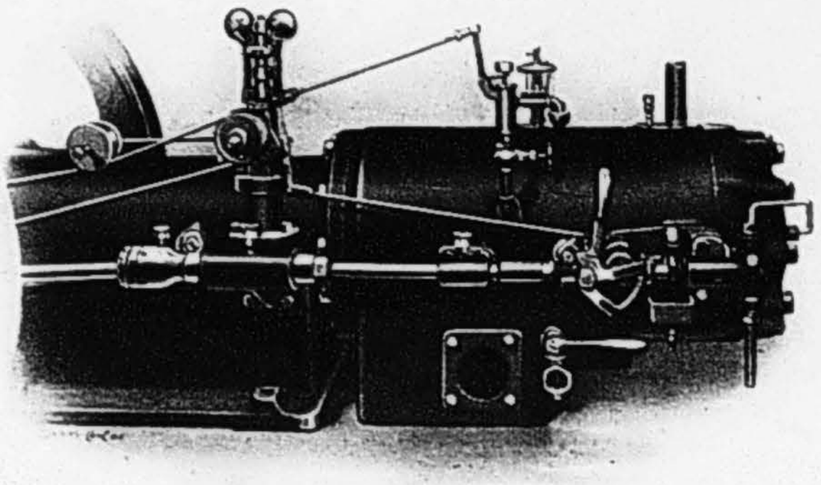
Giant Oil Engine
Operating
Alberger Pump

Giant Oil Engine
Driving
Gardner Pump



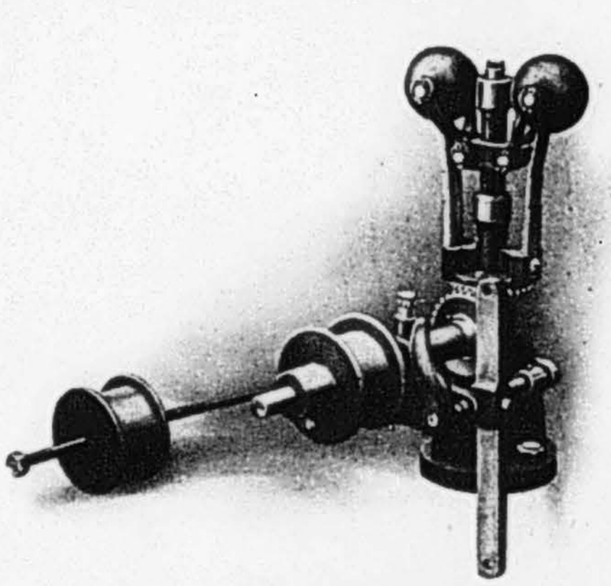
GIANT OIL ENGINES are suitable for many purposes. They have been adapted for driving electric generators, fans, blowers, exhausters, centrifugal and horizontal pumps, vertical triplex pumps, oil well powers, refrigerating machines, hoists, ne-sh ng, etc. They are in use on irrigating projects, in mines, machine shops, boiler shops, foundries, ice plants, stamp mills, planing mills, flour mills, cotton gins, laundries, printing offices, and manufacturing plants of all descriptions. The dependability of GIANT ENGINES and their smoothness and noiselessness of operation enable them to cover the entire industrial field of the gasoline engine. Their low operating costs make them desirable for many purposes where the cost of other forms of power is prohibitive. We have data available on numerous types of oil driven equipment and are prepared to make recommendations, and to furnish complete installations. Address inquiries to our nearest office. See page 28.

**CHICAGO - CHICAGO PNEUMATIC TOOL COMPANY - NEW YORK**



Cylinder, Pump and Governor Connections

The oil is distributed instantly over the surface of the plate, gasified and ignited. The rapidity of the ignition makes it possible to inject the fuel into the cylinder late in the stroke, thereby avoiding the abnormal pressures of pre-ignition.



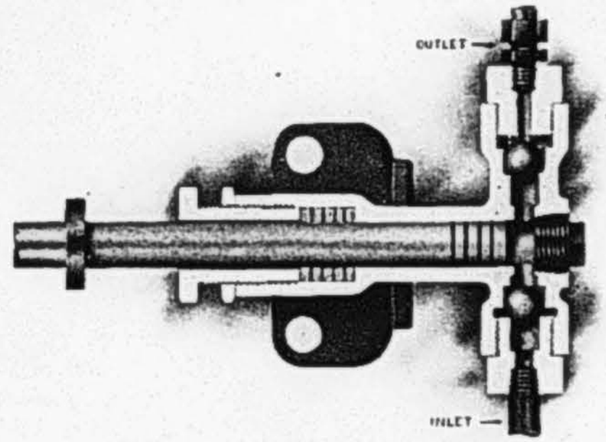
Speed Governor

Increased economy is secured by the use of water with the fuel oil. The water pipe enters the shell at a point just above the pure air port and the liquid is drawn into the combustion chamber with the pure air. The water reduces the flame propagation and





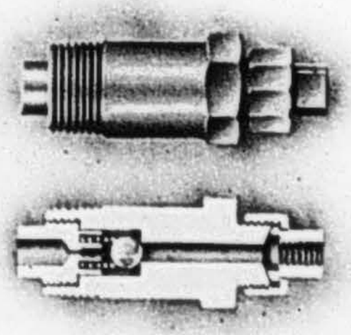
thus keeps the initial pressure down to slightly more than the compression. It also keeps the cylinder free from carbon and the piston rings from sticking.




Sectional View of Fuel Pump

The quantity of both oil and water admitted to the combustion chamber is regulated by a simple, but sensitive fly-ball governor. Combustion is so complete by the time the exhaust port is opened that there is no fuel loss.

The ignition system is fully covered by patents and it is, therefore, an exclusive Giant feature.



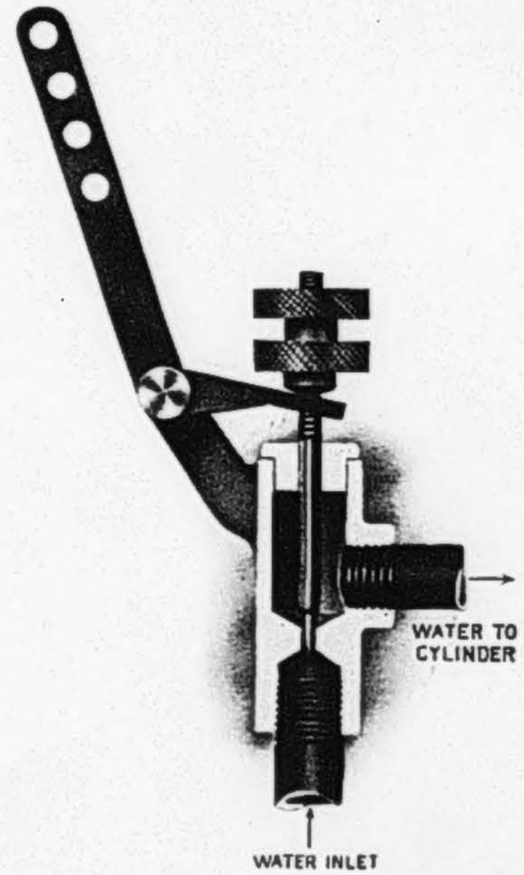
Assembly and Section of Injection Nozzle

**Fuel Injection Pump:**

The oil pump is of the positive plunger type fitted with ball valves and operated from an eccentric on the crank shaft. The illustrations show clearly the method of operation which is very simple and efficient.

A cam under the control of the governor rests against the collar shown on the plunger rod, the position of the cam determining and regulating the stroke of the pump and consequently the quantity of fuel injected. A hand operated lever, also acting upon the plunger, is provided for stopping the engine.

Injection is made through a combination ball check valve and nozzle which is made of steel and screwed into the center of the cylinder head.




Section of Water Regulator

**Water Regulator:**

Particular attention is invited to the simplicity of our water regulator. It is nothing more than a needle valve which is at all times under the control of the governor and automatically varies the admission of water to meet load requirements. By thus proportioning water supply to the quantity of fuel injected we are able to obtain an appreciable increase in power and economy to prevent overheating of cylinder head and burning of the lubricating oil, to eliminate shocks in the engine and to insure freedom from carbon deposits.





**Hot Tube:**

The hot tube in the fuel cylinder head near the bottom is used only for starting the engine. It is heated with a torch to a red heat, the torch being removed as soon as the engine starts. The tube does not remain red-hot but gradually cools.

**Flywheels:**

Fly-wheels are of extra large diameter to facilitate starting and are of sufficient weight to insure steady operation. For the smaller sizes of the single cylinder engine there is furnished a plain belt pulley and for the larger sizes a friction clutch pulley which may be bolted to the arms of either fly-wheel.

**Air Starter:**

The smaller single cylinder engines may be started by hand. For all of the larger sizes and for all of the duplex engines an air starter is furnished. The apparatus consists of a small, vertical, air cooled, single acting air compressor, driven by a small gasoline engine. An air receiver suitable for 150 lbs. working pressure, with a pressure gauge, pop safety valve and drain cock is provided. This equipment takes up little space. It can be placed at any convenient point. Its cost of maintenance and operation is practically nothing and it does its work satisfactorily.

**Sizes and Capacities:**

Class A-O single cylinder engines are built in eight sizes.

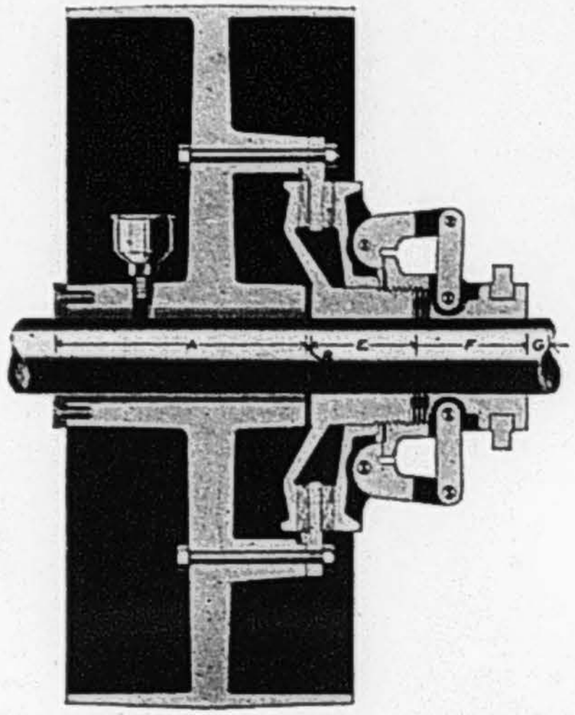
Class A-DO duplex engines are built in six sizes.

The horse power ratings and general dimensions are given in the tables on pages 24 and 25.

**Friction Clutch:**

Friction clutch, which is furnished at an extra price when required is simple, logical, and compact in design. The toggle arrangement gives a powerful leverage, a factor of importance because it determines the degree of pressure that can be applied to the friction plates. Release is positive; in the disengaging operation the friction plate is forced away from the friction surface.

The friction contact is wood to iron. Experience has proved that, regardless of what material the friction surfaces are made of, one or both of them will wear. With the arrangement here employed wear comes upon the wood, which can be replaced at little expense. All parts of the apparatus are readily accessible.



Friction Clutch

The outboard bearing is of the adjustable, ring-oiling type, with large wearing surfaces. It is of rugged construction and pleasing design. We consider this clutch and bearing to be the best now obtainable for use with our machines.

**Materials, Test and Guarantee:**

Modern engine practice has proved that high grade materials, first class workmanship, and durable construction are essential features of the most efficient design. With these cardinal points in mind the raw materials entering into GIANT engines are selected from the best the market affords, many of them being specially prepared and treated to best meet the stresses to which certain parts are subjected. An elaborate and efficient system of shop inspection and tests of both raw and finished material is an additional assurance to the buyer that all finished machines are in keeping with our established degree of excellence. Dimensional uniformity of parts is also maintained through a complete system of jigs and fixtures and repair parts can always be ordered when required with the knowledge that they will be strictly interchangeable with the old. Shop tests under full rated speed and full load conditions, assure the satisfactory performance of the machines after installation and our standard guarantee to replace within one year any parts which may become worn or broken due to faulty material or workmanship affords a full measure of protection to the buyer.





# Vital Points in Oil Engine Design

GIANT ENGINES differ from all others in one or more of three broad features of design. These are in the horizontal position of the engines, the use of a crosshead, and the use of a hot plate instead of a hot ball or electric ignition.

We believe our practice to be superior in these respects and we invite your attention to the following brief discussion of its comparative merits:

**Horizontal vs. Vertical:**

A vertical engine is very inaccessible; all parts in the crank case must be reached through small openings. If the piston has to be taken out the connecting rod must be disconnected from the crank pin, the cylinder head removed and the piston drawn out of the cylinder by means of chain blocks or some kind of a hoist. To remove the crank shaft, one or both fly wheels must be taken off, the flanges which support the main bearings removed and the shaft taken out of the frame endwise. This requires considerable extra floor space.

In the GIANT horizontal engine all parts in the crank case are accessible, as the crank case cover can be removed without the use of any tools. If it becomes necessary to remove the piston it can be screwed off the piston rod and after taking off the cylinder head, drawn out of the cylinder by one man without the use of jacks or hoists. The crank shaft can be taken out without taking off the flywheels by simply removing the main bearing caps and lifting it out vertically.

As vertical engines are not built with crossheads all of the arguments below in favor of the crosshead apply against them.

**Crosshead vs. No Crosshead:**

In any two cycle engine not fitted with a crosshead it is necessary to have the crank case as nearly air tight as possible. The compressing of the air for scavenging the cylinder must be done in the crank case and if it is not tight, air will leak out and impair the scavenging, and therefore the proper operation of the engine. This is so important that some builders put stuffing boxes on the outer

ends of main bearings. The crank case covers are all necessarily small and are bolted down on gaskets. This makes the parts within the case very inaccessible.

In GIANT engines the air for scavenging is compressed in the crank end of the cylinder and the crank case therefore does not need to be air tight. The accessibility of our crank case has been noted above.

When a crosshead is not used it is much more difficult to keep the bearings and particularly the piston pin; which must be used in all such engines, properly lubricated. Splash lubrication is dangerous because the lubricating oil in the crank case is liable to be carried through the intake port with the scavenging air and cause the engine to run away.

In GIANT engines the crosshead construction permits the crank end of the cylinder to be closed, hence, lubricating oil cannot reach the transfer port and splash lubrication can be safely used.

When no crosshead is used the piston must act as a crosshead and the cylinder act as a guide. In such an engine the piston must be made longer than otherwise necessary, in order to have room for the piston pin and to prevent as much as possible excessive wear on both piston and cylinder, caused by the piston being forced hard against the top and bottom of the cylinder by the action of the connecting rod.

This uneven cylinder wear can never be entirely prevented without the use of a crosshead, and as it increases it permits oils of heavy base to work back and under the piston rings, hardening there and causing additional wear. The disadvantages do not stop here. The extra friction covered by lengthening the cylinder and crosshead is greater than the friction of a crosshead.

In GIANT engines the use of a crosshead permits both piston and cylinder to be shortened. Friction is also minimized, and the forcing of the piston against the top and bottom of the cylinder entirely prevented.

Crosshead construction adds great stability to a machine. There is little doubt but that the addition of this one feature doubles the working life of an engine.

### Hot Plate vs. Hot Ball or Electric Ignition:

Electric ignition has not been successfully applied to the firing of low grade fuels. Such engines as employ this system are suitable only to burning kerosene and similar high grade oils. As Giant





engines are designed to use the widest possible range of fuels it follows that electric ignition is not feasible for them.

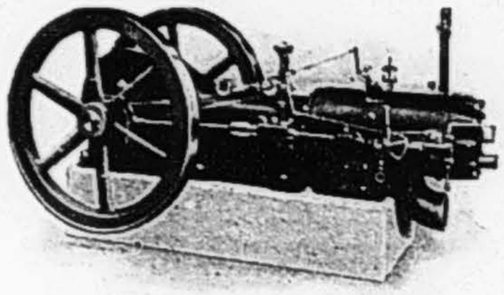
Hot balls fill up with carbon and stop the engine. Hot plates do not. Hot balls burn out quickly and as a result frequently burst. Hot plates are not subjected to any bursting pressure and will not burn out as quickly as the hot ball.

In any engine using hot ball ignition the oil in being injected into the cylinder, comes in contact with very little heated iron as compared with the hot plate method used in the Giant. As a result it takes much longer to gasify the oil and consequently it must be injected into the cylinder much earlier in the stroke than when using the hot plate and liner. The earlier the oil is injected into the cylinder of an oil engine, the more danger there is of pre-ignition and excessive initial pressures.

In GIANT engines, the oil is forced into the cylinder, striking the center of a concave malleable iron hot plate. The shape of this plate is such that the oil is instantly distributed over its surface, gasified and ignited. The rapidity of the ignition enables us to inject the fuel into the cylinder late in the stroke, thereby avoiding the abnormal pressures incident to pre-ignition.

With the proper amount of water going into the cylinder and the engine not loaded above its rated power, the initial pressure in the cylinders of GIANT engines is only about 25 pounds more than the compression. This initial pressure is maintained for a considerable distance along the stroke giving a distribution of pressures approaching those obtained in the steam engine. This permits higher compression to be used which increases fuel economy.

**When you buy GIANT ENGINES, you buy engines of the stanchest quality—engines whose characteristics are in the highest degree, durability, simplicity and economy of operation.**



Giant Class A-O Fuel Oil Engine

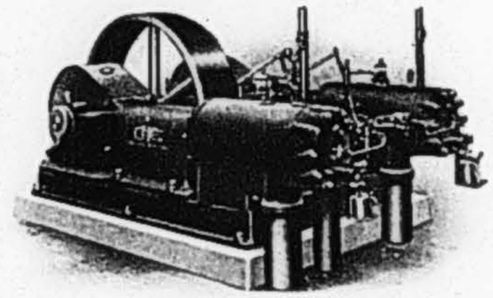
# Giant Fuel Oil Engines

## Class A-O

| Code Name | Brake H. P. | R. P. M. | Fly-Wheels | | Floor Space | |
|---|---|---|---|---|---|---|
| | | | Dia. | Wt. of Both, lbs. | Length | Width |
| **Avachir** | 12 | 325 | 42″ | 850 | 7′ 2″ | 3′ 0″ |
| **Avadavit** | 20 | 300 | 52″ | 1300 | 8′ 8″ | 3′ 5″ |
| **Avalanche** | 30 | 300 | 62″ | 2000 | 10′ 2″ | 5′ 3″ |
| **Avalenten** | 40 | 275 | 60″ | 3300 | 11′ 1″ | 6′ 3″ |
| **Avaliste** | 50 | 300 | 60″ | 3300 | 11′ 1″ | 6′ 3″ |
| **Avalon** | 60 | 250 | 63″ | 4200 | 13′ 6″ | 7′ 1″ |
| **Avalimbo** | 70 | 200 | 72″ | 5200 | 14′ 9″ | 8′ 2″ |
| **Avalix** | 80 | 230 | 72″ | 5200 | 14′ 9″ | 8′ 2″ |







Giant Class A-DO Duplex Fuel Oil Engine

# Giant Fuel Oil Engines

## Class A-DO

| Code Name | Brake H. P. | R.P.M. | Belt Wheels | | | Floor Space | |
|---|---|---|---|---|---|---|---|
| | | | Dia. | Face | Wt. lbs. | Length | Width |
| **Avare** | 60 | 300 | 60″ | 10½″ | 2400 | 10′2″ | 6′8″ |
| **Avobert** | 90 | 300 | 60″ | 16½″ | 3000 | 11′6″ | 8′2″ |
| **Avobismel** | 100 | 300 | 60″ | 16½″ | 3000 | 11′6″ | 8′2″ |
| **Avoboth** | 120 | 250 | 60″ | 21″ | 4000 | 13′6″ | 10′3″ |
| **Avoceltic** | 140 | 200 | 72″ | 26″ | 5000 | 14′9″ | 12′6″ |
| **Avobun** | 160 | 230 | 72″ | 26″ | 5000 | 14′9″ | 12′6″ |

Dr. Z. T. YOUNG
PHYSICIAN and SURGEON

OFFICE HOURS.
10 TO 12 A. M., 2 TO 4 P. M.

Opelousas, La. Oct. 16, 1915.

Chicago Pneumatic Tool Co.,
Chicago, Ill.

Gentlemen:

Last January I purchased of you through your representative, Mr. A. C. Jones, one twin cylinder, 90 Horse Power Giant Fuel Oil Engine for the purpose of pumping water from a 10 inch irrigation well. The water level in this well, by the way, is 38 feet.

The engine was promptly installed, being coupled to the well by 90 feet of 14 inch belting. It was operated throughout the purping season, running most of the time 24 hours a day and 7 days in the week. On several occasions, where the rice crop was very much in need of water, the engine was operated continuously for more that a week without stopping a wheel. I think this a pretty thorough test, especially when we consider that the well was furnishing 3,000 gallons of water per minute.

The engine's maximum fuel consumption was 4½ barrels of crude oil in 24 hours. I use the word "crude" here in its true sense, meaning oil exactly as it comes from the Caddo oil wells. For several weeks the engine ran on a very poor quality of this oil.

Last season I irrigated with this plant, 315 acres of land which yielded 4,000 bags of rice. I expect to plant more acreage next year, and feel confident the engine can easily take care of the added burden.

The engine is easy to operate as evidenced by the fact that neither of the men who ran the plant had ever had any experience previously In fact, they had never before seen a crude oil engine.

The engine has given me entire satisfaction, and I do not hesitate to recommend it to anybody desiring reliable power at minimum cost.

Thanking you for many past courtesies, I am,

Yours most sincerely,

Z. T. Young.





# A Few Users of Giant Fuel Oil Engines

| | |
|---|---|
| Agricultural Lime Company | Brunswick, Ga. |
| Arizona Asbestos Association | Rice, Arizona |
| Bloomington Milling Company | Bloomington, Ind. |
| Campbell Machinery Company | Joplin, Mo. |
| Campbell & Kelley | Tonopah, Nev. |
| Edith Mining Company | Yellville, Ark. |
| Evans & Chachere | Opelousas, La. |
| Hughes Bros. Company | Bloomington, Ind. |
| Gamer Company, The | Fort Worth, Texas. |
| Jackson Electric Company | Jackson, Ala. |
| Lagarde Company, C. | Thibodaux, La. |
| Lea, E. S. | Trenton, N. J. |
| Lighthouse Inspector | Woods Hole, Mass. |
| McCarty & Angel | Yellville, Ark. |
| Phoenix Quicksilver Mining Co. | Livermore, Cal. |
| Platte Gravel Company | Omaha, Neb. |
| Producers Oil Company | Danbury, Texas. |
| Richmond Machine Company, F. C. | Salt Lake City, Utah. |
| Robertson, J. G. | St. Paul, Minn. |
| Town of Dyersville | Dyersville, Iowa. |
| United States Engineering Office | Birmingham, Ala. |
| U. S. Tungsten Corporation | Ely, Nevada. |
| University of Wisconsin | Madison, Wis. |
| Village of Echo | Echo, Minn. |
| Village of Dwight | Dwight, Ill. |
| Wilkinson Machine Company | Savannah, Ga. |
| Young, Dr. Z. T. | Opelousas, La. |

and many others

**Ask The Man Who Owns One**

# Chicago Pneumatic Tool Co.

General Office, - Fisher Building, CHICAGO
Eastern Office, 52 Vanderbilt Ave., NEW YORK

## BRANCH OFFICES

| | |
|---|---|
| BOSTON: | 185 Pleasant Street |
| BIRMINGHAM: | 834 Brown-Marx Building |
| BUFFALO: | 503 Ellicott Square Building |
| CINCINNATI: | 1008 Mercantile Library Building |
| CLEVELAND: | 2122 Euclid Ave. and 1241 E. 49th Street |
| DETROIT: | Second Ave. and Amsterdam Street |
| DULUTH, MINN.: | Torrey Building |
| EL PASO: | 303 San Francisco Street |
| ERIE, PA.: | 12th and Cranberry Streets |
| FRANKLIN, PA.: | No. 13th Street |
| JOPLIN, MO.: | 308 Wall Street |
| LOS ANGELES: | 915 Title Insurance Building |
| MILWAUKEE, WIS.: | 1310 Majestic Building |
| PHILADELPHIA: | 1740-42 Market Street |
| PITTSBURGH: | 10 and 12 Wood Street |
| PORTLAND, ORE.: | 46-48 Front Street |
| RICHMOND, VA.: | 1004 Mutual Building |
| SALT LAKE CITY: | 117-19 West 2nd South Street |
| SEATTLE: | 122 King Street |
| ST. LOUIS: | 813-15-17-19 Hempstead Street |
| ST. PAUL: | Pioneer Building |
| SAN FRANCISCO: | 71 First Street |

## FOREIGN

| | |
|---|---|
| Canada: | Montreal, Canadian Pneumatic Tool Co. Montreal, Toronto, Winnipeg, The Holden Co., Ltd. |
| British Columbia: | Vancouver, Holden Co., Ltd., 542 Pendar Street, West. |
| Mexico: | Mexico City, The General Supply Company, Av. Isabel La Catolica No. 51. |
| Northern Mexico: | (Sonora and Chihuahua). D. A. Carpenter & Co., El Paso, Texas. |
| Great Britain: Spain: Portugal: | London, The Consolidated Pneumatic Tool Co., Ltd., 9 Bridge Street, Westminster, S. W. |
| France: | Paris, Anciens Etablissement Glaenzer & Perreaud, 18-20 Faubourg du Temple. |
| Italy: | Milan, The Consolidated Pneumatic Tool Co., Ltd., via A Capellini 7. |
| Germany: Austria Hungary: Balkan States: Norway: Sweden: Holland: Switzerland: Denmark: | Berlin, Internationale Pressluft & Elektricitats-Gesellschaft m. b. H. Berlin, C 54. Weinmeisterhof, Weinmeisterstrasse No. 14. |
| Belgium: | Brussels, The Consolidated Pneumatic Tool Co., Ltd., 22 Chaussee de Forest, Porte de Hal. |
| Russia: | Petrograd, Phœnix Engineering Works Co., Ltd., Polustrovskaya Quay No. 39. |
| India: | Bombay, Consolidated Pneumatic Tool Co., Ltd., Rampart Row, Fort. Calcutta, The Consolidated Pneumatic Tool Co., Ltd., 8 Lal Bazar St. |
| Japanese Empire: | Tokyo, Osaka, Seoul, Dairen. The F. W. Horne Co. |
| Philippine Islands: | Manila, F. L. Strong Machinery Co., 64-68 Echague. |
| Australia: | Sydney, Henry W. Peabody & Co. |
| New Zealand: | Wellington, Henry W. Peabody & Co. |
| South America: | Buenos Aires, Argentina, Evans, Thornton & Co. |
| South Africa: | Johannesburg, The Consolidated Pneumatic Tool Co., Ltd., 190 Main St. |
| Hawaiian Islands: | Honolulu, H. S. Gray & Co., 832 Fort Street. |
| Cuba: | Havana, J. F. Berndes & Co., Box 349. |



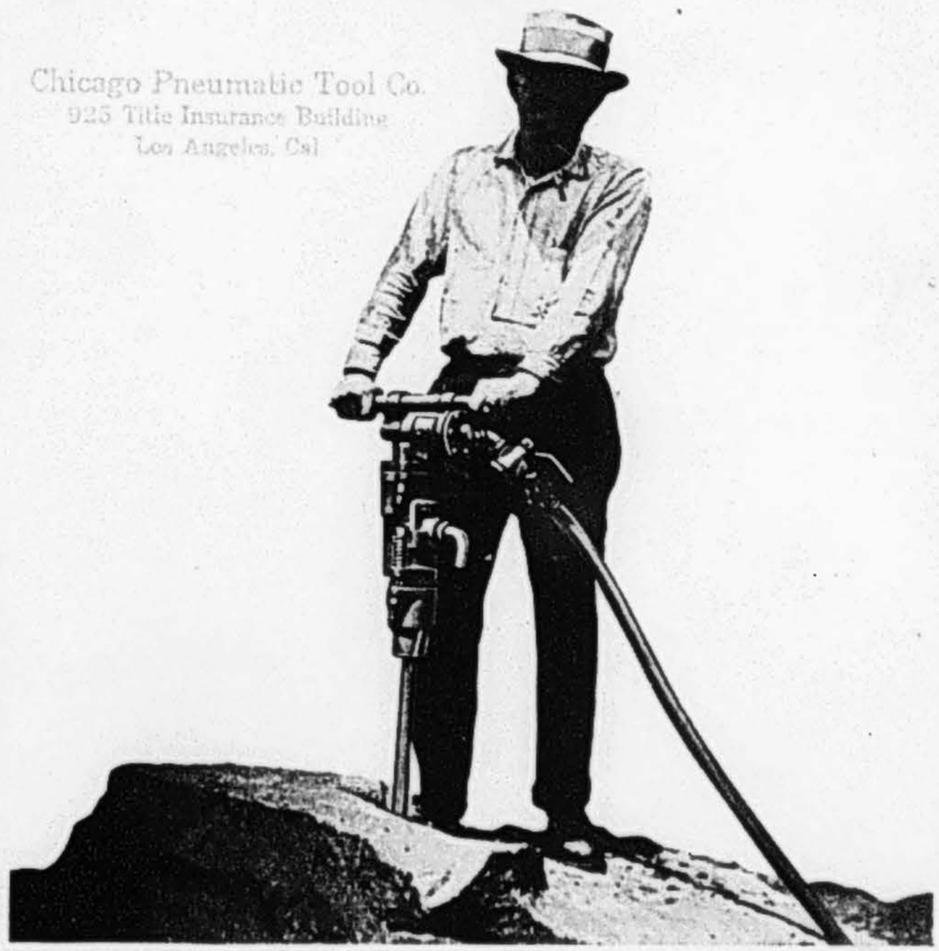
# CHICAGO PNEUMATIC TOOL COMPANY

BULLETIN No. 216 AUGUST, 1915

## "Hummer" Self Rotating Hammer Drills

FOR

Mining, Shaft Sinking, Tunneling, Drifting, Bench Work, Block Holing, Hitch Cutting, Quarrying, Breaking Boulders, Coal Mining, Road Building, Trench Work, Ore Drilling

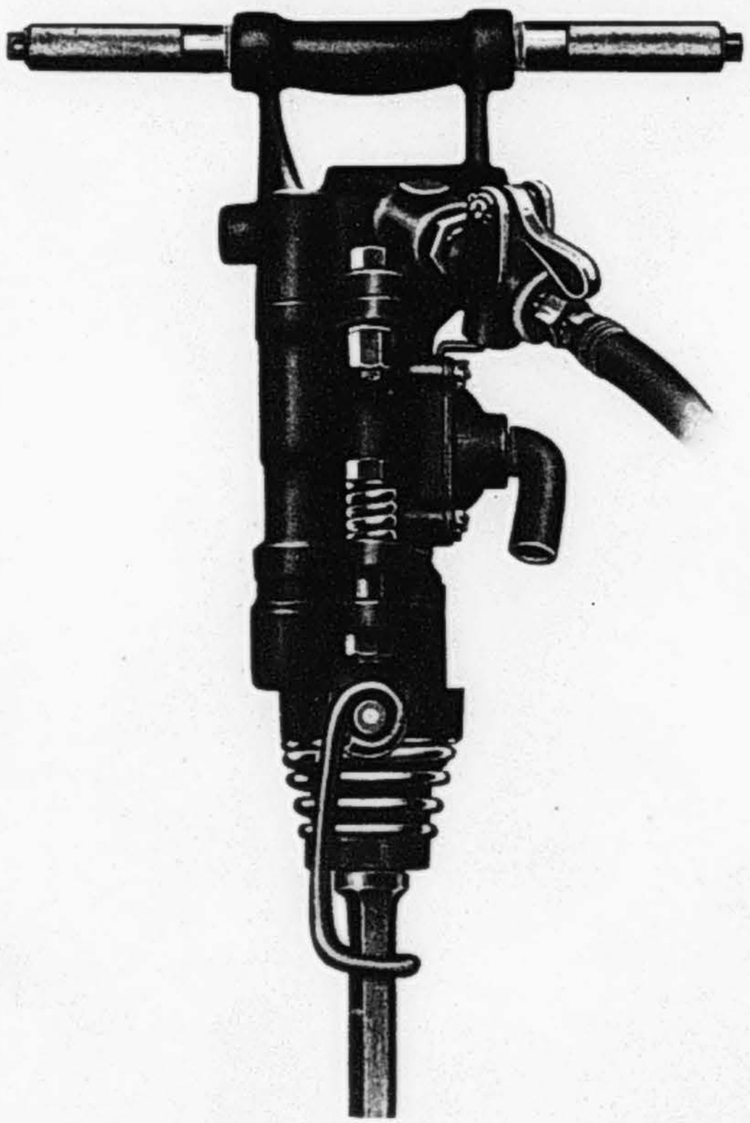



CHICAGO PNEUMATIC TOOL COMPANY

FISHER BUILDING, CHICAGO
52 VANDERBILT AVENUE, NEW YORK

# A66 Self Rotating Hammer Drill

Telegraph Name **"Repace"**



Christened

**"LITTLE HUMMER"**

By the drill runners on New York Subway construction work.



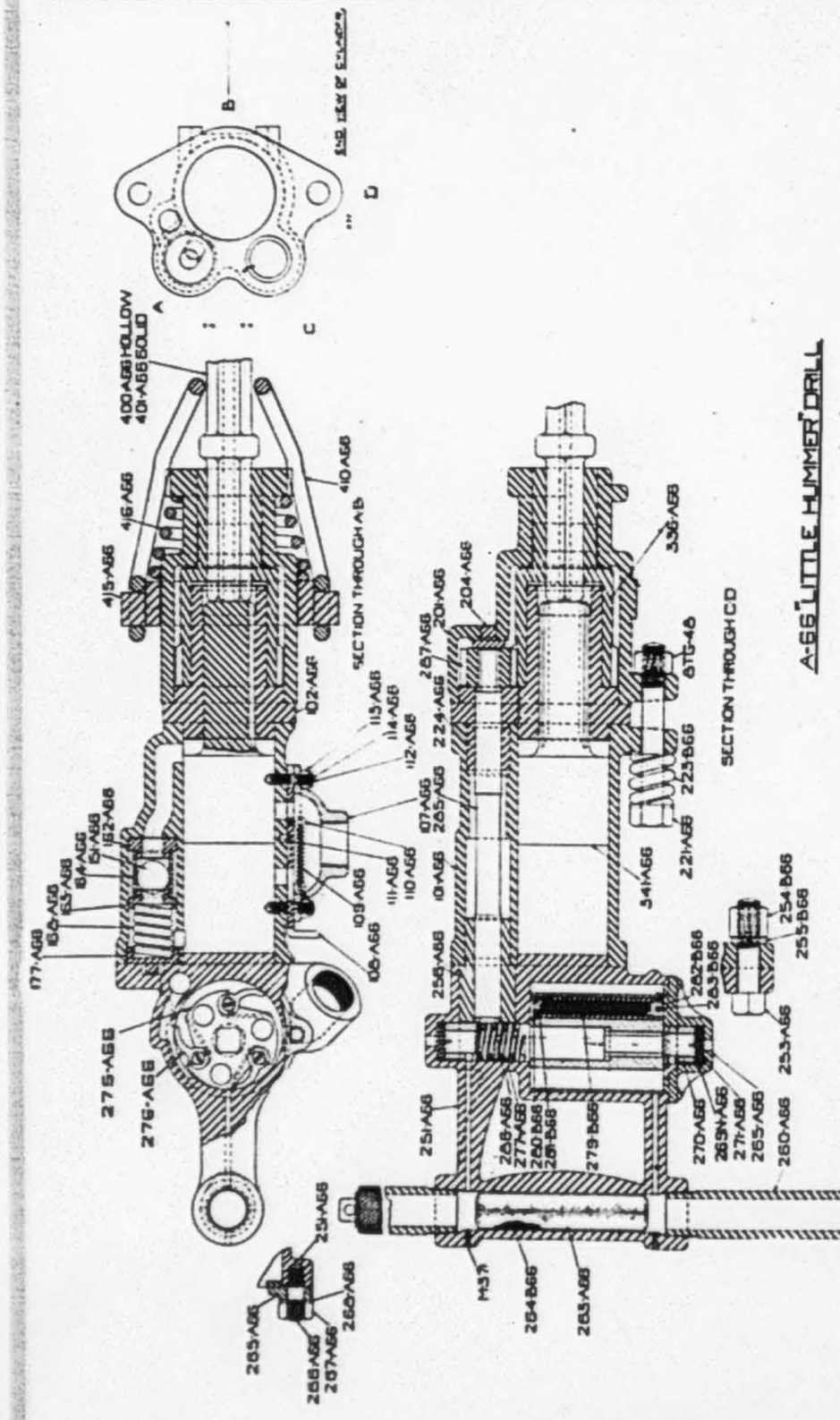


# Foreword

The worldwide adoption of the power hand hammer drill to replace the more cumbersome and less profitable mounted drill for all light rock drilling and kindred work has brought about the insistent demand for the best drill of the kind possible to produce.

When the "**Hummer**" drill was placed upon the market, we believed we had produced the nearest to the ideal hammer drill. This belief has now become a firm conviction owing to the immediate and continued recognition accorded the "**Hummer**" drill by the users, on points of superior design, efficiency, durability and upkeep and the preference shown by the drill runners for the drill they themselves have christened the "**Hummer.**"

It is gratifying to us to have been able to produce a drill the unique features of which result in such excellence as to make it a remarkable product. It is logical, however, that we should have been able to do so. The twenty years' experience that we have had as the foremost manufacturers of pneumatic percussive tools has qualified us to continue to excel in that line, and this experience is incorporated in the design, material and manufacture of the "**Hummer**" drill.








# "Hummer" Self Rotating Hammer Drills

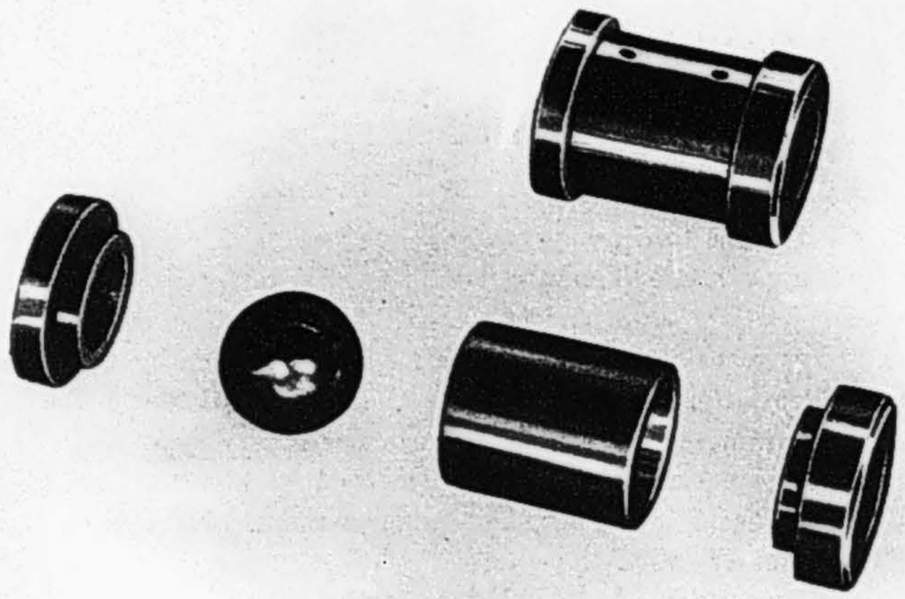
**General Design:**

By reference to drawing on opposite page showing sectional view of the "**Little Hummer**" drill, it will be noted that the drill chuck at the front end of the drill is rotated by two simple and strong gears operated by a shaft which is driven by a worm gearing from the rotation motor at the upper end of the drill. The rotation motor is a simple form of the rotary type, and the compressed air exhausted from it, **instead of being led to atmosphere, is discharged into the valve chamber of the hammer cylinder** and operates the hammer piston by means of a ball valve action.

This general design results in a sturdy, well balanced and compact structure throughout. By locating the rotation motor at the upper end, it is farthest removed from the strains and shocks of the hammer blows at the front end of the drill, and the distribution of the parts is such as to permit each part being made simple and strong and well calculated to stand up under the severe conditions to which the rock drill is ordinarily subjected.

**Rotation:**

The rotation of the drill steel is effected by the motor located at the upper end of the drill, in the handle part, and is entirely independent of the hammer piston. The compressed air to operate the drill first enters the rotation motor, causing the rotor of the motor to revolve at a high speed. The rotor shaft is provided with a worm thread that meshes with a worm gear on the outer end of the shaft that transmits the rotary movements to the pinion and gear at the lower end of the drill for turning the drill chuck. The rotation mechanism throughout is continuous in one direction and **does not have any ratchet or pawl parts.** The high speed of the rotation motor and the large ratio of gear reduction between the motor and the drill chuck give a strong rotation pull on the drill steel. The parts are few, simple, strong and accessible, and cannot be incorrectly assembled.



Valve Chest Complete and Its Four Parts

**Hammer Valve:**

A distinctive feature of the "**Hummer**" drill is the valve that governs the reciprocation of the hammer piston. It consists of a standard commercial hardened steel ball—such as is used ordinarily for ball bearings. The ball is three-quarters of an inch in diameter and weighs a trifle over one ounce. The travel between its seats in the valve chest is only one-eighth of an inch. Perfect in its action. Practically indestructible. Ideally simple compared with other rock drill valve mechanisms.

**Patents:**

The main novel feature in connection with the drill steel rotation of the "**Hummer**" drill is utilizing the exhaust air from the rotation motor to operate the hammer piston. This feature results in no additional amount of air being consumed by the rotation motor above what is required to operate the hammer piston. **The air that operates the hammer piston merely passes through the rotation motor first.** It is obvious that a saving in air consumption is thereby effected equal to the amount of air necessary to operate the rotation motor of other hammer drills, employing reciprocating rotation motors with live air supply separate from the air to operate the hammer piston.





We believe we are the first to employ such means, and have been granted broad patents in this and foreign countries in connection therewith. In order that this novel feature as well as the other principal novel features of the "**Hummer**" drill design and construction may be fully understood and respected, we desire to give more than ordinary publicity to these patents, and quote the following claims:

U. S. Patent 1,116,139—November 3, 1914:

Claim 1. "In a drilling machine, the combination, with the drilling engine, of means for effecting the rotation of the drilling tool, including a fluid pressure actuated motor operatively connected with the tool, the exhaust of the motor communicating with the inlet of the engine for operating the latter."

U. S. Patent 1,146,870—July 20, 1915:

Claim 1. "In a drilling machine, the combination of a drilling engine including a cylinder, a hammering piston reciprocable therein, a rotatable tool holder at the front end of the cylinder, a back head for the cylinder, a rotary motor mounted in the back head and reduction gearing between the motor and tool holder."

**Independent Hammer Action:**

The hammer piston has no connection with any other part of the drill and is perfectly free in its movements, in both directions, in the cylinder. It is a simple part without any holes or chamber or spiral flutes to weaken it. **Just plain piston.** Structurally of great strength—as a hammer piston should be; and the freedom of its action gives both high velocity and a hard blow.

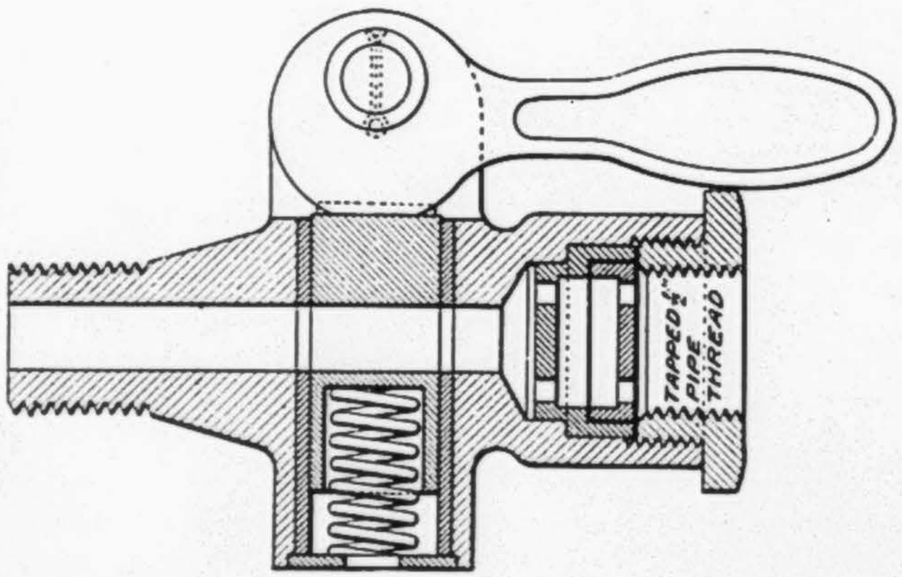
**Exhaust Throttle for Clearing Hole:**

In connection with the exhaust from the drill cylinder a slide or shutter is provided which by a slight movement chokes the exhaust ports in the cylinder, causing the hammer piston to stop striking hard, and allowing practically the full force of the live air to pass through the hollow drill steel to clear the hole of the cuttings when the air that ordinarily passes through the steel is not sufficient to prevent a portion of the cuttings from accumulating. There is permitted, however, a sufficient amount of exhaust through the hole in the steel and the loose fit of the shutter to allow the rotation motor to turn the drill steel—allow-

ing the drill steel to be easily withdrawn from the hole being drilled. The shutter is located between the side of the cylinder and the exhaust cap or bonnet and is fully protected from abuse in handling. The use of the exhaust shutter prevents liability of breakage of front head of the drill from careless handling.

**Holder for Drill Steel:**

The drill chuck is broached to take the usual collared steel with shank 3¼ inches long, ⅞ inch hexagon section. To retain the steel in the drill chuck and to provide means to churn the steel in a clogged hole or to withdraw the steel from the hole, a swinging holder is provided which is pivoted to a strong forged ring that encircles the front head of the drill. This ring rests upon a heavy spiral spring that absorbs the shock of the hammer blows on the drill holder when the drill runner carelessly allows the hammer piston to hit the front head.




**Throttle Valve:**

The throttle as shown above has been designed to overcome the objections to the ordinary taper plug cock throttle. The straight piston valve is made of tool steel, hardened and ground, and moves vertically in a bronze bushing that is forced into the drop-forged steel body. The valve moves upwards by a spring pressure and downwards by a cam portion on the lever handle.





The cam is provided with a flat surface to hold the valve full open when the drill is running. Quick in action. Readily and easily operated. Handle cannot become loose. Vibration of drill cannot partially shut off air supply, as the lever handle moves in line with the hose and not crosswise to the hose. **It stays put.**

**Strainer:**

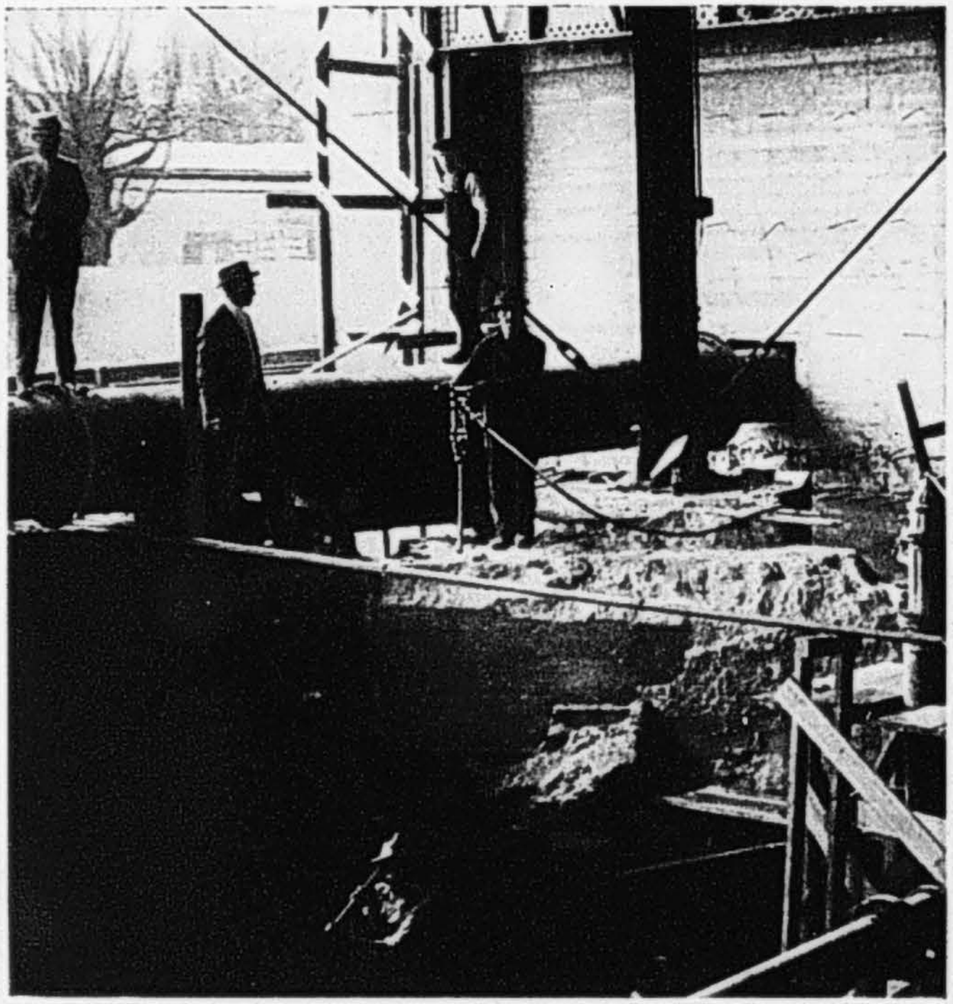
One end of the throttle valve body is formed to hold a strainer—as shown in cut. The strainer is provided with a fine mesh screen in order to prevent dirt or scale from the pipe line or particles of rubber from the hose entering the drill. The air screen is protected on both sides by the end walls of the strainer body, which contain a number of holes to allow free flow of the air and yet prevent the fine screen from becoming damaged. The strainer is readily accessible and easily cleaned.

**Oiling:**

The most essential and yet the most neglected detail in order to obtain the best results from all rock drills is that of proper lubrication. Particularly is this so with the high speed automatic rotation hammer drill. It is obvious that such a piece of machinery, in order to return a maximum profit as to work performed and low cost of upkeep, should be kept clean inside and well oiled at all times. It is difficult, if not well nigh impossible, to impress the ordinary hammer drill runner with the importance of oiling his drill before it becomes "bone dry" for want of oil and stops on account of some of the parts being cut fast to each other or a breakage occurring. It is not as much on account of wilful neglect on the part of the drill runner as it is forgetfulness, and as long as the drill keeps on running he does not think about oiling it. To offset this habit of the drill runner forgetting, we have designed the "**Hummer**" drills so that the rotation will gradually slow down and then stop if needing oil or becoming choked with dirt, before damage has occurred to any of the parts. This is an automatic signal to the drill runner to either oil his drill or clean it, or both. This feature has been well received and is especially popular with the drill runners who are engaged in mine contract work and are compelled to purchase drills for their work.

The handles of the "**Hummer**" drills are hollow and provided in the central portion with a cartridge consisting of a perforated metal tube filled with cotton wick. By filling the handles with oil, the cartridge feeds the oil continuously in small quantity when the drill is in operation. One filling will last several hours' constant running. A half gallon can of oil as sample is furnished with each drill.

A light body engine oil, similar to sample furnished with drill, should be poured into the ends of the handle about every two hours when drill is working. Occasionally kerosene should be poured into the cylinder and through the throttle valve to clean the inside parts. It is recommended that the entire drill should be kept immersed in kerosene when not in use.



A66 "LITTLE HUMMER" drilling holes for removal of reinforced concrete for engine foundation





**Cost of Upkeep:**

The design of the "**Hummer**" drills is such that the parts most likely to need renewal are of simple construction and the cost of such parts is much lower than corresponding parts of other makes of hammer drills. We invite comparisons on this point.

**Performance and Durability:**

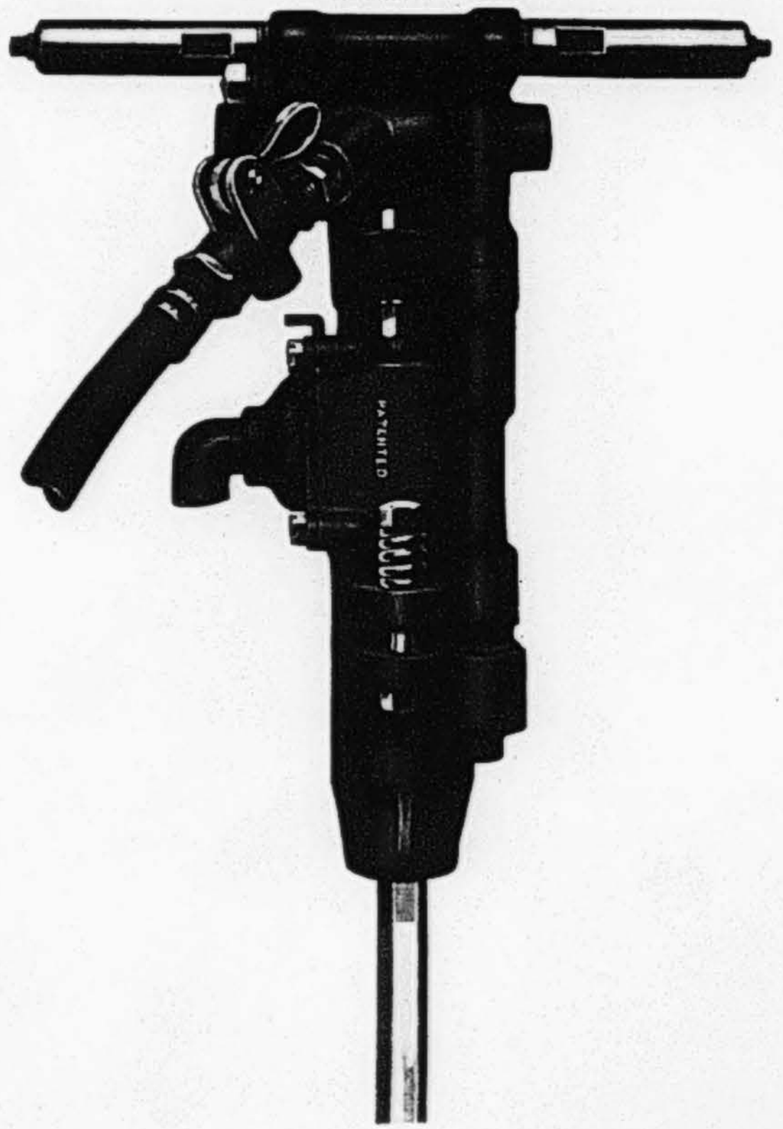
The performance and durability of the "**Hummer**" drills are the strongest arguments that we have to advance. They will outdrill and outlast any hammer drill of equal size and weight. They tell their own story.

Refer to page 20 for Price List of Repair Parts for A-66 "**Little Hummer**" Drill.

A66 "LITTLE HUMMER" Drill with auger bit as shown above is used for drilling ore, coal, sandstone, etc.

# B66 Self Rotating Hammer Drill

Telegraph Name **"Repeltic"**



"Hummer" Drill





**B-66 "Hummer" Self-Rotating Hammer Drill:**

This drill has been designed to meet the demand for a drill for down holes or sinking. It is not required to collar the shank of the steel for this drill, as the piston strikes an anvil block or tappet as shown by sectional drawing on page 14, part 376-B66.

By interposing the anvil block between the piston and the drill steel, the piston blow is slightly diminished, but this loss of force is so slight that it is more than made up by the economy of using drill steels that do not require a collared or special forged shank.

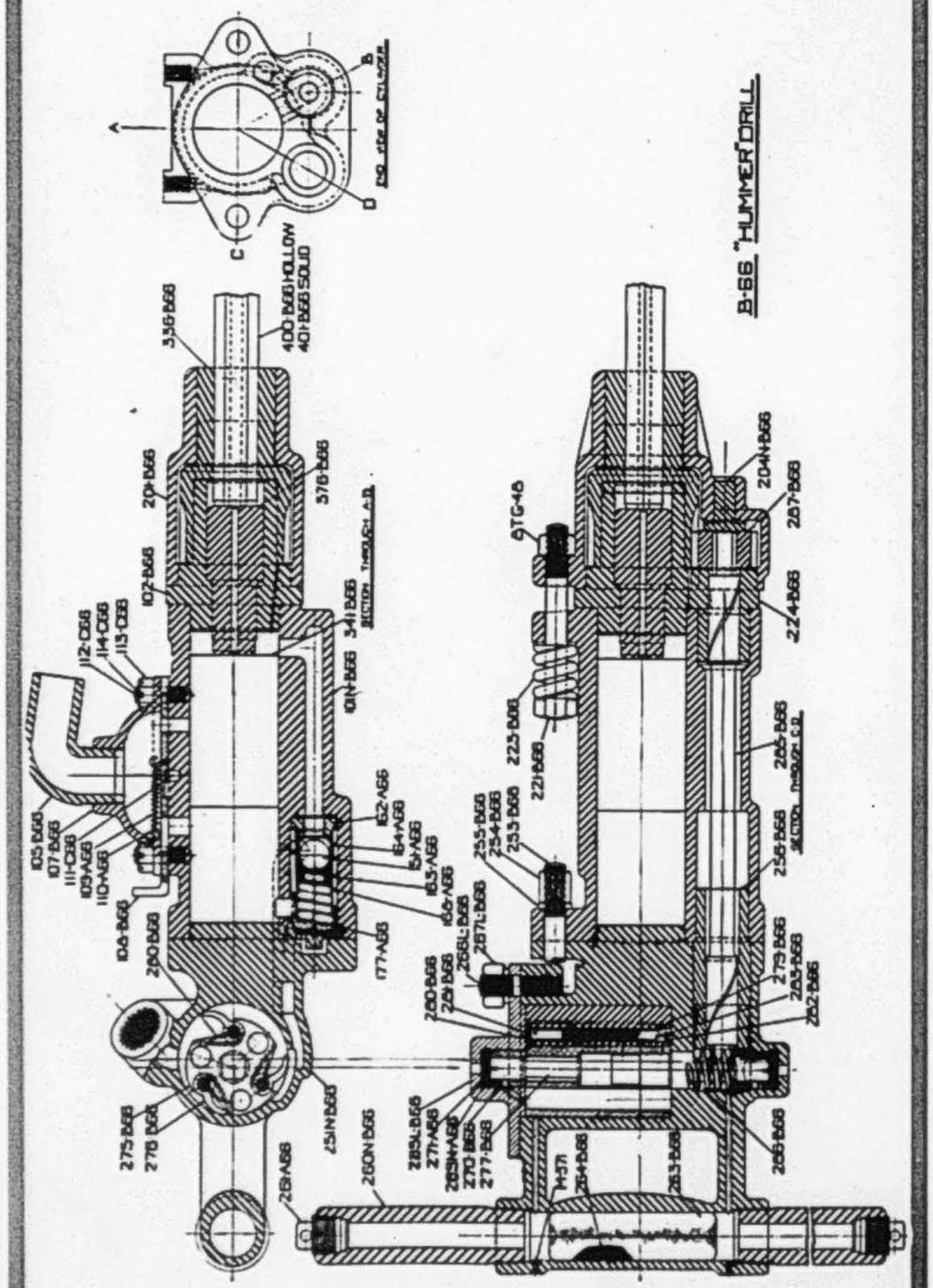
The B-66 "**Hummer**" drill is 15 lbs. heavier than the A-66 "**Little Hummer,**" but is preferred for down hole drilling on account of this extra weight making it steadier in operation and a more rapid driller. It is a general favorite on subway construction work and for sinking trenches. Unless otherwise ordered, the front head chuck is broached to take 1-inch hexagon steel.

**C-66 "Big Hummer" Self-Rotating Hammer Drill:**

This drill is exactly the same in design and construction as the B-66, excepting the length of piston stroke, and longer cylinder and rotation shaft. The front head chuck bearing is also longer to allow the heavier drill steel to have a greater shank surface in the chuck. Most of the parts of this drill are interchangeable with like parts of the B-66, which is a desirable feature for those who use both sizes, as it simplifies carrying duplicate parts for repairs.

The C-66 "**Big Hummer**" is by far the best one-man hammer drill that has been produced. It weighs 65 lbs. and will cut faster and with far less fatigue to the drill runner than other drills of heavier weight offered for the same work. For shaft sinking it has no equal. Chuck is broached to take 1⅛-inch hexagon steel.

We furnish a cradle and light shell mounting for the "**Hummer**" drills, by use of which any one of the three sizes may be mounted on column or tripod when so desired. Bulletin will be issued in a few weeks.








# Price List of Repair Parts

## B66 "Hummer" Drill

For symbol numbers refer to drawing on page 14 opposite

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 101N-B66 | **Regression** | Cylinder | $25.00 |
| 102-B66 | **Regressos** | Cylinder Extension | 10.00 |
| 105-B66 | **Regretful** | Exhaust Nozzle | .25 |
| 106-B66 | **Regrettons** | Exhaust Cap, complete, parts 105, 106, 107, 108, 109, 110, 111, 112, 113, 114 | 2.50 |
| 107-B66 | **Regriffer** | Exhaust Cap | .75 |
| 108-B66 | **Regrillant** | Exhaust Shutter | 1.50 |
| 109-A66 | **Regrimper** | Exhaust Shutter Spring | .10 |
| 110-A66 | **Regronder** | Exhaust Shutter Spring Hook | .05 |
| 111-C66 | **Regrowth** | Exhaust Shutter Stop Pin | .05 |
| 112-C66 | **Regrunido** | Exhaust Cap Stud | .10 |
| 113-C66 | **Regsam** | Exhaust Cap Stud Nut | .05 |
| 114-C66 | **Regsamer** | Exhaust Cap Stud Cotter | .05 |
| 150-A66 | **Reguante** | Ball Valve, complete, parts 151, 162, 163, 164 | 10.00 |
| 151-A66 | **Regueifa** | Ball Valve | .50 |
| 162-A66 | **Reguengo** | Front Valve Seat | 3.50 |
| 163-A66 | **Regueras** | Back Valve Seat | 3.50 |
| 164-A66 | **Reguerdon** | Valve Cage | 3.50 |
| 168-A66 | **Regwinder** | Valve Cage Spring | .50 |
| 177-A66 | **Regulable** | Valve Chamber Plug | 3.50 |
| 221-B66 | **Regulado** | Front Head Bolt | .50 |
| 8TG- 48 | **Regulatura** | Front Head Bolt Nut | .25 |
| 223-B66 | **Regulieren** | Cushion Spring | .50 |
| 200-B66 | **Regung** | Front Head, complete, parts 201, 204. | 8.50 |
| 201-B66 | **Regungen** | Front Head | 8.00 |
| 204N-B66 | **Regusteris** | Front Head Thrust Plug | .50 |
| 251L-B66 | **Regustor** | Cylinder Back Head | 35.00 |
| 253-B66 | **Regyravo** | Cylinder Back Head Bolt | .25 |
| 254-B66 | **Regyravit** | Cylinder Back Head Bolt Nut | .25 |
| 255-B66 | **Regyres** | Cylinder Back Head Bolt Nut Washer | .05 |
| 250-B66 | **Regyro** | Cylinder Back Head, complete, parts 251L, 253, 254, 255 | 36.00 |
| 260-B66 | **Rehacer** | Handles | .50 |
| 261-B66 | **Rehacio** | Handle Plug | .10 |

# PRICE LIST OF REPAIR PARTS

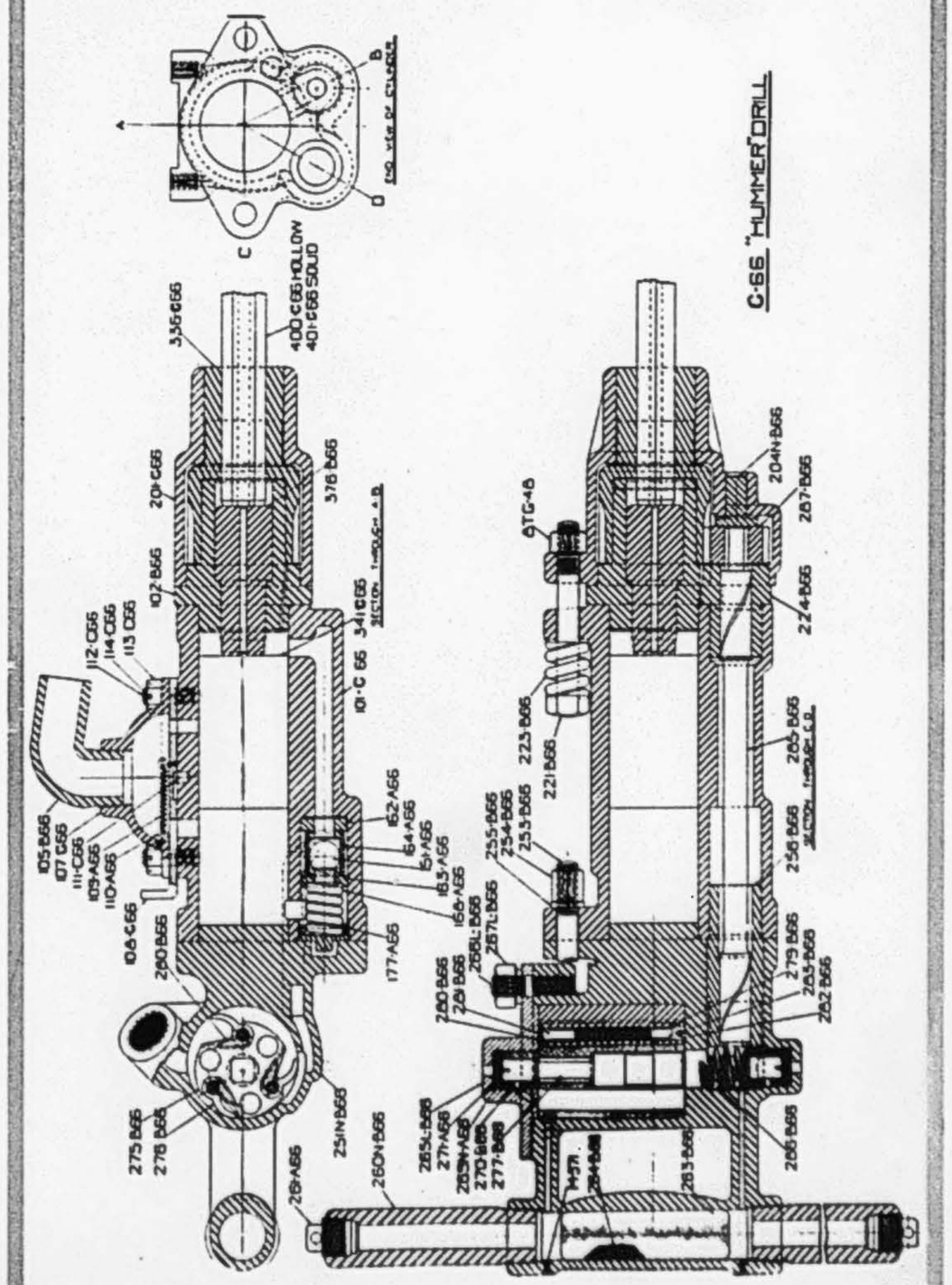
## B66—"Hummer" Drill

(Continued from page 15)

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 262-B66 | **Rehagais** | Oil Regulating Plug | $0.25 |
| 263-B66 | **Rehagan** | Oil Cartridge filled with wick | .50 |
| 265L-B66 | **Rehartada** | Rotor Cylinder Head | 2.50 |
| 266L-B66 | **Rehartar** | Rotor Cylinder Head Stud | .25 |
| 267L-B66 | **Reharteis** | Rotor Cylinder Head Stud Nut | .05 |
| 268-B66 | **Rehash** | Rotor Cylinder Head Stud Washer | .05 |
| 269N-A66 | **Rehashed** | Rotor Shaft Thrust Washer | .25 |
| 270-B66 | **Rehashing** | Rotor Shaft Bushing | .50 |
| 275-B66 | **Rehauge** | Rotor | 12.00 |
| 276-B66 | **Rehbock** | Rotor Blade | 1.00 |
| 279-B66 | **Rehockes** | Rotor Blade Springs, complete with dogs | .75 |
| 271-A66 | **Rehbraten** | Rotor Cylinder Head Thrust Plate Cage | .50 |
| 277-B66 | **Rehbrann** | Rotor Worm Shaft, single thread | 5.00 |
| 278-B66 | **Rehearsal** | Rotor Worm Shaft, double thread | 5.00 |
| 285-B66 | **Rehecho** | Rotation Shaft | 3.50 |
| 256-B66 | **Rehelm** | Back Rotation Shaft Bearing Bushing | 3.00 |
| 224-B66 | **Rehelmed** | Front Rotation Shaft Bearing Bushing | 2.50 |
| 287-B66 | **Rehelming** | Rotation Shaft Pinion Gear | 1.00 |
| 286-B66 | **Rehenes** | Rotation Shaft Worm Gear, single thread | 2.50 |
| 288-B66 | **Reherian** | Rotation Shaft Worm Gear, double thread | 2.50 |
| 336-B66 | **Reherrado** | Rotation Chuck, broached for ⅞ in. hexagon steel | 7.00 |
| 337-B66 | **Rehervidas** | Rotation Chuck, broached for 1 in. hexagon steel | 7.00 |
| 376-B66 | **Rehervido** | Anvil Block | 2.00 |
| 341-B66 | **Reheurter** | Piston | 4.00 |
| 300-A66 | **Rehfarbe** | Throttle Valve, complete with air strainer | 3.50 |
| 308-A66 | **Rehfarbig** | Throttle Valve Air Strainer Nut | .25 |
| 309-A66 | **Rehfusses** | Throttle Valve Air Strainer | .50 |







# Price List of Repair Parts

## C66 "Big Hummer" Drill

For symbol numbers refer to drawing page 17

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 101-C66 | **Rehgemse** | Cylinder | $35.00 |
| 102-B66 | **Rehicimos** | Cylinder Extension | 10.00 |
| 103-B66 | **Rehierve** | Reducing Bushing | .20 |
| 105-B66 | **Rehilaran** | Exhaust Nozzle | .25 |
| 106-C66 | **Rehiletes** | Exhaust Cap, complete, parts 105, 106, 107, 108, 109, 110, 111, 112, 113, 114 | 3.00 |
| 107-C66 | **Rehirvio** | Exhaust Cap | .75 |
| 108-C66 | **Rehjagd** | Exhaust Shutter | 1.50 |
| 109-A66 | **Rehkalb** | Exhaust Shutter Spring | .10 |
| 110-A66 | **Rehkitze** | Exhaust Shutter Spring Hook | .05 |
| 111-C66 | **Rehlein** | Exhaust Shutter Stop Pin | .05 |
| 112-C66 | **Rehlosung** | Exhaust Cap Stud | .10 |
| 113-C66 | **Rehoboam** | Exhaust Cap Stud Nut | .05 |
| 114-C66 | **Rehoboth** | Exhaust Cap Stud Cotter | .05 |
| 150-A66 | **Rehogaban** | Ball Valve, complete, parts 151, 162, 163, 164 | 10.00 |
| 151-A66 | **Rehogadas** | Ball Valve | .50 |
| 162-A66 | **Rehogamos** | Front Valve Seat | 3.50 |
| 163-A66 | **Rehogaste** | Back Valve Seat | 3.50 |
| 164-A66 | **Rehogo** | Valve Cage | 3.50 |
| 168-A66 | **Rehogue** | Valve Cage Spring | .50 |
| 177-A66 | **Rehogueis** | Valve Chamber Plug | 3.50 |
| 221-B66 | **Rehoyada** | Front Head Bolt | .50 |
| 8TG- 48 | **Rehoyar** | Front Head Bolt Nut | .25 |
| 223-B66 | **Rehposten** | Cushion Spring | .50 |
| 200-C66 | **Rehschrot** | Front Head, complete, parts 201, 204. | 9.50 |
| 201-C66 | **Rehuiamos** | Front Head | 9.00 |
| 204N-B66 | **Rehuias** | Front Head Thrust Plug | .50 |
| 251L-B66 | **Rehuirian** | Cylinder Back Head | 35.00 |
| 253-B66 | **Rehurta** | Cylinder Back Head Bolt | .25 |
| 254-B66 | **Rehusaras** | Cylinder Back Head Bolt Nut | .25 |
| 255-B66 | **Rehusaste** | Cylinder Back Head Bolt Washer | .05 |
| 250-B66 | **Rehuyais** | Cylinder Back Head, complete, parts 251L, 253, 254, 255 | 36.00 |
| 260-B66 | **Rehuyes** | Handles | .50 |





## PRICE LIST OF REPAIR PARTS

### C66—"Big Hummer" Drill

(Continued)

For symbol numbers refer to drawing page 17

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 261-B66 | **Rehwild** | Handle Plug | $0.10 |
| 262-B66 | **Rehziege** | Oil Regulating Plug | .25 |
| 263-B66 | **Reibahle** | Oil Cartridge filled with wick | .50 |
| 265L-B66 | **Reibbar** | Rotor Cylinder Head | 2.50 |
| 266L-B66 | **Reiberei** | Rotor Cylinder Head Stud | .25 |
| 267L-B66 | **Reibkeule** | Rotor Cylinder Head Stud Nut | .05 |
| 268-B66 | **Reibstein** | Rotor Cylinder Head Stud Washer | .05 |
| 269N-A66 | **Reibzeug** | Rotor Shaft Thrust Washer | .25 |
| 270-B66 | **Reich** | Rotor Shaft Bushing | .50 |
| 275-B66 | **Reichsabt** | Rotor | 12.00 |
| 276-B66 | **Reichserbe** | Rotor Blade | 1.00 |
| 279-B66 | **Reichsadel** | Rotor Blade Springs, complete with dogs | .75 |
| 271-A66 | **Reichstag** | Rotor Cylinder Head Thrust Plate Cage | .50 |
| 277-B66 | **Reiciebat** | Rotor Worm Shaft, single thread | 5.00 |
| 278-B66 | **Reideras** | Rotor Worm Shaft, double thread | 5.00 |
| 285-C66 | **Reidora** | Rotation Shaft | 5.00 |
| 256-B66 | **Reifbiege** | Back Rotation Shaft Bearing Bushing | 3.00 |
| 224-B66 | **Reifchen** | Front Rotation Shaft Bearing Bushing | 2.50 |
| 287-B66 | **Reifeis** | Rotation Shaft Pinion Gear | 1.00 |
| 286-B66 | **Reifeises** | Rotation Shaft Worm Gear, single thread | 2.50 |
| 288-B66 | **Reofmonat** | Rotation Shaft Worm Gear, Double Thread | 2.50 |
| 336-C66 | **Reifspiel** | Rotating Chuck, broached for 1⅛ in. hexagon steel | 8.00 |
| 337-C66 | **Reifstab** | Rotating Chuck, broached for 1 in. hexagon steel | 8.00 |
| 376-B66 | **Reigerbos** | Anvil Block | 2.00 |
| 341-B66 | **Reigerhut** | Piston | 4.00 |
| 300-A66 | **Reigned** | Throttle Valve, complete with air strainer | 3.50 |
| 308-A66 | **Reigning** | Throttle Valve Strainer Nut | .25 |
| 309-A66 | **Reillere** | Throttle Valve Air Strainer | .50 |

CHICAGO PNEUMATIC TOOL COMPANY

# Price List of Repair Parts

## A66 "Little Hummer" Drill

For symbol numbers refer to drawing page 4

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 101-A66 | **Reiltopp** | Cylinder | $20.00 |
| 102-A66 | **Reimao** | Cylinder Extension | 7.50 |
| 105-A66 | **Reimarie** | Exhaust Nozzle | .25 |
| 106-A66 | **Reimarus** | Exhaust Cap, complete, parts 105, 107, 108, 109, 110, 111, 112, 113, 114 | 2.50 |
| 107-A66 | **Reimbody** | Exhaust Cap | .75 |
| 108-A66 | **Reimbrar** | Exhaust Shutter | 1.00 |
| 109-A66 | **Reimfall** | Exhaust Shutter Spring | .10 |
| 110-A66 | **Reimfrei** | Exhaust Shutter Spring Hook | .05 |
| 111-A66 | **Reimpor** | Exhaust Shutter Stop Pin | .05 |
| 112-A66 | **Reimprimo** | Exhaust Cap Stud | .10 |
| 113-A66 | **Reimputer** | Exhaust Cap Stud Nut | .05 |
| 114-A66 | **Reimsatz** | Exhaust Cap Stud Cotter Pin | .05 |
| 150-A66 | **Reimsilbe** | Ball Valve, complete, parts 151, 162, 163, 164 | 10.00 |
| 151-A66 | **Reimsucht** | Ball Valve | .50 |
| 162-A66 | **Reimweise** | Front Valve Seat | 3.50 |
| 163-A66 | **Reimwort** | Back Valve Seat | 3.50 |
| 164-A66 | **Reinante** | Valve Cage | 3.50 |
| 168-A66 | **Reinazgo** | Valve Cage Spring | .50 |
| 177-A66 | **Reincense** | Valve Chamber Plug | 3.50 |
| 200-A66 | **Reincidir** | Front Head, complete, parts 201, 204 | 7.50 |
| 201-A66 | **Reincitant** | Front Head | 7.00 |
| 204-A66 | **Reinemos** | Front Head Thrust Plug | .50 |
| 221-A66 | **Reinettes** | Front Head Bolt | .50 |
| 8TG-48 | **Reinfecter** | Front Head Bolt Nut | .25 |
| 410-A66 | **Reinflame** | Steel Retainer Yoke | 1.50 |
| 415-A66 | **Reinheit** | Retainer Spring Collar | 3.50 |
| 416-A66 | **Reinhumer** | Retainer Spiral Spring | .75 |
| 224-A66 | **Reinigen** | Front Rotation Shaft Bearing Bushing | 2.00 |
| 250-A66 | **Reinless** | Cylinder Back Head, complete parts 251, 253, 254, 255 | 26.00 |
| 251-A66 | **Reinlich** | Cylinder Back Head | 25.00 |
| 253-A66 | **Reinol** | Cylinder Back Head Bolt | .50 |



CHICAGO PNEUMATIC TOOL COMPANY

## PRICE LIST OF REPAIR PARTS

### A66—"Little Hummer" Drill

(Continued)

For symbol numbers refer to drawing page 4

| Symbol | Telegraph Name | Description | Price |
|---|---|---|---|
| 254-A66 | **Reinquire** | Cylinder Back Head Bolt Nut | $0.15 |
| 255-A66 | **Reinscrire** | Cylinder Back Head Bolt Washer | .05 |
| 256-A66 | **Reinst** | Back Rotation Shaft Bearing Bushing | 2.50 |
| 258-A66 | **Reintrante** | Cylinder Back Head Bushing | .50 |
| 260-A66 | **Reinvestir** | Handles | .50 |
| 261-A66 | **Reinvito** | Handle Plugs | .10 |
| 262-A66 | **Reinwald** | Oil Regulating Plug | .25 |
| 263-A66 | **Reisacker** | Oil Cartridge, filled with wick | .50 |
| 265-A66 | **Reisbau** | Rotor Cylinder Head | 2.50 |
| 266-A66 | **Reisbesen** | Rotor Cylinder Head Stud | .25 |
| 267-A66 | **Reisblad** | Rotor Cylinder Head Stud Nut | .10 |
| 268-A66 | **Reisbrief** | Rotor Cylinder Head Stud Washer | .05 |
| 269N-A66 | **Reisbrot** | Rotor Shaft Thrust Washer | .25 |
| 270-A66 | **Reisbund** | Rotor Shaft Bushing | .50 |
| 275-A66 | **Reisbutos** | Rotor | 10.00 |
| 276-A66 | **Reisebild** | Rotor Blades | 1.00 |
| 277-A66 | **Reisebuch** | Rotor Worm Shaft, single thread | 5.00 |
| 278-A66 | **Reisegeld** | Rotor Worm Shaft, double thread | 5.50 |
| 279-A66 | **Reisehut** | Rotor Blade Springs, complete with dogs | .75 |
| 285-A66 | **Reiselade** | Rotation Shaft | 2.50 |
| 286-A66 | **Reiselled** | Rotation Shaft Worm Gear, single thread | 2.50 |
| 288-A66 | **Reiselust** | Rotation Shaft Worm Gear, double thread | 2.75 |
| 287-A66 | **Reisepass** | Rotation Shaft Pinion Gear | 1.00 |
| 300-A66 | **Reisern** | Throttle Valve, complete with strainer | 3.50 |
| 309-A66 | **Reisesack** | Throttle Valve Air Strainer | .50 |
| 308-A66 | **Reisetag** | Throttle Valve Air Strainer Nut | .25 |
| 336-A66 | **Reisete** | Rotation Chuck, broached for ⅜-inch hexagon steel | 6.00 |
| 341-A66 | **Reiseweg** | Piston | 7.50 |
| 223-A66 | **Reisewerk** | Cushion Springs | .40 |
| 271-A66 | **Reisewuth** | Rotor Cylinder Head Thrust Plate Cage | .50 |

## General Specifications
## "Hummer" Self-Rotating Hammer Drills

| Name | "Little Hummer" | "Hummer" | "Big Hummer" |
|---|---|---|---|
| Size Symbol | A-66 | B-66 | C-66 |
| Diameter of Cylinder | 2⅛ in. | 2⅛ in. | 2⅛ in. |
| Length of Stroke | 2½ in. | 2¾ in. | 4¾ in. |
| Weight | 40 lbs. | 55 lbs. | 65 lbs. |
| Length over-all | 17½ in. | 19⅛ in. | 22⅝ in. |
| Air Consumption at 80 lbs. pressure | 61 ft. | 68 ft. | 82 ft. |
| Size Hose to use | ¾ in. | ¾ in. | ¾ in. |
| Size Steel (Hollow Hex.) | ⅞ in. | 1 in. | 1⅛ in. |
| Depth of Hole | 6 ft. | 8 ft. | 12 ft. |
| Diameter of Starter | 1¾ in. | 2⅛ in. | 2⅞ in. |
| Shank-hexagon | Collared ⅞x3¼ in. | Collarless 1 in. | Collarless 1⅛ in. |
| Telegraph Name | Repeace | Repeltic | Repinule |





# Drill Steels

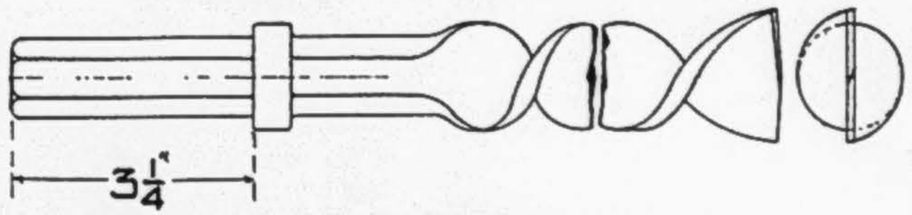
The following drill steel lists cover the standard sizes and lengths of steels for general work in connection with the "**Hummer**" self rotating hammer drills. These steels are made from the best material obtainable and the collar of the shanked steels and all cutting points are forged in a drill sharpening and forging machine, insuring uniformity in the gage diameter of the cutting points.

We can furnish solid steels in place of the hollow steels listed if desired. Can also furnish steels with "X" or "Z" or bull bit cutting points if desired, but such steels are not carried in stock and shipments cannot be made as promptly as the standard hollow hexagon rose bit or four-point cross bit listed.

A set of steels is always understood to mean one steel of each length up to and including the longest length ordered. In ordering drill steels care should be exercised to specify distinctly whether a set, duplicate set, or single steels are desired; also the depth of hole intended to be drilled.

Unless otherwise specified hollow hexagon steels as listed with rose bit cutting points will be furnished when steels are ordered for any size "**Hummer**" drill.

## Auger Drill Steels
## for A66 "Little Hummer" Drill

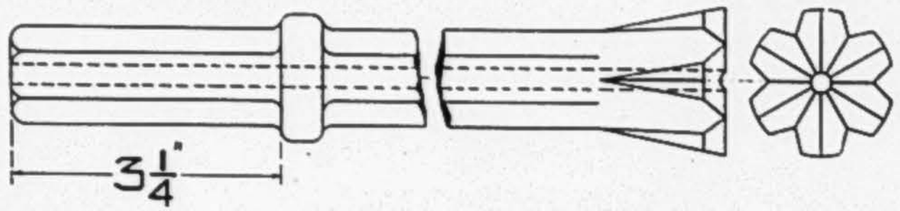



Solid steel with chisel bit for boring ore, coal, sandstone, etc.
Can be furnished with fish-tail bit if desired.

| Length exclusive of Shank Inches | For boring holes up to 12 feet deep. | | | | | | |
|---|---|---|---|---|---|---|---|
| | Diam. of Auger Inches | Diam. Cutting Point Inches | Approx. Weight per Steel Lbs. | Net Price: Per Single Steel | Net Price: Per Set | Telegraph Name: Single Steels | Telegraph Name: Set |
| Standard 18 in. Run | 12 Ft. Set | ⅞ inch Hexagon Shank, Collared. Left Hand Spiral Twist, 1¼ inch pitch. | | | | | |
| 18 | 1⅜ | 1¾ | 3¾ | $2.40 | ..... | Reisfeld | Reispet |
| 36 | 1⅜ | 1¾ | 7¼ | 3.00 | $ 5.40 | Reisgoed | Reisplan |
| 54 | 1⅜ | 1¾ | 10¾ | 3.60 | 9.00 | Reisholz | Reisrok |
| 72 | 1⅜ | 1¾ | 14¼ | 4.20 | 13.20 | Reisje | Reissaus |
| 90 | 1⅜ | 1¾ | 17¾ | 4.80 | 18.00 | Reiskist | Reissblei |
| 108 | 1⅜ | 1¾ | 21¼ | 5.40 | 23.40 | Reiskorn | Reisslatte |
| 126 | 1⅜ | 1¾ | 24¾ | 6.00 | 29.40 | Reislauf | Reisszeug |
| 144 | 1⅜ | 1¾ | 28¼ | 6.60 | 36.00 | Reismehl | Reistasch |

Shank and cutting ends hardened.

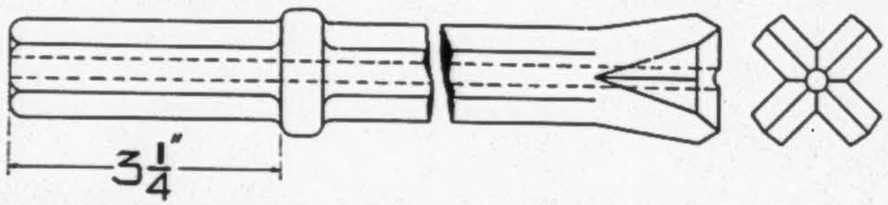
# Hollow Hexagon "Hummer" Drill Steels




Rose Bit—⅞-inch hexagon hollow steel—Collared Shank.

| Drilling Length exclusive of Shank Inches | For drilling holes up to 6 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 6 Ft. Set | ⅞ inch, for "A-66" "Little Hummer" Drill | | | | |
| 12 | 1¾ | 3⅜ | $1.80 | ..... | Reiterava | Reistruhe |
| 24 | 1⅝ | 5⅝ | 2.20 | $4.00 | Reitero | Reiswoede |
| 36 | 1½ | 7¾ | 2.60 | 6.60 | Reitesel | Reiszak |
| 48 | 1⅜ | 9¾ | 3.00 | 9.60 | Reitgaul | Reitbahn |
| 60 | 1¼ | 12 | 3.40 | 13.00 | Reitgerte | Reitendes |
| 72 | 1⅛ | 14¼ | 3.80 | 16.80 | Reithose | Reiterar |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.




Cross Bit—⅞-inch hexagon hollow steel—Collared Shank.

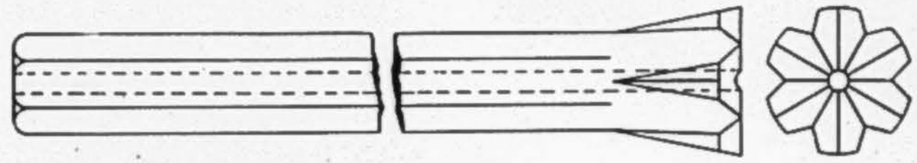
| Drilling Length exclusive of Shank Inches | For drilling holes up to 6 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 6 Ft. Set | ⅞ inch, for "A-66" "Little Hummer" Drill | | | | |
| 12 | 1¾ | 3⅜ | $1.80 | ..... | Reitjacke | Reitpost |
| 24 | 1⅝ | 5⅝ | 2.20 | $4.00 | Reitjunge | Reitross |
| 36 | 1½ | 7¾ | 2.60 | 6.60 | Reitkleid | Reitstall |
| 48 | 1⅜ | 9¾ | 3.00 | 9.60 | Reitlehen | Reitstock |
| 60 | 1¼ | 12 | 3.40 | 13.00 | Reitochs | Reitvogt |
| 72 | 1⅛ | 14¼ | 3.80 | 16.80 | Reitoral | Reitwegen |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.





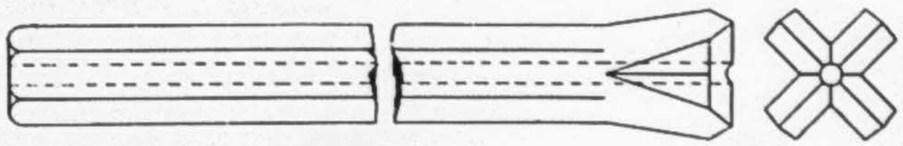
# Hollow Hexagon "Hummer" Drill Steel



Collarless shank, 1-inch hexagon, rose bit.

| Drilling Length exclusive of Shank Inches | For drilling holes up to 8 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 8 Ft. Set | 1 inch, for "B-66" "Hummer" Drill | | | | |
| 12 | 2⅛ | 3¾ | $2.40 | ..... | Reitzeug | Reizung |
| 24 | 2 | 6½ | 2.80 | $ 5.20 | Reixelo | Reisungen |
| 36 | 1⅞ | 9¼ | 3.20 | 8.40 | Reizbares | Reizvoll |
| 48 | 1¾ | 12 | 3.60 | 12.00 | Reizend | Rejalgar |
| 60 | 1⅝ | 14¾ | 3.90 | 15.90 | Reizender | Rejaser |
| 72 | 1½ | 17½ | 4.20 | 20.10 | Reizker | Rejaunier |
| 84 | 1⅜ | 20¼ | 4.50 | 24.60 | Reizlos | Rejectabis |
| 96 | 1¼ | 23 | 4.80 | 29.40 | Reizloser | Rejeitar |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.

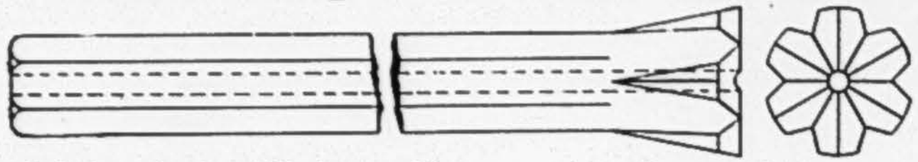


Collarless shank, 1-inch hexagon, cross bit.

| Drilling Length exclusive of Shank Inches | For drilling holes up to 8 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 8 Ft. Set | 1 inch, for "B-66" "Hummer" Drill | | | | |
| 12 | 2⅛ | 3¾ | $2.40 | ..... | Rejero | Rejolting |
| 24 | 2 | 6½ | 2.80 | $ 5.20 | Rejetable | Rejoneado |
| 36 | 1⅞ | 9¼ | 3.20 | 8.40 | Rejetais | Rejonear |
| 48 | 1¾ | 12 | 3.60 | 12.00 | Rejicimus | Rejoneo |
| 60 | 1⅝ | 14¾ | 3.90 | 15.90 | Rejicula | Rejouimes |
| 72 | 1½ | 17½ | 4.20 | 20.10 | Rejiculus | Rejouiras |
| 84 | 1⅜ | 20¼ | 4.50 | 24.60 | Rejoicing | Rejourned |
| 96 | 1¼ | 23 | 4.80 | 29.40 | Rejoinder | Rejuriez |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.

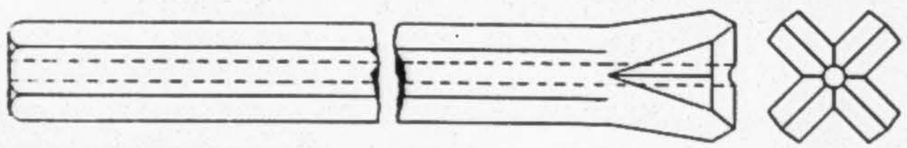
# Hollow Hexagon "Hummer" Drill Steel



Collarless shank, 1⅛-inch, rose bit.

| Drilling Length exclusive of Shank Inches | For drilling holes up to 12 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 12 Ft. Set | 1⅛ inch, for "C-66" "Hummer" Drill | | | | |
| 12 | 2⅞ | 4¾ | $2.50 | ..... | Rekenbord | Relabebar |
| 24 | 2¾ | 8¼ | 3.00 | 5.50 | Rekenen | Relaberis |
| 36 | 2⅝ | 11¾ | 3.40 | 8.90 | Rekenfeil | Reisollver |
| 48 | 2½ | 15¼ | 3.80 | 13.70 | Rekening | Relabimur |
| 60 | 2⅜ | 18¾ | 4.10 | 17.80 | Rekenles | Relache |
| 72 | 2¼ | 22¼ | 4.40 | 22.20 | Rekhout | Relachons |
| 84 | 2⅛ | 25¾ | 4.80 | 26.00 | Rekindle | Relaciono |
| 96 | 2 | 29¼ | 5.10 | 31.10 | Rekrut | Relaedes |
| 108 | 1⅞ | 32¾ | 5.40 | 36.50 | Rekruten | Relaedo |
| 120 | 1¾ | 36¼ | 5.80 | 42.30 | Rekstok | Relaedunt |
| 132 | 1⅝ | 39¾ | 6.10 | 48.40 | Rektorat | Relaesero |
| 144 | 1½ | 43¼ | 6.40 | 54.80 | Rektuig | Relajabas |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.



Collarless shank, 1⅛-inch, cross bit.

| Drilling Length exclusive of Shank Inches | For drilling holes up to 12 feet deep. | | | | | |
|---|---|---|---|---|---|---|
| | Diam. of Bit Inches | Approx. Weight per Steel Lbs. | Net Price | | Telegraph Name | |
| | | | Per Single Steel | Per Set | Single Steels | Set |
| Standard 12 in. Run | 12 Ft. Set | 1⅛ inch, for "C-66" "Hummer" Drill | | | | |
| 12 | 2⅞ | 4¾ | $2.50 | ..... | Relajantes | Relapsia |
| 24 | 2¾ | 8¼ | 3.00 | $ 5.50 | Relajaran | Relapsing |
| 36 | 2⅝ | 11¾ | 3.40 | 8.90 | Relamber | Relapso |
| 48 | 2½ | 15¼ | 3.80 | 12.70 | Relambido | Relargage |
| 60 | 2⅜ | 18¾ | 4.10 | 17.80 | Relamemos | Relargir |
| 72 | 2¼ | 22¼ | 4.40 | 22.20 | Relamiera | Relargites |
| 84 | 2⅛ | 25¾ | 4.80 | 26.00 | Relampo | Relatador |
| 96 | 2 | 29¼ | 5.10 | 31.10 | Relancait | Relatando |
| 108 | 1⅞ | 32¾ | 5.40 | 36.50 | Relanciez | Relavabo |
| 120 | 1¾ | 36¼ | 5.80 | 42.30 | Relanzado | Relavais |
| 132 | 1⅝ | 39¾ | 6.10 | 48.40 | Relanzar | Relavaras |
| 144 | 1½ | 43¼ | 6.40 | 54.80 | Relanzo | Relavavit |

Cutting point and shank hardened.
Sets for drilling deeper holes can be furnished. Prices quoted upon request.



## CHICAGO PNEUMATIC TOOL COMPANY

The Chicago Pneumatic Tool Company issues the following bulletins, any of which will be sent on request if the number of the bulletin is stated:

# Air Compressors

BULLETIN NUMBER

34-A Class "G" "Chicago Pneumatic" Steam Driven Compressors.
34-B "Chicago Pneumatic" Power Driven Compressors.
34-C "Chicago Pneumatic" Gasoline Driven Compressors.
34-D "Chicago Pneumatic" Corliss Type Steam Driven Compressors.
34-F Design and Construction Class "G" "Chicago Pneumatic" Compressors.
34-G Air Receivers, Aftercoolers, Reheaters, etc.
34-H General Instructions for Installing and Operating "Chicago Pneumatic" Compressors.
34-K "Chicago Pneumatic" Class N-SO and N-SG Fuel Oil and Gas Driven Compressors.
34-L General Pneumatic Engineering Information.
34-M "Chicago Pneumatic" Class "O" Steam and Power Driven Compressors.
34-N Class N-SS and N-SB Single Enclosed Compressors.
34-O Instructions for the Installation and Care of "Chicago Pneumatic" Gasoline Driven Air Compressors.
34-S Small Power Driven Compressors.
34-W Class "A-O" Fuel Oil Engines.
34-X Class A-G Gas and Gasoline Engines.

# Rock Drills and Hand Drills

148 Chicago Valveless Hand Drills.
149 Chicago Portable Mine Hoist.
150 Chicago Coal Drills.
151 Chicago Slogger Rock Drills.
152 Chicago Gatling Drills.
153 Chicago Sinker.
154 Chicago Stoper.
172 Chicago Plug and Feather Drill.
216 "Hummer" Self Rotating Hammer Drills.

CHICAGO PNEUMATIC TOOL COMPANY

# Chicago Pneumatic Tool Co.

**General Office, Fisher Building, CHICAGO**
**Eastern Office, 52 Vanderbilt Ave., NEW YORK**

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## FOREIGN

| | |
|---|---|
| Canada: | Montreal, Canadian Pneumatic Tool Co.<br>Montreal, Toronto, Winnipeg, The Holden Co., Ltd. |
| British Columbia: | Vancouver, Holden Co., Ltd., 429 Pendar Street. |
| Mexico: | Mexico City, The General Supply Company, Av. Isabel La Catolica No. 51. |
| Northern Mexico: | (Sonora and Chihuahua). D. A. Carpenter & Co., El Paso, Texas. |
| Great Britain:<br>Spain:<br>Portugal: | London, The Consolidated Pneumatic Tool Co., Ltd., 9 Bridge Street, Westminster, S. W. |
| France: | Paris, Anciens Etablissement Glaenzer & Perreaud, 18-20 Faubourg du Temple. |
| Italy: | Milan, The Consolidated Pneumatic Tool Co., Ltd., via A Capellini 7. |
| Belgium: | Brussels, The Consolidated Pneumatic Tool Co., Ltd., 22 Chaussee de Forest, Porte de Hal. |
| Russia: | Petrograd, Phoenix Engineering Works, Ltd., Polustrovskaya Quay No. 39. |
| Germany:<br>Austria:<br>Hungary:<br>Balkan States:<br>Norway:<br>Sweden:<br>Holland:<br>Switzerland:<br>Denmark: | Berlin, Internationale Pressluft & Elektricitats-Gesellschaft m.b. H. Berlin, C 54. Weinmeisterhof, Weinmeisterstrasse No. 14. |
| India: | Bombay, Consolidated Pneumatic Tool Co., Ltd., Rampart Row, Fort.<br>Calcutta, The Consolidated Pneumatic Tool Co., Ltd., 8 Lal Bazar St. |
| Japanese Empire: | Tokyo, Osaka, Seoul, Dairen. The F. W. Horne Co. |
| Philippine Islands: | Manila, Frank L. Strong Machinery Co., 64-68 Echague |
| Australia: | Sydney, Henry W. Peabody & Co. |
| New Zealand: | Wellington, Henry W. Peabody & Co. |
| South America: | Buenos Aires, Argentina, Evans, Thornton & Co. |
| South Africa: | Johannesburg, The Consolidated Pneumatic Tool Co., Ltd., 3 and 9 Cullinan Bldgs. |

# SLUICE GATES AND OTHER WATER WORKS APPLIANCES

## COLDWELL-WILCOX CO.

NEWBURGH, N.Y. U.S.A.

---

JUNE, 1910.

WATER WORKS SUPPLY COMPANY

SALES AGENTS

CHICAGO

SAN FRANCISCO, CAL. LOS ANGELES, CAL.

**For Many Years the Leaders in Quality, Design and Workmanship**

# SLUICE GATES

AND MODERN

# WATER WORKS

# APPLIANCES

## COLDWELL - WILCOX COMPANY

### NEWBURGH, NEW YORK

# INTRODUCTION

On the following pages is a description with illustrations of the general line of Water Works Appliances which we manufacture. Being one of the oldest concerns in this line in America we are equipped to design and manufacture all goods of this nature.

We, however, manufacture many types of special Sluice Gates and Water Works Appliances not shown herein and are always glad to give an inquiry the benefit of our experience. We will continue to maintain the high standard of quality that we have established.

Correspondence is solicited.

Very respectfully,

COLDWELL-WILCOX CO.

THE NEWS CO., NEWBURGH, N.Y.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# NEW CROTON DAM

**All Sluice Gates, Special Valves and Iron Work for this Dam were manufactured and installed by COLDWELL - WILCOX COMPANY.**

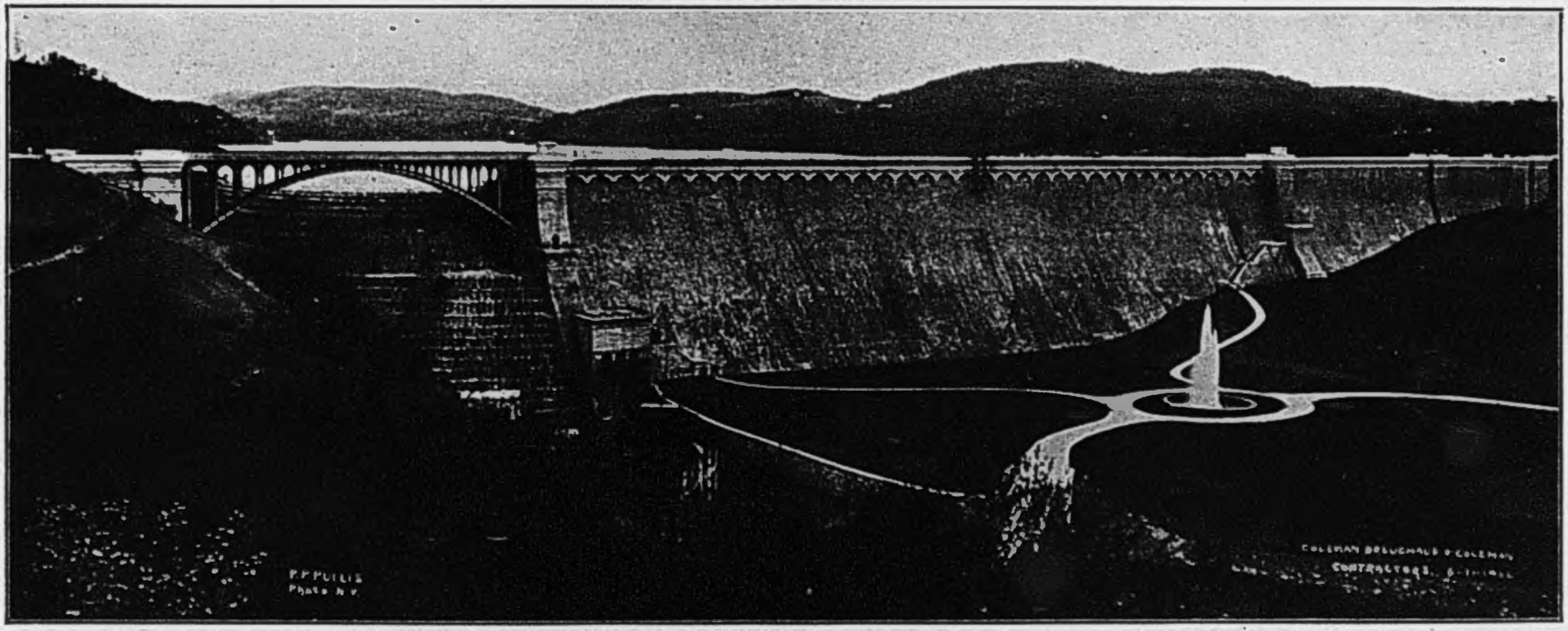


FIG. 42.

| | | | |
|---|---|---|---|
| Length of Dam proper | 1168 ft. | Lowest point of Foundation | 131 ft. below bed of River |
| " Spillway | 1000 ft. | Top of Dam | 166 ft. above " " " |
| Total Length, | 2168 ft. | Total Height | 297 ft. |

Thickness of Base, 206 ft. Thickness of Top, 18 ft. Width of Roadway over Dam, 20 ft.

**Sheet No. 2.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# General Specifications for Sluice Gates and Hoisting Standards

## FRAME

The gate frame is cast in one piece. It is channel shape and both of the flange faces are machined to a true surface. The back flange is drilled to bolt direct to masonry or for connection to special casting or pipe built in the masonry. The other flange acts as the bearing surface of the frame and is fully bronze-mounted to match the bronze-bearing face of the sliding gate. This flange is also drilled for the guides to be bolted thereto.

## GUIDES

The guides are made in rights and lefts and are strong, heavy castings finished true to fit the gate frame to which they are fastened with machine bolts. The guides are fitted with either stationary or adjustable bronze wedges to conform to the wedges on the gate. The guides will extend above the gate opening so that the gate when opened full height will still be within the guides.

## GATE

The gate is a heavy, well-ribbed casting, finished on the face side to receive the bronze facing to correspond with that on the gate frame. It is fitted with either stationary or adjustable bronze wedges, corresponding with those on the guides, so that all the wedge-bearing surfaces will come in contact at the same time and force the gate to its seat, and all will be released immediately when the gate moves up. On the ribbed side of the gate in the upper part is a hub to which the stem is keyed.

## STEM

The stem to be made of cold-rolled steel and when required longer than 24 ft. will be made in two or more pieces. If made in more than one piece they are coupled together with couplings. The couplings are cross-keyed with taper keys and the keys are drilled at one end to receive cotter pin. The upper part of stem has a square thread cut sufficient length to raise the gate full opening. The threaded part of stem is fitted to the bronze nut in hoisting standard.

## ROLLER BEARING HOISTING STANDARD

The hoisting standard is made of ample strength to operate the gate. The base is flanged and drilled to connect to floor beams or wall bracket. The bronze nut that engages the thread on the upper part of the stem is held in position by a top flange bolted to the upper flange of the standard. The bronze nut has a bottom flange or collar.

Below the flange or collar of the nut are placed two bronze plain rotating plates and between these plates is another bronze plate fitted with roller-bearing steel rollers. Thereby preventing rust or corrosion. This set of bearings take the downward thrust caused by opening the gate.

Above the nut collar is placed another set of bearings like that below. This set takes the upward thrust caused when closing gate.

The nut is keyed to a hand-wheel, or gearing as required, which, when turned causes the stem to rise, showing at all times the position of the gate. If desired can be furnished without roller bearings.

## STEM GUIDE BRACKETS

Stems over 15 ft. long to be provided bronze-lined adjustable guide brackets to be set true in line with stem and anchored securely to masonry.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

Amongst the Oldest Designers and
Manufacturers of

# SLUICE GATES

In America.

FOR ALL : :
CONDITIONS
AND HEADS

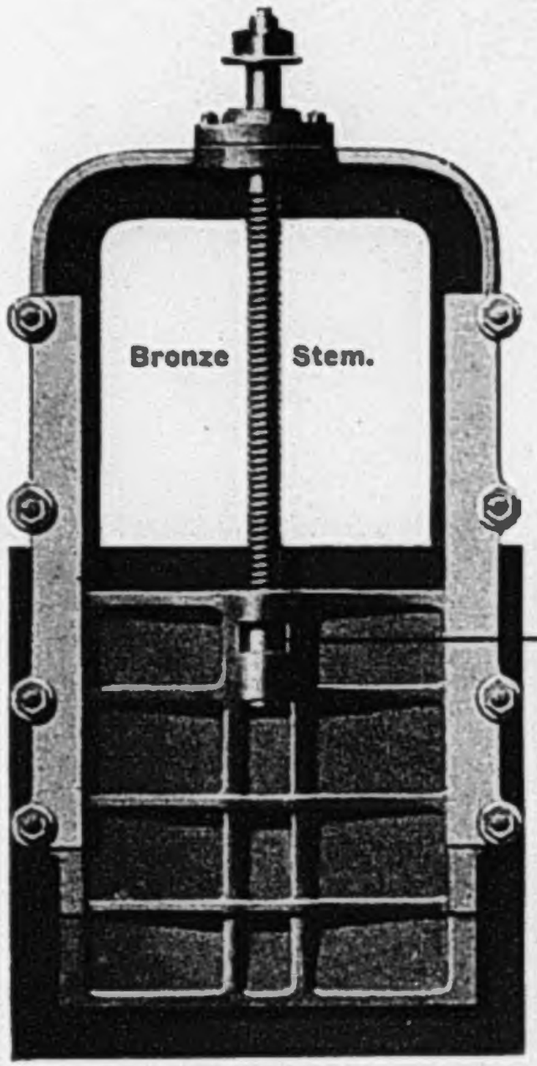



FIG. 4.

18 inch x 18 inch self-contained
Sluice Gate
Bronze Mounted Stationary Stem

## Made with Flange End Connections

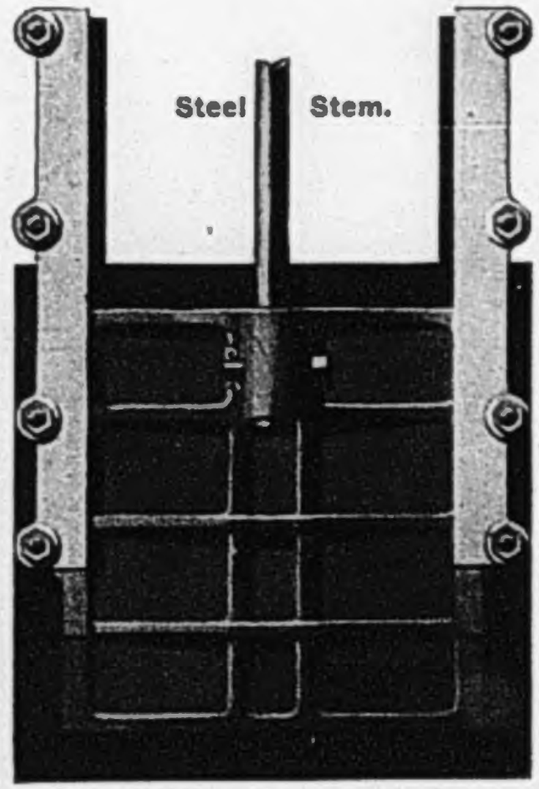



FIG. 5.

18 inch x 18 inch Sluice Gate
Bronze Mounted Rising Stem

# Wilcox Square and Rectangular Sluice Gates

Sheet No. 4.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Wilcox
## Square and Rectangular
## Sluice Gates

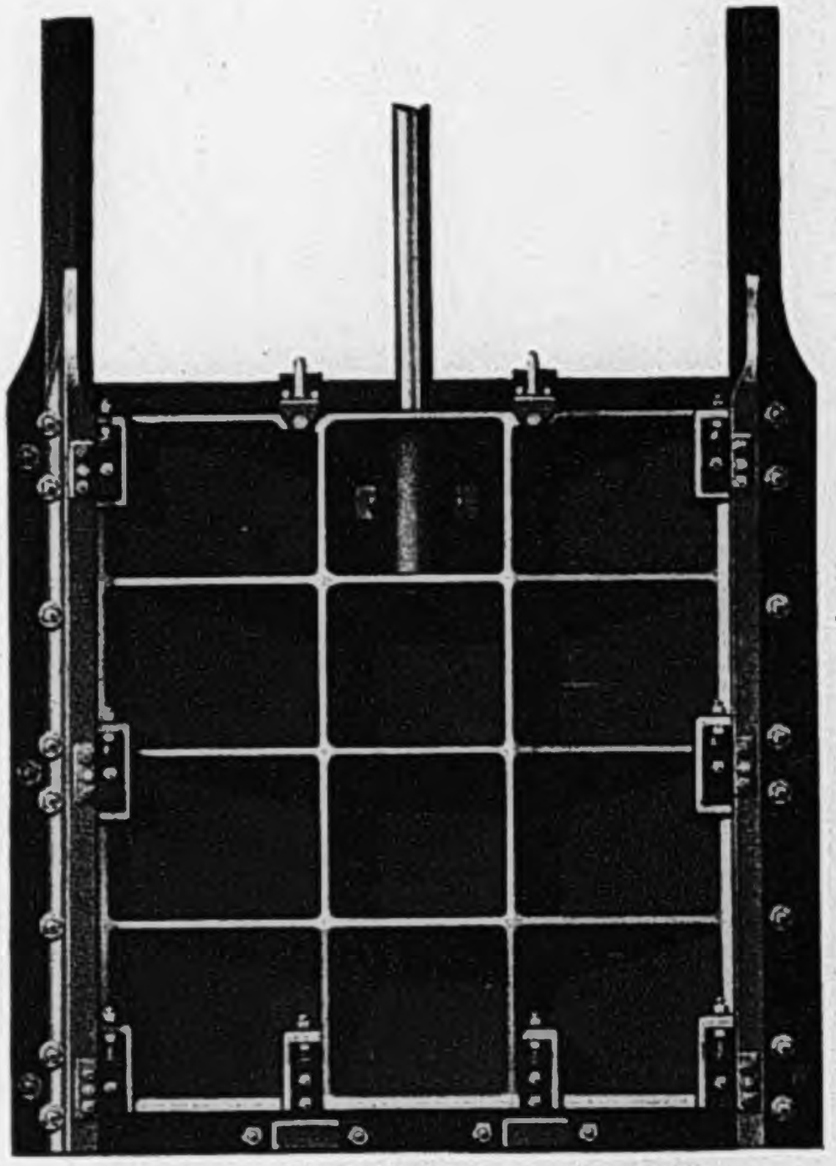


FIG. 6.

4 ft. x 4 ft. Back Pressure
Sluice Gate

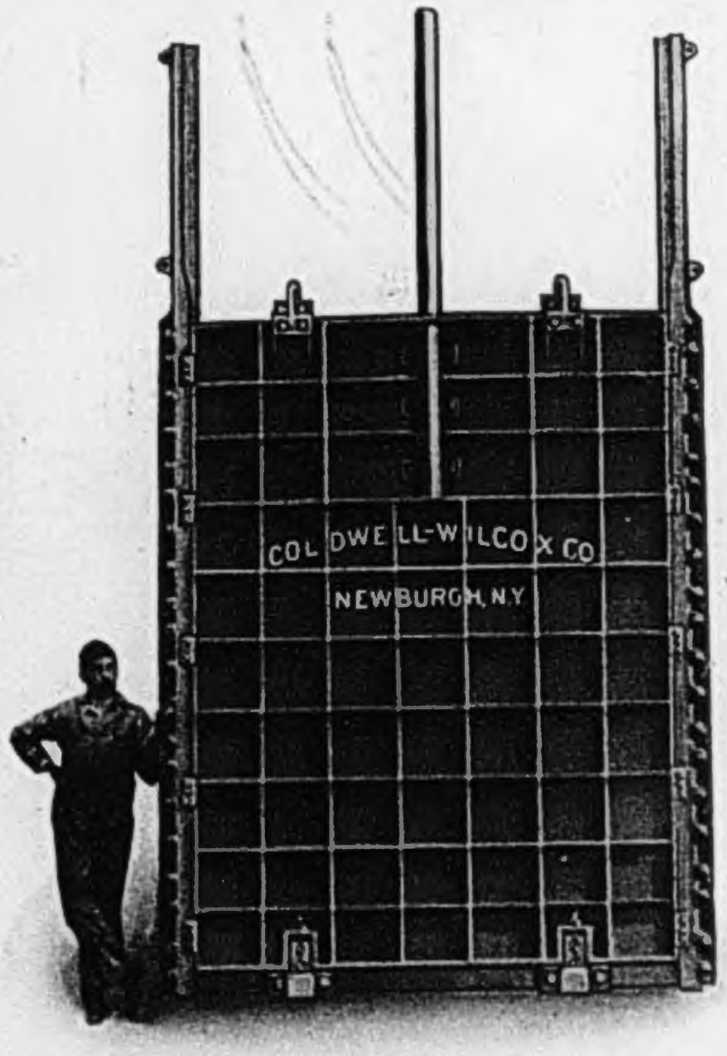



FIG. 7.

7 ft. x 9 ft. Rectangular Sluice Gate

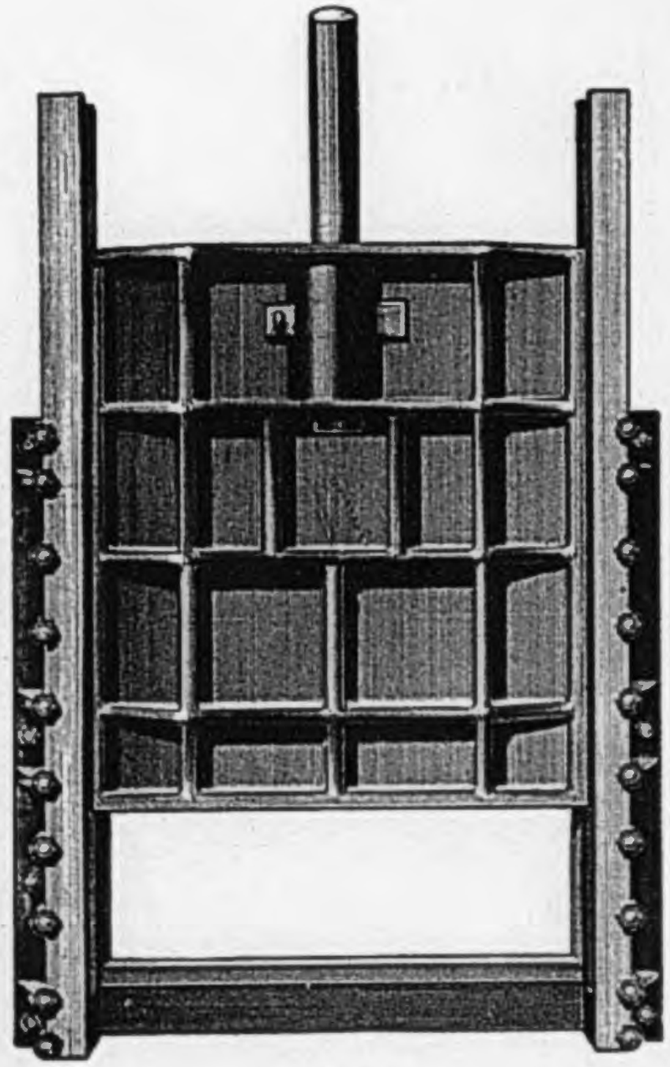


FIG. 8.

4 ft. x 4 ft. Direct Pressure
Sluice Gate

Made with either
Stationary or
Adjustable Wedges

All Gates
Bronze Mounted
and Hand Scraped

FOR DIMENSIONS, SEE SHEET 6. LIST A.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

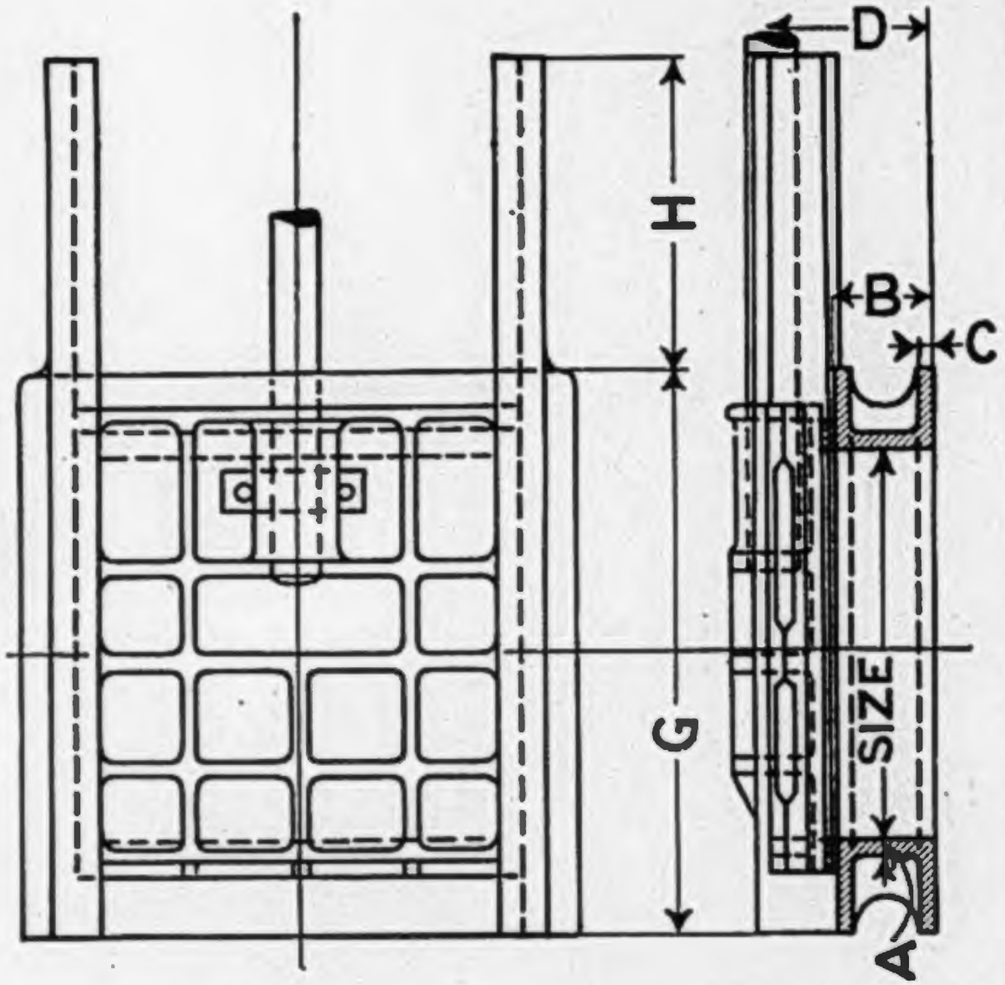



FIG. 50.
FRONT VIEW.

FIG. 51.
CROSS SECTION.

# DIMENSIONS OF SQUARE AND RECTANGULAR SLUICE GATES

## List A

FOR ILLUSTRATION, SEE SHEET NO. 5.

**Sheet No. 6.**

| Size of Gate | Size of Flange | A | B | C | D | G | H |
|---|---|---|---|---|---|---|---|
| 10 x 10 | 17 x 17 | ⅝ | 5 | ¾ | 7½ | 14½ | 5 |
| 12 x 12 | 19 x 19 | ⅝ | 5 | ¾ | 7½ | 16½ | 6 |
| 14 x 14 | 21 x 21 | ⅝ | 5 | ¾ | 7½ | 18½ | 7 |
| 16 x 16 | 23 x 23 | ⅝ | 5 | ¾ | 7¾ | 21 | 8 |
| 18 x 18 | 25 x 25 | ⅝ | 5 | 1 | 7¾ | 23 | 9 |
| 18 x 24 | 25 x 31 | ¾ | 5 | 1 | 7⅞ | 29 | 12 |
| 18 x 30 | 27 x 39 | ¾ | 6 | 1 | 8⅝ | 35 | 15 |
| 18 x 36 | 27 x 45 | ¾ | 6 | 1 | 8⅝ | 41 | 16 |
| 20 x 20 | 28 x 28 | ¾ | 5 | 1 | 8 | 25 | 10 |
| 20 x 24 | 28 x 32 | ¾ | 5 | 1 | 8 | 29 | 12 |
| 24 x 24 | 33 x 33 | ¾ | 5 | 1 | 8½ | 29 | 12 |
| 24 x 30 | 33 x 39 | ¾ | 5 | 1 | 8¾ | 35 | 15 |
| 24 x 36 | 33 x 45 | ¾ | 5 | 1 | 8¾ | 41 | 16 |
| 24 x 48 | 33 x 57 | ¾ | 5 | 1 | 8¾ | 53 | 21 |
| 30 x 30 | 39 x 39 | ¾ | 6 | 1 | 9⅜ | 35 | 15 |
| 30 x 36 | 39 x 45 | ¾ | 6 | 1 | 9⅜ | 41 | 16 |
| 30 x 42 | 39 x 51 | ¾ | 6 | 1 | 9⅜ | 47 | 18 |
| 30 x 60 | 39 x 69 | ¾ | 6 | 1 | 9⅜ | 65 | 24 |
| 30 x 72 | 39 x 81 | ¾ | 6 | 1 | 9⅞ | 77 | 28 |
| 36 x 36 | 45 x 45 | ¾ | 6 | 1 | 10¼ | 41 | 16 |
| 36 x 42 | 45 x 51 | ¾ | 6 | 1 | 10¼ | 47 | 18 |
| 36 x 48 | 45 x 57 | ¾ | 6 | 1 | 10¼ | 53 | 21 |
| 36 x 60 | 45 x 69 | ¾ | 6 | 1 | 10¼ | 65 | 24 |
| 36 x 72 | 45 x 81 | ¾ | 6 | 1 | 10¼ | 77 | 28 |
| 42 x 42 | 51 x 51 | ¾ | 6 | 1 | 10 | 47 | 18 |
| 42 x 48 | 51 x 57 | ¾ | 6 | 1 | 10 | 53 | 21 |
| 42 x 60 | 51 x 69 | ¾ | 6 | 1 | 10 | 65 | 24 |
| 42 x 72 | 52 x 82 | ⅞ | 6 | 1⅛ | 10¼ | 78 | 28 |
| 42 x 84 | 52 x 94 | ⅞ | 6 | 1⅛ | 10¼ | 90 | 32 |
| 48 x 48 | 57 x 57 | ¾ | 6 | 1 | 10 | 53 | 21 |
| 48 x 60 | 58 x 70 | ⅞ | 6 | 1⅛ | 10¼ | 66 | 24 |
| 48 x 72 | 58 x 82 | ⅞ | 6 | 1⅛ | 10¼ | 78 | 28 |
| 54 x 54 | 64 x 64 | ⅞ | 6 | 1⅛ | 10¼ | 60 | 22 |
| 54 x 60 | 64 x 70 | ⅞ | 6 | 1⅛ | 10¼ | 66 | 24 |
| 54 x 72 | 64 x 82 | ⅞ | 6 | 1⅛ | 10¼ | 78 | 28 |
| 54 x 84 | 64 x 94 | ⅞ | 6 | 1⅛ | 10½ | 90 | 32 |
| 54 x 96 | 64 x106 | ⅞ | 6 | 1⅛ | 10½ | 102 | 34 |
| 60 x 60 | 70 x 70 | 1⅛ | 7 | 1½ | 11 | 65 | 24 |
| 60 x 72 | 70 x 82 | 1⅛ | 7 | 1½ | 11 | 77 | 28 |
| 60 x 84 | 70 x 94 | 1⅛ | 7 | 1½ | 11 | 91½ | 32 |
| 60 x 96 | 70 x106 | 1⅛ | 7 | 1½ | 11 | 103½ | 34 |
| 60 x108 | 70 x118 | 1⅛ | 7 | 1½ | 11 | 115½ | 36 |
| 60 x156 | 72 x168 | 1⅛ | 7 | 1½ | 11½ | 163½ | 60 |
| 60 x216 | 72 x228 | 1⅛ | 7 | 1½ | 11½ | 223½ | 85 |
| 72 x 72 | 82 x 82 | 1⅛ | 7 | 1½ | 11½ | 79½ | 28 |
| 72 x 84 | 82 x 94 | 1⅛ | 7 | 1½ | 11½ | 91½ | 32 |
| 72 x 96 | 82 x106 | 1⅛ | 7 | 1½ | 11½ | 103½ | 34 |
| 72 x108 | 82 x118 | 1⅛ | 7 | 1½ | 11½ | 115½ | 36 |
| 72 x120 | 82 x130 | 1⅛ | 7 | 1½ | 11½ | 127½ | 42 |
| 72 x168 | 84 x180 | 1⅛ | 7 | 1½ | 11½ | 175½ | 65 |
| 84 x 84 | 94 x 94 | 1⅛ | 7 | 1½ | 11½ | 91½ | 32 |
| 84 x 96 | 94 x106 | 1⅛ | 7 | 1½ | 11½ | 103½ | 34 |
| 84 x108 | 94 x118 | 1⅛ | 7 | 1½ | 11½ | 115½ | 36 |

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# WILCOX CIRCULAR SLUICE GATES

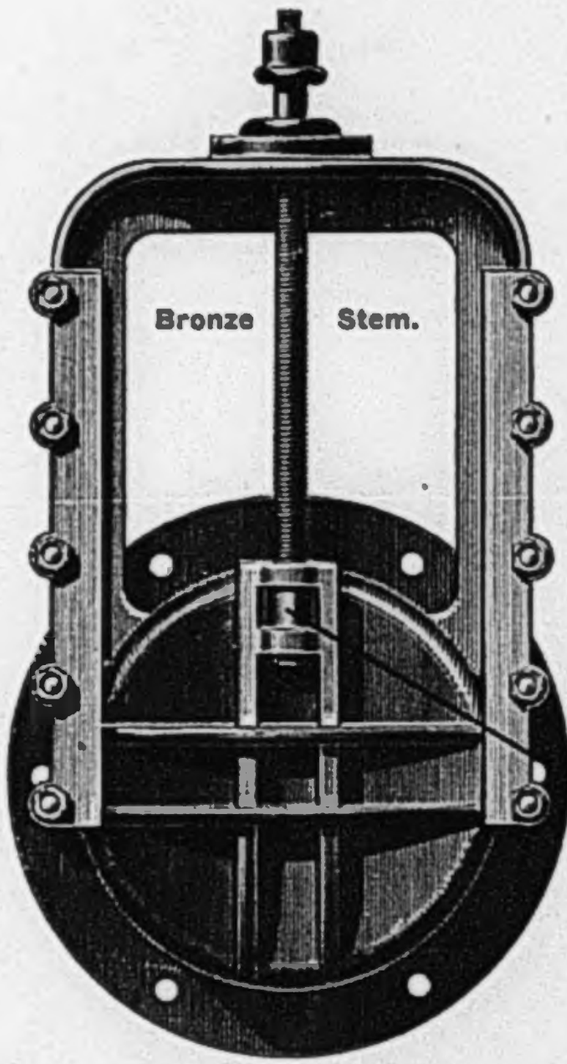



FIG. 10.—FRONT VIEW.

Made in
Sizes
from 4 in.
to 48 in.

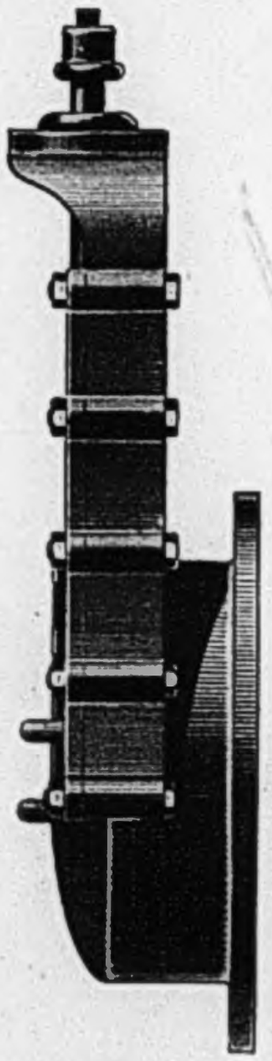


FIG. 11.
SIDE VIEW.

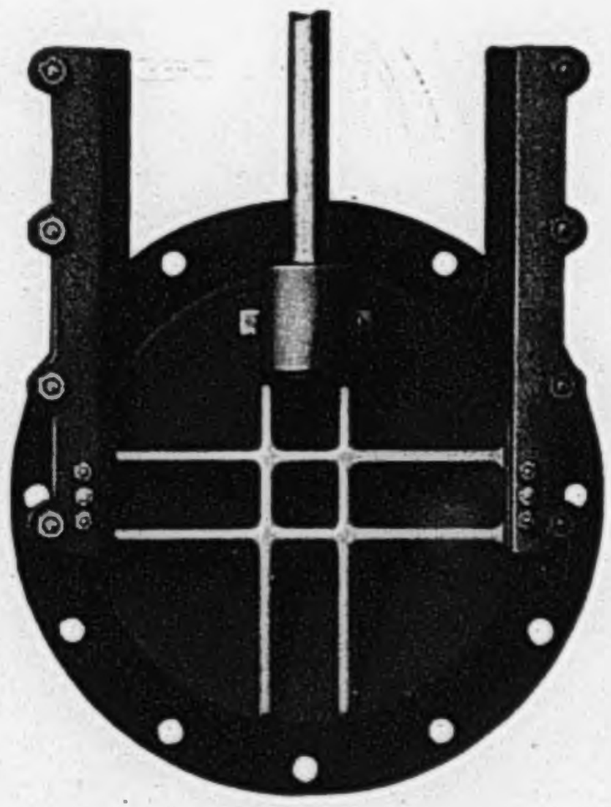


FIG. 39.

12 inch dia. self-contained
Sluice Gate.
Bronze Mounted Stationary Stem

Bolted to Masonry direct or
to Special with Flange
Bell or Spigot

12 inch dia. Sluice Gate

Bronze Mounted Rising Stem

**For Light Pressures from Face Only.**

List of Dimensions See Sheet No. 8, List C.

**Sheet No. 7.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

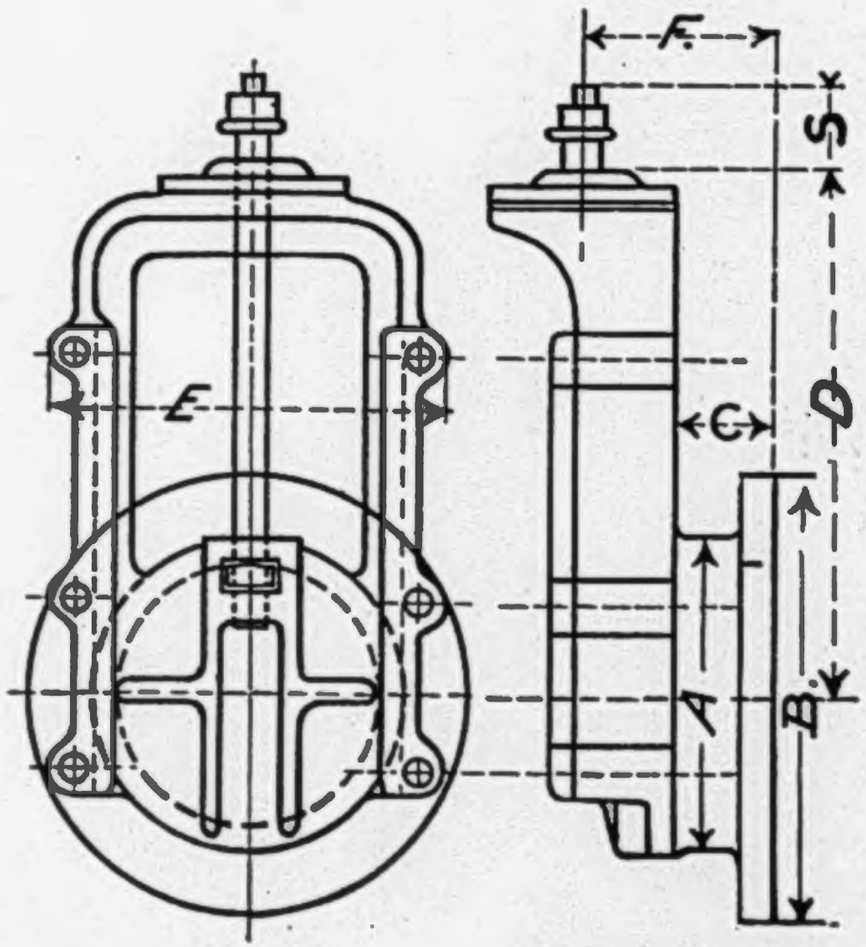



FIG. 54.

Front Elevation.

FIG. 55.

Side Elevation.

| Size | A | B | C | D | E | F | S |
|---|---|---|---|---|---|---|---|
| 4 | 4⅞ | 9 | 2½ | 8⅞ | 7⅝ | 4¾ | 4⅝ |
| 6 | 6⅞ | 11 | 2½ | 12 | 9⅞ | 4¾ | 4⅝ |
| 8 | 9¼ | 13½ | 3⅛ | 16 | 12⅜ | 6¼ | 4 1/16 |
| 10 | 11¼ | 16 | 3⅛ | 19⅛ | 14½ | 6 5/16 | 4 1/16 |
| 12 | 13¼ | 19 | 3½ | 22 | 17 | 6⅞ | 4 1/16 |
| 14 | 15¼ | 21 | 3⅝ | 25½ | 19½ | 6⅞ | 4 1/16 |
| 16 | 17¼ | 23⅝ | 4⅛ | 28⅜ | 22 | 8⅛ | 4 1/16 |
| 18 | 19½ | 25 | 4¼ | 31⅜ | 24⅜ | 8⅛ | 4 1/16 |
| 20 | 21½ | 27½ | 5⅛ | 35¼ | 26¾ | 9⅛ | 5 1/16 |
| 24 | 25½ | 32 | 5¼ | 41⅜ | 30¾ | 9¼ | 5 1/16 |
| 30 | 31¼ | 38¼ | 5¼ | 50⅞ | 37 | 9⅝ | 5 1/16 |
| 36 | 37¼ | 45¼ | 6⅛ | 59⅞ | 44¼ | 11 | 5 1/16 |
| 42 | 43¼ | 52¼ | 7 | 69 | 49¾ | 12⅜ | 5 1/16 |
| 48 | 49¼ | 59½ | 7 | 78 | 56 | 12⅝ | 5 1/16 |

## Dimensions of Wilcox Self Contained Sluice Gates

## List C

For Illustration, see Sheet No. 7.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Standard Bronze Mounted Rising Stem

## Circular Sluice Gates

FOR

## Influent or Effluent Service

MADE WITH STATIONARY OR ADJUSTABLE WEDGES

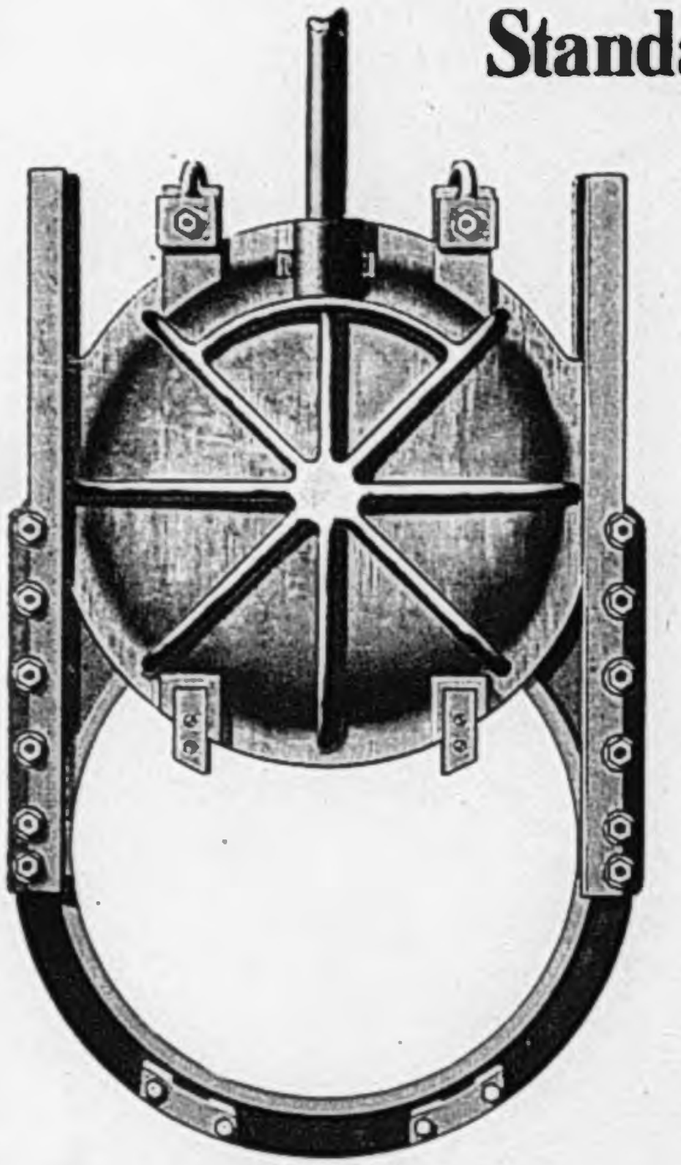


FIG 40.
36 inch Circular Sluice Gate.
Pressure both ways.

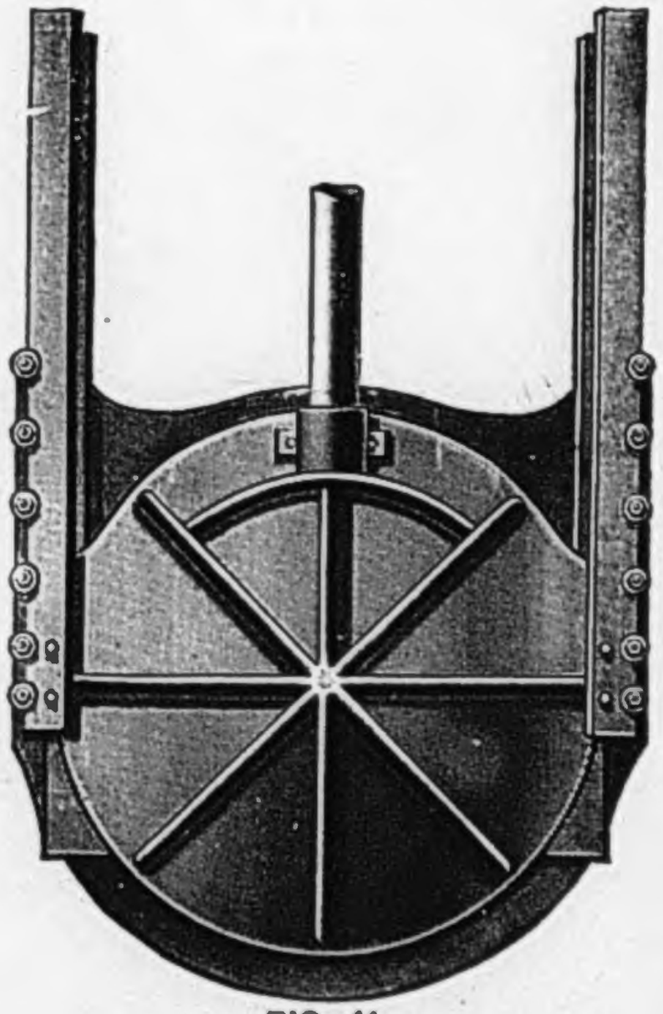


FIG. 41.
36 inch Circular Sluice Gate.
Direct Pressure.

# WILCOX CIRCULAR SLUICE GATES

List of Dimensions See Sheet No. 10, List B.

Sheet No. 9.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

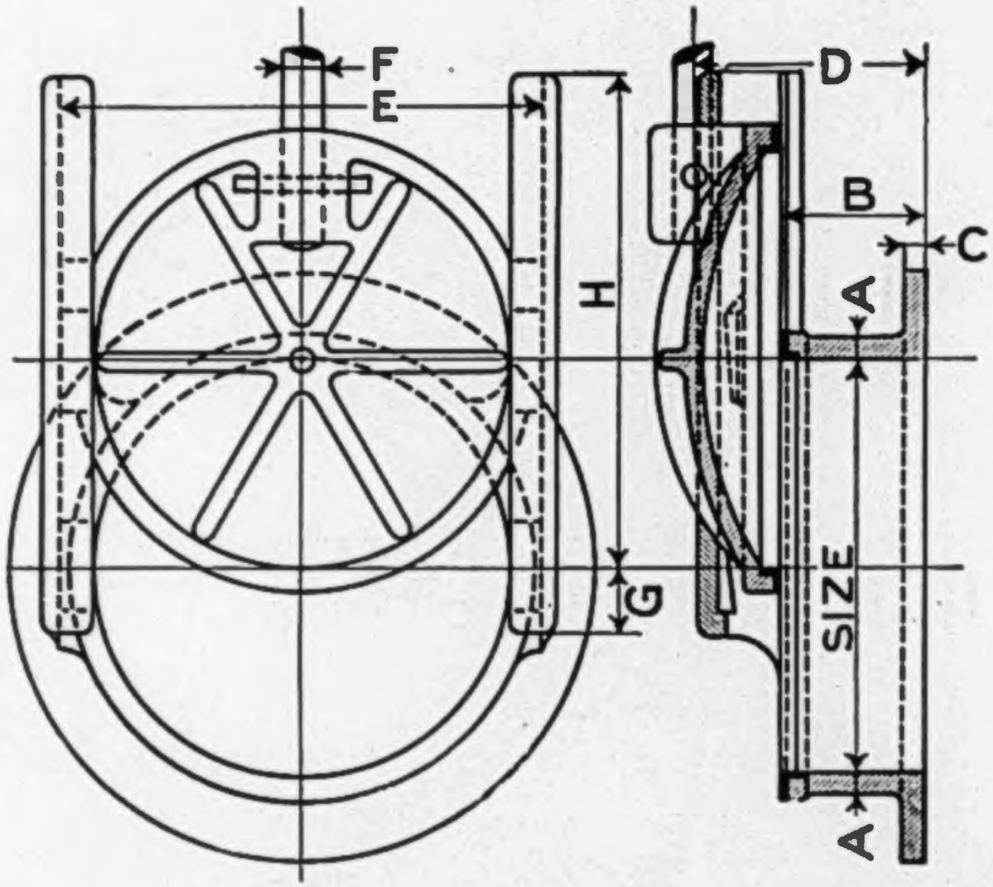



FIG. 52.
FRONT ELEVATION.




FIG. 53.
CROSS SECTION.

| Size | A | B | C | D | E | F | G | H | Dia. of Flange |
|---|---|---|---|---|---|---|---|---|---|
| 18 | ⅞ | 6½ | 1 | 10 | 21 | 1 1/16 | 3¼ | 23¼ | 25 |
| 20 | ⅞ | 6½ | 1 | 10 | 23¼ | 1 1/16 | 3⅜ | 25⅜ | 27½ |
| 24 | ⅞ | 6¼ | 1 | 10 | 27¼ | 1 1/16 | 3⅜ | 31⅜ | 32 |
| 30 | ⅞ | 8 | 1¼ | 12½ | 34 | 2 | 4⅛ | 40⅜ | 38¼ |
| 36 | ⅞ | 8 | 1¼ | 12¼ | 40 | 2 | 3⅜ | 43½ | 45¼ |
| 42 | ⅞ | 8⅛ | 1½ | 13¼ | 46 | 2½ | 3½ | 55 | 52¼ |
| 48 | ⅞ | 8 | 1½ | 13¼ | 52 | 2¼ | 3⅝ | 62½ | 59½ |

# Dimensions of Wilcox Standard Circular Sluice Gates

## WITH RISING STEM

## List B.

For Illustration, see Sheet 9.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Standard Circular Flat Face Sluice Gates

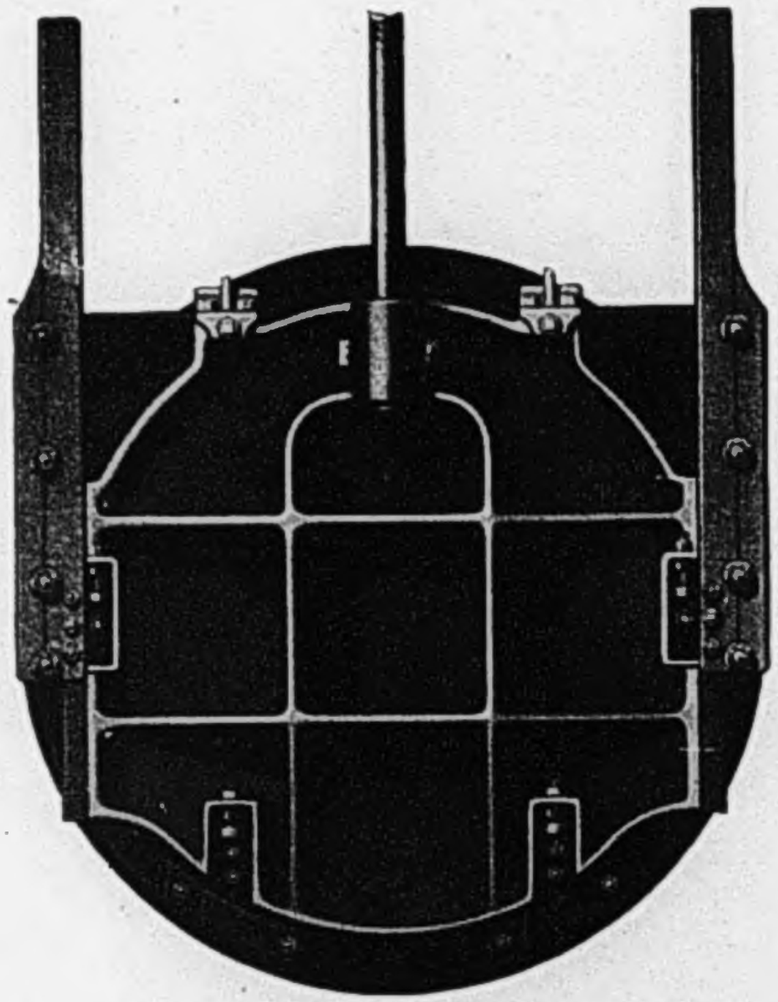


FIG. 48.

36 inch Circular Sluice Gate
Pressure Both Ways
Bronze Mounted Rising Stem

Made with either
Stationary or Adjustable
Wedges

**For LIST OF DIMENSIONS**
**See**
**List H,[8] Sheet No. 12**

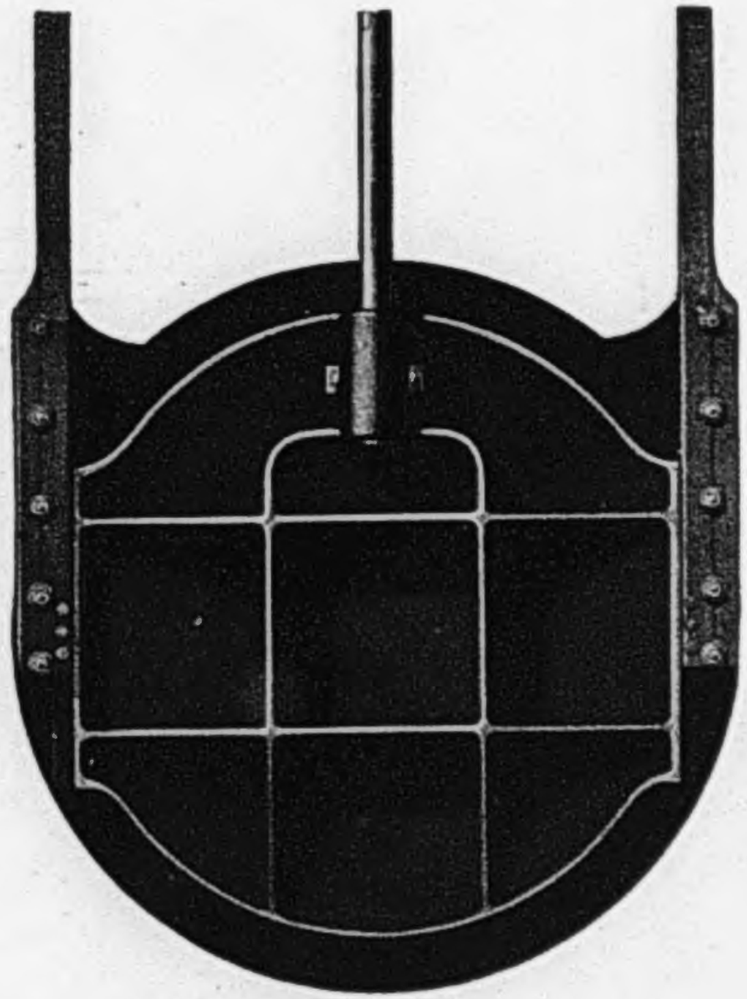


FIG 49.

42 inch Circular Sluice Gate
Pressure face side only
Bronze Mounted Rising Stem

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

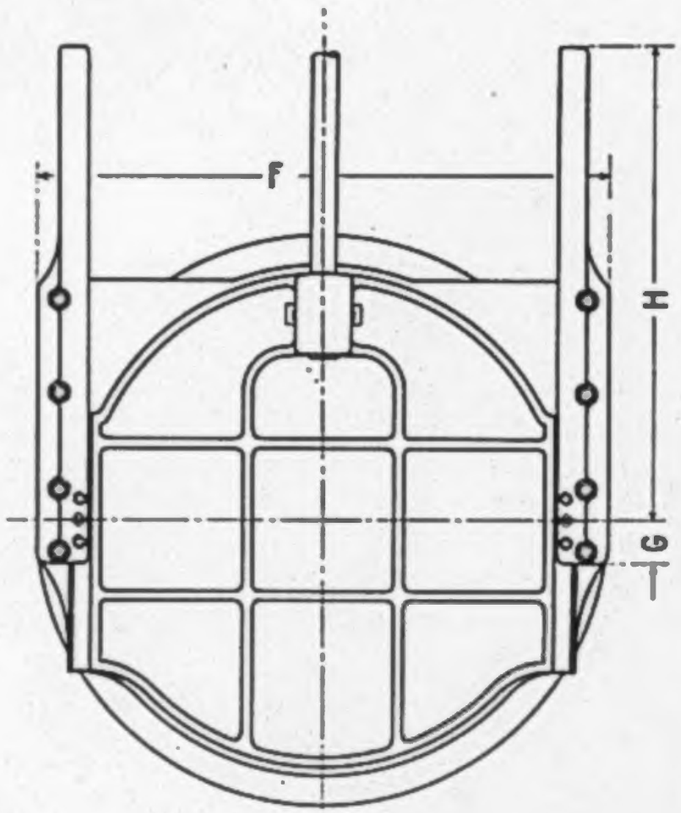



FIG. 67.
FRONT VIEW.

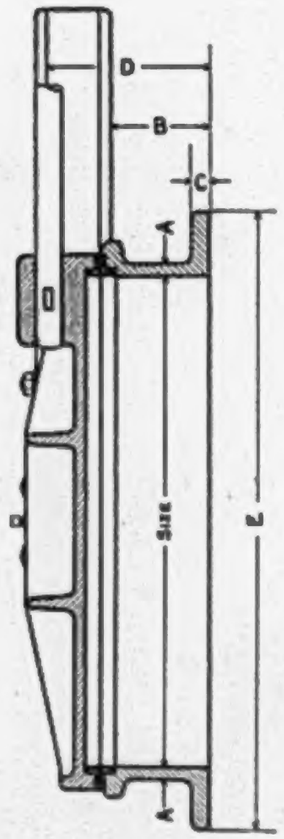



FIG. 68.
CROSS SECTION.

| Size | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 18 | ¼ | 5⅛ | 1 | 8⅛ | 25 | 26 | 3¼ | 19¾ |
| 20 | ¼ | 6¼ | 1 | 9⅛ | 27½ | 28¼ | 3⅜ | 21¾ |
| 24 | ¼ | 6¼ | 1 | 9¼ | 32 | 32¼ | 3⅜ | 26 |
| 30 | ⅜ | 6¼ | 1¼ | 9⅜ | 38¼ | 39¼ | 4⅛ | 32 |
| 36 | ⅜ | 6⅛ | 1¼ | 10 | 45¼ | 45¼ | 3⅜ | 38 |
| 42 | ⅜ | 7¼ | 1¼ | 11¼ | 52¾ | 51½ | 3½ | 44 |
| 48 | ⅜ | 8 | 1½ | 12¼ | 59½ | 57½ | 3⅝ | 50 |
| 54 | 1 | 8 | 1½ | 12½ | 66 | 63½ | 3⅝ | 56 |
| 60 | 1 | 8¼ | 1⅝ | 13 | 72 | 69½ | 4⅛ | 62½ |
| 66 | 1⅛ | 8¼ | 1⅝ | 13 | 79 | 76½ | 4⅛ | 68½ |
| 72 | 1⅛ | 9 | 1¾ | 14 | 86 | 82½ | 4⅛ | 74½ |
| 78 | 1¼ | 9 | 1¾ | 14 | 93 | 88½ | 4⅛ | 80½ |

# DIMENSIONS OF CIRCULAR RISING STEM SLUICE GATES

FOR ILLUSTRATION, SEE SHEET 11.

## List H

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# Roller Bearing Pedestals

**FRICTION REDUCED OVER 75 PER CENT.**

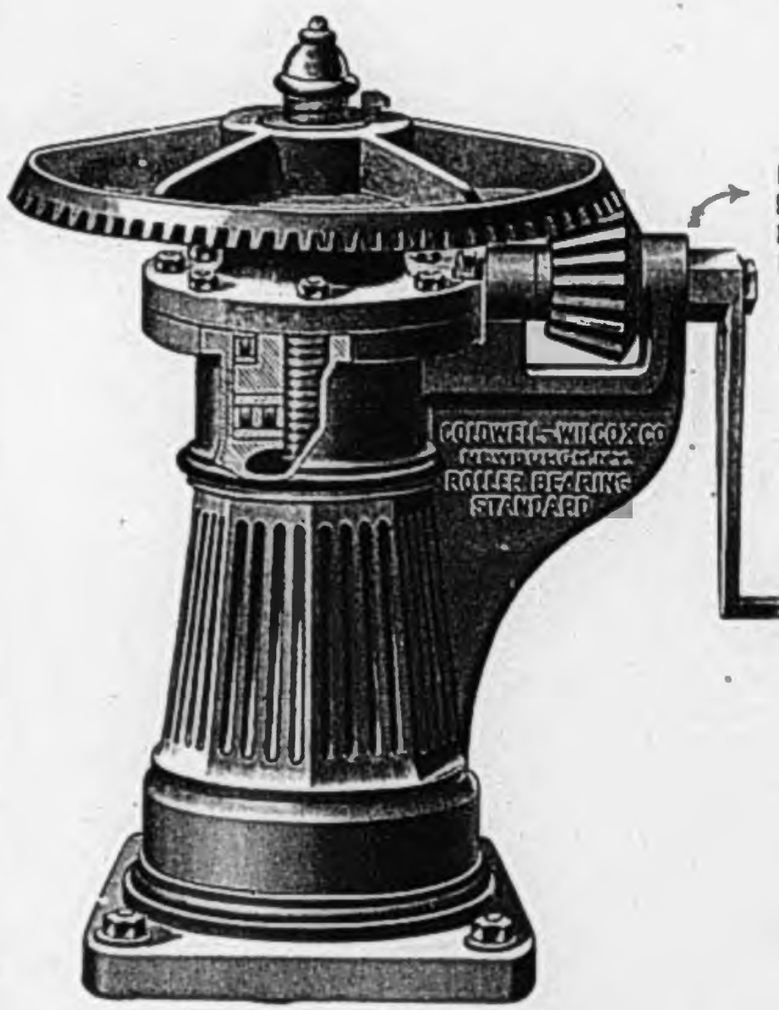



FIG. 18.

Geared for Heavy Sluice Gates.

FIG. 19.

Hand Wheel for Light Sluice Gates

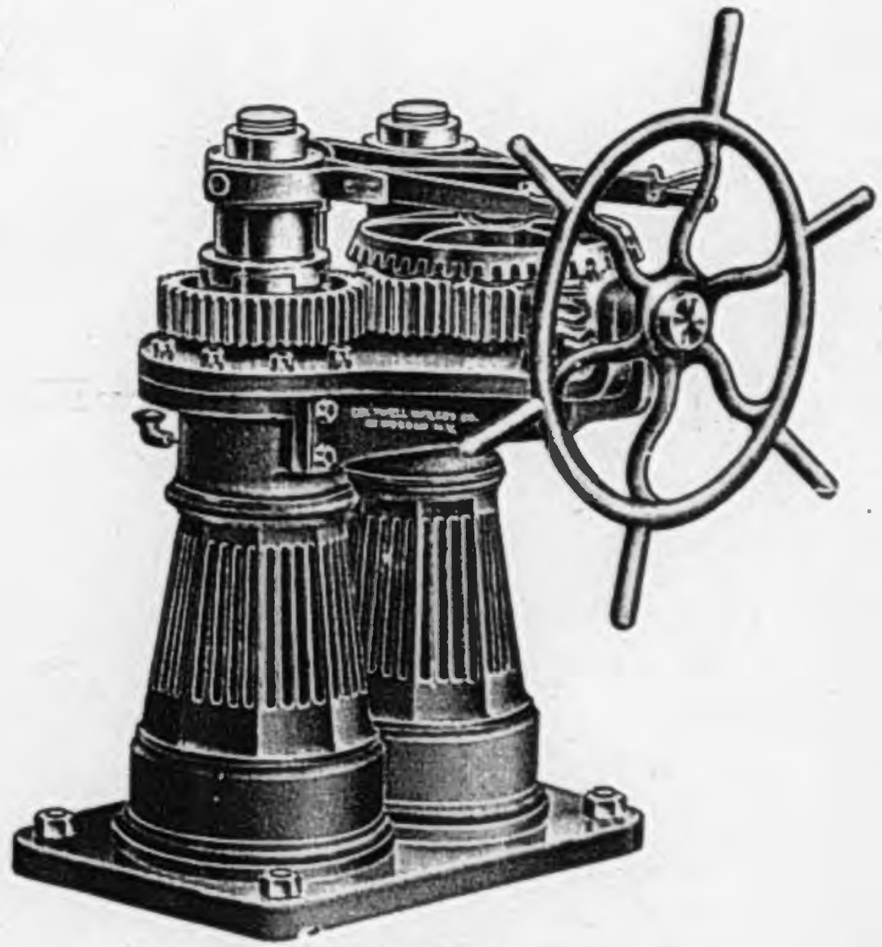


FIG. 20.

Twin Stem for operating Two Gates with same Pedestal.

**For Dimensions, see Sheets 14 and 15, Lists D and E.**

# WILCOX HOISTING STANDARDS

**Sheet No. 13.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

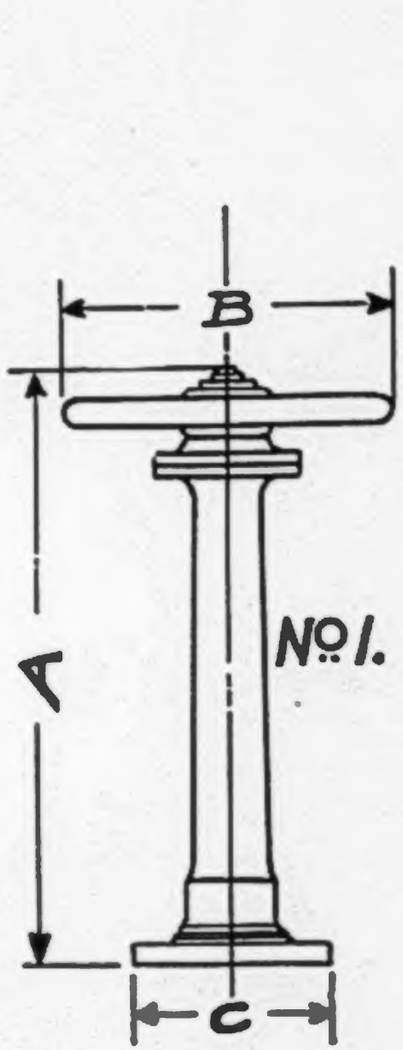



FIG. 62.

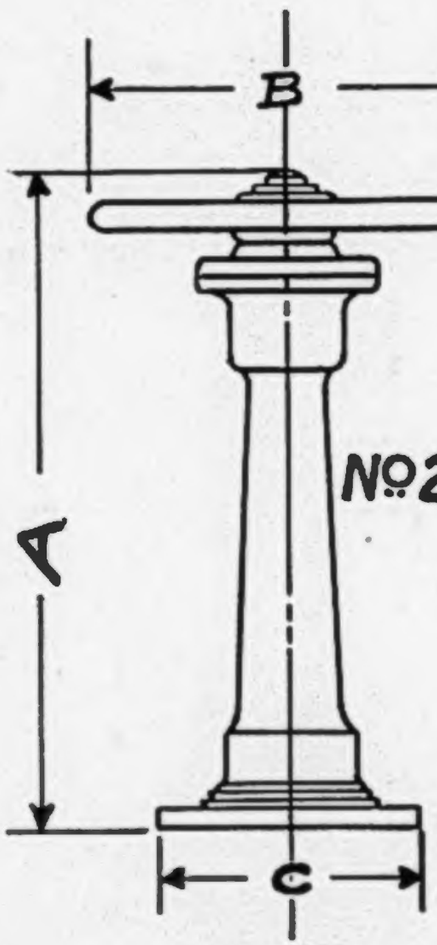



FIG. 61.

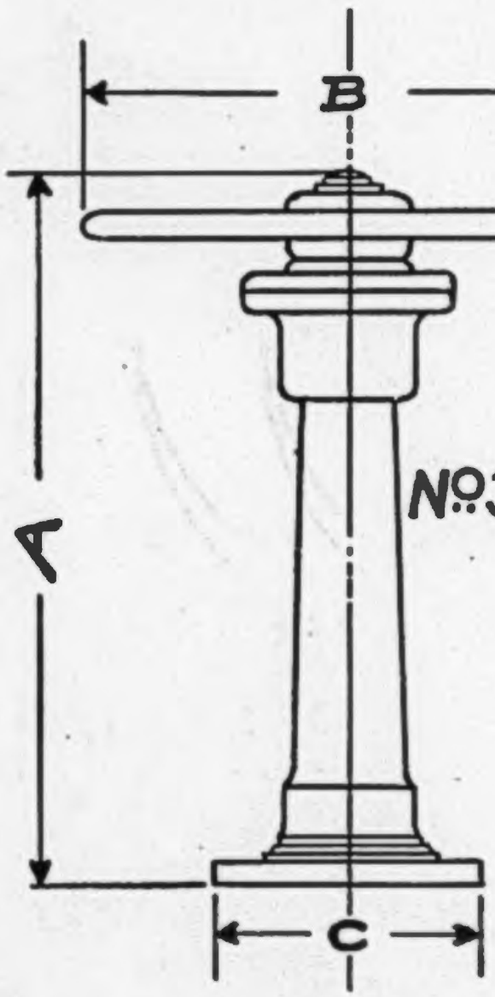



FIG. 60.

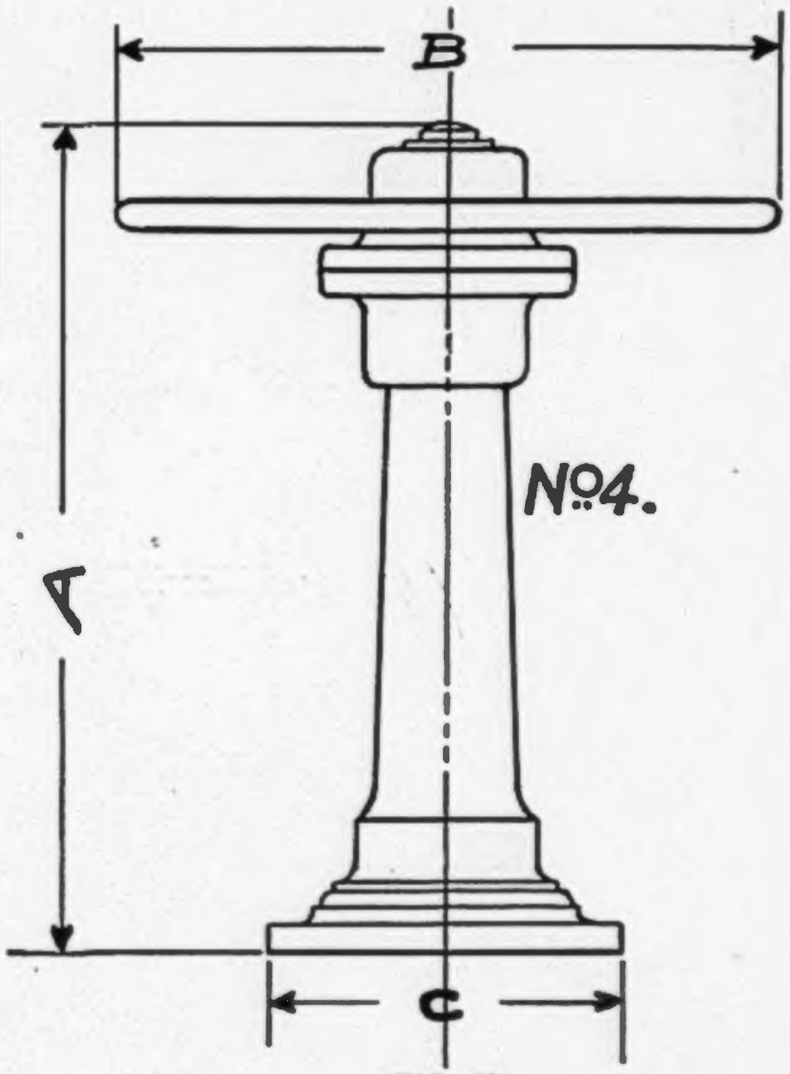



FIG. 59.

# DIMENSIONS OF WILCOX HAND WHEEL PEDESTALS

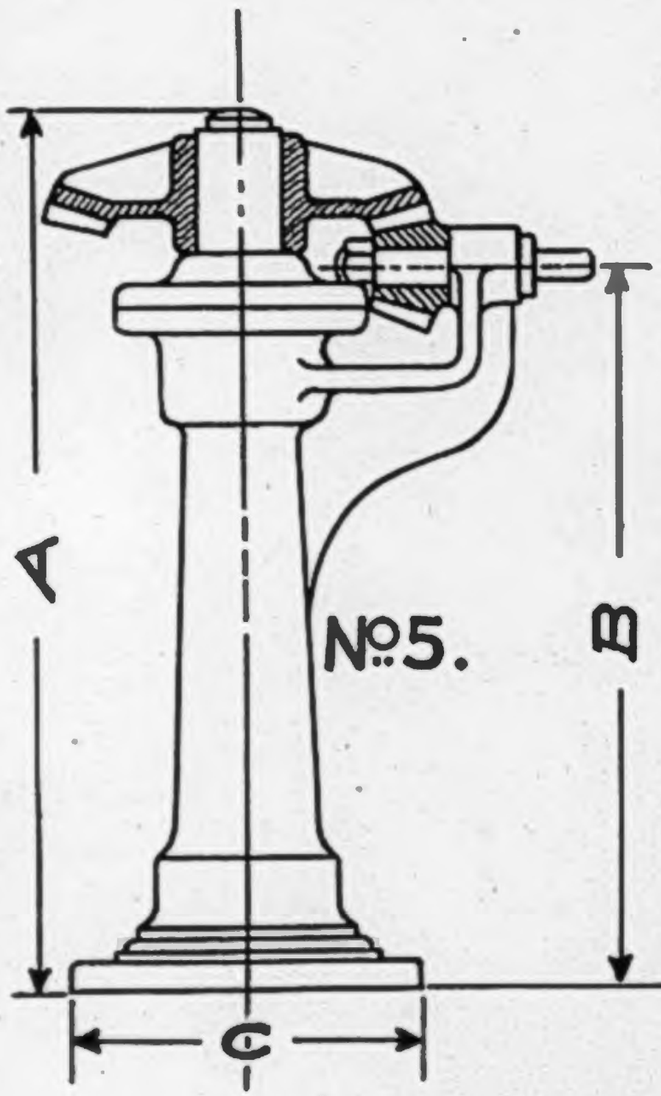
## List E

**For Illustration, see Sheet 13.**

| No. | A | B | C |
|---|---|---|---|
| | ft. ins. | ins. dia. | ins. square |
| 1 | 2 2 | 15 | 9 |
| 2 | 2 4½ | 18 | 12 |
| 3 | 2 6¾ | 24 | 12 |
| 4 | 3 0 | 30 | 16 |

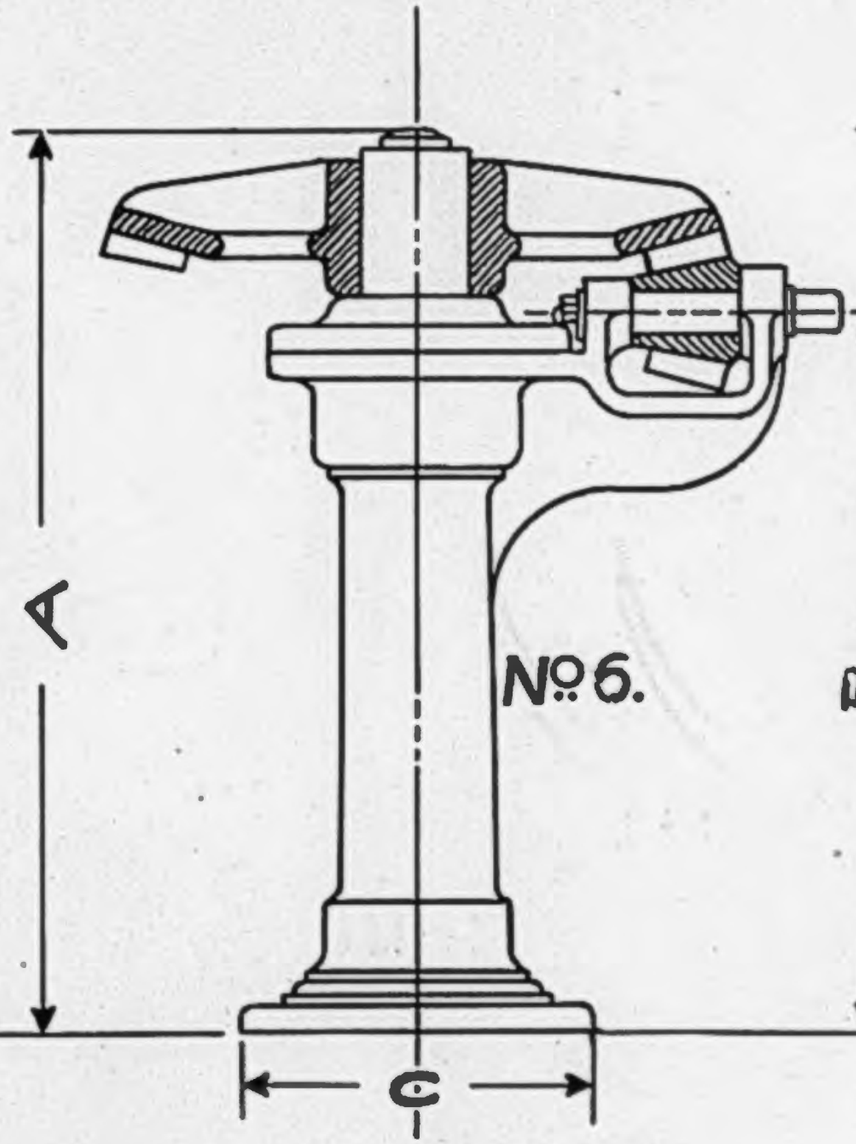
# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK



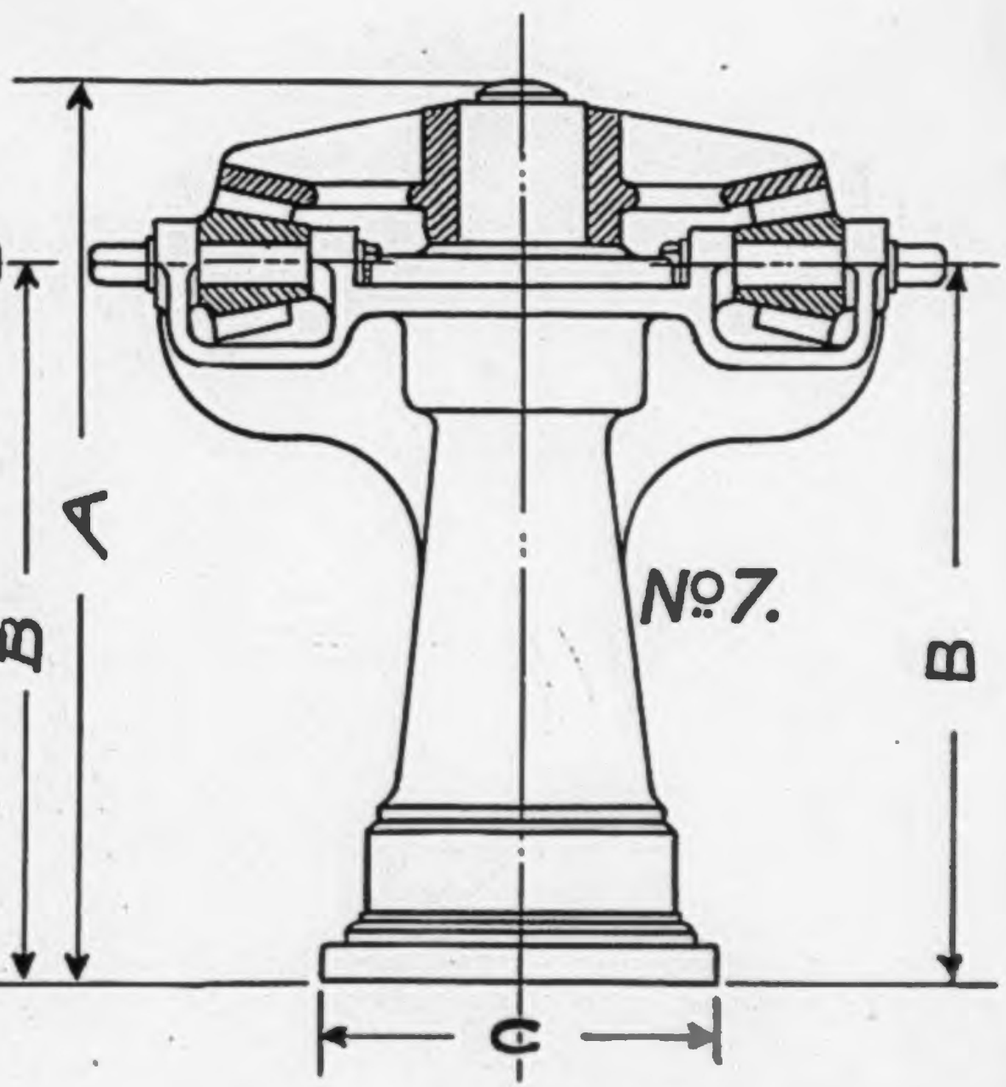

No. 5.

FIG. 56.




No. 6.

FIG. 57.




No. 7.

FIG. 58.

# DIMENSIONS OF WILCOX GEARED PEDESTALS

## List D.

**For Illustration, see Sheets 13-16.**

| No. | A | B | C |
|---|---|---|---|
| | ft. ins. | ft. ins. | ins. square |
| 5 | 3 3½ | 2 8 | 16 |
| 6 | 3 4 | 2 8 | 16 |
| 7 | 3 4 | 2 8 | 18 |

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# HIGH GRADE HOISTING STANDARDS

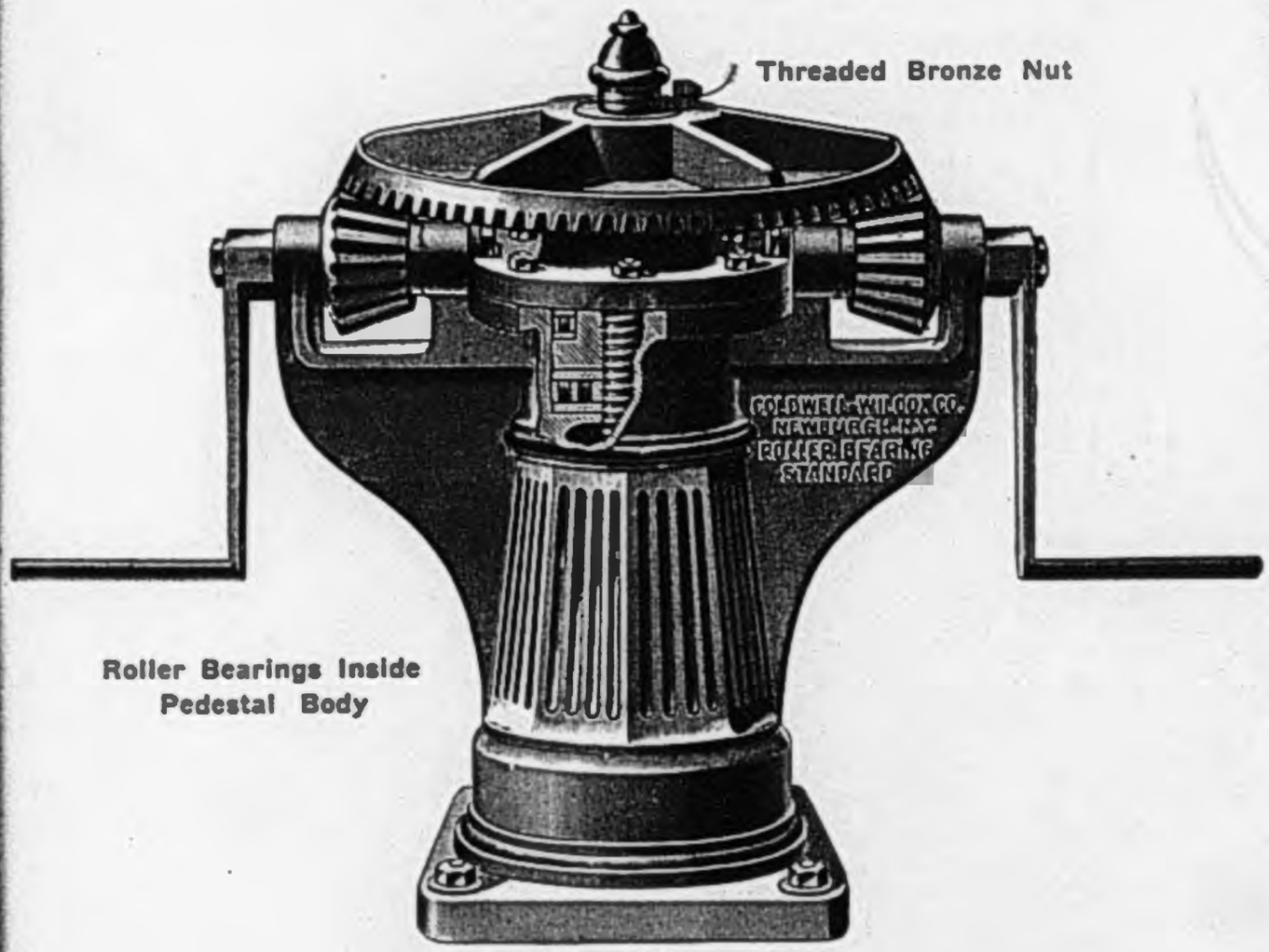


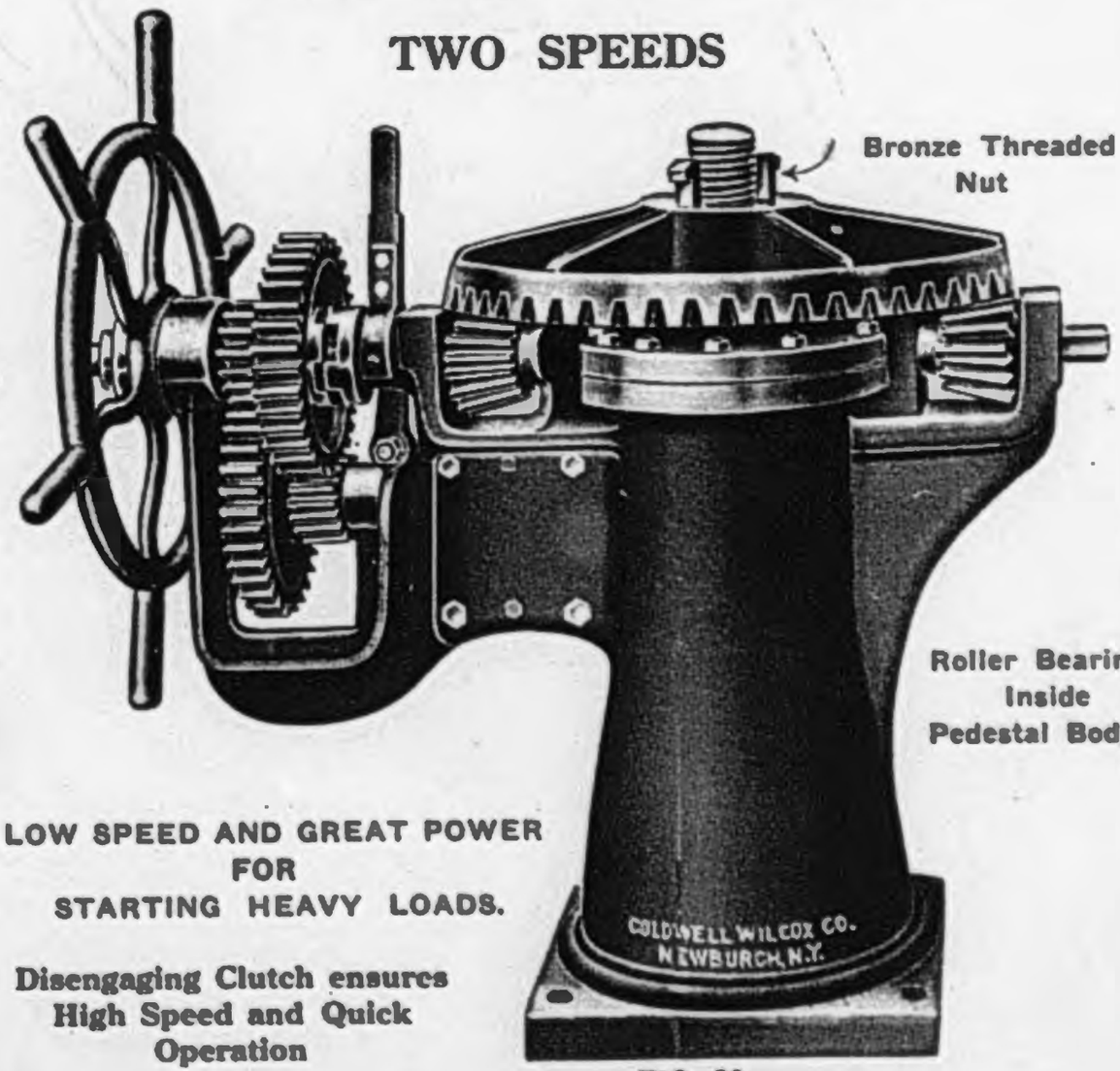

FIG. 21.

Geared-Double Crank Pedestal for Heavy Sluice Gates fitted with Roller Bearings.

**For Dimensions, see Sheets 15—17, Lists D and F.**

## Roller Bearing Compound Gear Hoisting Standards

### TWO SPEEDS




**LOW SPEED AND GREAT POWER FOR STARTING HEAVY LOADS.**

**Disengaging Clutch ensures High Speed and Quick Operation**

FIG. 22.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

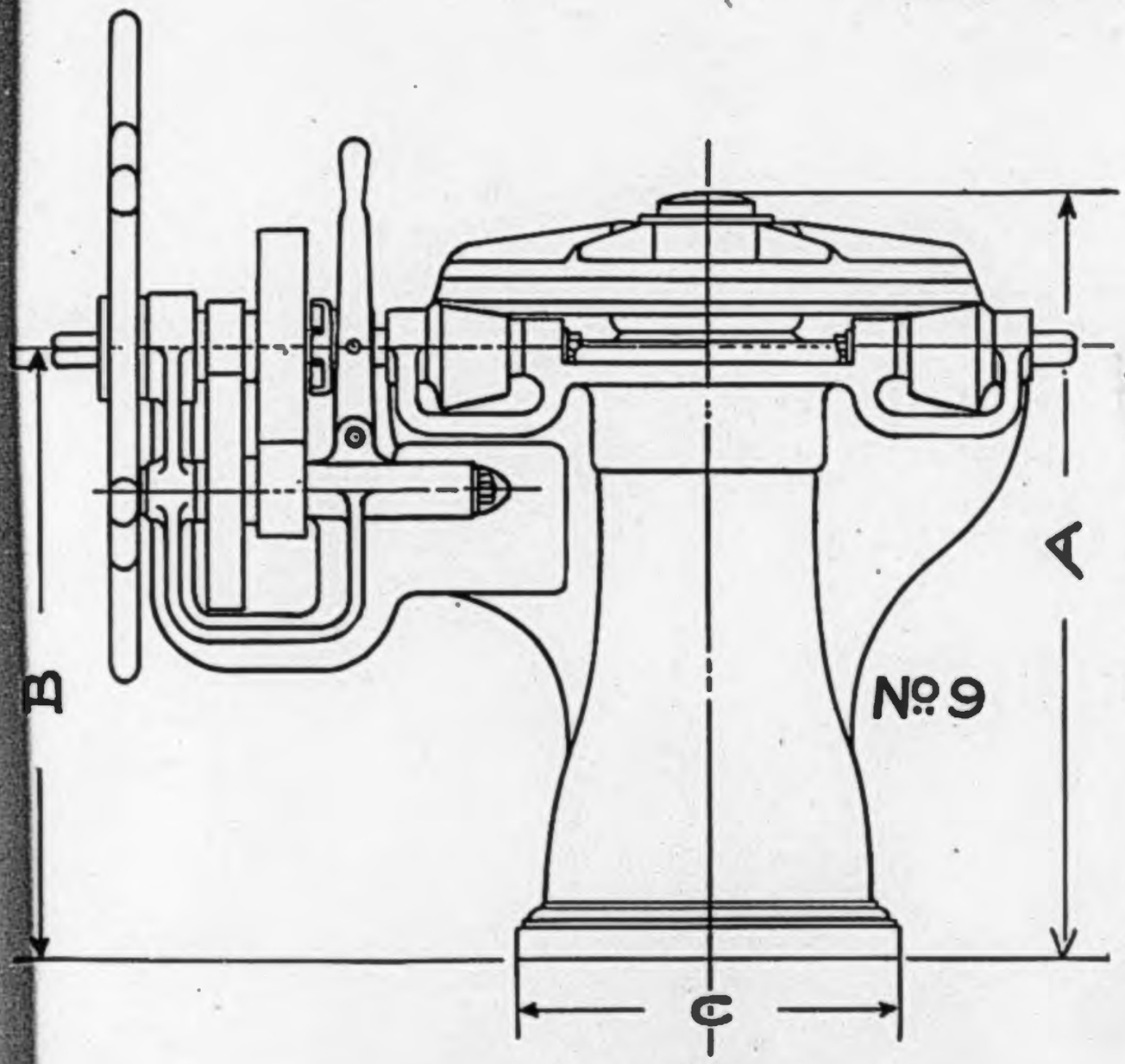



FIG. 63.

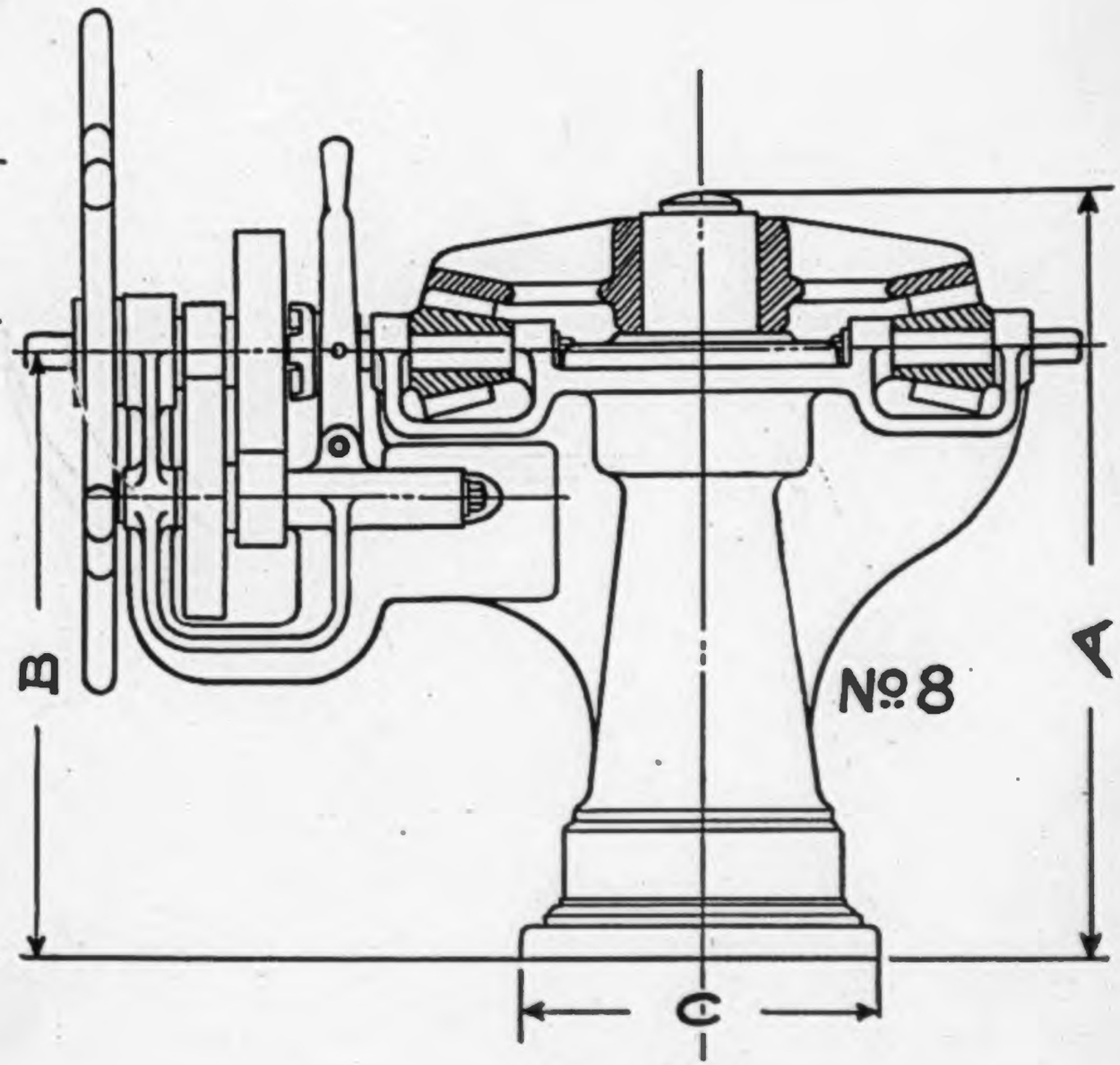



FIG. 64.

# DIMENSIONS OF COMPOUND GEARED TWO SPEED PEDESTALS

## ROLLER BEARINGS

**For Illustration, see Sheet 16.**

**List F.**

| No. | A | B | C |
|---|---|---|---|
| | ft. ins. | ft. ins. | ins. square |
| 8 | 3 4 | 2 8 | 18 |
| 9 | 3 5½ | 2 9 | 20 |

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# Electric Hoisting Standards

## A SPECIALTY

**FOR EITHER SINGLE GATE HOISTS OR SERIES—OPERATED BY LINE SHAFT ::**

ALL GEARS WITH CUT TEETH.

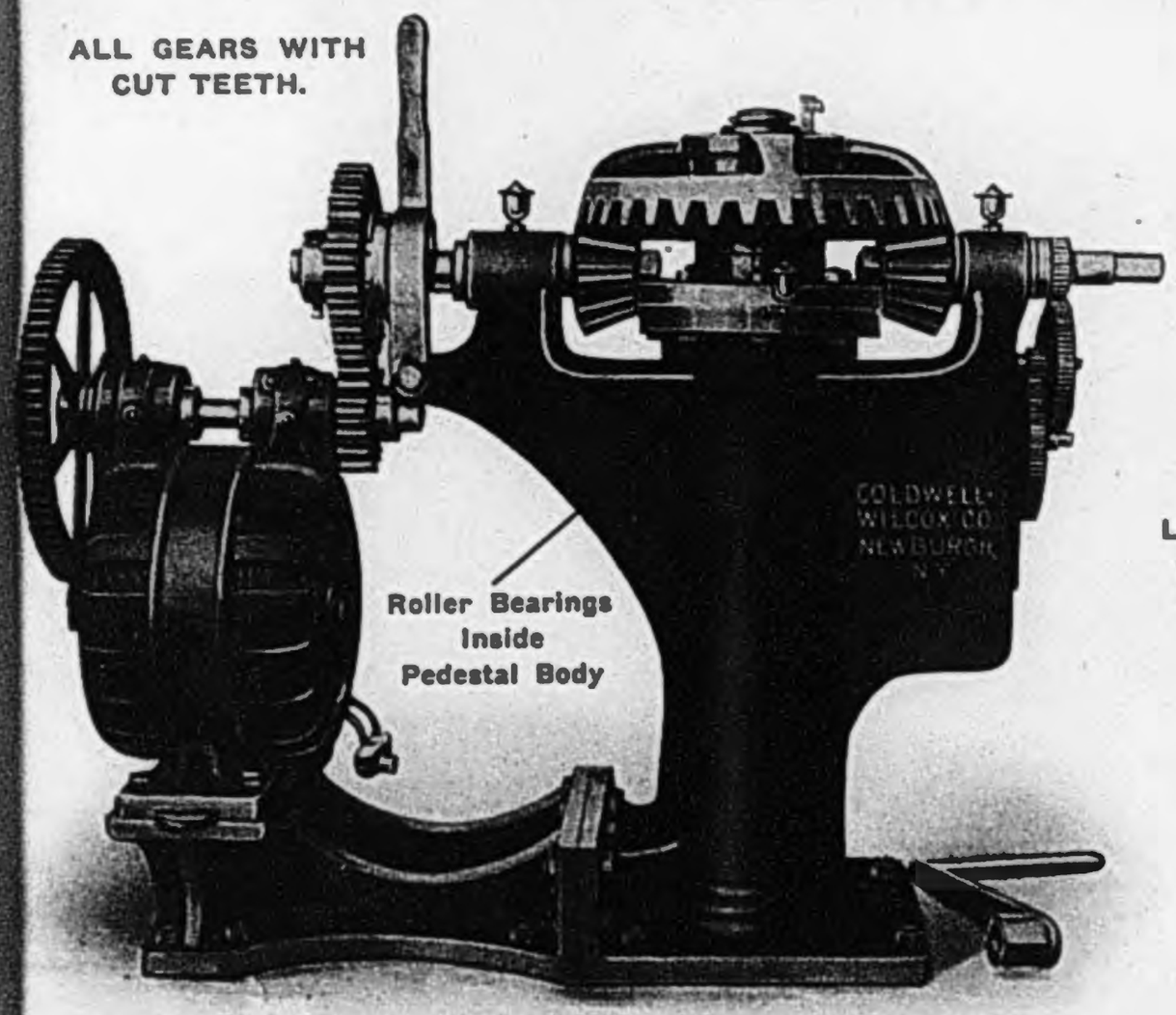



FIG. 23.—BACK VIEW.

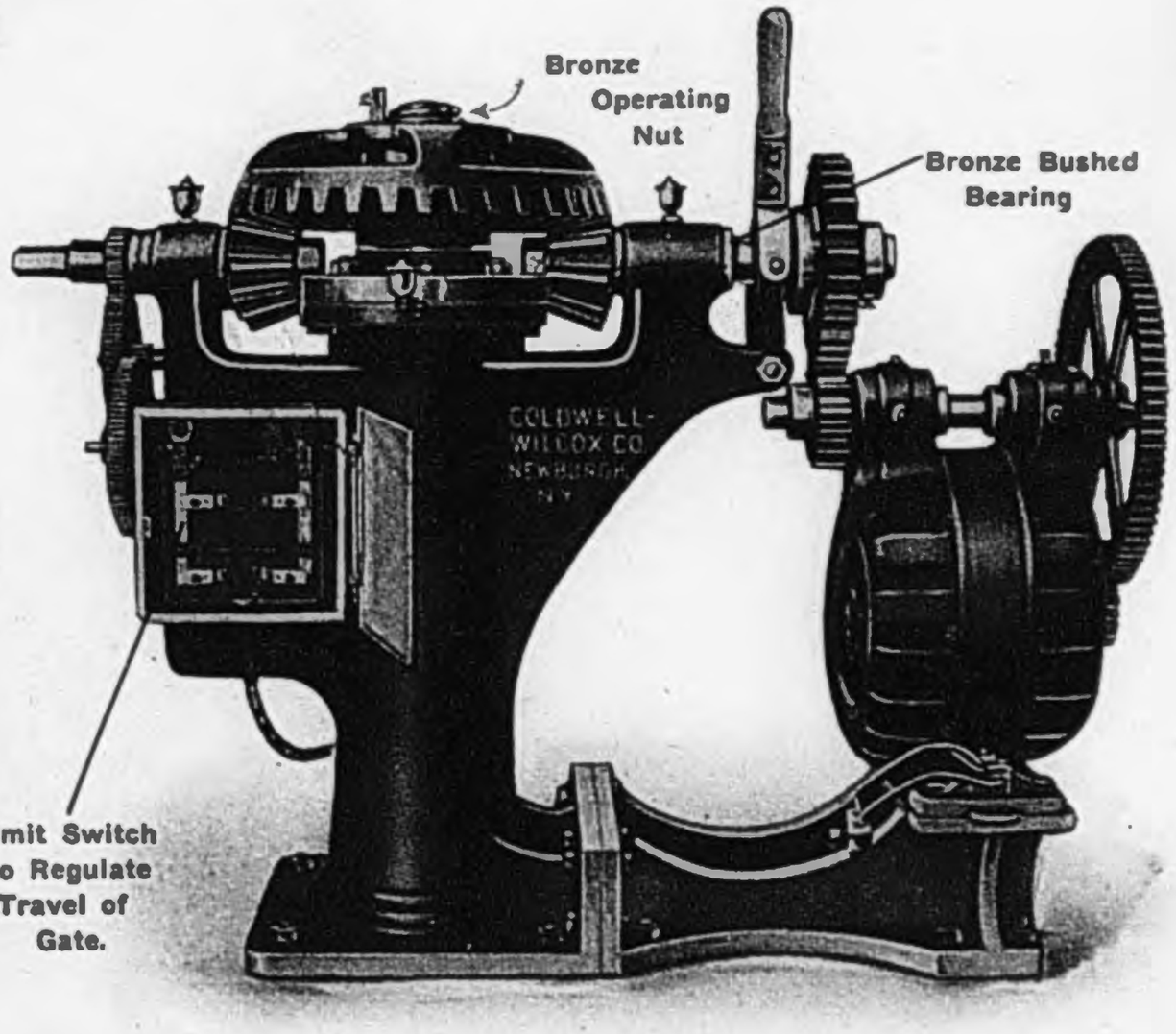



FIG 24.—FRONT VIEW.

Single Sluice Gate Hoist, actuated by Electric Motor.

By disengaging Clutch, can be operated by hand.

Friction reduced to minimum by our Roller Bearings.

Many of these Improvements are protected by Letter Patent. And we warn all infringers, whether manufacturers or not, that we will fully protect our rights under such Patents.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# WILCOX SLUICE GATE

**Anchored to**
**Cast Iron Pipe**

## Operated with Wilcox Modern Hoisting Standard

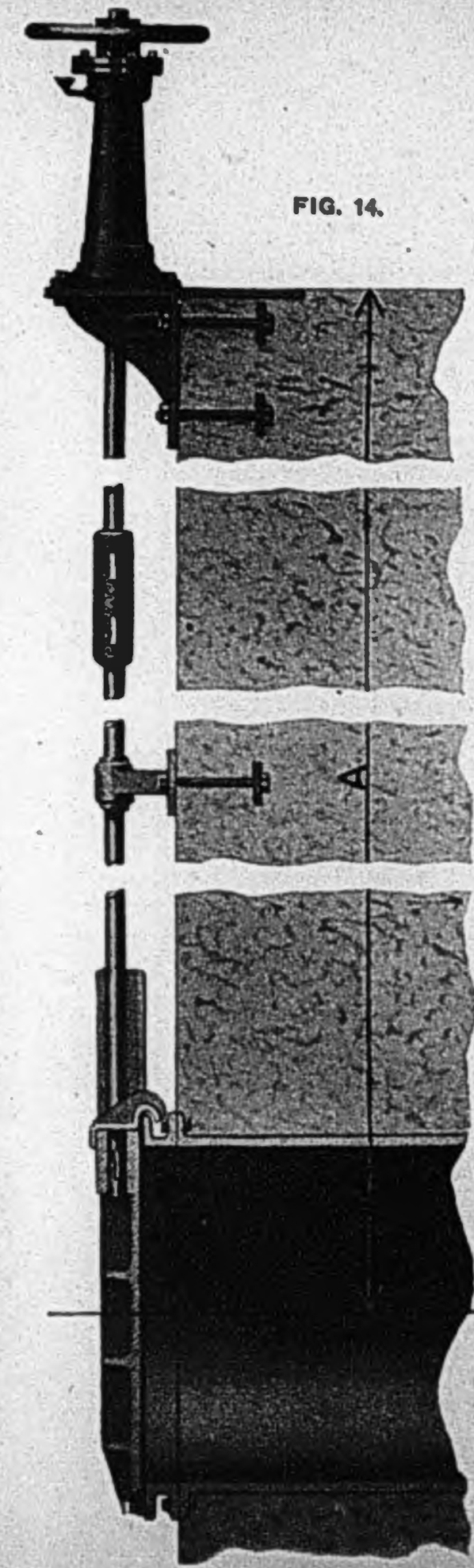


FIG. 14.

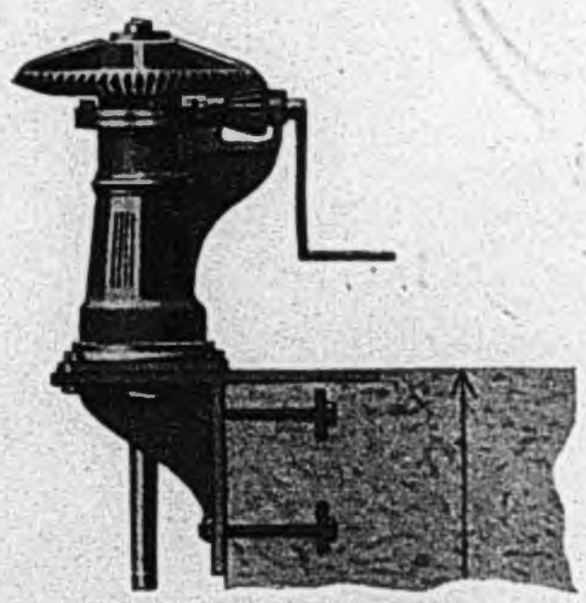


FIG. 15.

Single Hand Operated Geared
Roller Bearing Pedestal
Supported to Wall by Bracket

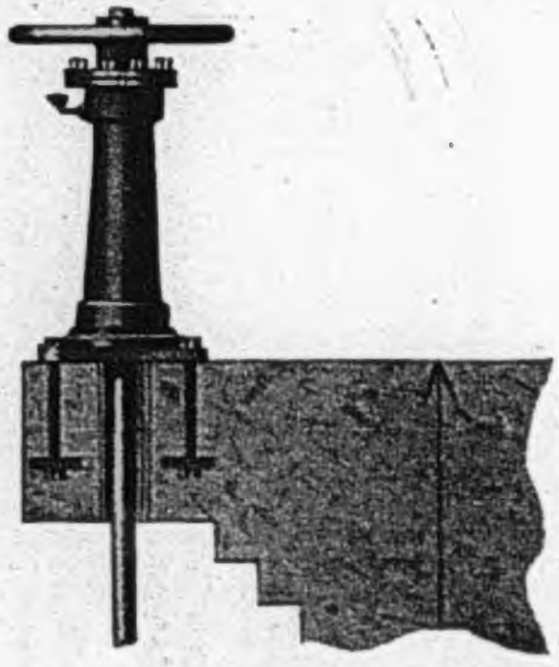


FIG. 16.

Hand Wheel Pedestal
supported by Masonry.

**Always give Dimension "A," Number, Size and Style of Opening, Maximum Pressure to be carried, and whether from one or both sides.**

**Sheet No. 19.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## MANUFACTURERS OF MODERN SLUICE GATE APPLIANCES

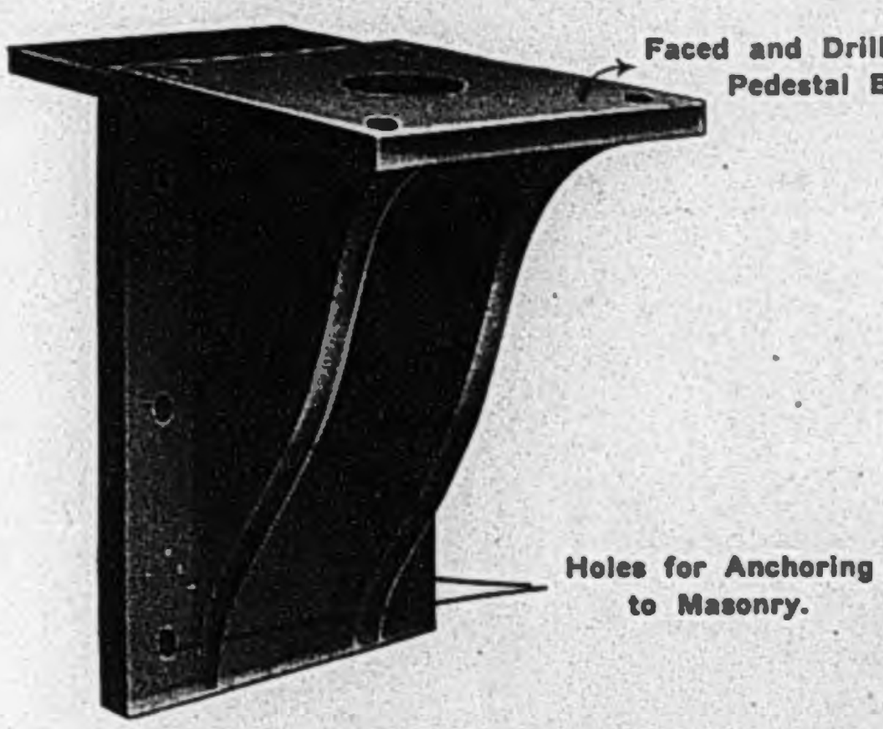



FIG. 25.

## PEDESTAL SUPPORT BRACKET

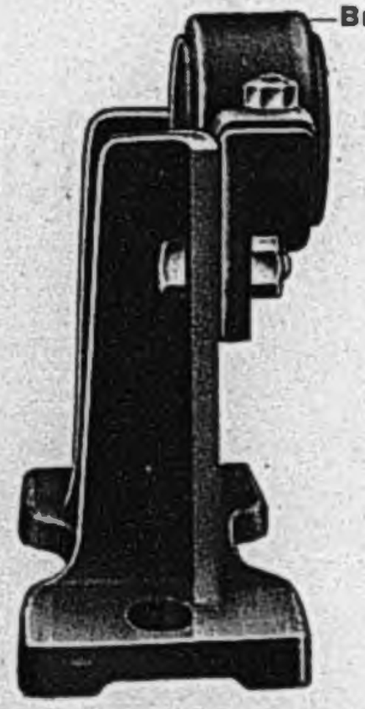


FIG. 26.—SIDE VIEW.

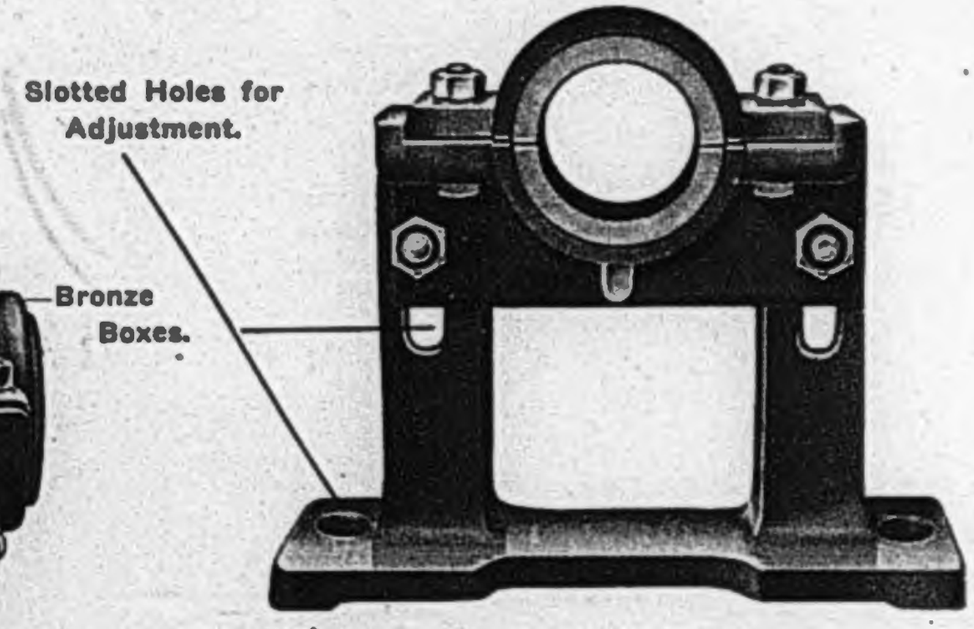



FIG. 27.—FRONT VIEW.

## ADJUSTABLE GUIDE BRACKET

## Guide Brackets and Hoisting Standard Supports

Sheet No. 20.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# TWIN STEM INTAKE GATE

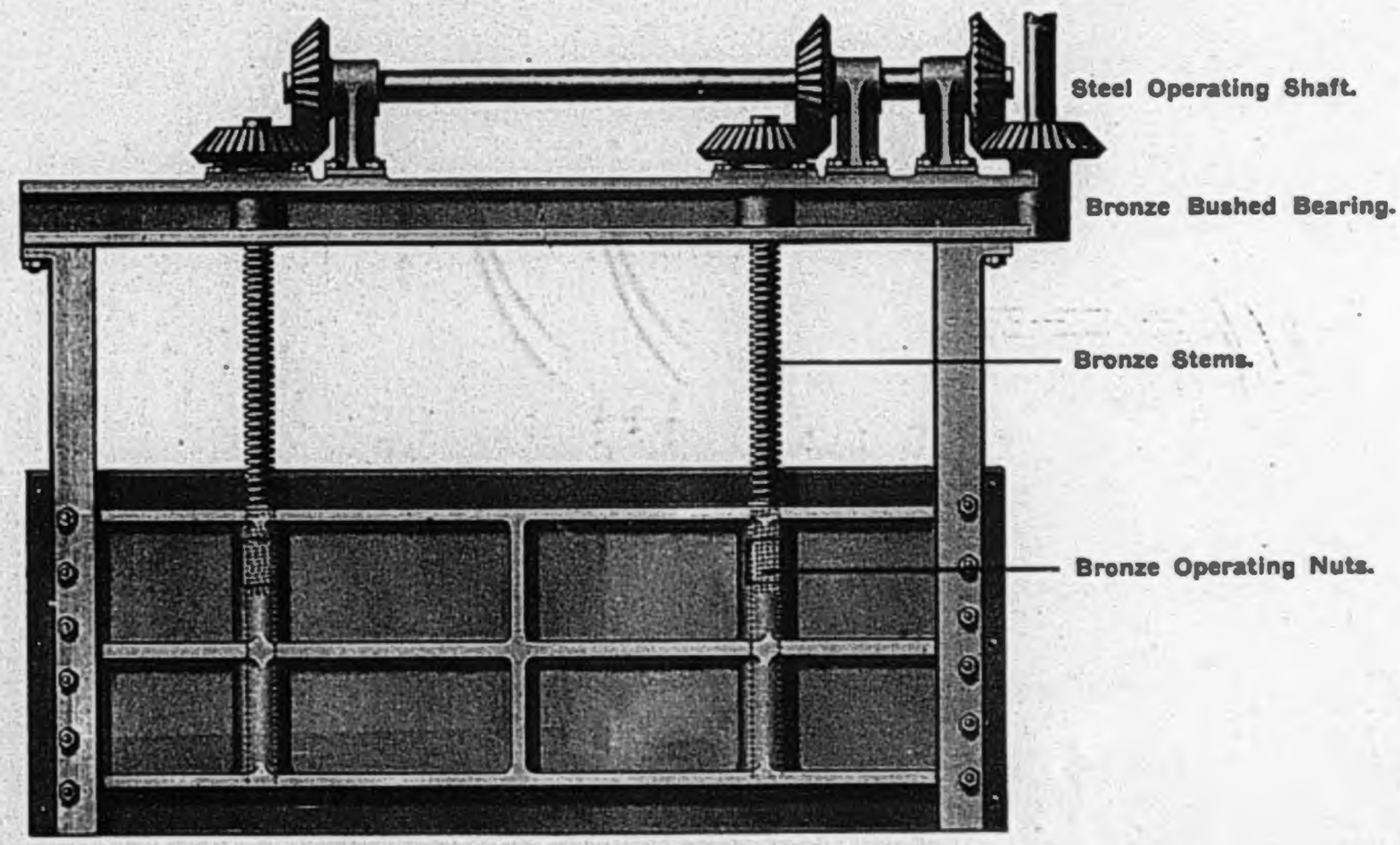



FIG. 9.

16 inch x 60 inch Rectangular Sluice Gate

Bronze Mounted Stationary Stem

These Gates made ANY size required.

Made with either Stationary or Adjustable Wedges.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

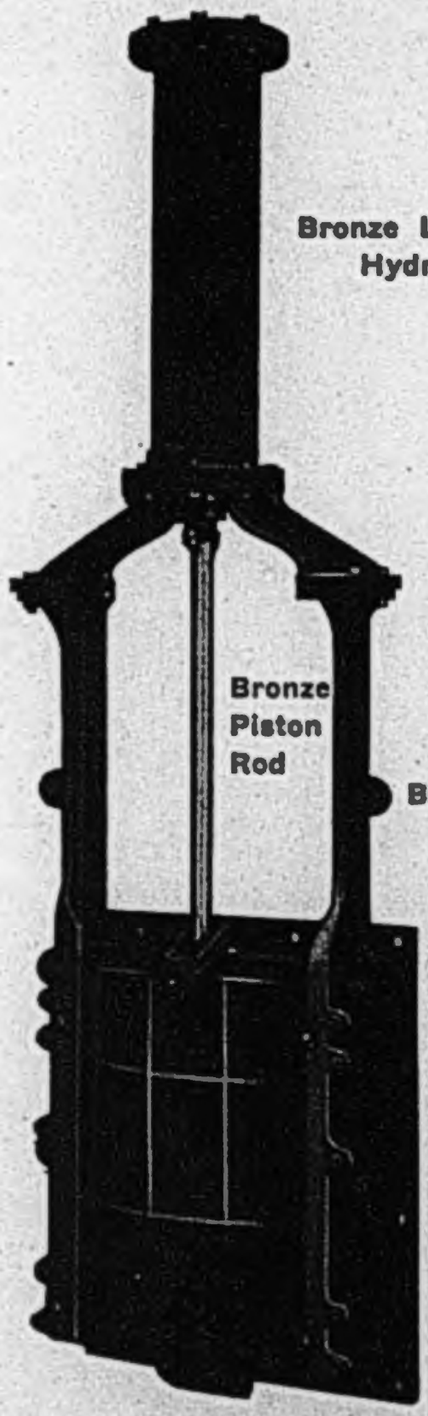



FIG. NO. 47.

## Hydraulically Operated
## 18-inch x 24-inch Rectangular
## Sluice Gate

## Fitted with Anti-Friction Rollers
## and Chatter Strips

## Bronze Mounted  Adjustable Wedges

## 40 Installed

## Queen Lane Filter Plant, Philadelphia, Pa.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Modes of Connecting Sluice Gates by means of Flange

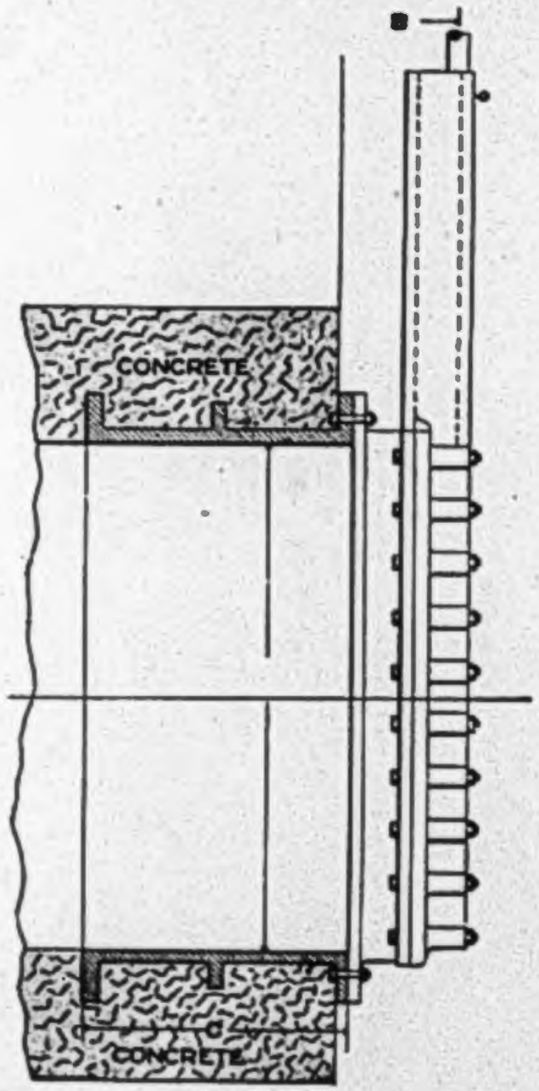



FIG 1.

Sluice Gate with Thimble set in Concrete

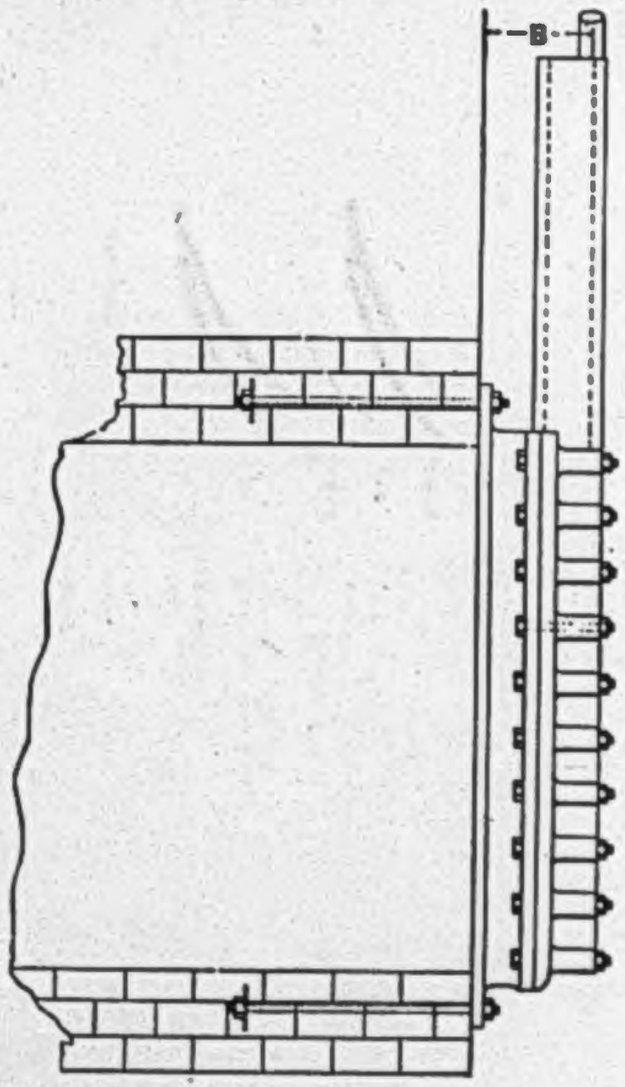



FIG. 2.

Sluice Gate anchored to Masonry

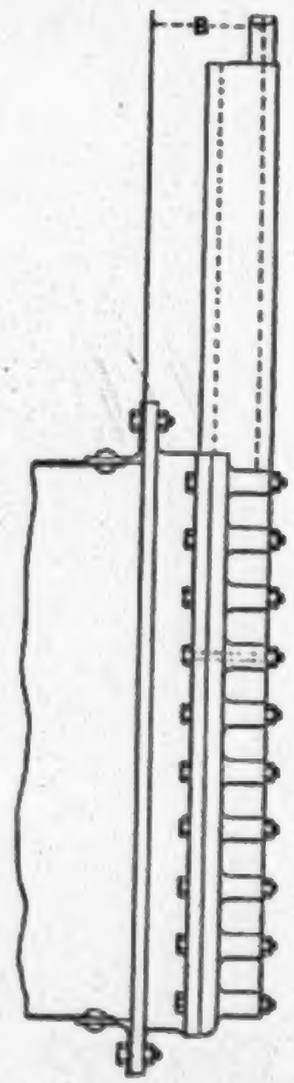



FIG 3.

Sluice Gate bolted to Steel Pipe

END FLANGES FACED AND DRILLED.

**Wrought Iron Bolts used for fastening Anchor Plates furnished when desired.**

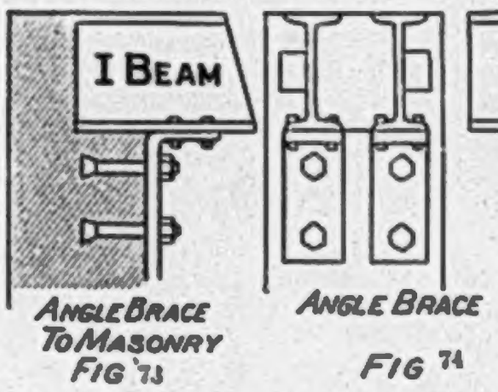
**Sheet No. 23.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Manufacturers of High Grade Water Works Appliances

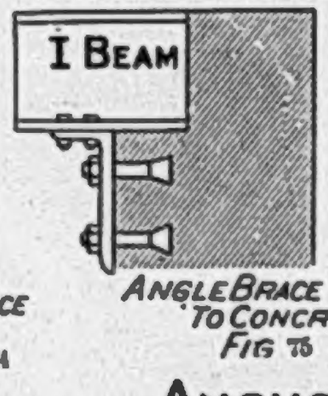
BEAMS SUPPORTED TO WALL.



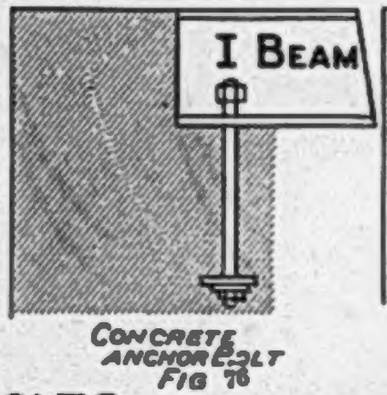

ANGLE BRACE TO MASONRY
FIG 73



ANGLE BRACE
FIG 74




ANGLE BRACE TO CONCRETE
FIG 75




CONCRETE ANCHOR BOLT
FIG 76

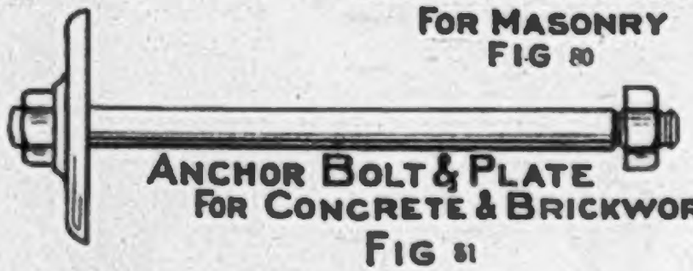
ANCHOR BOLT & PLATE TO CONCRETE
FIG 77


ANCHOR BOLT & PLATE TO CONCRETE
FIG- 78

ANCHOR BOLTS & PLATES FOR ANCHORNG TO MASONRY.

ANCHOR BOLT FOR MASONRY
FIG - 79

EXPANSION ANCHOR BOLT FOR MASONRY
FIG 80



ANCHOR BOLT & PLATE FOR CONCRETE & BRICKWORK
FIG 81

# Beam Supports for the Wilcox Sluice Gates

Sheet No. 24.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# PLUG DRAIN VALVES

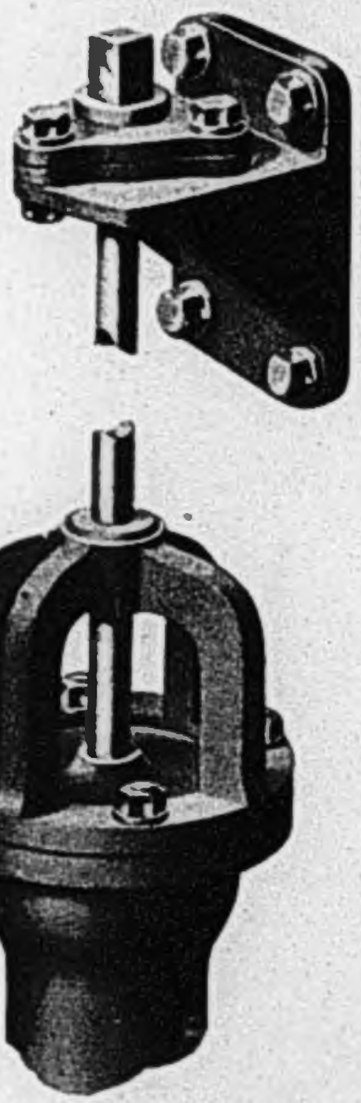


FIG. 12.

6 inch Straight Pipe
Connection
Plug Drain Valve

FOR

## Sewage, Water, Irrigation or Filtration Plants

## Made either Flange, Bell or Spigot

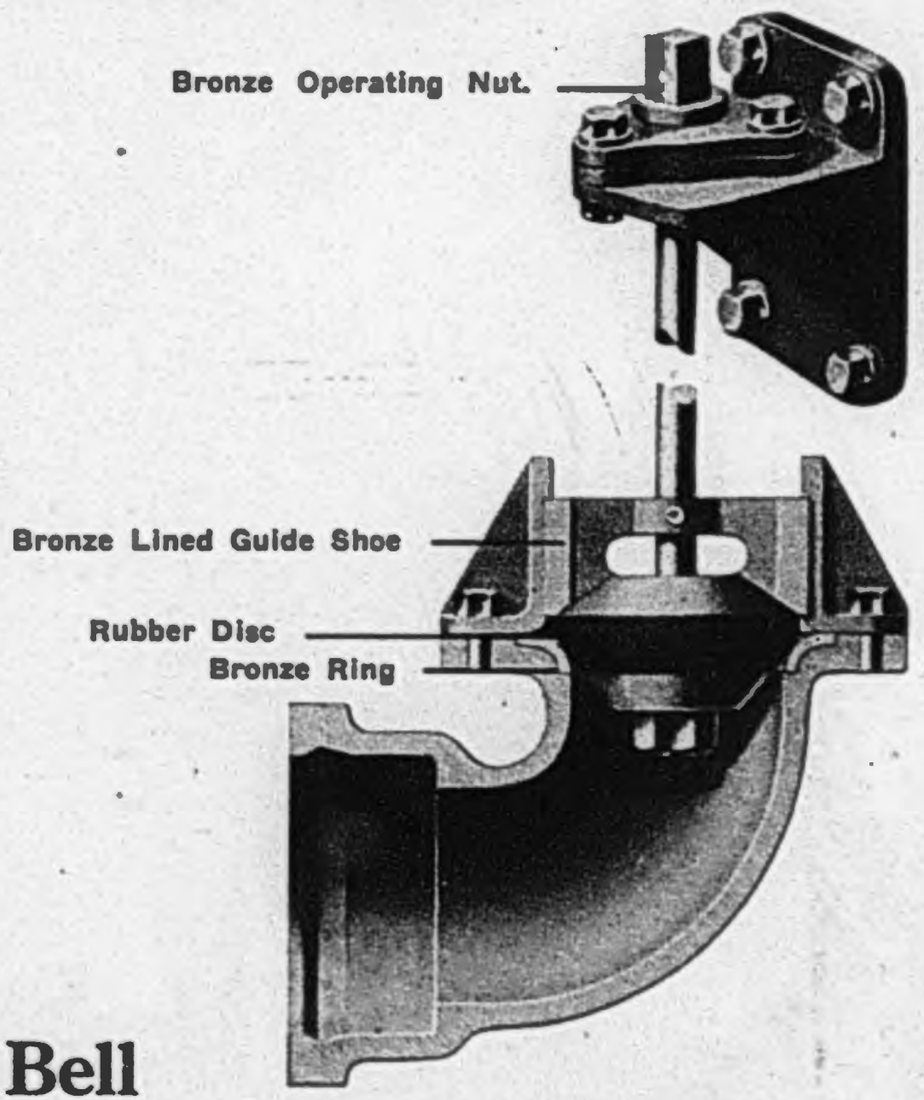



FIG. 13.

6 inch Elbow Connection
Plug Drain Valve

## Makers of Modern Sluice Gates, Valves and Appliances

Sheet No. 25.

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# WILCOX SHEAR AND DRAIN VALVES

## FOR SEWAGE

[SHEAR VALVE, FIG. 44]

Are used in Drainage Systems and
Sewage Disposal Plants.

---

Furnished with
either
Lugs "A" or "B"

---

**Made in sizes from 3 inch to 24 inch**

---

For Dimensions, see List G,
Sheet 27.

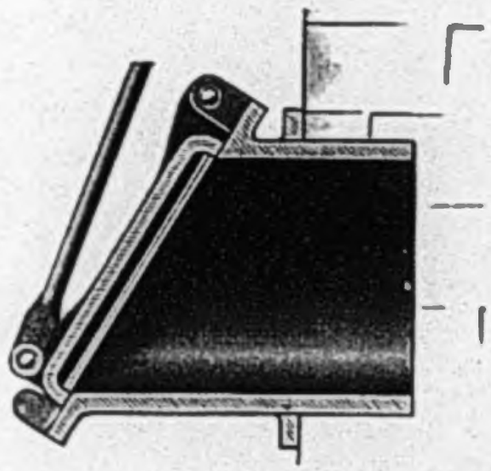


FIG. 43.

8 inch Angle Drain Valve
for Light
Pressure
from
Face only.

For Sewage or Drainage Systems.

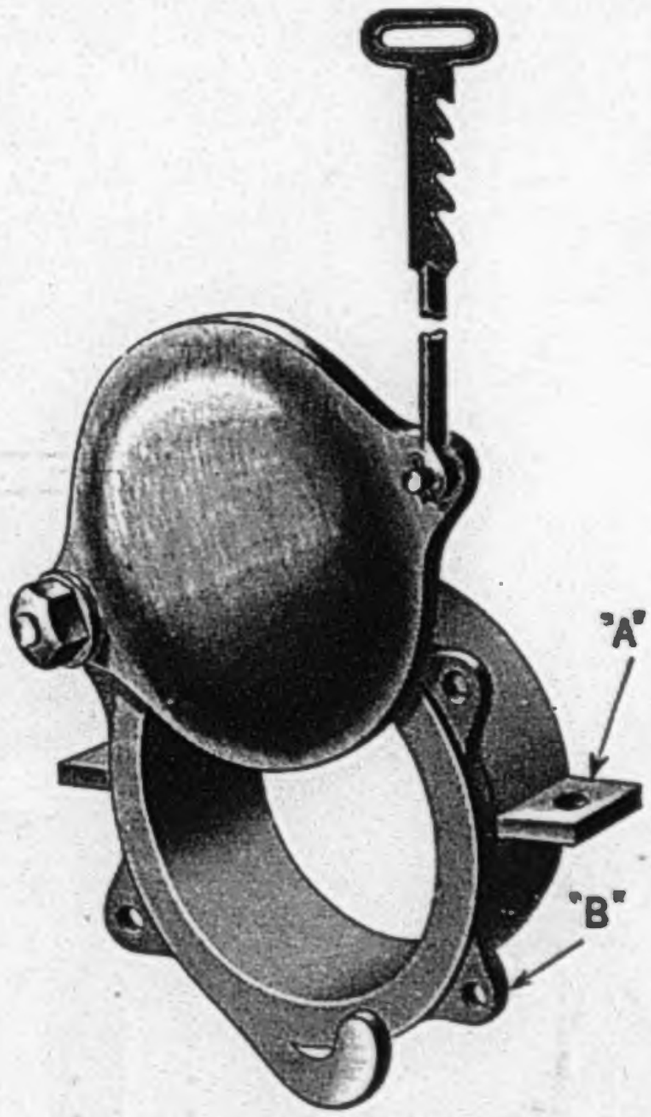



FIG. 44.

12 inch dia. Shear Valve

## Made all Iron or Bronze Mountings

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

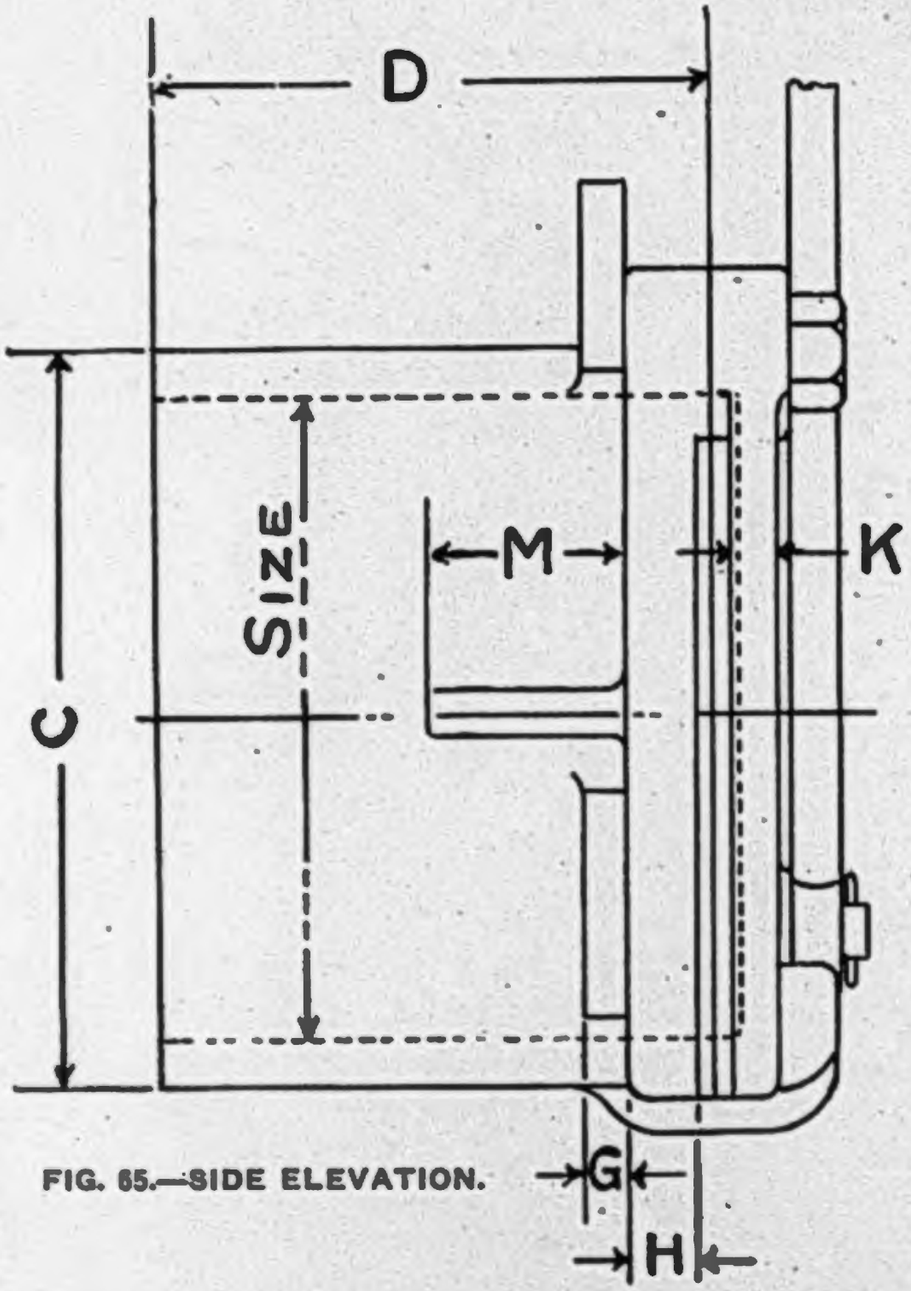



FIG. 65.—SIDE ELEVATION.

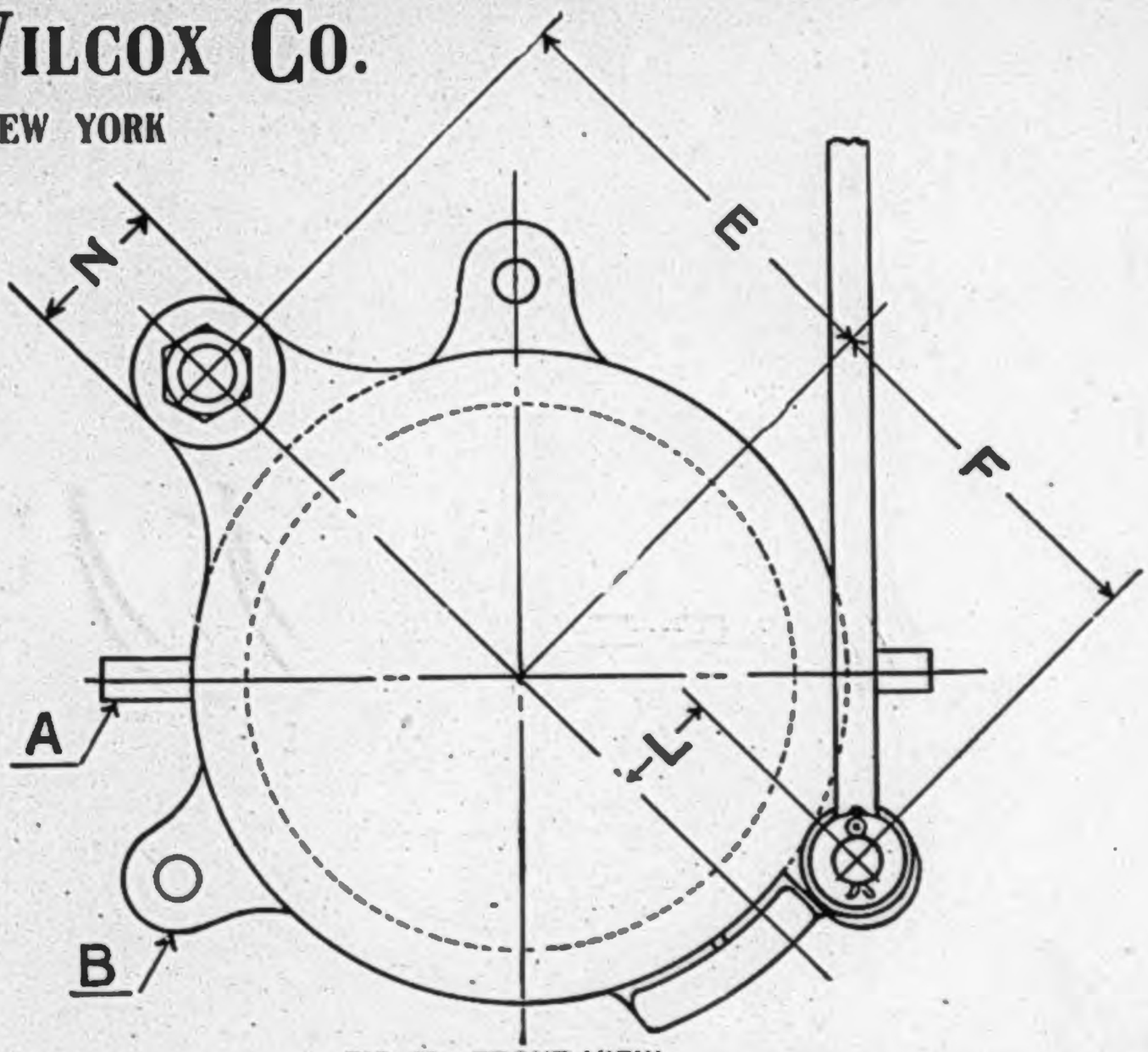



FIG. 66.—FRONT VIEW.

# WILCOX SHEAR VALVE

## Dimension List G

**Made All Iron or with Bronze Mountings**

**For Illustration, see Sheet 26.**

| Size | C | D | E | F | G | H | K | L | M | N |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 3¼ | 6 | 3 | 2¼ | ½ | ½ | ½ | 1¼ | 2½ | 1¼ |
| 4 | 4⅜ | 6 | 3½ | 3¼ | ½ | ½ | ½ | 1¾ | 2½ | 1½ |
| 5 | 5⅜ | 6 | 4 | 3¾ | ½ | ½ | ½ | 1¾ | 3 | 1¾ |
| 6 | 7 | 7 | 4½ | 4½ | ½ | ½ | ½ | 1½ | 3 | 2 |
| 8 | 9¼ | 8½ | 6¾ | 5½ | ½ | ½ | ½ | 2 | 3 | 2 |
| 10 | 11¼ | 9 | 8 | 6½ | ½ | ½ | ½ | 2 | 3 | 2½ |
| 12 | 13¼ | 9¼ | 9½ | 8¼ | ½ | ½ | ½ | 2¼ | 3½ | 2½ |
| 14 | 15¼ | 9¼ | 10 | 9¼ | ½ | ½ | ½ | 2¼ | 3½ | 2½ |
| 15 | 16¼ | 9¼ | 11 | 10¼ | ½ | ½ | ½ | 2¼ | 3½ | 3½ |
| 16 | 17¼ | 9¼ | 11½ | 10¼ | ½ | ½ | ½ | 2¼ | 3½ | 3½ |
| 18 | 19¼ | 9¼ | 12½ | 11¼ | ½ | ½ | ½ | 2¼ | 3½ | 3½ |
| 20 | 21¼ | 9¼ | 13½ | 12¼ | ½ | ½ | ½ | 2¼ | 3½ | 3½ |
| 24 | 25¼ | 9¼ | 15½ | 14¼ | ½ | ½ | ½ | 2¼ | 3½ | 3½ |

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

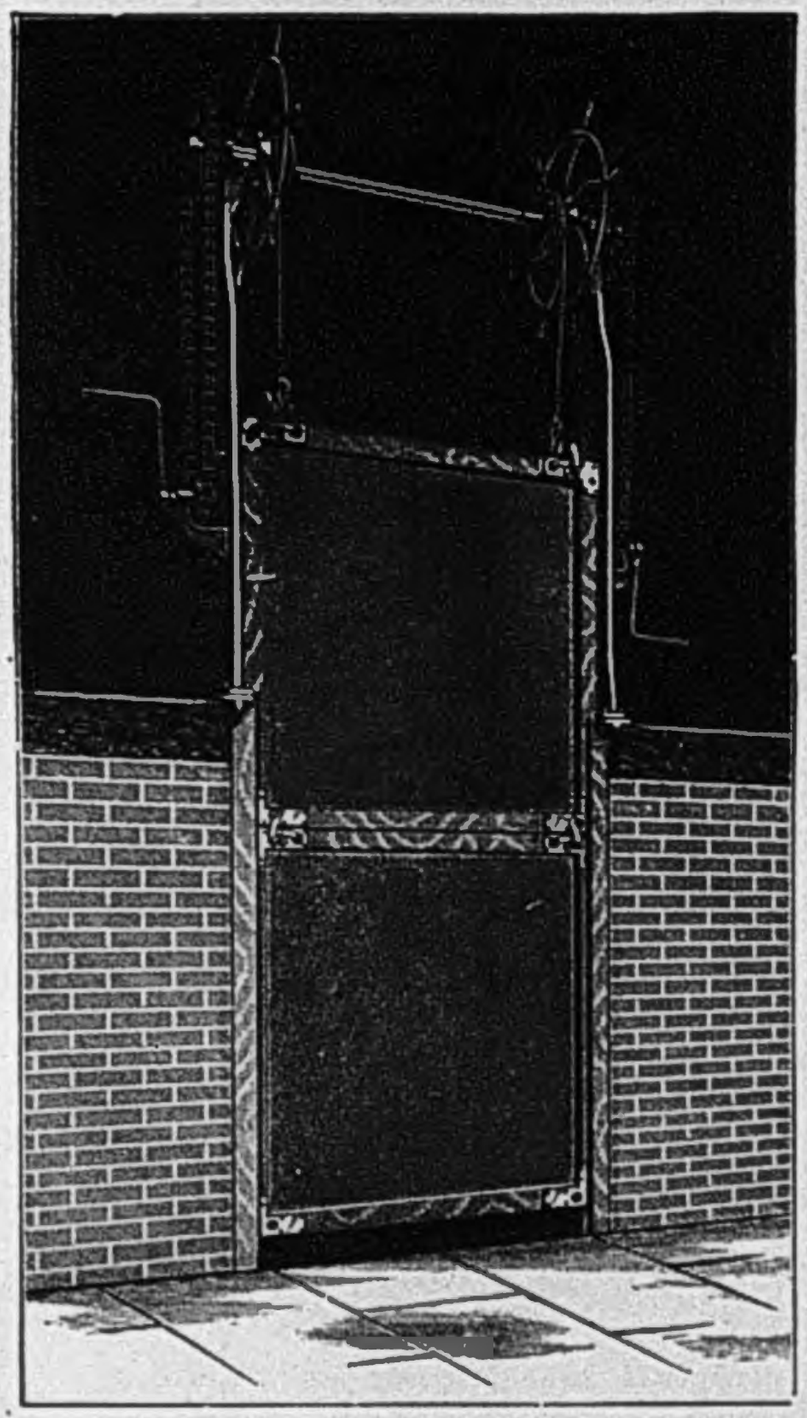


FIG. 36.

Screens for Water Works

# High Grade Screen and Hoisting Apparatus

**MODERN WATER WORKS**

Include among their necessary appurtenances

## Screen Chambers

equipped with screening appliances for removing foreign matter, and thus purifying the water supply.

We manufacture high grade Screens and Hoisting Apparatus, and shall be pleased to consult with you concerning any proposed work in this line, or will quote prices upon receipt of plans and specifications.

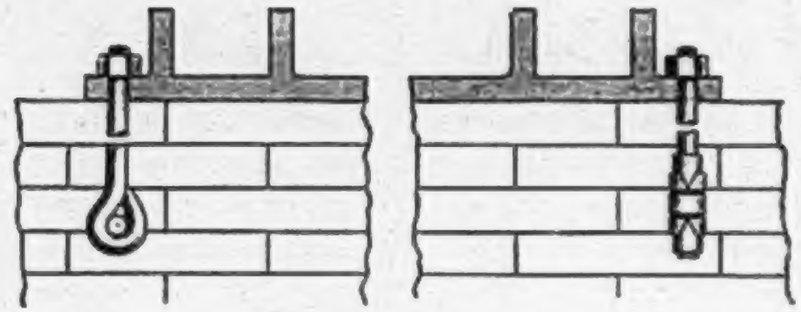


FIG. 37.

Double Screen Groove

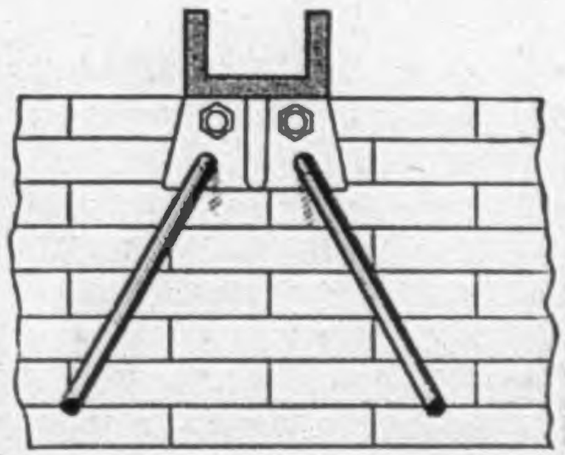


FIG. 38.

Single Screen Groove

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

## Manufacturers of Modern Water Works Appliances

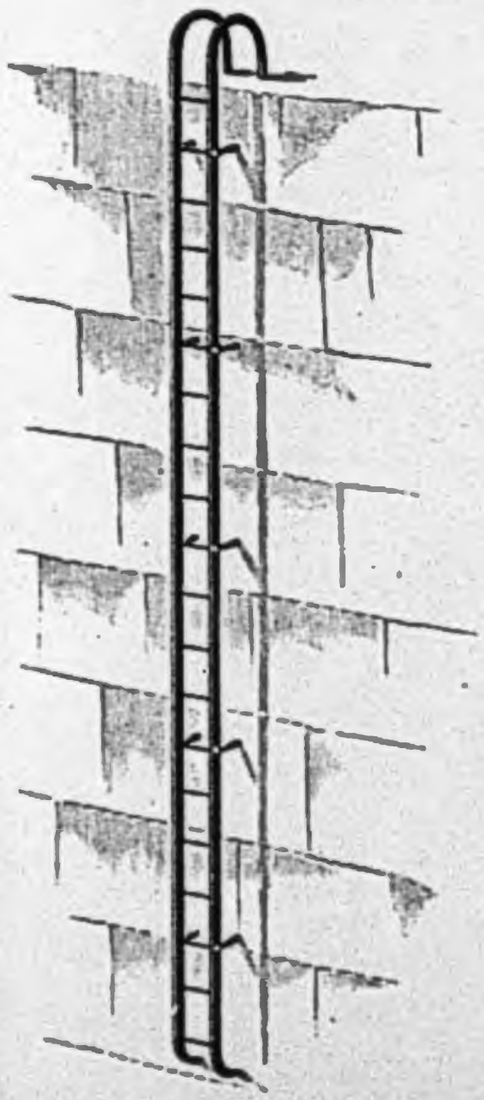


FIG. 31.

Wrought Iron Ladders.

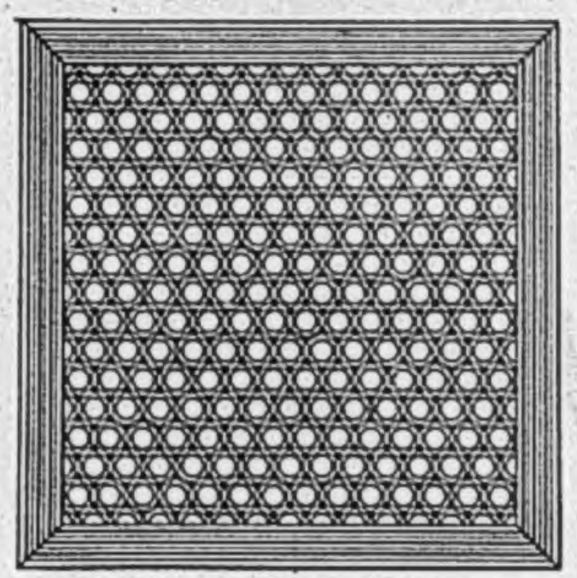


FIG. 32.

Vault Lights.

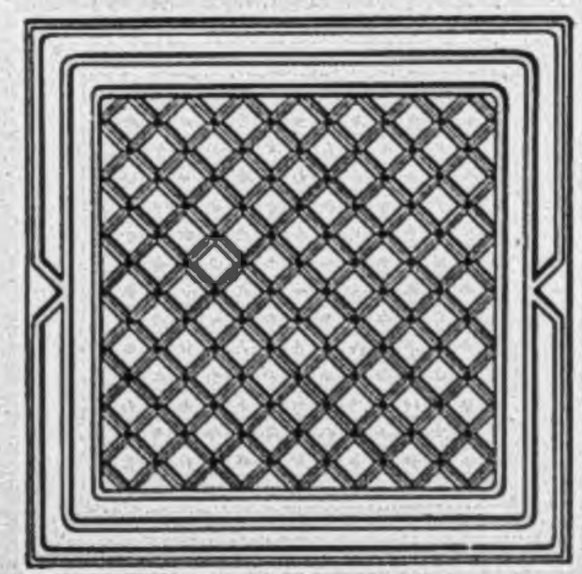


FIG. 34.

Floor Plate.

**Quality is Our First Aim and is Remembered Long After Price is Forgotten**

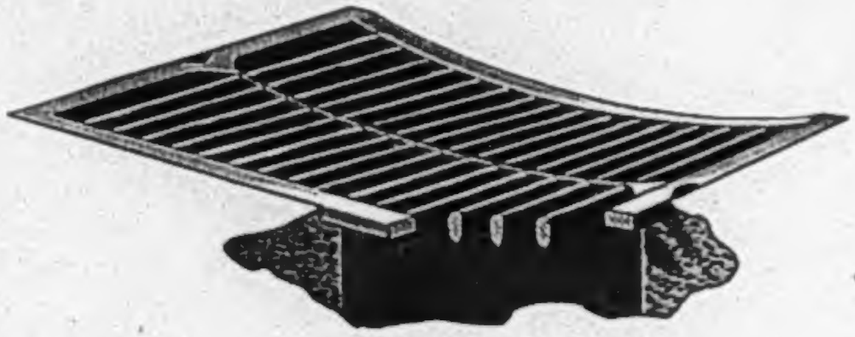
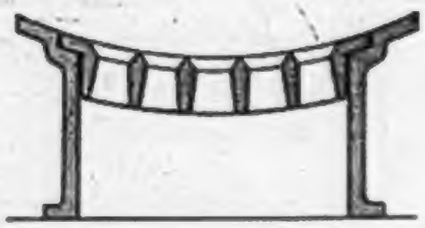


FIG. 33.

Drain Grating.



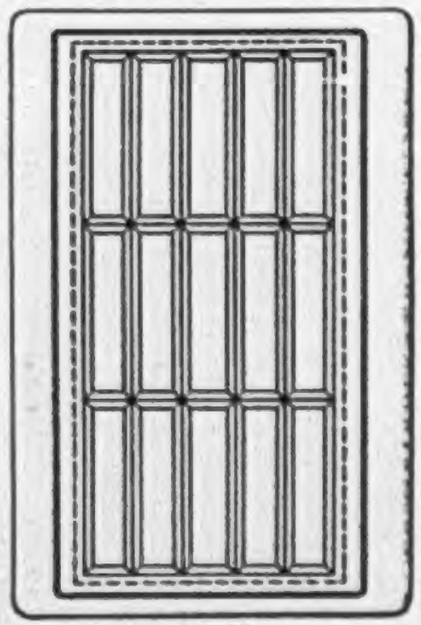


FIG. 35.

Drain Grating

**Sheet No. 29.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

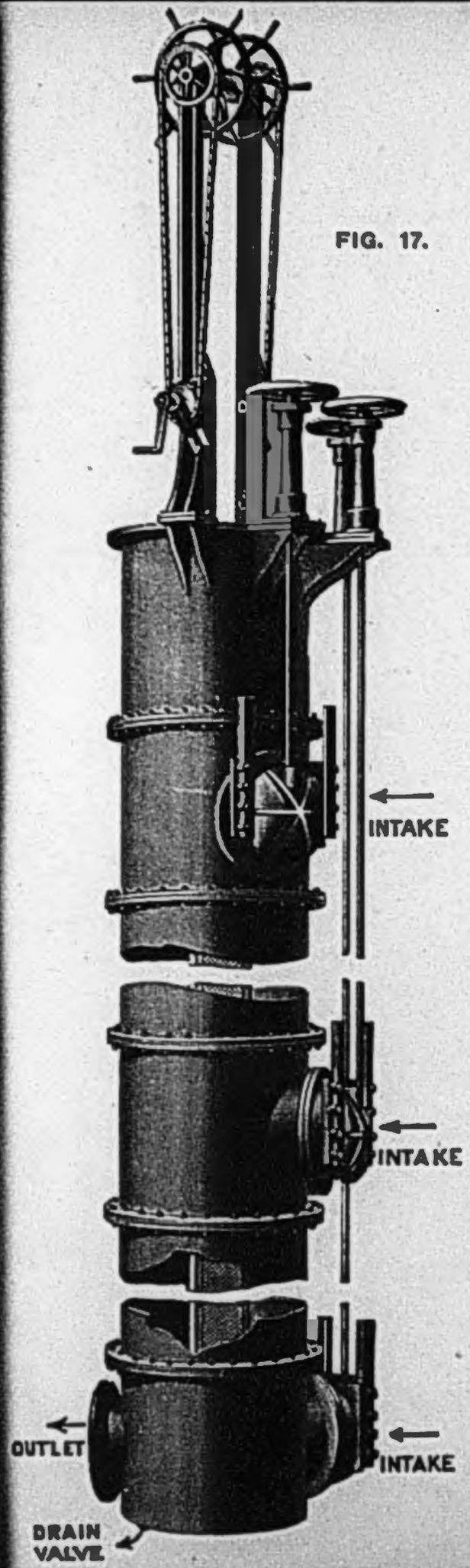



FIG. 17.

## Wilcox Improved Form of Intake Pipe

This Stand Pipe is arranged with Sluice Gates, Screens, Screen Hoist, Outlet Pipe and Drain Valve.

The **SLUICE GATES** are placed at different elevations so that the water can always be taken from near the surface. This prevents to a great extent sediment entering into the supply pipe as is usually the case when the intake is near the bottom of the lake.

The **SCREENS** are placed in suitable grooves and prevent any foreign matter from entering the outlet pipe. They are attached to hoisting apparatus so they can be easily cleaned and kept in good order.

A **DRAIN VALVE** is placed at the bottom for the blowing out of sediment.

A Small Ladder is fastened in place on inside.

This pipe can be built solidly in concrete, leaving the sluice gates projecting beyond face of masonry. :: ::

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

**Makers of High Grade Water Works Appliances**

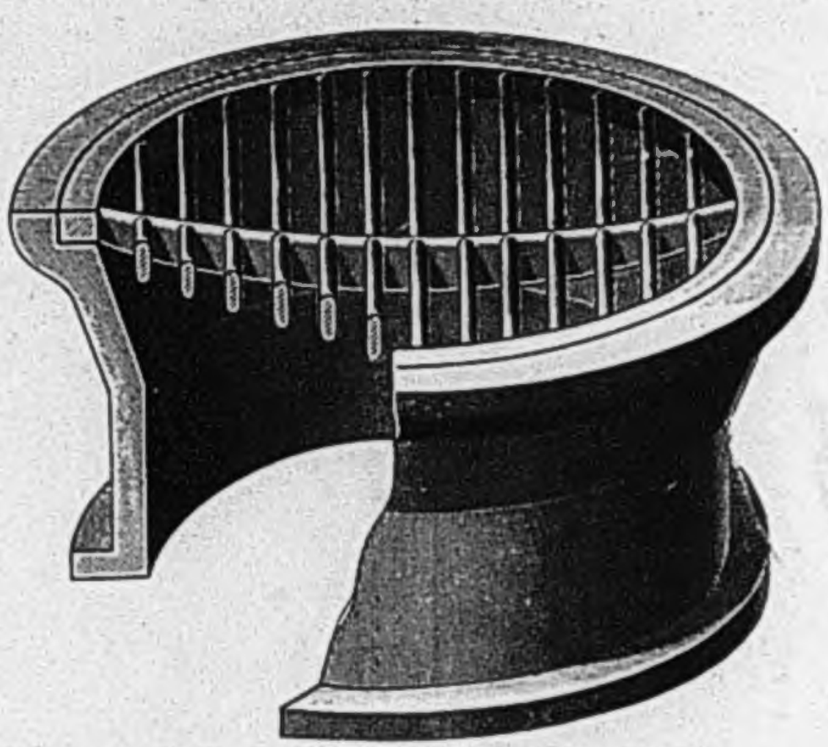


FIG 28.

Circular Drain Grating.

**Man Hole Frames and Covers**

—

**Drain Gratings**

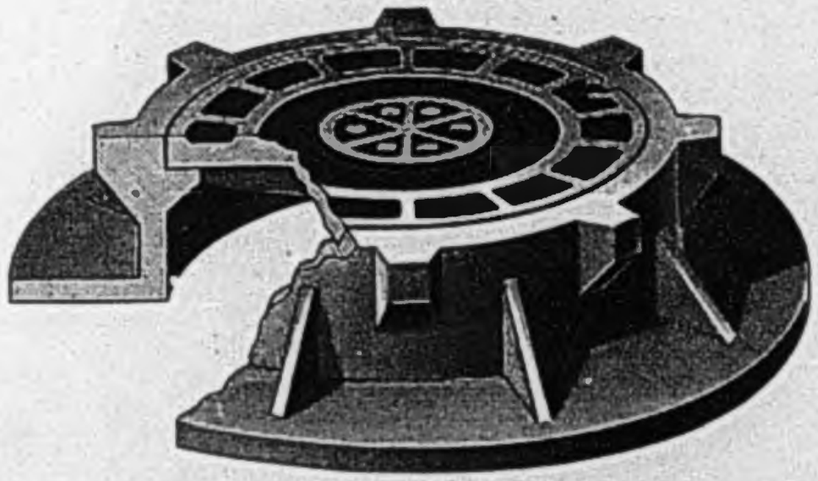


FIG. 29.

24 inch Heavy Man Hole Frame and Cover

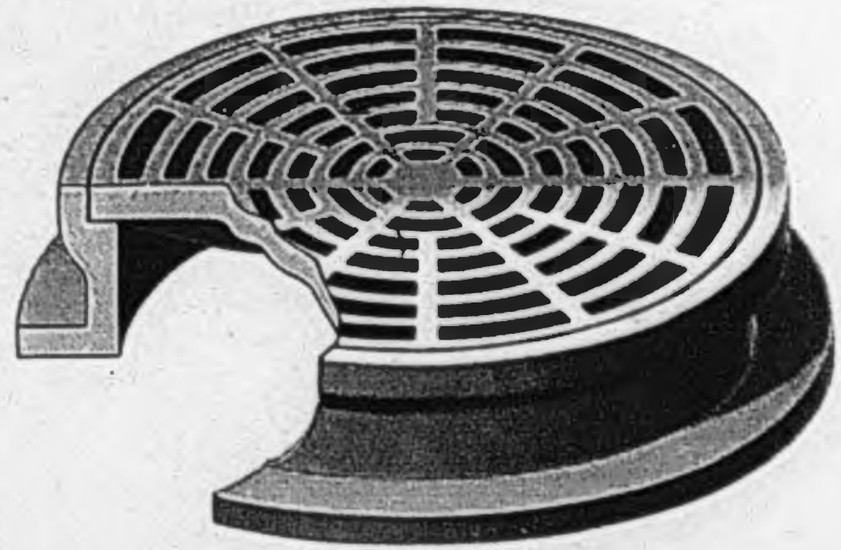


FIG. 30.

24 inch Light Man Hole Frame and Cover

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# WILCOX PATENTED FLEXIBLE JOINTS

FOR USE IN

## Steam, Water, Air, Oil and Gas Pipe Lines

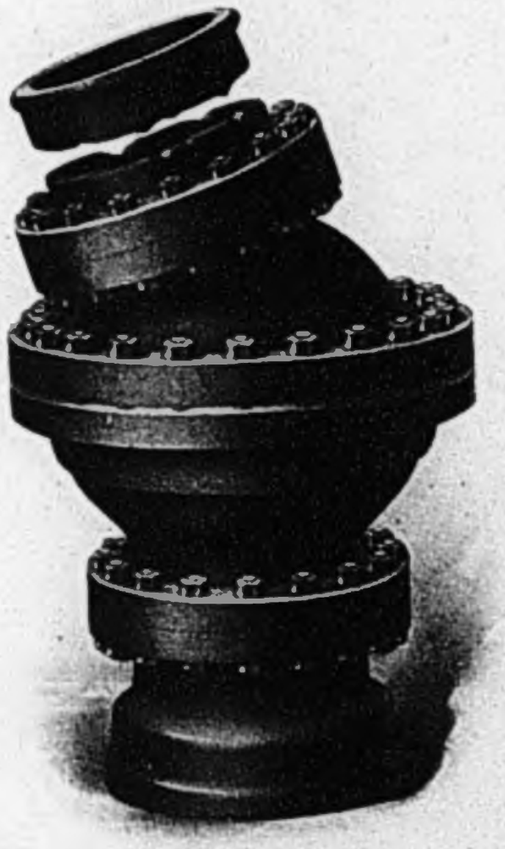


FIG. 69.

12 inch High Pressure
Flexible Joint
Furnished with Flange, Bell or
Spigot Connections

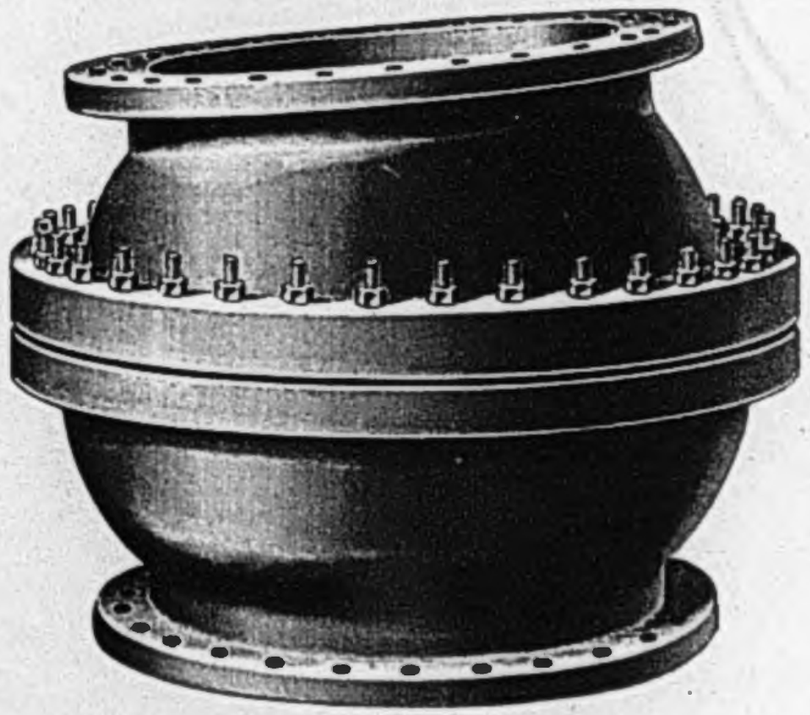


FIG. 70.

30 inch Flexible Joint
for use in
Water, Gas and Other Materials

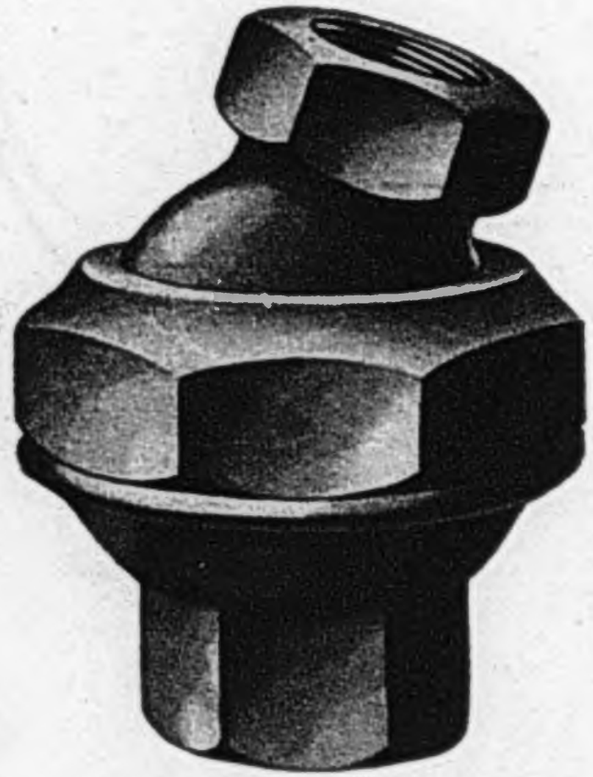


FIG. 71.

¾ inch All Bronze Flexible Joint
for High Pressure

—

Screwed Ends

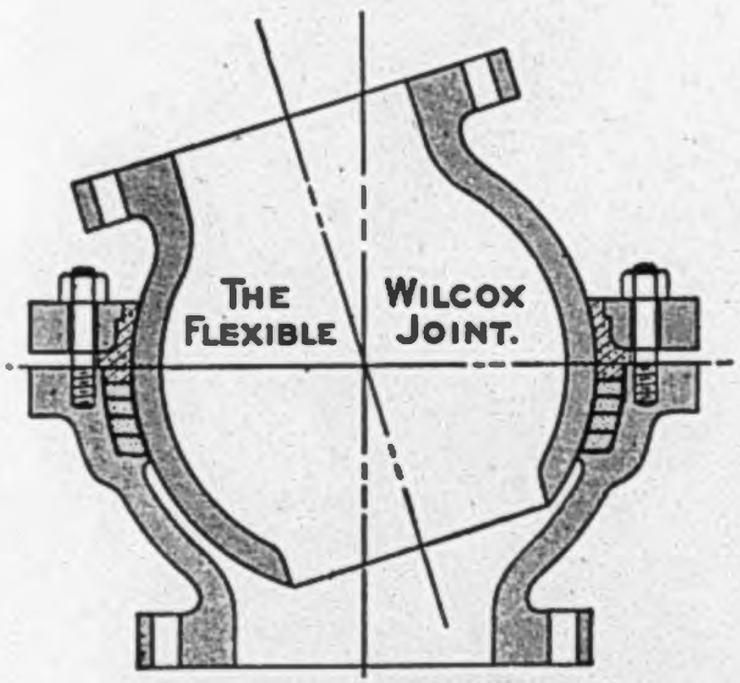
**Sheet No. 32.**

# COLDWELL-WILCOX CO.

NEWBURGH, NEW YORK

# WILCOX PATENTED FLEXIBLE JOINTS

**USED IN STEAM, WATER, AIR AND OIL PIPE LINES.**




SECTIONAL VIEW—FIG. 45.

These illustrations show clearly our Flexible Joint, which we make in all sizes.

By reference to the sectional view, you will notice that the bronze packing ring, which is held rigidly by the cast iron holding ring, acts as a bearing for the ball part of the joint. The fibrous packing shown below the bronze ring acts as a wiper and prevents any sediment being carried to the ground joint. In the placing of long lines of piping, provision for expansion and contraction and the necessity which often arises of setting pipes at obtuse angles, has necessitated the use of such a fitting, and wherever installed this joint has given perfect service and satisfaction. They have frequently been used in the place of Expansion Joints, especially where space is limited.

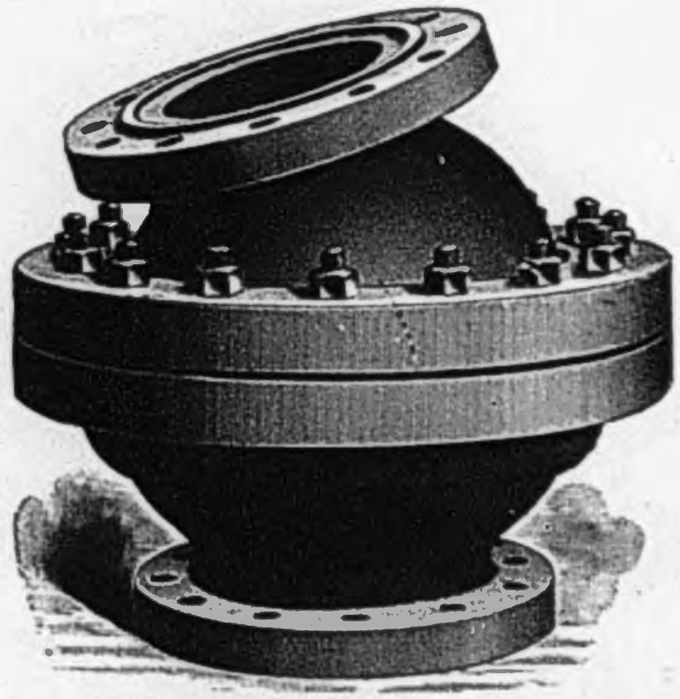


FIG. 46.

**Made in sizes ¾ inch to 2½ inch Screwed Ends; and 2½ inch to 48 inch Flanged ends.**

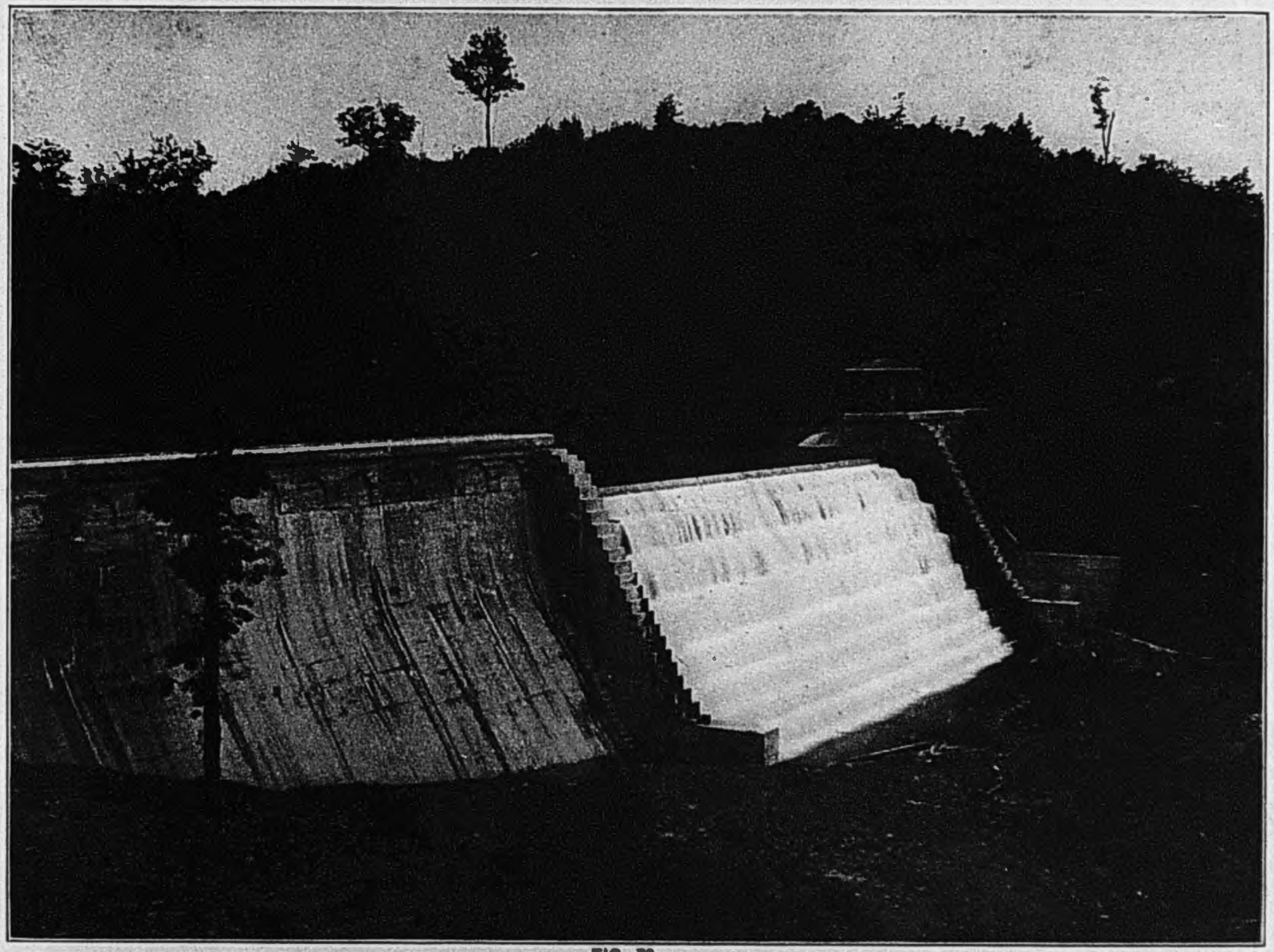


FIG. 72.

**DAM AT LYNCHBURG, VA. All Sluice Gates and Controlling Mechanism manufactured by COLDWELL-WILCOX CO., Newburgh, N. Y.**

# Valve Estimate

## Alternative A

| | | |
|---|---|---|
| 2 - | 24" Gate Valves. @ $400 | 800. |
| 2 - | Pipes - 6' long - @ 75 | 150 |
| 2 - | Sliding Gates 2'x2' @ 325 | 650 |
| ~~2 -~~ | ~~48" Gate Vals~~ | |
| 6 - | 18"x 24" Sliding Gates @ $300 | 1800 |
| | | $ ~~3000~~ 3400 |

## Alternative B -

| | | |
|---|---|---|
| 2 - | 24" Gate Valves @ $400 | 800 |
| 2 | Pipes 30' long - @ 325 | 650 |
| 2 | Sliding Gates @ 2x2 @ 325 | 650 |
| 1 - | 48" Gate Valves @ 1200 | 1200. |
| 4 - | Sliding Gates 12"x12" @ 100 | 400 |
| 2 - | Sliding gates 18"x24 @ 300 | 600 |
| | | $ 4300 |

## Alternative C.

| | | |
|---|---|---|
| 2 - | 48" Gate Valves - @ $1500 | $ 3000 |
| 2 - | 12x12" Sliding Gates @ $100 | 200. |
| | | 3200. |

Alternative D - valves $ 800

" E valves 800

Carroll Conduit valves. $ 2000

# VALVE ESTIMATE

## Alternative A

| | | |
|---|---|---|
| 2 - 24" Gate Valves at $400 | | $ 800 |
| 2 - Pipes 6' long at $ 75 | | 150 |
| 2 - Sliding Gates 2'x2' at $325 | | 650 |
| 6 - 18"x24" Sliding Gates at $300 | | 1,800 |
| | | $ 3,400 |

## Alternative B

| | | |
|---|---|---|
| 2 - 24" Gate Valves at $400 | | $ 800 |
| 2 - Pipes 30' long at $325 | | 650 |
| 2 - Sliding Gates 2'x2' at $325 | | 650 |
| 1 - 48" Gate Valves at $1200 | | 1,200 |
| 4 - Sliding Gates 12"x12" at $100 | | 400 |
| 2 - Sliding gates 18"x24" at $300 | | 600 |
| | | $ 4,300 |

## Alternative C

| | | |
|---|---|---|
| 2 - 48" Gate Valves at $1500 | | $ 3,000 |
| 2 - 12x12" Sliding Gates at $100 | | 200 |
| | | $ 3,200 |

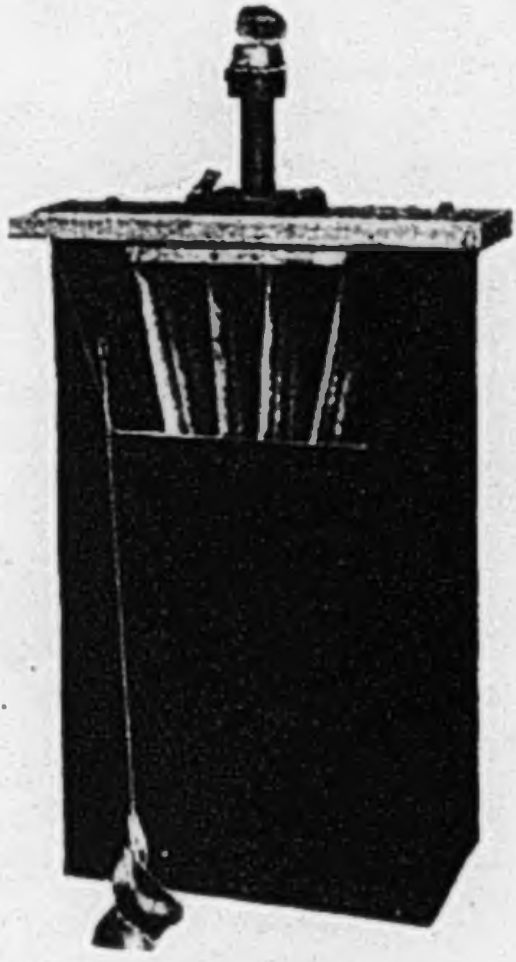
Alternative D - Valves $ 800

Alternative E - Valves $ 800

Carroll Conduit - Valves $ 2,000

# THE RELIANCE

## IRRIGATION METER



100 INCHES


HYDROMETRIC COMPANY

1120 CENTRAL BUILDING

LOS ANGELES, CAL.

The need of a device that will accurately measure and register the delivery of irrigation water to individual consumers, has been felt for years. This type of meter must be:

Simple in construction, with consequent low cost.

Accurate under all conditions, not being affected by fluctuations in canal or difference of pressure in pipe line.

Operative with low loss of head.

Easy to read, so that the consumer can also tell the amount used.

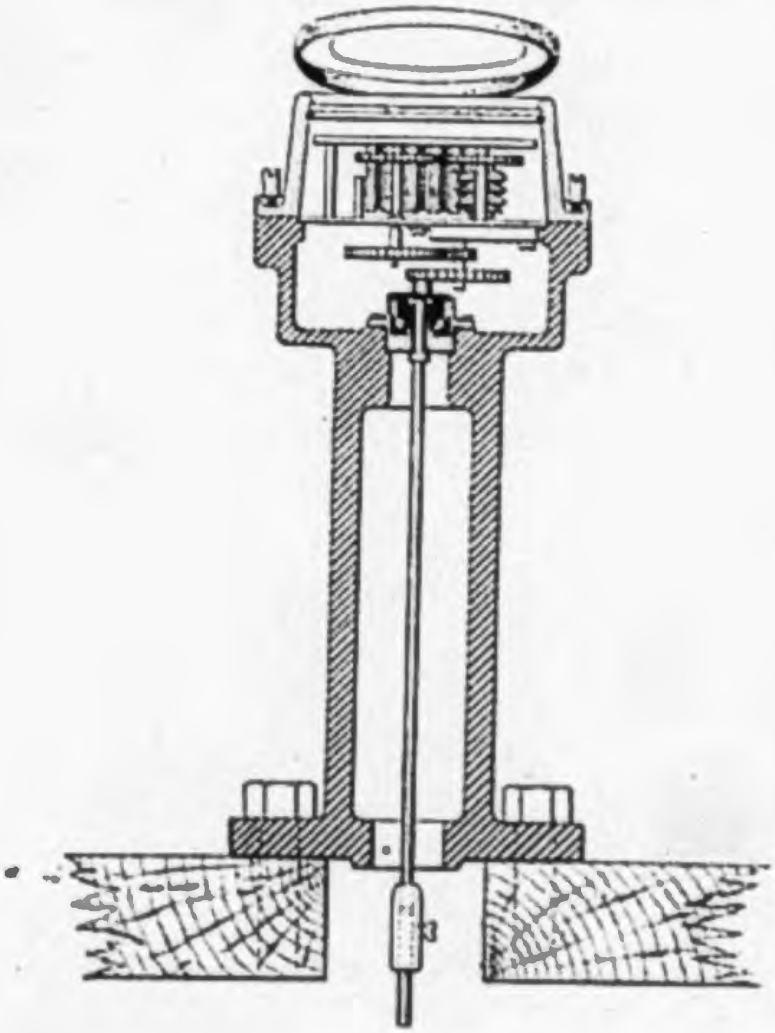
Without clocks to wind and keep in repair.

Without ink or pencil and the necessity of continual supervision.

Without bearings under water.

The Reliance Irrigation Meter fulfills these requirements. It consists of a vertical acceleration chamber, gradually increasing the velocity of the water flowing, whirls being prevented by diaphragms. This chamber terminates in a throat of definite dimensions. In this throat is suspended a brass wheel or

CROSS SECTION METER STAND



vane, similar to a ship's log. The revolutions of this wheel are dependent upon the velocity of the water. The wheel movement is transmitted by a hard

drawn spring brass rod to a registering mechanism in the meter stand.

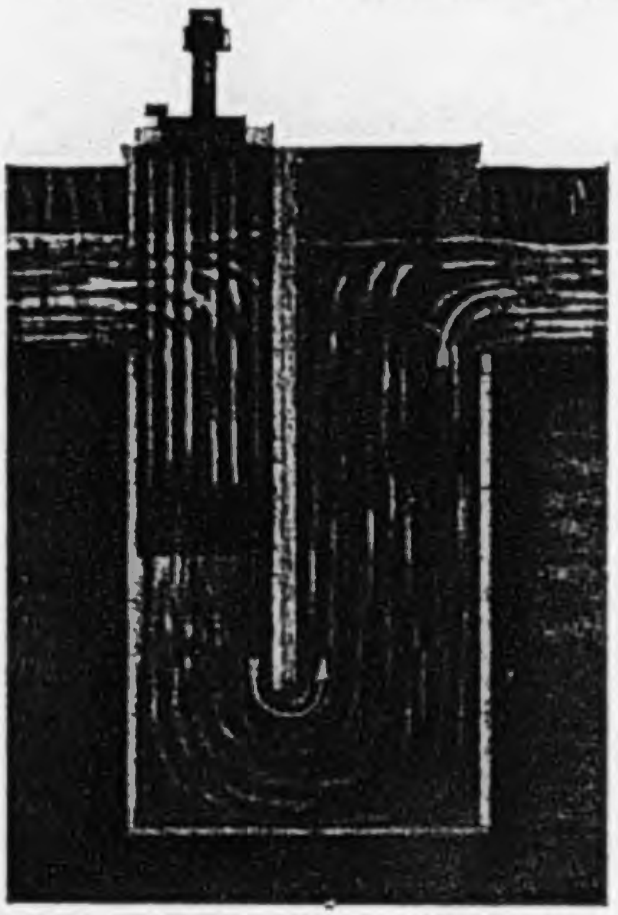
The only bearing for the wheel is a ball bearing of finest constructed tool steel, at the upper end of the rod, well above the water. The turning of the rod actuates the recording gear train and the flow is totalized on a straight reading dial anyone can read. A small revolving hand is provided for timing the rate of flow.

The loss of head is small, from nothing to a maximum of four inches, between the level of the water at entrance and discharge.

A great many careful tests show it to record with an accuracy within 2% on flows within its range. For instance, the 1 second-foot (50 miners inches) size will record with almost perfect accuracy, flows from 5 to 50 miners inches.

The advantages of such a meter are many and important. It satisfies both the company and the consumer, both know, without guess or calculation, the

CROSS SECTION SHOWING WOODEN BOX CONSTRUCTION



amount for which charge should be made. The company saves in office work. At the end of any period it is only necessary to deduct the previous reading from the present reading; the difference is the amount used. The personal element, always liable to error and dispute, is eliminated.

The consumer, knowing the area irrigated, can easily tell the depth of irrigation and can determine the amount of water that brings the best results.

The meter is being used by companies that desire to account for all the water supplied and at the same time satisfy the consumer. It has given universal satisfaction.

It is difficult to quote prices without knowing conditions. Weir boxes already installed can often be utilized. In writing for prices, please let us know how you are now making deliveries and probable number of meters of different sizes required.

The Reliance Irrigation Meter is made in the following sizes:

| Size | | Capacity Miners Inches |
|---|---|---|
| A | ½ Second-foot | 3 to 25 |
| B | 1 Second-foot | 5 to 50 |
| C | 2 Second-feet | 10 to 100 |
| D | 4 Second-feet | 20 to 225 |
| E | 8 Second-feet | 40 to 450 |

In writing, please use the inquiry blank.

## COMPARATIVE WATER MEASUREMENTS

Cubic feet per second multiplied by

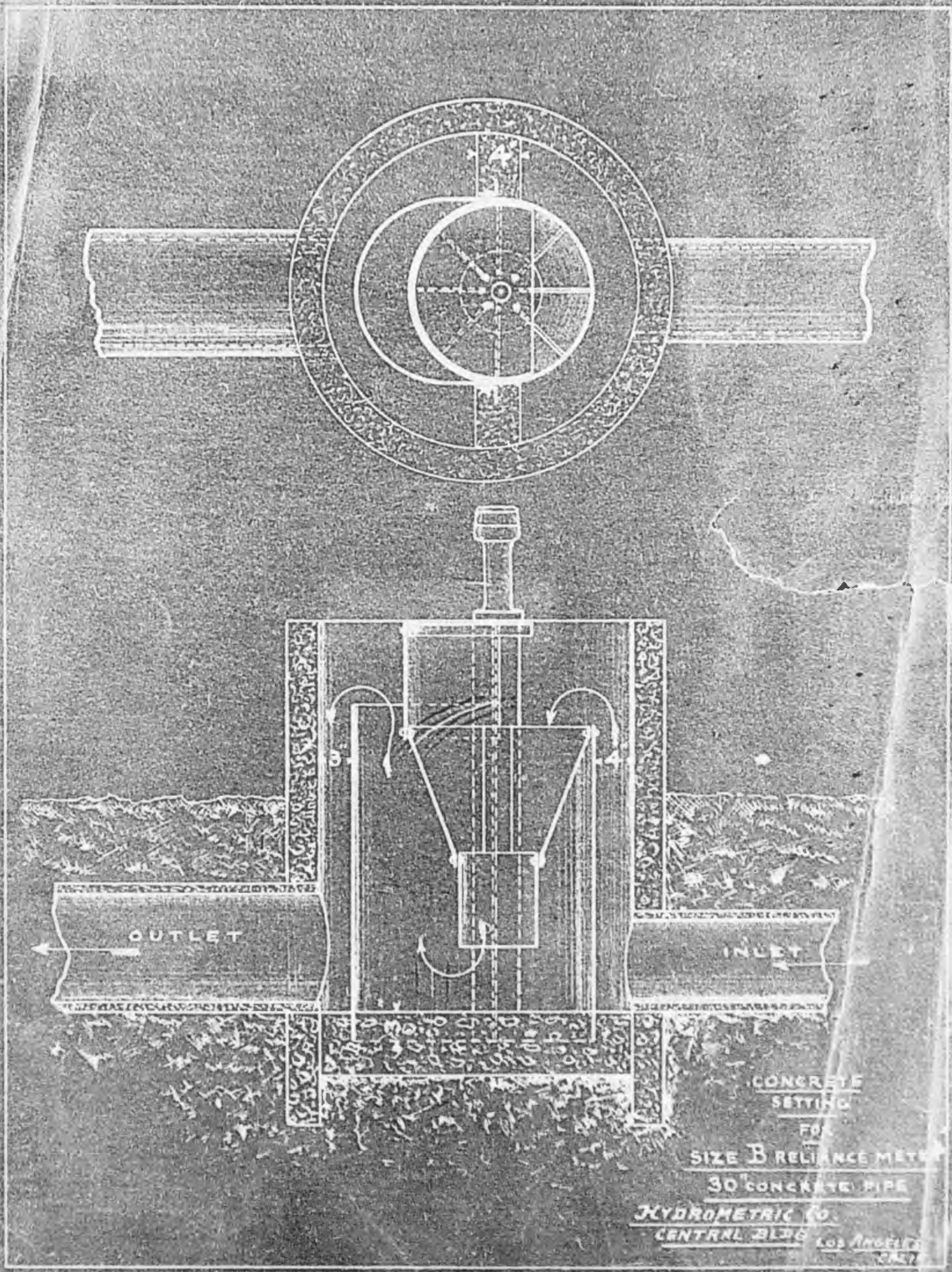
| | | | | |
|---|---|---|---|---|
| 448.83 | equals | gallons per minute. | | |
| 38.4 | " | Colorado | miners | inches |
| 40. | " | California | " | " |
| 40. | " | Arizona | " | " |
| 50. | " | Idaho | " | " |
| 40. | " | Montana | " | " |
| 50. | " | Nebraska | " | " |
| 50. | " | Nevada | " | " |
| 50. | " | New Mexico | " | " |
| 50. | " | Oregon | " | " |
| 50. | " | Utah | " | " |
| 50. | " | Washington | " | " |

Acre feet per hour multiplied by

| | | | | |
|---|---|---|---|---|
| 12.1 | equals | cubic feet per second. | | |
| 5430.86 | " | gallons per minute. | | |
| 464.64 | " | Colorado | miners | inches |
| 484. | " | California | " | " |
| 484. | " | Arizona | " | " |
| 605. | " | Idaho | " | " |
| 484. | " | Montana | " | " |
| 605. | " | Nebraska | " | " |
| 605. | " | Nevada | " | " |
| 605. | " | New Mexico | " | " |
| 605. | " | Oregon | " | " |
| 605. | " | Utah | " | " |
| 605. | " | Washington | " | " |

Acre feet per 24 hours multiplied by

| | | | | |
|---|---|---|---|---|
| .50417 | equals | cubic feet per second. | | |
| 226.287 | " | gallons per minute | | |
| 19.36 | " | Colorado | miners | inches |
| 20.1668 | " | California | " | " |
| 20.1668 | " | Arizona | " | " |
| 25.2085 | " | Idaho | " | " |
| 20.1668 | " | Montana | " | " |
| 25.2085 | " | Nebraska | " | " |
| 25.2085 | " | Nevada | " | " |
| 25.2085 | " | New Mexico | " | " |
| 25.2085 | " | Oregon | " | " |
| 25.2085 | " | Utah | " | " |
| 25.2085 | " | Washington | " | " |


OUTLET
INLET
CONCRETE
SETTING
FOR
SIZE B RELIANCE METER
30" CONCRETE PIPE
HYDROMETRIC CO.
CENTRAL BLDG
LOS ANGELES

4 - 6½

Pg 62 - catalogue

Standard end 6

No 20 Gage - #96 Flume -
6½" Dia - cost $ 2.10 deliv -
erected.

Flume understructure about = 1.00 per ft

~~Lobb~~

Pelton Water Wheels Co.

# Ed Fletcher Papers

## 1870-1955

## MSS.81

## Box: 45 Folder: 16

## Business Records - Water Companies - Volcan Land and Water Company - Machine contractors and brochures