Figure 105 shows a lattice of cylindrical uranium rods in a system in which heavy water serves as a slowing agent and in which a eutectic bismuth-lead alloy containing about 60% bismuth may serve as a cooling agent. In Figure 105, (1), (2), and (3) are cylindrical uranium rods (thick walled tubes). The uranium rod (1) is covered by a thin layer (4) which separates it from the gas in the cylindrical gap between the uranium rod (1) and the aluminum tube (5). This gap serves to heat insulate the uranium rod from the heavy water (8) which is in contact with the aluminum tubes (5), (6), and (7). A thin-walled steel tube (9) runs in the axis of the uranium rod (1) and the bismuth-lead alloy flows through this tube as indicated by the arrow. (12) and (13) are the bottom and top of a tank which distributes the cooling agent into the lattice. (11) and (12) are the bottom and top of a space which distributes an inert gas into the annular gaps which heat insulate the uranium rods from the heavy water.

A heavy water plant of this type is shown diagrammatically in Figure 106. In this figure, (1) is a tank containing a lattice of uranium rods immersed in heavy water which forms the chain reacting unit. (2) is the electrodynamic control system which serves to stabilize the chain reaction which is described in detail in connection with Figure 41. Mercury may be used in place of the bismuth-lead-cadmium alloy in the case of heavy water power units in the stabilizer (2). The hot liquid bismuth-lead alloy leaves the chain reaction unit through tube (3) and this alloy is led through a boiler (4) in which steam is produced from water for purposes of power production. From the boiler the liquid bismuth-lead alloy goes through a pipe (5) into a heat exchanger (6) where it is cooled down to a temperature slightly above its melting point of about 130°C. The cold liquid bismuth-lead alloy goes through the pipe (7) into the pump (8). From here through the pipe (9) it goes back to the top of the chain reaction power unit. (10) and (11) are pipes carrying water to and from the heat exchanger (6).

Figure 100 shows diagrammatically a lattice of cylindrical uranium rods embedded in graphite. This lattice is surrounded by a layer of graphite which serves as a neutron reflector. The lattice is cooled by liquid bismuth or a bismuth-lead alloy, the former being more favorable from the point of view of the efficiency of the chain reaction. The cooling agent is distributed by the pipe (1) to steel tubes (1), (2), (3), etc. (1) and (2) go through the peripheral of graphite layer whereas (3) goes through the cylindrical uranium rod (4), one of the lattice elements of the uranium rod lattice. The cooling agent is collected at the bottom of the pile in pipe (5).

Figure 100B shows the top view from which it is visible in what way the cooling agent is distributed on the top and collected on the bottom, carried by the pipes (6) and (7) respectively.

Figure 101 shows a diagram of a graphite power unit of this type. The chain reaction unit is contained in the steel tank (1). The system (2) which is described in detail in connection with Figure 41 serves the purpose of stabilizing the chain reaction unit. The cooling agent leaves the chain reacting unit at the bottom and goes through the heat exchanger (3) where it transfers its heat to a eutectic alloy of lead and bismuth. The bismuth-lead eutectic coming from the heat exchanger (3) transfers heat to the boiler (4) in which steam for purposes of power production may be generated. After leaving the boiler (4) the bismuth-lead eutectic goes through the heat exchanger (5) in which heat is transferred to water and through the pump (6) back to the heat exchanger (3).

IV (7) Assembly

Figure 105 shows a lattice of cylindrical uranium rods in a system in which heavy water serves as a slowing agent and in which a eutectic bismuth-lead alloy containing about 60% bismuth may serve as a cooling agent. In Figure 105, (1), (2), and (3) are cylindrical uranium rods. (thick walled tubes) The uranium rod (1) is covered by a thin layer (4) which ~~prevents chemical action on the uranium by~~ separates it from the gas in the cylindrical gap between the uranium rod (1) and the aluminum tube (5). This gap serves to heat insulate the uranium rod from the heavy water (8) which is ~~touching~~ in contact with the aluminum tubes (5) and (6) and (7). A thin-walled steel tube (9) runs in the axis of the uranium rod (1) and the bismuth-lead alloy flows through this tube as indicated by the arrow. (12) and (13) are the bottom and top of a tank which distributes the cooling agent into the lattice. (11) and (12) are the bottom and top of a space which distributes an inert gas into the annular gaps which heat insulate the uranium rods from the heavy water.

A heavy water plant of this type is shown diagrammatically in Figure 106. In this figure, (1) is a tank containing a lattice of uranium rods immersed in heavy water which forms the chain reacting unit. (2) is the electrodynamic control system which serves to stabilize the chain reaction which has been described in detail in connection with Figure 41. Mercury is used inplace of the bismuth-lead-cadmium alloy in the case of heavy water power units in the stabilizer (2). The hot liquid bismuth-lead alloy leaves the chain reaction unit through tube (3) and this alloy is led through a boiler (4) in which steam is produced from water for purposes of power production. From the boiler the liquid bismuth-lead alloy goes through a pipe (5) into a heat exchanger (6) where it is cooled down to a temperature slightly above its melting point of about 130°C. The cold liquid bismuth-lead alloy goes through the pipe (7) into the pump (8). From here through the pipe (9) it goes back to the top of the chian reaction power unit. (10) and (11) are pipes carrying water to and from the heat exchanger (6).

Figure 100 shows diagrammatically a lattice of cylindrical uranium rods embedded in graphite. This lattice is surrounded by a ~~further~~ layer of graphite. The lattice is cooled by liquid bismuth or a bismuth-lead alloy the former ~~automatically~~ being ~~much~~ more favorable from a point of view of the efficiency of the chain reaction. The cooling agent is distributed by the pipe (1) to steel tubes (1), (2), (3), etc. (1) and (2) go through the periphery of graphite layers whereas (3) goes through the cylindrical uranium rod (4), one of the lattice element of the uranium rod lattice. The cooling agent is collected at the bottom of the pile in pipe (5).

Figure 100B shows the top view from which it is visible in what way the cooling agent is distributed on the top and collected on the bottom, carried by the pipes (6) and (7) respectively.

Figure 101 shows a diagram of a graphite power unit of this type. The chain reaction unit is contained in the tank (1). The system (2) described in detail in connection with Figure 41 serves the purpose of stabilizing the chain reacting unit. The cooling agent leaves the chain reacting unit at the bottom and goes through the heat exchanger (3) where it transfers its heat to a eutectic alloy of lead and bismuth. The bismuth-lead eutectic coming from the heat exchanger (3) transfers heat to the boiler (4) in which steam for purposes of power production may be generated. After leaving the boiler (4) the bismuth-lead eutectic goes through the heat exchanger (5) in which heat is transferred to water and through the pump (6) back to the heat exchanger (3).