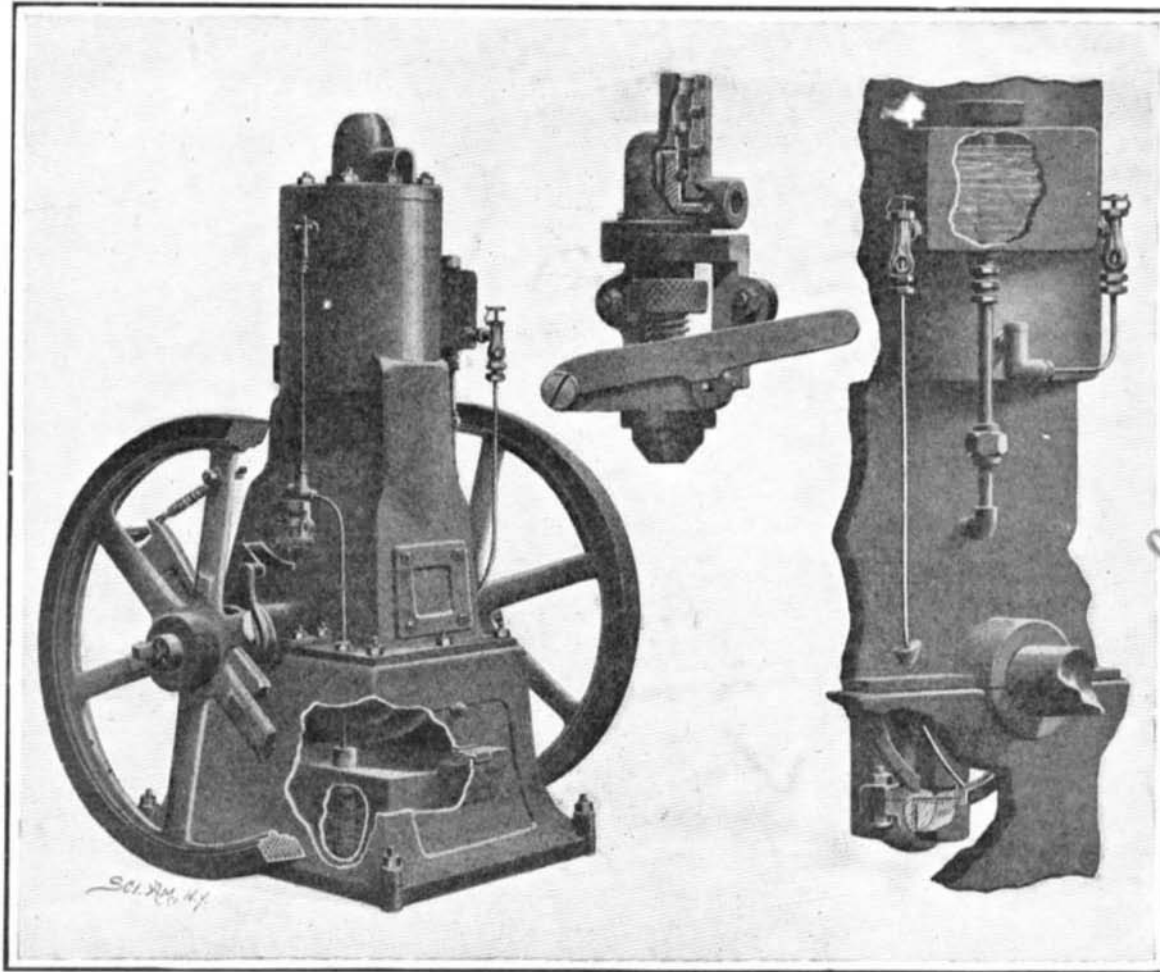


**A COMPACT AND ECONOMICAL KEROSENE ENGINE.**

There is a growing demand on the part of the users of engines of moderate horse-power for a light motor, that will occupy little space, can be quickly started and stopped, that is simple in its construction and operation, is thoroughly reliable, and above all that will yield its rated horse-power, day in and day out, with a reasonable economy of fuel. The accompanying drawings illustrate the most important features in a kerosene engine in which a successful effort has been made to meet the above requirements. The engine is simple in construction. It consists of a cast-iron base, reaching to the center of the crank-shaft, in which is placed a galvanized-iron kerosene tank holding enough oil for a whole day's run. To avoid the inconvenience of having to withdraw the tank for filling, a projection is cast on the side of the base and provided with a lid, on lifting which, the kerosene may be poured direct into the funnel of the tank. The crank-case and cylinder casting is bolted upon the base, and the whole can be readily taken apart at any time for inspection. Reliability and economy in running are assured by the use of a positive feed of oil, the supply being controlled by a force pump, operated from an eccentric, which is controlled by the flywheel governor. The device is so adjusted that the feed of oil is always proportionate to the load. Under full load and low speed, the eccentric gives a long stroke to the plunger; as the load lightens and the speed rises, the stroke shortens and the feed of oil is proportionately reduced. This is directly in line with the best steam-engine practice, in which the governor acts directly on the cut-off. Careful electrical tests have shown that the supply of oil is directly proportional to the work to be done; and as this regulation of the supply is automatic, a constant economy is assured. Particular care has been given to the design and construction

of the pump. It is provided with steel ball valves, seating on phosphor bronze. The action is positive, and the many troubles which come from the use of spring-adjusted valves are quite avoided. The action of this mechanism is so sensitive that the interposition of a sheet of tissue paper between the eccentric lever and the plunger will produce instant increase in

section, which is set concentrically to the crank-shaft and eccentrically to the crank-pin, to which latter it is attached. A hole passes from the side of the oiling-ring into a hole bored through the crank-pin and communicating with oil channels in the wearing surface of the pin. As the engine revolves, centrifugal force retains the oil in the ring and forces it through the oil hole onto the wearing surfaces. The engine is adapted to use the ordinary grades of commercial kerosene; and the electrical tests, to which we have already referred, show that the larger engines of this type run on a consumption of somewhat less than one pint of oil per horse-power per hour, and that the smaller sizes show an economy that is proportionately good. The engine is manufactured by the Universal Kerosene Engine Company, 137 Liberty Street, New York.



Forced feed regulated from the flywheel governor; ball valves; forced lubrication; oil tank in base.

**COMPACT KEROSENE ENGINE FOR ISOLATED PLANTS.**

the speed of the engine. One of the sectional views shows the ingenious method of forced lubrication. A small pipe leads from the compression chamber to an oil tank attached to the cylinder, the top of the pipe terminating near the roof of the tank and clear of the surface of the oil, which is thus subjected to a pressure equal to that in the crank case. The oil is forced through two sight-feeds, one of which leads to the crank-pin, and the other to the cylinder and wrist-pin. The crank-pin oiler consists of a ring of channel

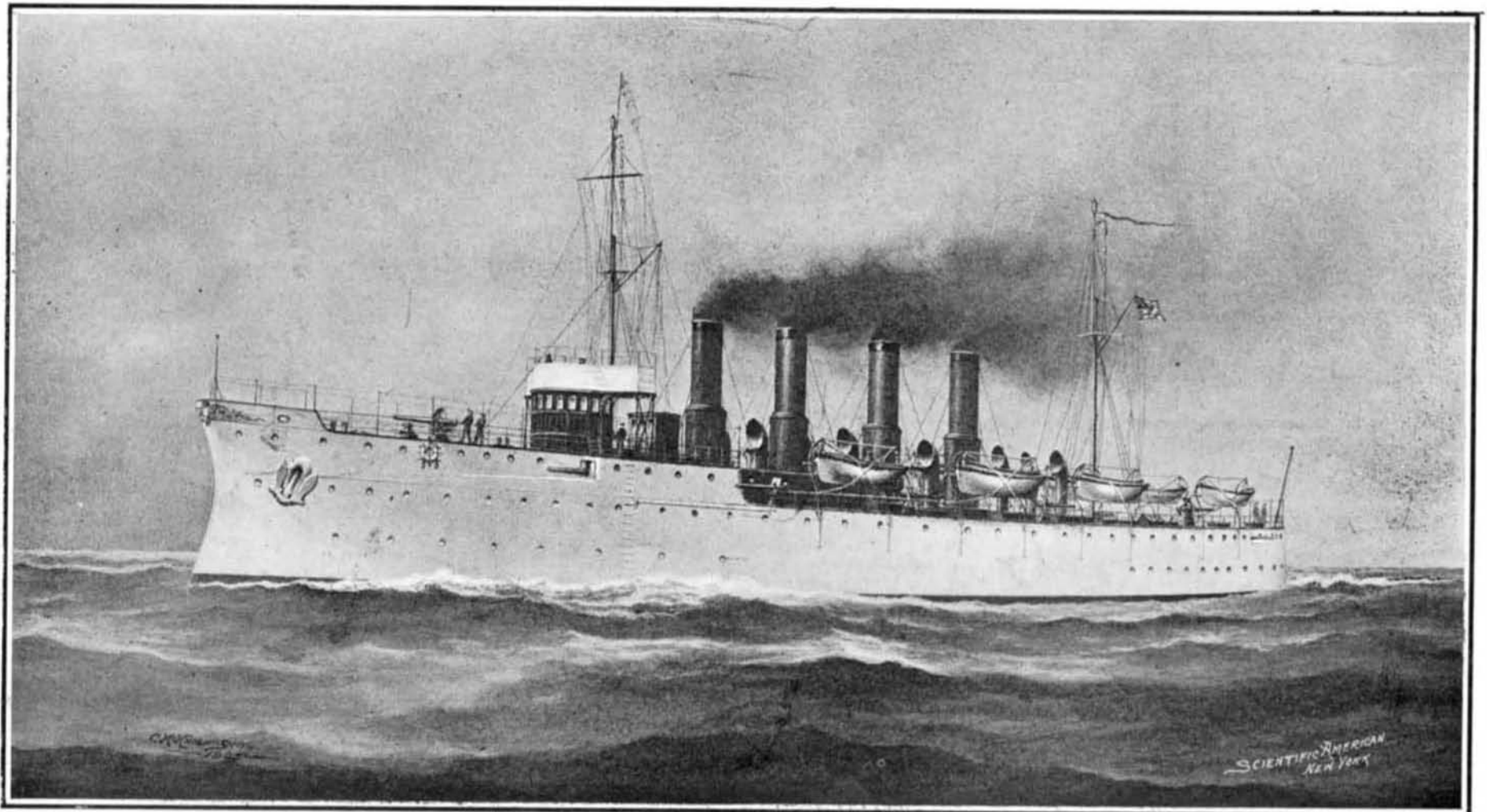
corresponding displacement on trial, 3,750 tons; speed, 24 knots. The battery will consist of twelve 3-inch guns, carried on the main deck. There will be two 21-inch submerged torpedo tubes; 3,600 rounds of 3-inch ammunition and 8 torpedoes to be carried. The estimated weight of battery and full ammunition is 140 tons.

The Board at first recommended a 1½-inch inclined nickel-steel deck for the length of the machinery space, and 2-inch vertical steel protection to extend

**SCOUT CRUISERS FOR THE UNITED STATES NAVY.**

BY LIEUT. H. C. DINGER, U. S. N.

The chief characteristics of the new 24-knot scout cruisers appropriated for in the Naval Appropriation Act of April 27, 1904, have been defined by the Board on Construction, and the development of the details of design is now in progress. The chief characteristics are as follows: Length between perpendiculars, 420 feet; breadth, 46 feet 8 inches; draft fully loaded, 18 feet 3½ inches; depth amidships, 36 feet 5 15-16 inches; displacement loaded, 4,310 tons; draft on trial, 16 feet 10 inches;



Length, 420 feet; Beam, 46 feet 8 inches. Trial Draft, 16 feet 10 inches. Depth Amidship, 36 feet 6 inches. Displacement on trial, 3,750 tons. Battery, twelve 3-inch guns. Torpedo Tubes, two submerged. Armor, deck 1½-inch, side 2-inch. Horse-power, 16,000. Speed, 24 knots. Coal Supply, 1,200 tons.

THE NEW 24-KNOT SCOUTS FOR THE UNITED STATES NAVY.

above the tops of boilers and cylinders of the main engines, with at each end of the machinery space an athwartship 1-inch steel bulkhead. For the steering gear, nickel-steel protection 2 inches thick and 1 inch on the flat was recommended. In working up the details of the design, it developed that the inclined deck would interfere to a very great extent with proper coal-bunker arrangement and means for rapidly stowing and emptying bunkers; so that the nickel-steel protection in wake of machinery may be placed either at the ship's side, or on the fore-and-aft inclined bulkhead

two pole masts for signaling. There will be four smokestacks, 78 feet above base line. The forecastle deck will be raised, and will extend aft as far as the forward smokestack. The freeboard will be about 34 feet forward and about 22 feet aft. The total coal capacity will be between 1,000 and 1,200 tons; coal on trial, 500 tons. Sixteen officers and a crew of 368 men are to be carried.

The development of the design of machinery instal-

#### FOG DISPERSION BY ELECTRICITY.

BY THE ENGLISH CORRESPONDENT OF THE SCIENTIFIC AMERICAN.

A few months ago we briefly described in the SCIENTIFIC AMERICAN the latest experiments that had been carried out by Sir Oliver Lodge in dispelling fogs by the discharge of electricity into the laden atmosphere, and the highly satisfactory results that attended the tests. Through the courtesy of the inventor, we are now enabled to describe his process, and to illustrate the apparatus employed for the purpose.

The possibility of dispersing fogs which consist of

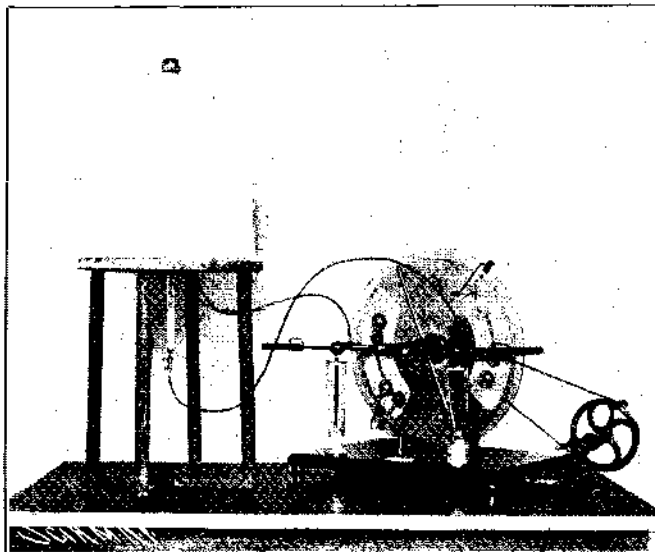


Fig. 1.—The Old Laboratory Experiment of 1884 with a Bell Jar Full of Fog Ready to be Dispersed by the Electricity Supplied by the Voss Machine, the Terminals of Which Are Connected Respectively with the Floor of the Jar and with an Insulated Point Inside.

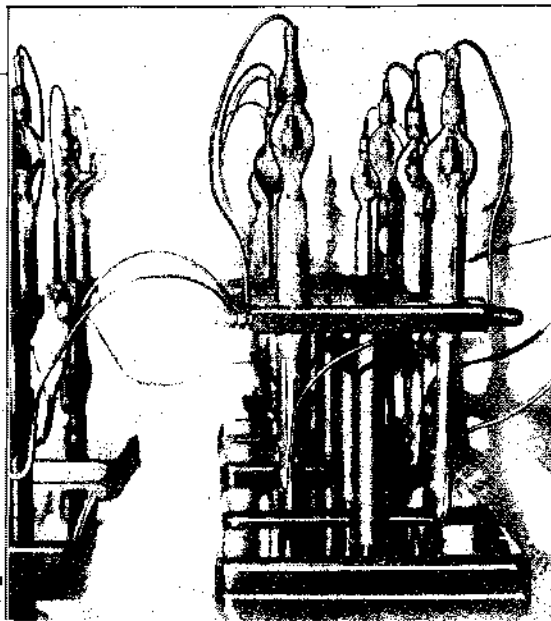


Fig. 4.—A Battery of Rectifiers Able to Stand Excessively High Potentials Without Conveying a Current in One Direction, while in the Other Direction they Transmit a Current Quite Easily.

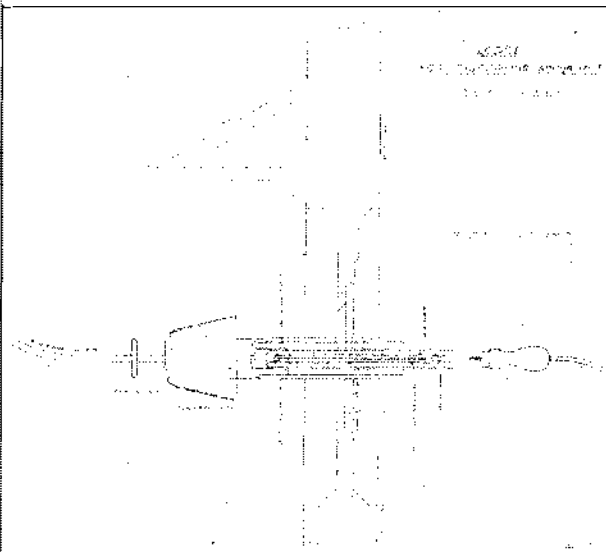


Fig. 6.—A Wall Insulator, Being the Arrangement Found Necessary for Carrying the High-Tension Leads Through a Partition and at the Same Time Enabling them to Maintain Something Like a Million Volts, even During the Damp Atmosphere of a Fog.

between bunkers and firerooms. This change will give to these vessels an efficient arrangement of coal bunkers, which will add very materially to their steaming efficiency and endurance.

The Board recommended that a design be prepared by the Department, to include twin-screw reciprocating engines, with the necessary auxiliaries, of about 16,000 maximum I.H.P.; twelve water-tube boilers; an evaporating plant of 1,600 gallons capacity per day; a refrigerating plant of two tons capacity; a general workshop; the total weight of machinery including spare parts to be 794 tons. The Board recommended that the Department ask for bids under two classes; the first to be on the Department's design without changes in hull or machinery, and the second to be with the general characteristics of hull as set forth above, but on the bidder's design of machinery, preference being given to a turbine installation.

The 3-inch guns are to be supplied by chain ammunition hoists, two forward and two aft. The vessels are to be lighted by electricity. An electric generating plant of three 32-kilowatt machines is to be installed in separate dynamo room. The ventilating blowers, deck winches, and workshop motors are also to be electrically driven. Two large searchlights are to be installed. A wireless telegraph outfit is to be supplied. This, as well as other signal apparatus, is of special importance for the particular work the scouts will be required to perform. The vessels will carry

lation has in contemplation the following: Twelve boilers, modified Normand type, placed in three watertight compartments, with a total grate surface of 690 square feet, and a total heating surface 38,000 square feet. At full speed the coal consumption will be about 300 tons per day. Each boiler room is to have an auxiliary feed pump piped to feed the boilers in its own compartment, to have fresh-water connections only; a fire and bilge pump piped to supply fire main and ash ejectors and for pumping bilges; an ash ejector for removing ashes while firerooms are under air pressure.

There will be twelve blower engines driven by reciprocating engines or steam turbines and located in the deck space above the boiler rooms. The blowers are to be of sufficient capacity to give an air pressure of 5 inches in firerooms. The engines are to be of the four-cylinder, four-crank, triple-expansion type, with a low-pressure cylinder at each end. The cylinders are high-pressure 28½ inches, intermediate-pressure 45 inches, low-pressure two 62 inches diameter. The stroke is 36 inches; revolutions 200 per minute, with corresponding piston speed of 1,200 feet per minute. It will be noted that the low-pressure cylinder for the corresponding power is of considerably larger proportions than has heretofore been the practice with naval engines. The larger low-pressure cylinder will allow a greater range of expansion to be used, and hence will conduce to greater economy.

one, or both, of two things—particles of dust in various forms, or minute drops of water vapor—has occupied the attention of this scientist for the past twenty years. In 1884 Sir Oliver Lodge, acting on the observations that had been made by the late Prof. Tyndall as far back as 1870, who discovered that when a hot body is held in strongly-illuminated dusty air, a dark or dust-free space is immediately formed above it, carried out a series of electrical experiments to substantiate Tyndall's theories, and also to discover the cause of the dust-free space. At first it was suggested that the solution was that the dust was burned and destroyed, but this explanation was soon disproved by using a moderately-heated body, which was not sufficiently hot to consume the particles. The same phenomenon was observed. Dr. Tyndall, unable to ascertain any other answer to the problem, advanced the suggestion that the air was dragged up in convection currents faster than its supported dust, which was consequently left behind. And so the question rested until Lord Rayleigh took up the subject in 1881, and shortly afterward by Sir Oliver Lodge, who carried out his investigations in conjunction with the late Mr. J. W. Clark. All the known experiments were repeated with minute care, and the results were highly satisfactory. In these preliminary trials hot bodies of varying descriptions were employed, but in the course of the researches the scientist accidentally conceived the idea of testing one hypothesis that had occurred

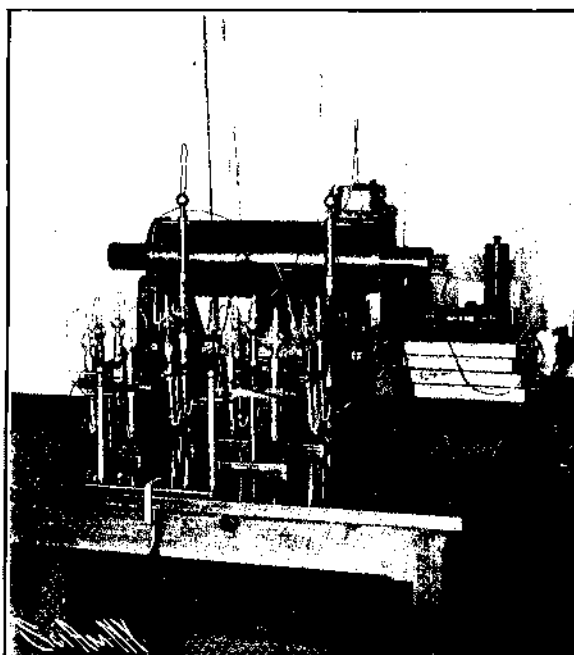


Fig. 5.—Rectifiers Connected up to a Coil Excited by an Alternating Dynamo with Condensers in Series with the Primary and Alternators so as to Get a Maximum Effect by "Tuning."

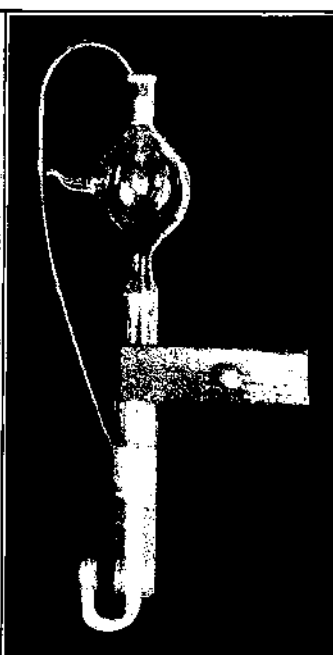


Fig. 8.—A Mercury Rectifier in a Rather Convenient Form for the Fog-Dispelling Experiments of Sir Oliver Lodge.

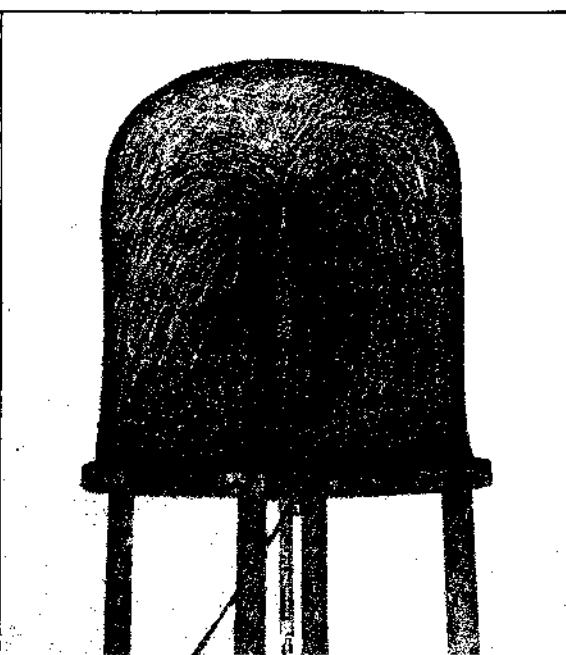


Fig. 2.—If the Supply of Electricity is Stopped the Flakes Fall; if it is Continued they are Rapidly Deposited on the Sides and Floor of the Jar.

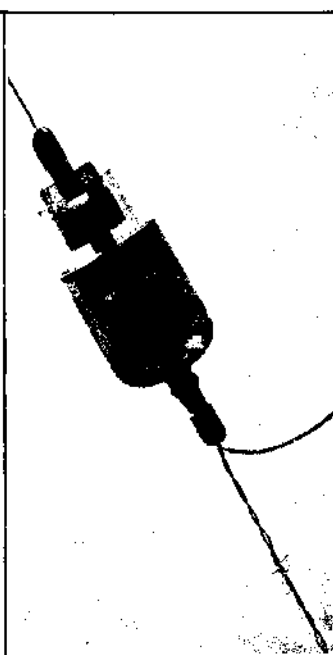


Fig. 7.—An Aerial Insulator that Fixes the End of an Insulated Barbed Discharging Wire, under Tension, by Means of a Wire Rope Tie.