SCIENCE

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ELECTRIC LIGHTING BY THE KNOWLES SYSTEM.

THIS system consists of a central station containing the dynamos for the generation of the current, which is then conducted to the several points at which it is to be used. At these points, instead of passing the current through the lamps, it is employed in storage-batteries; and from these storage-batteries the current for lamp-use is obtained. It is maintained that this system is more economical, and that it allows of longer circuits, than that of direct distribution.

The system has been in operation for some time in Brooklyn, one of the battery-plants being located at 187 Montague Street, the generating-station being on Graham Street, where will be found the necessary boilers, engines, dynamos, and regulators.

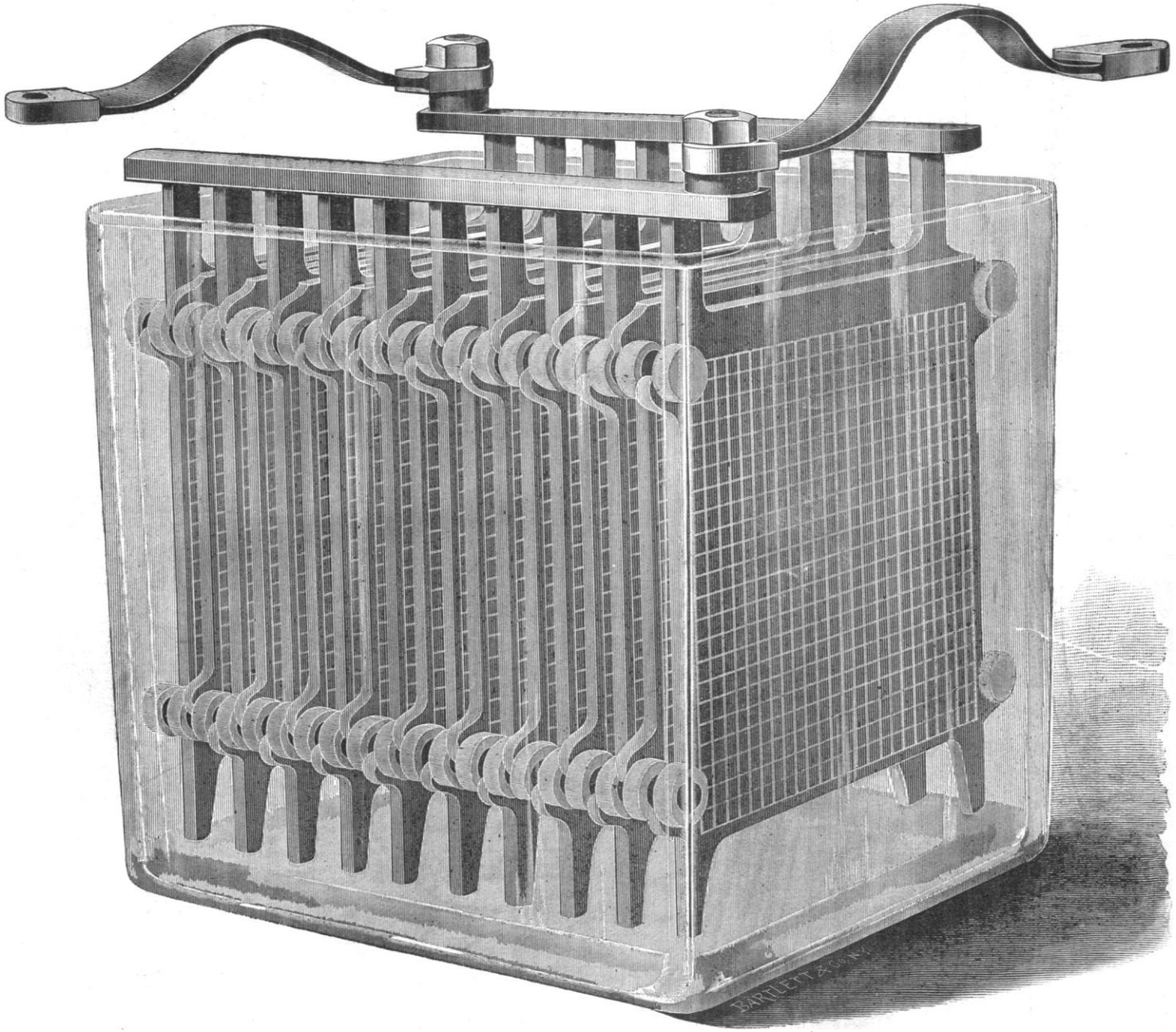

FIG. 1.—STORAGE-BATTERY OF MUTUAL ELECTRIC MANUFACTURING COMPANY, KNOWLES PATENT.

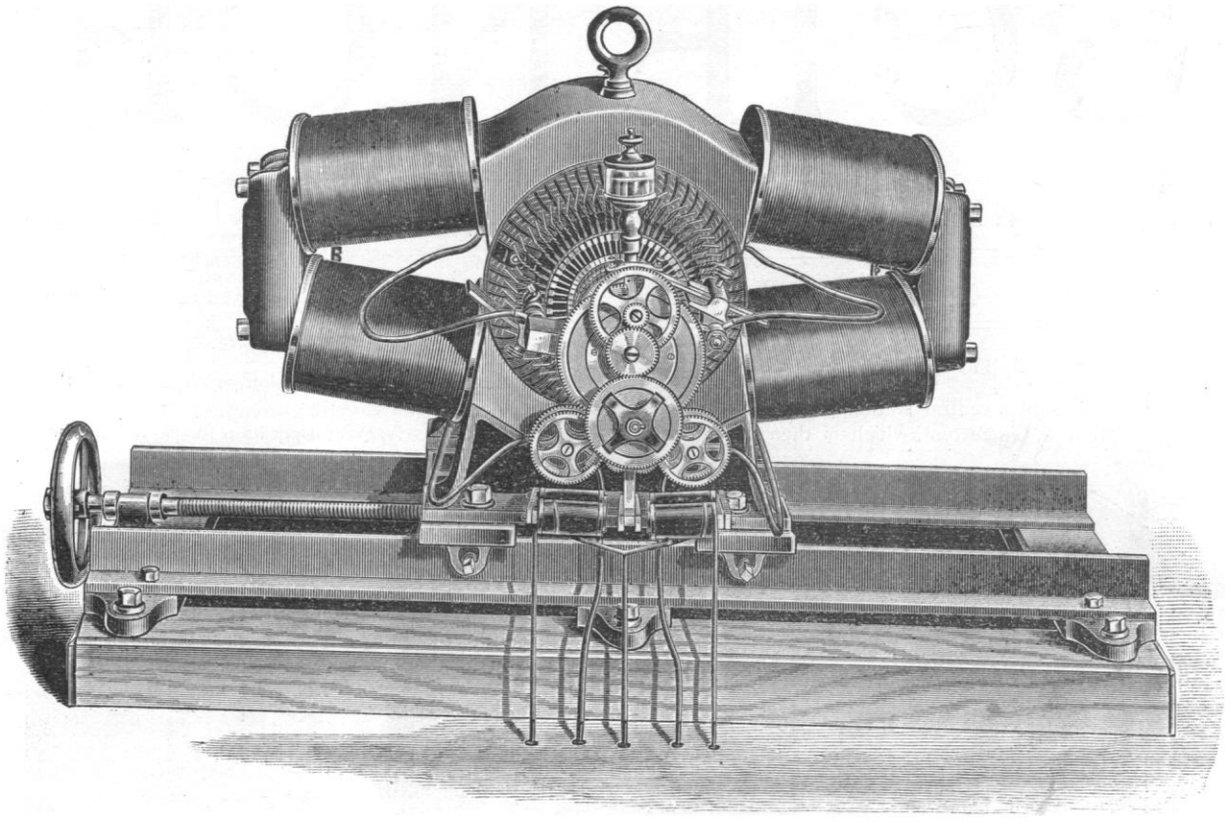

FIG. 2. — KNOWLES DYNAMO.

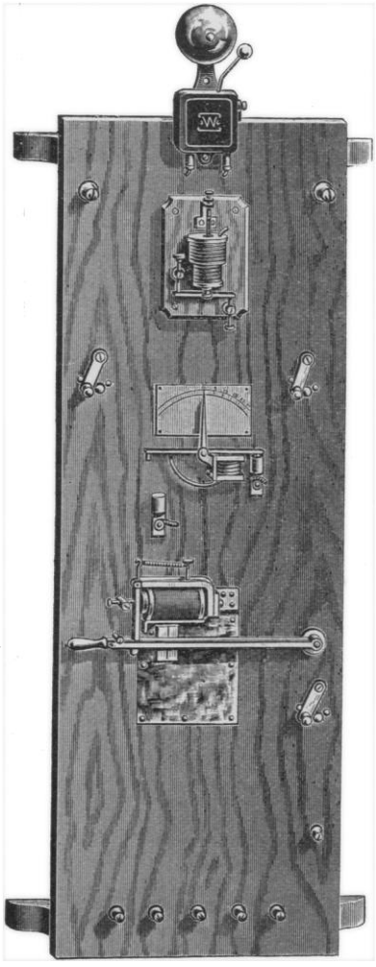

FIG. 3. — REGULATOR AND SAFETY CUT-OUT.

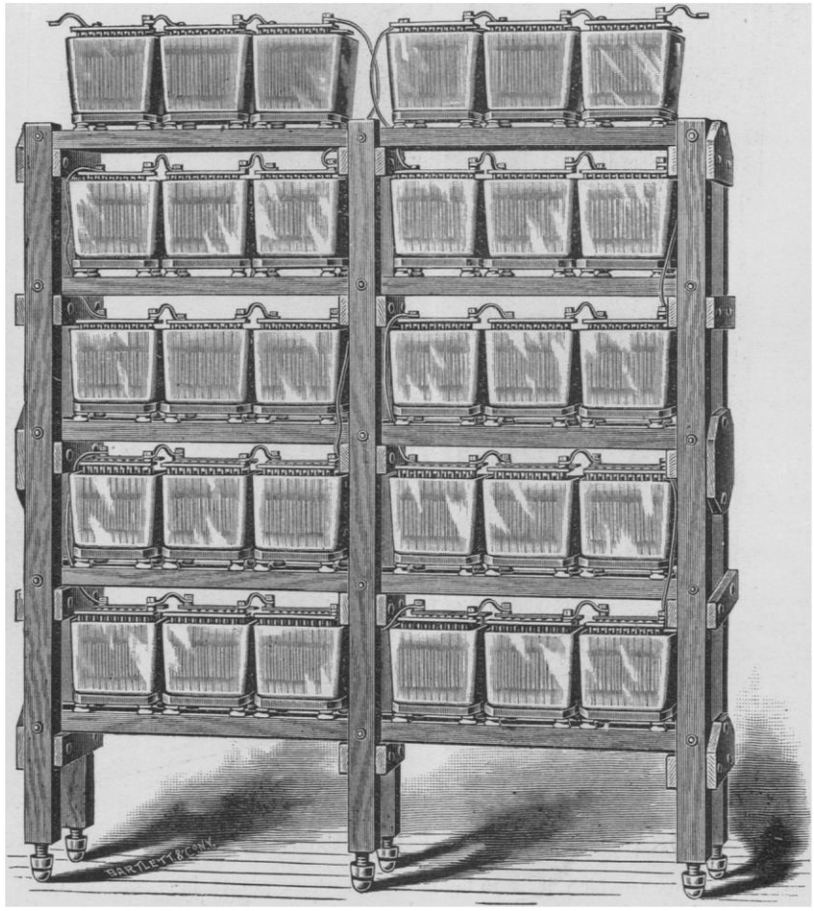

FIG. 5. — STORAGE-BATTERY AND RACK.

In charging a secondary battery from a dynamo, there is need of maintaining the charging current at a constant and suitable strength. For this purpose it will be seen in Fig. 2 that the dynamo is supplied with a clock-work arrangement, to one of the shafts of which the dynamo brushes are attached. Now, so long as the current strength is maintained, this clock-work remains

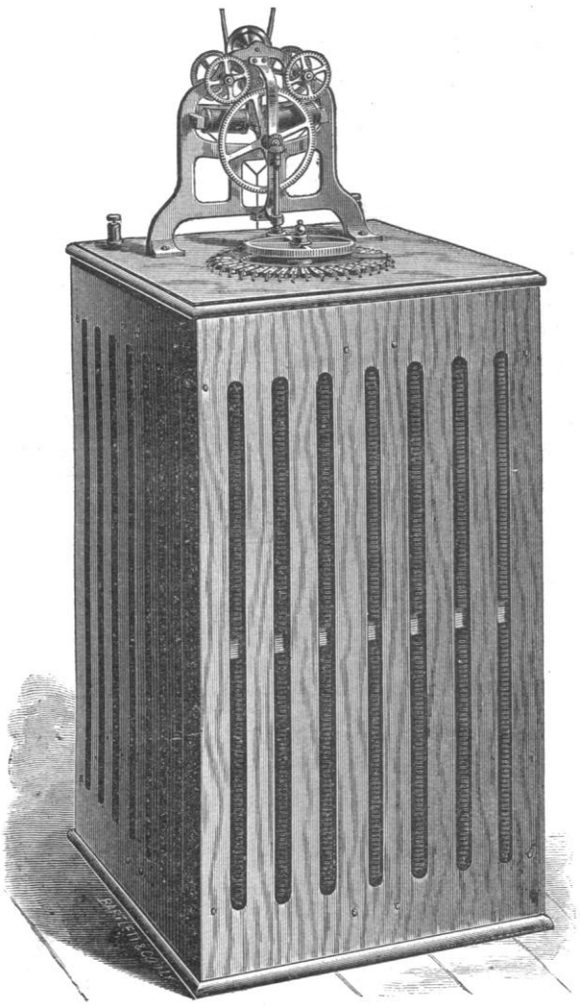

FIG. 4.—AUTOMATIC RHEOSTAT AND REGULATOR.

still; but upon any slight variation the contact-bar in the regulator (seen in the upper part of Fig. 3), consisting of a solenoid carrying a core with the contact-bar at its low end, closes a circuit passing through one or the other of the magnets of the dynamo clock-work, and causes this to move the brushes so as to increase or decrease the current, as need may be.

Again, to avoid the reversal of the polarity of the dynamo through an excessive fall in its current while charging the battery, which would allow of a reverse current passing through it from the storage-battery, the apparatus shown on the lower part of Fig. 3 is provided. On the occurrence of any sudden change, the lever shown near the bottom of the board would fall, breaking the main circuit, and causing the alarm-bell at the top to ring.

The practice of Mr. Knowles in charging is to start the dynamo on the resistances contained in the rheostat (Fig. 4), connecting the batteries when the due strength of current is reached, when, at the same time, the automatic contrivance shown on the top cuts out resistance in proportion.

The battery station in this Brooklyn plant is about half a mile from the dynamo station, but could be much farther away, it is maintained. Here the cells (Fig. 1) are arranged in batteries, as shown in Fig. 5. These racks are of wood, covered with insulating paint. Each cell rests on porcelain knobs, and the whole is again insulated from the floor.

In his secondary battery Mr. Knowles has several new features, and has avoided the application of the active material as a paste. Fig. 1 shows the cell complete. The perforated plates of non-oxidizable alloy are made in two sheets, between which is held a layer of the active material, which is moulded to the right shape before being placed between the two halves of the retaining plates. When ready, the whole is assembled as shown in the illustration, flexible insulating-rods being passed through the hooks cast on the plates top and bottom.

In a later number we hope to give further details of this system, which is being introduced by the Mutual Electric Company of Brooklyn.

DESCRIPTION OF PERRET MOTORS AND DYNAMOS.

THE chief distinctive feature of these machines, manufactured by The Elektron Manufacturing Company, Brooklyn, N.Y., is the method of constructing the field-magnet, whereby the well-known advantages due to lamination and to the best quality of iron are secured, while the cost, which has heretofore been a bar to the commercial use of such magnets, is reduced nearly to that of forgings. This method of construction is peculiarly adapted to machines of small size; and by its use their efficiency is greatly increased, as a test will show. It may also be used to advantage in machines up to 10 horse-power, and even higher; as, by the ingenious shape and arrangement of the plates, a magnet of large size may be built up of comparatively small plates, which are stamped from sheet iron, no other machine-work being necessary. Eight sizes are now on the market, and others will be soon brought out.

In the $\frac{1}{12}$, $\frac{1}{8}$, and $\frac{1}{6}$ horse-power sizes, a magnet of the ordinary U-shape is used, in which the plates are so formed and put together that the limbs may be swung apart and clamped to the face plate of a lathe for winding, after which they are swung back and bolted fast. Fig. 1 shows one of these motors complete. Fig. 2 shows the magnet before winding.

In machines of $\frac{1}{4}$ horse-power and upwards, the double horse-shoe shape, with consequent poles, is used. These are shown in Fig. 3. Upon removing the two bolts which pass through the yoke, the top half of the magnet may be separated from the lower

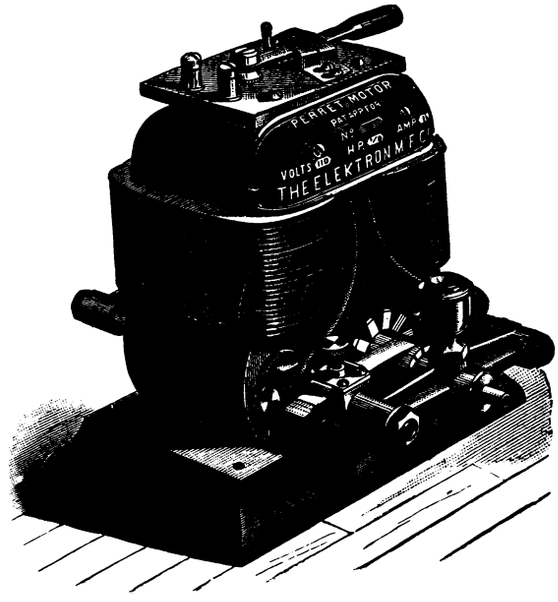

FIG. 1.

half. Each half is then attached to a lathe or other suitable machine, and wound by revolving it, after which they are put together and the bolts replaced, all these operations being very simple and very rapidly done.

One of the plates of which these magnets are built is shown in Fig. 4. Four of these are necessary to form the complete enclosure (see Fig. 5). It will be noticed that the plates interleave at the yoke, at which point their cross-section is enlarged, and they are