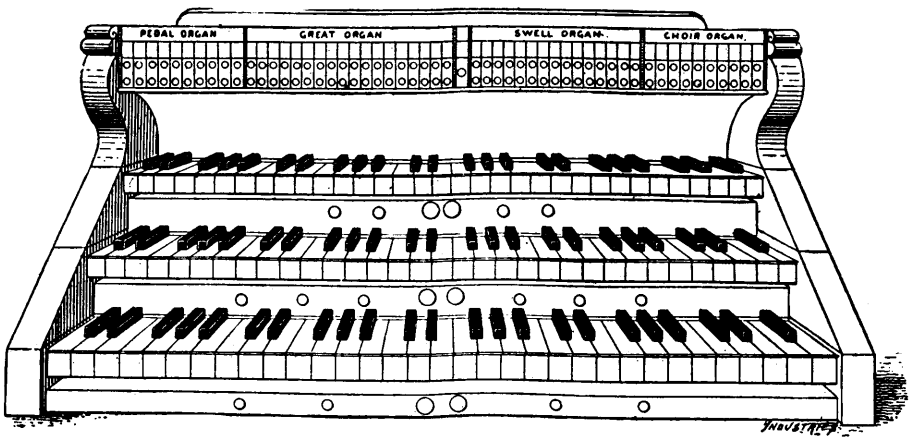

CONSOLE OF THE ORGAN AT ST. JOHN'S, BIRKENHEAD.

same work, hence the comparison has many points in favor of the new type. The Crowdus batteries are all made up in hard rubber cases, practically sealed, as far as handling is concerned, and are portable, there being no glass or loose porous cups in them. We have had occasion to illustrate these small batteries as they are now made up in hand and vase lamps. In this shape they are no larger than a coal oil lamp and give greater light.

We illustrate this week another design and application of this battery. The engraving shows a small, square table with a 7-inch square battery placed upon the shelf beneath, with wire leading up to a portable or drop light placed upon the table. This outfit will give a 16 c. p. light for one evening, on one charge, at a cost of 1½ c. to 2c. an hour.

One very practical feature of this battery is that no electrical connections have to be studied out or attended to, and the only metal parts exposed are the two terminal knobs, which serve the double purpose of handles for transporting the battery and electrical terminals.

The fan outfits are finding ready sale, even in offices located in the center of electric power districts.

The Crowdus Chemical-Electric Co., Memphis, Tenn., owners of, and manufacturers under, Mr. Crowdus' patents, are also adapting these batteries to train lighting, and have a passenger train running regularly fully equipped with electric light, including head light, supplied from their battery, the light being much brighter than was obtained from the oil lamps. Concerning this, however, we shall have more to say, as it is a departure of much importance.—*Electrical Engineer.*

ELECTRIC ORGANS.

BY JAMES SWINBURNE.

The idea, and to some extent the application, of electricity to the mechanism of organs is not new. Gauntlett proposed to build models of various celebrated organs at the London Exhibition of 1815, and to connect them all to one console. Barker, the inventor of the pneumatic pallet, worked out what was probably the earliest practical system of electrically controlled organs.

An organ consists essentially of three or four independent instruments. Each instrument is composed of sets of pipes, called stops, arranged in rows, say, crosswise, on what is known as the "soundboard," probably because it is not a soundboard. The pipes are also arranged in rows from back to front, each row corresponding to a key on the keyboard belonging to that organ. Each key commands a valve, or pallet, letting wind into a channel under all the front to back row belonging to it. Each stop has a long perforated slip or slider running under it, which can be moved so that the holes correspond or not with those leading to the pipes. These sliders are controlled by the draw-stops. A fourfold organ has one pedal and three manual keyboards, called "great," "swell," and "choir." Further mechanism is necessary to connect various keyboards, and to admit of rapid changes of the arrangement of the draw-stops. This appears very simple, but when an organ has about forty stops, and over fifty draw-stops, it becomes very complicated. The first trouble is that it soon becomes almost impossible for the fingers of the left hand to work air valves or pallets large enough to control the wind for twenty or thirty large pipes, even if equilibrium valves are used. I am, as far as possible, using engineering, and not organ building nomenclature. To get over this, the air relay, or pneumatic pallet, has been adopted in large organs. The finger then controls a tiny equilibrium valve, which controls an air bellows that does all the work. When this system is applied to the great organ of a small instrument, it is generally arranged to work the "choir" and "swell," too, when coupled to the "great."

There is still another difficulty. In large instruments the pneumatic pallets frequently have to be a long way off the player, and the connections are apt to alter in length and get out of adjustment. In All Saints' Church, Manchester, there is, or was, an organ played from near the reading desk, placed high up on each side of the chancel, 70ft. off. It has mechanical connections, but they are not heavy, and seem to work very well. Generally, an arrangement like that used in pneumatic bells is used, and known as the tubular pneumatic system. Barker, however, controlled his little air relay valves electrically, and realized the advantages of electrical connections in admitting of great simplicity in coupling and key mechanism, as well as ease in connecting distant organs. The electric action, as it is called, has developed especially abroad. Messrs. Bryceson have done a great deal, and many English organs have electric connection. In France there are a large number of these combined electric and air relay mechanisms. M. Carré describes several in a valuable article in *La Lumière Electrique*. Roosevelt, in America, has not only developed pneumatic actions thoroughly, but has employed electricity too. The three-manual organ at Trinity Church, Boston, has