

as there are contact points. In the one I used there were 120 contact points and consequently 120 places at which the current might be accidentally broken. This accident, in fact, has actually happened to me on several occasions.

Since I have adopted the Bailey rheostat, the current has always been turned on and off with perfect smoothness, and with it I have been able to make the finest possible adjustment from one to over two hundred milliamperes. Another defect of the switch-board collector is that the first ten or fifteen cells being used more than the next ten or fifteen, are run down to one half or a quarter of the strength of the latter, so that no matter what care be taken to run down all the cells equally, we cannot avoid occasionally striking a very weak or very strong cell; in some cases the difference in strength caused by adding another cell to the circuit being sufficient to cause an appreciable shock. With the Bailey rheostat all the cells are worked equally at the same time, so that, with ordinary use, the battery requires almost no attention during the first one or two years, and then all the cells must be re-charged together.

The Bailey rheostat is manufactured by the Law Telephone Company, Liberty street, New York. Should the ratchet on this instrument become too loose, it must be tightened up with the screw for the purpose, otherwise its weight might cause the carbons to drop an inch or two into the water without our wishing it.

We now come to the important question of the best galvanometer. My own experience has been limited to Gaiffe's instrument, of which I have two, one measuring from one to fifty milliamperes and the other from ten to two hundred and fifty. The former has of course proportionately larger spaces for each milliampere. I am in a position to state, from information which I have received from a number of correspondents in the United States, that the Gaiffe instrument is far superior in accuracy to any instrument so far manufactured in this country, although I can see no reason why such an instrument should not be made here. In the meantime, I can recommend anyone purchasing an outfit to obtain that part of it, at any rate, from Paris.

It might be well to mention with regard to the galvanometer than the needle which

registers the strength of the current on the scale, is only a nickle one which is fastened at right angles to the real magnetic needle, which is concealed under the coil of wire. I mention this because some of my confreres who know where the north and south poles in their city were situated spent some time in vainly trying to get the needle of the galvanometer to point in those directions. It is also important that no steel instrument, such as dressing forceps or scissors, or any faradic machine, be allowed to lie near the galvanometer when it is in use. Care must be taken, too, that no magnetic machines be placed in its vicinity. A place should be chosen for it as far removed from iron pipes as possible. It is also desirable that the galvanometer be placed considerably below the level of the patient, so that, while sitting in front of her, we may keep our eye constantly on the needle.

The current having been led from the first carbon through the artificial resistance of the rheostat and then through the galvanometer, must now be made to enter the patient so as to encounter the least amount of friction, for friction means heat, and unless the surface of contact of the electrode with the skin be very large, a high power cannot be used owing to the burning and even vesication which it produces. In this consists one of the great secrets of Apostoli's success.

By means of his abdominal electrode of moist potter's clay, which adapts itself to the open mouth of every pore of the skin, the electrical current finds its way into the body through many thousand pores, and thus resistance to its entrance is reduced to a minimum.

Martin, of Chicago, has introduced a modified electrode of the same size, however, as Apostoli's, but differing from it in that instead of a flat cake of clay to which the pole is attached by means of a piece of zinc, a metal dish filled with water and covered with animal membrane is employed.

Engelman uses a piece of absorbent cotton loosely sewed to several thicknesses of tinfoil, to which the wire is attached. The advantage of Apostoli's clay is that its weight is sufficient to keep it applied closely to the skin; but its disadvantages are that it is apt to soil the clothes, has a constant tendency to dry unless frequently very moistened, and fold when steel