Kilauea. The members of the expedition, except Messrs. Preston and Brown, who remained at the Hawaiian Islands to make pendulum observations, left Honolulu by the steamer Zealandia on the 4th of June, and arrived at San Francisco June 11. W. U.

technical society a piece of apparatus, shown in the illustration, which, when connected in circuit with a telegraph-line, will show the varying strength of the current in the line, registering the results on a diagram. The earth-currents are generally very weak, and only can be

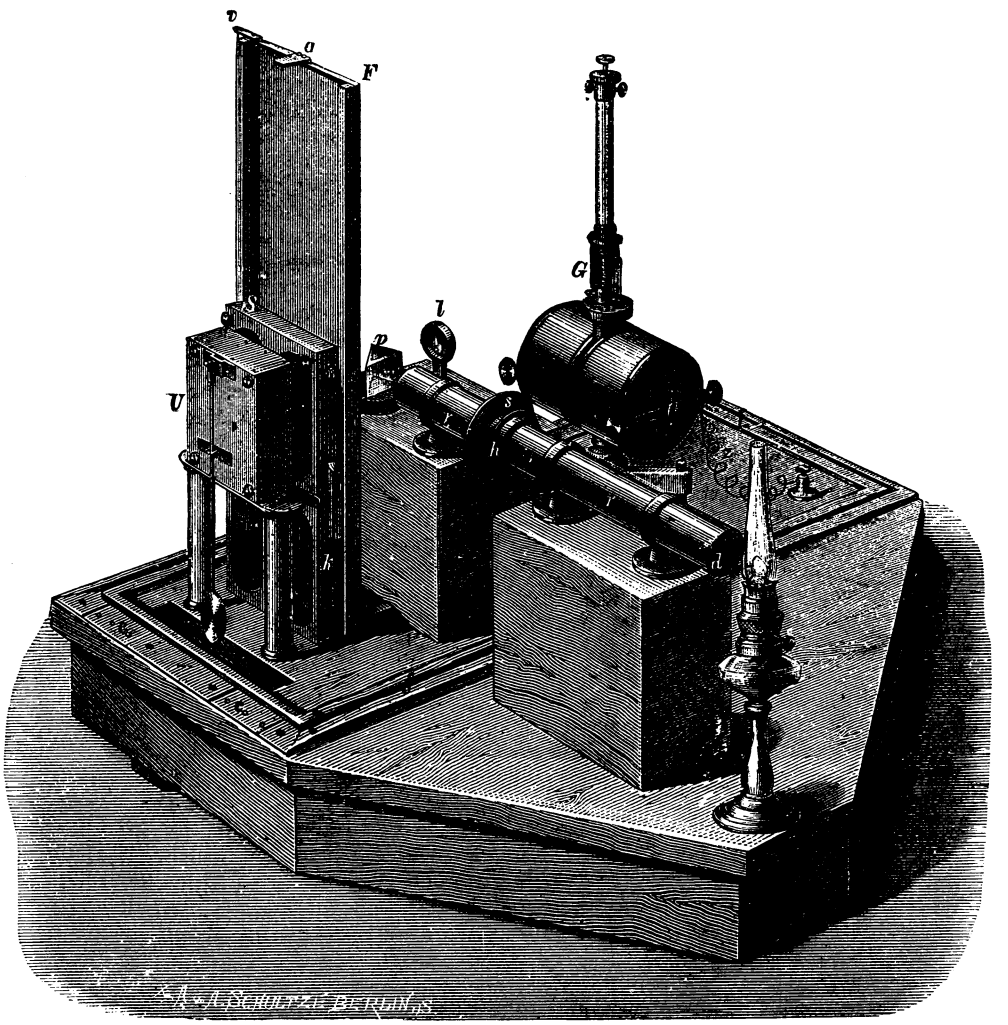

Fig. 1.

REGISTERING APPARATUS FOR EARTH-CURRENTS.[1]

For the purpose of studying the earth-currents on telegraph-lines, the instrument-maker, Wauschaff of Berlin, has made for the earth-current committee of the German electro-

shown by the most delicate galvanometers, so that no registering apparatus requiring a great amount of force could be used. This necessitated the use of photography. That the observations might be independent of the hour of the day, an artificial source of light was used. The most sensitive dry plates were employed, and, to keep out all extraneous light, the

[1] From the April number of *Zeitschrift für instrumentenkunde.*

whole apparatus is covered with a wooden box, removed in the illustration. This cover turns on the hinges at *c*, and, when closed, rests in the grooves *f*. The tubes *r* and *r'* are furnished with two cloth-lined metal collars, which can be pressed up against the box where the tubes pass through it. The outer end of *r* is closed with a plate in which there are three round holes side by side in a horizontal line. Before this plate is the diaphragm *d*, which can be turned on a vertical axis, and through which there is one hole. With this diaphragm the central opening in the end of *r* may be alone left open. In front is placed a kerosene lamp. From the flame of this lamp a fine pencil of rays passes through the hole in *d*, along the tubes *r* and *r'*, and is reflected by a total reflecting-prism, *p*, which throws it on the mirror, *G*, of the galvanometer, which is connected in circuit with the line by the wires *z*. From the mirror *G* the light is reflected back through the lens *l*, which brings the rays to a focus on the photographic plate. This plate is put in a holder, *k*, in the slide *S*, before the beginning of the observation. There are spring clamps on *S*, so that, when the cover is drawn from in front of the plate, the holder will remain in *S*. In order that it may be possible to expose the plate after the box-cover is put down, there is a slit covered with rubber cloth in the box, through which the fingers may reach the top of the plate-holder and pull out the sliding front. The slide *S* travels on guides *F*, and on one side is furnished with two rollers, and on the other with one; so that the movement may be as straight as the guide against which the two rollers press. In the front side of *F* there is a horizontal slit at the height of the focus of the rays. The back side of *S* carries a rack which fits a pinion on the driving-axis of the clock *U*. The downward movement of *S* is therefore regulated by this clock, of which it forms the driving-weight. The downward velocity is about 80 mm. per hour. This is sufficient to allow of changes from minute to minute being easily distinguished. For the purpose of allowing different rates of speed, it is proposed to put another rack on the back of *S*, which, by a sliding motion, may be made to catch on a second pinion of different size.

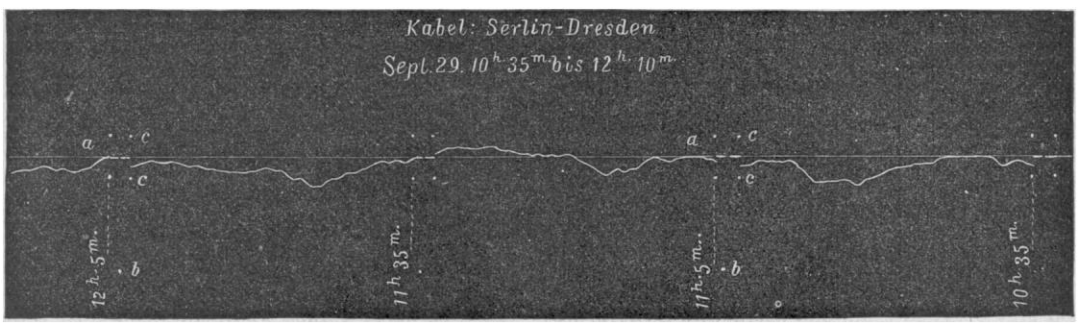

FIG. 2.

For lesser changes the pendulum may be varied in length.

The wires leading to the galvanometer are connected with a commutator. When the needle is in its position of rest, a straight line will be marked on the plate by an upward movement of the slide. From this line the deflections caused when the earth-currents pass are measured. Time-signals may be made by turning back the diaphragm *d*, when marks will be made on each side of the neutral line. From time to time, currents of known strength may be sent through the apparatus, and will produce spots, as *b*.

Fig. 2 shows one of the diagrams obtained. The abscissa line was drawn through the portions *a*, which were marked by the light. The portions *a* are broken, and at these points occur the dots *b*, the result of the known currents. *c*, *c* are the time-signals.

A NEW CONDENSING-HYGROMETER.

EVERY one who has had occasion to use the common form of condensing-hygrometer for the determination of the dew-point of the air, as devised by Regnault, has found great difficulty in obtaining satisfactory results, especially if the air is in rapid motion, and there is a great difference between the dew-point and the air-temperature.

Professor Crova of Montpellier, France, recognizing these defects, has devised a new form of this apparatus which obviates many of the difficulties, and goes far toward making this justly important instrument one of precision.