THE TELECHIROGRAPH--A NEW FACSIMILE TELEGRAPH.

The most successful facsimile telegraphs which have been so far devised are based in principle upon the Gray and Ritchie telautographs, in which the movement of the transmitting stylus is resolved into two components, which after having been transmitted over two independent circuits, are reunited in a single resultant at the receiving station. In machines of this type chemically-treated paper is usually employed, which as it is acted upon by the current from the receiving stylus, is electrolytically decomposed to reproduce in facsimile the message, pictorial or written, sent from the transmitting station. An ingenious modification of these instruments is embodied in the "telechirograph," a device invented by Mr. E. Karl Gruhn, of Dresden, Germany. The accompanying photographs were made from machines brought to this country by Mr. Gruhn and installed in the offices of Mr. Thomas F. Fitzhugh Lee, who, with the inventor and Mr. Max Herzka, has undertaken to introduce the telechirograph in this country.

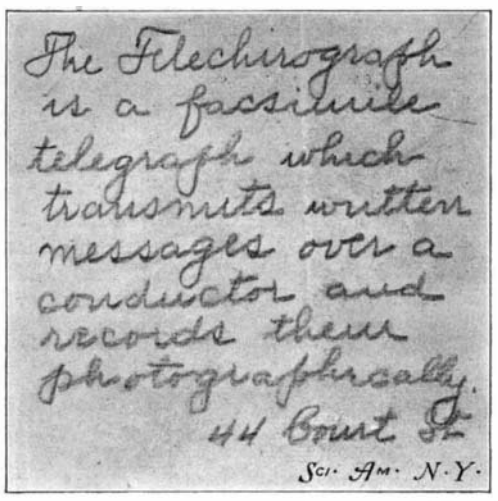

Fig. 1.—An Original Message and Its Photographic Record.

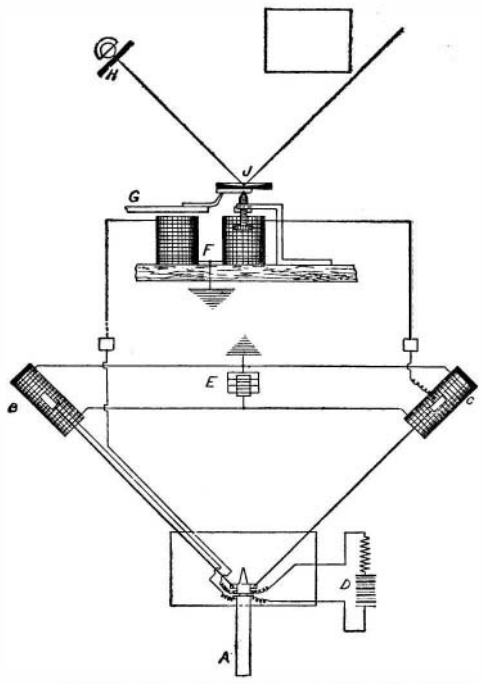

Fig. 2.—Diagram Showing the Principal Circuits of the Telechirograph.

The telechirograph differs radically from previous facsimile telegraphs in its method of receiving the message transmitted. Instead of employing chemically-treated paper upon which an unwieldy and cumbersome stylus is caused to act, a beam of light is utilized, which writes the message transmitted upon a strip of sensitized photographic paper. The striking photographic principle which characterizes the Pollak-Virag telegraph is here employed for an analogous purpose and with the same wonderful results.

Each instrument acts both as a transmitter and as a receiver. It is necessary therefore to describe only the operation of sending and recording that which is written. The message is inscribed on a piece of ordinary paper by lead held in the peculiarly-constructed pencil *A* (Fig. 2). By flexible connections the pencil *A* is caused, as it moves, to shift sliding contacts on their respective rheostats *B* and *C*. As the contacts reciprocate, the electrical resistance is varied, the amount of resistance cut out depending of course on the scope of the pencil's movements. Each of the two transmission lines forms a shunt on the local circuit of the battery, the currents changing when the contacts move along the rheostats, to influence two electro-magnets in the receiving station, by which electromagnets a small mirror *J* is caused to move, somewhat in the manner of the mirror of a Thomson reflecting galvanometer. A beam of light from a small incandescent lamp, *H*, is allowed to fall upon this mirror, after having passed through a system of condensing lenses mounted in a tube by which the rays are concentrated into a point. As the transmitting pencil writes, the mirror oscillates correspondingly, so that its beam of light, acting as a recording pencil, writes photographically on a strip of bromide paper, which is unwound from a roll, the message being developed in the box containing the operative mechanism.

A description of a few of the electrical details should not be without interest.

The coils of the rheostat are formed of insulated wire wound in the narrowest possible windings in contact with each other upon a non-conducting core, while the insulation in the path of the sliding contacts is removed from the surface of the spools, but in such a way that it remains between the single windings of the latter. Each winding, therefore, forms an element of resistance, and by the displacement of the contacts toward either end such elements are in number either reduced or increased. The mirror *J* is attached to a small triangular iron plate, one corner of which rests upon a setscrew, so that the mirror can oscillate in any direction. Beneath the other corners extend two armatures which produce the oscillations corresponding to the component movements of the transmitter, from the co-operation of which the previous motion of the transmitting stylus is obtained. The positive upward oscillations of the mirror are insured through the positive movement of the armatures of the electromagnet *F*. Permanent or steel magnets are used for the armatures of the electromagnets.

When not in use the pencil lies in a rest which opens a switch breaking both circuits—very much as the receiver hangs in a rest on the ordinary telephone, and by its weight opens the switch and breaks the current. When taken out of the rest the switch is closed and the current thus set in motion lights the small incandescent lamp in the receiving instrument. The apparatus is then ready for use.

When the message is completed the metallic pencil is put back in its rest at the transmitting instrument and the circuit is broken. In the receiving instrument the light goes out and an electric motor operated by an independent battery in the receiving instrument is set in motion. This motor operates a train of wheels or rollers which draw the portion of the paper written upon by the light ray through a developing bath and out again through a pair of rubber drying rolls so that the completed message is delivered about thirty-five seconds after the sender replaces the metallic pencil in its rest. The amperage and voltage used in the telephone will serve for the telechirograph.

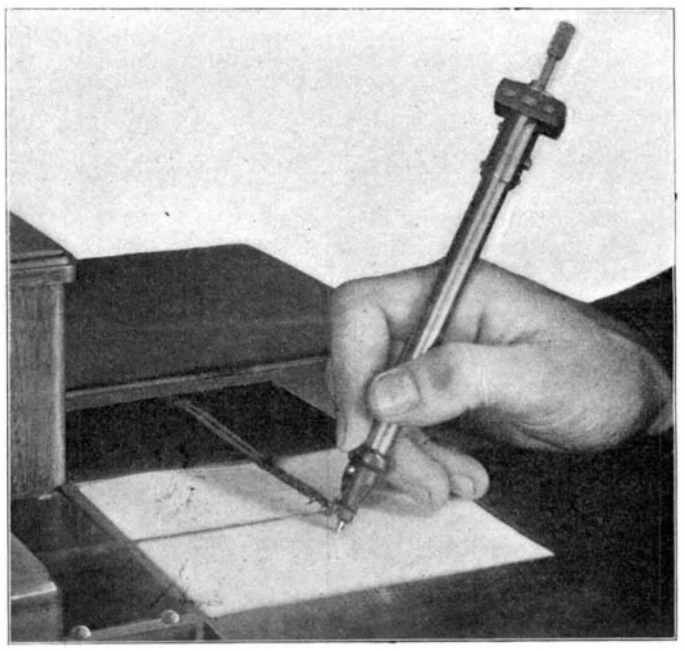

Fig. 3.—The Transmitting Pencil and Its Connections.

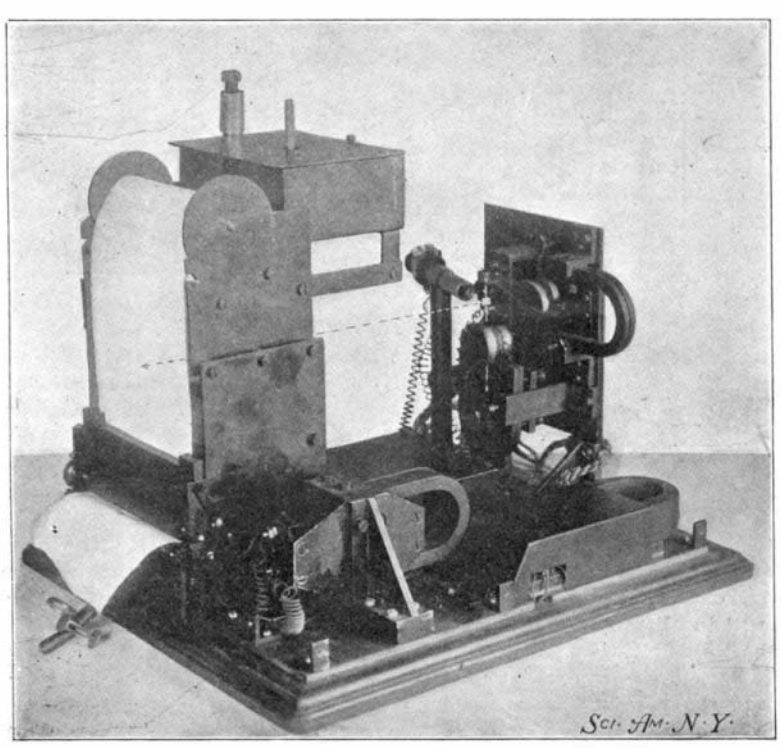

Fig. 4.—Operative Mechanism. Path of Ray is Shown by Dotted Line.

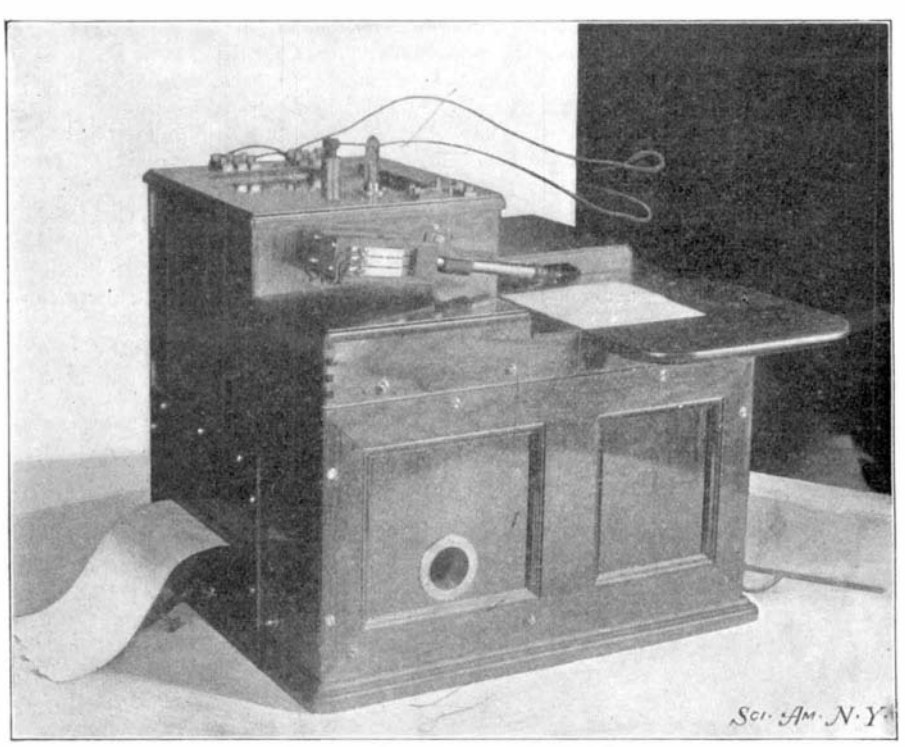

Fig. 5.—General View of the Telechirograph.

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