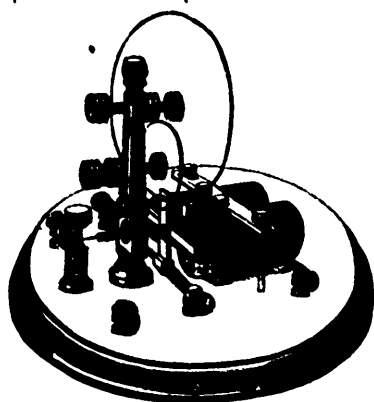


placed horizontally on the board, with two helices of wire surrounding the



legs. An armature supported by an upright bar, is seen forming a cross just in front of the poles of the electro-magnet. This is held back by a delicate spiral spring, graduated by a screw which is seen to the left of the cross. A platinum point on the upright bar or pendulum, and a little platinum disc immediately in front of it, are so placed that the interval between the point and disc shall constitute the break in a local circuit—to be formed by the attachment of wires to the screw cups upon the board.

The long or telegraphic circuit, is connected with the helices of the magnet by means of the first pair of screw cups. When the current flows from the main battery, the armature is attracted to the magnet, and, by the medium of the upright bar and horizontal screw, completes a local or branch circuit.

The employment of the relay instrument, does not extend the current of electricity, from the first battery, beyond the electro-magnet of the relay—but a distinct circuit is formed in both cases—the completion of the circuit by the current of the first battery acting upon the magnet and armature or keeper of the relay by the metallic connection induced, serving to complete the second circuit. For the passage of the electric fluid a *circuit* is always necessary—two conductors being required—one by which the electricity goes out; the other by which it returns.

Instead of connecting the battery and register of the telegraph directly by the use of a second wire, the earth is employed as a conductor, and is found to serve the purpose of completing the circuit equally well. The pole of the battery and register attached to a large metallic plate or coil of copper wire being sunk in the ground at either terminus of the line.

The difficulty of insulating the wires under water has led to the erection of towers with masts upon the banks of rivers or straits, over which steel wire, necessarily of great strength is suspended. Two of these towers recently completed at the Strait of Canso, now connect Cape Breton by telegraph with

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+ That portion of this instrument used as a *Call* to give notice to the operator at a distant station, as practised on the lines where, as in the Southern and Western States, Bain's system is employed, is thus described. Between two circular plates of glass, the upright bar rises, armed with two little knobs to perform the part of a hammer. When the armature is drawn to the magnet by the operation of the electric current, it strikes one of them, and on being drawn back it strikes the other. The repetition of this signal draws attention to the register. The duty of the operator is then to set the clock work in motion and receive the communication from the distant station. By Morse's system the Call is performed simply by a preconcerted signal of the operators upon the ordinary register.