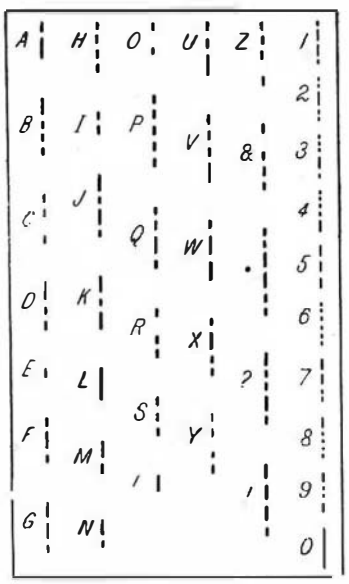


HOW THE BOARD IS WIRED FOR THE MORSE ALPHABET.

RECORDING TELEGRAPH FOR AMATEURS.

BY THE LATE GEORGE M. HOPKINS.

If the question of utility controls one in making and trying a piece of apparatus, it is useless to expect to realize anything in the way of profit from the recording telegraph illustrated and described; but a few interested amateurs can co-operate, and with a wire and transmitter for each can secure a practical knowledge of the workings of some of the large telegraph systems and of some of the applications of electricity, which could not be secured in any other way. The expense would be slight, when there is a joining of amateurs for one purpose.

It is assumed that an ordinary sounder is available for the central office recorder, and that every subscriber will furnish a transmitter, a wire to communicate with the central office recorder, and battery sufficient to operate one branch of the central office system.

In making the central office recorder, a common sounder is pressed into service. It is provided with a stylus-holder which is clamped to the free end of the armature lever. The stylus is a piece of steel wire 1-16 inch in diameter and 1 inch long, with a rounded and hardened point. It is clamped in place by a set screw.

Under the free end of the armature lever is journaled an arbor, carrying a wooden roller having a V-shaped peripheral groove at the center, exactly under the stylus; so that when a paper strip passes over the roller, the stylus can make a slight depression in the paper, when the sounder magnet is actuated.

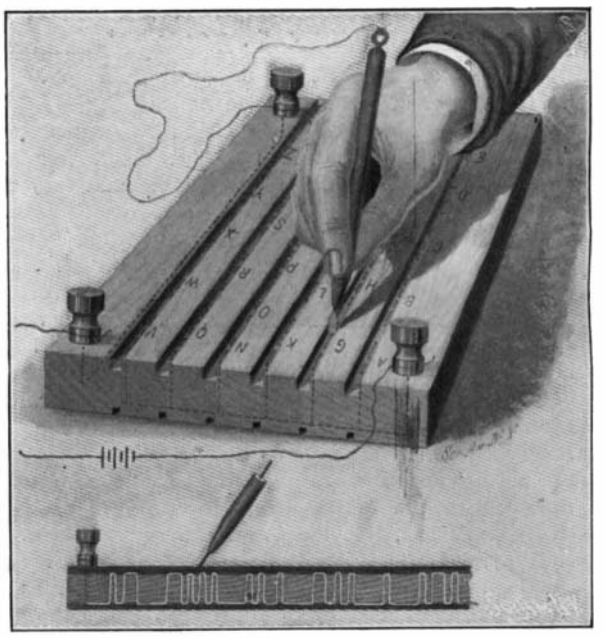
The principal features of this telegraph are a simple transmitter for giving fixed calls, like a call box, and the mechanism for carrying the paper tape over the grooved spool and under the stylus. The roll of tape as purchased from the dealer is carried on a wooden reel, supported by a standard at the rear of the sounder. Between two standards in front of the sounder are journaled two rollers, *a b*. The roller *a* is flanged and provided on its periphery with three or four rubber bands, to give it frictional contact with the paper tape. The lower roller *b* is covered with a piece of rubber tube and the shaft of this roller carries a small governor *c*, for regulating the speed of the tape. The tape extends over the roller *b*, thence downward under the flanged roller *d*, then upward to a fastener. The roller *d* is provided with a weight which actuates the mechanism.

It will thus be seen that the paper tape is carried through the machine by the action of the weighted roller *d*, and its motion is regulated by the governor *c*. The governor *c* consists of a slotted hub *f*, links *g g*, pivoted in the slots of the hub, a slotted sliding block *h*, placed loosely on the shaft of the roller *b*, weighted arms *i i* pivoted in slots in the block *h*, and pivotally connected to the outer ends of the links *g g*, and a light spring, *j*, tending to draw the weighted arms *i i* toward each other. The block *h* is provided with a leather washer *l*, which produces necessary frictional contact with the standard, when the weighted arms are thrown out by centrifugal action. The tape reel is provided with a slight spring for checking its motion when the paper feed stops. In the side of the block which carries the stylus is inserted a small stud, in which is clamped a wire *m*, having its free end near the side of the roller *a*, flattened and turned up at right angles. The flattened end of this wire *m* lies in the path of a small pin projecting from the roller *a*, so that whenever the armature lever is drawn down by the magnet, the pin is released, and the roller *a* is allowed to turn, but when no current passes the magnet, the armature lever rises and brings the flattened end of the wire *m* into the path of the small pin, and stops the movement of the roller *a*, and consequently arrests the progress of the paper, until the pin is released by another action of the armature lever. Binding posts placed at the rear of the sounder are connected with the magnet electrically in the usual way. To transmit a signal over a line connected with this instrument, it is not necessary to understand the telegraph alphabet, nor to know anything in regard to telegraphy. The signals are pre-arranged, so that the operation of sending is purely mechanical.

The signal board here represented in detail, was invented and patented years ago by William Hadden, but the patent has long expired. This simple device consists of a board, a few inches wide, and perhaps twice the length, depending on the number and length of the messages sent. The board here shown is 4½ inches wide, 7 inches long, and ¾ inch thick, with as many longitudinal grooves formed in it, as there are signals to be given. The signal board must be of very hard wood, and the dots and dashes of the signals are formed by sewing No. 30 plain copper wire through holes extending through the board, from the grooves in front to the grooves in the rear. As the signal transmitter is at present constructed, the copper wire sewed through the first set of holes represents the letters of the Morse alphabet from *A* to *F*, with a dash between each letter. The sewing in the second groove represents the letters from *G* to *J*. The sewing in the third groove represents the letters from *K* to *M*, and so on. All of the wires forming these letters are connected together at the top of the board, by a wire on the back, which is in electrical connection with the binding post seen to the right in our view of the signal apparatus. The binding post at the opposite edge of the board is connected on the back of the board with a third binding post, at the lower end of the board. The third binding post is connected by a flexible cord with a wire, having a flattened end, and provided with a wooden handle. Sending a signal consists simply in drawing the flattened end of the wire with a uniform speed down one of the grooves. The first two binding posts, being connected with the binding posts of the recording instrument and with a battery, when a signal is sent, the recorder is released automatically, and the detent is constantly withdrawn from the pin in the roller, so long as the signal is being sent, and the message is thus recorded. When the signaling stops, the recorder is stopped by the action of the detent.

Several transmitters may be connected with the recorder, and one wire in each case may be dispensed with, by grounding the other at each end.

The recorder will run long enough to record a long signal or several short ones, with one raising of the weight carried by the paper tape.



VIEW OF THE TRANSMITTING APPARATUS.

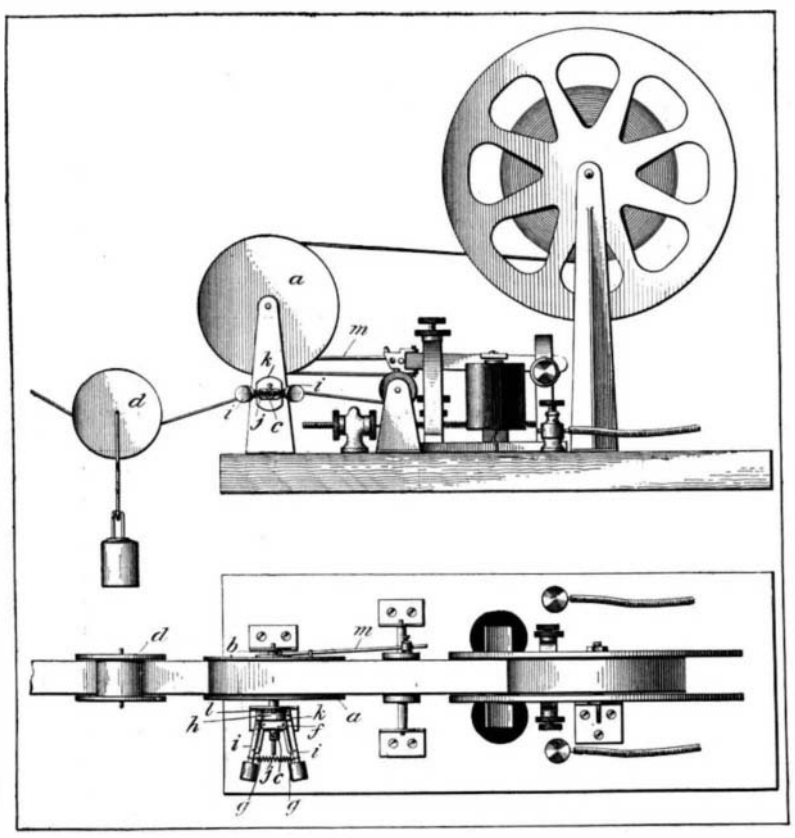
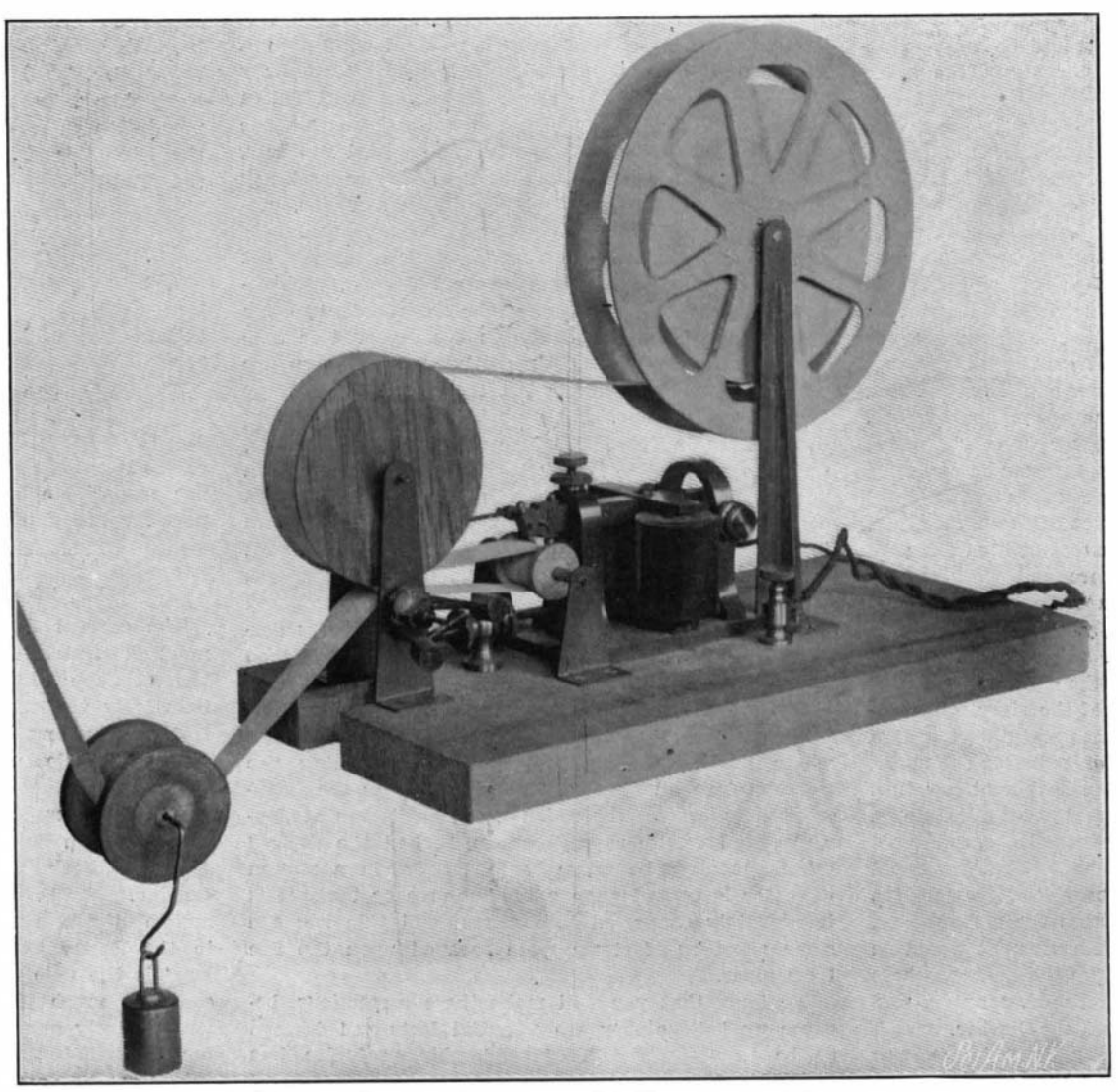


DIAGRAM OF THE HOPKINS RECEIVER.



THE RECEIVING INSTRUMENT OF THE HOPKINS RECORDING TELEGRAPH.

The motive power used in the manufacturing establishments of the United States in 1900, according to the census report, aggregated 11,300,081 as compared with 5,954,655 in 1890, 3,410,837 in 1880, and 2,346,142 in 1870. During the census year steam power represented 77.4 per cent, water wheels 15.33 per cent, horse power 1.3 per cent and other forms of mechanical power one-fifth of one per cent. New York leads the States in the use of water power, having 368,456 horse power derived from that source.