CHAPTER X.

SPAGNOLETTI'S BLOCK SIGNAL INSTRUMENT.

129. REJECTING the primitive method of using the ordinary needle pinned over to the right, or to the left, to indicate "line blocked" or "line clear," Mr. Spagnoletti affixes to the indicating needle a screen on which is printed the signal which the movement of the needle is intended to indicate. A square aperture is cut in the face of the instrument immediately in front of the needle, at which the screen carrying the signal { LINE / CLEAR } or { TRAIN / ON / LINE } is exhibited according to the direction of the current. But similar as is this arrangement, in principle, to the needle-block signal instrument, improvements in other respects accompany it, which claim for it an advanced position to that form of instrument.

Three wires are employed—one for each line, up or down, and one for the bell.

130. Fig. 60 is a front view of the block instrument. The "line clear" or "train on line" signal is given by pressing down one or other of the keys G, G^1, and keeping it in that position by means of a pin O, inserted through a

tube P, so as to intercept the upward movement of the key.

Each **key** has on its outer end a metal projection *g*, (Fig. 61) which is insulated from the key-lever. Underneath these projections is a spring *i*, *i*, stretch-

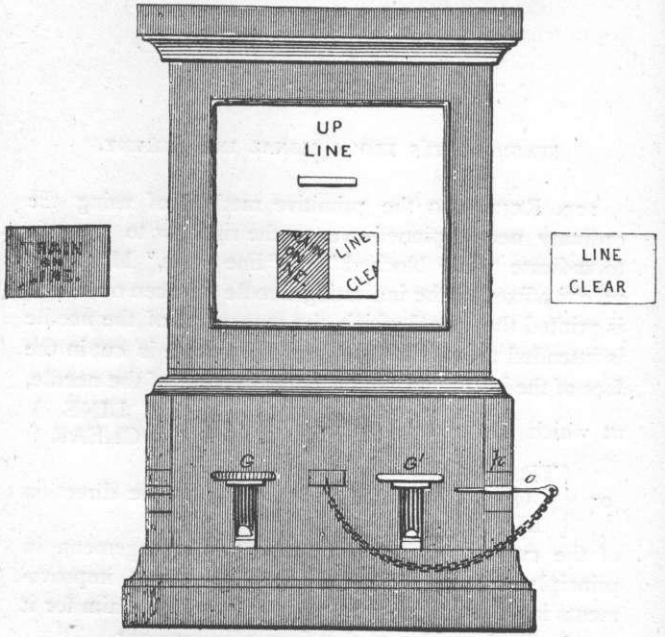

FIG. 60.

ing across the instrument, normally connecting the two cocks K, K¹. Upon depressing either key, the contact between K, or K¹, and the spring *i*, is broken; but immediately afterwards the spring seen below the lever

key (Fig. 63) is brought into contact with the stud *l*, or *l*¹, which is also in metal contact with the cock K, or K¹.

131. The **needle** by which the indicator is moved is magnetized by induction in the following manner.

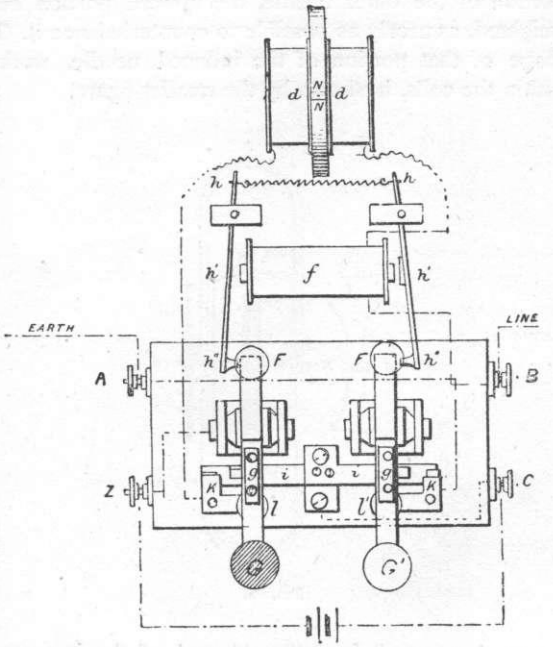

FIG. 61.

n s, *n*¹ *s*¹ (Fig. 62), are two pieces of soft iron of the shape indicated in the drawing, coupled together by a piece of brass, or other non-magnetic metal at *e*, of which *n e s*¹, forms the spindle, and *s e n*¹ the needle working within the coils. C, C¹, are two permanent

magnets, of the horseshoe shape, arranged with their similar poles adjoining, from which the rectangular pieces $n\ s$, $n^1\ s^1$, acquire magnetic properties. D is the half coil. The permanent and the acquired polarity is that shown in the figure. The screen is affixed to the lower portion of the outer needle, the upward portion being weighted, as nearly as possible to counterbalance it. The shape of that portion of the induced needle, working within the coils, is shown by the smaller figure.

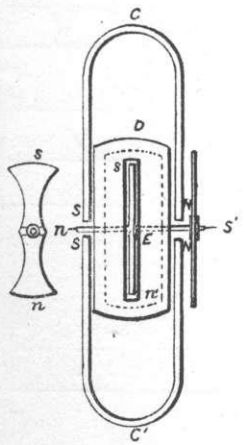

FIG. 62.

132. A **recent improvement** of the instrument embraces a means for preventing the signalman at one end of the circuit interrupting a signal given from the opposite end. Fig. 63 gives a side view, whilst Fig. 61 is also arranged to show that portion of the instrument to which this applies. f is an electro-magnet, fixed to the back of the instrument, but standing below the coils; h^1, h^1, are ar-

matures centred at h, to which are attached, by means of small wire rods, small brass blocks h^2. The armatures are coupled together at their upper extremities by means of a spiral spring, the tendency of which is to keep the blocks h^2 extended outwards, free from the back of the key and the cock F. Any current sent through the electro-magnet

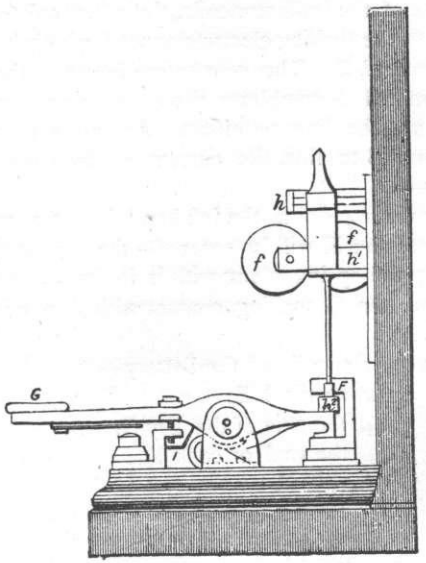

FIG. 63.

will attract the armatures, and bring the blocks h^2 between the top of the back part of the key G, and the lower portion of the cock F, which stands above it, after which it will be impossible to move the key G, so long as the current flows through the coil f, and the armatures h remain attracted. By this means all possibility of

contention between the men at either end is avoided, and any neutralization of signals from such a cause prevented.

133. The **electrical connections** are as follows. C, Z, are the battery connections; C is in connection with the plate, to which is attached the spring *i i*, and Z with the barrel of each key. The cock and stud K is in circuit with one of the indicator coils, the other coil being connected to the locking electro-magnet *f*, which is in circuit with terminal B. The connection between the cock K^1 and terminal A completes the circuit arrangements. A and B are the line terminals. Assuming that A is to earth and B to line, the current will take the following course:—

On pressing down the left-hand key the connection between *i* and K will be severed—the insulated cock *g* carrying the spring along with it in its downward progression. On G making contact with *l*, a current will flow

From the zinc pole of the battery—
to terminal Z,
„ the axle of the key G,
„ the stud or cock K,
„ coils *d*,
„ Electro-magnet *f*,
„ terminal B,
„ line.

Whilst the current from the copper pole will have passed

to terminal C,
„ spring *i*,
„ cock K^1,
„ terminal A,
„ earth.

The action of key G^1, as also the course of an incoming current, may, with equal readiness, be traced from the figure.

The pressure of the left-hand key gives the "train on line" signal; that of the right-hand the "line clear" signal.

The bell usually employed is that known as the "Tapper bell," which will be found fully described as we proceed.