W. KAISLING.

ELECTROMAGNETIC SIGNAL.

APPLICATION FILED JUNE 1, 1915.

1,219,949. Patented Mar. 20, 1917.

Fig. 3.

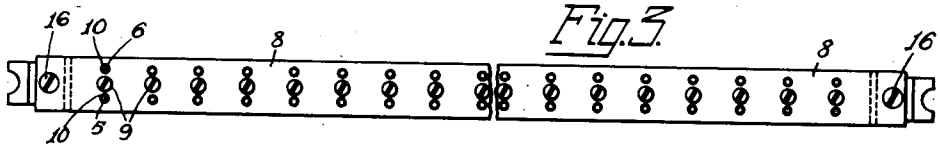
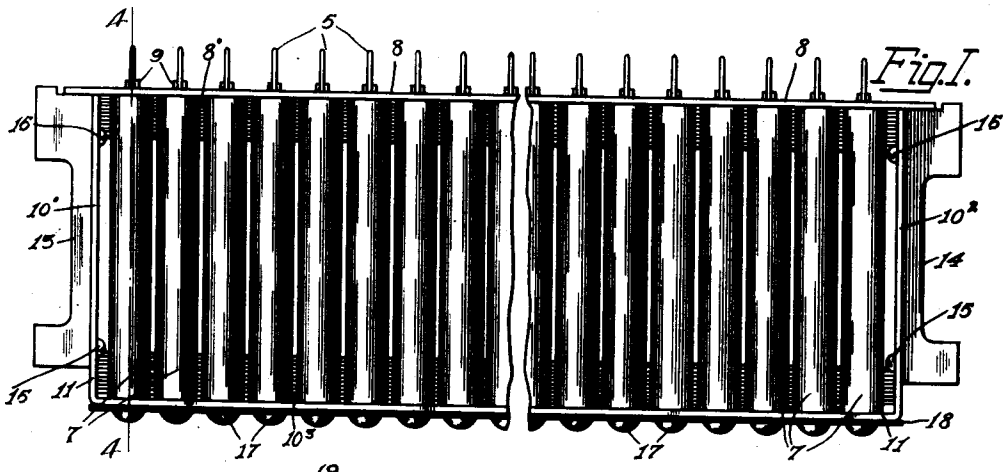


Fig. 1.



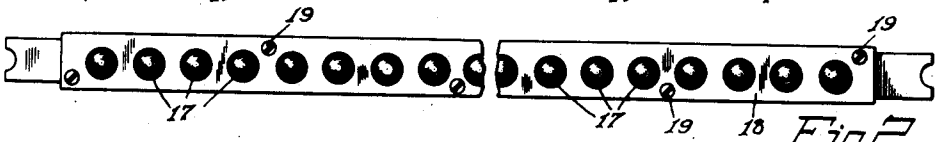


Fig. 2.

Fig. 4.

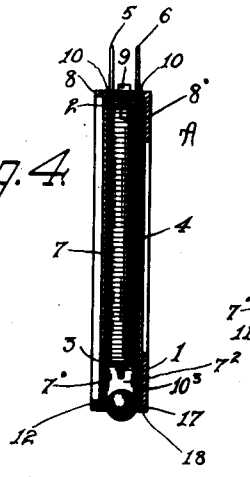
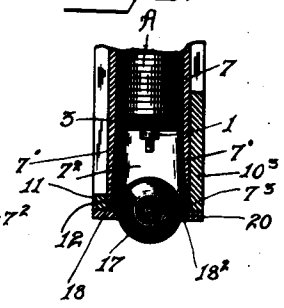


Fig. 6.



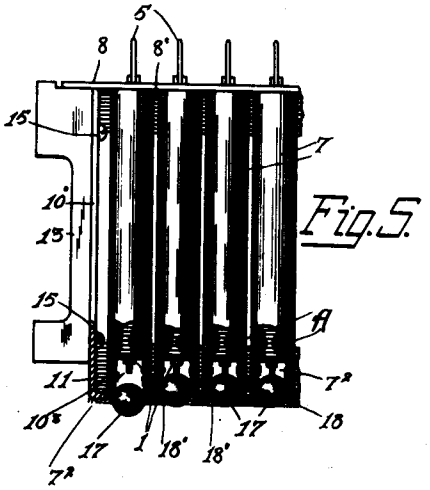


Fig. 5.

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UNITED STATES PATENT OFFICE.

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ELECTROMAGNETIC SIGNAL.

1,219,949. Specification of Letters Patent. Patented Mar. 20, 1917.

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To all whom it may concern:

Be it known that I, WILLIAM KAISLING, a citizen of the United States of America, residing in Chicago, county of Cook, and State of Illinois, have invented certain new and useful Improvements in Electromagnetic Signals, of which the following is a specification.

My invention relates to signals and has to do more particularly with electromagnetic signals such as are used in electrical circuits which are adapted to operate in conjunction with other apparatus in telephone switchboards.

The electromagnetic signal of my invention is in the form of a small signal ball which is associated with an electromagnet, both of which are contained in a cylindrical shell, thus forming a compact unitary structure.

I preferably employ the signal of my invention to indicate the idle or busy condition of trunk lines which interconnect different exchanges, but I do not wish to be limited to the same as the signal may be used for other purposes, such as subscribers' line signals and the like. Lamps are commonly used to indicate the idle or busy condition of trunk circuits with which they are associated by their glowing or effacement. However, these have been found objectionable in certain respects. Also the mechanical signals heretofore used have been found objectional due to the large amount of space they occupy in the face of the switchboard. I preferably mount a plurality of these signals on a strip, and as it is common to provide a plurality of trunk jacks in a strip, the signals may be placed above the trunk jacks so as not to take up any more room than the lamps heretofore used.

It is the object of my invention to produce an improved device of the class described which will obviate the above-mentioned objections and embody desirable features and advantages all in a simple, efficient, and economical manner; and to the accomplishment of this object and such others as may hereinafter appear the invention consists in the novel details of construction, parts, and combination of parts hereinafter described, and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part hereof, in which the same reference characters indicate like parts throughout the several views, and in which—

Figure 1 is a plan view of a row or series of the electromagnetic signals of my invention;

Fig. 2 is a front view of the same;

Fig. 3 is a rear view of the same;

Fig. 4 is a sectional view along the line, 4—4 of Fig. 1;

Fig. 5 is a plan view of the signals, only a few of them being shown and having parts broken away to show certain of them in their actuated positions.

Fig. 6 is an enlarged view of the end of one of the electromagnetic signals with parts broken away showing the method employed to prevent the signal ball from wedging in the opening of the face plate.

Referring now more in detail to my invention as illustrated, and referring first to the electromagnet A, and its containing member, it comprises a core 1 supporting the spool heads 2 and 3 and an energizing winding 4 wound upon the core 1 between the spool heads 2 and 3. Terminals 5 and 6 are fastened to the spool head 2 in any suitable manner to form terminals for the winding 4. A shell 7 of any suitable magnetic material in the form of an elongated cup forms an inclosing casing for the magnet A. The forward end 7^1 of the shell 7, which protrudes beyond the magnet A a short distance has its inner circumference slightly tapered to permit the signal ball to return to normal, as will be more fully hereinafter described.

I preferably mount a plurality of these magnets A and shells 7, as a whole, upon a rear mounting plate 8, in any suitable manner as by the screws 9 which pass through suitable openings in the plate 8 and have screw-threaded engagement with the holes drilled and tapped in the rear ends of the cores 1 of the magnets A. The terminals 5 and 6 extend through suitable openings in the shell 7 and the mounting plate 8, the said terminals 5 and 6 being suitably insulated from the shell and plate by means of the insulation bushings 10.

I also provide a U-shaped frame 11 having a plurality of suitable openings 12 of a size to allow the forward ends 7^1 of the shells 7 to be inserted into the said openings. I provide a pair of lugs 13 and 14

which are suitably fastened to the legs 10^1 and 10^2, of the frame 11, by means of screws 15. The rear mounting plate 8 is suitably fastened to the lugs 13 and 14 by means of the screws 16 which have screw-threaded engagement with suitable holes drilled and tapped in the lugs 13 and 14 respectively. The lugs 13 and 14 provide means for securing the strip of signals to the face of the switch-board. A strip 8^1 is formed integrally with the plate 8 and a strip 10^3 is formed integrally with the frame 11 so as to add strength to the mounting plate and U-shaped frame, so that when the plate 8 and frame 11 are clamped together as above described, a solid and substantial frame is provided to hold the plurality of shells 7 and magnets A suitably supported between the said plate and frame.

The signal I use for indicating purposes in the electromagnetic device of my invention is in the form of a metal ball 17 preferably of Norway iron and of a color which can be easily distinguished. The ball 17 is of a diameter smaller than the inner diameter of the chamber 7^2 of the forward portion of the shell 7 which protrudes beyond the magnet A, a short distance. To confine the balls 17 in the chamber 7^2, of the shell 7, I provide a face plate 18 which is suitably secured to the front face of the frame 11 by the screws 19 which have screw threaded engagement with holes drilled and tapped into the said face of the frame 11. The face plate 18 is provided with a plurality of openings 18^1 which are so formed that the walls of the said openings diverge toward the ends 7^1 of the shells 7. The openings 18^1 are so positioned in the face plate 18 that when the said plate is clamped to the frame 11 by means of the screws 19, the lower wall portions 18^2 of the openings 18^1 are in alinement with the inner lower circumferential edges 7^3 of the tapered portions of the shells.

Now, when a plurality of these electromagnetic signals are mounted as described, to form a compact strip as illustrated in Fig. 1, and mounted in the face of a switchboard, the signal balls 17 in the chambers 7^2, due to the tapered chambers, protrude through the openings 18^1, of the face plate 18, as shown in the drawings. In this position the signals are in their normal or unactuated position and the operator at the switchboard can tell at a glance which of the trunk circuits, that said signals are associated with, are idle, and which are in use. When one of the trunk circuits is taken for use, the magnet A becomes energized and attracts its ball 17 and holds it in an actuated position as illustrated in Fig. 5, as long as that trunk circuit is in use, so that an operator in looking at the strip of signals associated with the trunk circuits can tell at a glance which ones of the circuits are in use, as the ball signals of the busy trunks do not protrude through the openings in the face plate. Now when the magnet holding the ball signal in its actuated position is deënergized, the ball will be released and again roll into the opening 18^1 of the face plate 18, due to the tapered chamber 7^2 of the shell 7. To prevent the ball signal 17 from becoming wedged in the openings 18^1, I upset a small portion of the wall of the said opening by making a prick punch mark 20, thus preventing the ball from wedging in the opening and I thus secure a positive operation of the signal ball. The magnet A, shell 7 and ball 17 form a unit, and are mounted as illustrated so that when the said magnet is energized, and the ball is in a busy indicative position, the shell 7 acts as a portion of the magnetic field.

While I have described my invention operating in connection with certain switchboard circuits, I do not wish to be limited to the same as the signal of my invention may be used in other ways. Therefore, I do not wish to be limited to the exact structure as shown, as many changes and modifications may readily suggest themselves but I aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

What I claim as new and desire to secure by United States Letters Patent, is:

1. A signal device comprising an electromagnet, a signal ball operatively associated with the said electromagnet, a cylindrical shell forming a containing member for said electromagnet and signal ball, a mounting plate, a U-shaped frame, the said plate and frame forming supporting means for the said shell at its extremities, and a pair of lugs attached to said U-shaped frame for supporting the device as a unit.

2. A signal device comprising an electromagnet, a signal ball operatively associated with the said electromagnet, a cylindrical shell forming a containing member for said electromagnet and signal ball, a mounting plate, a U-shaped frame, the said plate and frame forming supporting means for the said shell, and a face plate for retaining the said signal ball in said cylindrical shell.

3. A signal device comprising a signal ball, an electromagnet, a shell for containing said signal ball and electromagnet, supporting means for said shell, a taper formed upon the inner circumference at the forward end of said shell, a face-plate provided with an opening, a normal position and an actuated position for said signal ball, said ball resting in said opening when at normal and withdrawn from said opening upon energization of said electromagnet.

4. A signal device comprising a signal ball and an electromagnet, a cylindrical shell

containing said signal ball and electromagnet, a mounting plate, a U-shaped plate provided with a circular orifice to receive said cylindrical shell, said mounting plate and U-shaped plate providing mounting means for said device, a normal and an indicative position for said signal ball, a face-plate retaining said signal ball in said shell, and means for energizing said electromagnet to attract said ball from its normal position, the said shell forming a portion of the magnetic path of said electromagnet.

5. A signaling device comprising an electromagnet and a movable member inclosed in a casing, a rear mounting strip to which said electromagnet is secured, a front mounting strip adapted to receive the forward extremity of said inclosing casing, a face plate secured to said front mounting strip and provided with an opening through which said movable member protrudes when at normal, means for preventing the said member from becoming lodged in said opening, and means for causing the said electromagnet to withdraw the said member from the said opening.

6. A signaling device of the character described comprising a shell member inclosing an electromagnet and a spherical member, a face plate adapted to be positioned over one end of said shell and provided with a circular opening through which said spherical member protrudes, and means for preventing the said spherical member from completely engaging the circumference of said circular opening thereby preventing the spherical member from becoming wedged in said opening.

7. The combination with a series of self-contained signaling devices, of a pair of supporting strips between which said devices are arranged close together side by side, a face plate secured to one of said strips and provided with openings through which a movable part of said signaling device protrudes, and a pair of lugs secured to the said supporting strips forming means for mounting the unit as a whole upon a switchboard.

8. The combination with a series of self-contained signaling devices, each including a shell member, of a pair of mounting strips between which said devices are arranged close together side by side, the said shells being fitted into openings at their one extremity in one of said mounting strips and being firmly secured by screws at their other extremity to the other of said mounting strips, and a pair of lugs firmly secured to one of said mounting strips whereby the device as a unit may be firmly secured to the face of a switchboard.

9. A device of the character described including a cylindrical shell inclosing an electromagnet and a movable member, a rear mounting strip to which said shell is secured, a front mounting plate provided with an annular orifice to receive the forward extremity of said cylindrical shell, and a face plate attached to said front mounting strip and through which said movable member protrudes.

10. The combination with a series of self-contained signaling devices each including a shell member, an electromagnet, and a movable spherical member, of a pair of mounting strips between which said devices are arranged, said shells being fitted into orifices at their one extremity in one of said mounting strips and being firmly secured at their other extremity to the other of said mounting strips, and a face plate provided with annular orifices slightly less in diameter than the diameter of said spherical members for retaining said spherical members within their inclosing shells.

Signed by me at Chicago, county of Cook and State of Illinois, in the presence of two witnesses.

WILLIAM KAISLING.

Witnesses:
GEORGE YANOCHOWSKI,
WM. BERGHAHN.