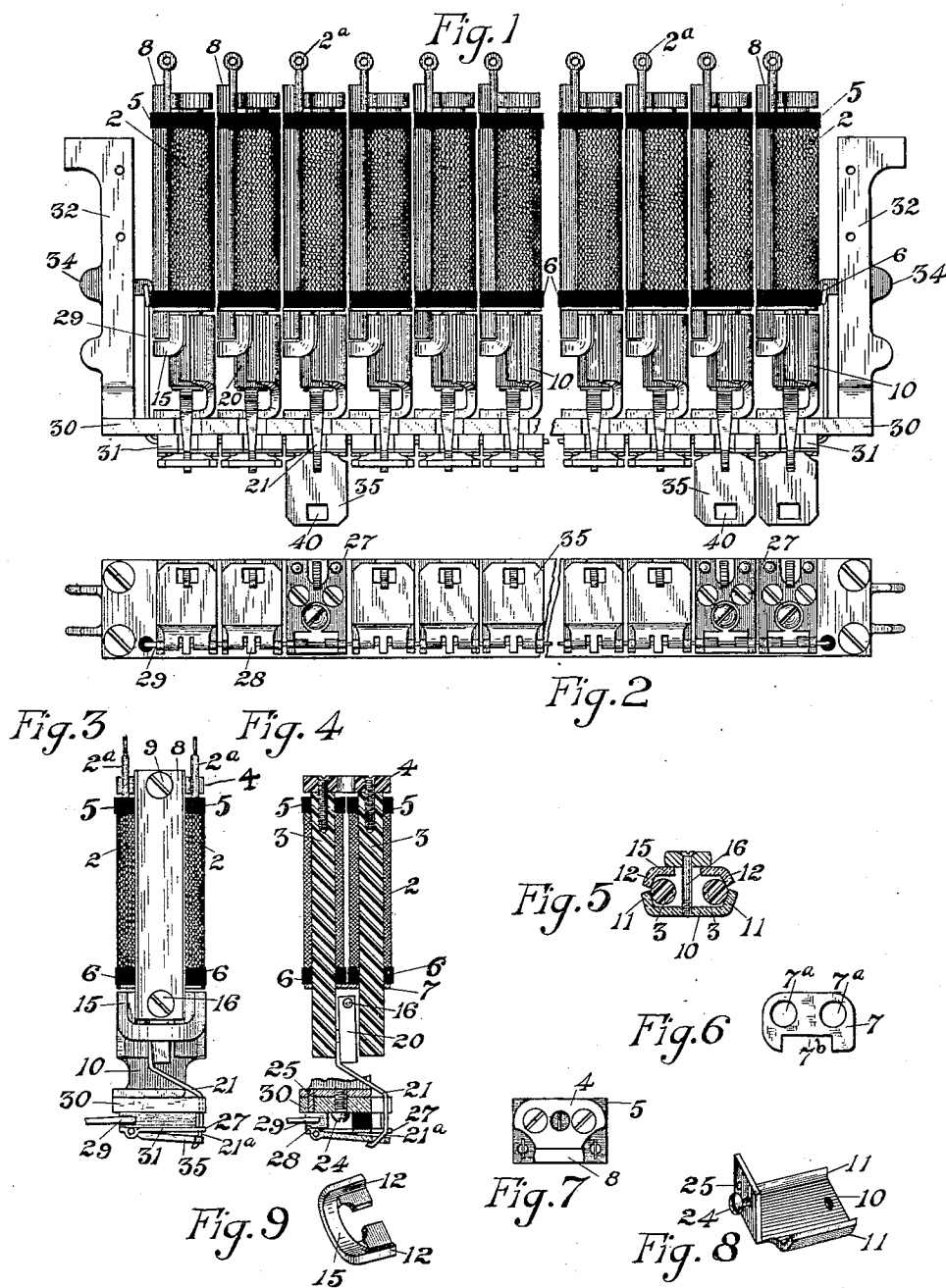


F. W. DUNBAR.
ANNUNCIATOR.

APPLICATION FILED MAY 27, 1901.

NO MODEL.



Witnesses.

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ANNUNCIATOR.

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To all whom it may concern:

Be it known that I, FRANCIS W. DUNBAR, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented new and useful Improvements in Annunciators, of which the following is a specification.

In telephone systems or exchanges comprising subscribers' lines centering at a common office it is absolutely essential that the subscribers have some means for signaling the central office in order to make their wants known, so that they may be placed in communication with other subscribers. Such means may comprise a magneto-generator at the subscriber's station and an electromagnetic signaling device or annunciator in the subscriber's line at the central office, which is operated to give a signal and attract the operator's attention when the subscriber operates his generator. For convenience these signals, which may be provided with shutters or "drops" adapted to display a number or other indication, are all mounted upon a frame, called the "switchboard," in handy relation before the operator, whereby when a signal is displayed the operator's attention is attracted and the subscriber's wants are attended to.

This invention relates, primarily, to those electromagnetic signaling devices, line-annunciators, or drops, though many of its features are of general application in kindred devices.

As will be apparent, it is desirable in devices of this class to crowd a large number into a limited space upon the switchboard before the operator; but it is difficult to do so, owing to the room ordinarily required for the polarizing-magnet, which is commonly a hard-steel bar and located at some distance from the cores to prevent its depolarization by the leakage of magnetism therefrom. Again, it is desirable to so locate such devices that when arranged side by side in a row or series the permanent magnets will assist each other in biasing the armatures. Other desirable features are the provision of an armature having only a slight air-gap between it and the operating-poles and which will

still have a considerable movement of its drop-retaining catch. It is also desirable that the drops or shutters shall not be easily thrown by slight shocks or jars to which they are subject when installed, and, further, that means shall be provided to prevent the armatures from "sticking" or "freezing" to the magnet-poles and to insure the falling of the drops. Additional desirable and important features are the ease with which the individual devices may be assembled, the facility with which they may be mounted in strips or series, and their removability therefrom for inspection, repairs, and the like.

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 the said 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 drops. Fig. 2 is a front elevation of the same. Fig. 3 is a side elevational view of one of the individual drops. Fig. 4 is a longitudinal section of the same. Fig. 5 is a cross-section of the same on a plane through the pivot-screw. Fig. 6 is a detached view of the spacing-washer. Fig. 7 is a back end view of the signal. Fig. 8 is a perspective view of one of the clamping members, and Fig. 9 is a similar view of the clamping and supporting member.

In the figures the numeral 2 designates the coils of the instrument, which are wound upon the parallel cores 3, the magnetic circuit of which is completed at their rear ends by the soft-iron bar or block 4, secured thereto by screws, as shown. Fiber or rubber blocks 5 are placed upon the cores at the rear ends of the coils adjacent the piece 4, while at the

forward ends of the coils 2 similar insulating blocks or heads 6 are located. In front of these blocks 6 a brass spacing-washer 7, shown in detail in Fig. 6 and having suitable apertures 7^a, is slipped over the projecting ends of the cores and against the insulating-heads 6. Magnet-terminals 2^a are driven into the fiber heads 5, and the ends of the magnet-coils are soldered to the terminals in the usual way.

The polarizing-magnet, consisting of a hard-steel magnetized bar 8, is suitably secured at the rear end of the coils to one edge of the end piece 4, as seen in Fig. 3, by a screw 9, and at the forward end the bar fits within a notch 7^b, Fig. 6, formed in the brass spacing-washer 7. As stated, the cores of the magnets are extended some distance beyond the forward ends of the coils, and on one side of said extended ends opposite the permanent magnet the clamping member 10 is located, said member being extended forward and constructed to secure the magnet to its supporting-strip, as will be hereinafter described. Between the end of the permanent magnet 8 and the extended ends of the cores 3 a small clamping member 15 is placed. To firmly secure the permanent magnet at its forward end to the other parts, a screw 16 is passed therethrough and into the clamping member 10 on the opposite side, which screw solidly clamps all the parts together and in their proper relative positions, the spacing-washer 7 serving to maintain the cores at the desired distance apart and the permanent magnet in a linear direction therewith, while the space between the magnet and the cores is maintained by the clamping member 15.

The action of the clamping and spacing members is shown in Fig. 5, where they are shown in the position assumed before the screw 16 is tightened, the members 10 and 15 having the slanting or beveled side portions 11 and 12, which are so designed as to prevent the cores from quite touching their inner flat sides when the said cores are lying loosely therein, whereby when the screw 16 is tightened the two cores will be pressed toward each other and all the parts will be accurately spaced.

The spacing-washer 7 and the clamping member 15 are mainly necessary because the fiber heads 6 are not adapted to secure and maintain the accurate adjustment of the cores and bar-magnet necessary; but if the said heads 6 were made of brass or other non-magnetic metal the said spacing-washer and the clamping member could be dispensed with.

In apparatus of this class provision must be made for allowing a better path for the lines of force from core to core than from the cores to the permanent magnet. This may be done by making the air-gap smaller between the armature and the cores than between the cores and the polarizing-magnet, for otherwise the magnetic lines have a tendency to traverse the permanent magnet in-

stead of following the natural course through both cores. To accomplish this, in this construction the armature 20, consisting of a small bar, is placed between the cores in a linear direction and is pivoted at its rear end upon the screw 16. The thickness of it is such that the air-gap between the armature and the cores is much smaller than that between the cores and the permanent magnet. The magnetic lines will therefore stream across from one core to the armature and from the armature to the other core and not jump to the permanent magnet. This construction also results in a large movement of the drop-catch 21, which is secured to the armature 20 at the lower side of its forward end, as seen in Fig. 4, and which arrangement, the catch being of brass, and therefore non-magnetic, prevents the armature from sticking to the lower core and holds it in close proximity to the upper core, thus making it readily responsive to the influence of the cores. The action of the armature is made more positive by inclining it slightly between the cores by placing the pivot-hole a little off center toward the upper edge, as shown in Fig. 4. The effect of the permanent magnet is to polarize the armature, and when the current traverses the coil the cores are rendered of unlike polarity and the armature is urged to one side, the arrangement being such that the armature and catch are drawn upwardly.

The forward end of the clamping member 10 is bent at right angles, as shown in Figs. 1 and 8, and is adapted to be secured to the rear face of a supporting-strip 30 by means of a small screw 24 and a steady-pin 25, on the front face of which strip the insulating-block 31 is mounted. Upon the face of this block a small brass plate 27 (see Fig. 2) is fixed in any desired way, as by screws and steady-pins, and to the lower edge of this plate the drop or shutter is hinged, as shown in Figs. 2, 3, and 4. The upper edges of the supporting-strip, the insulating-block, and the brass plate 27 are notched for the catch 21, which is bent upwardly from the armature and extends forward to the drop or shutter.

An aperture 40 is provided in the upper edge of the drop or shutter 35, through which the inclined end 21^a of the catch 21 normally extends. The function of this arrangement is to restore the armature to normal condition in case it should "freeze" or stick to the upper core by the residual magnetism upon the restoration of the drop and also to give the drop a slight impulse or push when the catch is raised in order to start the same to falling, although the latter operation would rarely be necessary. The end of the catch is beveled on the outside, so as to be raised by the drop when it is restored in case the armature has not been held in raised position.

The magnet, as stated, is secured to the strip by means of a small screw 24, passing therethrough from the front face into the extended ends of the clamping member 10, a

small aperture through the drop-supporting plate 27 and the insulating-block 31 being provided in order to conveniently get at the screw.

5 The night-bell circuit is closed by a projection 28 on the lower edge of the drop, which is adapted to strike a wire or rod 29, extending through the insulating-block 31, the other terminal of the circuit being formed
10 by the frame or support, since the drop is connected therewith.

When the signals are mounted in a row or series, as shown in Figs. 1 and 2, the supporting-strip 30 is one continuous strip suitably apertured and notched, and the magnets are secured to one face and the drops to the other. End supports 32, fixed to said supporting-strip, are provided with lugs and apertures to enable it to be readily secured
20 to the switchboard. The night-bell circuit here may consist of the wire aforesaid extending through the insulating-blocks 31, through an insulating-bushing in the plate 30, and is finally secured to insulated metallic strips 34,
25 carried on the lower edges of the end pieces 32. The circuit-wires may then be readily connected with the said strip and with the frame or support of the set.

In assembling the permanent magnet is placed in the notches in the fiber or other insulating-heads on the coils and in that of the washer 7 and the screw 9 inserted. The clamping members 10 and 15 are then placed in position, the forward ends of the cores having the armature between them, and the screw 16 is passed through said member 15, the armature, and into the member 10, and is tightened to firmly secure all parts together in adjusted positions, no further change or adjustment being required. This part of the device may then be secured to the back face of the supporting-strip 30 by means of a small screw 24. When the annunciators are in series or rows, as shown in Figs. 1 and 2, a permanent magnet 8 will be upon both sides of the coils and each armature will be acted upon by the neighboring permanent magnets on either side, which have a stronger effect upon them than in the usual arrangement.
50 The individual devices are easily taken out of the series for inspection, repairs, or other purposes by simply taking out the small screw 24.

While the invention has been described with reference to the details of construction,
55 I do not wish to be limited thereto, as I hold it to include all such changes, alterations, and modifications as fairly fall within its scope; but

What I do claim, and desire to secure by
60 Letters Patent, is—

1. In a signaling device, the combination with a pair of magnet-coils arranged side by side, of cores in said coils connected together by a metallic member at their rear ends, a pivoted armature extending longitudinally between the forwardly-projecting ends of said cores, the pivot of said armature being be-

tween said cores and at its rear end, a permanent magnet to polarize the armature, a drop or shutter, and a catch carried by said armature and adapted to engage and normally retain said drop or shutter closed, substantially as described.

2. In a signaling device, the combination with a pair of coils, of cores in said coils, an armature between said cores pivoted at its inner end slightly off center, and a non-magnetic spacing member between the free end of the armature and one core, the said pivot and spacing member serving to cause the armature to stand normally with its free end inclined toward the attracting-core.

3. A plurality of signaling devices closely mounted side by side in a row or series, each having a pair of coils with cores in the coils, an armature pivoted between the said cores, and a permanent magnet at the side of each set of coils whereby the armatures of the series are acted upon by the permanent magnets on either side.

4. In a signaling device, the combination with parallel cores, of coils on the cores, a soft-iron piece connecting the rear ends of said cores together, a permanent bar-magnet at the side of the cores parallel therewith and secured at its rear end to said piece, an armature between the forward ends of said cores pivoted to the bar-magnet and polarized thereby.

5. In a signaling device, the combination with magnet-coils, of cores in said coils projecting beyond them at one end, a bar-magnet at one side of said coils, a non-magnetic clamping member embracing the extended ends of the cores opposite the magnet, an armature between said cores, a screw passing through the permanent magnet, the armature and into the first-named clamping member whereby when the parts are assembled and the screw tightened the parts are clamped together in adjusted positions.

6. In a signaling device, the combination with a pair of coils, of cores in said coils extending beyond the same at one end, a bar-magnet at one side of said coils, a non-magnetic clamping member embracing the extended ends of said cores opposite the magnet, an armature between the cores, a screw passing through the permanent magnet, the armature and threading into the first-named clamping member, a supporting-strip, and a screw extending through said strip into said forwardly-projecting portion of said clamping member to secure the assembled and adjusted magnet in place upon the strip and to permit its ready removal.

7. The combination with a series of polarized signaling devices, each having a pair of coils, cores in said coils having projecting ends, a bar-magnet at one side of said coils, a non-magnetic clamping member embracing the extended ends of said cores opposite the magnet and having a forwardly-extending portion, an armature between the cores, and

a screw passing through the bar, the armature and the first-named clamping member adapted to clamp said parts together into an adjusted and self-contained device, of a supporting-strip on one side of which the said series are placed side by side, and a screw for each said device passing through said strip and into the projecting portion of said clamping member, whereby any of said devices may be readily attached or removed from the strip.

8. In a signaling device, the combination with an electromagnet having cores extending beyond the coils, a bar-magnet at the side of said coils, a supporting-strip, a drop secured to one side of said strip, a support for the electromagnet on the other side of said strip, and an armature between said cores carrying a catch-arm extending over the supporting-strip to the drop.

9. The combination with a series of self-contained polarized signaling devices, of a supporting-strip on the rear side of which said devices are arranged close together side by side, drops for said devices mounted upon the front side of said bar, and screws passing through said strip from the said forward side and into said devices to secure them in position, the said drop-mountings having apertures therein to permit access to the said screws, whereby any or all of said devices may be readily secured to or detached from said strip from said forward side.

10. In a polarized signaling device, the combination with a magnet having a pair of coils side by side with projecting cores, of an armature therefor pivoted between the projecting ends of the cores and parallel with said ends, a permanent magnet to polarize the armature, a catch operated by said armature, and a shutter or drop adapted to be released by said catch, and means actuated by the shutter or drop to prevent the armature sticking when the shutter or drop is restored.

11. In a polarized signaling device, the combination with a magnet, of an armature therefor carrying a catch, a permanent magnet to polarize the armature, and a drop or shutter having a catch-engaging portion and an adjacent portion, said catch having an oblique part adapted to engage said adjacent portion of the shutter to start it falling when released, the said portion again engaging the oblique part to free the armature from the magnet when the drop or shutter is restored.

12. In a polarized signaling device, the combination with a magnet, of an armature therefor, a permanent magnet to polarize the armature, a catch carried by the armature, a shutter pivoted to fall outwardly from the magnet and having an aperture near its upper edge, said catch being adapted to extend through said aperture and having a beveled portion to engage with the upper edge of the aperture.

13. In a signaling device, the combination with a pair of coils arranged side by side, of cores in said coils connected together by a metallic member at their rear ends and projecting beyond the forward ends of the cores; an armature located between said cores and extending longitudinally thereof, said armature being pivoted between said cores, and means to cause the armature to stand normally with its outer end inclined toward the attracting-core.

14. A plurality of signaling devices closely mounted side by side in a row or series so as to almost touch each other, each device having a pair of coils arranged side by side with cores in the coils, an armature for each pair of cores and actuated thereby, and a permanent magnet at the side of each of said pair of coils, whereby the armatures of the row or series of devices are acted upon by the permanent magnets upon either side.

15. A plurality of signaling devices closely mounted side by side in a row or series, each device having a pair of coils arranged side by side and transversely of the row or series, cores in the said coils, an armature for each device and actuated by the said cores, and a permanent magnet in the form of a straight bar placed at the side of each set of coils, and substantially equidistant from the individual coils or cores whereby when the devices are assembled in the row or series a permanent magnet occurs upon each side of the armatures to increase the effect upon the same.

16. In a polarized signaling device, the combination with a magnet, of an armature therefor carrying a catch, a permanent magnet to polarize the armature, and a drop or shutter normally prevented from falling by said catch, and means to positively start the drop falling by means of the catch when the catch is operated to release the drop, said means serving also to free the armature from its magnet when the drop is restored to prevent the same from sticking.

17. The combination with a series of self-contained signaling devices, of a supporting-strip upon one side of which said devices are mounted, a drop for each of said devices mounted upon the other side of said strip and controlled by the armature and retaining-catch of said device, a screw extending from the latter side of said strip into a supporting portion of the frame of the device to secure the same in position, said drop-supporting means having an aperture for the passage of the screw whereby when the drop is down free access to the said screw is provided.

In witness whereof I hereunto subscribe my name in the presence of two witnesses.

FRANCIS W. DUNBAR.

Witnesses:

CHARLES S. WINSTON,
MILO G. KELLOGG.