E. P. STEEN.

ELECTRIC BELL.

APPLICATION FILED MAY 19, 1905.

908,899.

Patented Jan. 5, 1909.

3 SHEETS—SHEET 1.

Fig. 1.

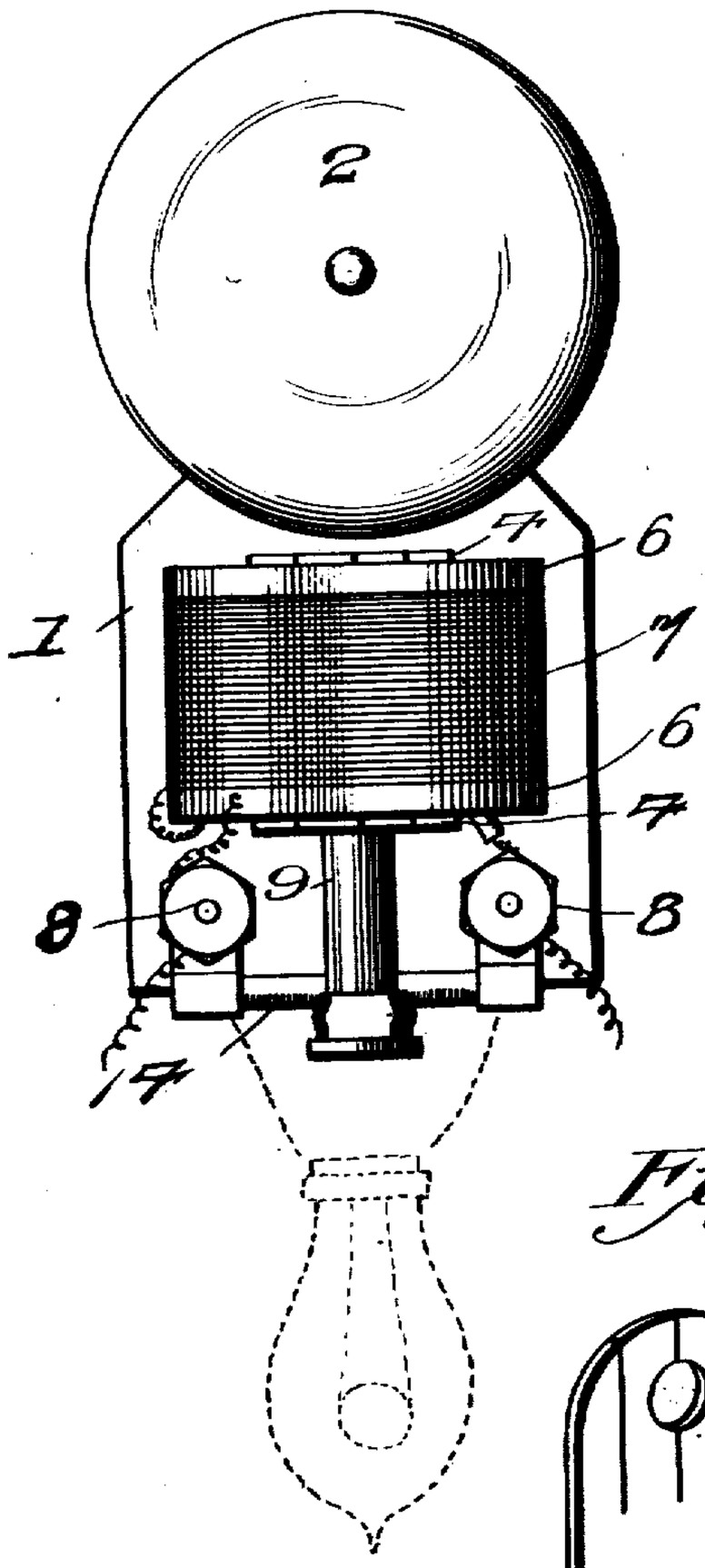


Fig. 2.

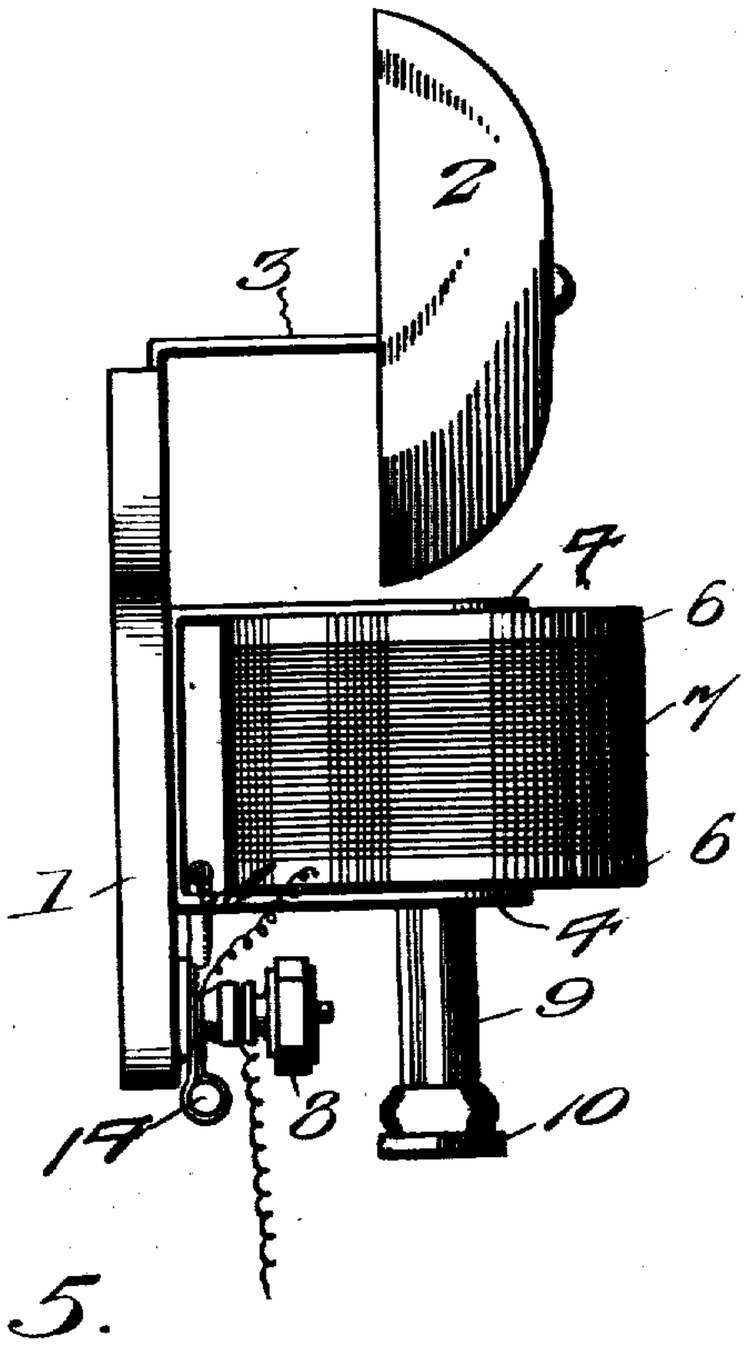
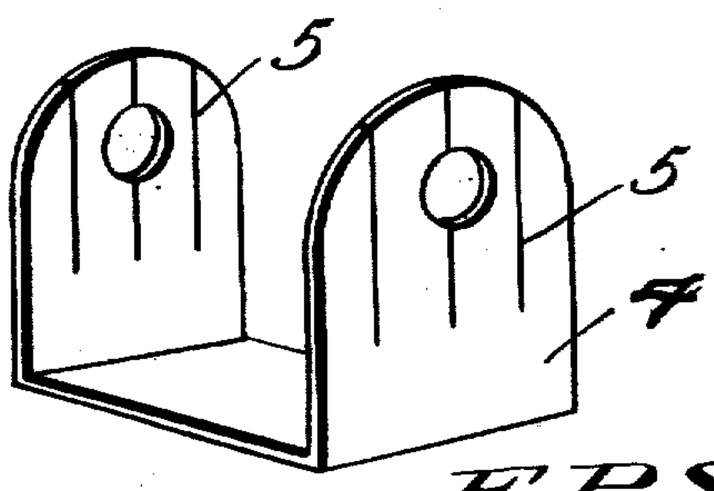


Fig. 5.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 3.

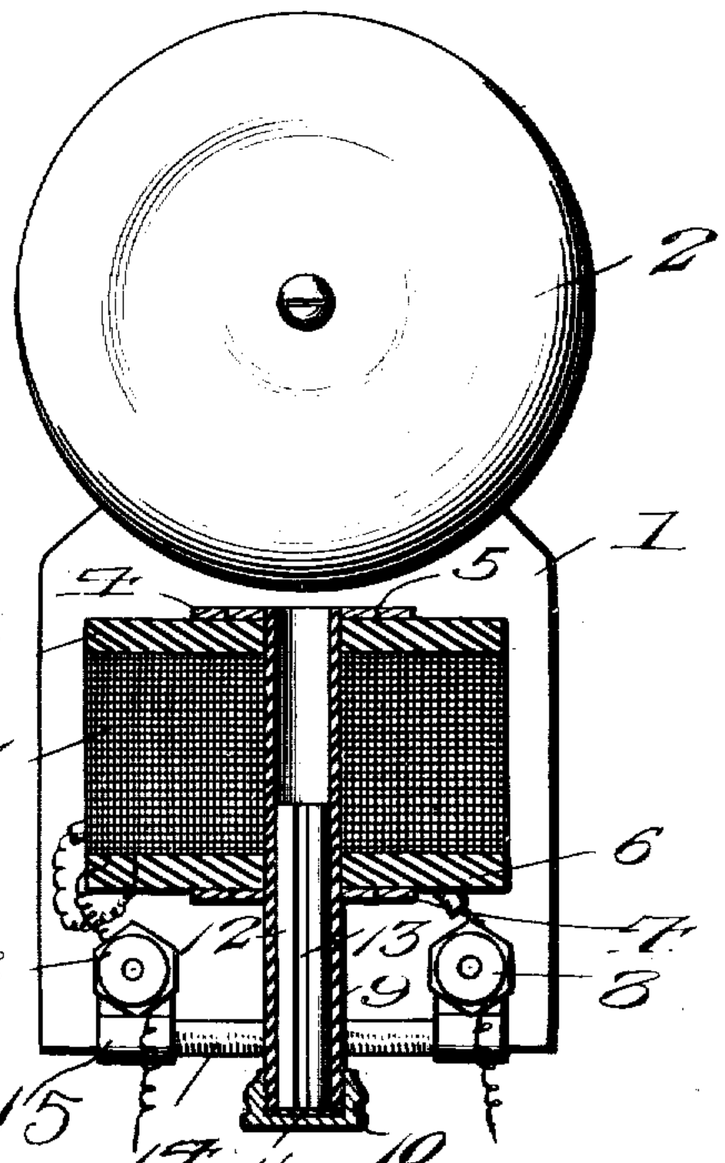


Fig. 6.

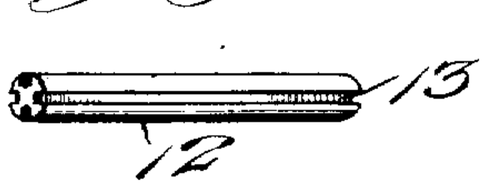
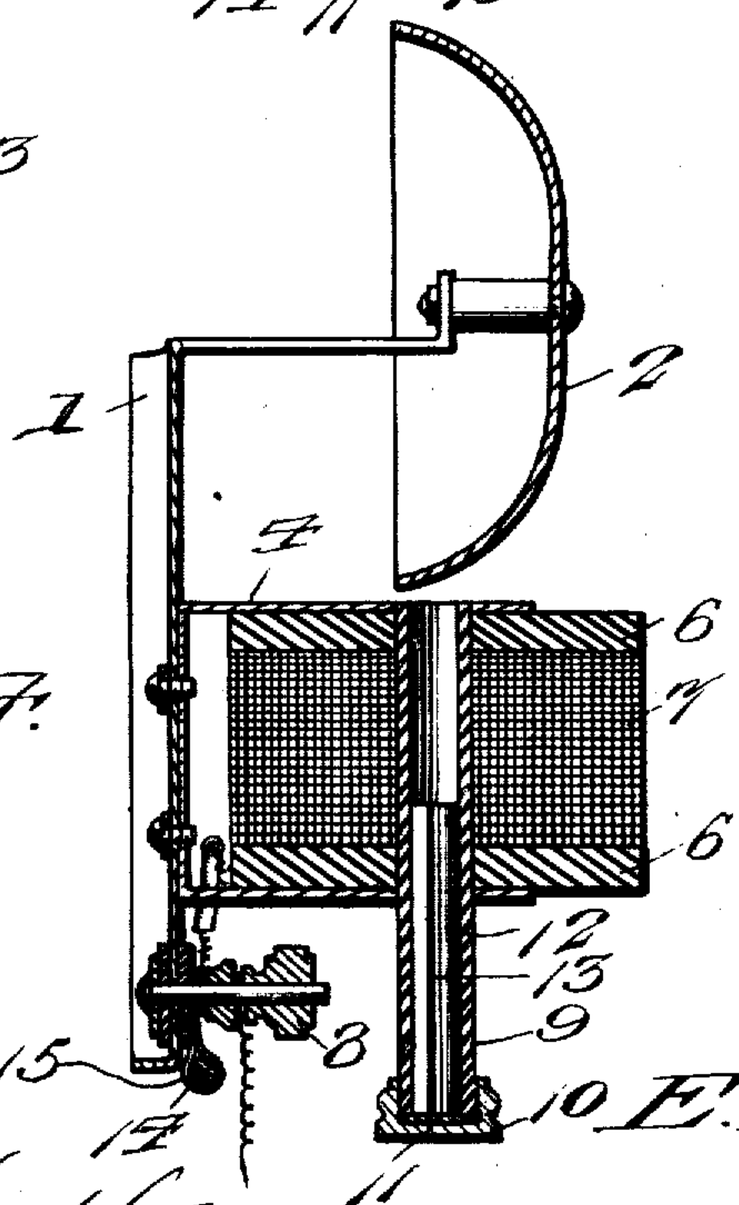


Fig. 4.



Witnesses

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3 SHEETS—SHEET 3.

Fig. 7.

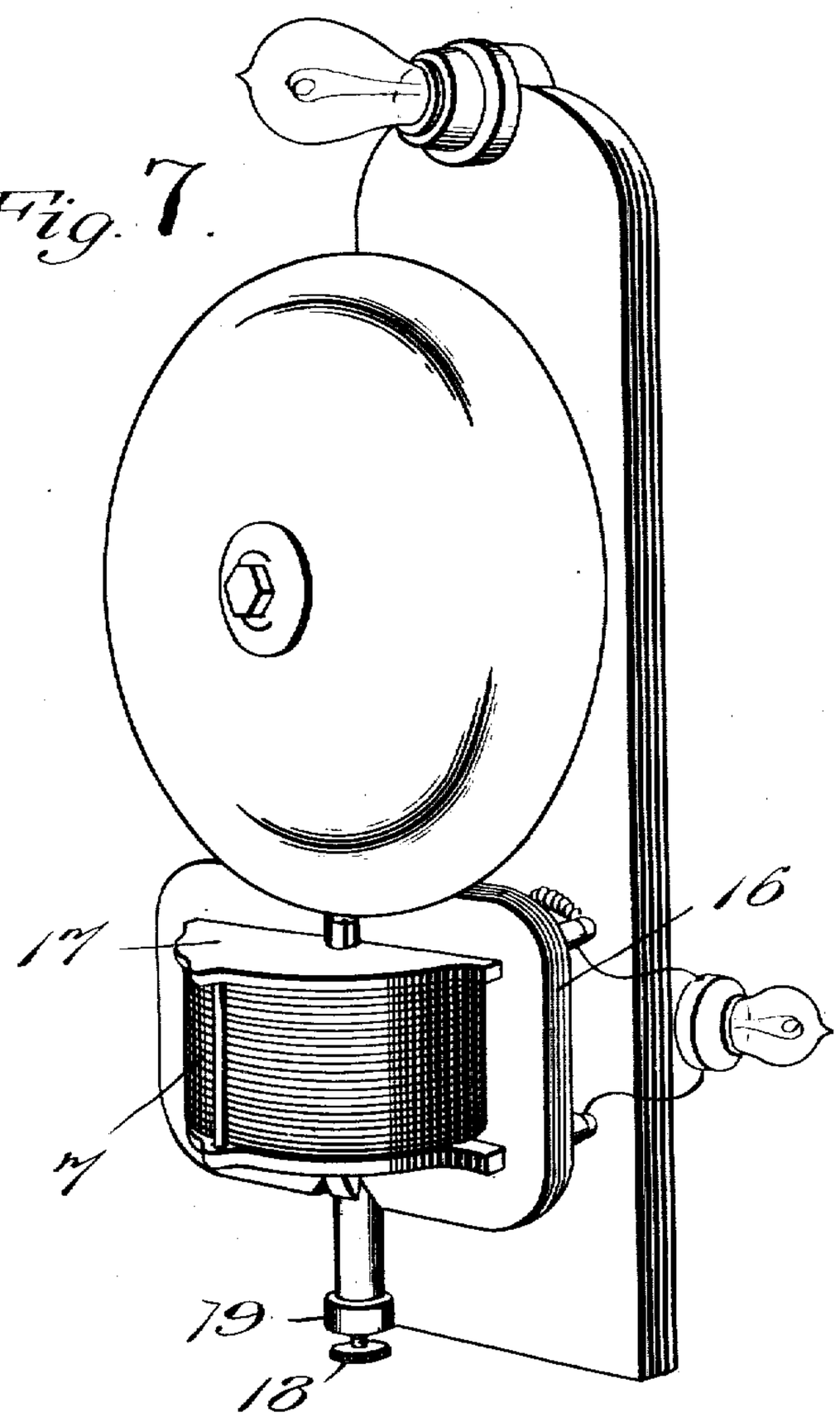
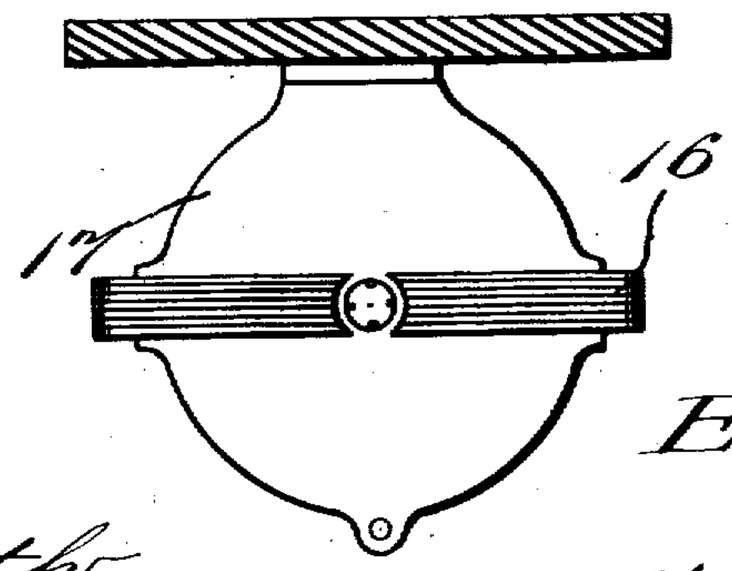


Fig. 8.



Witnesses

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UNITED STATES PATENT OFFICE.

EDGAR P. STEEN, OF CRIPPLE CREEK, COLORADO.

ELECTRIC BELL.

No. 908,899. Specification of Letters Patent. Patented Jan. 5, 1909.

Application filed May 19, 1905. Serial No. 261,240.

To all whom it may concern:

Be it known that I, EDGAR P. STEEN, a citizen of the United States, residing at Cripple Creek, in the county of Teller and State of Colorado, have invented new and useful Improvements in Electric Bells, of which the following is a specification.

The object of my invention is to provide an improved single stroke electric bell particularly adapted to be used in connection with an alternating current light and power circuit, although it may be used on a direct current circuit.

It is further the object of my invention to provide such a bell which will be adapted to avoid excessive sustained currents through the magnet coil and in which injurious eddy-currents may be avoided.

These objects and others will be made apparent in the following specification and claims.

Referring to the drawings—Figure 1 is a front elevation of my improved bell. Fig. 2 is a side elevation thereof. Fig. 3 is a front elevation showing the magnet coil in section. Fig. 4 is a section taken at right angles to that of Fig. 3. Fig. 5 is a perspective view of the magnet yoke. Fig. 6 is a perspective view of the movable magnet core. Fig. 7 is a perspective view of a modification of my invention, and Fig. 8 is a horizontal section of the same taken through the magnet coil.

On the base 1, which is made of any suitable material and is adapted to be placed against a vertical wall, the gong 2 is mounted by means of an extension arm 3. Also attached to this base is a yoke 4 which is made of magnetic metal and has its ends slitted, as indicated by the reference numeral 5. Between the ends of the yoke 4 a spool 6 of non-magnetic non-conducting material is inserted and this spool is wound with a coil 7, the two ends of which are led to the two binding posts 8 mounted on the base 1. The spool 7 has an axial opening, the walls of which are extended downwardly to form the depending tube 9. The lower end of this tube 9 is closed by a cap 10 within which is a cushion 11 of some resilient material. Within the tube 9 is a core 12 of magnetic material with corrugations 13 extending down its sides. A high resistance member 14 is bridged across the two binding posts 8, its ends being engaged by the clamps 15 which extend under the binding posts. Instead of the high resistance member 14 I may employ an incandescent lamp, as indicated by dotted lines in Fig. 1.

The modification illustrated in Figs. 7 and 8 differs from that just described in the following respects: The yoke 16 is composed of a plurality of superposed bars of soft iron from which the pole pieces 17 project. The depending tube which holds the magnet core is closed at its lower end by a cap 19 which carries a thumb-screw 18 projecting within, and thus permitting adjustment of the height of the base on which the said core rests. In this modification I have shown a lamp at the right of the magnet acting as a bridge across the terminals of the core. The lamp at the top of Fig. 7 is intended to be in series with a current supply circuit independently of the control switch.

It will be observed that this bell has no automatic make and break device as it is intended to give a single stroke on the gong whenever an operating switch in circuit therewith is closed. The magnetic circuit of the coil 7 (referring to modification of Figs. 1 to 6) is through the yoke 4 and across the gap between the ends of the yoke from the center of the coil. When the bell is not energized the core 12 stands in the depending tube 9, but with the first rush of current through the coil upon closure of the control switch, the core 12 is drawn energetically upward to close the gap across the ends of the yoke 4 and thus reduce the reluctance of the magnetic circuit that has just been referred to. In this upward movement of the core 12 it strikes a hard blow on the gong 2 and thus gives a single loud ring. Thereafter the core 12 remains upheld within the coil 7 as long as the current continues to flow through said coil.

It will be observed that the description of the operation given thus far applies substantially as well whether the bell be energized by a direct current or by an alternating current, and that the bell will work well on either kind of a circuit. But there are certain features in my invention which are especially appropriate to use with an alternating current, and I shall proceed to refer to these. The alternating flux in the magnetic circuit of the bell would have a tendency to produce wasteful eddy-currents in the poles of the yoke 4, hence these poles have been slitted, as indicated by the reference numeral

5 so as to reduce the eddy-currents in a manner well understood in the art. Similarly, eddy-currents would tend to be maintained around the core or plunger 12 and therefore this is grooved longitudinally to minimize the effect. I have not described how to adapt the winding of the coil 7 to a particular voltage, as this is well understood by those skilled in the art. However, it is desirable to have the coil so constructed that the alternating current shall flow therethrough in considerable quantity when first turned on in order that the core 12 may be actively energized. The inductive reactance of the coil 7 is therefore made moderate with respect to the frequency of the applied source of electro-motive force, when the core is down in the tube 9. But if the operating switch should be held closed for some time it is desirable that the current in the coil 7 should be choked somewhat so as to prevent useless waste thereof and also to prevent overheating the coil. Therefore, the construction is such that when the core 12 is drawn up, the inductance of the coil is much increased because of the decreased reluctance of the magnetic circuit. Thus after the first rush of current that impels the core 12 against the gong, the current is much abated.

The operation of the modification of Figs. 7 and 8 is substantially the same as that just described. The lamp bridged across the coil terminals serves a double purpose, (1) it flashes when the gong strikes and thus combines a visible with an audible signal, and (2) it acts as a discharge resistance to protect the controlling switch terminals from injury due to the inductive kick of the coil 7.

It will be observed that I have provided a simple, durable and effective bell which can be used on ordinary power circuits and is economical in its consumption of current.

I claim:

1. An electric bell comprising a gong, a coil, and an iron core for the coil adapted to act as a hammer for the gong, the parts being so constructed that the magnetic circuit of the coil shall have a large air gap when the core is withdrawn from the coil, but shall have a very small air gap when the core is within the coil.

2. An electric bell comprising a gong, a coil, an iron yoke outside the coil and having its ends overlapping the respective ends of the coil, an iron core for the coil adapted to act as a hammer for the gong and when within the coil to substantially complete the magnetic circuit of the said yoke.

3. An electric bell comprising a gong, a coil, an iron yoke outside the coil and having its ends slitted and overlapping the respective ends of the coil, an iron core for the coil adapted to act as a hammer for the gong and when within the coil to substantially complete the magnetic circuit of the said yoke.

4. An electric bell comprising a gong, a coil, a longitudinally grooved iron core for the coil adapted to act as a hammer for the gong, the parts being so constructed that the coil shall have a moderate inductance when the core is withdrawn therefrom, but shall have a relatively high inductance when the core is within the coil.

5. An electric bell comprising a gong, a coil, an iron core for the coil adapted to act as a hammer for the gong, and a lamp in parallel with the coil, the parts being so constructed that the magnetic circuit of the coil shall have a large air gap when the core is withdrawn from the coil, but shall have a very small air gap when the core is within the coil.

6. An electric bell comprising a gong, a coil under the gong having its axis vertical, a core adapted to move up within the coil, and a tube extending down from the coil adapted to hold the core with its upper end in proximity to the coil when it is not energized by current.

7. An electric bell comprising a gong, a spool of non-conducting non-magnetic material, a coil wound thereon, a yoke having its ends embracing the ends of said spool, and a core adapted to act as a hammer for the bell and to complete the magnetic circuit of the yoke within the spool.

8. An electric bell comprising a gong, a coil, a yoke forming a partial magnetic circuit for the coil, a movable core adapted in one position to complete said circuit, the reluctance of said magnetic circuit being much less and the impedance of the coil with respect to alternating currents being much greater when the core completes the magnetic circuit than when it does not do so.

In testimony whereof, I affix my signature in presence of two witnesses.

EDGAR P. STEEN.

Witnesses:
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J. H. SCHISSLER.