

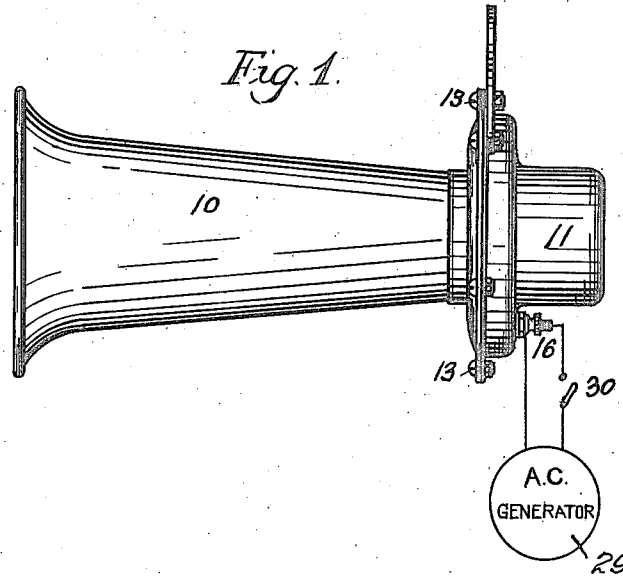
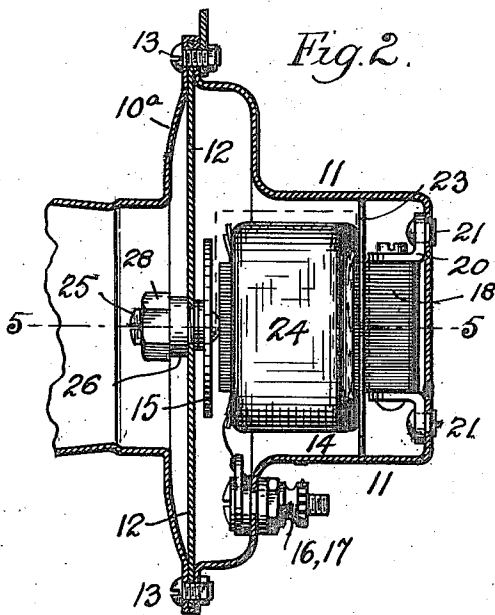
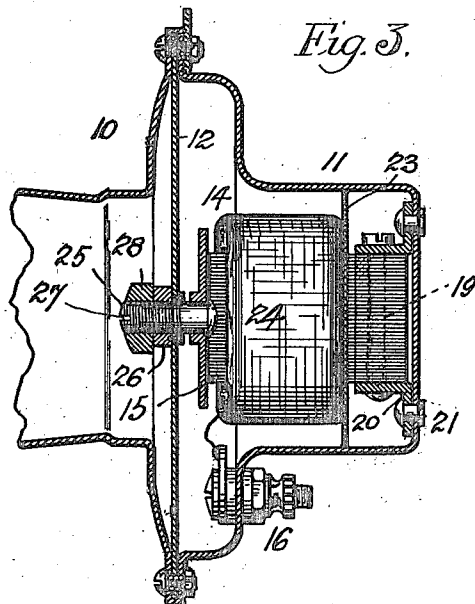
D. B. HILL.
SIGNAL HORN.

APPLICATION FILED DEC. 16, 1915.

1,277,587.

Patented Sept. 3, 1918.

2 SHEETS—SHEET 1.



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1,277,587.

Patented Sept. 3, 1918.
 2 SHEETS—SHEET 2.

Fig. 4.

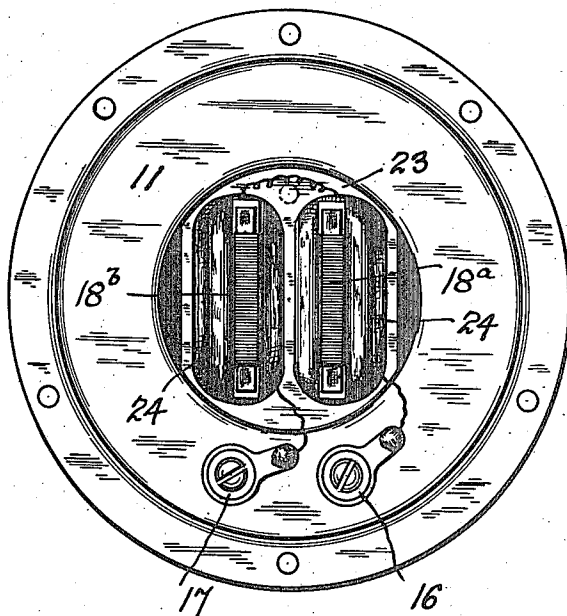


Fig. 4^a

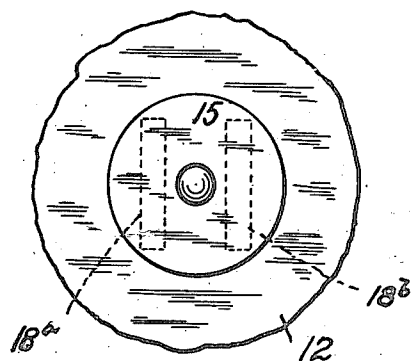


Fig. 6.

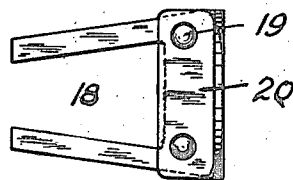


Fig. 5.

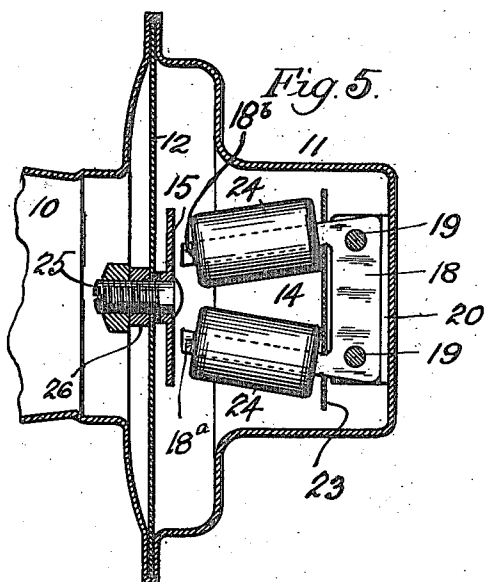
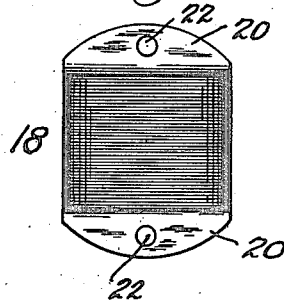


Fig. 7.



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DWIGHT B. HILL, OF BRIDGEPORT, CONNECTICUT.

SIGNAL-HORN.

1,277,587.

Specification of Letters Patent.

Patented Sept. 3, 1918.

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To all whom it may concern:

Be it known that I, DWIGHT B. HILL, a citizen of the United States, residing in Bridgeport, county of Fairfield, and State of Connecticut, have invented certain new and useful Improvements in Signal-Horns, of which the following is a full, clear, and exact description.

This invention relates to signal horns, and more particularly to a type of signal horn, especially adapted for automobiles, in which a sound producing diaphragm is vibrated by an electromagnet. The invention also refers especially to a signal horn in which the electromagnet is energized by a source of alternating current, such as a magneto, so as to cause vibration of an appropriate armature, which in turn actuates the diaphragm.

One of the primary objects of the invention is to provide a simple, reliable and inexpensive signal horn in which the current of the magneto or other generator is so utilized as to produce a very sharp loud tone which rises above or penetrates the ordinary traffic noises so as to attract immediate attention in crowded thoroughfares. The diaphragm and electromagnet are so arranged that in addition to the sustained tone produced by the free vibration of the diaphragm, the latter may be given sharp hammer blows, producing a peculiar raucous noise. Thus the total sound produced by the sustained tone and the hammer blows is sufficient to form a very efficient signal.

Another object of the invention is to provide a signal horn in which the blow on the diaphragm is produced by moving the central portion of the latter in a direction counter to the emission of the sound waves from the horn, as this enables me to obtain a loud tone with a comparatively small electric current and with a very simple combination of parts.

To these and other ends, the invention consists in the novel features and combinations of parts to be hereinafter described and claimed.

In the accompanying drawings,

Figure 1 is a side elevation of a signal horn embodying my improvements,

Fig. 2 is an enlarged elevation of the rear end portion of the horn, with certain parts shown in section,

Fig. 3 is a vertical longitudinal section through the rear portion of the horn, show-

ing the armature disk or button in a somewhat different adjustment from that illustrated in Fig. 2,

Fig. 4 is a front elevation of the rear section carrying the electromagnet, showing it detached from the other parts.

Fig. 4^a is a fragmentary detail of the diaphragm,

Fig. 5 is a section on the irregular section line 5—5 of Fig. 2,

Fig. 6 is a plan view of the magnet core; and

Fig. 7 is a rear elevation of the magnet core.

In the particular form shown, the improved signal horn comprises front and rear portions or sections 10, 11, between which is interposed a sound-emitting diaphragm 12. This diaphragm is usually of metal, for example a phosphor bronze alloy. The rear section 11 of the horn is in the form of a closed casing having an open flared forward end over which the diaphragm is clamped, preferably by means of small bolts 13 passing through openings in the enlarged rear end portion 10^a of the section 10, and through registering openings in the periphery of the diaphragm and the periphery or rim of the casing 11. Within the casing 11, an electromagnet 14 is mounted which acts on a suitable armature 15 directly carried by the diaphragm 12. The electromagnet 14 is appropriately connected by means of binding posts 16, 17, with a suitable source of alternating current, such as the magneto of the automobile motor.

By preference, the electromagnet is constructed in the following manner: The core 18 (Figs. 6 and 7) is of laminated form, being made of a plurality of superposed steel sheets stamped out in approximately horse-shoe form and riveted together by pins 19. These pins 19 also pass through angle plates or brackets 20 by means of which the magnet is secured in place in the casing, the brackets being riveted to the end wall of the casing by rivets 21 (Fig. 3) passing through perforations 22 (Fig. 7) in the respective plates or brackets. After the core 18 has been mounted in the casing in the manner described, an insulating plate or sheet 23 having openings for the legs or branches of the magnet core is slipped over said core into the position shown so as to form a support and insulator for wire coils 24, one of which embraces each leg or branch

of the core. The coils 24 are preferably formed of thin copper wire and covered with binding tape, and they may be tightly held in place against the insulating plate 23 by bending up the ends of the uppermost and lowermost laminations. The coils 24 are suitably connected with the binding posts 16, 17, as shown in Fig. 4, and are interconnected in series so that, in conjunction with the core, they form a bi-polar electromagnet of substantially horse-shoe form, the free ends of the core projecting out beyond the respective coils being in close proximity to the armature member 15 carried by the diaphragm. Each of the wire coils 24 is very effectively insulated from the metal casing by the insulating member 23, which may advantageously consist of a sheet or plate of fibrous insulating material, and this sheet or plate, together with the wire coils, is effectively held in place by bending up the laminations of the core in the manner previously described. In bending up the laminations pressure is exerted on the coils and on the insulating member back of the same in the direction of the rear wall of the case so as to hold said parts firmly in position, and thereby prevent any looseness or dislocation of the assemblage.

By preference, the armature member 15 is constituted by a steel button, the relation of which to the magnet core is substantially that shown in Fig. 4^a. In this view, the core ends, designated 18^a, 18^b are shown as located in parallelism on opposite sides of the center of the armature disk or button. This disk or button is preferably constituted by a single fairly thin piece of sheet metal as shown and is carried by a screw 25 having a threaded shank which engages an interiorly threaded bushing 26 on the diaphragm. The bushing 26 is preferably set and clenched in a central perforation in the diaphragm. By turning the screw 25 in one or the other direction by means of a screw driver engaging the nick or groove 27, the armature button or disk may be moved toward or away from the electromagnet to the desired extent. After it is adjusted to the desired position, it may be tightly clamped in that position by means of a lock or jam nut 28. Figs. 2 and 3 show the armature disk or member in two different adjustments respectively. The bushing 26 is disposed for the most part at the front of the diaphragm 12, but has a reduced neck portion extending rearwardly through a central opening in the diaphragm and clenched in said opening so as to prevent the bushing from rotating relatively to the diaphragm. This bushing serves as a support for the threaded shank or screw 25. When the jam nut 28 is tightened, it abuts the front edge of the bushing and exerts such a thrust on the screw as to lock it effectively against accidental turning

movement in the bushing which would disturb the adjustment.

The source of alternating current may be constituted by the ignition magneto of the automobile. In Fig. 1 the current source is indicated diagrammatically at 29, it being connected with the binding posts 16, 17, by suitable wires or conductors. A switch 30 for opening and closing the circuit is usually located in practice on the steering post of the automobile. When the switch is closed, the alternating current passes through the coils 24 of the electromagnet 14, and thereby energizes the latter so as to cause the vibration of the sound-emitting diaphragm 12. Suppose that with the parts in the position shown in Fig. 5, the current passes through the electromagnet in one direction, the poles of the magnet will attract the armature member 15 and thereby move the central part of the flexible diaphragm toward the magnet. This produces a movement of the diaphragm in one direction, and then as the direction of the current in the coils 24 is reversed, the diaphragm moves back to the initial position. In this way, the diaphragm is vibrated in correspondence with the frequency of the current alternations, and has a movement corresponding to the frequency curve. In other words, the rapidity of the vibration of the diaphragm increases with the speed of the motor and the magneto. Of course the armature 15 has pole portions corresponding to the poles of the magnet core, and these are disposed on opposite sides of the center of the armature disk in substantially parallel zones. This arrangement has given very good results in actual practice.

When the diaphragm is vibrated without contact of the armature with the magnet, the tone produced is what may be termed a sustained musical tone. Generally, however, the armature 15 will be so adjusted by means of the screw 25 that at the limit of its movement in one direction it will strike the poles of the magnet, thereby giving the effect of a sharp hammer blow. This produces a peculiar raucous noise which readily attracts attention in crowded thoroughfares. The rapidity of these hammer blows, which take place on the rearward movement of the diaphragm only, is obviously dependent upon the frequency of the current and the speed of the magneto. In producing these hammer blows, the diaphragm is moved in a direction counter to the emission of the sound waves from the horn. This enables me to use a very simple combination of parts, while obtaining at the same time an unexpectedly loud tone.

The bending up of the laminations at the free ends of the pole portions of the magnet core serves to hold the energizing coils away from the extremities of the core and to pre-

vent the coils from making contact with the armature disk or button, and thereby muffling the sound. It will be observed that the casing 11, which is made of light sheet metal in the embodiment shown, is of cylindrical form at the rear portion thereof, presenting a pocket into which the magnet structure is introduced from the front without a great deal of clearance. At its forward end, the sheet metal casing is increased in diameter considerably to form a flaring mouth portion, over which the diaphragm is located. The casing is preferably made of a single piece of drawn metal, as in the example shown, the magnet structure being riveted to the closed rear wall thereof and the diaphragm being clamped over the flared open front end by the fastening bolts.

By adjustment of the armature disk or button, the latter may be moved into such position with respect to the magnet as to produce the kind of signal desired, *i. e.*, one in which the interruption of the musical vibration by the hammer blows is more or less pronounced. Obviously, the tone changes with the speed of the motor, so that in addition to the raucous noise produced by the hammer blows (contact of magnet and armature), the sound is higher and shriller as the motor speed increases. Thus, in crowded traffic, the horn will produce a siren effect when it is sounded at the moment that the clutch is slipped to reduce speed, and the motor is thereby accelerated.

Various changes in the details of the device may be adopted without departing from the scope of the invention as defined in the claims.

What I claim is:—

1. In a signal horn, the combination of a diaphragm, a casing located at the rear of the diaphragm, a magnet core composed of a plurality of laminations, angle plates between which the rear portions of said laminations are interposed, fastening members extending through the rear wall of the casing and through said angle plates for securing said angle plates to said wall, an insulating member fitting over said magnet core in front of said angle plates, a coil on said magnet core in front of said insulating member, and an armature button supported by said diaphragm at the rear face thereof in proximity to the poles of said magnet core; substantially as described.

2. In a signal horn, the combination of a diaphragm, a casing at the rear of the diaphragm, a magnet core composed of a plurality of laminations, plates or brackets secured to the rear wall of the casing and having forwardly projecting portions between which said laminations are interposed and secured, said magnet core having a forwardly extending pole member, an insulating member fitting over said pole member

in front of said plates or brackets, an energizing coil fitting over said pole member, certain laminations of said pole member being bent up to hold the coil firmly in place, and an armature carried by the diaphragm to cooperate, with said pole member; substantially as described.

3. In a signal horn, the combination of a diaphragm, a casing at the rear of the diaphragm, a magnet core, plates between which said core is interposed secured to a wall of the casing, said magnet core having a forwardly extending pole member, an insulating member fitting over said pole member in front of said plates, an energizing coil fitting over said pole member in front of said insulating member, means at the forward end of the pole member for preventing dislocation thereon of said insulating member and said coil, and an armature carried by said diaphragm; substantially as described.

4. In a signal horn, the combination of a diaphragm, a casing at the rear of said diaphragm, a magnet core composed of a plurality of laminations, said core having forwardly extending pole portions, plates or brackets secured to a wall of the casing and having forwardly projecting portions between which said laminations are interposed and secured at their rear portions, an insulating plate fitting over at least one of said pole portions in front of said first-named plates, a coil fitting over said pole portion in front of said insulating plate, the laminations of said pole portion being bent up at the front ends to hold said coil in position, and an armature member to cooperate with said magnet core connected with the diaphragm; substantially as described.

5. In a signal horn, the combination of a diaphragm, a casing at the rear of the diaphragm, a horseshoe magnet core composed of a plurality of laminations, plates or brackets secured to the rear wall of the casing and having forwardly projecting portions between which said laminations are interposed and secured, an insulating plate fitting over the pole portions of said magnet in front of said plates or brackets, coils fitting over the respective pole portions in front of said insulating plate, the laminations of said core being bent up to hold said coils in position on the respective pole portions, and an armature connected with the diaphragm to cooperate with said magnet core; substantially as described.

6. In a signal horn, the combination of a diaphragm, a casing at the rear of the same, a magnet mounted in the casing and comprising a core having forwardly extending poles and an energizing coil for said core, a bushing secured to the diaphragm and extending forwardly therefrom, a threaded

screw or shank engaging screw threads in said bushing and extending rearwardly through said diaphragm, said screw or shank having means at the forward end thereof, whereby it may be screwed forwardly or rearwardly, and an armature disk carried by the rear end portion of said screw or shank close to and facing the poles of said magnet core; substantially as described.

7. In a signal horn, the combination, with the horn proper and the diaphragm at the rear of the same, of a casing at the back of the diaphragm, a magnet mounted in said casing and comprising a core and an energizing coil, said core having parallel forward extremities adjacent to said diaphragm, an armature at the rear of the diaphragm composed of a disk made of a single piece of metal and having portions on opposite sides of the center facing the poles of said core, a bushing extending forwardly from said diaphragm and having its rear end non-rotatively secured in an opening in said diaphragm, said bushing provided with interior screw threads, a screw engaging the threads of said bushing and extending through the diaphragm, the rear end of said screw fixed to said armature disk, and a lock nut on the forward end of said screw in front of said bushing; substantially as described.

8. In a signal horn, the combination of a diaphragm, a casing at the rear of the same, a magnet in said casing comprising a core and an energizing coil, a bushing extending forwardly from said diaphragm but having a reduced neck portion clenched in an opening of the diaphragm, said bushing provided with interior screw threads, a screw engaging said threads and having a grooved end protruding from the front end of said bushing, a lock nut engaging the forward end of said screw and adapted to abut the forward end of said bushing, and an armature button carried by the rear end of said screw to cooperate with the magnet core; substantially as described.

In witness whereof, I have hereunto set my hand on the 22nd day of July, 1915.

DWIGHT B. HILL.

Witness:

O. H. PETERSON.