W. W. DEAN.

ELECTRICAL SIGNALING DEVICE.

APPLICATION FILED MAR. 18, 1912.

1,243,047.

Patented Oct. 16, 1917.

2 SHEETS—SHEET 1.

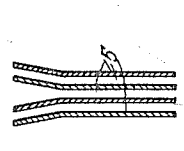

Fig. 4.

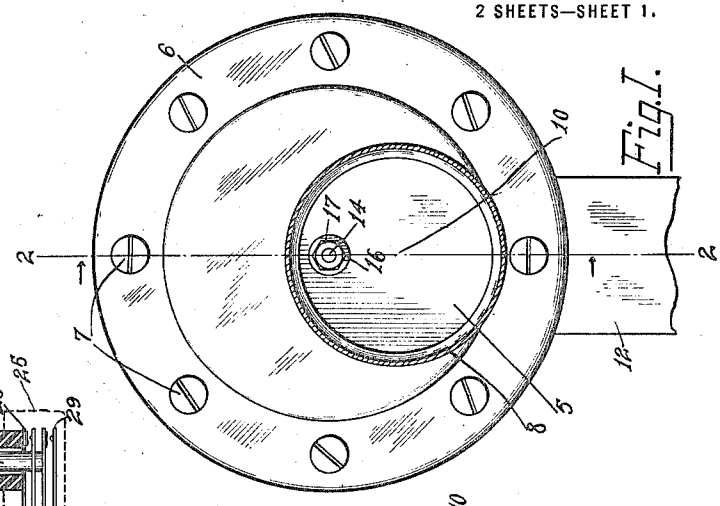

Fig. 1.

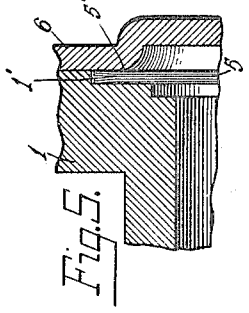

Fig. 5.

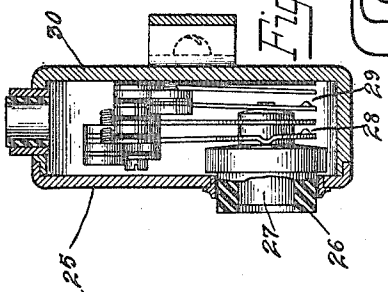

Fig. 7.

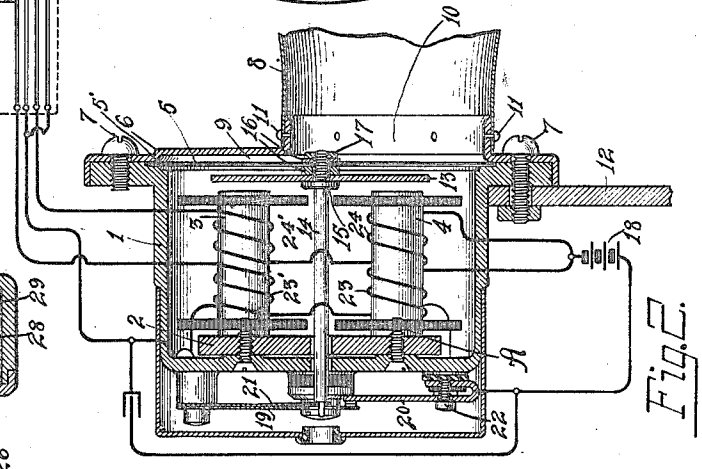

Fig. 2.

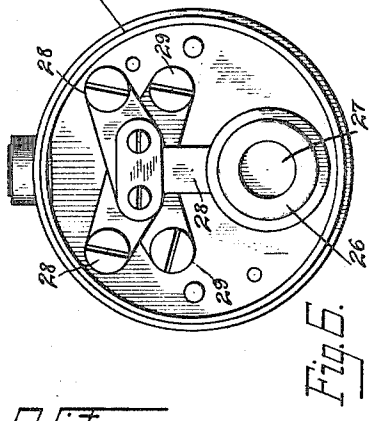

Fig. 6.

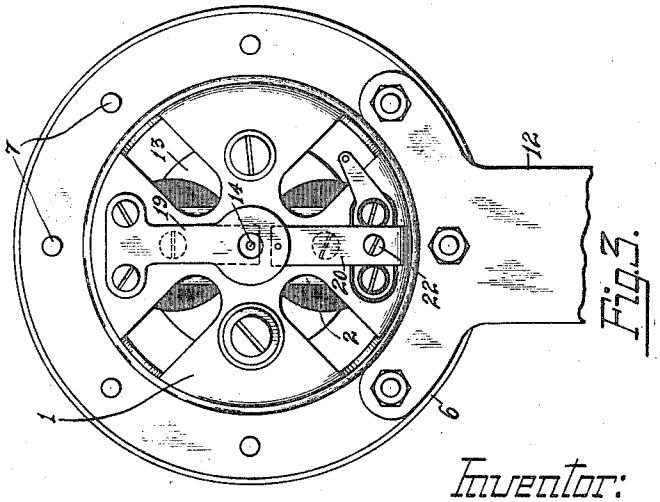

Fig. 3.

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2 SHEETS—SHEET 2.

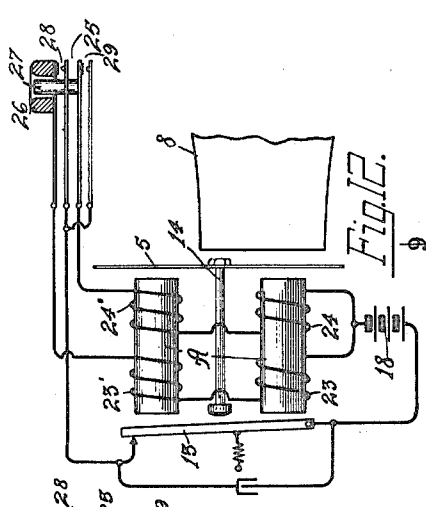

Fig. 12.

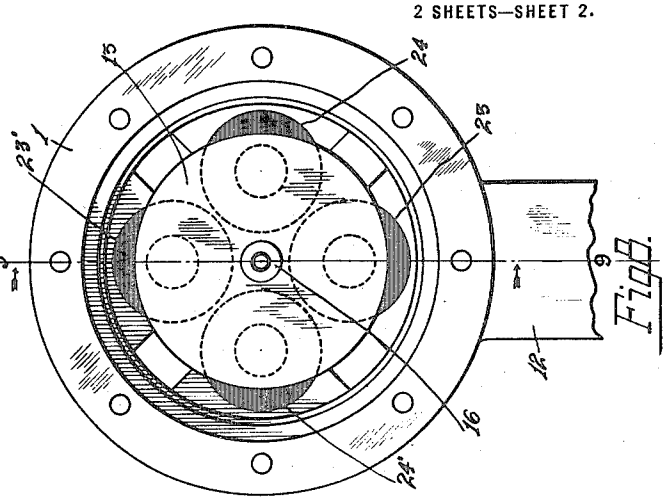

Fig. 8.

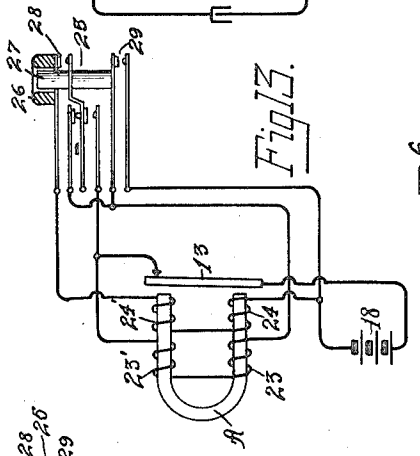

Fig. 13.

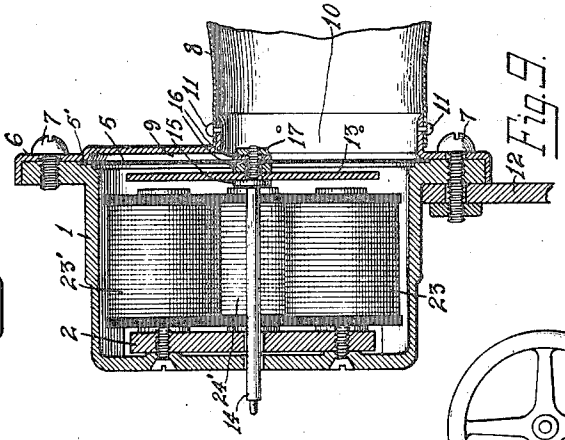

Fig. 9.

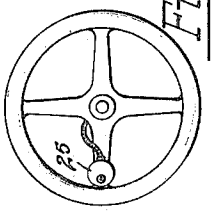

Fig. 14

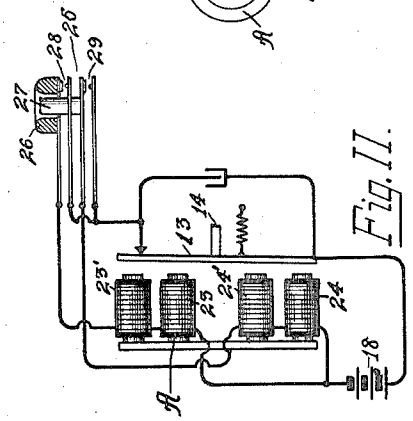

Fig. 11.

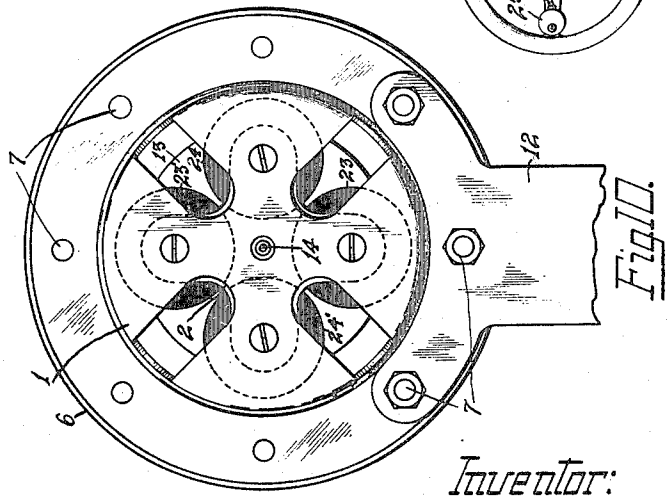

Fig. 10.

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UNITED STATES PATENT OFFICE.

WILLIAM W. DEAN, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD & SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ELECTRICAL SIGNALING DEVICE.

1,243,047. Specification of Letters Patent. Patented Oct. 16, 1917.

Application filed March 18, 1912. Serial No. 684,593.

To all whom it may concern:

Be it known that I, WILLIAM W. DEAN, a citizen of the United States, and resident of Chicago, county of Cook, and State of Illinois, have invented new and useful Improvements in Electrical Signaling Devices, of which the following is a specification.

My invention has to do with electrical signaling devices and more particularly to devices of a character used as warning or calling signals on automobiles, motor boats or in fact wherever the occasion may require such device, an object being to provide an improved form of such apparatus and my invention will be more clearly understood from the accompanying drawings and specification.

Referring now to the accompanying drawings in which all parts are shown at normal and in which like reference characters indicate like parts or parts having like functions,

Figure 1 is a face view of one form of the signaling device proper.

Fig. 2 is a sectional view along line 2—2 of Fig. 1 in the direction of the arrow indicated thereon together with an operating circuit therefor diagrammatically illustrated.

Fig. 3 is a rear elevation of the device of Fig. 2, but with the rear cap removed.

Fig. 4 is a disassembled sectional view of a portion of the laterally disposed peripheral edge of the laminated diaphragm.

Fig. 5 is a sectional view of a portion of the signaling device showing the preferred method of clamping the diaphragm.

Fig. 6 is a face view of an improved form of push button switch.

Fig. 7 is a sectional view along line 7—7 of Fig. 6.

Figs. 8, 9 and 10 are front, sectional and rear views respectively of a modification of the device shown on Sheet 1.

Fig. 11 illustrates diagrammatically one method of connecting the modified device of Figs. 8, 9 and 10 in circuit with the push button switch.

Fig. 12 illustrates diagrammatically another modified form of the device of Sheet 1.

Fig. 13 shows another modified form of signaling device, and

Fig. 14 shows one way of securing the control switch to the steering wheel of an automobile.

Referring now more particularly to the device illustrated in Figs. 1 to 5 inclusive, it comprises preferably a cup shaped frame 1 having secured thereto an electromagnet A comprising yoke 2 and electromagnet spools 3—4. A diaphragm 5 comprising preferably a plurality of thin sheets of metal having laterally disposed peripheral edges as shown in Fig. 4, is clamped between frame 1 and a front plate or cap 6 preferably by means of a plurality of clamping screws 7.

I have found that by using a single comparatively thick sheet for the diaphragm, certain disadvantages arise, one of which is a tendency for the diaphragm to disrupt or crack, this being caused by the vibrations thereof. As is well known the greater the amplitude of vibration of the diaphragm the greater the volume of sound, and I have found that by using a plurality of thin metallic sheets in place of a single comparatively thick sheet, that a comparatively greater amplitude of vibration may be secured without disrupting the diaphragm. In order to hold the peripheral edge of the diaphragm secure and still allow of a slight movement thereof when the diaphragm is oscillated, I preferably dispose the peripheral edge of the sheets of the diaphragm at an angle to the central or flat portion as indicated in Fig. 4 and then form the recess 1′ slightly deeper than the combined thickness of the sheets of the diaphragm so that when the cap or front plate 6 is clamped in position the diaphragm 5 is held in a yielding manner.

In signaling devices wherein diaphragms are employed and especially that type of a device wherein a front cap or plate is employed to carry the bell such as bell 8, it is of general practice to leave a space between such front plate as 6 and a diaphragm as 5 as indicated at 9, and therefore it is apparent that with the bell opening 10 central with the diaphragm, dust, snow or water will accumulate between the diaphragm and the front plate affecting the amplitude of vibration of the diaphragm unless means

are provided to allow such accumulation to be expressed from its resting place. In certain devices this has been taken care of by providing small openings in the front plate or cap near the periphery or inner clamping edge 5′ of the diaphragm to allow the escape of such accumulation, but such openings are necessarily small and sometimes incompetent to serve their purpose. Therefore in order to allow the escape of such accumulation or deposits, I preferably arrange the bell opening 10 eccentric to the axis or center of the device, so that it will of itself allow the escape of such deposits. The bell 8 may be secured to the front cap 6 in any desired manner but I preferably rivet the two members 8 and 6 together by means of pins 11.

An adjustable bracket 12 is also provided being secured to the device proper by means of the bolts 7, thus allowing said bracket 12 to be secured in any one of a plurality of positions whereby the bell opening 10 may always be at substantially its lowest point in order to always allow the escape of any accumulation or deposit.

The diaphragm 5 may be caused to vibrate by magnets A in any desirable manner, but as illustrated in Fig. 2, it is connected directly to an armature 13 by means of a connecting stud 14. Said stud 14 carries a collar 15, supporting armature 13 while a pair of washers 16 are disposed between the diaphragm 5, armature 13 and a clamping nut 17. Thus it will be seen that the diaphragm and armature are securely fastened together and it follows that any movement imparted to armature 13 by the electromagnet A affects the diaphragm 5.

As is well known the pitch of the sound produced by a vibrating diaphragm depends upon its rate of vibration and as direct source of current as battery 18 is generally employed to operate magnet A, I preferably provide means for rapidly interrupting the circuit of said magnet, comprising a pair of contact springs 19—20 which are operatively connected with the armature 13 by means of stud 14. I also cause a normal flexure of diaphragm 5 by means of a spring 21 which rests against a shoulder on stud 14, thereby causing an outward flexure of diaphragm 5, said spring 21 being also assisted by the tension of contact spring 19. It will be apparent that with an attraction of armature 13, stud 14 moves against the tension of springs 19—21 until the circuit is interrupted through contacts 19—20 whereby said springs tend to restore the armature and diaphragm. Adjusting means for contacts 19—20 are provided in the form of an adjusting screw 22.

I have also so arranged my device that two different sounds may be produced thereby, and to this end I have arranged a plurality of windings upon the electromagnet A and connected them with battery 18 in such a manner that either one or both windings may be included in circuit. With this arrangement it will be apparent that with one winding in circuit I will secure a certain degree of operation of the electromagnets, while with the two windings in circuit a different effect is produced, that is a different amount of current is passed through the windings of magnet A, whereby a different degree of operation is secured.

Any means may be employed to connect the windings 23—23′—24—24′ in circuit, and I have chosen to illustrate a switch 25 having two actuating buttons 26—27 and each controlling a pair of windings 23—23′, 24—24, by means of their associated contact springs 28—29 respectively. It is apparent that when button 26 is depressed contacts 28 are closed thereby connecting the pair of windings 23—23′ in circuit with battery 18, causing a certain degree of actuation of the device and then by also closing contacts 29, windings 24, 24′ are cut in circuit with battery 18, causing a different degree of actuation of the signaling device.

In using my device as an automobile warning signal I have found that usually at the time the operator desires to sound the signal he is busily engaged in manipulating his steering wheel and various levers and therefore it is an advantage to have the actuating button of switch 25 so arranged that it may be reached by the thumb or finger of the operator with the least deviation from the customary position of the hands and to this end I have provided a push button 25 having its actuating buttons 26—27 eccentrically disposed so that when mounted upon the spoke of the steering wheel as shown in Fig. 14 the actuating buttons 26—27 are brought relatively close to the rim of the wheel. As illustrated in Figs. 6—7 I preferably employ a casing 30 having the contact spring sets 28—29 insulatingly secured thereto and coöperating with plungers 26—27 respectively. The outer end of springs 28 encircle the central plunger 27.

In Figs. 8, 9 and 10 I have illustrated a modified form of my invention in which I preferably employ four electromagnet spools 23, 23′, 24, 24′ and acting upon a circular armature 13 in a manner similar to the device of Sheet 1. In the device of Figs. 8, 9 and 10, I have designated the like parts thereof by reference characters corresponding to the characters used in Figs. 1 to 3, and while I have not illustrated the circuit breaker contacts 19—20 in Fig. 9, it is to be understood that any form of cir-

cuit breaker may be used, or the device illustrated in Fig. 2.

In Fig. 11 I have illustrated one method of connecting the four electromagnet spools whereby two degrees of actuation may be secured, although other means of connecting these magnets will readily present themselves. Thus, referring now to Fig. 11, with the contacts 28 closed only the electromagnet windings 23—23′ are connected in circuit, while with both the sets of contacts 28 and 29 closed, both sets of magnet spools 23—23′ and 24—24′ are cut in circuit, thus producing a different degree of actuation.

In the several previous modifications of my invention as described I have referred to the armature 13 as being directly connected to the diaphragm 5, but in Fig. 12 another modification is shown in which the armature 13 is not directly connected to diaphragm 5, but upon being vibrated due to the closure of push button 25, it strikes the connecting rod 14 upon each vibration, in this manner acting upon diapragm 5.

Fig. 13 illustrates another method of connecting a plurality of windings in circuit with a source of current in such a manner that two degrees of actuation may be secured. In operating the switch 25, upon closing of contacts 28 thereof the windings are connected in series thus producing one degree of actuation of the device, while upon further depressing button 26 to interrupt the normally closed contacts 28 and close alternate contact 28 and also closing contacts 29 by the depression of button 27 the windings are connected in multiple thus giving a different degree of actuation to the device.

While I have chosen to illustrate my invention by several different applications thereof, many other forms, changes and modifications will readily suggest themselves and it will also be apparent that various ways will suggest themselves of connecting the several windings in circuit to secure a variable operation of the device and therefore I do not desire to be limited to the exact structure as disclosed, but aim to cover all such changes and modifications as come within the spirit and scope of the appended claims.

Having described my invention what I claim as new and desire to secure by Letters Patent is:

1. A signaling device including a diaphragm, an electromagnet provided with an armature for vibrating the said diaphragm, a plurality of windings for said electromagnet, a source of current, means for including either or all of said windings and said source of current in circuit whereby different degrees of actuation of said diaphragm are effected, and a common vibrating interrupter controlled by said electromagnet having one of its interrupter contacts connected permanently to one pole of said source of current and adapted to be variably included in said operating circuits.

2. A signaling device including a diaphragm, an electromagnet and an armature for vibrating said diaphragm, a plurality of windings for said electromagnet, a common circuit interrupter controlled by said electromagnet, and circuit connections for including said interrupter in circuit with either of said windings or with all of said windings to secure variable operations of said electromagnet and diaphragm.

3. An electrical sounding horn comprising a casing and a face plate, a diaphragm including a plurality of comparatively thin metallic sheets having laterally disposed peripheral edges, means including said face plate for clamping said diaphragm by said edges against said casing whereby said diaphragm is yieldingly supported, and an electromagnet and armature operatively associated to vibrate said diaphragm.

4. A signaling device comprising a casing, a diaphragm consisting of a plurality of thin metallic sheets having laterally disposed peripheral edges, a front plate for clamping said diaphragm at the periphery thereof to said casing whereby said diaphragm is yieldingly supported, said cap having an eccentrically disposed bell opening for the escapement of sound waves and electromagnetic means to vibrate said diaphragm.

5. An electrical sounding horn comprising a casing and a front plate, a diaphragm comprising a plurality of thin metallic sheets some of which have laterally disposed peripheral edges adapted to be clamped to yieldingly hold said sheets, means including said front plate and said casing for so clamping said diaphragm, and electromagnetic means for vibrating said diaphragm.

6. An electrical sounding device comprising a casing and a clamping plate, a diaphragm including a plurality of comparatively thin metallic sheets having laterally disposed peripheral edges, means including the said casing and clamping plate for clamping said diaphragm by said edges whereby said diaphragm is yieldingly supported, an electromagnet and armature for vibrating the said diaphragm, and a plurality of circuit connections whereby different degrees of actuation of said diaphragm may be secured.

7. A signaling device including a diaphragm, an electromagnet provided with an armature for vibrating the same, a plurality of windings for said electromagnet, a source

of current, means for including either or all of the said windings and said source of current in circuit whereby different degrees of actuation of the said diaphragm are effected, and a vibrating interrupter controlled by said electromagnet adapted to be variably included in said operating circuits.

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

WILLIAM W. DEAN.

Witnesses:
GEORGE E. MUELLER,
CARRIE E. ANDERSON.