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1,511,347

W. KAISLING

MOTOR HORN

Filed May 22, 1919

3 Sheets-Sheet 1

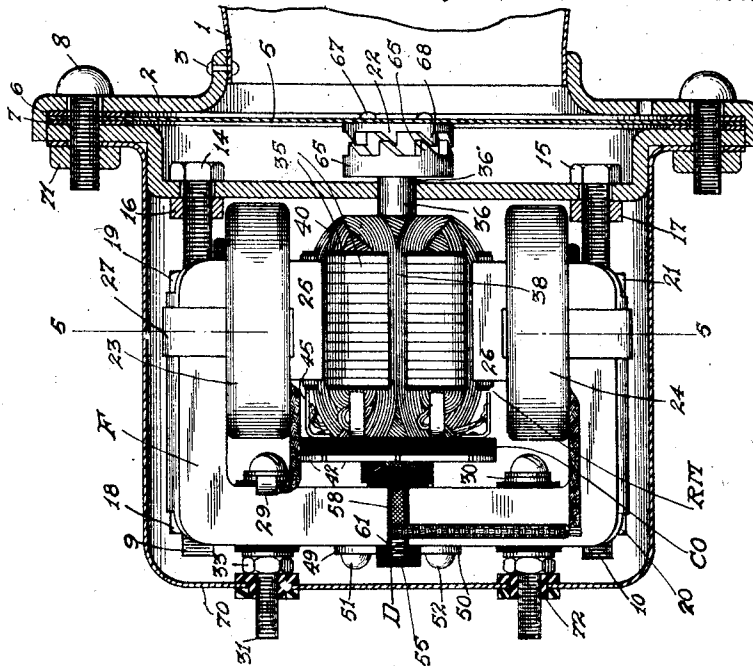


Fig. 2.

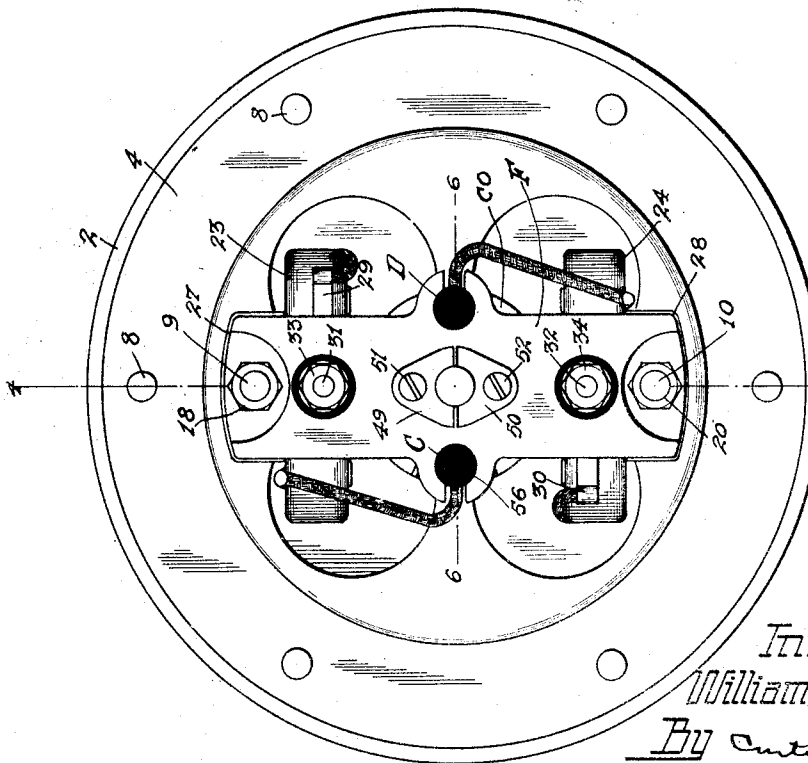


Fig. 1.

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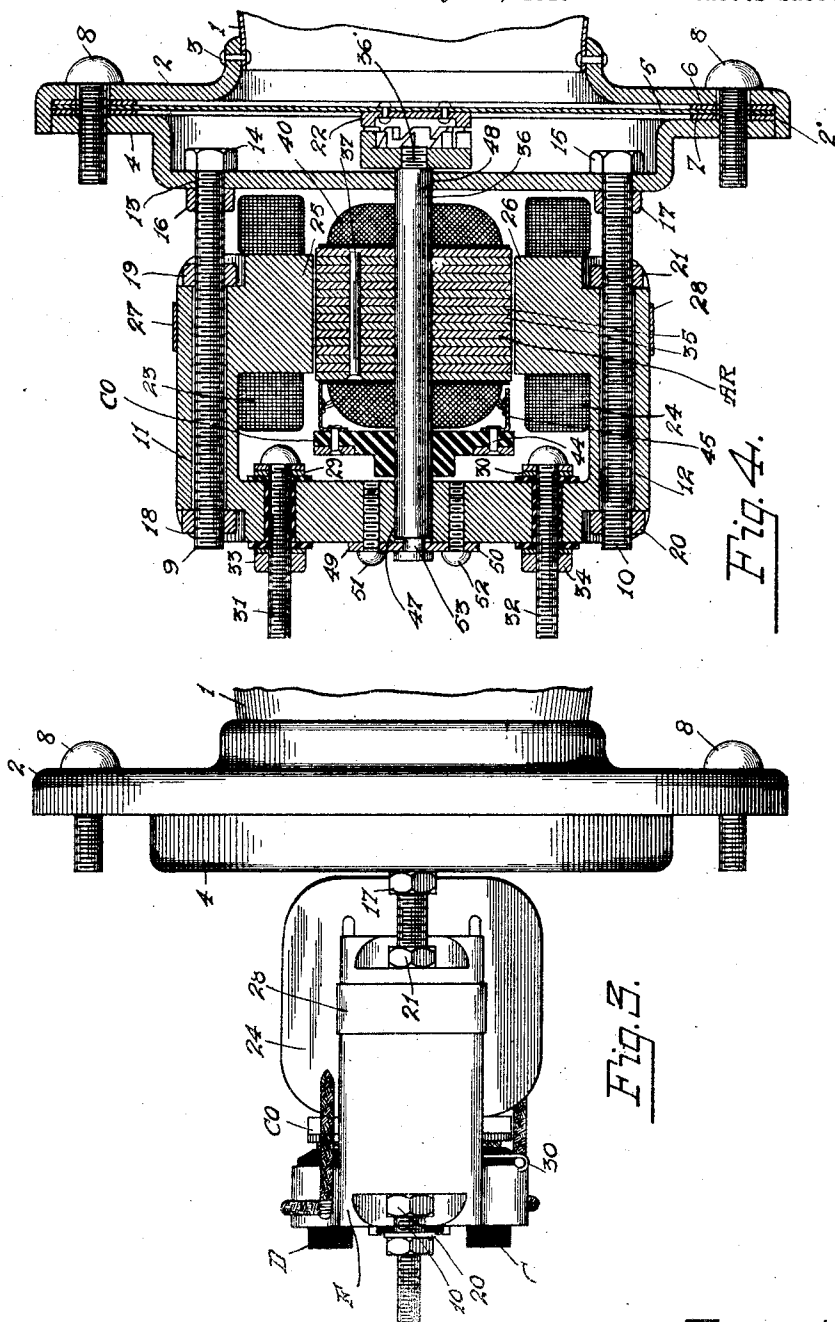
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3 Sheets-Sheet 2



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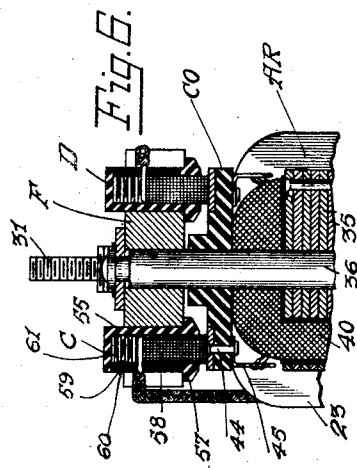
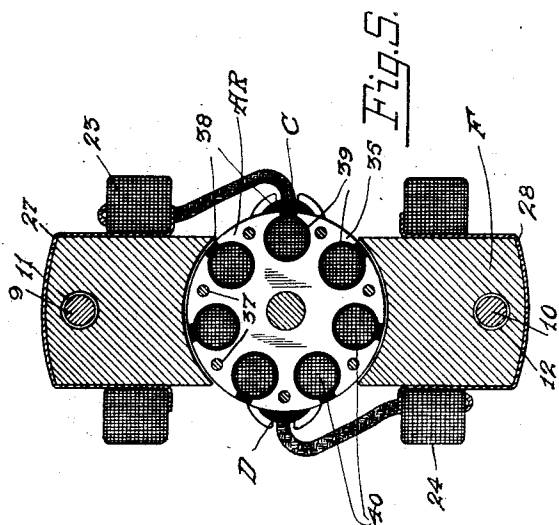
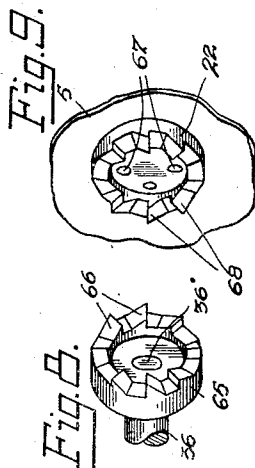
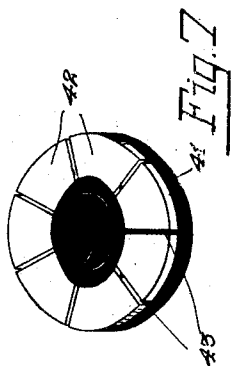
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE.

WILLIAM KAISLING, OF CHICAGO, ILLINOIS, ASSIGNOR TO KELLOGG SWITCHBOARD AND SUPPLY COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

MOTOR HORN.

Application filed May 22, 1919. Serial No. 298,940.

To all whom it may concern:

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

My invention relates to signaling devices and has to do more particularly with signaling horns such as are usually employed as warning signals on automobiles, launches and the like.

My invention is particularly directed to electrically operated signaling horns including a vibratile member such as a diaphragm, a small rotary motor, and an enclosing casing provided with a resonator or horn. The small rotary motor is located directly behind the diaphragm, whereby a vibratory motion of the diaphragm may be derived from the drive shaft of the small rotary motor. The motor is small and compact in construction and consumes but little current, and may be operated from a low voltage storage battery which is now practically universally used in conjunction with the ignition system of automobile engines.

A feature of my invention is the construction of the motor and its parts, and the adjustable means of the motor, as a whole, in relation to the wear piece or contact button upon the diaphragm.

Another feature of my invention resides in the construction of the commutator which comprises a disk upon which the commutator segments are radially mounted.

Still another feature of my invention resides in the construction of the motor brush holder which is suitably supported in an orifice in the field piece of the motor.

The horn of my invention is simple in construction, efficient in its operation, low in current consumption and compact in its arrangement of parts, all of which parts are readily accessible for adjustment.

A further feature of my invention resides in mounting the motor at right angles to the diaphragm and in providing a circular serrated agitator on the shaft of the motor for engagement with a similarly formed member attached to the diaphragm thereby permitting the motor to be mounted concentrically with respect to the diaphragm.

And still a further feature of my invention

relates to the mounting of the motor in the above mentioned manner in combination with a disk commutator whereby the commutator of the motor is forced against the commutator brushes when the motor is operated. A still further feature of novelty relates to the end thrust bearing I provide for the motor shaft.

The above features as pointed out, as well as others, will be more fully pointed out in the ensuing specification and claims.

Fig. 1 is a rear elevation of the signaling horn of my invention without the protective casing;

Fig. 2 is a right side elevation of Fig. 1 with the protective casing in section;

Fig. 3 is a top view of Fig. 1;

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

Fig. 5 is a sectional view along the line 5-5 of Fig. 2;

Fig. 6 is a sectional view along the line 6-6 of Fig. 1;

Fig. 7 is a perspective view of the commutator;

Fig. 8 is a perspective view of the ratchet which is secured to the shaft; and

Fig. 9 is a perspective view of the ratchet which is carried by the diaphragm of my device.

Referring now more in detail to my invention as illustrated, it comprises a resonating horn 1, only a portion of which is shown, suitably secured to the front plate 2 in any suitable manner, as by means of the rivets 3. A mounting frame 4 is provided to which the apparatus as a whole, is secured, as will be more fully hereinafter described. A diaphragm 5 of suitable material is placed within the cup-shaped portion 2' of the front plate 2 with a packing ring 6 of any suitable material, such as cork, between it and the front plate 2. A packing ring 7 is then placed between the diaphragm 5 and the mounting frame 4. The front plate 2, diaphragm 5, packing rings 6 and 7, and mounting frame 4 are then securely clamped together by means of bolts 8, thus circumferentially engaging and clamping the diaphragm in place between the frame 4 and front plate 2.

Referring now to the small rotary motor RM, it comprises a U-shaped field piece F, which is micrometrically adjustably supported by the mounting plate 4. A pair of

threaded studs 9 and 10 are provided which support the field piece F. Suitable openings 11 and 12 are provided in the field piece F through which the studs 9 and 10 extend.

5 The mounting plate 4 is provided with suitably tapped openings 13, which receive the threaded studs 9 and 10, and the said studs 9 and 10 are provided with hexagonally shaped heads 14 and 15, which, when the
10 studs 9 and 10 are in place, engage the face of the plate 4. Lock nuts 16 and 17 are provided for the studs 9 and 10 and are used to secure the said studs to the mounting plate 4. The stud 9 is provided with a pair
15 of nuts 18 and 19, and likewise the stud 10 is provided with nuts 20 and 21 for holding the motor in its adjusted position. To adjust the motor as a unit relative to the impact button or wear piece 22 secured to the
20 diaphragm 5, it is only necessary to loosen nuts 18 and 20 on the studs 9 and 10, respectively, and turn the nuts 19 and 21 to the right or left, depending on whether it is desired to move the motor RM away or
25 towards the anvil 22. When the motor RM, as a whole, is adjusted in relation to the anvil 22, the nuts 18 and 20 are tightened to securely hold the motor in its adjusted position.

30 Field coils 23 and 24 are provided which are suitably mounted upon the pole-pieces 25 and 26 of the U-shaped field F, the said coils 23 and 24 being held in place in any suitable manner, as by means of the straps
35 27 and 28. Terminals 29 and 30 are insulatingly secured to the field piece F by means of screws 31 and 32. These screws are also suitably insulated from the frame F, and nuts 33 and 34 are provided to secure
40 the said terminals 29 and 30 to the frame F. Terminal 29 serves as one terminal for the field winding 23 and the terminal 30 serves as one terminal for the winding of the field winding 24. The other terminal of the field
45 winding 23 extends to the brush C of the motor RM and the other terminal of the field winding 24 extends to the brush D of the motor RM. The screws 31 and 32 also serve as terminals for the external leads
50 that connect to the circuit closer or battery (not shown).

A laminated armature AR for the motor is centrally positioned between the pole-pieces 25 and 26 of the U-shaped field piece
55 F, the said armature AR being built up of a plurality of disks 35, which are fitted upon the shaft 36 in any suitable manner as by means of a drive fit, the said laminations being held together as a unit AR by means
60 of rivets 37, and the armature shaft 36 is arranged with its axis at right angles to the diaphragm. The armature has a plurality of circular slotted orifices 38 extending lengthwise of the armature into which split
65 sleeves of insulation 39 are fastened. The

windings 40 of the armature AR are contained in these insulated orifices and the terminals of these windings are connected to the terminals of the commutator CO.

The commutator CO is suitably mounted
70 upon the shaft 36 by means of a drive fit, and it comprises a disk 41 of suitable insulation material and carries the commutator segments 42. The segments 42 are
75 radially disposed upon the disk 41 and are suitably spaced, as indicated at 43, to properly separate the commutator plates 42 from each other. The plates 42 are secured to the disk 41 in any suitable manner, as by
80 means of rivets 44. Each plate 42 is provided with a terminal 45, which is secured to the bottom face of the disk 41 by means of the rivets 44, and each terminal 45 forms a terminal for the windings of the motor
85 armature RM.

I rotatably support the shaft 36 and its parts as a whole in bearing 47 in the field piece F, and in bearing 48 in the mounting plate 4. End thrust bearing plates 49 and
90 50 are provided and are secured to the field piece F by means of screws 51 and 52. The said plates 49 and 50 are provided with semi-circular orifices which fit into an annular groove 53 formed in the shaft 36 to
95 permit the armature RM and its parts, as a whole, to have only a small amount of longitudinal movements when the armature is rotated. Motor brush holders C and D are suitably supported in the field piece F, and
100 as both are similarly constructed, I will describe brush holder C only. The brush holder C comprises a shell 55 of suitable insulating material, the said shell fitting into a suitable opening 56 in the field piece
105 F. A shoulder 57 is formed on the shell 55, which bears against the inner face of the field piece F to prevent the said shell 55 from being forced through the orifice 56. The motor brush 58 is made of any suitable
110 material, such as wire gauze, rolled to form a brush, of a size to fit into the orifice 59 in the shell 55. The lead to the brush 58 is passed through a suitable slot 60 cut in the shell 55 and then soldered to the said brush
115 58. To obtain the proper bearing pressure of the brush 58 against the commutator face of the commutator CO, I provide a coil spring 61 which is placed in the shell 55 behind the brush 58, and the tension of the
120 spring 61 is such that the brush 58 receives the proper bearing pressure to maintain it in engagement with the segments 42 of the commutator CO. The end 36' of the shaft 36 which protrudes through the bearing
125 48 in the mounting plate 4 is threaded to receive a member 65, circular in shape and provided with a plurality of serrations or teeth 66 in the form of face projections. A wear piece 22 is provided and secured to the diaphragm 5 in any suitable manner, as
130

by means of rivets 67, and is provided with a plurality of projections or teeth 68 in the form of face projections, so that upon rotation of the shaft 36, the teeth 66 of the member 65 engage the teeth 68 of the wear piece 22, causing the vibration of the diaphragm 5.

A suitable enclosing casing or cap 70 is provided which is secured to the mounting plate 4 by means of nuts 71, which have screw-threaded engagement with the clamping screws 8. The screws 31 and 32 which form terminals for external leads extend through the cap 70, but are insulated therefrom by means of insulation bushings 72.

In assembling the horn and attuning it, the nuts 18, 19, 20 and 21 are loosened so as to permit the entire motor to slide along studs 9 and 10 to or from the diaphragm 5, and when the desired tone has been developed, that is, the proper relation between the member 65 and the wear piece 22, the nuts 18, 19, 20 and 21 are set to lock the motor in its adjusted position.

From the foregoing it is to be noted that when the motor is rotated and the agitator contacts the wear button that there is a tendency to force the motor away from the diaphragm against the end thrust bearing, and due to the width of the annular groove 53 a small longitudinal movement of the shaft 36 to the left is permitted thus causing the commutator to make good contact with the motor brushes. Permitting slight longitudinal movement of the armature shaft with its attached agitator element 65 not only insures better electrical contact between the commutator and its brushes but produces a second and more important result; that of starting the camming action of the teeth of element 65 over the teeth of the wear button or anvil 22. Where the armature shaft has no longitudinal movement the static friction between these toothed elements is sometimes so great that it cannot be overcome by the torque of the motor. The slight longitudinal movement of the armature shaft (permitted in the present device), against the brush springs, allows a start of the camming action between the toothed elements and thereby gives the armature the opportunity to acquire sufficient momentum to start operation. When this is done the horn will continue to operate, even on a very low voltage.

While the invention has been described with particular reference to the details of construction, it should be understood that it is not limited thereto, as many changes and modifications may be made therein without departing therefrom, and I, therefore, wish to cover all such changes and modifications that come within the spirit and scope of the appended claims.

Having described my invention what I

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

1. A signaling device of the character described comprising a mounting plate, a diaphragm secured to said plate, a motor for vibrating said diaphragm including a rotary shaft having bearing at one end in said plate and a field piece, said shaft extending through said field piece and provided with a groove, means engageable with said groove to form an end thrust bearing for said shaft and arranged to permit limited longitudinal movement of said shaft, interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis and means for mounting the motor to permit movement bodily toward and away from the plate.

2. A signaling device of the character described comprising a mounting plate, a diaphragm secured to said plate, a motor for vibrating said diaphragm including a rotary shaft having bearing at one end in said plate and a field piece, said shaft extending through said field piece and provided with a groove, a pair of members provided with semi-circular openings adapted to fit into said groove to form means engageable with said groove to form an end thrust bearing for said shaft and arranged to permit limited longitudinal movement of said shaft, interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis and means for mounting the motor to permit movement bodily toward and away from the plate.

3. A signaling device of the character described comprising a mounting plate, a diaphragm secured to said plate, a motor for vibrating said diaphragm including a rotary shaft having bearing at one end in said plate and a field piece, said shaft extending through said field piece and provided with a groove, means carried by the field piece engageable with said groove to form an end thrust bearing for said shaft and arranged to permit limited longitudinal movement of said shaft interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis, and means adjustably connecting the motor and plate.

4. A device of the character described including a mounting plate, a diaphragm secured to said mounting plate and provided with a cam, a motor provided with a shaft perpendicular to the diaphragm and having a cam for engaging the cam attached to said diaphragm, a field piece for the motor, a pair of longitudinal orifices in said field piece diametrically opposite each other, a pair of studs secured to said mounting plate and passing through said orifices in said

field piece for micrometrically adjusting said field piece perpendicularly relative to said mounting plate whereby the degree of engagement between the cam on said motor shaft and said diaphragm may be regulated, said motor shaft having one bearing in said field piece and one bearing in said mounting plate.

5. A device of the character described including a mounting plate, a diaphragm secured to said mounting plate and provided with a cam, a motor provided with a shaft perpendicular to the diaphragm and having a cam for engaging the cam attached to said diaphragm, a field piece for the motor, said field piece having a pair of longitudinal orifices diametrically opposite each other, a pair of studs secured to said mounting plate and passing through said orifices in said field piece, for micrometrically adjusting said field piece perpendicularly relative to said mounting plate whereby the degree of engagement between the cam on said motor shaft and said diaphragm may be regulated, said motor shaft having one bearing in said field piece and one bearing in said mounting plate, and means secured to said field piece forming an end thrust bearing for said motor shaft.

6. A device of the character described, comprising a diaphragm, a motor for vibrating said diaphragm including a field piece and a rotary shaft having slight longitudinal movement, a disc commutator on said shaft, brush holders, spring pressed brushes slidably mounted in said holders, and means mounting said holders so that the brushes exert a pressure on the commutator in a direction tending to move the shaft toward the diaphragm interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis and means to oppose the thrust of said brushes and limit the longitudinal movement of said shaft.

7. A device of the character described, comprising a diaphragm, a motor for vibrating said diaphragm including a field piece and a rotary shaft having slight longitudinal movement, a disc commutator on said shaft, brush holders, spring pressed brushes slidably mounted in said holders, and means mounting said holders so that the brushes exert a pressure on the commutator in a direction tending to move the shaft toward the diaphragm, interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis means to oppose the thrust of said brushes and limit the longitudinal movement of said shaft, and means to adjust the motor with respect to the diaphragm.

8. In a device of the character described, a mounting plate, a diaphragm carried thereby, a motor including a rotary shaft, coaxing diaphragm vibrating cams on the shaft and diaphragm, a disc commutator on the shaft, spring brushes engaged with the commutator, said diaphragm and spring brushes acting in opposition to one another when the shaft is rotated, and means to permit limited longitudinal movement of the shaft in either direction.

9. In a motor horn, a diaphragm, a motor for vibrating said diaphragm including a rotary shaft and a field piece, a commutator on said shaft, tubular insulators mounted in said field piece, brushes slidably mounted in said insulators and engaged with the commutator and springs interposed between the insulators and brushes and acting to hold the brushes against the commutator and normally acting to impel the shaft toward the diaphragm interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis.

10. In a motor horn, a diaphragm, a motor for vibrating said diaphragm including a rotary shaft and a field piece, a commutator on said shaft, tubular insulators mounted in said field piece and having flanges, brushes slidably mounted in said insulators engaged with the commutator and springs interposed between the insulators and brushes, adapted to hold the brushes against the commutator and the flanges against the field piece, said brushes acting on the commutator to impel the shaft toward the diaphragm and interengaging members on said diaphragm and motor shaft for producing relative movement between said members in the direction of the shaft axis.

11. In a motor horn, a mounting plate, a diaphragm secured thereto, a motor having an armature shaft journaled at one end in said mounting plate perpendicular to the diaphragm, and carrying means for vibrating said diaphragm, a field piece for the motor, the opposite end of said shaft being journaled in the field piece, said field piece being provided with diametrically opposite openings, threaded studs secured to the mounting plate and extending through said openings, nuts threaded on said studs micrometrically adjusting the motor relative to the diaphragm and means connected to the field piece for moving the armature shaft with the motor.

Signed by me at Chicago, in the county of Cook and State of Illinois, this 19th day of May, 1919.

WILLIAM KAISLING.