D. A. McCONNELL.

VIBRATORY DIAPHRAGM SIGNALING DEVICE.

APPLICATION FILED APR. 24, 1918.

1,400,085.

Patented Dec. 13, 1921.

3 SHEETS—SHEET 1.

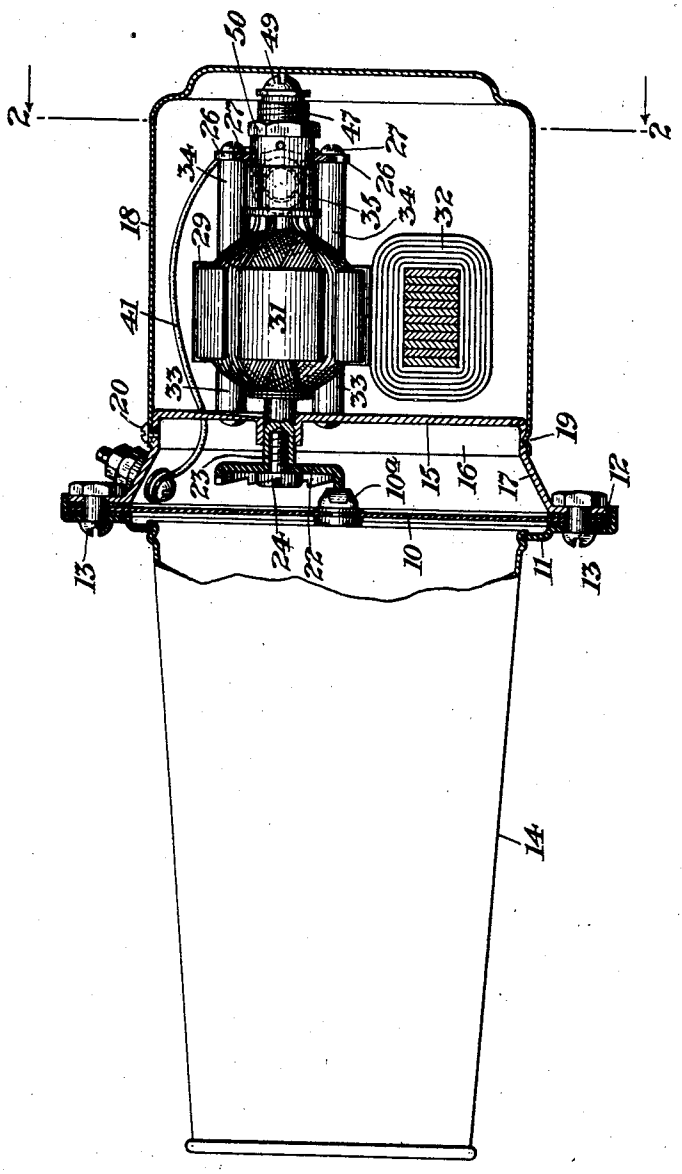


Fig. 1

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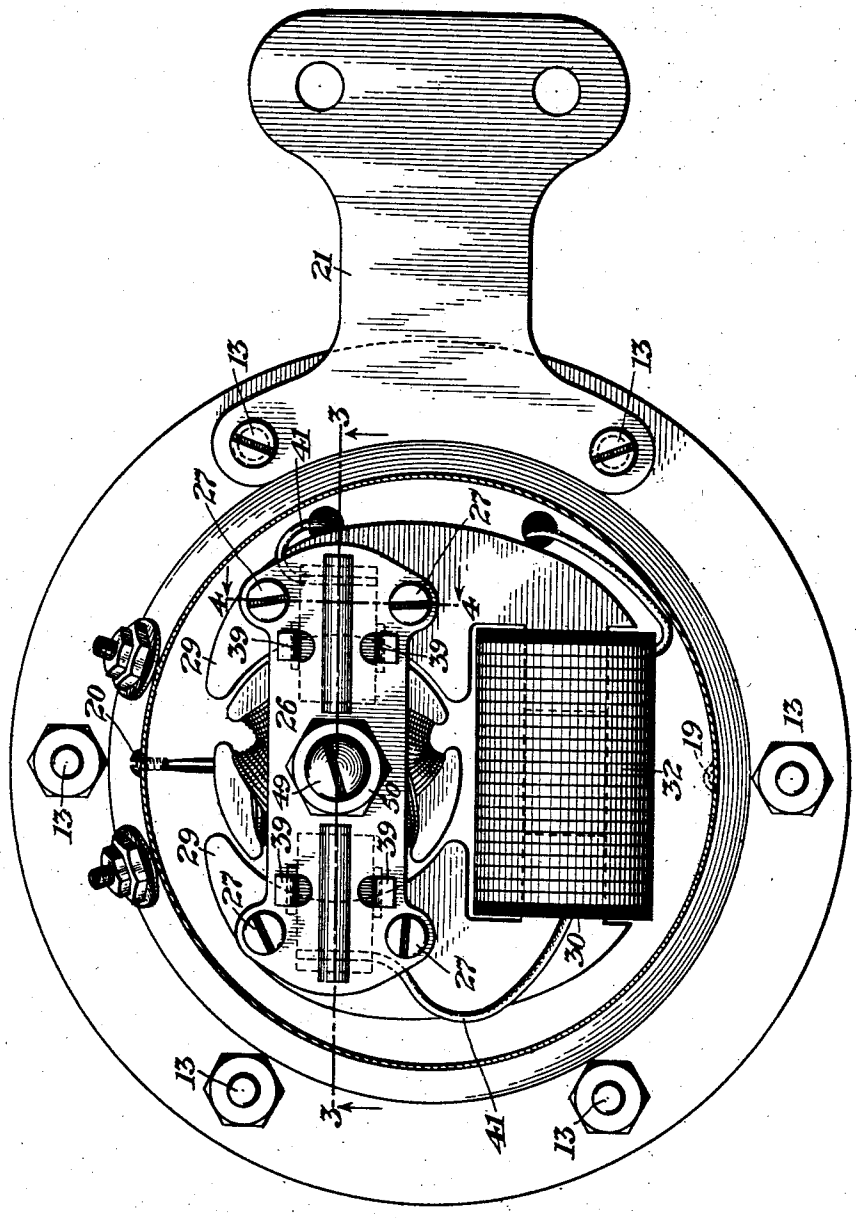


Fig. 2

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3 SHEETS—SHEET 3.

Fig. 4

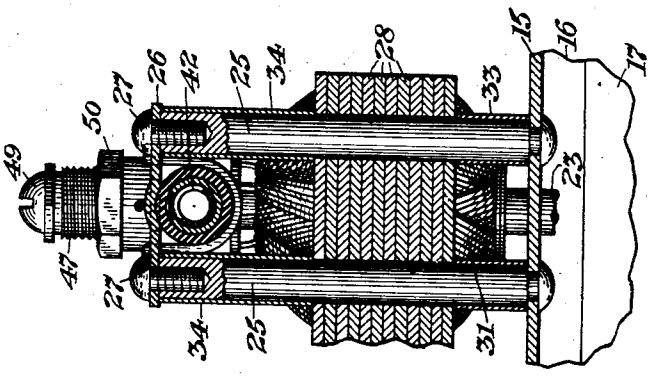
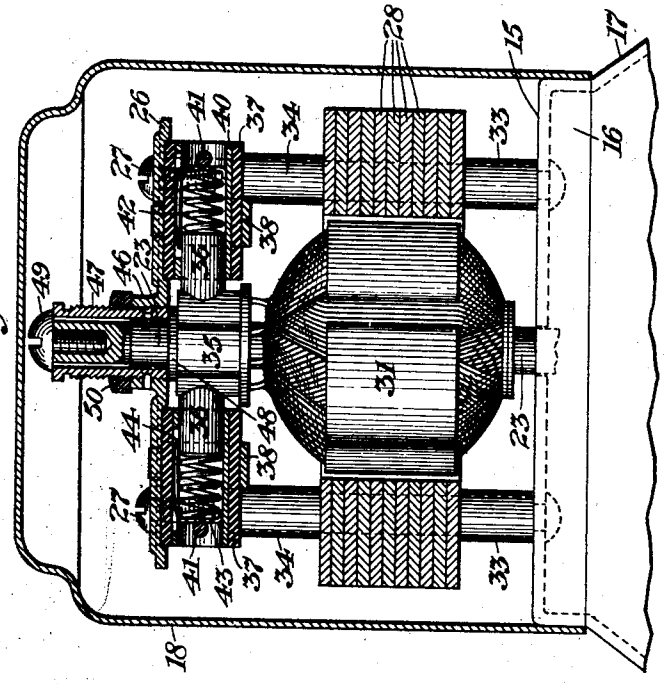


Fig. 3



WITNESS:

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UNITED STATES PATENT OFFICE.

DUNCAN ALEXANDER McCONNELL, OF ARLINGTON, NEW JERSEY, ASSIGNOR TO KLAXON COMPANY, A CORPORATION OF DELAWARE.

VIBRATORY-DIAPHRAGM SIGNALING DEVICE.

1,400,085. Specification of Letters Patent. Patented Dec. 13, 1921.

Application filed April 24, 1918. Serial No. 230,448.

To all whom it may concern:

Be it known that I, DUNCAN A. McCONNELL, a citizen of the United States, and resident of Arlington, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Vibratory-Diaphragm Signaling Devices, of which the following is a specification.

This invention is a signaling device of that type in which sound producing vibrations are imparted to a diaphragm by the high speed rotation of an electric motor-driven member presenting camming teeth or projections engaging with a wear-piece or other part carried by or otherwise operatively positioned in respect to the diaphragm.

In my prior Patent No. 1,160,902 issued November 16th, 1915, I have illustrated a construction of this character in which the motor is so designed as to permit the use of a comparatively large armature eccentrically positioned in a cylindrical casing coaxial with the diaphragm and resonator. Such motor involves a U-shaped motor frame with its side members supported by and extending rearwardly from a dished disk serving the treble function of a diaphragm clamp, a casing support, and an armature shaft support.

The main object of my present invention is to secure certain important advantages of my prior construction and at the same time to materially reduce the cost of manufacture and increase the power without increasing the size. As an important result of my invention, I am able to construct most of the parts of simple, inexpensive stampings, so cut and shaped that they may be easily and quickly assembled and accurately fitted together by comparatively unskilled labor, the minimum number of parts requiring the services of expert machinists.

Further important features of my invention involve the simple and effective construction of the commutator brush supports and the armature shaft adjusting means.

In the accompanying drawings, I have shown one embodiment of my invention. In these drawings,

Figure 1 is a central longitudinal section,

Fig. 2 is an end view on a larger scale, the casing being shown in section on the line 2—2 of Fig. 1, and

Figs. 3 and 4 are longitudinal sections on the lines 3—3 and 4—4, respectively, of Fig. 2.

I have illustrated my invention as embodied in a horn having a vibratory diaphragm 10, the periphery of which is held between two opposed clamping members 11 and 12 which may be of any suitable character and which may hold the diaphragm in any suitable manner as, for instance, by an annular row of bolts 13 and annular washers. The front diaphragm clamp 11 carries a resonator or sound wave projector 14 which is illustrated as being substantially cylindrical but of somewhat smaller diameter at its front end than at the end adjacent the diaphragm.

The rear diaphragm clamp 12 is shown as constituting a peripheral portion of a circular dished plate or disk, the center portion 15 of which is spaced from and substantially parallel to the diaphragm and is connected to the clamping portion by cylindrical and conical tapering portions 16 and 17. A cup-shaped casing of substantially cylindrical form is shown as telescoping with and secured to this cylindrical portion 16 of the plate. It may be secured in position in any suitable manner but is shown as having a projection 19 sprung into a corresponding socket at one point and a screw 20 entering a threaded aperture at a substantially diametrically opposite point on the cylindrical portion 16. The horn may be secured in position by various forms of clamps or brackets. In Fig. 2, I have shown a bracket 21 having a portion adapted to rest against the rear surface of the diaphragm clamp 12 and be held in place by two of the bolts or screws 13. For effecting vibration of the diaphragm, the latter may carry a wear-piece 10^a with which the cam projections or teeth of a rotor 22 may engage. This rotor is disposed between the diaphragm and the plate 15 and is shown as being secured to a shaft 23 by means of a locking screw 24.

The specific details of the part so far referred to are not essential to my present invention and may be the same as shown in my prior Patent No. 1,160,902, above referred to, or they may be widely varied even to the extent of radically re-designing them.

My invention involves particularly a construction of the motor employed for rotating

the shaft 23 and adapted to be supported by the plate 15 within the casing 18, it being important that the casing be not materially larger than the projector 14 and that the motor be of as high power as can be conveniently accommodated to a casing of this size. My improved motor in its preferred embodiment includes a substantially U-shaped frame and a substantially U-shaped coil support and pole piece member carried by the side members of said frame. The frame is shown as being made up of two pairs of rods 25 and a transversely extending sheet metal connecting piece 26. The rods are all substantially parallel and at right angles to the plane of the plate 15 and each has one end riveted or otherwise rigidly secured to said plate. The cross or connecting member 26 is secured to the outer ends of these rods preferably by means of screws 27 extending through said member into the outer ends of the corresponding rods.

The rods serve to support and rigidly hold in place the pole pieces and field coil carrier. These are preferably laminated and formed of a series of superposed sheet metal plates 28, each cut to form two pole piece projections 29 and a field coil supporting portion 30. The edges of the pole piece sections are cut concave so that when the plates are assembled, there is formed a circular passage or chamber for a rotary armature 31 mounted on the shaft 23.

A coil 32 is mounted or wound on the supporting portions 30 and lies with its axis substantially parallel to the diaphragm and at one side of the armature, the axis of the latter being substantially normal to the diaphragm. For supporting this laminated field on the rods 25 and rigidly holding it at the desired position between the plate 15 and the connecting member 26 of the frame, the plates 28 are apertured to receive the rods and the latter are provided with opposing shoulders for engaging with the opposite sides of the upper and lower sheets 28. These shoulders are formed by tubes 33 and 34 slidably mounted on the rods. After the rods are rigidly secured to the plate or base 15, the tubes 33 are placed in position, each with one end resting against said base or plate 15. The laminated field is then slid on the rods until it rests on the ends of the tubes 33 and the tubes 34 are then placed in position and the whole structure locked rigid by the screws 27 which enter the ends of the rods and have their heads binding the transverse frame member against the ends of the tubes 34.

Where the rear wall 15 of the rear diaphragm clamping member is made of sheet metal or iron, precaution must be taken to avoid shunting the lines of force of the field magnet through said sheet metal and, in such case, it is necessary to make the rods 25 of non-magnetic material such as brass. The sleeves 33, if thin enough, may be made of steel without causing too great weakening of the field in this way, but, in most cases, I prefer to make these sleeves of brass, the same as the rods. The upper sleeves 34 being much longer than the lower ones, it is possible to get steel tubing thin enough for use in this location without getting too great short-circuiting of the magnetic field through the stamping 26.

All of these parts are simple and inexpensive to manufacture and may be assembled without the aid of complicated machinery, special tools, or particularly skilful labor.

The armature has its commutator 35 positioned above the field and preferably beneath the transverse frame member 26. For supporting a pair of tubular brushes in engagement with this commutator, the tubular sleeves 37 preferably of fiber or other suitable non-conducting material, are carried by the frame member 26 upon opposite sides of the commutator and preferably between the two rods of each pair which pairs form the side members of the U-shaped frame. The transverse member 26 may be bent upwardly slightly to form a slight socket or seat for the sleeve, as is shown particularly in Fig. 4, and each sleeve may be held in place by a band or loop 38 extending beneath the sleeve and having its opposite ends 39 projecting through slots in the member 26 and bent over to prevent their withdrawal. The seats or sockets in the under surface of the member 26 may be of a length substantially equal to the length of the sleeves 37 so that the ends of the seats or sockets hold the sleeve against endwise movement.

For conducting electricity to the brushes 37, the sleeves 38 each preferably have a metallic or conducting lining 40 within which the brushes 36 slide. The insulated wires 41 merely have their un-insulated terminal portions extending through diametrically opposite apertures at the outer ends of the sleeves 37 and their linings 40. Between the portions of these wires which extend across the sleeves are coil springs 42 which serve partly as conductors although the lining 40 serves as the main conductor between the brushes and the wires. The springs merely hold the brushes in proper engagement with the commutator.

To facilitate the compression of the springs and the holding of them under compression while the wires are inserted in the apertures of the sleeve, I may employ a small disk or cover plate 43 approximately fitting the metallic lining 40 of the sleeve and having a tongue portion 44 extending along a slot through the wall of the lining tube 40.

The tongue 44 does not project out through the sleeve, but only lies in the groove alongside the spring to prevent tilting or dis-

placing of the disk. By having it of greater length than the compressed spring, its end cannot interfere with the slight compression and expansion of the spring during movements of the brush.

For journaling the armature shaft in the transverse member 26 and providing for the positive endwise adjustment of the shaft, either toward or from the diaphragm, to control the amount of overlap of the cam projections on the wear-piece, the frame member 26 has a boss 46 within which is threaded a sleeve 47. This sleeve constitutes the bearing for the shaft 23 although the latter may have its outer extremity of reduced diameter so as to reduce the amount of bearing surface as indicated in Fig. 3. This sleeve may be adjusted endwise until its inner end abuts against a washer 48, or other insulated part, on the shaft at the end of the commutator.

Thus, by rotating the sleeve 47, the shaft may be forced endwise toward the diaphragm. The end of the shaft has a threaded axial passage within which is secured a screw 49, the head of which is larger than the shaft so that it may abut against the outer end of the sleeve 47. The parts are so proportioned that the screw 49, when tightened, only slightly engages with but does not bind upon the outer end of the sleeve. The shaft is thus held against endwise movement in either direction in respect to the sleeve but may rotate in respect to it, and the normally stationary sleeve may be rotated to adjust the shaft in either direction. To facilitate the rotation of the sleeve, its outer end may be so shaped that a wrench may be quickly fitted thereto and a lock nut 50 may encircle the sleeve and abut against the boss 46 to normally lock the sleeve against movement.

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

1. An electric motor, including a pair of supporting rods, pole pieces carried thereby intermediate of the ends thereof, a stamped metal member connecting said rods, a pair of lined sleeves, a band encircling each sleeve and having its end portions secured to said member, brushes longitudinally movable within said sleeves, and an armature shaft journaled in said member intermediate of said sleeves.

2. An electric motor, having a transversely extending frame member, a sleeve threaded therein, an armature shaft journaled in said sleeve and having a portion abutting against one end of said sleeve, and a member carried by said shaft at the free end of the latter and engaging with the opposite end of said sleeve whereby said shaft may be adjusted endwise in either direction by a rotation of said sleeve within said frame member.

Signed at New York city, in the county of New York and State of New York, this 18th day of April, A. D. 1918.

DUNCAN ALEXANDER McCONNELL.