

1,160,902.

Patented Nov. 16, 1915.
 2 SHEETS—SHEET 1.

Fig. 2

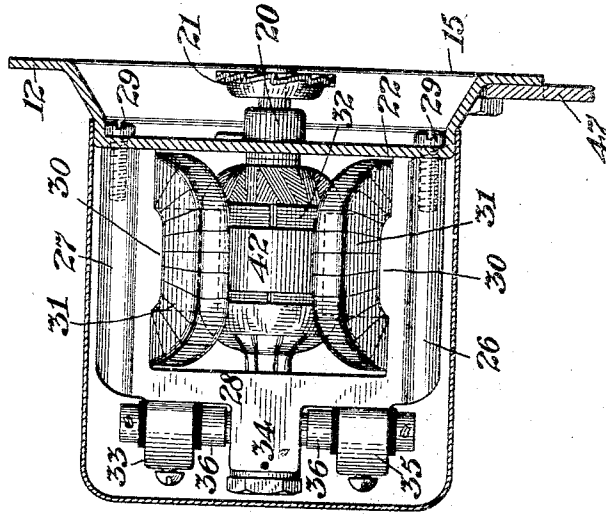
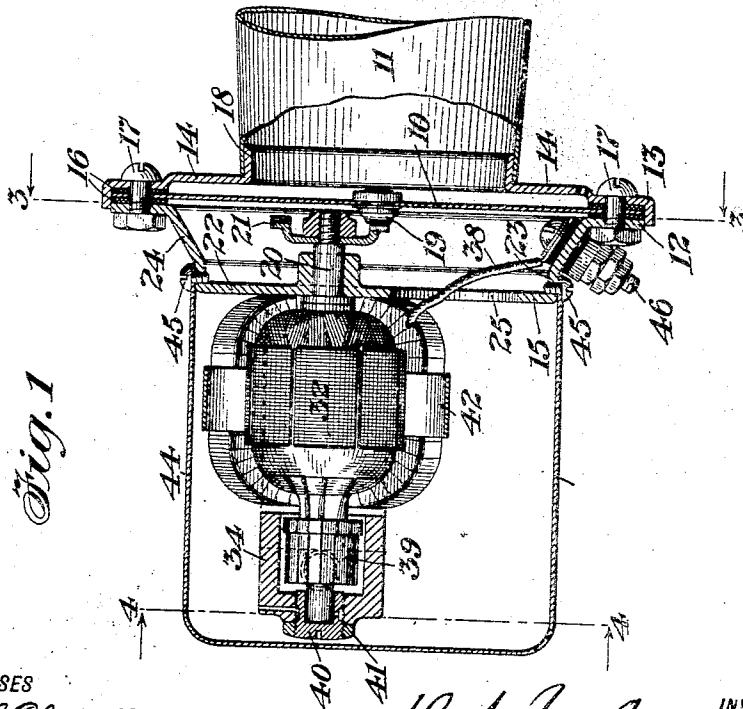


Fig. 1



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 2 SHEETS—SHEET 2.

Fig. 3

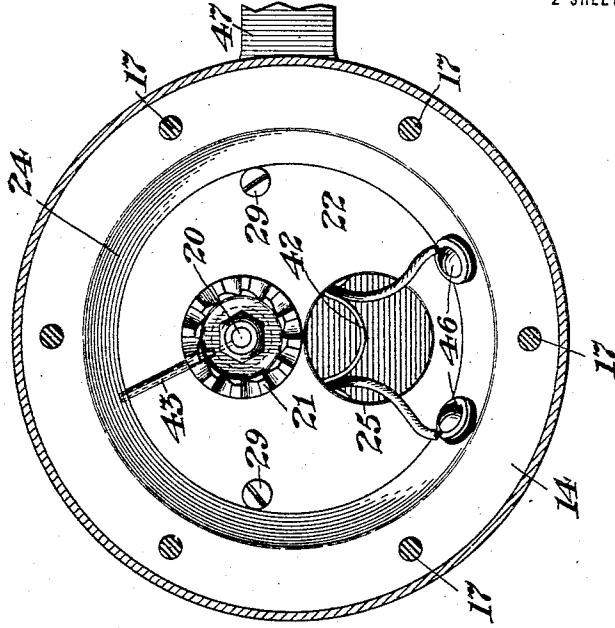
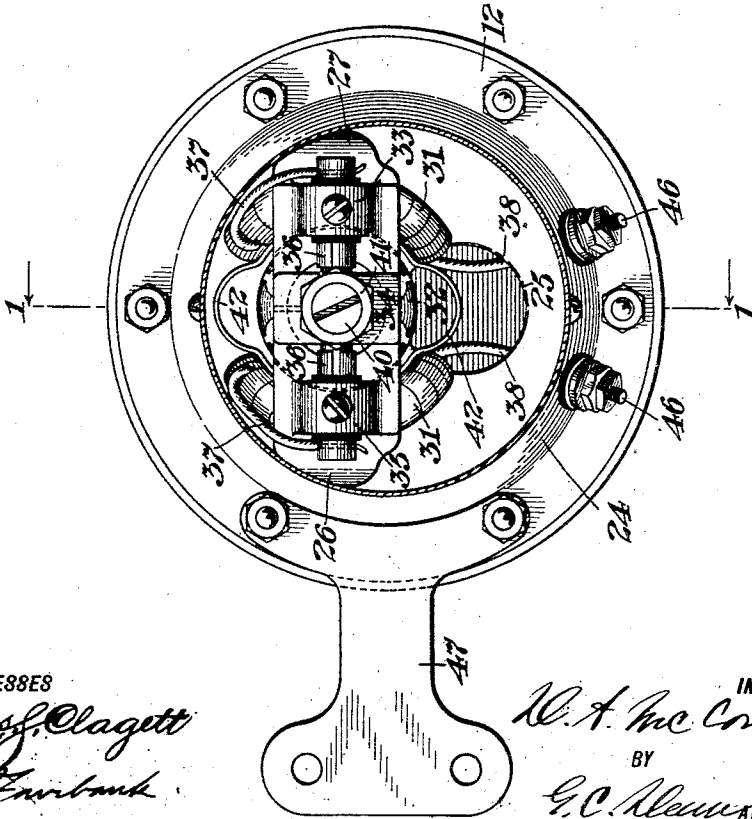


Fig. 4



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UNITED STATES PATENT OFFICE.

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DIAPHRAGM-HORN.

1,160,902.

Specification of Letters Patent.

Patented Nov. 16, 1915.

Application filed April 2, 1913. Serial No. 753,386.

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 Diaphragm-Horns, of which the following is a specification.

This invention relates to mechanical or diaphragm horns and more particularly to that type in which the diaphragm is given a partly forced and partly free vibration at high speed by a rotor driven from a suitable motor.

My invention involves certain improvements in the construction of the motor and the mounting of it in proper relationship to the diaphragm, and the main objects are to simplify the construction, reduce the number of parts, render the parts more accessible and more easy to assemble, adjust and inspect and to reduce the cost of manufacture to a minimum without reducing the efficiency of the device.

An important feature of my improved construction involves the utilizing of the rear diaphragm-casing member as a part of the motor frame and as one support for the armature shaft, so that the remainder of the motor frame may be simplified to a single U-shaped casting secured thereto.

A further important feature involves the supporting of the end of the motor toward the diaphragm by an annular wall also serving as a diaphragm clamp.

Other important features will be more particularly pointed out hereinafter and the novel features defined in the claims.

Reference is to be had to the accompanying drawings, in which similar reference characters indicate corresponding parts throughout the several views.

Figure 1 is a central longitudinal section of a horn embodying my invention, said section being taken on the line 1—1 of Fig. 4, a part of the resonator being broken away; Fig. 2 is an inverted plan view, the motor casing and support being shown in section and the diaphragm and resonator being removed; and Figs. 3 and 4 are sections on the line 3—3 and 4—4 respectively, of Fig. 1.

I have illustrated my invention embodied in a horn employing a diaphragm 10 and a resonator or projector 11. The diaphragm

is illustrated as being held between the annular peripheral portions 12 and 13 of two diaphragm casing sections 14 and 15. Washers 16 of cork, fiber or other non-vibratory material, are preferably interposed between the diaphragm and the faces of the casing sections and suitable bolts or screws 17 hold the diaphragm casing sections, the washers and the diaphragm in the proper relative positions. The front casing section 14 has a large central opening and presents an annular flange 18 to which the resonator may be secured. The diaphragm at its center or in the vicinity thereof is provided with a suitable wear-piece 19 adapted to be engaged by the rotor to give the diaphragm the desired vibrations. The construction and mounting of the diaphragm does not involve any portion of my invention and may be varied or changed without in any way departing from the spirit of my invention. Preferably these parts are similar in construction and operation to the corresponding parts in the commercial Klaxon horn, or as disclosed in the patent of Miller Reese Hutchison, Number 1,043,704, issued November 5th, 1912.

As previously stated my invention relates particularly to the construction of the motor and the means for mounting and supporting the same. In the preferred embodiment illustrated I locate this motor within the rearward projection of the diaphragm or its case, and the armature shaft 20 of the motor is substantially perpendicular to the diaphragm but eccentric in respect thereto. The armature shaft carries a rotor 21 in the form of a face cam or ratchet having projections, corrugations, irregularities or teeth adapted to successively engage with the wear-piece 19 or other thrust member. The eccentricity of the armature shaft is substantially equal to the effective radius of the rotor, although it is evident that any other suitable and well known means may be employed for transmitting motion from the operating face of the rotor to the center of the diaphragm. The particular arrangement of rotor and wear-piece illustrated constitutes no portion of my invention, and therefore any other suitable means may be employed in place of that shown for securing the vibration of the diaphragm upon the rotor of the armature shaft.

One of the principal objects of my inven-

tion is to simplify the construction by reducing the number of parts and the weight of said parts to a minimum, and one way in which I secure this object is by utilizing the rear diaphragm casing section as a part of the motor frame. Preferably the rear diaphragm casing section 15 is in the form of a dished disk and includes a transverse wall 22 spaced from the diaphragm and substantially parallel thereto and connected to the clamping portion 12 by an annular peripheral wall including a cylindrical portion 23 and an inclined or conical portion 24. The transverse wall 22 is spaced from the diaphragm a sufficient distance to permit the positioning of the rotor and wear-piece therebetween and permit the proper vibration of the diaphragm. This casing section has the transverse wall 22 provided with an opening 25 through which the wires or other conductors may freely extend. This transverse wall 22 serves as a bearing for one end of the armature shaft 20 and for supporting the opposite end I provide a substantially U-shaped frame member having side legs or bars 26 and 27 extending rearwardly from the wall 22 and a transverse portion 28 substantially parallel to the wall 22 but spaced therefrom and formed integral with the side bars 26 and 27. The armature shaft at the end away from the diaphragm is supported in the transverse portion 28 of this U-shaped member, as will be described more in detail hereinafter. Thus, it will be noted that the U-shaped bar supports one end of the armature shaft and the rear diaphragm casing section 15 supports the opposite end and that the two together make up the motor frame, while the same member which forms one end wall of the frame and supports one end of the armature shaft also serves as the diaphragm clamping member. The two parts may be secured together in any suitable manner as for instance by screws 29 extending through the wall 22 into the ends of the side bars 26 and 27.

The two side bars 26 and 27 serve to support the pole pieces of the motor and in fact may have inwardly projecting portions 30 integral therewith and constituting said pole pieces. The field coils 31 are preferably made up separately and after being provided with suitable casings to hold the separate wires of the coil together may be slipped on over the pole-pieces prior to the placing of the armature 32 there-between. Thus, the motor may be very easily assembled by first slipping the coils over the pole-pieces, then inserting the armature thereon, and then securing the U-shaped frame member to the wall 22 by means of the screws 29. For holding the coils in position upon the pole-pieces and preventing their slipping inwardly or becoming accidentally displaced,

so as to contact with the armature, I provide suitable spring clips 42 which may extend across from one coil to the other and may be held from inward movement by engaging with the pole-pieces.

The transverse portion 28 of the motor frame member is provided with three lugs or projections 33, 34 and 35 on the outer surface and these three projections have aligned openings substantially parallel to said portion 28. Within the openings of the two end projections 33 and 35 are the brushes 36 which are adjustable and are held in place in any suitable manner. Two insulated wires 37 lead from the two coils to the outer ends of the two brushes and two insulated wires 38 lead from the coils through the opening 25 to terminals on the inclined or conical wall 24. The terminals 46 may be of any suitable character. I have shown bolts extending through insulated bushings and having lock nuts at the outer end for retaining the wires. The central projection 34 not only has an opening transversely thereof through which the brushes may extend, but also has an opening axially of the motor and serves to receive one end of the armature shaft and the commutator 39 with which the brushes engage. The end of the armature shaft preferably fits within a socket in a plug 40 screwed into the outer end of the projection 34, and by adjusting this plug the armature may be moved endwise a limited distance to insure the proper contact of the rotor with the wear-piece and thus absolute accuracy in the forming or assembling of the parts is not required and wear may be taken up. The plug may be held in place by a lock nut 41 and preferably has an annular external groove communicating with an oil duct in the projection 34, as shown in Fig. 4 and communicating with the socket for the armature shaft through a small opening as indicated in Fig. 1. For lubricating the armature shaft at its opposite end I may provide a small duct 43, leading downwardly from the cylindrical wall 23 to the bearing of the armature shaft and upon the side toward the diaphragm, so as not to interfere with the armature or coils. For protecting the motor, I provide a thin casing 44 preferably of metal and preferably of cylindrical form. The casing is shown as being of cup shape with the open end slipping on to the cylindrical wall 23 and then held in place by suitable screws 45. The length of this cylindrical wall determines the endwise sliding movement of the casing and the casing is preferably considerably smaller than the diaphragm, so that the inclined wall serves not only to limit the position of the casing 44, but connects the casing of small diameter to the diaphragm clamps of larger diameter.

The casing 44 also preferably covers the upper end of the oil duct 43 so as to protect the latter from dust and dirt.

It will be noted that by merely removing the two screws 45, the casing 44 may be taken off and all of the parts of the motor will be exposed so that they may be adjusted, replaced or repaired without removing the motor from the horn. By extending the wires 36 from the field coils through the opening 25 and mounting the terminals 46 on the inclined wall 24, it will be noted that the removal of the case 44 does not disturb the wiring connection to the motor and that the motor may be run and tested and its operation noted with the casing removed.

Any suitable means may be employed for supporting the horn, for instance a bracket 47 which may be secured to the diaphragm casing by two of the bolts, which hold the diaphragm clamping portions in position, as shown in Fig. 4.

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

1. In a horn or signaling device, the combination of a circular diaphragm, a diaphragm case, a U-shaped motor frame having the free ends of its side members secured to the diaphragm case and extending rearwardly therefrom and both substantially on the same side of a plane of the axis of said diaphragm, a motor armature supported by the transverse member of said frame and by said diaphragm case and disposed at right angles to said diaphragm and eccentric in respect to the axis thereof, and a casing inclosing said motor frame and armature and engaging with said diaphragm case.

2. In a horn or signaling device, the combination of a circular diaphragm, a diaphragm case, a U-shaped motor frame having the free ends of its side members secured to the diaphragm case and extending rearwardly therefrom and both substantially on the same side of the plane of the axis of said diaphragm, a motor armature supported by the transverse member of said frame and by said diaphragm case and disposed at right angles to said diaphragm and eccentric in respect to the axis thereof, and a cylindrical casing inclosing said motor frame and armature and concentric in respect to said diaphragm.

3. In combination, a dished disk constituting a supporting member, a substantially U-shaped frame disposed substantially on one side of a plane including the axis of said disk having side members and a transverse member integral therewith, the free ends of said side members being rigidly secured to

said disk and each of said side members having integral pole pieces projecting toward each other, coils encircling said pole pieces, spring clips for retaining said coils in place, an armature between said pole pieces and having its shaft journaled in said transverse member and in said disk, and said transverse member having a plurality of outwardly extending integral projections, one of which serves to receive the commutator of said armature and two of which serve to receive brushes adjustable toward and from said commutator.

4. In combination, a transverse wall, a U-shaped integral frame having the ends of its side members secured to said wall and said side members presenting inwardly extending pole pieces; coils detachably mounted upon the said pole pieces and brushes carried by said transverse member in axial alignment with each other and adjustable toward and from each other and an armature having its commutator between said brushes and having its shaft journaled in the transverse member of said frame and in said wall.

5. A horn or signaling device, including a circular diaphragm, a dished disk having its peripheral portion serving as a diaphragm clamp and its intermediate portion spaced from said diaphragm, a U-shaped motor frame having its side members secured to the intermediate portion of said disk substantially at one side of a plane including the axis of said diaphragm, a motor armature journaled in said disk and in the transverse member of said frame, and brush supports integral with the transverse member of said frame.

6. A horn or signaling device, including a circular diaphragm, a dished disk having its peripheral portion serving as a diaphragm clamp and its intermediate portion spaced from said diaphragm, a U-shaped motor frame having its side members secured to the intermediate portion of said disk substantially at one side of a plane including the axis of said diaphragm, a motor armature journaled in said disk and in the transverse member of said frame, and a cylindrical cup-shaped casing concentric with said diaphragm and inclosing said frame and said armature and having its open end engaging with said disk.

Signed at Newark in the county of Essex and State of New Jersey this 7th day of March, A. D. 1913.

DUNCAN A. McCONNELL.

Witnesses:

WILLIAM O. TURNER,
Geo. S. MORGAN.