Sept. 24, 1929. F. F. DORSEY 1,729,284

ELECTROMAGNETIC HORN

Filed July 16, 1926

Fig. 1

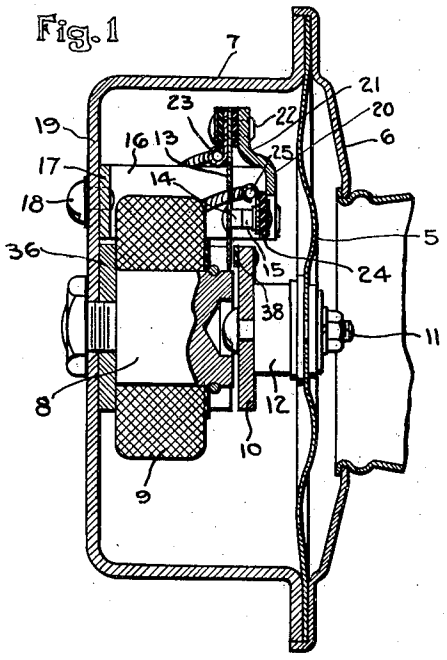


Fig. 2

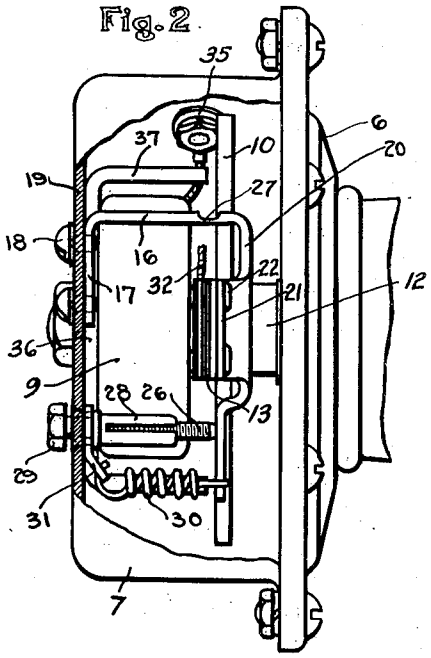
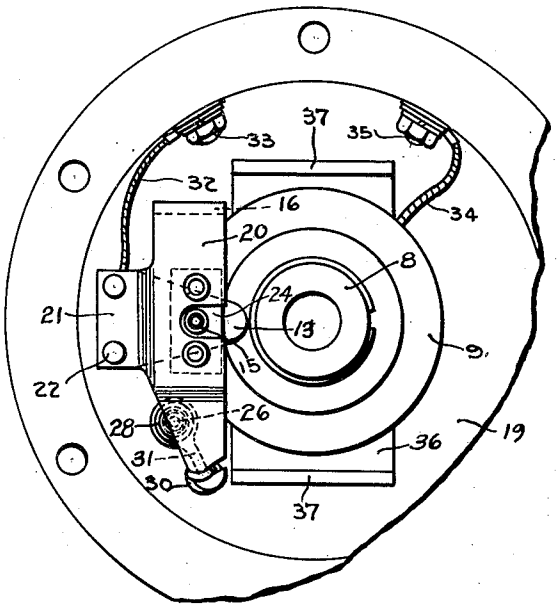


Fig. 3



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Patented Sept. 24, 1929 1,729,284

UNITED STATES PATENT OFFICE

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ELECTROMAGNETIC HORN

Application filed July 16, 1926. Serial No. 122,812.

The invention relates to electromagnetic horns or sound signals of the kind in which a diaphragm is vibrated by the action of an electromagnet. In such horns the coil by which the magnet is energized is usually controlled by a circuit-breaker moved by engagement with the armature or some other vibratory member of the horn.

The object of the invention is to provide a circuit-breaker of simple, compact and inexpensive form for embodiment in a horn of the type referred to, and to provide simple and convenient means for adjusting the operative position of the circuit-breaker. More particularly, an object of the invention is to produce a circuit-breaker which is adapted in form to the restricted space within the body of such a horn at one side of a magnet having a centrally located core and winding.

To the foregoing ends the invention consists in the circuit-breaker hereinafter particularly described, as it is defined in the appended claims.

In the accompanying drawings, Fig. 1 is a side-elevation, partly in median section, of a horn embodying the present invention. Fig. 2 is a plan-view of the same horn with the upper portion of the housing broken away to show the interior parts, and Fig. 3 is a front-elevation of the housing and the parts fixed to and inclosed within it, the vibratory members and the forward portion of the horn being removed.

The invention is illustrated as embodied in a horn having a diaphragm 5 of thin sheet metal, which may be corrugated, as shown, to impart to it, the necessary stiffness. This diaphragm is clamped, at its margin, between a front plate 6 and a body shell or housing 7.

The diaphragm is actuated by an electromagnet having a core 8 which is surrounded by a coil or winding 9. The magnet comprises, also, a generally U-shaped member 36, which embraces the winding and has polar extremities 37 on either side thereof.

The magnet cooperates with an armature in the form of a flat steel bar 10, which is fixed to the middle of the diaphragm by means of a screw or bolt 11, a spacer 12 being interposed between the armature and the diaphragm.

The housing 7 has a flat rear wall constituting a stationary support or a base-plate 19, upon which the magnet is fixed in a position coaxial with the diaphragm.

The parts so far described are substantially similar to those of an electromagnetic horn which I have described in previous applications, and they are therefore not claimed herein, but the circuit-breaker in which the present invention resides is especially adapted for use in a horn having a construction such as that just described. This circuit-breaker comprises a blade-spring, 13 of thin and resilient steel or other sheet metal, and a movable contact 14 carried by the blade-spring. A stationary contract 15 cooperates with the movable contact. The blade-spring and the stationary contact are both supported by a member which is normally stationary but which may be moved, through a slight distance, to adjust the operative position of the circuit-breaker. This stationary support is shown as having the form of a single elongated blank of sheet metal, comprising a part 16 extending parallel to the axis of the casing and fixed, at its rear end, to the plate 19 by means of screws. These screws engage a bent extension 17 at the rear end of the part 16. At the front end of the part 16 the support is bent at a right angle so as to provide a part 20 substantially parallel with the diaphragm. At its middle portion the part 20 has an upwardly extending lug 21, and the blade-spring 13 is secured to this lug by rivets 22 but is insulated from the lug by interposed insulating material, as shown in Fig. 1. A terminal 23 is secured in place against the blade-spring, by means of the same rivets 22, and through a wire 32 this terminal is connected with a binding-post 33.

The stationary contact 15 is fixed to the middle of a plate 24 of insulating material, and this plate is riveted, at its ends, to the part 20 of the support. A terminal 25, engaged by the contact 15, is connected to one terminal of the coil 9, as shown in Fig. 1. The other terminal 34 of the coil is connected with the other binding-post 35.

The support is made of sheet metal which, while substantially thicker and more rigid

than that of the blade-spring 13, is still flexible enough to permit a movement by which the operative position of the blade-spring and the contacts may be adjusted. The blade-spring projects radially toward the axis of the magnet, and its inner end lies behind the armature 10 and is adjusted at a position in which it will be engaged and moved by the armature at each rearward vibration, so as to cause the contact 14 to be disengaged from the contact 15 and thus to break the circuit through the magnet. The adjustment in question is effected by means of a screw 26, which engages the rear surface of the support and is threaded into a sleeve 28, fixed to the rear wall or plate 19, the head 29 of the screw extending to the outside of the housing so as to be readily accessible. If it be desired to adjust the blade-spring to a position nearer the normal position of the armature, this is accomplished by turning the screw in a direction to move the support forwardly. This movement occurs chiefly in the part 20 and is permitted by bending of the support, particularly in the part 16. To facilitate and localize such bending, and at the same time to permit the use of relatively thick and firm material in the support, it is preferable to provide a transverse notch 27 in the part 16 to increase the flexibility of the material at this point.

The resiliency of the metal may keep the support in engagement with the screw 26, and this screw rigidly resists rearward bending of the support when the blade-spring is engaged and bent rearwardly by the armature. To prevent the possibility of looseness in the parts, however, it is desirable to use a spring to hold the support firmly against the screw 26, and for this purpose a coil-spring 30 may be used as shown particularly in Fig. 2, one end of the spring being attached to the lower end of the support while the other end is attached to an eye 31 fixed to the plate 19.

It will be apparent that the construction just described provides, in a simple and effective manner, for the adjustment of the circuit-breaker, while at the same time it permits no vibration in any of its parts. The extension of the adjusting screw through the rear wall of the housing makes it conveniently accessible for the purpose of adjustment, while the constant spring pressure against the screw in one direction causes the screw to be held frictionally against any accidental rotation while the horn is in use.

A piece of insulating material 38, fixed to the rear surface of the armature, prevents direct engagement between the metal of the armature and that of the blade-spring, and by this means, together with the insulation of the two contacts, the electric circuit is entirely insulated from the mechanical parts of the horn.

The invention claimed is:

1. In an electromagnetic horn comprising a diaphragm, an armature attached thereto, and an electromagnet cooperating with the armature and having a core concentric with the diaphragm, a circuit breaker, for controlling the magnet, comprising: a movable contact, a relatively flexible blade spring, on which the movable contact is mounted, arranged with its length substantially radial with respect to the axis of the magnet and with its inner end lying in the path of movement of the armature so as to be engaged and moved thereby, a stationary contact cooperative with the movable contact, an adjustable stationary support, for the blade-spring and the stationary contact, comprising an elongated member of sheet-metal to which the stationary contact and the outer end of the blade-spring are rigidly attached, but from which one at least of them is insulated, said member arranged with its length substantially at a right angle with the length of the blade-spring, and screw-threaded means engaging one end of said support and operable to move the support in the general direction of movement of the movable contact so as to adjust the operative position of the blade-spring; in combination with a rigid stationary member of the horn to which the other end of the support is rigidly attached, the support consisting of material substantially stiffer than the blade-spring so as not to participate in the operative movement thereof, but being sufficiently flexible to permit bending, at the part between its fixed end and the point of attachment of the blade-spring, so as to permit angular displacement of the support by the screw-threaded adjusting means.

2. In an electromagnetic horn having a diaphragm, an armature attached to the diaphragm in the rear thereof, a stationary plate in the rear of the armature, and a magnet supported by said plate and having a core concentric with and projecting toward the diaphragm: a circuit-breaker, for controlling the magnet, comprising a continuous strip of resilient sheet-metal attached at one end to said plate, projecting forwardly from the plate but bent, at a substantial distance therefrom, at a substantially right angle and extending thence substantially parallel with and between the plate and the diaphragm and alongside the magnet, adjusting means engaging the free end of said strip, for moving said end in a direction normal to the plate, a stationary contact mounted on but insulated from said strip, a movable contact cooperative with the stationary contact, a blade-spring carrying the movable contact and attached, at its outer end, to said strip but insulated therefrom, said spring extending radially toward the axis of the diaphragm with its inner end in the path of movement of the armature, and a body of insulating material

interposed between the spring and the armature and attached to one of these parts.

3. In combination with a stationary member of an electromagnetic horn, a circuit-breaker comprising a strip of resilient sheet-metal attached, at one end, to said stationary member, means engaging the strip, at a point remote from its point of attachment, for bending the strip to adjust its position, a blade spring attached to said strip and projecting beyond one side-edge thereof, and co-operative contacts mounted respectively on the strip and the blade-spring, one at least of said contacts being insulated from the member on which it is mounted.

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