Oct. 22, 1935. G. ZEININGER 2,018,479

ELECTROMAGNETIC HORN

Filed Aug. 11, 1930

Fig. 1.

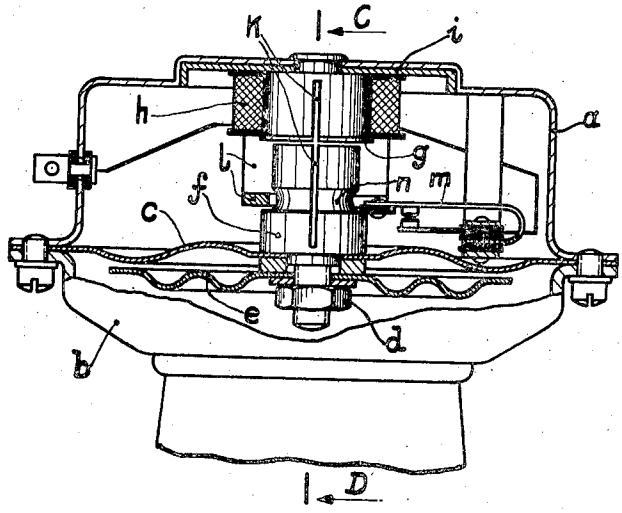
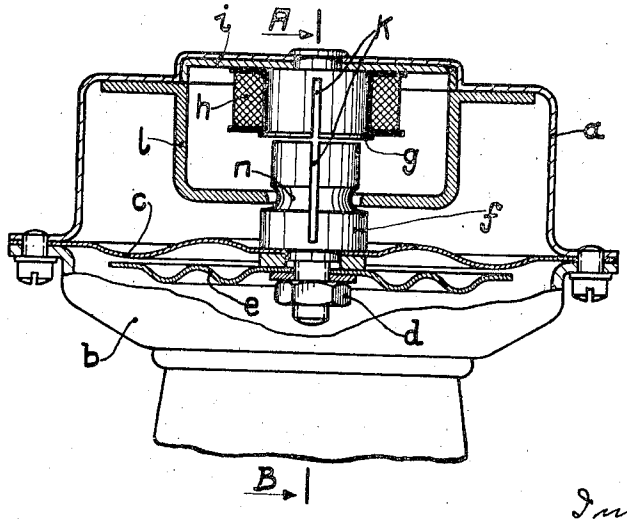


Fig. 2.



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ELECTROMAGNETIC HORN

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3 Claims. (Cl. 177—7)

The present invention relates to electro-magnetic horns more particularly for motor vehicles.

The object of the invention is a simple construction which is easily manufactured and which, in spite of its simplicity produces a musical and penetrating tone which is retained even when the horn has been in use for a considerable time. For this purpose the electromagnetic armature is secured to the diaphragm in known manner and a further guide for the armature is omitted. If however a simplified horn of this kind is to give a musical tone care must be taken by suitable means that the armature rocks substantially in the same manner as if it were guided at two places so that the armature cannot move into an inclined position or be struck on one side by the electro-magnet causing forces to act on the diaphragm which tend to make the diaphragm bend into a position other than that parallel to its position of rest.

This is obtained according to the invention in that the flux passing into the armature at its end passes out of it into a yoke forming a closed flux path, which yoke lies considerably nearer the diaphragm than does the free end of the armature.

One form of the construction of the invention is shown by way of example in the accompanying drawing in which:—

Figure 1 is a part sectional view on the line AB of Figure 2 and

Figure 2 is a part sectional view on the line CB of Figure 1.

The casing of the horn consists of two metal parts *a* and *b* between the flanges of which is stretched a diaphragm *c* at its edges. A circular corrugated metal plate *e* is secured to the diaphragm *c* by a nut *d* together with a cylindrical armature *f*. The armature *f* has a flat end, the distance of which from the diaphragm in this example is about .222 of the diameter of the diaphragm, and the diameter of which is about a sixth of the diameter of the diaphragm. During operation of the horn, this end abuts against the end of a magnet core *g* which is also flat. The armature is mounted on the diaphragm with a surface which amounts to about .222 of the diameter of the diaphragm. The magnet core *g* has mounted on it a magnet coil *h*, and together with an iron disc *i* is riveted to the base of the casing lid *a*. The armature *f* and the core *g* have radial longitudinal slots *k* so that there is low eddy current loss.

Welded to the base of the casing lid *a* is a U-shaped iron flux path yoke *l* which member enshrouds the magnet and completes the iron path from the magnet core to the armature. A centre opening for the armature is provided in the web part of the iron yoke *l* and adjacent to this centre opening is a lateral recess for an interrupter spring *m*. The armature *f* is provided with an annular groove *n* at the place where it passes through the flux yoke *l* and the part lying between this groove and the diaphragm is increased in diameter to form a flange which is separated from the flux yoke *l* by an air gap greater than the air gap between the end of the armature and the core *g* and serves to operate the interrupter spring *m*. The air gap between the flange and the flux yoke is smaller than that between the annular groove and the flux yoke so that the flux path between the armature and the guiding member is in an axial direction.

As the magnetic flux passes over the iron disc *i* to the guiding member *l* the casing of the horn can consist of relatively thin metal and if desired the iron disc can be disposed externally of the casing instead of inside the casing as shown.

It will be seen that a horn structure has been provided in which the armature is secured at one end to and supported solely by the diaphragm, and that yoke member *l* provides a return path for the magnetic flux passing out from the free end of the armature and into the electro-magnet, said flux being returned to the end of the armature near the diaphragm.

The construction described makes it possible to obtain a satisfactory guiding of the armature and of the diaphragm which is important for obtaining a uniform tone.

If, for example, during the operation of the horn the diaphragm is overstressed through any reason so that it endeavours to assume an inclined position then this will be counterbalanced by the considerable leverage of the magnetic pull acting on the end of the armature.

By limiting the diameter of the end, tilting moments which can occur between the end and the core of the electromagnet are limited, similarly the carry over point of the flux from the armature to the magnet yoke is moved forward in the same sense from the end of the armature to the diaphragm. On the other hand, the ample seating surface of the armature on the diaphragm prevents the armature from assuming an inclined position on it. The diaphragm will therefore endeavour to maintain its normal position and the striking of the armature against the core of the magnet being thus maintained uni-

form, guarantees a penetrating tone especially when using an oscillating plate.

I claim:

1. An electromagnetic horn comprising in combination a casing, a diaphragm secured at its periphery to said casing, an armature secured at one end to and supported solely by said diaphragm and extending axially thereto, an electro magnet secured to the casing in a position coaxial with the armature, an interrupter in circuit with said electromagnet, a U-shaped metal yoke partially enshrouding the armature to form therewith a closed flux path and having an extension towards the armature located nearer to the diaphragm than the free end of the armature, and an iron plate bridge magnetically connecting the ends of the yoke and said electro-magnet and secured to the cover of the casing to strengthen the same and provide a mounting for said electromagnet, whereby the magnetic flux passing from the free end of the armature and into the electromagnet is returned to the armature by said yoke at a point nearer to the diaphragm than the free end of said armature.

2. An electromagnetic horn comprising in combination a pot casing having a magnetic bottom, a diaphragm secured at its periphery to the open end of said casing, a magnetic armature secured at one end to and supported solely by said diaphragm and extending at right angles thereto, an electromagnet secured to said bottom in alignment with said magnetic armature, a magnetic U-shaped yoke member mounted in said casing with its arms in engagement with said magnetic bottom and its loop extending toward said diaphragm, said yoke member being provided with an aperture in its web portion through which said armature extends to provide an air gap between said yoke member and said armature.

3. An electromagnetic horn comprising in combination a pot casing having a magnetic plate in the bottom thereof, a diaphragm secured at its periphery to the open end of said casing, a magnetic armature secured at one end to and supported solely by said diaphragm and extending at right angles thereto, an electromagnet including a coil and a core secured to said magnetic plate with the core presenting a surface in alignment with an end surface of said armature, a magnetic U-shaped yoke member mounted in said casing with its arms in engagement with said magnetic plate and its loop extending toward said diaphragm, said yoke member being provided with an aperture in its web portion through which said armature extends to provide an air gap between said yoke member and said armature.

GUSTAV ZEININGER.