Oct. 20, 1925. 1,557,658

L. CHOLLET

MECHANICAL HORN

Filed Dec. 28, 1922

Fig. 1.

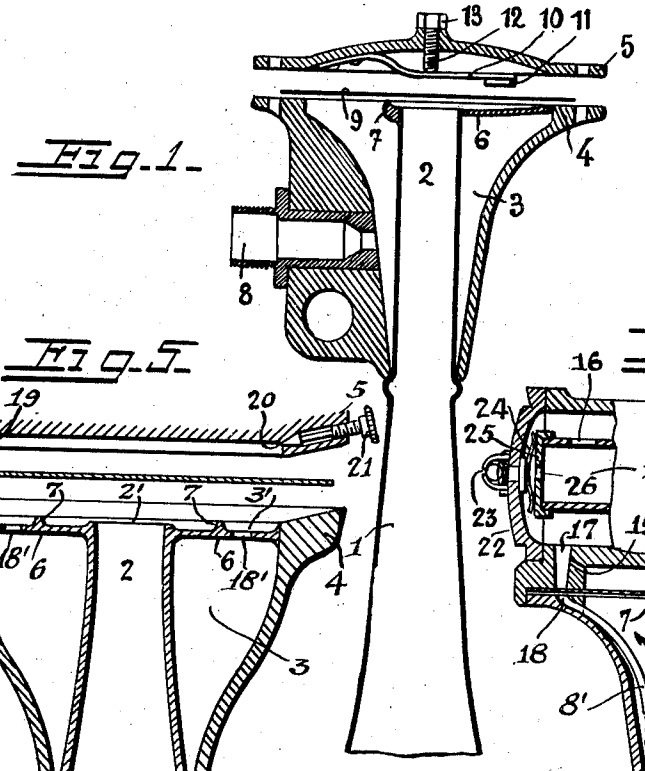
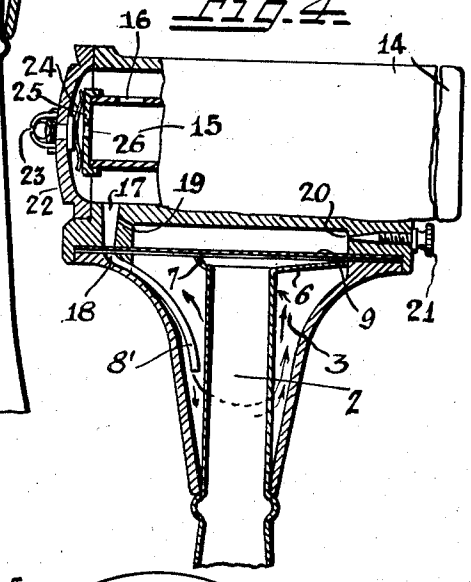


Fig. 5.

Fig. 4.



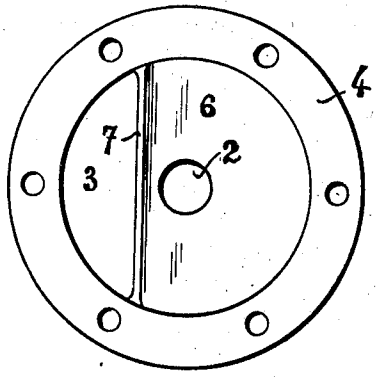


Fig. 2.

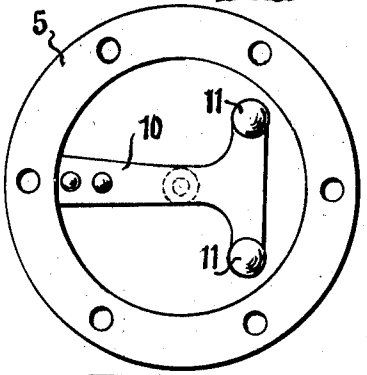


Fig. 3.

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Patented Oct. 20, 1925. 1,557,658

UNITED STATES PATENT OFFICE.

LOUIS CHOLLET, OF PARIS, FRANCE, ASSIGNOR TO COMPAGNIE INDUSTRIELLE ET COMMERCIALE DU CYCLE ET DE L'AUTOMOBILE, OF NEUILLY-SUR-SEINE, FRANCE.

MECHANICAL HORN.

Application filed December 28, 1922. Serial No. 609,405.

To all whom it may concern:

Be it known that I, LOUIS CHOLLET, a citizen of the Republic of France, and resident of Paris, in the Republic of France, have invented certain new and useful Improvements in Mechanical Horns, of which the following is a specification.

This invention relates to improvements in mechanical horns and has for its object so to construct a horn that it shall be light, compact and cheap and give either loud or soft sounds as and when desired whereby it becomes unnecessary to employ two horns when a motorist desires on occasions to give an imperative warning.

The invention is however in no way confined to horns for motor vehicles but it may be used in factories, harbours, boats, etc. It gives a bugle like note.

According to this invention a horn of the type having a vibrating membrane secured between an expansion chamber and its cover is so constructed that the chamber is provided with an end carrying a horn and having on it a projection against which the membrane alone contacts on vibrating.

In the accompanying drawings illustrating the invention Figure 1 is a cross section of the horn and Fig. 2 an underside view of the cover 5. Figure 3 is a plan with cover 5 removed. Figures 4 and 5 show modifications.

1 is the horn having an extension 2 passing through expansion chamber 3 on which there is a circular flange 4 for the purpose of securing the cover 5.

The extension 2 does not end flush with the flange 4 but is carried by an end piece 6 which partially closes chamber 3 and is soldered or otherwise attached to flange 4 and is terminated by a rigid strip 7 whose upper surface is in the plane of flange 4. The end piece 6 is concave and lies lower than flange 4 and the highness of the note emitted depends partially on its degree of concavity.

It will be seen that a metallic membrane 9 resting on flange 4 and whose rim is held between the flange and the cover bears slightly on the strip 7.

8 is a small tube through which air passes to chamber 3. It can be seen that when air enters chamber 3 under a certain pressure (where it loses its rotational velocity), it will act upon a segment of membrane 9 and raise it; air will thus pass between it and the upper surface of strip 7. As the air escapes expansion takes place in chamber 3 and the elasticity of membrane 9 causes it again to contact with strip 7; a speed of vibration is acquired giving rise to a note that is intensified by horn 1 without any effect due to the extension 2. The air cushion obtained between membrane 9 and the cover 5 forms a counterforce that aids the return of membrane 9; however to have a powerful note it is necessary for the air current to be travelling at high speed or under high pressure and in this case the membrane would remain in an open position and no sound would be produced.

This is easily remedied however by adjusting the tension on the membrane, by means of a plate 10 secured to cover 5. Plate 10 cooperates with the air cushion and bears on the upper face of the membrane through one or more contacts 11 adjusted by a screw 12 which can be regulated from the outside by a nut 13. As and when desired screw 12 is adjusted to give the desired intensity of sound according to the air supply whether by bulb or mechanical feed. The contacts 11 act in the same way as the vibrating membrane or sound producer does in musical instruments and strip 7 forms the edges of the hollow in which originate the contracting and expanding waves producing the note which is intensified and distributed by the horn.

To prevent the fixed point or points 11 unduly distorting the membrane the incoming air may be utilized to cushion membrane 9 as is illustrated in Figure 4 in which there is an accessory feed pump, 14 being the electric motor on whose shaft is a pump 15 of the known fan type.

Air drawn through motor 14 (which it cools in passing) is forced through opening 16 into a chamber from which it issues through passage 17 and passage 18 in chamber 3 into a pipe 8′; owing to the position of the end of pipe 8′ in chamber 3 the air circulating around extension 2 of the horn loses its rotational velocity and behaves in the same way as described for the arrangement shown in Figure 1 to 3.

The air may moreover be delivered to passage 17 from some source of supply or directly into chamber 3 as in the preceding case. Passage 17 is connected to chamber

3 behind the membrane 9 by a passage 19 of very small diameter. In addition to which there is an outlet 20 adjusted by a needle valve 21 to allow air to pass out to the atmosphere.

By adjusting needle valve 21 a cushioning effect in rear of membrane 9 similar to that effected by plate 10 in Figure 1 can easily be obtained. This arrangement is much more efficient than that before described in that the air cushion is acting upon the entire surface of the membrane and not only on one or two points; so that by this equal distribution of the pressure there is no fear of distortion of the plate other than the vibratory movements that give rise to the note.

By regulating valve 21 or screw 13 in Figure 1 the same results are obtained, i. e. a note of high or low pitch. Thus by means of these two regulating devices the power of the horn may be modified as desired to suit the surrounding conditioned whether in the town or in the open country without using more than one instrument.

The valve 21 may also be placed on the inlet 19 giving exactly the same result.

Or two needle valves may be employed to control outlets 19, 20, thereby increasing security, but of course if the horn is only going to be used for one purpose the valves 19, 20 may be adjusted during the manufacture and there would then be no need of either. The essential factor is that the cushioning effect is caused by the air supply on the entire area of membrane 9. 23 is a ball acted upon by a spring and having for its object to allow of the lubrication of the rotary pump.

Horns are known in which a membrane opens and closes on the mouth piece itself and others where the use of the air supply as a means of cushioning may similarly be applied in the majority of cases as described above. This adaptation is included in the present invention and also the use of the air cushioning effect using the supply itself whether from a mechanical reservoir or bulb.

When the horn has an elastic means in conjunction with the membrane, for example a movable mouthpiece mounted on a spring valve, there is no need to provide an outlet 20 in the air cushioning chamber, equilibrium being obtained by the valve; it will be sufficient if the passage 19 is large enough.

Strip 7 against which the membrane 9 vibrates may be raised higher or another strip may be provided parallel and symmetrical with respect to the centre of the extension 2; the semi-circular part 6 of the base of the chamber 3 may then be eliminated, reducing it to a rectangular channel bordered by two raised edges exactly similar to the grooved channel in an ordinary wind instrument.

In this case membrane 9 is subjected to the pressure of the air in chamber 3 on two symmetrical sectors on its front surface and the air cushioning effect uniformly over its entire rear surface, giving easy equilibrium and a very clear note.

The raised strip 7 (single or double) may be replaced by one circular raised portion as shown in Figure 5 which has the advantage of giving absolutely symmetrical displacements of the membrane.

Referring to Figure 5 the end 6 extends over the whole surface of chamber 3 and is provided with a circular projection 7. The air passing in at 17, 18, into the expansion chamber 3 comes beneath membrane 9 through one or more holes 18′ and expands in a circular channel 3′ formed between the projection 7 and flange 4 by which it is secured.

This projection may be given a certain inclination to the axis of the instrument and also the cover 5 thus forcing the rim of membrane 9 to camber and thus increase to a substantial extent its tension against projection 7 to which the loudness of the instrument is due.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:

1. In a sound producing instrument the combination with a horn, an inner extension thereof, an air supply entrance, and an air expansion chamber, of an end piece mounted on the inner end of the said horn extension and adapted to partially close the open end of the said air expansion chamber, a rigid strip on the said horn extension end piece; a membrane adapted to bear lightly on the said rigid strip, means for securing said membrane on the end piece, and means for adjusting the tension of the membrane.

2. In a sound producing instrument the combination with a horn, an inner extension thereof, an air supply entrance, an expansion chamber and a cover piece, of an end piece mounted on the inner end of the said horn extension and adapted to partially close the open end of the said air expansion chamber, a rigid strip on the said horn extension end piece, a membrane secured between the said expansion chamber and the said cover piece, an adjustable plate secured within the said cover piece and adapted to be actuated by the air pressure acting on the entire surface of the membrane; a passage leading from the air supply entrance to the air expansion chamber, and an air outlet of adjustable diameter.

3. A sound producing instrument comprising a horn, an inner extension thereof, an

expansion chamber, a flange thereon, a cover secured to the flange, a concaved end piece on the extension partially closing expansion chamber, a rigid strip on end piece, a membrane held by its rim between the flange and the cover and bearing lightly on the strip, a plate secured to cover and provided with contacts, and means comprising a screw and a nut adapted to adjust the tension in the membrane.

In witness whereof I have hereunto signed my name this 12th day of December 1922.

LOUIS CHOLLET.