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K. WENZ

DIAPHRAGM SOUNDER

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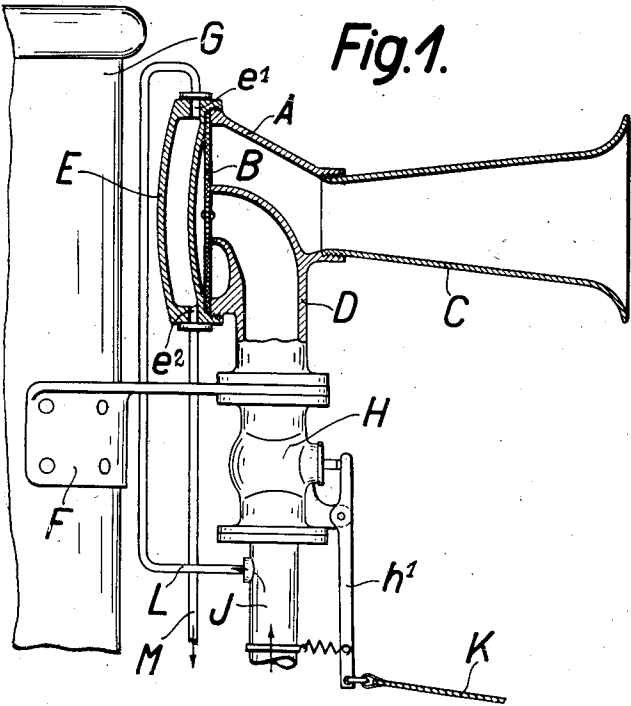


Fig. 1.

Fig. 2. Fig. 3.

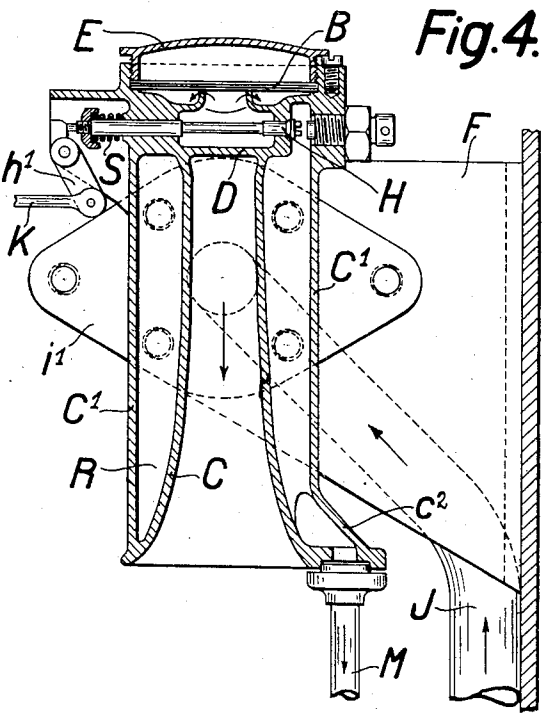
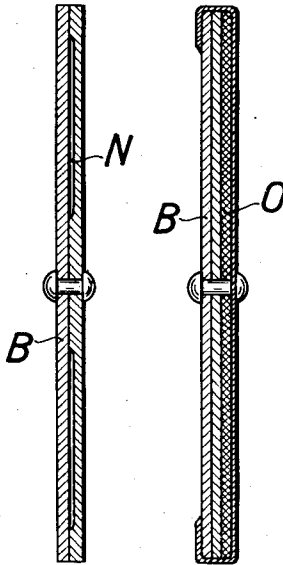


Fig. 4.

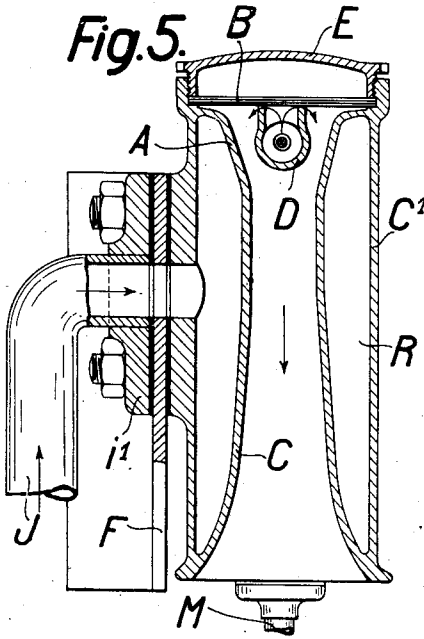


Fig. 5.

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DIAPHRAGM SOUNDER.

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The invention relates to sounders acting by means of a diaphragm of the kind in which the supply pipe for the pressure medium leads through the casing of the sounder and ends on the centre of the diaphragm. When operated by ordinary compressed air, these diaphragm sounders will easily start at any time so exactly that, for instance, they may be used for giving Morse signals.

If, however, sounders of this kind have to be operated by a pressure medium the temperature of which is considerably higher than that of the atmosphere, for instance steam or hot waste gases, or is considerably lower, as carbonic acid for instance, then important difficulties will occur. For, upon a very hot pressure medium, as above mentioned, striking the metal parts generating the sound, that is the diaphragm, the casing and the mouth-piece, the following drawbacks will arise:

The diaphragm will be strongly heated at the outlet of the pressure medium, that is on its centre, and will expand at this spot more than at its edge where it is still in contact with the cold air. Thus a uniform expansion of the diaphragm cannot take place. The diaphragm will consequently get warped and will start very insufficiently in this state. Irregular and impure sounds will therefore be generated as long as the whole diaphragm has not yet reached the temperature of the pressure medium.

Further, the casing and the mouth-piece are likewise cold in the moment the sounder is started first and will, in their turn, considerably cool the hot operating medium so that, by this reason too, any formation of sound will first not take place. This formation of sound begins only in the measure as the casing and the mouth-piece will gradually become heated. Besides, with steam-operated sounders a high condensing effect will take place at the spots where the steam strikes the cold walls of the casing and of the mouth-piece, whereby the sound-generating vibrations are likewise hindered or retarded. Only after a certain time, that is, when the sound-generating parts have become heated also, clearer and purer sounds gradually will come. Before this moment a reliable signalling, for instance a give-way

signal on board of ships or on automobiles, is impossible, much less, of course, a Morse signalling.

Now the invention has for its object to obviate these drawbacks and attains this substantially by the fact that the sound-generating parts of the sounder are permanently kept at the temperature of the pressure medium, by means of this medium itself or by a special heating (or cooling) device.

In the drawing is illustrated an embodiment of the subject-matter of the invention by way of example.

Fig. 1 showing a steam-operated diaphragm sounder arranged on the chimney of a ship, in elevation, partly in section,

Figs. 2 and 3 showing in enlarged scale two different embodiments of the diaphragm-plates used:

Figs. 4 and 5 show a second embodiment of the sounder by two longitudinal sections normal to one another.

The embodiment shown in Figs. 1 to 3 will be described first, this embodiment being adapted to advantageously be used in cases where the difference in temperature between the operating medium and the atmosphere is not a very great one.

This sounder consists of a casing A, a diaphragm B fixed thereto, a mouth-piece C and a tube portion D for supplying the pressure medium. The tube portion D leads through the casing A and has its outlet disposed on the centre of the diaphragm B. To the annular screw cap fixing the diaphragm to the casing A, is connected, according to the invention, a hollow chamber E which shows openings e^1 , e^2 for supplying and leading-off a heating or cooling medium. In practice the sounder may be fixed for instance on the chimney G of a ship by means of an angle sheet metal plate F. A steam supply pipe J is connected to the tube portion D of the casing A, a steam throttling valve H being provided in this pipe J. A cord K which leads to the bridge of the ship is fixed to a double lever h^1 of the throttling valve H, by means of which cord said valve may be opened and the sounder operated. A small steam pipe L is branched-off from the main pipe J directly below the valve H, said pipe L fitting into the upper opening e^1 of the heating chamber E. To the

lower opening e^2 is connected an outlet pipe M which leads the steam to a condenser or into the atmosphere.

As in this manner a small quantity of steam permanently flows through the chamber E, this chamber always remains hot and heats the diaphragm B by radiation. If a signal is given by the above-described sounder, the hot steam will strike always a sufficiently warm diaphragm even in case the sounder has not been used a long time, so that the drawbacks hereinbefore mentioned relative to the diaphragm will not occur. The diaphragm of a sounder of this construction will always start in a very satisfying manner and a failure in signalling is excluded.

In order to counteract the cooling effect of the mouth-piece, the diaphragm itself may be equipped with means which prevent a delivery of heat from the heated diaphragm to the cold air contained in the casing A. With the diaphragm shown in Fig. 2 which is composed in a well-known manner of two lamels connected by a rivet, this heat protection is obtained by an annular groove N provided in the outer lamel and including an insulating air layer, whilst with the diaphragm of Fig. 3 the two lamels have before them a layer of asbestos O fixed to the diaphragm by a thin brass plate with bent-over edge.

The described arrangement of a branched-off steam pipe L, M results, besides in the heating of the diaphragm, still in the advantage that fresh steam will always be present in the supply pipe J below the valve H so that no water of condensation will be present at this spot, which water would likewise disturb the operation of the sounder, as experience has shown.

The sounder illustrated in Figs. 4 and 5 substantially differs from the above-described by the fact that instead of the diaphragm the mouth-piece of the sounder is able to be heated directly by steam. This form of execution may be advantageously made use of where the differences in temperature are great, for instance with locomotives and ships. The mouth-piece C of this sounder is surrounded by a wall C^1 which also includes the diaphragm casing A. The casing A, mouth-piece C and wall C^1 form together a cast metal piece having a hollow space R which forms a heating chamber. A pipe J connected by a flange z^1 to the wall C^1 , supplies the steam from the boiler to the heating chamber R, an angle sheet metal piece F fixing the sounder to its carrier, being interposed between said flange and pipe. A branch e^2 is provided on the heating chamber R from which a pipe M leads to a condenser (not shown).

The interior of the supply passage D is connected to the heating chamber R by a

valve H the needle of which outwardly projects beyond the casing wall. In the state of rest the valve H is kept closed by a spring S and can be opened by means of a lever h^1 and a rod K. Between the cover E and the diaphragm B is provided an air-filled insulating space.

The supply pipe J and the heating chamber R are permanently filled with steam. The condensing water is led-off through the pipe M the sectional area of which is chosen so as to take the water only, but no steam.

When a signal has to be given, the valve H is opened by means of the lever h^1 and the rod K. Steam will then stream from the upper portion of the heating chamber R into the supply passage D and strike the diaphragm B, this latter being thereby set in vibration in the well-known manner. The steam then escapes, as indicated by arrows, at the edge of the supply passage D through the mouth-piece C.

The steam contained in the heating chamber R transmits its heat directly to the mouth-piece C, the supply-passage D and to the casing A and, by transmission and radiation also to the diaphragm B. All the sound-generating parts thus being permanently kept at the temperature of the steam, the diaphragm will at once start upon opening the valve H, accurately as in the case of using compressed air, and the sounder will give from the beginning clear sounds adapted for Morse signals.

In order to attain a still more effective heating (or cooling) the heating of the mouth-piece according to Figs. 4 and 5 may of course be combined with the cover heating according to Fig. 1. Instead of heating by means of the pressure medium an independent heating may be made use of, for instance by means of an electric heater or the like.

Claims.

1. In a diaphragm sounder operated by a pressure medium differing in temperature from the temperature of the atmosphere in which the sounder is exposed, means for maintaining the diaphragm of said sounder at substantially the temperature of said pressure medium irrespective of the operative contact of the latter therewith.

2. In a diaphragm sounder operated by a pressure medium differing in temperature from the temperature of the atmosphere in which the sounder is exposed, means for maintaining the sound-generating parts of said sounder at substantially the temperature of said pressure medium when the sounder is out of operation.

3. In a diaphragm sounder operated by a pressure medium differing in temperature from the temperature of the atmosphere in which the sounder is exposed, means for utilizing the pressure medium for maintaining

the diaphragm of said sounder at substantially the temperature of said pressure medium irrespective of the operative contact of the latter therewith.

4. In a diaphragm sounder operated by a pressure medium differing in temperature from the temperature of the atmosphere in which the sounder is exposed, means for utilizing the pressure medium for maintaining the sound-generating parts at substantially the temperature of the pressure medium when the sounder is out of operation.

5. In a diaphragm sounder having a mouth-piece and operated by a pressure medium differing in temperature from the atmosphere, a chamber surrounding said mouth-piece and a pipe supplying the pressure medium to said chamber.

6. In a diaphragm sounder having a mouth-piece and operated by a pressure medium differing in temperature from the atmosphere, a chamber surrounding said

mouth-piece, a pipe supplying the pressure medium to said chamber and a connection between said chamber and said diaphragm in order to lead the pressure medium to the latter.

7. In a diaphragm sounder having means for keeping the inner face of the diaphragm hot, a diaphragm having an insulating air chamber intermediate its faces.

8. In a diaphragm sounder operated by a pressure medium differing in temperature from the atmosphere and the sound-generating parts of which are permanently kept on the temperature of said pressure medium, a diaphragm composed of two superimposed lamels one of which has an annular groove, towards the other lamel, forming an insulating air chamber.

The foregoing specification signed at Hamburg, Germany, this 12th day of November, 1924.

KARL WENZ.