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H. C. HARRISON

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ACOUSTIC DEVICE

Filed Aug. 30, 1926

Fig. 1.

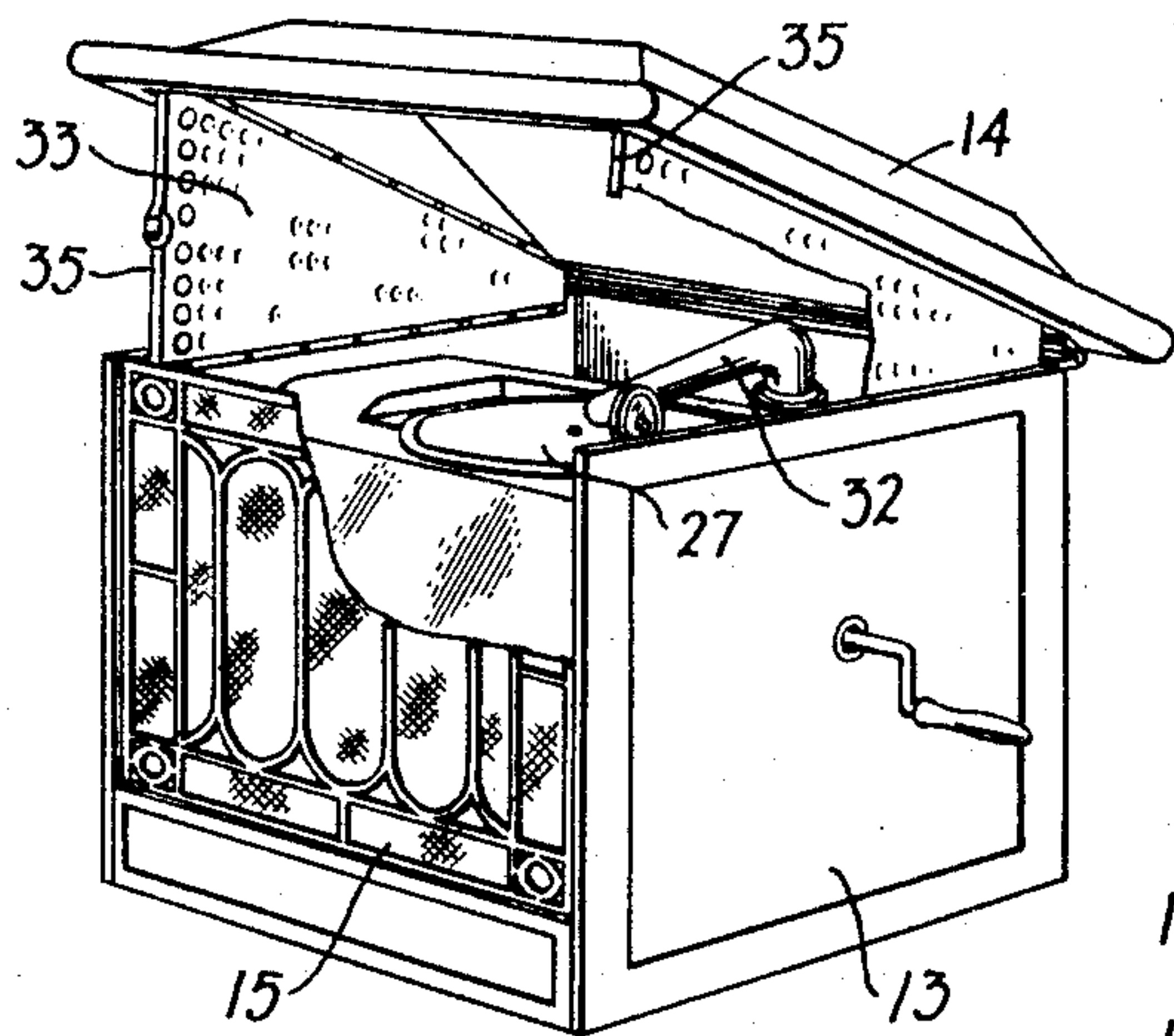


Fig. 2.

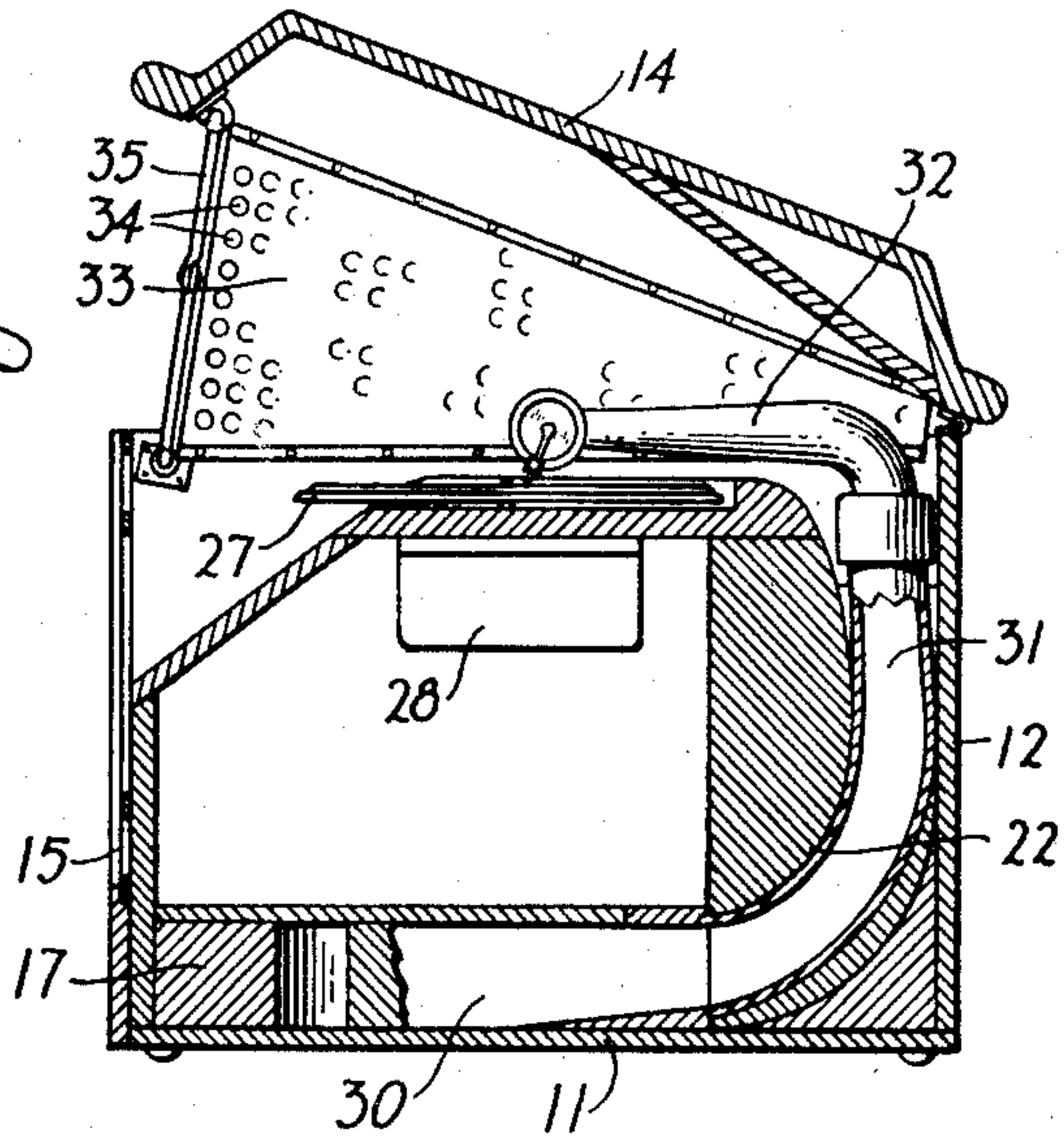


Fig. 3.

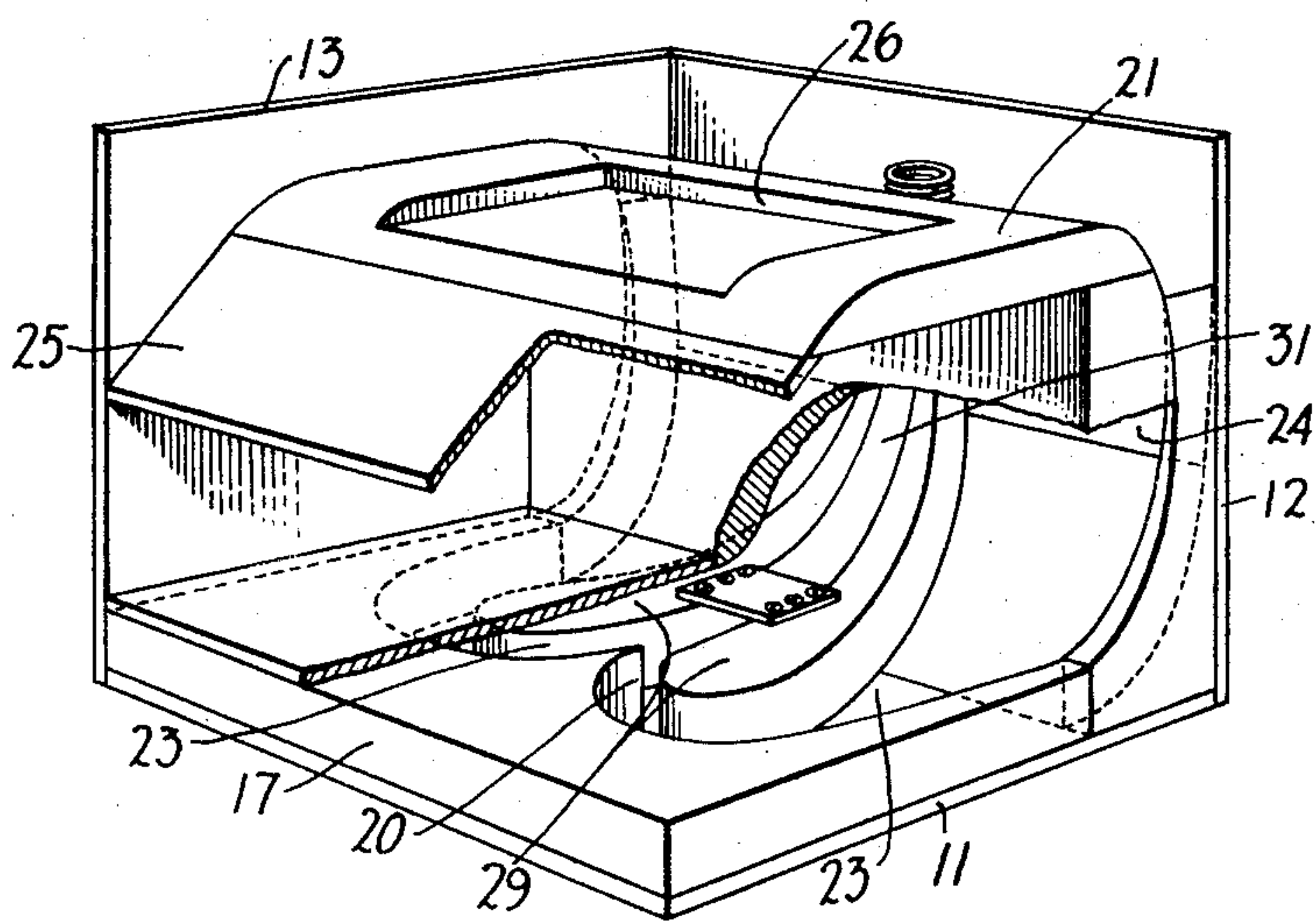
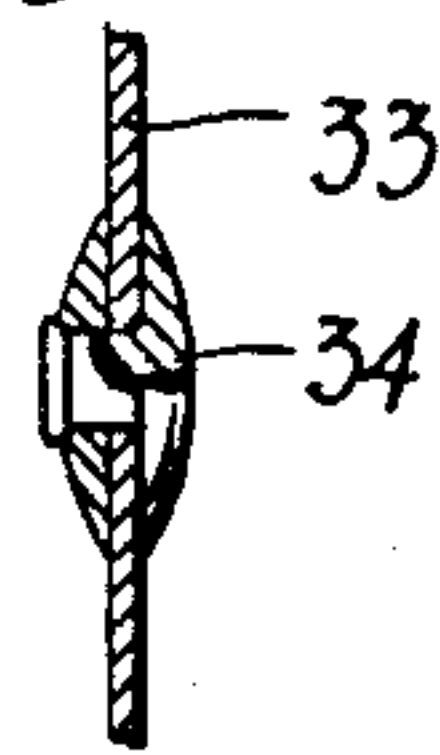


Fig. 4.



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UNITED STATES PATENT OFFICE

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ACOUSTIC DEVICE

Application filed August 30, 1926. Serial No. 132,451.

This invention relates to acoustic devices and particularly to horns for phonograph, loud speaking telephones and the like.

An object of the invention is to obtain compactness in acoustic devices.

A further object of the invention is to embody in a phonograph cabinet of the so-called portable type a horn of such length and mouth area that it will efficiently radiate sound waves of the essential frequencies of the speech and music range.

As explained in the application of H. C. Harrison, Serial No. 628,168, filed March 28, 1923, a horn having a logarithmic taper will uniformly transmit waves of all frequencies above a definite critical frequency determined by the rate of taper and will efficiently radiate all waves whose wave lengths are not greater than three to four times the equivalent diameter of the mouth or bell opening. In order to mount in a phonograph cabinet of the portable type a horn of such dimensions as are necessary to obtain good quality reproduction of speech and music waves, it is necessary to provide a tortuous passage of the general type described in the application of H. C. Harrison referred to above. The device of this invention is a particular modification of the general type of horn described in that application adapted to suit the requirements of the ordinary type of portable phonograph cabinet.

In a preferred embodiment of this invention, a portable type of phonograph is constructed having a horn comprising a bell portion, the upper wall of which is formed by the cover of the phonograph and the side walls of which are formed in part by flexible material which is loaded so as to reduce its natural period of vibration to a frequency well below the frequency range of the waves to be reproduced and which folds inside the cabinet when the cover is closed. The horn passage leads from the bell portion down the rear of the cabinet, contracting mainly in the vertical plane, where it is divided into two chambers arranged in the bottom of the cabinet which contract in a horizontal plane and join together in a single passage which leads upward to the tone arm. The turntable is mounted in the bell portion of the horn.

Obviously, various features of the folded horn of this invention may be useful in other combinations or sub-combinations. The use of folded flexible material may be found useful in various folding acoustical devices.

This invention can be more readily understood by reference to the following detailed description in connection with the drawing in which:

Fig. 1, is a perspective view of a phonograph constructed in accordance with this invention;

Fig. 2, is a transverse sectional view through Fig. 1;

Fig. 3, is a perspective view of the horn, portions being broken away to more clearly illustrate the details of construction; and

Fig. 4, is an enlarged sectional view through a portion of one of the side walls of the bell of the horn, illustrating in detail the method of loading.

Referring to the drawing, there is shown a portable phonograph cabinet having a base 11, a back wall 12, side walls 13 and a cover 14 which is hinged to the back wall 12. The front of the cabinet is provided with a perforated wall 15, the upper portion of which covers a portion of the mouth opening of the horn.

Fitted into the cabinet and supported in spaced relation to the base 11 by means of a plate 17 is a substantially U shaped partition 21. The upper leg 25 of this partition is curved to form the bottom wall of the bell portion of the horn and is provided with a recess 26 in which is mounted the turntable 27 and phonograph motor 28. The upper wall of the bell portion is formed by the cover 14 when it is in the open position, and the side walls are in part formed by the loaded canvas 33, the forward edges of which are joined to the brackets 35 which support the cover in its open position and which fold the canvas inside the cabinet when it is closed. It is to be understood that, if so desired, these brackets may be retarded in their action to prevent too sudden lowering of the cover and also arranged so that, as the cover approaches its open position, they will open to their full extent with a spring action.

The canvas walls 33 are loaded in a suitable manner to reduce their natural period of vibration to a point well below the frequency of any waves to be reproduced. The loading also has the effect of increasing the mass of the walls so that they will effectively resist vibration and prevent the escape of sound. One method of loading the flexible material is illustrated in detail in Fig. 4 and consists in perforating the canvas and securing metallic rivets 34 in the perforations.

The sound passage leads from the bell portion down the back of the phonograph, this vertical sound passage 24 being formed between the back wall 12 and the rear wall of the U shaped partition 21.

The sound passage 24 is divided by the partitions 29 into two horizontal chambers 23 which are formed by recesses in the block 17 and which join together at the center in a single channel or throat 31, formed between the partitions 29, which leads up to the tone arm 32. The partitions 29 are shaped to fit the contour of the vertical passage 24 and divides the lower portion thereof into two separate passages.

The horn passage is tapered throughout in accordance with the logarithmic law.

In use, the cover 14 is raised, giving access to the turntable and simultaneously completing the formation of the bell portion of the horn. Sound waves produced in the tone arm 32 by the action of the reproducer are conducted down through the throat passage 31 to the horizontal chamber where they are divided into the two horizontal chambers 23, both of which open into the vertical passage 24 which discharges at its upper end into the bell portion of the horn.

From the foregoing, it is apparent that a horn structure is provided which is particularly adapted to phonographs having collapsible bell portions. The specific contour of the sound passages is such as to produce a very compact structure of adequate length for good reproduction and readily adaptable for phonographs of the portable type.

What is claimed is:

1. A tapered horn comprising a bell portion, a passage substantially perpendicular to the axis of the bell portion and communicating with the reduced end of the bell portion, a chamber communicating with the reduced end of the perpendicular passage, partitions dividing the chamber into sound conducting passages joining at their reduced ends, and a throat piece communicating with the passages of said chamber and lying within said perpendicular passage.

2. A tapered horn comprising a bell portion, a substantially perpendicular passage communicating with the reduced end of the bell portion, a substantially horizontal chamber, partitions dividing the chamber into oppositely curved sound conducting pas-

sages communicating at their enlarged ends with the perpendicular passage and joining together at their reduced ends, and a throat piece communicating with said curved passages at their junction and lying within said perpendicular passage.

3. A horn having a folding bell portion, a flexible material forming portions thereof, and weighted means distributed over said material to render the flexible portions non-responsive to sound vibrations to be reproduced by the horn.

4. A horn having a folding bell portion, portions of which are formed of a flexible, practically air tight material, and metallic means carried by the material to reduce its natural period of vibration below the frequency range of sound vibrations to be reproduced by the horn.

5. A horn having a bell portion comprising a substantially stationary wall, a hinged cover forming in one position a wall thereof, and loaded flexible side walls connecting the lateral edges of the stationary wall and the cover.

6. A horn having a bell portion comprising a substantially stationary wall, a hinged cover forming in one position a wall thereof, loaded flexible side walls connecting the lateral edges of the stationary wall and the cover, and means to retain the cover in raised position and limit its elevation whereby the proper taper of the bell portion is preserved, said flexible side walls being attached thereto.

7. A horn having a substantially U-shaped sound passage, one leg of which forms a discharge mouth, and a throat piece wholly within and following the contour of said passage for the introduction of sound waves thereinto.

8. A horn comprising a bell portion, a stationary wall forming a part of said bell portion, a folded passage communicating with said bell portion, a cover forming in its open position a part of said bell portion, and a folding wall connecting the stationary wall and the cover.

9. A horn according to the preceding claim in which the folded passage includes oppositely curved passages in parallel.

In witness whereof, I hereunto subscribe my name this 25th day of August A. D., 1926.

HENRY C. HARRISON.