June 17, 1924. 1,497,848

O. O. HAGE

TELEPHONE

Filed Dec. 4, 1919 2 Sheets-Sheet 1

Fig. 1.

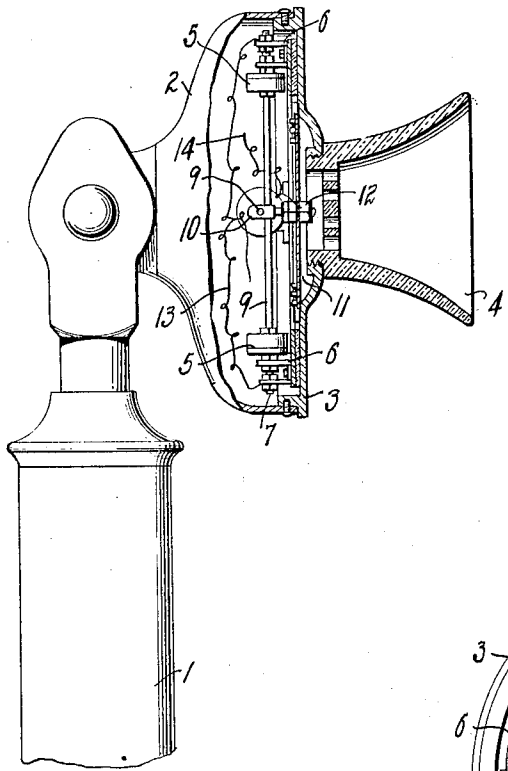


Fig. 3.

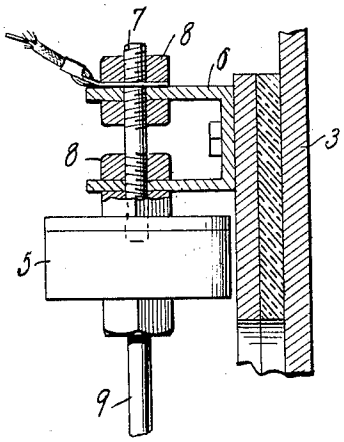


Fig. 2.

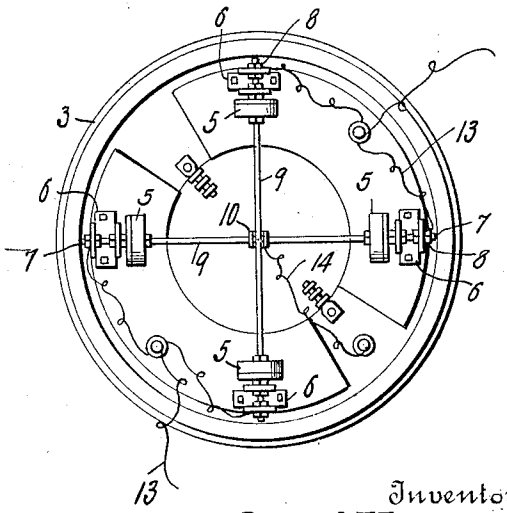
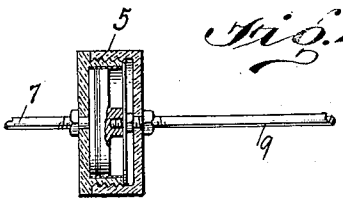


Fig. 4.



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Filed Dec. 4, 1919 2 Sheets-Sheet 2

Fig. 5.

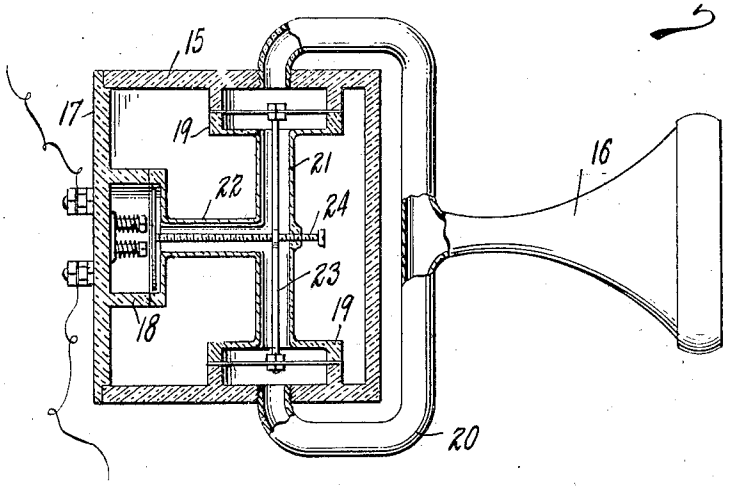
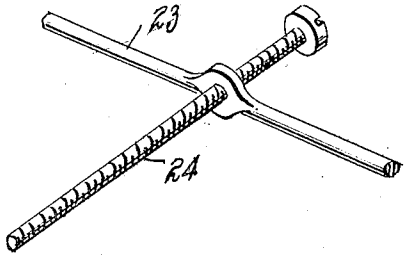
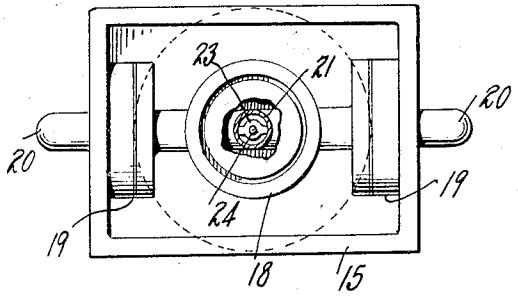


Fig. 6.

Fig. 7.





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UNITED STATES PATENT OFFICE.

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TELEPHONE.

Application filed December 4, 1919. Serial No. 342,340.

To all whom it may concern:

Be it known that I, OLAF O. HAGE, a citizen of the United States, residing at Crookston, in the county of Polk and State of Minnesota, have invented certain new and useful Improvements in Telephones, of which the following is a specification.

This invention relates to telephones, and, more particularly to microphone transmitters and co-operative receivers, and has for its object to overcome the sluggishness of the transmitter diaphragm and effect a quick make and break with the result that strong current is produced in the secondary of the induction coil; also to increase the responsive action of the receiver diaphragm and cause the latter to vibrate more sharply and thereby enhance the phonographic effect.

The invention depends upon the expanding effect produced in a metal rod by molecular disturbances resulting when a diaphragm is caused to vibrate under the influence of sound waves. This applies to the transmitter and receiver, since each employs a diaphragm.

The drawings herein illustrate a preferred embodiment of the invention. However, it is to be understood that in adapting the same to meet different conditions, various changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit of the invention as claimed hereinafter.

Referring to the accompanying drawings,

Figure 1 is a sectional detail of a microphone transmitter embodying the invention, the same being shown attached to a stem, the lower portion of which is broken away.

Figure 2 is a rear view of the front plate of the shell or casing, and the carbon cups or resistance buttons attached thereto and showing the same connected in accordance with the principles of the invention,

Figure 3 is a sectional detail of the supporting means and one of the carbon cups or resistance buttons, showing the parts on a larger scale,

Figure 4 is a sectional detail of one of the carbon cups or resistance buttons,

Figure 5 is a sectional detail of a telephone receiver embodying the invention,

Figure 6 is a rear view of the shell or casing of the receiver, the back plate being removed and parts broken away,

Figure 7 is a detail perspective view of the metal rod connecting the diaphragms of opposite reproducers and the adjustable stud co-acting therewith.

Corresponding and like parts are referred to in the accompanying drawings and indicated in the following specification by like reference characters.

The numeral 1 designates a stem or support for the transmitter and the same may be of any approved form. The transmitter embodies a shell or casing 2 and a front plate 3, the latter being centrally apertured to receive the usual mouth piece 4. In accordance with the present invention carbon cups or resistance buttons 5 are provided in pairs and the buttons of each pair are diametrically opposed. This is indicated most clearly in Figs. 1 and 2. The carbon cups or resistance buttons 5 may be of any approved construction and consist of shell or casings in which are disposed the electrodes and interposed carbon granules. Each carbon cup or resistance button 5 is attached to a suitable support as 6, the same being in the nature of a bracket, as illustrated most clearly in Fig. 3, the bracket being of U-shape and having its closed end attached to the front plate 3, and electrically insulated therefrom. A stem 7 adjustably connects the carbon cup or resistance button to the elements comprising the brackets 6, said stem being threaded to receive pairs of binding nuts 8 between which the respective elements of the support are clamped. The stem 7 may be connected to the shell or casing of the part 5 in any manner. A rod 9 connects one carbon cup or resistance button with the diametrically disposed carbon cup or button. When the resistance buttons are set quartering, as indicated in Fig. 2, the connecting rods 9 cross at a central point. A stud 10 is disposed at the point of crossing of the rods 9 and the latter passes loosely through openings formed therein. As indicated most clearly in Fig. 1, the stud 10 comprises a head and a stem, the latter being threaded and extending centrally through the diaphragm 11 and made secure thereto by means of binding nuts 12 disposed upon opposite sides of the diaphragm. The diaphragm 11 may be of any material commonly employed in the manufacture of telephonic instruments and may be secured to the shell or casing in any preferred way. The carbon cups or resistance buttons are electrically connected by means

of wires 13 and said wires may be connected to one another and to a terminal of the primary wire of an ordinary induction coil in a manner well understood. The other terminal of the primary wire of the induction coil is connected by means of a wire 14 to the stud 10 thereby completing the circuit through the carbon cups or resistance buttons 5 in a manner well understood.

In accordance with the present invention, sound waves acting upon the diaphragm 11 causes the same to vibrate in a manner well understood and such vibrations are transmitted through the stud 10 to the metal rods 9 and affect the same to cause a variation in their length whereby the resistance in the carbon cups or buttons 5 varies thereby causing corresponding variations in the primary wire of the induction coil and producing variable induced current in the secondary wire of the induction coil in a manner well understood, in the operation of telephonic apparatus.

The variation in the linear expansion of the metal rods 9 is due chiefly to the disturbances of their molecular structure which is produced primarily by the action of the sound waves on the diaphragm 11. The construction is such as to enable a plurality of carbon cups or resistance buttons to be used in series thereby amplifying the graphic action with the result that the sound waves are transmitted more sharply and quickly since there is a respectiveness of action between the diaphragm and the resistance buttons, and the latter act synchronously, each contributing its part in the production of a well defined variation in the current of the primary of the induction coil.

The receiver of the telephone set is illustrated more particularly in Fig. 5 and comprises a shell or casing 15 and a horn 16. A back plate 17 closes the shell or casing. The receiver 18 may be of any well known construction and is shown attached to the back plate 17. Opposed reproducers 19 are disposed within the shell or casing 15 at diametrically opposite points. The reproducers 19 may be of any preferred type. A tube 20 connects the reproducers 19 and the horn 16 is attached thereto. A tube 21 is disposed within the shell or casing and connects the reproducers 19. A tube 22 connects the receiver 18 with the tube 21. A metal rod 23 connects the diaphragms of the reproducers 19 and is provided centrally with a threaded opening to receive a stud 24. The rod 23 is adapted to be connected to the diaphragm of the reproducers in any preferred way so that the parts may be under tension. The stud 24 is adjusted so that the end adjacent the diaphragm of the receiver 18 is approximately in contact therewith so that any movement of the diaphragm will impart a corresponding movement to the stud and the latter being connected to the rod 23 sets up an action therein which causes the diaphragm of the reproducers 19 to vibrate in unison with the diaphragm of the receiver 18 but in a more pronounced manner so that the sound reproduced is sharp, clear and distinct. So, as I have been able to ascertain, the action of the rod 23 is similar to the action of the rods 9 and is due to molecular disturbances brought about by the vibration of the diaphragm of the receiver 18 resulting from variation in the induced current produced in the secondary wire of the induction coil of the transmitter of the telephone set.

Having thus fully described my invention what I claim as new and desire to secure by Letters Patent, is:—

1. In a telephone, a pair of oppositely facing vibratory members adapted to be affected by sound waves, a spacing rod connecting and extending between said members to cause synchronous actuation thereof, a diaphragm disposed parallel to said rod and at right angles to the vibratory members, and means connecting the longitudinal center of the spacing rod with the center of the diaphragm.

2. In a telephone, pairs of oppositely disposed resistance buttons, crossing rods connecting opposed resistance buttons, a stud engaging the rods at the point of crosssing, and a diaphragm disposed in parallel relation to the crossing rods and at right angles to the resistance buttons adapted to be affected by sound waves and having the said stud connected thereto.

In testimony whereof I affix my signature in presence of two witnesses.

OLAF O. HAGE.

Witnesses:
W. HAGE,
H. I. KRAMER.