Aug. 23, 1932. W. H. WOODFORD 1,873,095

ELECTRIC IMPULSE CONTACTING MEANS

Filed Sept. 10, 1929

Fig. 1

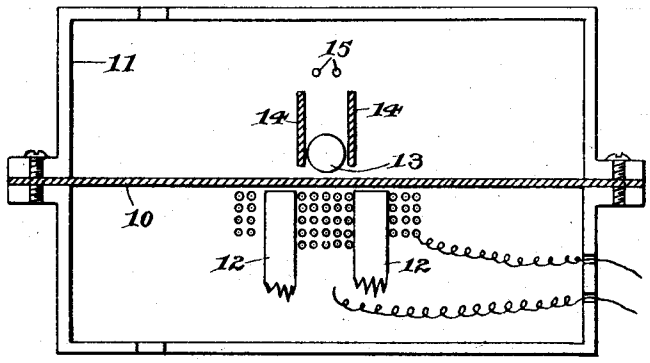


Fig. 2

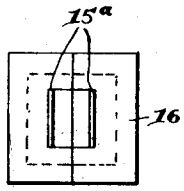


Fig. 3

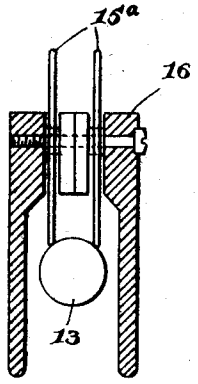
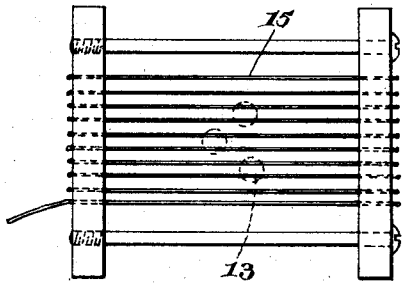


Fig. 4



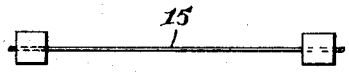
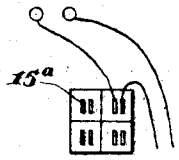


Fig. 5

Fig. 6



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UNITED STATES PATENT OFFICE

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ELECTRIC IMPULSE CONTACTING MEANS

Application filed September 10, 1929. Serial No. 391,555.

This invention relates to electric impulse contacting means adapted to be operated by a diaphragm of a telephone, radio headphone, loud speaker, microphone, or in fact most any diaphragm adapted to be actuated by the voice or low power impulse currents. The means being so constructed and arranged as to adapt it to various uses, especially that of making and breaking a high energetic current to synchronize with the present dominating impulses of the current or diaphragm.

The invention may be used in single contact applications or in multiples according to the many uses to which it is applicable, one of which being to take a small percentage of the amplified impulse current from a microphone, or radio receiving set and by means of one or more of my contact units, revolve a disk with various transparent colored sections. With such a device used in connection with a rotatable disk and by the use of concentrated rays of light, different transparent colored effects could be reflected on a screen. By means of one or more contacts controlled by the current impulse, the movement of the disk will synchronize with the pre-dominating impulses, as the voice or music producing color sensations in combination with sound sensations.

The invention is thus not alone applicable to picture machines but may also be applied to advantage to radio apparatus.

With these and other objects in view, the invention resides and consists in the construction and novel combination and arrangement of parts hereinafter more fully described, illustrated in the accompanying drawing, and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion, size, and minor details of construction within the scope of the claims may be resorted to without departure from the spirit, or sacrificing any of the advantages of the invention.

Similar characters of reference denote like or corresponding parts throughout the several figures of the accompanying drawing forming a part of this specification and upon which

Fig. 1 shows a longitudinal cross sectional view of a loud speaker or receiving phone including a suitable diaphragm and illustrating the application of the invention thereto;

Figs. 2 and 3 show a plan and vertical sectional view respectively of a slight modification of the invention;

Figs. 4 and 5 show a plan and edge view respectively of a multiple illustration of a series of contacting means as employed in some uses of the invention; and

Fig. 6 shows a multiple application of the invention with separate sources of current of various voltage and capacity.

The invention is shown applied to a diaphragm 10 of the class employed in microphones, loud speakers, and the like, 11, and which for the purpose of my invention must be retained in a horizontal position with the usual high resistance coil magnet 12 upon the underside and adapted to operate the diaphragm by feeble impulse currents. I employ in connection with this diaphragm one or more metal contact balls 13 which may be made solid or hollow as desired, and of suitable size and weight to insure their quick action by vibrations of the diaphragm whereby the desired contacts are made. Guides 14 may be used for these balls so as to retain them central or in other proper relative areas whereby they will function over a given portion of the diaphragm and contact with certain pairs of wires located above and in close proximity thereto. These contact wires 15 may be arranged horizontally as shown in Figs. 1, 4 and 5 or vertical strips 15ª may be used as shown in Figs. 2 and 3. In both instances they are arranged in exposed relation to each other so that, as the ball is thrown upward against the wires, they will bridge the two, assuring minimum arcing in making contact. The rebound energy of the ball striking the two tight wires as in Figs. 1, 4 and 5 assures minimum arcing at the break of contact. In Figs. 2 and 3 the vertically disposed strips 15ª are adjustably supported in a suitable insulative holder 16 so that the ends of the strips 15ª are exposed for contact by the ball housed therein and above the diaphragm. In case of rapid speed and heavy currents to be broken, it is desired that the two contacts

be bridged by the ball, should it be in the form of two tight wires of arc resisting metal or alloy. It will be obvious that the effect will depend on the ratio of the vibrations of the diaphragm and also on the force or amplitude of the vibrations, distance between parallel contacts and diaphragm. In case of tight wire contact where most of the impact energy of the ball is not absorbed but is utilized as reaction against the ball, the distance should be great enough so that the rebound energy of the ball hitting the diaphragm will not bound back and make contact, unless by aid of diaphragm impulses. Where a number of balls are in use on one diaphragm and less current to be broken, the contacts should be made of arc resisting strips as in Figs. 2 and 3. The point of maximum impulse energy on the ball is the center of the diaphragm where the amplitude of vibrations is maximum.

The comparative sensitiveness of the impulse depends on the weight of the balls and volume, so by using a number of various weights and volumes guided to operate on different locations of the diaphragm and with each ball making a separate contact on the same diaphragm, it will give a combination of contacts as between different pairs of wires, see Figs. 4 and 6, at different instances as depending on the amplitude frequency and intensity of the current and diaphragm.

With a number of balls making a number of contacts and with each contact supplying a different voltage or current capacity, the result of all contacts connected individually, in series or parallel or in combination of heavy current energy controlled by the feeble current of approximately one watt energizing the diaphragm or in case of the microphone the sound energy acting on the microphone diaphragm.

A partial vacuum in the lower chamber would be used while a greater vacuum would be emloyed in the upper chamber to counterbalance the weight of the ball on the diaphragm. Owing to the partial vacuum the energy dissipated as sound vibrations from the diaphragm and air resistance on the ball will be greatly reduced, resulting in increased amplitude of vibrations and energy.

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

1. In a device of the class described, the combination with a vibratable diaphragm, of a pair of electric contact members positioned in spaced relation to the diaphragm, a metal ball loosely positioned upon the diaphragm beneath the contact member adapted to be manipulated by the vibratory movements of the diaphragm and to contact with and bridge the said pair of contact members.

2. In a device of the class described, the combination with a vibratable diaphragm, of a pair of electric contact wires positioned above the diaphragm, a metal ball upon the diaphragm beneath the contact wire adapted to be manipulated by the vibrating movements of the diaphragm and to contact with and bridge the said pair of wires.

3. In a device of the class described, the combination with a vibratable diaphragm, of a series of electrical contact members positioned in spaced relation to the diaphragm, a series of metal balls loosely positioned upon the diaphragm and adapted to be manipulated by the vibrating movements of the diaphragm and to contact with and bridge the said contacts.

4. In a device of the class described, the combination with a vibratable diaphragm, of a pair of electric contact members positioned in spaced relation to the diaphragm, a metal ball loosely positioned beneath the contact member and adapted to be manipulated by the vibratory movements of the diaphragm and be thrown up in contact with and bridge the said pair of contact members, and guides for the ball to insure proper line of movement of the ball.

Signed at Bridgeport in the county of Fairfield and State of Connecticut this 27th day of August, A. D. 1929.

WATSON H. WOODFORD.