(No Model.)

A. W. S. DAVIS.

MICROPHONE.

No. 579,699. Patented Mar. 30, 1897.

Fig: 1.

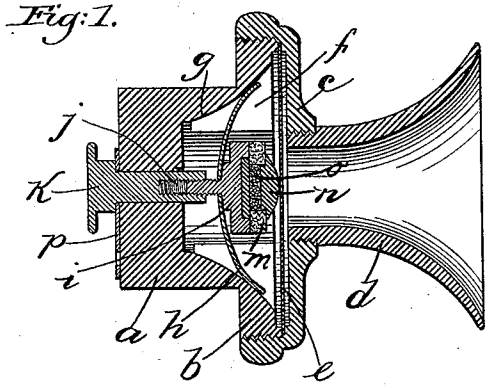


Fig: 2.

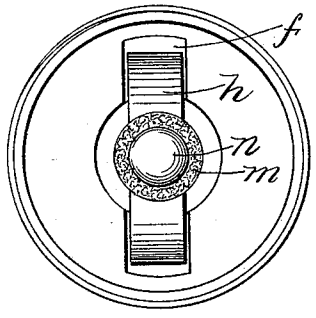


Fig: 3.

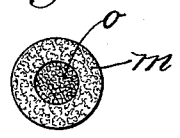


Fig: 4.

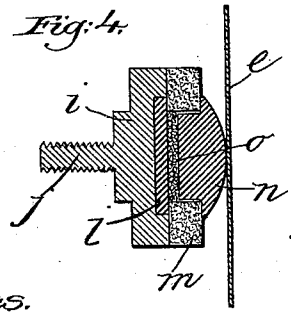
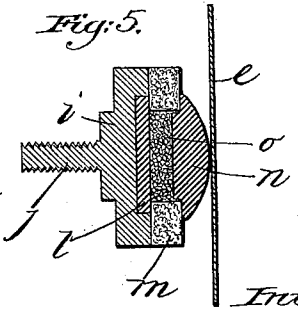


Fig: 5.



Witnesses.

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Inventor:

A. W. S. Davis

by his Atty. A. W. Crossley

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ARTHUR W. S. DAVIS, OF LOWELL, MASSACHUSETTS.

MICROPHONE.

SPECIFICATION forming part of Letters Patent No. 579,699, dated March 30, 1897.

Application filed April 30, 1896. Serial No. 589,772. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR W. S. DAVIS, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Microphones, of which the following is a description sufficiently full, clear, and exact to enable those skilled in the art to which it appertains or with which it is most nearly connected to make and use the same.

This invention has relation to that class of microphones or telephone-transmitters in which granulated carbon is placed between the electrodes behind the diaphragm, the object of the invention being to render the transmitter more highly efficient for augmenting and transmitting those atmospheric sound-waves produced by the slightest sounds; to prevent that disagreeable buzzing and crackling sound which is not only annoying, but renders speech less clear; to permit of the use of battery-currents of higher tension for overcoming the high resistance of a long line, and to improve the transmitter in other ways, as shall be hereinafter set forth.

To these ends my invention consists of a microphone or transmitter possessing the features and characteristics which I shall now proceed to describe with particularity, and set forth in the specification hereto annexed, and then point out in the claims.

Reference is to be had to the annexed drawings and to the letters marked thereon, forming a part of this specification, the same letters designating the same parts or features, as the case may be, wherever they occur.

Of the drawings, Figure 1 shows in vertical longitudinal section one form of microphone or transmitter in which my invention is embodied. Fig. 2 is a front view of the same with the mouthpiece, the front plate, and the diaphragm removed. Fig. 3 shows the annular resilient or cushioning ring and the granular carbon therein. Figs. 4 and 5 are similar views in vertical section, showing some of the parts illustrated in Fig. 1, the carbon plug being formed in the two views with bosses of varying depths.

In carrying out my invention I employ a cylindrical casing *a*, having an annular flange *b*, which is externally threaded to receive a front plate or cap *c*. The cap has a central threaded aperture into which is screwed the flaring mouthpiece *d*. The metallic diaphragm *e* is mounted between the cap and the front face of the flange *b* and is accessible to sound-waves through the aperture in the mouthpiece. Thus far the transmitter is no different from those now in use. The casing is provided with a central longitudinal cylindrical aperture *e* and a transverse groove *f*, the bottom walls *g* of which flare outwardly.

h is a flat curved spring lying in the groove *f* and having its ends pressed against the flaring walls *g*. It supports the button having the metallic support *i*, which has a rearwardly-extending bolt *j* passed through an aperture in said spring, there being a female thumb-screw *k*, with which the threaded end of the said bolt *j* engages, so that the button may be adjusted longitudinally as desired.

The support is formed with a central cavity to receive a carbon block *l*, which is rigidly secured therein with its face flush into the face of the button. Also secured to the said button is an annular ring or support *m* of any suitable non-conducting elastic material, as felt, rubber, or their equivalents, into which is fitted a carbon plug *n*. The said plug is wider than the chamber through the ring, but is formed with a boss to fit into said chamber. In the said chamber, between the carbon plate and the carbon button, I place a small quantity of granular carbon *o*. It will be observed that the ring insulates the plug from the button except through the granular carbon and the carbon block.

The carbon plug is readily removable and has a convex outer surface which rests against the diaphragm, but is loose relatively thereto.

For different circuits of varying resistances I use plugs with thicker or thinner bosses, as the case may be, and a smaller or larger quantity of granulated carbon. That is to say, when the microphone is employed for long-distance circuits, where a current of high potential must be employed, I use a plug with a large amount of granulated carbon, and when the circuit is short, so that a relatively weak current is used, the amount of granulated carbon is decreased, and a plug with a relatively thick boss is employed, as illustrated in Fig. 4. In this way I prevent those crackling or sparking sounds so often heard

in telephones when a current of high potential passes through the granular carbon, and at the same time greatly augment the sounds to be transmitted, and also reducing the amount of granular carbon to be used to a minimum.

When a current is passing through a mass of granular carbon, the electricity seeks the path of least resistance. Hence it passes through those contiguous grains which are largest and repels the smaller grains, since it meets less resistance in taking such a course. This causes considerable sparking and crackling, which of course affects the diaphragm in the receiver and is sometimes so loud as to prevent the hearing of sounds made by the voice, whereas by the employment of a carbon plug with a boss the granular carbon may be retained in compact shape, so that the current can pass through it in practically straight lines instead of zigzagging through the larger grains. The carbon plug also intensifies the microphone's effect, as will be well understood.

The granular carbon is confined within the cushion-ring between the plug and the support, which ring permits the diaphragm to move the plug against the said granular carbon with the proper pressure.

It will be observed that the plug is not so great in diameter as the cushion-ring, and has its shoulders resting upon but a portion of the latter. By this arrangement but a portion of the ring is utilized as a cushion, and the carbon plug in vibrating with the diaphragm does not have to overcome the inertia of the particles of the entire cushion.

The button may be adjusted so as to impinge upon the diaphragm by the thumb-screw and is supported upon a yielding or spring backing, which is so mounted as to expand and contract under the influence of thermal changes without affecting the adjustment of the button.

The thumb-screw *k* rests against a strip *p*, to which one end of the battery-wire is connected, the other end of the wire being connected with the diaphragm, so that the current passes from the diaphragm through the carbon plug, the granular carbon, the carbon block, the metallic support, the thumb-screw, and the strip *p*.

What I claim is—

1. In a microphone, the combination with a casing having a central aperture and a transverse groove, and a diaphragm, of a button, an adjusting-screw for the button, and a curved flat spring lying in the groove, for supporting the button.

2. In a microphone, the combination with a casing having a central aperture and a transverse groove, and a diaphragm, of a curved flat spring lying in the groove, an adjusting-screw, and a button held against the spring by an adjusting-screw, said button comprising a support, a cushioning insulating-ring thereon, granular carbon in the chamber in the ring, and a carbon plug resting against the diaphragm and extending into the ring.

3. In a microphone, the combination with a casing, and a diaphragm, of an adjustable metallic support in the casing, a cushioning-ring having its interior chamber filled with granular carbon and being secured to the support, a carbon plug in contact with the granular carbon and the diaphragm, means for adjusting the metallic support toward and from the diaphragm, and a spring inserted between the said support and the casing.

4. In a microphone, the combination with a metallic diaphragm, and a metallic support in rear of the diaphragm, of a cushioning insulating-ring on the front face of the support, loose granular carbon in the chamber in the ring, and a solid carbon plug bearing against the ring and having a boss extending into the chamber in the ring and engaging the loose granular carbon, said carbon plug having a convex outer face bearing loosely against the diaphragm.

5. In a microphone, the combination with a metallic diaphragm, a metallic support in rear of the diaphragm, a cushioning insulating-ring secured to said support, and a mass of loose granular carbon in the chamber in the ring, of a series of removable and interchangeable solid carbon plugs, each having a plug of a thickness different from the others, said plugs extending for different distances into the chamber, whereby the amount of loose carbon is varied, and each plug having a shoulder bearing against the cushioning-ring, and a convex face bearing loosely against the diaphragm.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 18th day of January, A. D. 1896.

ARTHUR W. S. DAVIS.

Witnesses:

ARTHUR W. CROSSLEY,

C. C. STECHER.