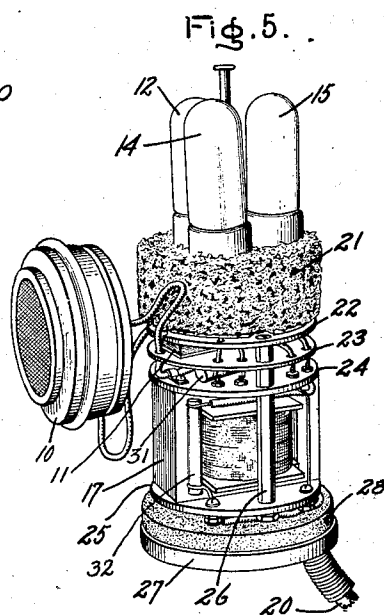
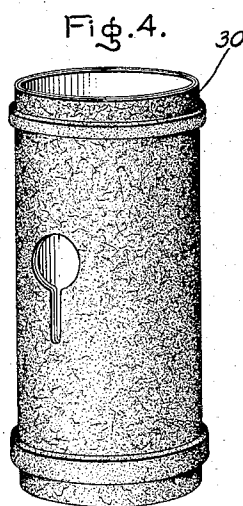
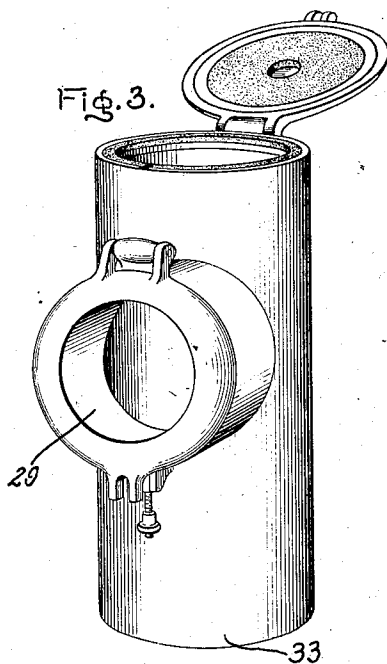
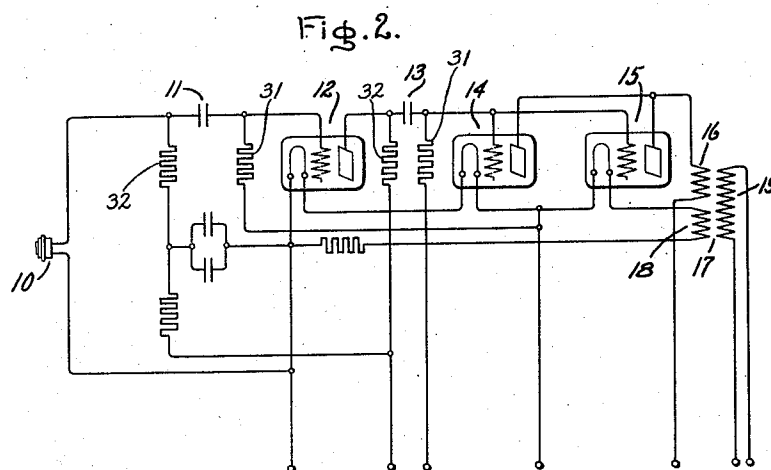
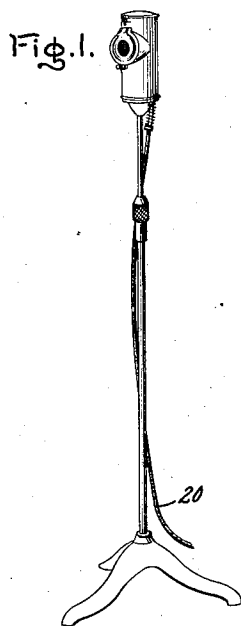


Nov. 4, 1930.

E. G. CRIPPEN
CONDENSER MICROPHONE
Filed June 13, 1928

1,780,671



Inventor:
Eugene G. Crippen,
by *Charles E. Tuller*
His Attorney.

UNITED STATES PATENT OFFICE

EUGENE G. CRIPPEN, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK

CONDENSER MICROPHONE

Application filed June 13, 1928. Serial No. 285,085.

My invention relates to condenser microphones, and has for its principal object the provision of an improved portable device capable of being used interchangeably with carbon microphones for radio broadcasting and other purposes.

In the use of condenser microphones, difficulty has been encountered heretofore due to the fact that only a short cable could be used between the microphone and the amplifying or transmitting apparatus. A condenser microphone capable of a uniform response to substantially all vibrations within the audio range has a high internal impedance and low electrical output. Because of the feeble output of the microphone, it is necessary that the leakage loss and the interference from stray magnetic fields be kept low. The condenser microphones heretofore provided have been of such a character that the leakage loss and interference could be kept within the necessary limits only by the use of a very short cable. This is a disadvantage in radio broadcasting where it is frequently desirable that microphones be used at long distances from the transmitting apparatus.

In accordance with my invention this difficulty is avoided by the provision of a common casing for the microphone condenser and amplifying apparatus whereby the cable between the condenser and amplifying apparatus is substantially eliminated. Under these conditions, a cable of considerable length can be used between the amplifier and the transmitter without undue losses of energy and interference from stray magnetic fields.

The novel features which I believe to be characteristic of my invention are pointed out in the appended claims. My invention itself, however, will best be understood by reference to the accompanying drawings in which Fig. 1 illustrates a microphone built in accordance with my invention; Fig. 2 is a wiring diagram of the apparatus; and Figs. 3 to 5 show various details of the apparatus.

Referring to the drawings in detail, 10 indicates a condenser microphone having a diaphragm electrode responsive to sound vibrations, and capable of varying its capacity in

accordance with these vibrations. The electrodes of this condenser may be energized as disclosed in Letters Patent to Irving Langmuir, No. 1,223,496 and its output is amplified by thermionic amplifiers as indicated in Fig. 2.

The current vibrations due to the vibrations of the diaphragm of the microphone 10 are transmitted through coupling condenser 11 to the control electrode of the thermionic valve 12, are amplified by the valve and transmitted through coupling condenser 13 to the control electrodes of the thermionic valves 14 and 15 connected in multiple. Resistors 31 and 32 are the usual grid and plate resistors used in condenser and resistance coupled amplifiers. The output of the valves 14 and 15 is fed to the primary winding 16 of transformer 17. Transformer 17 is also equipped with a winding 18, through which the cathode heating current flows, the purpose of which is to counteract the flux created by the direct-current component of the current in winding 16 and thereby prevent the saturation of the transformer core. The secondary winding 19, the conductors to which together with conductors to the valve electrodes are contained in cable 20, may have an impedance of about 250 ohms which matches the impedance of the average audio transmission circuits.

The assemblage of the apparatus shown in the wiring diagram Fig. 2 is illustrated in Fig. 5. The valves 12, 14 and 15 are mounted in sockets which are supported on a sponge rubber cushion 21 resting on an insulating disc 22. The condensers and resistors indicated in Fig. 2 are mounted between discs 22, 23 and 24 which in turn are held in place over disk 25 by studs 26. Transformer 17 is mounted between discs 24 and 25. The whole unit is supported by a base 27 by means of disc 28 of sponge rubber or similar material. The elaborate resilient mounting and lining is provided for preventing sound vibrations from effecting the electrode spacing within the valves.

The amplifying unit is placed inside of lining 30 (Fig. 4) and therewith inside of casing 33 (Fig. 3). The condenser 10 is

placed inside of extension 29 of the casing having its vibratory plate exposed and connected electrically to the casing. In this manner an integral shield for both the condenser and amplifying apparatus is provided and the possibility of using very short connections between the microphone and the amplifier is realized.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. The combination with a condenser microphone, of a casing having a sidewall extension adapted to receive said microphone, a resilient lining for the casing, and a multistage thermionic valve amplifier adapted to be mounted as a unit in said casing and within the lining, said amplifier unit including a plurality of valves, sockets for said valves, a resilient cushion for said sockets, electrical coupling means for said valves, a supporting means for said coupling means and said cushion including a plurality of spaced insulating disks, a base for the casing and a resilient supporting means between said unit and said base whereby sound vibrations are prevented from affecting the electrode spacing of said valves.

2. A microphone unit for a condenser microphone including a single casing adapted to enclose and support the microphone and having a cylindrical portion provided with a base, a lining for said cylindrical portion, and a multistage amplifier unit adapted to be mounted in and enclosed by said casing within said lining, said amplifier including a disk of resilient material mounted on the base, a plurality of vertically spaced insulating disks mounted on said first named disk, a plurality of valve sockets, means for resiliently supporting said sockets upon and in connection with one of said disks, and amplifier valve coupling means mounted between and supported by said spaced disks.

In witness whereof, I have hereunto set my hand this 12th day of June, 1928.

EUGENE G. CRIPPEN.

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