

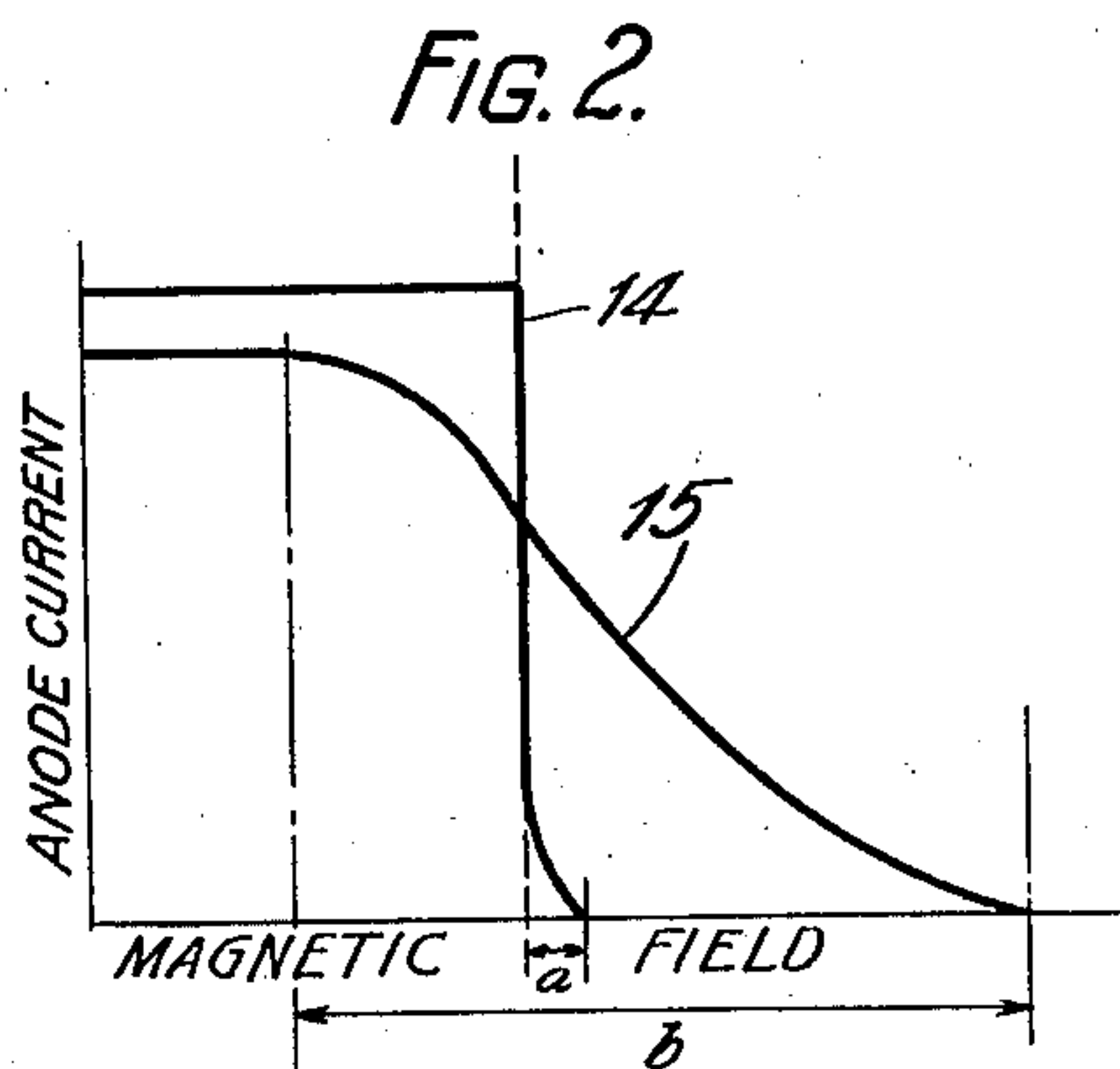
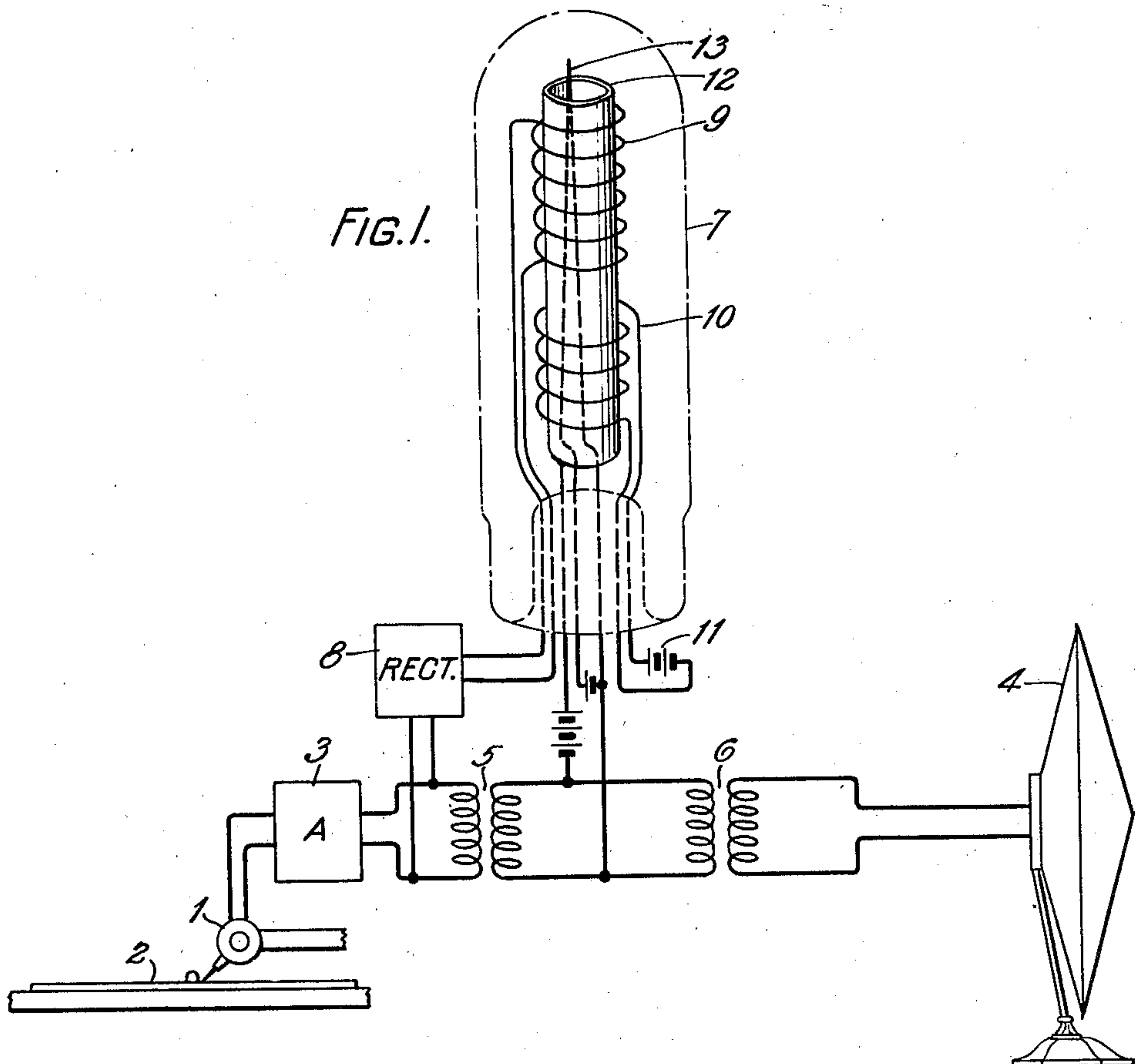
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A. C. KELLER

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SOUND REPRODUCING SYSTEM

Filed June 30, 1928



INVENTOR
ARTHUR C. KELLER
BY *G. M. Campbell*
ATTORNEY

UNITED STATES PATENT OFFICE

ARTHUR C. KELLER, OF NEW YORK, N. Y., ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

SOUND-REPRODUCING SYSTEM

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This invention relates to sound reproducing systems and more particularly to methods of improving the quality of reproduction in such systems.

During intervals when no recorded sounds are being heard such as at the start of a record or at other times during reproduction, the noise due to record irregularities is often very objectionable, particularly in systems employing high amplification. It is therefore the object of this invention to automatically eliminate this surface noise.

For this purpose a sensitive relay device may be used in the reproducer circuit to short circuit the receiver or otherwise divert the reproduced currents whenever they fall to the noise level. Since the too sudden action of an ordinary relay causes an objectionable shock to the listener a special magnetron is provided in the receiver circuit to make this action as gradual as desired. The proper characteristic for the magnetron may be obtained in any well known manner such as by locating the filament eccentrically with respect to the anode.

In the drawing Fig. 1 shows a reproducing system embodying this invention and Fig. 2 shows the normal characteristic of the sensitive relay device in Fig. 1 and also how this characteristic may be modified to suit the purpose of this invention.

In the system shown in Fig. 1 the reproducer 1 is arranged to generate electric currents corresponding to the sounds recorded upon the record 2. These currents may be amplified to any desired extent by the amplifier 3 and may be utilized to operate loud speaker 4 over an obvious circuit including transformers 5 and 6. The sensitive relay device 7 is preferably a magnetron of the general type disclosed in Patent 1,387,985, granted to A. W. Hull, August 16, 1921.

It is well known in the art that the current which flows through such a device is not affected by a magnetic field weaker than a certain critical value but falls to zero if the field is increased beyond this value. In the present invention advantage is taken of this property of the magnetron to prevent the loud speaker 4 from reproducing undesired

sounds such as those due to the surface noise of the record 2. The rectifier 8 rectifies a portion of the current variations delivered by the amplifier and delivers the corresponding direct current to the magnetizing winding 9 of the magnetron. A polarizing winding 10 energized by the battery 11 is provided and may be used where necessary to supplement the magnetic field produced by the main magnetizing winding.

During periods such as at the start of reproduction when the only currents generated by the reproducer 1 are those due to surface noise, the magnetizing current in the winding 9 will be very small. Consequently, the impedance between the circular anode 12 and the cathode 13 will be low as compared with the impedance of transformer 6 so that these currents which would otherwise produce objectionable noise in the loud speaker are in this case diverted through the electron discharge device. When, however, the actual reproduction of speech or music begins the currents delivered by the amplifier are very much larger than before and the magnetizing current of the winding 9 is correspondingly increased. By properly adjusting the output of the rectifier and of the current in winding 10 if necessary, the total magnetic field in the magnetron may be made higher than the critical value and the impedance of the device 7 then becomes almost infinite. Under this condition the anode current falls suddenly to zero as indicated by the curve 14, of Fig. 2. Transformer 6 now offers the lower impedance path to the currents representing the speech or music and the corresponding sounds are therefore reproduced by the loud speaker.

Since the magnetron in its ordinary form operates almost instantaneously, the transition from the condition of sound to silence, or vice versa, is very sudden and causes an objectionable shock to the listener. The action of the magnetron may be made more gradual in any one of various ways which are well known in the art. One such method would be to locate the cathode eccentrically with respect to the anode as shown in the drawing. With this modified form of construc-

tion the impedance of the magnetron device may be made to vary with the strength of the magnetic field as shown by curve 15 of Fig. 2. As indicated by this curve the time of cut
5 off in terms of change in field strength may be increased in this way from value "a" to value "b" so that no disagreeable sensation is experienced.

What is claimed is:

10 1. In a sound reproducing system, a sound record, a current reproducing device cooperating with said record, a loud speaker responsive to the currents generated by said device, a magnetron connected between said
15 device and said loud speaker, and means for rectifying a portion of the output of said device for exciting said magnetron.

2. In a sound reproducing system, a sound record, a current reproducing device cooperating with the record, a loud speaker responsive to the currents generated by the device,
20 a magnetron adapted to vary in impedance gradually in response to changes in its excitation connected between the device and the
25 loud speaker, and means for rectifying a portion of the output of the device for exciting the magnetron.

3. In a sound reproducing system, a sound record, a current reproducing device cooperating with the record, a loud speaker responsive to the currents generated by the device, a magnetron connected between the device and the loud speaker, and means for
30 varying the impedance of the magnetron in accordance with the output of the reproducing device.
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In witness whereof I hereunto subscribe my name this 25th day of June, 1928.

ARTHUR C. KELLER.

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