March 26, 1929. F. W. DIERDORF 1,707,115

APPARATUS FOR REPRODUCING MUSICAL TONES

Filed Jan. 18, 1924 3 Sheets-Sheet 1

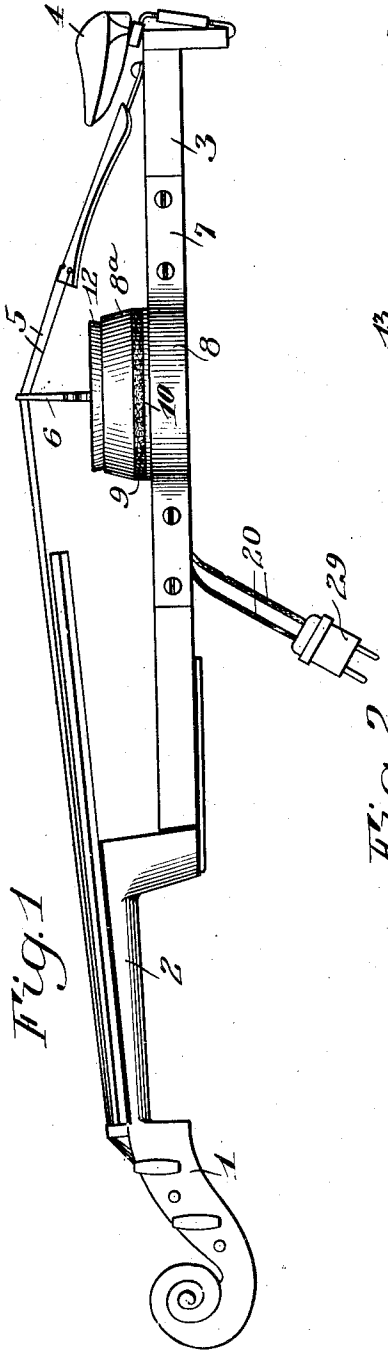


Fig. 1

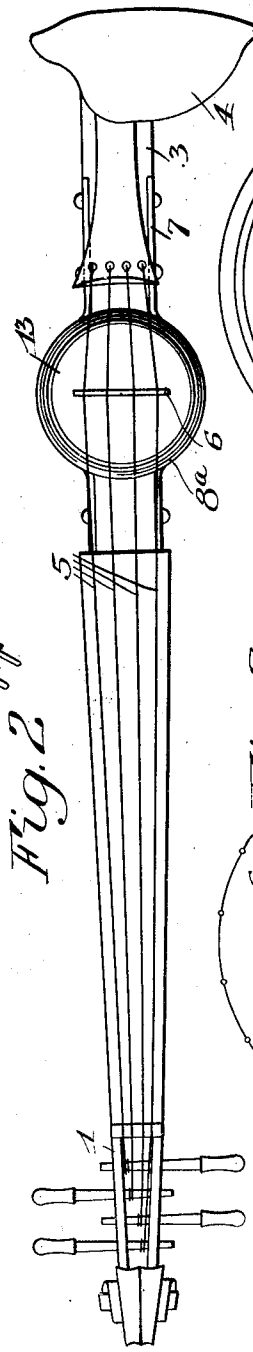


Fig. 2

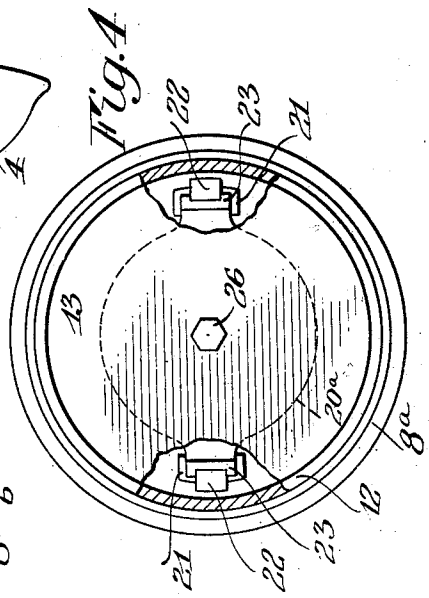


Fig. 4

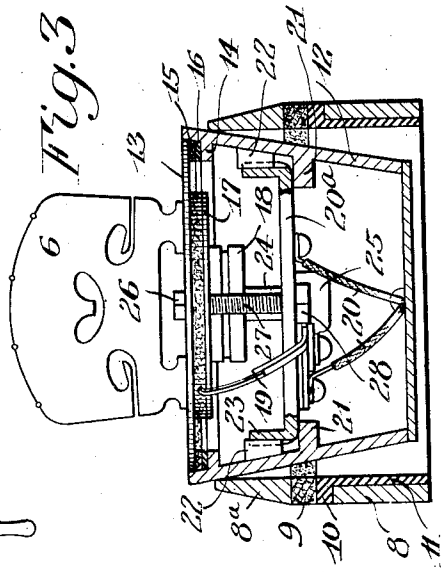


Fig. 3

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APPARATUS FOR REPRODUCING MUSICAL TONES

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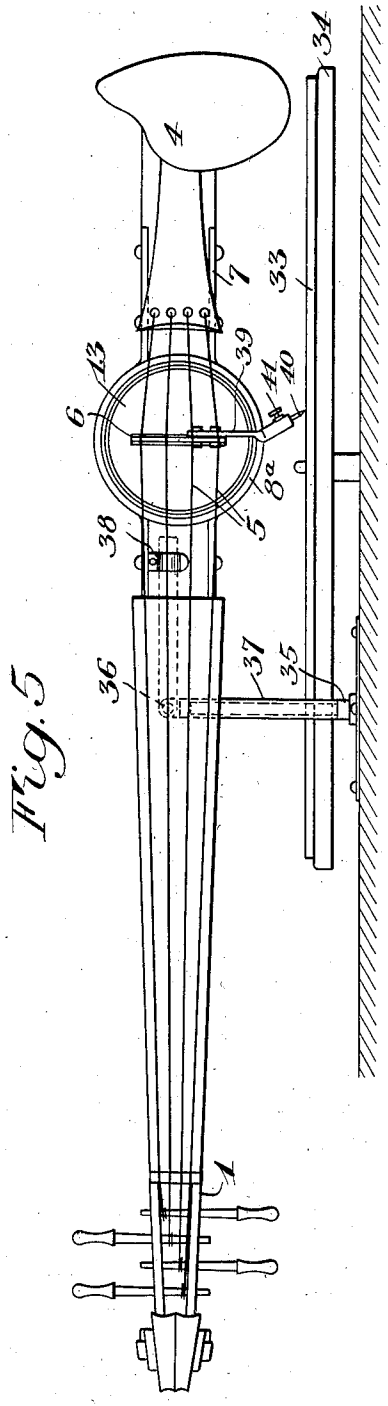


Fig. 5

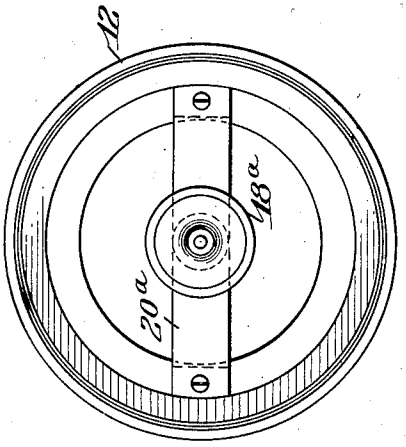


Fig. 7

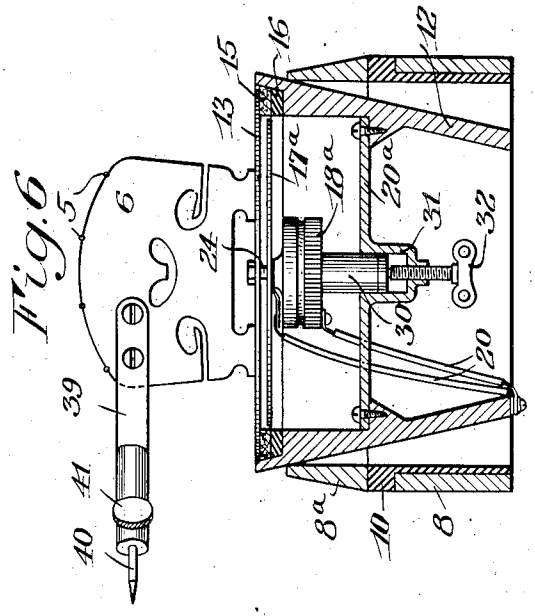


Fig. 6

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Fig. 8

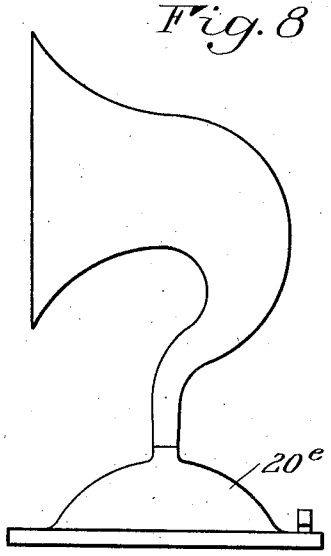
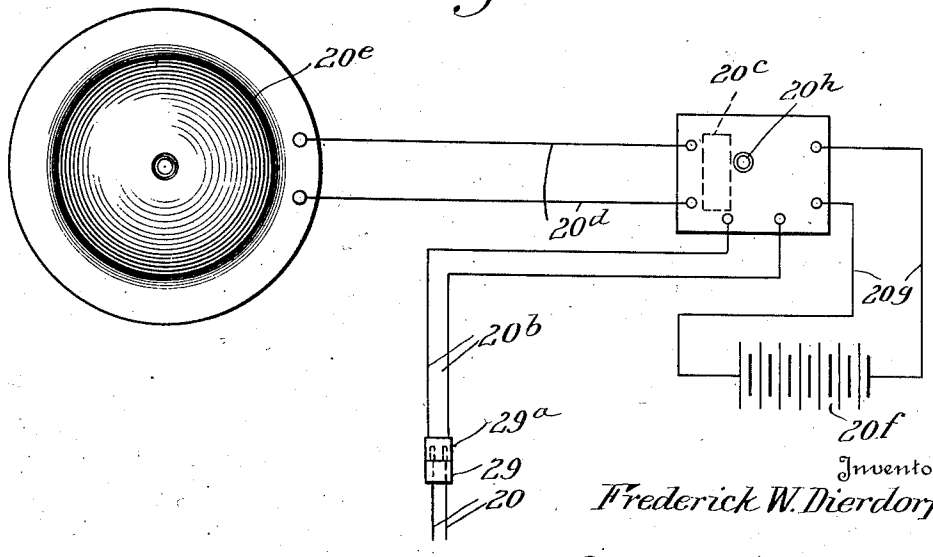


Fig. 9



Inventor
Frederick W. Dierdorf

By Cumpston & Griffith
his Attorney

Patented Mar. 26, 1929. 1,707,115

UNITED STATES PATENT OFFICE.

FREDERICK W. DIERDORF, OF ROCHESTER, NEW YORK.

APPARATUS FOR REPRODUCING MUSICAL TONES.

Application filed January 18, 1924. Serial No. 687,115.

My present invention relates to apparatus for reproducing musical tones and more particularly to means for transmitting and augmenting or modifying the tones produced by a stringed instrument and it has for its object to provide an instrument preferably in the nature of a violin so fitted that the music produced thereon may be efficiently reproduced at a distant point. A further object of the invention is to fit the same instrument with means whereby its transmitting capabilities may be utilized, at pleasure, to reproduce the tones of a phonographic record. To these and other ends the invention resides in certain improvements and combinations of parts all as will be hereinafter more fully described, the novel features being pointed out in the claims at the end of the specification.

In the drawings:

Figure 1 is a side view of a stringed musical instrument constructed in accordance with and illustrating one embodiment of my invention;

Figure 2 is a top plan view thereof;

Figure 3 is an enlarged transverse section through the instrument taken in substantially the plane of the bridge thereof;

Figure 4 is an enlarged plan view partly broken away of the main diaphragm;

Figure 5 is a top plan view partly in section of another embodiment of the invention;

Figure 6 is a transverse section, enlarged, taken substantially in the plane of the bridge through the instrument shown in Figure 5 and

Figure 7 is a plan view of the diaphragm mounting with the main diaphragm removed.

Figure 8 is a view in elevation of an amplifier, and

Figure 9 is a diagrammatic view illustrating the means for electrically connecting the amplifier with the transmitter of the instrument.

Similar reference numerals throughout the the several views indicate the same parts.

Referring first to the embodiment of the invention illustrated in Figures 1 to 4, the instrument illustrated is in the general nature of a violin embodying a head 1, a neck 2 and a body frame or rib 3 having the usual chin rest 4 at the further end. The usual resonating body for the strings 5 and bridge 6 is omitted. Instead, the back rib or frame 3 is fitted with a mounting 7 screwed thereto and embodying a central ring 8. On this ring is superposed a mounting ring 8^a with an interposed gasket 9 of felt and, next beneath the same, a rubber gasket 10 that is preferably extended downwardly at 11 to form a non-vibrant lining.

Resting within the ring 8^a is a tapered drum 12 preferably of metal or some rigid material. At its top is a main diaphragm 13 resting on a seat 14 through the medium of a felt gasket 15 and a rubber gasket 16. It is on this diaphragm that the bridge 6 rests as shown. Secured to the under side of the main diaphragm 13 is a secondary diaphragm 17 in connection with a carbon transmitter 18 of the usual type, the circuit connections to which are indicated at 19 and 20. Below the transmitter is a holder 20^a spanning the interior of the drum and supported on seats 21 having centering lugs 22 above them engaged by the upturned ends 23 of the holder. A stem 24 having a head 25 beneath the holder extends to base of transmitter 18 and the diaphragms 17 and 13 and terminates in a nut 26 on the upper side of the latter. Threaded studs 27 also extend downwardly from the diaphragm 17 to the holder 20^a being secured by nuts 28. It will be seen from this that the diaphragms and the holder with the electrical connections may be removed as a unit from the instrument.

With these arrangements, the vibrations of the strings 5 as transmitted through the bridge 6 are electrically transmitted through the carbon transmitter 18 and the wires 20 and 20^b, induction coil or electromagnet 20^c and wires 20^d to a loud speaker or other electrical reproducing device 20^e located at a distant point, current being supplied preferably by a battery 20^f through wires 20^g and controlled by a switch 20^h, it being understood that the loud speaker includes a diaphragm or other suitable amplifying means. The wires 20 terminate at a plug 29 for connection with a socket 29^a carrying the wires 20^b. The bridge 6 and diaphragm 13 are so insulated against vibration from the rest of the structure by means of the several felt and rubber gaskets that the musical tones only reach the transmitter.

In the embodiment of the invention shown in Figures 5 to 7, the arrangements are gen-

erally similar but differ in details and where similar in structure the same reference numerals have been applied. The secondary diaphragm 17^a is mounted on a stem 24 in spaced relation to the main diaphragm 13 and the carbon transmitter 18^a is arranged next below it on the same stem but the latter is not positively secured to the holder 20^a. Instead, a neck 30 on the transmitter occupies a socket or guide 31 in the holder and is engaged from below by a thumb screw 32 threaded into the socket portion of the holder. By tightening or loosening this thumb screw the desired tension can be applied to the diaphragm 13 pressure being exerted in opposition to that of the bridge 6 and the strings 5 stretched thereover.

An instrument of this kind can be used to give entertainments such as vaudeville acts wherein its tones are reproduced through a loud speaker to emanate at any desired part of the hall or theater. A diaphragm or reproducer being present the instrument can be utilized through the use of a further attachment of my invention to reproduce the tones of phonograph records. Such a record is shown at 33 in Figure 5 on a turn table 34 adjacent to which is a pivot post 35. On the under side of the frame or back rib 3 of the instrument I pivot at 36 a sleeve 37 adapted to fit over the post 35 but normally held in an inoperative position as shown in dotted lines by a suitable clip 38. Fastened to the bridge 6 is a needle arm 39 carrying a reproducing needle 40 held in a socket by a set screw 41 in the ordinary manner. In view of the pivot provided at 35 the instrument may swing across the record in the ordinary manner with the needle resting on the groove.

In this modification it will be understood that the transmitter is adapted for connection with the loud speaker or tone modifying device 20^c as in the case of the instrument illusutrated in Figures 1 to 4.

I claim as my invention:

1. The combination with a musical instrument having a bridge and strings stretched thereon, of a diaphragm supporting the bridge and an electrical transmitter having an operating portion extending into engagement with the diaphragm and adapted to be actuated thereby.

2. The combination with a musical instrument having a bridge and strings stretched thereon, of a primary diaphragm, a ring of relatively soft material adapted to support the primary diaphragm, a secondary diaphragm and an electrical transmitter connected with and adapted to be positively actuated by the primary diaphragm through the medium of the secondary diaphragm, the bridge being supported by the primary diaphragm.

3. The combination with a musical instrument having a bridge and strings stretched thereon, of a detachable drum mounted in the instrument, a diaphragm carried by the drum and supporting the bridge and a sound transmitting device associated with the diaphragm, the drum, diaphragm and transmitting device being removable as a unit.

4. The combination of a musical instrument having a bridge and strings stretched thereon, a body frame provided with a mounting ring insulated from the frame against vibration, a member disposed within the mounting ring, a diaphragm carried by said member in supporting engagement with the bridge and a sound transmitting device associated with the diaphragm.

5. The combination of a musical instrument having a bridge and strings stretched thereon, a body frame provided with a mounting ring insulated from the frame against vibration, an element supported in the mounting ring, a diaphragm carried by said element and supporting the bridge and a sound transmitting device associated with the diaphragm.

6. The combination with a musical instrument having a bridge and strings stretched thereon, of a drum, a diaphragm carried thereby and supporting the bridge, a sound transmitting device on the other side of the diaphragm and a tensioning device acting on the diaphragm in opposition to the pressure of the bridge and through the medium of the sound transmitting device.

7. The combination with a musical instrument having a bridge and strings stretched thereon, of a drum provided with a holder, a diaphragm carried by the drum and supporting the bridge, a sound transmitting device carried by the holder on the other side of the diaphragm and a screw threaded in the holder and acting on the diaphragm through the medium of the sound transmitting device to tension the diaphragm in opposition to the pressure of the bridge.

8. In apparatus for reproducing musical tones, a musical instrument having a non-resonant base substituted for the sound box of the instrument and including a bridge upon which the strings are stretched, a diaphragm supported by the base and upon which the bridge is mounted, a microphone disposed at one side of the diaphragm, a vibration transmitting connection between the diaphragm and the microphone and tone modifying means electrically connected with the microphone.

9. In a sound reproducing apparatus, a musical instrument having a non-resonant base substituted for the sound box of the instrument and having strings stretched upon the base, tone modifying means, electrical transmitting means interposed between the instrument and said modifying means comprising a microphone and vibration trans-

mitting means engaging the strings of the instrument and being connected with the microphone whereby to positively effect vibration of the same.

10. In a sound reproducing apparatus, a musical instrument having a non-resonant base substituted for the sound box of the instrument and upon which the strings are stretched, an electrical transmitter, vibratory means forming a support for the strings and being responsive to the vibrations thereof and adapted to positively effect vibration of the transmitter, and means connected with the electrical transmitter for reproducing the tones of the instrument in different volume from instrument tones.

11. In combination, a stringed musical instrument having a head and a finger-board and having a non-resonant base substituted for the sound box of the instrument, a diaphragm, means interposed between the diaphragm and the base for insulating the latter from the vibrations of the former, an electrical transmitter, means for transmitting the vibrations of the diaphragm to the transmitter and tone modifying means electrically connected with the transmitter and adapted to modify the vibrations transmitted thereto.

12. In combination, a stringed musical instrument having a head and a finger-board and having a non-resonant frame or base substituted for the sound box of the instrument, a diaphragm, a member interposed between the diaphragm and base for insulating the vibrations of the former from the latter, an electrical transmitter including an operating connection extending into engagement with the diaphragm whereby to positively effect vibration of the transmitter and a loud speaker electrically connected with the transmitter.

13. In combination, a stringed musical instrument having a head and a finger-board for the strings and having a non-resonant base substituted for the sound box of the instrument, a diaphragm supported by the base, a bridge carried by the diaphragm, strings stretched upon the bridge and connected with the head and base, an electrical transmitter arranged for positive vibration by the diaphragm and a loud speaker electrically connected with the transmitter.

14. In combination, a musical instrument comprising a frame, a diaphragm, means adapted to space the diaphragm from the frame and serving to insulate the latter from the vibrations of the former, a bridge disposed upon the diaphragm, strings stretched upon the bridge and having their ends connected with the frame and sound transmitting means connected with the diaphragm.

15. In combination, a musical instrument comprising a frame, a diaphragm, means adapted to space the diaphragm from the frame and serving to insulate the latter from the vibrations of the former, a bridge disposed upon the diaphragm, strings stretched upon the bridge and having their ends connected with the frame, and an electrical transmitter connected with the diaphragm for transmitting the vibrations thereof.

16. In combination, a musical instrument comprising a frame, a diaphragm, means supporting the diaphragm in spaced relation to the frame, a bridge disposed on the diaphragm, strings stretched upon the bridge and having their ends connected with the frame, a transmitter for the vibrations of the diaphragm adjustable relative to the latter and an operating connection for the transmitter adapted to be actuated by the diaphragm.

17. In combination, a stringed musical instrument having a head and a finger-board and having a non-resonant base for supporting the same, a diaphragm, means interposed between the diaphragm and the base for insulating the latter from the vibrations of the former and an electrical transmitter adapted to receive and transmit the vibrations of the diaphragm.

18. In combination, a musical instrument of the violin type having the neck, head and finger-board of the violin and having a non-resonant base substituted for the sound box of the instrument, a diaphragm supported by said base, a bridge disposed upon the diaphragm, strings stretched upon the bridge and having their ends connected with the head and base and a vibration transmitter associated with the diaphragm and adapted for receiving and transmitting the vibrations thereof.

19. In combination, a musical instrument having a base and strings thereon, a hollow member upon the base, means for insulating the latter from the vibrations of the former, a diaphragm carried by the hollow member, a bridge for the strings supported by the diaphragm and an electrical transmitter disposed at one side of the diaphragm and adapted to receive and transmit the vibrations thereof.

20. In a sound reproducing apparatus, a musical instrument having a non-resonant base substituted for the sound box of the instrument, strings stretched upon the base, an electrical transmitter, vibratory means forming a support for the strings and being responsive to the vibrations thereof and means adapted to positively transfer the vibrations to the electrical transmitter.

21. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, an electrical transmitter carried by the base, means between the ends of the strings upon which the latter are stretched arranged to positive-

ly transmit the vibrations of the strings to the transmitter and tone modifying means electrically connected with the transmitter.

22. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, an electrical transmitter, a support for the transmitter carried by the base constructed to insulate the latter from the vibrations produced by the strings, a bridge or the like for the strings mounted upon the support and having a connection with the transmitter whereby to transmit the vibrations of the strings to the latter, and tone modifying means electrically connected with the transmitter.

23. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, a bridge or the like for the strings, a support interposed between the bridge and the base and serving to insulate the latter from the vibrations of the former, a transmitter carried by the support, and means interposed between the bridge and transmitter for transmitting the vibrations of the former to the latter.

24. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, an electrical transmitter, a support for the transmitter carried by the base constructed to insulate the latter from the vibrations produced by the strings and a bridge or the like for the strings mounted upon the support and having a connection with the transmitter whereby to transmit to the latter the vibrations of the strings.

25. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, an electrical transmitter carried by the base, and means between the ends of the strings upon which the latter are stretched arranged to positively transmit the vibrations of the strings to the transmitter.

26. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, an electrical transmitter, supporting means for the strings engaging the latter between their ends, a part connected with the supporting means for transmitting the vibrations of the strings to the transmitter, and means interposed between the supporting means and the base for insulating the latter from the vibrations of the former.

27. In apparatus for producing musical tones, a musical instrument comprising a base, strings stretched thereon, said base being of rigid non-vibratory construction designed to avoid the setting up therein of vibrations transmitted by the strings, an electrical transmitter carried by the base, a bridge or the like for the strings, means for transmitting the vibrations of the bridge to the transmitter and means for effecting relative adjustment between said means and the transmitter.

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