Jan. 31, 1933. E. W. GENT 1,895,757

TRANSLATING DEVICE

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FIG. 1

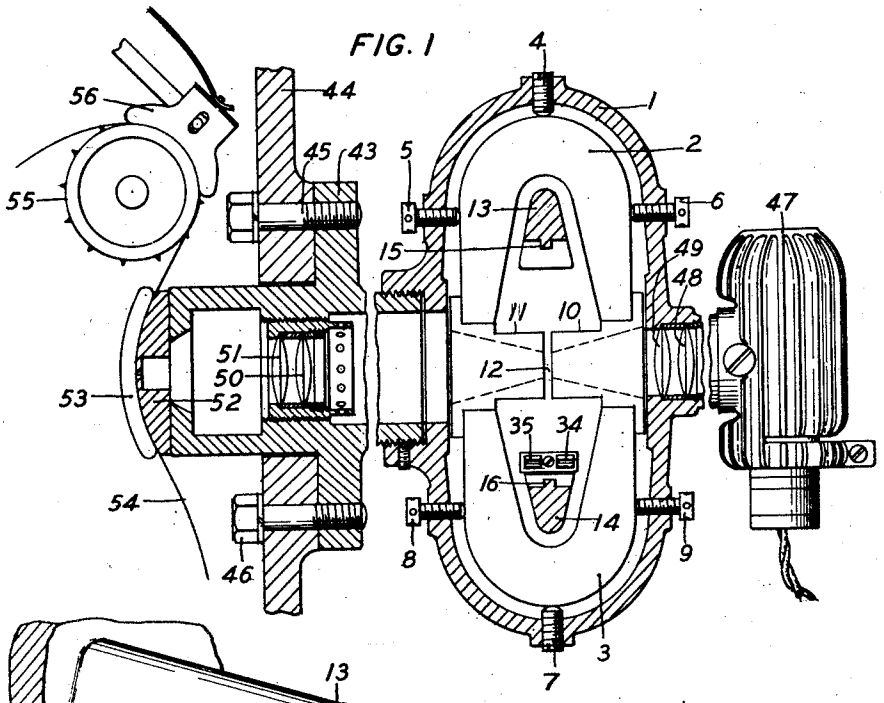


FIG. 2

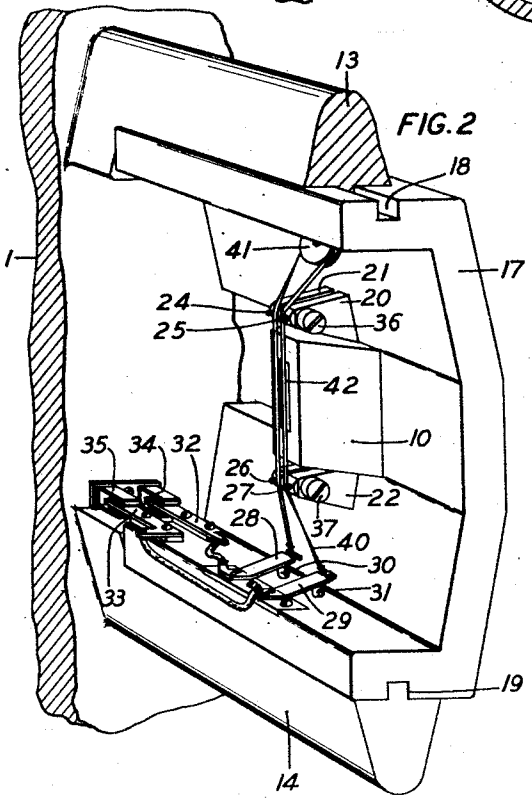
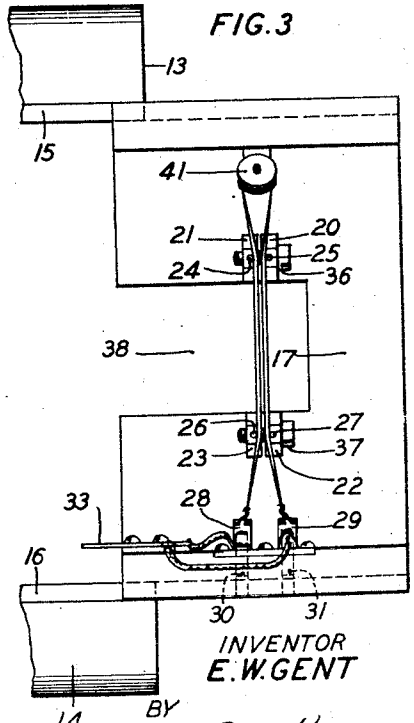


FIG. 3



INVENTOR
E. W. GENT
BY
M. B. McKenney
ATTORNEY

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TRANSLATING DEVICE

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FIG. 4

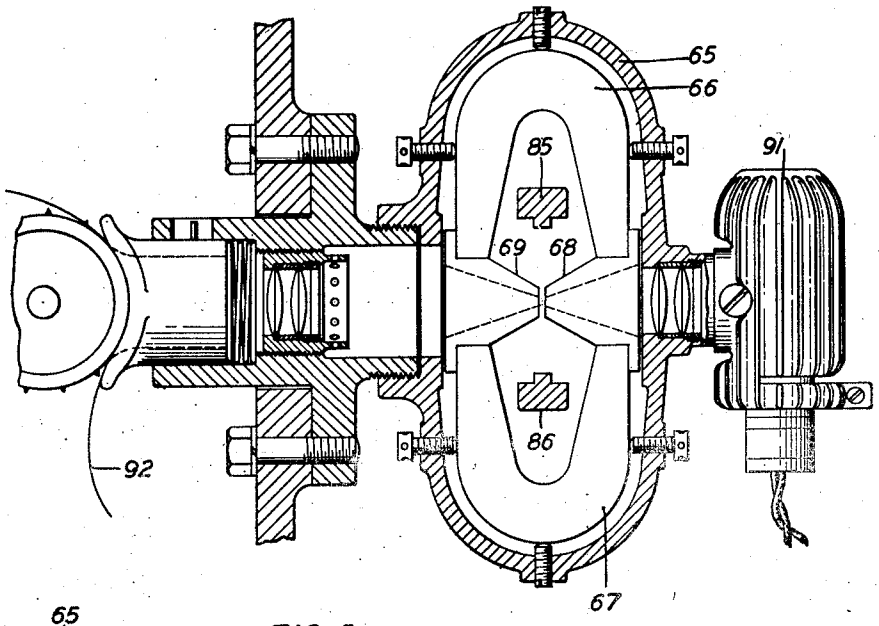


FIG. 5

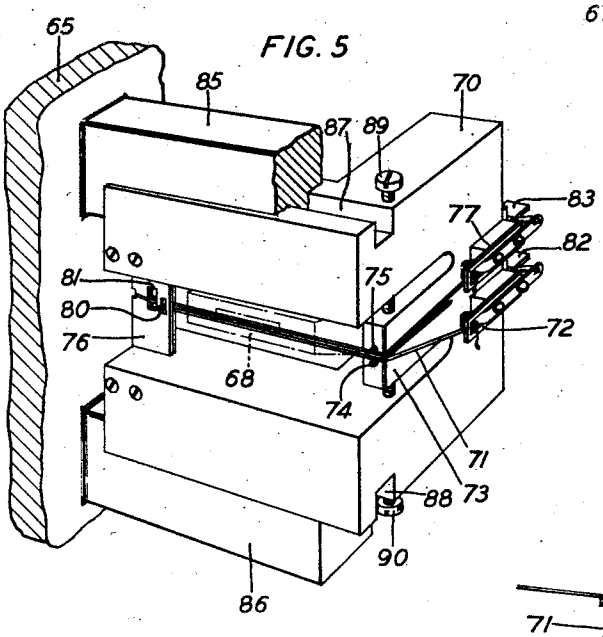


FIG. 6

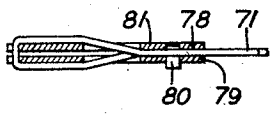


FIG. 7

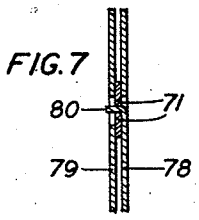
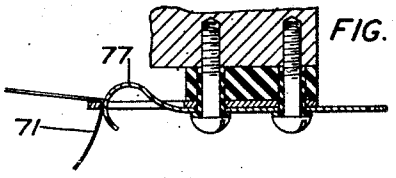


FIG. 8



INVENTOR
E. W. GENT
BY
ATTORNEY

Patented Jan. 31, 1933 1,895,757

UNITED STATES PATENT OFFICE

EDGAR W. GENT, OF MORRISTOWN, NEW JERSEY, ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

TRANSLATING DEVICE

Application filed February 27, 1931. Serial No. 518,741.

This invention relates to translating devices and particularly to light valves used for recording sound on a photographic medium.

The objects are to facilitate the mounting and adjustment of the vibratory elements of a light valve, to enable the replacement of these elements without disturbing other parts of the device, to secure a simplified and more compact magnetic structure, and to otherwise improve apparatus of this nature.

Heretofore in light valves employing vibratory strings or ribbons, it has been the practice to supply the necessary magnetic field by means of electromagnets having two pole pieces with a light-transmitting slot passing therethrough. Usually one of these pole pieces was mounted on one part of the structure and the other pole piece on another part, the latter of which was removable for the purpose of mounting and adjusting the vibratory ribbons. With such a construction it was necessary to disassemble the magnetic structure by removing one pole piece from its cooperative relation with the other in order to replace or adjust the vibratory ribbons.

According to the present invention, these objections are overcome by means of a device in which the magnetic structure forms one complete unit and the vibratory string or ribbon structure forms a second and separate complete unit. In other words, the magnets and pole pieces which furnish the magnetic flux in the region of the light-transmitting slot are mounted and securely fastened to a main mounting frame. The vibratory ribbons are mounted on a secondary or separate mounting frame which is provided with adjusting means whereby the necessary spacing adjustment and tension adjustment may be made before assembly. After these adjustments have been completed, the secondary frame comprising the ribbon unit is detachably secured to the main frame to bring the ribbon into cooperative relation with the light-transmitting slot and pole pieces.

A feature of the invention is a structure of this kind in which it is possible to use permanent magnets to supply the magnetic flux for the valve. Although these magnets set up a strong flux, which is constantly present, such flux does not interfere with the removal of the ribbon unit for replacement and adjustment since it is not necessary for this purpose to withdraw either pole piece from its fixed position with respect to the other pole piece.

In the drawings accompanying this specification, Fig. 1 is a sectional view showing a portion of a sound recording device including the light valve embodying the present invention; Fig. 2 is a perspective view on an enlarged scale illustrating the manner in which the parts of the light valve are assembled; Fig. 3 is a plan view also on an enlarged scale showing more clearly the arrangement of the vibratory ribbons; Fig. 4 is a sectional view similar to the one shown in Fig. 1 involving a modified form of light valve; Fig. 5 is a perspective view showing the way in which the ribbon unit is assembled; and Figs. 6, 7 and 8 are details of the vibratory ribbon structure.

The present light valve is particularly useful for recording sound on moving picture film although it may also be employed for recording pictures and views. The invention is an improvement in light valves of the general type disclosed in the copending application by E. W. Gent and L. M. Potts, Serial No. 336,474, filed January 31, 1929.

Referring first to Figs. 1, 2 and 3, the structure may be regarded as comprising two separate parts, the magnetic unit and the vibratory ribbon unit. The main frame 1, constructed in the form of a housing, serves as the support and container for the permanent magnets 2 and 3 comprising the magnetic unit. For clearness of illustration this portion of the device is shown in Fig. 1 rotated through an angle of 90°. The permanent magnet 2 is located and secured within the housing 1 by means of screws 4, 5 and 6 and the permanent magnet 3 is similarly located by means of screws 7, 8 and 9. When these magnets are properly adjusted and secured, their magnetic pole pieces 10 and 11 form an air-gap 12 of proper dimensions. As is clearly disclosed in the above-noted Gent et al. application, the pole pieces 10 and 11

are provided with light-transmitting slots which register accurately with each other at the air-gap 12. These slots are outlined by the dotted lines in Fig. 1, and one of them is seen more clearly in Fig. 2.

The vibratory ribbon unit shown in Figs. 2 and 3 comprises a separate auxiliary mounting frame 17. This support 17 carries a pair of ribbon suspending bridges. One of these bridges includes the supporting elements 20 and 21, and the other bridge includes the supporting elements 22 and 23. The tips of these bridges are equipped with locating pins 24, 25 and 26, 27 embedded in insulating material to prevent electrical short-circuiting of the parallel sections of the ribbon. The vibratory ribbon 40 is secured to the mounting plate 17 by means of two tension springs 28 and 29 and a loop anchor in the form of an idler pulley 41. One of the free ends of the ribbon is secured to the tension spring 28. From the spring 28 it passes over the bridge members 23 and 21, being located in proper position by the pins 26 and 24, thence around the pulley 41 and returning over the bridge members 20 and 22, being located by the pins 25 and 27, to the other tension spring 29. The tension springs 28 and 29 are adjustable by means of screws 30 and 31 respectively, in order to give the ribbon the proper tension. The spacing of the two parallel sections of the ribbon is controlled by the adjusting screws 36 and 37. The tension springs 28 and 29 are electrically connected respectively to the terminal plugs 32 and 33 which project slightly beyond the edge of the frame 17.

After the ribbon has been mounted and adjusted on its supporting frame 17, the said frame 17 is then assembled with respect to the main frame 1. It will be noted that the main frame 1 is provided with two projecting arms 13 and 14 integrally formed therewith. The supporting arm 13 is provided with a tongue 15 and the arm 14 with a tongue 16. It will also be noted that the auxiliary frame 17 is provided with grooves 18 and 19 which register respectively with the tongues 15 and 16. The frame 17 has a rectangular portion 38 cut away to a sufficient depth to receive the pole piece 10 as the frame 17 slides into place by means of the tongue and groove connection. With the frame 17 fully in place the assembled and adjusted ribbons are brought to rest exactly in proper relation with respect to the light-transmitting slots in the pole pieces 10 and 11.

With the parts thus assembled the connecting plugs 32 and 33 enter the jacks 34 and 35 whereby the ribbon operating currents may be brought in from the outside of the structure.

The optical system with which the light valve is associated includes a source of light 47 and lenses 48, 49, 50 and 51. The lenses 48 and 49 are secured in the housing 1, which in turn is removably secured to the member 43. The member 43 is attached to the supporting frame 44 by means of bolts 45 and 46. The lenses 50 and 51 are adjustably mounted within the member 43. Light from the source 47 passes through lenses 48, 49 and the light-transmitting slot in the pole pieces 10 and 11, and thence through the lenses 50 and 51, through an aperture in the aperture plate 52 where it encounters the moving film 54 held in position by the presser foot 53. The film 54 is driven by a sprocket 55 in any convenient manner, the tension element 56 serving to hold the film against the sprocket.

A description will now be given of the alternative construction shown in Figs. 4 to 8 inclusive. In this device the magnetic unit, including the housing member 65, permanent magnets 66 and 67, and pole pieces 68 and 69, is substantially the same as that shown in Fig. 1. The ribbon unit, however, comprises a mounting frame 70 of right-angled formation. In this case the vibratory ribbon 71 is secured at one end to the tension grip 72 from whence it passes over the bridge 73, being located by the pin 74, thence around the anchor plate 76 and returning to the bridge 73 where it is located by the pin 75 and thence to the other tension grip 77. The anchor plate 76 comprises two thicknesses 78 and 79 of some suitable material such as duralumin having a thickness of about .002 inch. The thickness 78 has a small ear 80 upturned within an aperture cut through both thicknesses 78 and 79 as seen in Figs. 6 and 7. The ribbon 71 is secured to this anchor plate as seen in Figs. 6 and 7 by first passing it between the thicknesses 78 and 79 on one side of the ear 80, thence to the exterior through aperture 81, around both thicknesses 78 and 79, back through the aperture 81 and between the two thicknesses on the other side of the ear 80 and thence to the bridge 73. This gives an accurate spacing of the sections of the ribbon of about .002 inch. The bridge 73 is adjustable to secure the proper spacing of the ribbon sections by means of adjusting screws 89 and 90. The tension grips 72 and 77 are electrically connected to the plug members 82 and 83.

The magnetic and ribbon units in this structure are assembled in a manner similar to that disclosed in Figs. 1, 2 and 3. The main frame 65 is equipped with tongued supporting arms 85 and 86 which match with the grooves 87 and 88 in the frame 70.

The optical system in Fig. 4 is similar to that shown in Fig. 1. The light beam produced by the lamp 91 passes through the various lenses and the light-transmitting slot and is directed to the moving film 92 on which the record is produced.

With a light valve of the construction explained herein, it is possible to completely remove the vibratory string or ribbon unit to

facilitate replacement and adjustment without interfering with the magnetic circuit. Since the pole pieces 10 and 11 in Fig. 1, for example, do not need to be disturbed to enable replacement and adjustment of the ribbon, permanent magnets may be employed instead of the electromagnets. This greatly simplifies the equipment necessary for apparatus of this kind.

What is claimed is:

1. The combination in a translating device of a pair of pole pieces formed to define a light-transmitting slot, a mounting member to which said pole pieces are secured in operative relation to each other, a vibratory element for controlling the passage of light through said slot, a second mounting member to which said vibratory element is secured, and means for detachably securing said second mounting member to said first mounting member to locate said vibratory member in operative relation to said light-transmitting slot.

2. The combination in a light valve of a pair of pole pieces having a light-transmitting slot passing therethrough, a mounting frame to which said pole pieces are secured in operative relation to each other, a vibratory ribbon for controlling the passage of light through said slot, a second mounting frame to which said ribbon is secured, means on said second frame for adjusting said ribbon, and means for detachably securing said second frame to said first mentioned frame to bring said ribbon into operative relation with said light-transmitting slot.

3. The combination in a translating device of a magnetic structure comprising magnets and pole pieces therefor, said pole pieces having a light-transmitting aperture therein, a housing and mounting frame to which said magnets and pole pieces are secured, an auxiliary mounting frame, a pair of vibratory ribbons secured to said auxiliary frame and traversing said aperture to control the density of the light transmitted therethrough, means on said auxiliary frame for adjusting the tension and spacing of said ribbons, and means for detachably securing said auxiliary frame to said housing and mounting frame.

4. In a light valve, a main mounting frame, a magnetic structure comprising permanent magnets and pole pieces securely attached to said mounting frame, said pole pieces having a light-transmitting aperture therein, an auxiliary mounting frame, a vibratory element secured to said auxiliary frame and traversing said aperture to define the opening through which light is transmitted, and means for detachably securing said auxiliary frame to said main mounting frame to locate said vibratory element with respect to said light-transmitting aperture.

5. The combination in a translating device of a pair of pole pieces formed to define a light-transmitting slot, a main mounting member to which said pole pieces are attached, an auxiliary mounting member, a vibratory ribbon on said auxiliary member for controlling the passage of light through said slot, said main mounting member and said auxiliary member being provided with tongued and grooved portions to permit said auxiliary member to be detachably secured to said main mounting member to locate said ribbon with respect to said light-transmitting slot.

In witness whereof, I hereunto subscribe my name this 20th day of February, 1931.

EDGAR W. GENT.