Sept. 6, 1927. 1,641,947

J. T. SCULLY

RECORDING AND REPRODUCING APPARATUS

Filed Aug. 5, 1924 3 Sheets-Sheet 1

Fig. 1.

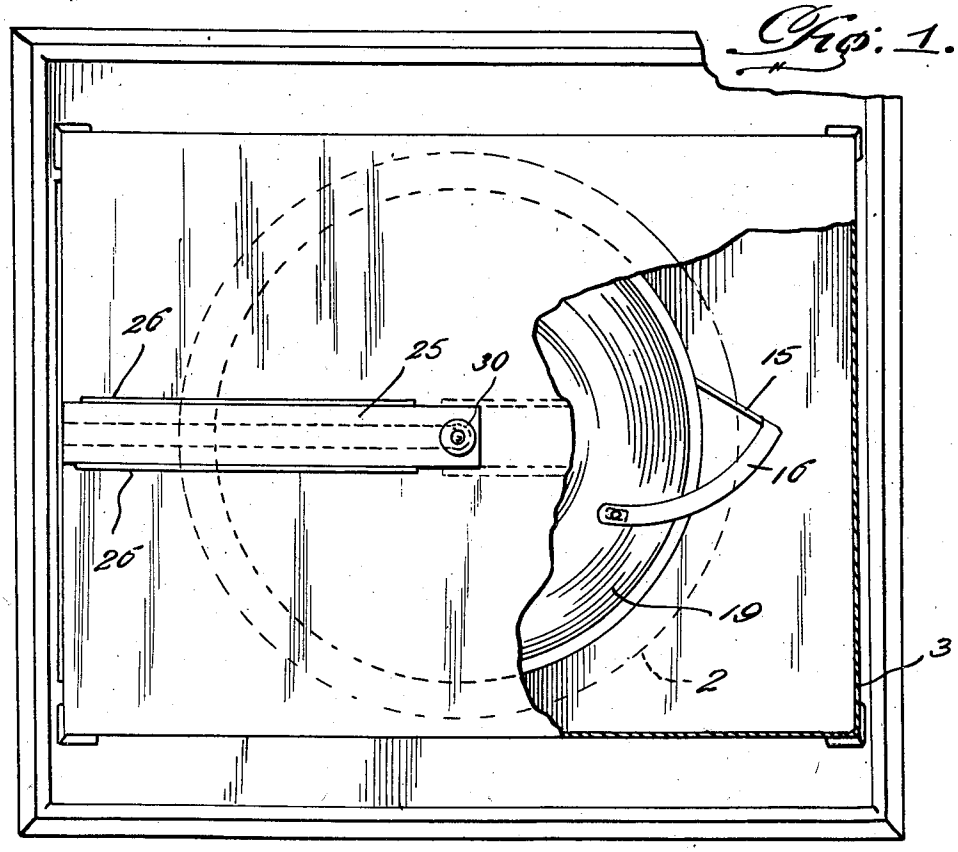
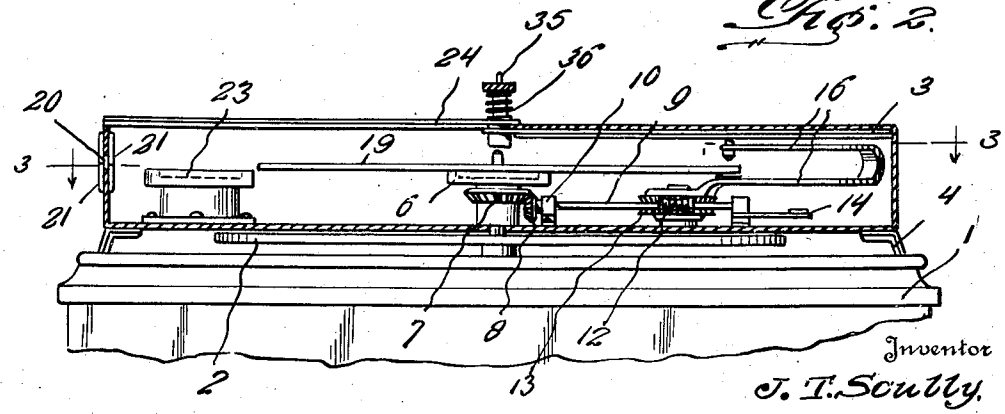


Fig. 2.



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Fig: 3.

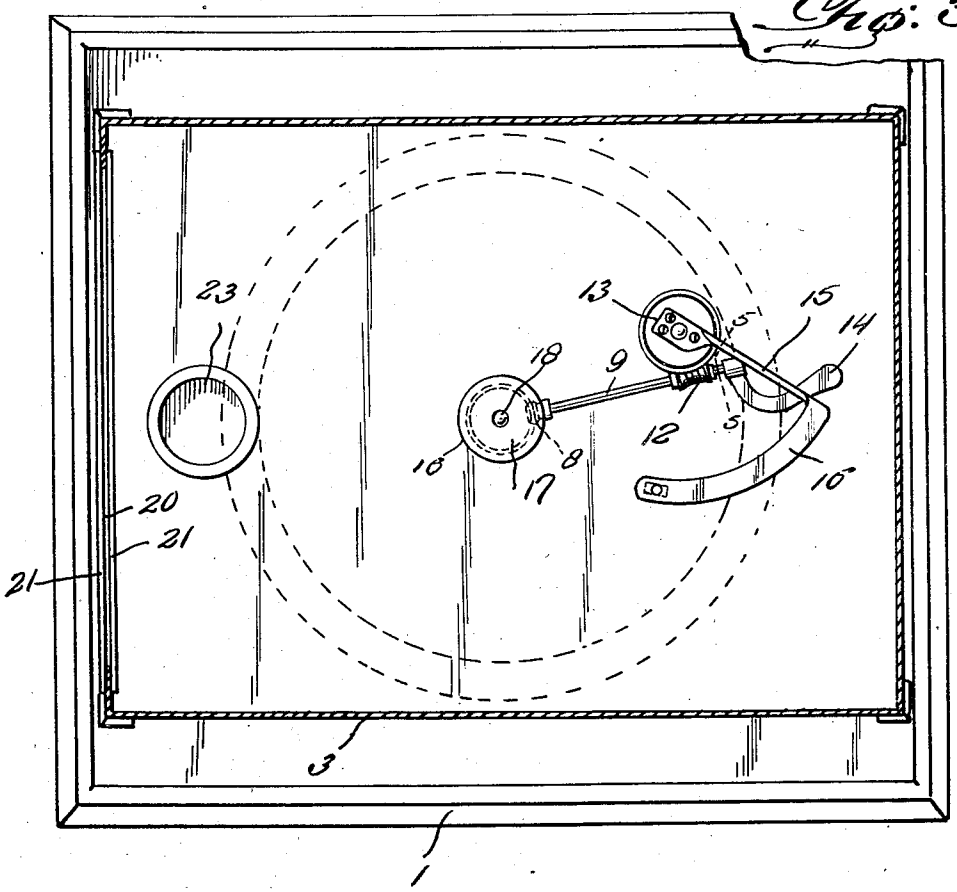


Fig: 5

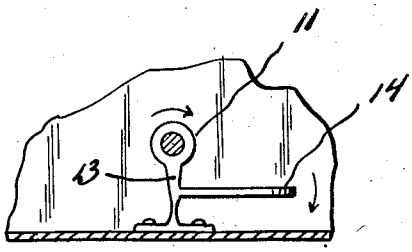
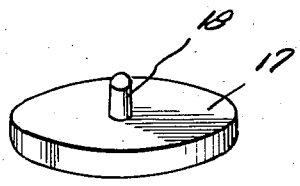


Fig: 6.



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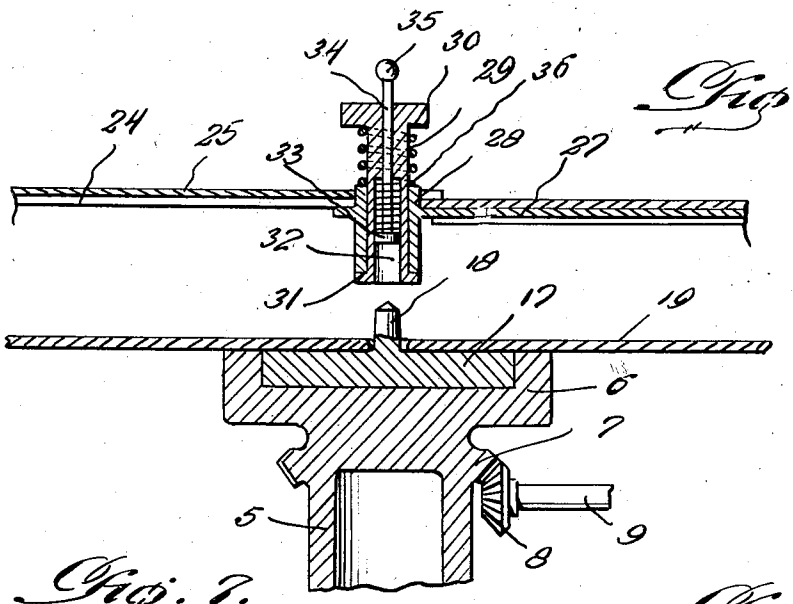
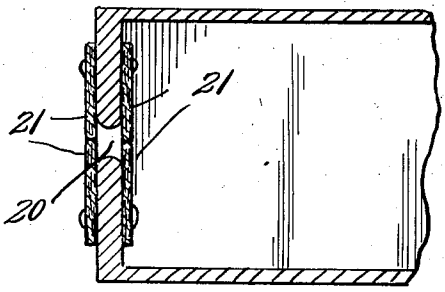


Fig. 4.

Fig. 7.

Fig. 8.



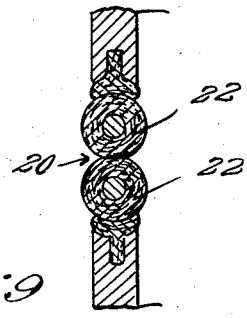
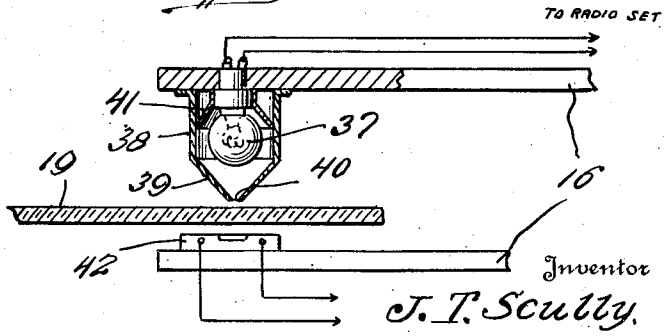


Fig. 9



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Patented Sept. 6, 1927. 1,641,947

UNITED STATES PATENT OFFICE.

JOHN T. SCULLY, OF NEW YORK, N. Y.

RECORDING AND REPRODUCING APPARATUS.

Application filed August 5, 1924. Serial No. 730,188.

In carrying out the present invention it is my purpose to provide apparatus whereby permanent photographic records may be made of the sound waves broadcast by radio sending stations, and whereby such sound waves may be reproduced whenever desired, thereby enabling the matter being broadcast to be recorded for reproduction and reproduced when desired.

It is also my purpose to provide an adapter for housing my recording and reproducing apparatus which will be of such construction that my apparatus may be used in connection with a talking machine motor and cabinet, the apparatus being so constructed that it may be operated by the motor of the talking machine both in recording and in reproducing.

Furthermore, I aim to provide an adapter which will be constructed in such manner as to receive and protect from light the photographic plates or films upon which the waves are to be recorded, and which will be constructed in such manner that the plates or films may be easily and conveniently inserted in the adapter and removed therefrom.

A further object of my invention is to provide a recording and reproducing apparatus of the class described and an adapter therefor which will embrace the desired features of simplicity, efficiency and durability, which may be manufactured and marketed at small cost, which will operate efficiently, reliably and effectively both in recording and reproducing and which will embody comparatively few parts, and these so arranged and co-related as to reduce the possibility of derangement to a minimum.

With the above recited objects in view, and others of a similar nature, the invention consists in the construction, combination and arrangement of parts set forth in and falling within the scope of the appended claims.

In the accompanying drawings:

Figure 1 is a top plan view of my improved adapter partly broken away, showing my improved apparatus therein.

Figure 2 is a cross sectional view through the same.

Figure 3 is a horizontal sectional view on the line 3—3 of Figure 2.

Figure 4 is an enlarged transverse sectional view through the top portion of the adapter, and the apparatus therein, showing the means for carrying the photographic plates into and out of the adapter.

Figure 5 is a sectional view on the line 5—5 of Figure 3.

Figure 6 is a detailed perspective view of the photographic plate carrier.

Figure 7 is an enlarged fragmentary sectional view through one end of the adapter showing the light excluding gates.

Figure 8 is a similar view showing a modified construction of gate.

Figure 9 is a fragmentary view partly diagrammatic showing the recording and reproducing devices in association with the photographic plate.

Referring now to the drawings in detail, 1 designates the top portion of a talking machine cabinet of any suitable or preferred construction in which is housed the usual motor mechanism for driving the turn table 2 that is mounted on the upper end of the driving shaft of the motor mechanism.

The numeral 3 designates my improved adapter which, in the present instance, is substantially rectangular in outline and is composed of top, bottom and side walls, so as to form an enclosed rectangular receptacle, as is clearly depicted in Figures 1, 2 and 3 of the drawings. This adapter 3 is equipped on its bottom wall with feet 4 adapted to rest upon the top of the talking machine cabinet and to support the bottom wall of the adapter above the turn table 2, as is shown in Figure 2. The adapter 3 is properly centered upon the top of the cabinet above the turn table and the bottom wall of the adapter is formed centrally with an opening through which the upper end of the shaft carrying the turn table 2 projects, so that the upper end of said shaft will extend into the adapter casing.

Within this adapter casing is my improved recording and reproducing apparatus. In the present instance, this apparatus embodies a sleeve 5 that surrounds the upper

end of the turn table carrying shaft and frictionally engages said shaft and cast integral with the upper end of the sleeve 5 is a cup 6 co-axial with the sleeve 5, while formed on the sleeve 5 below the cup 6 is a miter gear 7 which meshes with a similar pinion 8 on the inner end of a feed shaft 9 arranged at right angles to the sleeve carrying shaft and journaled in axially alining bearings 10—11. This shaft 9 carries a worm 12 which meshes with a worm wheel 13 rotatably mounted on a stud carried by the bottom wall of the adapter adjacent to the shaft 9. The inner bearing 10 of the shaft 9 is fixed, while the outer bearing 11 is mounted on a spring arm 13′ provided with a thumb piece 14, as clearly shown in Figure 5 of the drawings. This spring 13′ acts to hold the bearing 11 normally in line with the bearing 10, so that the worm 12 will normally engage the worm wheel 13. When, however, it is desired to disengage the worm 12 from the worm wheel 13, the thumb piece 14 is pressed so as to swing the bearing 11 against the action of the spring 13′, thereby disengaging the worm from the worm wheel, so that the worm wheel may be revolved independently of the worm for a purpose which will presently appear.

Suitably fixed to the upper side of the worm wheel 13 is the inner end of a radial arm 15 that projects outwardly and on the outer end of the arm 15 is a yoke-like carrier 16, the arms of the yoke-like carrier 16 extending inwardly toward the cup 6, one below the other, and describing an arc, as clearly shown in Figures 1 and 3 of the drawings, while the yoke-like carrier is connected to the outer end of the arm 15 at its interconnecting portion. It will be seen that as the sleeve 5 revolves under the action of the shaft carrying the turn table, motion will be transmitted through the bevel gears 7 and 8 to the shaft 9, thereby revolving the worm wheel 13 as long as the worm 12 is in engagement with said wheel 13, so as to swing the arm 15 and the yoke-like carrier 16 radially away from the cup 6.

In the present form of my invention, I employ a plate carrier which is in the form of a disk 17 provided on one face with an axial pin 18. This disk 17 is adapted to seat in the cup 6, as shown in detail in Figure 4 of the drawings, and is designed to carry a photographic plate 19 which, in the present instance, is in the form of a disk.

The plate 19 is formed centrally with an aperture through which the pin 18 projects and the central portion of the plate on one side rests against the confronting face of the disk 17. When the disk 17 is seated in the cup 6 it is held against movement relative to the cup by the friction between the disk and the cup, so that in the rotation of the cup under the action of the sleeve 5 and the turn table carrying shaft a rotary motion will be imparted to the plate carrier and the photographic plate 19. In order that the plate 19 may be introduced into the adapter casing and removed therefrom, suitable means is provided; in this form of my invention I form the end wall of the adapter casing opposite from that adjacent to the arm 15 with an elongated slot 20 that may be closed by means of felt flaps 21 fastened to the inner and outer sides, respectively, of the slotted wall above and below the slot, as clearly shown in Figure 7 of the drawings, or, if desired, the slot 20 may be equipped with felt rollers 22, as illustrated in Figure 8 of the drawings, the flaps 20 or rollers 22, as the case may be, acting as light excluding gates or valves, by means of which the interior of the adapter casing is protected against the entrance of light. Adjacent to the slot 20 within the adapter casing, and fastened to the bottom wall of said casing, is a cup 23 corresponding in shape to the cup 6, and arranged in line with the cup 6 so as to receive the carrier disk 17, as will be presently described. The top wall of the adapter casing at one side of its center and contiguous to the end wall formed with the slot 20 is provided with a slot 24 that is normally closed by a slide 25 fitted in guides 26 formed on the upper side of the adapter casing contiguous to the respective sides of the slot 24. This slide 25 covers the slot 24, which is formed in one-half of the top wall of the adapter, and slidably mounted within guides on the under side of the other half of said wall is a slide 27. The inner ends of these slides 25—27 overlap each other at the center of the top wall of the adapter and passed through said ends and secured thereto is a sleeve 28. Slidably mounted within the sleeve 28 is a stem 29 having its outer end provided with an enlarged knob 30 and its inner end formed with an outturned flange 31 engageable with the inner end of the sleeve 28 and cooperating with the knob 30 to prevent casual displacement of the stem from the sleeve. The inner end of the stem is formed with a socket 32 and slidably mounted within the socket 32 is an ejector 33 provided with a rod 34 that extends upwardly through the stem and beyond the outer end thereof, the outer end of said rod being formed with a knob 35 by means of which the rod and ejector may be manipulated. Encircling the stem 29 between the adjacent portions of the slide 25 and the knob 30 is an expansion spring 36 which acts to hold the stem normally in inactive position, as shown in Figure 4 of the drawings.

When it is desired to introduce a photographic plate into the adapter 3, the exit opening of the plate holder is placed against the entrance slot 20 of the adapter. The stem 29 is moved through the slot 24 to a

position where the socket 32 aligns axially with the cup 23 and in this movement of the stem the slide 25 uncovers the slot 24, while the slide 27 moving simultaneously with the slide 25 covers said slot 24, so as to prevent the ingress of light to the ejector. Just previous to the movement of the stem as described, said stem is lowered against the action of the spring 36 and the socket 32 thereof frictionally engages the pin 18 so that the carrier 17 may be lifted and moved to normal position with the stem. When the stem reaches the position just described, the ejector is actuated to release the pin 18 and the disk 17, so that the latter may seat within the cup 23. With the parts in this position the plate 19, which, in the present form of my invention, is of disk-like form, is discharged from the plate holder through the slot 20 and into the adapter casing, and when the opening, which is formed in the center of the sensitized plate, aligns with the pin of the disk 17 in the cup 23, such plate is seated upon the carrier disk 17. The stem 29 is now lowered so that the socket 32 frictionally engages the pin 18, thereby permitting the carrier disk 17 and the plate to be elevated and moved to operative position; that is to say, to a position in which the carrier disk 17 may be seated in the cup 6 and centered therein, as shown in the drawings. With the parts in this position, the photographic plate is confined within the adapter casing free of the influence of the light on the exterior of the adapter and may be used for recording or reproducing according to the condition of the plate.

For the purpose of converting pulsating or undulating electric current produced by sound waves into corresponding light variations and recording these light rays upon the sensitized plate or film within the adapter, suitable means are provided. In the embodiment of my invention selected for illustrative purposes, I employ a lamp bulb 37 fitted into a socket or receptacle carried by the inner end of the upper arm of the yoke-like carrier 16. Surrounding the lamp bulb 37 is a light directing casing 38 having its upper end fastened to the adjacent portion of the upper arm of the yoke-like carrier 16 and its lower end formed to provide a cone-like condenser 39. The lower end of the cone-like condenser is formed with a needle opening 40 through which the light rays from the lamp 37 are projected on to the upper surface of the sensitized plate in the form of a needle-like stream. Behind the lamp bulb 37 and within the casing 38 is a reflector 41 which acts to direct the rays through the aperture 40.

The receptacle of the lamp bulb 37 is electrically connected in the receiving circuit of a radio receiving set, so that the current fluctuations in the receiving circuit of the radio set will be imparted to the filament of the lamp bulb 37, thereby varying the intensity of the light. For reproducing purposes, the inner end of the lower arm of the yoke-like carrier 16 is equipped with a selenium cell 42 or other photo-electric cell, subject to the influence of light, connected in circuit with a radio receiving set.

In operation, when it is desired to use my apparatus and adapter for recording purposes, the sensitized plate is introduced into the adapter casing and placed in position upon the cup 6, as previously described. The bearing 11 is now manipulated by the thumb piece 14 to withdraw the worm 12 from engagement with the worm wheel 13, thereby permitting the carrier 16 to be swung inwardly so that the bulb on the inner end of the upper arm may be disposed in proper position adjacent to the center of the sensitized plate. The circuit of the bulb 37 is now placed under the influence of the receiving circuit of the radio receiving apparatus, so that the intensity of the light may be varied in accordance with the pulsations of electric current in the receiving circuit produced by the detection of broadcast radio sound waves, and the conversion of these waves into electrical currents by the radio receiving set. The motor of the talking machine cabinet is now set in operation, the thumb piece 14, of course having been released in order to permit the worm 12 to re-engage the worm gear 13, and in the operation of the talking machine motor motion is imparted to the sleeve 5, so as to rotate the sensitized plate in a manner corresponding with the rotation of the record on a phonograph. In the rotation of the sleeve 5, motion is transmitted to the shaft 9 and through the worm 12 and worm wheel 13, the yoke-like carrier 16 moving outwardly carrying the lamp 37 after the fashion of the reproducer of a phonograph. Thus, the fluctuation or variation in the intensity of the filament produced by the corresponding undulations in the radio receiving circuit records photographically upon the sensitized plate the varying light rays which correspond to the sound waves detected and converted into electric currents by the radio receiving set.

To reproduce the sounds represented by the light ray photographs upon the plate, after the plate has been properly developed, the plate is re-introduced into the adapter casing and the circuit of the lamp 37 is removed from the influence of the receiving set, so that the intensity of the filament remains constant. The arm 15 and carrier 16 are again swung to starting position, as previously described, and the selenium or other variety of photo electric cell 42 brought into service. As the developed plate revolves and the carrier 16 moves outwardly

or inwardly with the bulb 37 and the cell 42, the light photographs on the plate representing the previously recorded sound waves causes the now constant light from the lamp 37 to influence the cell 42, which, in turn, sets up pulsations in its circuit. These pulsating currents are governed or controlled by the variations in the intensity of the light (lamp 37) and this circuit of the cell 42 is connected with a radio receiving apparatus by which the recorded sounds on the plate in the form of light ray photographs are translated into sound waves and the sound waves amplified. The variations in intensity of the light from lamp 37 which acts upon cell 42 are caused, controlled or governed by the photographically represented sound waves on the record.

From the foregoing description, taken in connection with the accompanying drawings, it will be seen that I have provided a recording and reproducing apparatus which, in connection with my improved adapter, may be used in conjunction with a talking machine and operated from the talking machine motor, both to record sounds and to reproduce said sounds, thereby enabling the same apparatus to be used for either or both purposes. It is to be understood that this invention which in its present form is peculiarly adaptable to the well known phonograph, may also be so constructed as to contain, independent of existing or contemplated phonographs, a driving mechanism of its own.

While I have herein shown and described one particular form of my invention by way of illustration, I wish it to be understood that I do not limit or confine myself to the precise details of construction herein described and delineated, as modifications and variations may be made within the scope of the claims and without departing from the spirit of the invention.

Having thus described the invention, what is claimed as new, is:—

1. In combination, a phonograph turntable shaft, an adapter casing receiving the upper end of the shaft, said casing having an opening in the side wall thereof for the passage of a sensitized plate and also having a slot in its top wall extending from its center toward said side wall, means to normally close the opening in the side wall of the adapter casing, a plate carrier, means to operatively associate the plate carrier and turntable shaft to support said carrier for rotation by said shaft, means movable in the slot in the top wall of the adapter casing to engage the carrier to move the plate relative to the turntable shaft to load and unload the adapter casing, said means having slides to close said slot, and mechanism for converting electric currents into light rays and recording said rays upon the sensitized plate.

2. In combination, a phonograph turntable shaft, an adapter casing receiving the upper end of the shaft, said casing having an opening therein for the passage of a sensitized plate, means to normally close the opening, a plate carrier, means to operatively associate the plate carrier and turntable shaft to support said carrier for rotation by said shaft, means extending through and movable relative to the adapter casing to engage the carrier to move the plate relative to the turntable shaft to load and unload the adapter casing and mechanism for converting electric currents into light rays and recording said rays upon the sensitized plate.

3. In combination, a phonograph turntable shaft, an adapter casing receiving the upper end of the shaft, said casing having an opening therein for the passage of a sensitized plate, means to normally close the opening, a plate carrier, means to operatively associate the plate carrier and turntable shaft to support said carrier for rotation by said shaft, means extending through and movable relative to the adapter casing to engage the carrier and move the plate relative to the turntable shaft to load and unload the adapter casing, means located within the adapter casing adjacent the opening to receive the plate carrier during the loading and unloading operation and mechanism for converting electric currents into light rays and recording said rays upon the sensitized plate.

4. In combination, a phonograph turntable shaft, an adapter casing receiving the upper end of the shaft, said casing having an opening in the side wall thereof for the passage of a sensitized plate and also having a slot in its top wall extending from its center toward said side wall, means to normally close the opening in the side wall of the adapter casing, a plate carrier, means to opperatively associate the plate carrier and turntable shaft to support said carrier for rotation by said shaft, means movable in the slot in the top wall of the adapter casing to engage the carrier to move the plate relative to the turntable shaft to load and unload the adapter casing, said means having slides to close said slot, a cup located within the adapter casing adjacent to the opening in the side wall thereof to receive the plate carrier during the loading and unloading operation, and mechanism for converting electric currents into light rays and recording said rays upon the sensitized plate.

5. In combination, a phonograph turntable shaft, an adapter casing receiving the upper end of said shaft, a sensitized plate associated with and rotatable by the shaft and mechanism within said casing operable from said shaft for converting electric currents into light rays and recording said rays upon the sensitized plate, said mechanism in-

cluding a pivotally mounted arm, a worm gear fixed thereto, a light bulb carried by said arm and movable over the sensitized plate, gearing including a shaft with a worm to engage said worm-gear and a movable spring-supported bearing for one end of the shaft for connecting the turntable shaft and arm to move the latter pivotally with respect to said plate and means connected with the spring-supported bearing to move the bearing to disengage the shaft and arm so that the latter may be moved manually.

In testimony whereof, I affix my signature.

JOHN T. SCULLY.