

Jan. 21, 1930.

A. C. KELLER

1,744,047

COMBINED RECORDER AND REPRODUCER

Filed Feb. 10, 1928

FIG. 1.

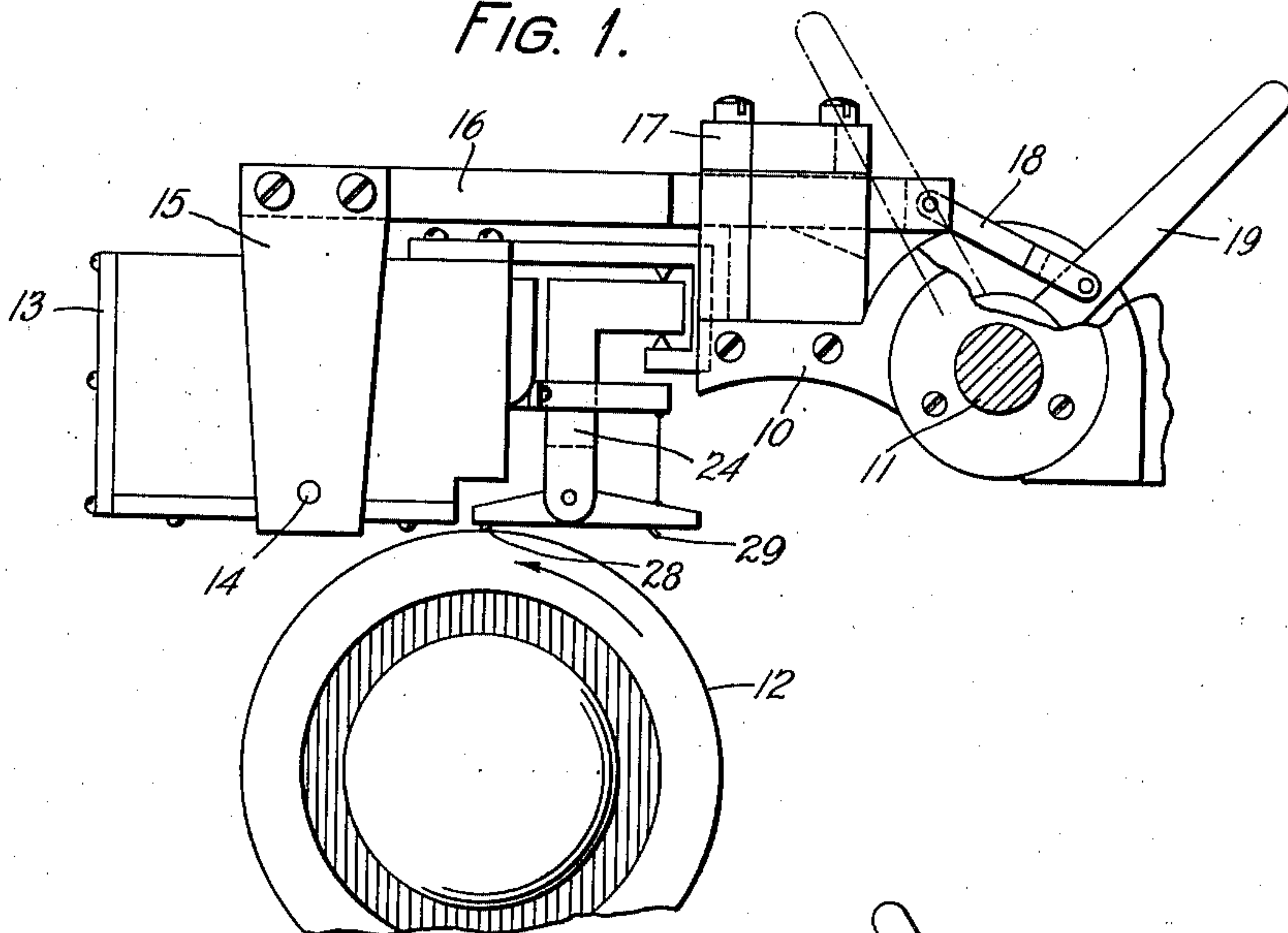


FIG. 2.

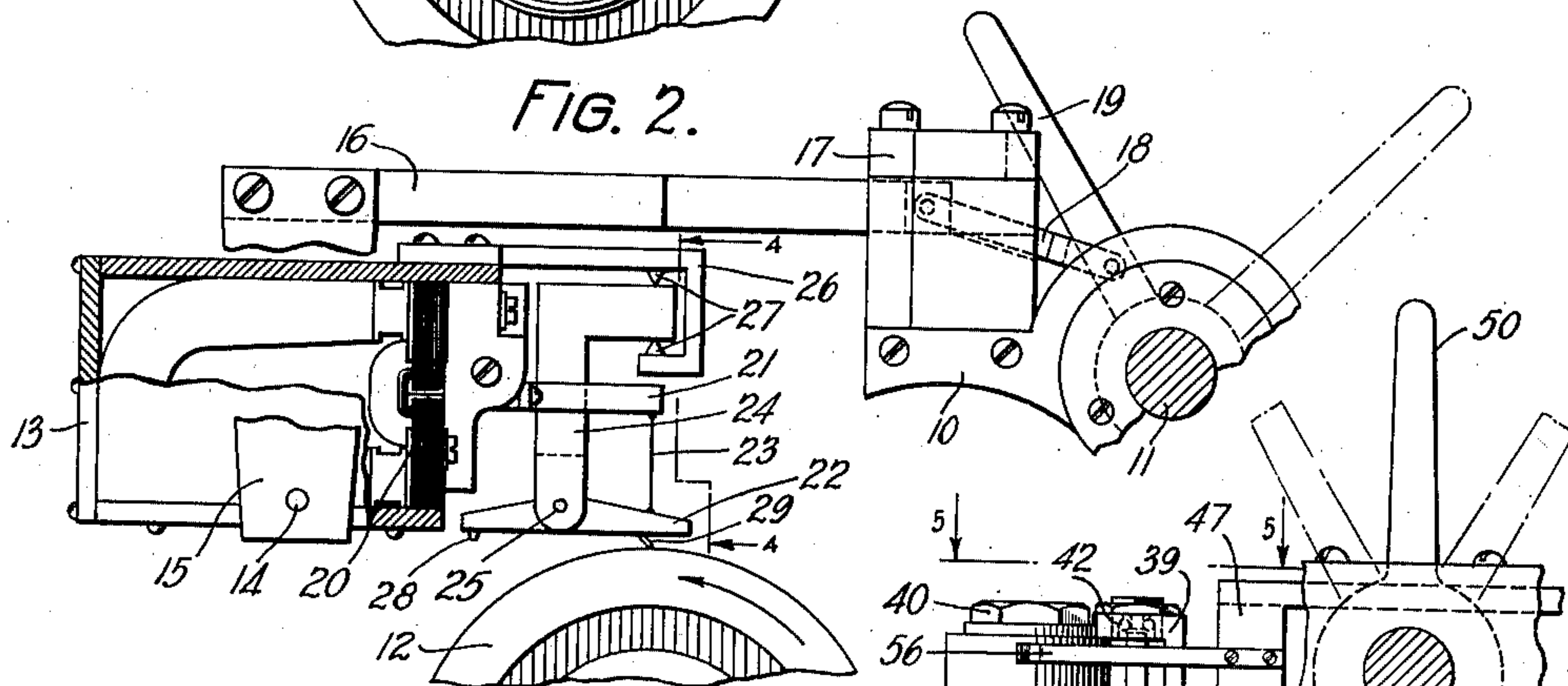


FIG. 4.

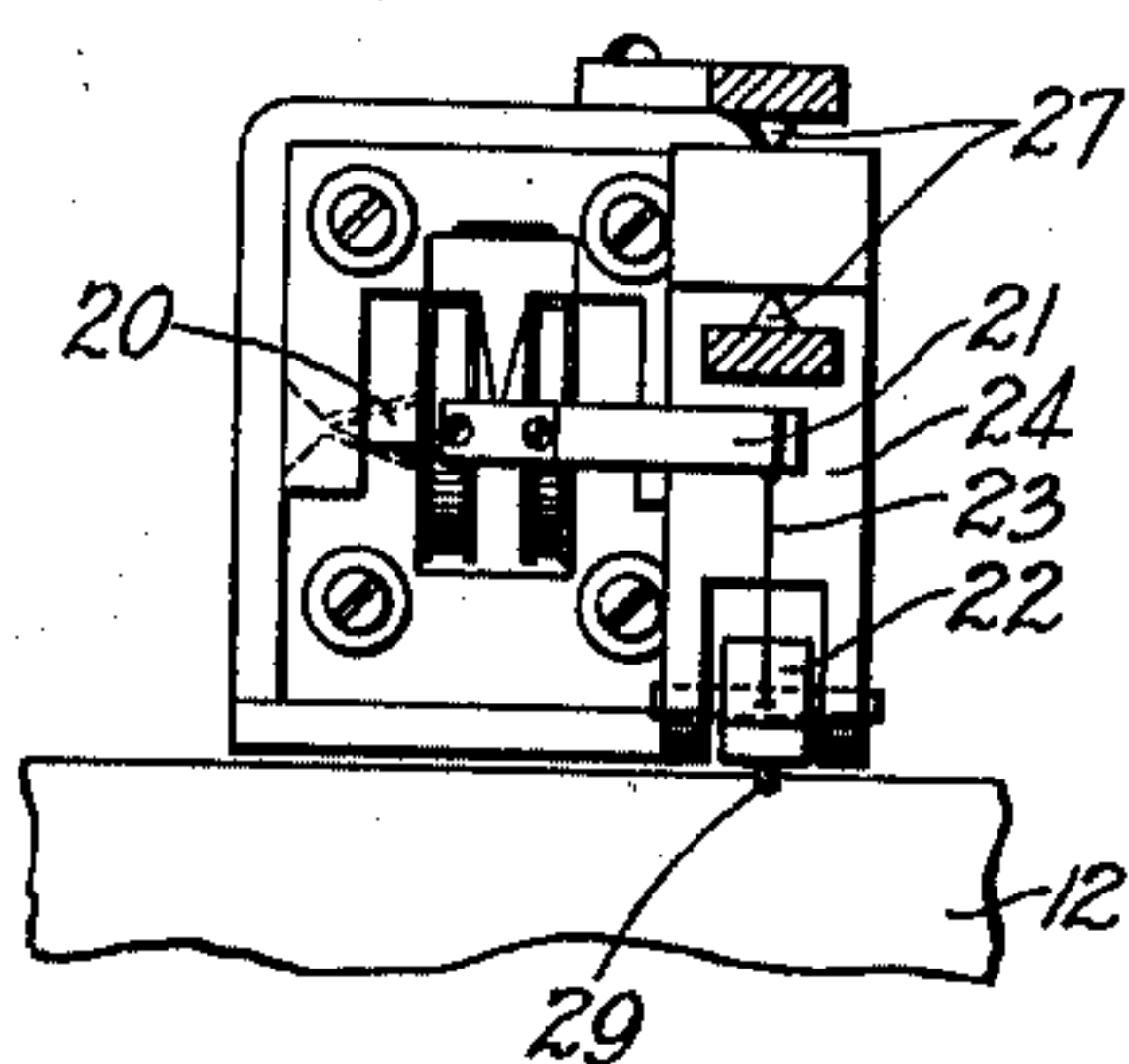


FIG. 5.

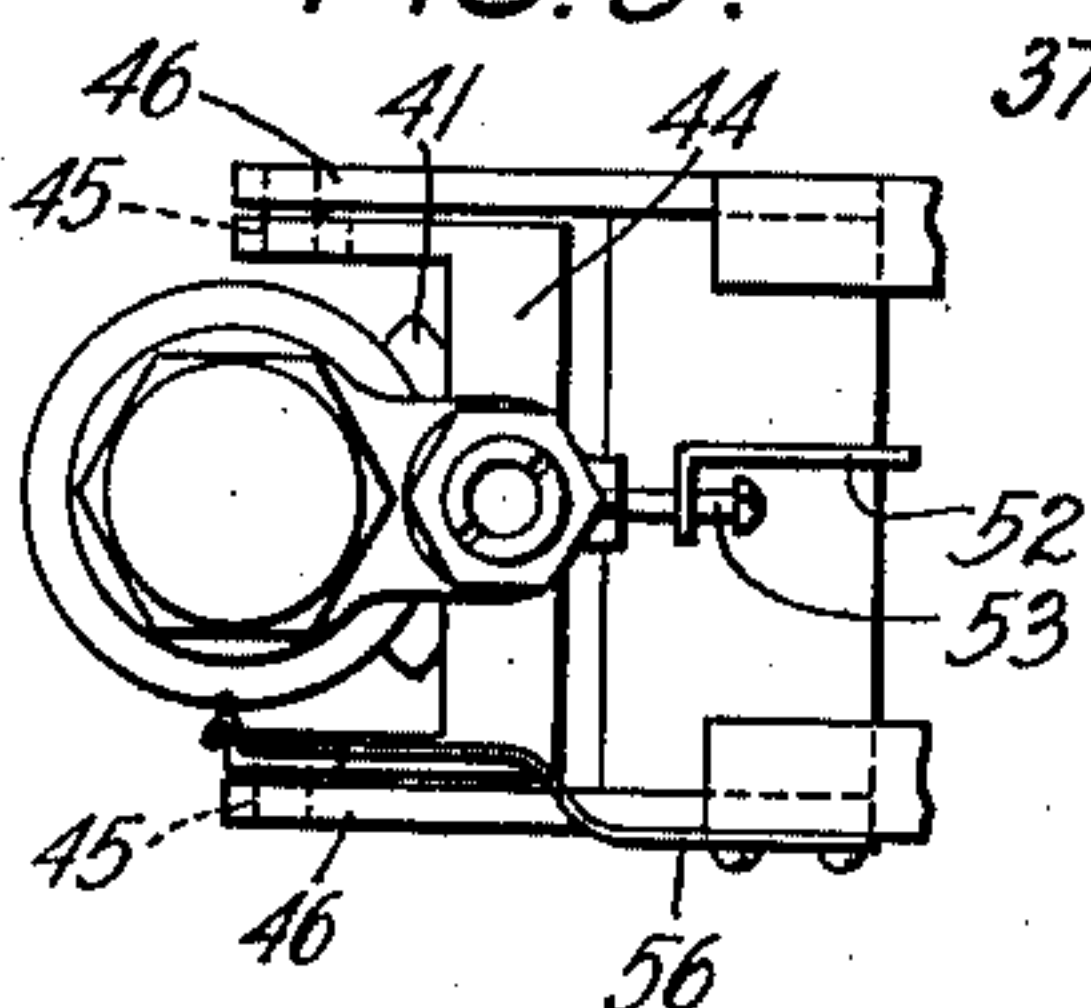
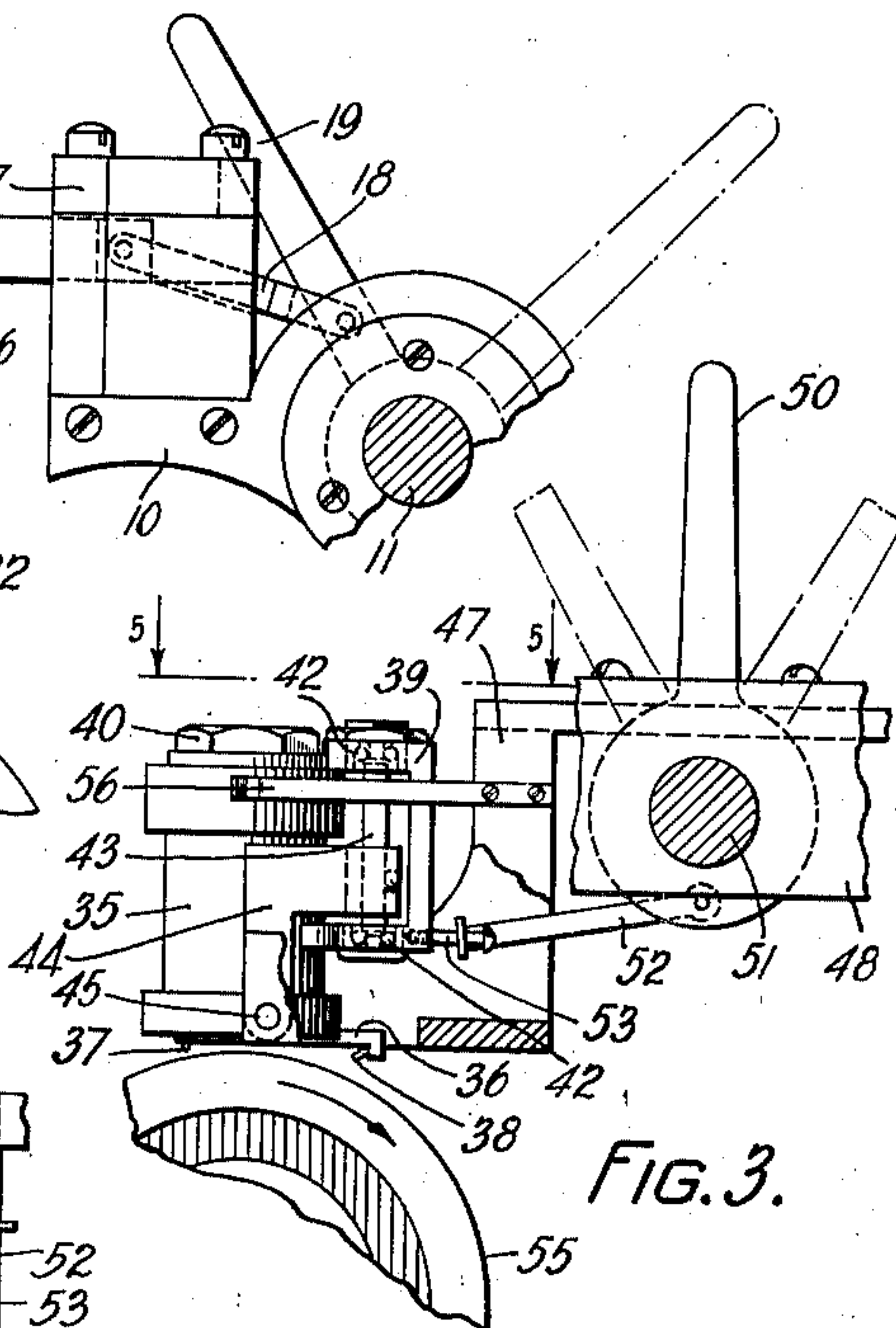


FIG. 3.



INVENTOR
ARTHUR C. KELLER
By *H. B. Banfield*
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

COMBINED RECORDER AND REPRODUCER

Application filed February 10, 1928. Serial No. 253,250.

This invention relates, in general, to phonographs equipped for both the recording and the reproduction of sound waves and more particularly to devices of this type in which the same instrument is employed for both operations.

In phonograph devices arranged for the recording and reproduction of sound waves, it has long been appreciated that any lateral movement of the recording stylus should be prevented, while the reproducing stylus should be permitted a certain amount of lateral movement in order that it might accurately follow the groove of the record. Another requirement for devices of this type is that the force exerted against the record by the reproducing stylus be somewhat greater than that exerted by the recording stylus. Various arrangements have been proposed to meet these requirements but these arrangements were, in general complicated, resulting in devices which were inefficient and difficult to maintain in adjustment. It is therefore an object of the present invention to provide a structure in which the reproducing stylus is allowed a certain amount of lateral motion and bears against the record with a greater force than the recording stylus which is prevented from lateral movement. A further object is to provide a structure which is simple, efficient and easily maintained in adjustment.

To accomplish these objects and in accordance with one feature of the invention, the recording and reproducing styli are mounted on a stylus arm which is supported by means of a member pivotally mounted to the frame of the electromagnetic unit, the pivot points for the supporting member being in alignment with the cutting edge of the recording stylus, thus permitting a lateral movement of the reproducing stylus without any lateral movement of the recording stylus. In accordance with another feature of the invention the armature of the electromagnetic unit is rigidly connected to the stylus arm by means of a perpendicular drive and the entire electromagnetic unit with its stylus arm and supporting member is moved bodily when shifting from the recording position to the re-

producing position or vice versa. With this arrangement a drive of maximum efficiency is maintained irrespective of the operating position of the device. In accordance with still another feature of the invention the recording stylus and the reproducing stylus are mounted on the stylus arm in such relation to each other and the axis of rotation that the reproducing stylus exerts a greater pressure upon the record thus eliminating the use of an additional weight member.

The invention may be more clearly understood by reference to the accompanying drawing in which:

Fig. 1 is a view of a device embodying the features of this invention and arranged for reproducing.

Fig. 2 is a view partly in section of the device of Fig. 1 in the position for recording.

Fig. 3 is a view of a modified structure in the neutral position.

Fig. 4 is a sectional view of the device of Fig. 2 taken along the lines 4—4 and linking in the direction of the arrows, and

Fig. 5 is a plan view of that portion of the device of Fig. 3 indicated by the arrows.

In the device as disclosed in Figs. 1, 2 and 4 of the drawing, the carriage 10 is arranged to move slowly along the rod 11 in a well-known manner, as the recording or reproducing stylus traces a helix in the periphery of the record 12, which is rotated at a suitable speed in the direction of the arrow. The electrical operating unit is enclosed in casing 13 which is pivotally mounted at 14 to the bracket members 15 which in turn are rigidly secured to plate 16. This plate is arranged to slide freely through guide member 17 and is connected by means of link 18 to the operating lever 19. An extension member 21 is rigidly secured to the armature 20 of the electrical unit and this extension member is in turn secured to the stylus arm 22 by means of a substantially rigid rod 23. A supporting arm 24 upon which the stylus arm is pivotally mounted at 25 is mounted by means of pivots 27 to an L shaped supporting member 26 which is rigidly secured to casing 13. The stylus arm is provided at the end nearer the unit with a reproducing stylus 28 and on the other side

of the pivot 25 there is provided a recording stylus 29, the cutting edge of this stylus being in alignment with the pivot points 27—27. With the device set for reproducing as shown in Fig. 1, the reproducing stylus is in engagement with the record 12 and is allowed lateral movement due to the action of pivots 27—27. When in the recording position shown by Fig. 2 the recording stylus which is in engagement with the record 12, is allowed vertical movement due to the rotation of stylus arm 22 about pivot 23 in response to the movement of armature 25, but is not permitted any lateral movement since the cutting edge of recording stylus 29 is in direct alignment with the pivots of the supporting arm 24.

With the arrangement as shown, due to the manner in which the device is pivoted and the relative positions of the recording and reproducing styli, the force exerted upon the record when the device is used for reproducing is greater than when it is used for recording. Furthermore, since the relative positions of the stylus arm and the electrical unit are the same, irrespective of whether the device is being used for recording or for reproducing, the driving rod 23 which is positioned perpendicular to the member 21 provides a driving arrangement of maximum efficiency in either case.

In the arrangement disclosed in Figs. 3 and 5 an electrical unit is provided of the general type disclosed in the copending application of Henry C. Harrison, Serial No. 191,012, filed May 13, 1927. This unit comprises a cylindrical casing 35 within which are mounted a polarized electromagnet and armature (not shown) and the remaining space is filled with a viscous damping material such as heavy oil. A diaphragm which serves to close the lower end of the casing is rigidly secured to the armature and secured to the outer side of this diaphragm is a stylus arm 36 which is provided with a reproducing stylus 37 and recording stylus 38 at opposite ends thereof. Rigidly secured to the casing 35 is a substantially U-shaped member 39 having one arm perforated to fit over a portion extending from the upper part of the casing and to which it is securely locked by nut 40. The lower arm of this member is forked to bear against the casing, as at 41. The arms of member 39 are provided with suitable perforations in which are mounted the ball bearings 42 which support shaft 43. This shaft passes through a perforation in a second U-shaped member 44 which is mounted by suitable pivots 45—45 to the bifurcated ends 46—46 of mounting bracket 47, which in turn is rigidly secured to the frame 48 of the device. An operating lever 50 shown in full line in the neutral position and in broken lines in the recording and reproducing positions is adapted to rotate about shaft 51 along which the device moves when in operation,

Secured to the hub of lever 50 is a link member 52 having one end offset at an angle of 90° and perforated to receive the shank of screw 53 which is fastened into the lower end of member 39.

As shown in Fig. 3, lever 50 is in its neutral or vertical position in which case both the recording stylus and the reproducing stylus are out of engagement with the record 55. When the lever 50 is moved to the position shown at the right the offset end of the link 52 engages member 39 and rotates the entire unit in a counter-clockwise direction about the pivots 45 thereby causing the reproducing stylus 37 to engage record 55. When lever 50 is moved to the position shown at the left the offset end of link 52 engages the head of screw 53 causing the entire electrical unit to be rotated about pivoted 45—45 in a clockwise direction and thereby placing the recording stylus 38 in position to engage record 55 which is rotated in the direction shown by the arrow. Upon flexure of the diaphragm the recording stylus 38 is permitted movement in a vertical plane but it is not capable of lateral movement since its cutting edge is in direct alignment with the axis of shaft 43. On the other hand, since the entire unit is free to rotate about the shaft 43, the stylus 37 is permitted sufficient lateral movement so that it may freely follow the groove in the record. With the device in either the recording or reproducing position, the recording stylus or the reproducing stylus, respectively, is in engagement with the record and the device is maintained in position by its own. The unit is maintained in the neutral position by means of spring 56 secured at one end to bracket 47 and having its other end formed to engage a suitable slot in the casing 35.

What is claimed is:

1. In a sound recording and reproducing device, a stylus arm, a recording stylus and a reproducing stylus mounted thereon, a pivotally mounted supporting member for said stylus arm, said member having its axis of rotation in alignment with the cutting edge of the recording stylus.
2. In a sound recording and reproducing device, a stylus arm pivotally mounted to oscillate in a vertical plane only, a recording stylus and a reproducing stylus mounted on said arm, and a supporting member for said arm adapted to oscillate in a horizontal plane, the axis of rotation being in alignment with the cutting edge of the recording stylus.
3. In a sound recording and reproducing device, a stylus arm, a recording and reproducing stylus mounted thereon, a supporting member upon which said arm is pivotally mounted, and an electromagnetic unit having a frame member upon which said supporting member is pivotally mounted, the axis of rotation of said supporting member being in alignment with the recording stylus,

the armature of said electromagnetic unit being rigidly connected to said arm to provide a substantially perpendicular drive.

4. In a sound recording and reproducing device, a stylus arm pivotally mounted to oscillate in one plane only, a recording stylus and a reproducing stylus mounted thereon, and a supporting member for said stylus arm pivotally mounted to oscillate in a plane perpendicular to the plane of rotation of the stylus arm and having its axis of rotation in alignment with the cutting edge of the recording stylus.

5. In a sound recording and reproducing device, a stylus arm, a supporting member to which said stylus arm is pivotally mounted, a recording stylus and a reproducing stylus rigidly secured to said stylus arm and positioned on opposite sides of the axis of rotation of the stylus arm, and means for permitting the rotation of said supporting member in a plane perpendicular to the plane of rotation of said stylus arm, the axis of rotation of said supporting member being in alignment with the cutting edge of the recording stylus.

6. In a sound recording and reproducing device, an electrical operating unit, a casing therefor, a supporting member pivotally mounted to said casing, a stylus arm pivotally mounted to said supporting member, the axis of rotation of said stylus arm being perpendicular to the axis of rotation of said supporting member, and a recording and a reproducing stylus mounted on said stylus arm, the recording stylus being so positioned that its cutting edge is in alignment with the axis of rotation of the supporting member.

In witness whereof, I hereunto subscribe my name this 3rd day of February, 1928.

ARTHUR C. KELLER.

45

50

55

60

65