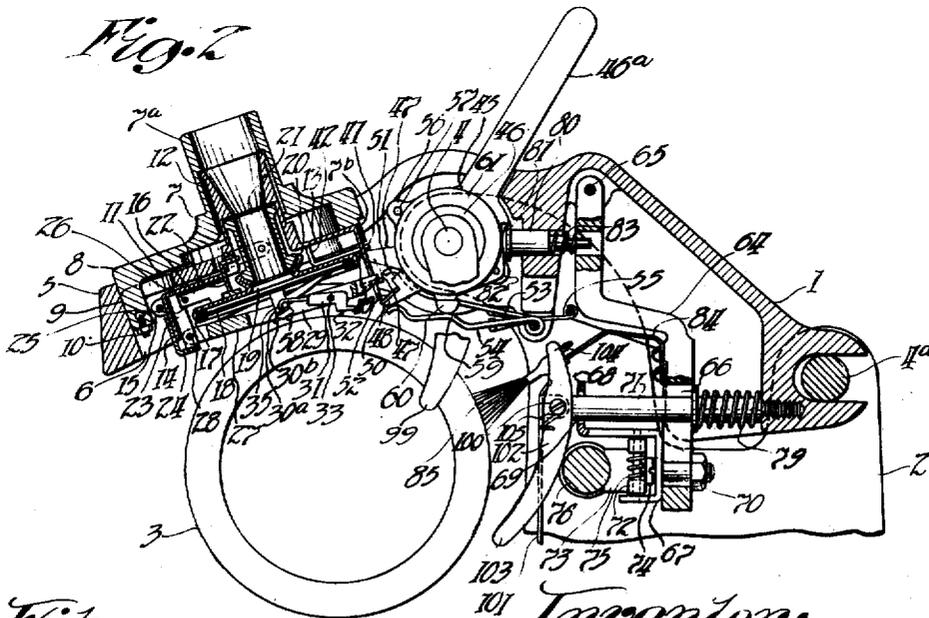
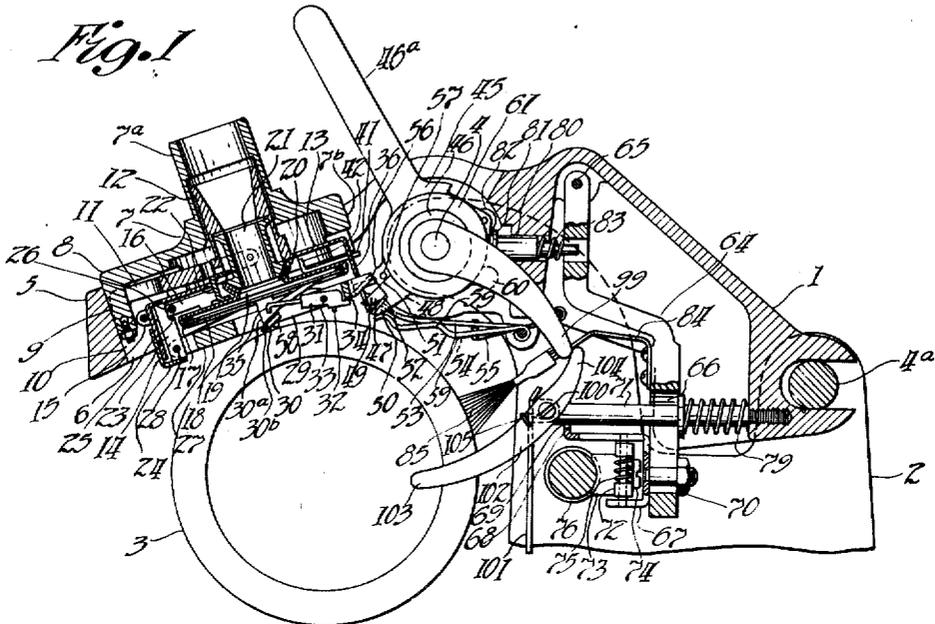


N. H. HOLLAND,
 PHONOGRAPH.
 APPLICATION FILED DEC. 26, 1917.

1,420,316.

Patented June 20, 1922.
 3 SHEETS—SHEET 1.



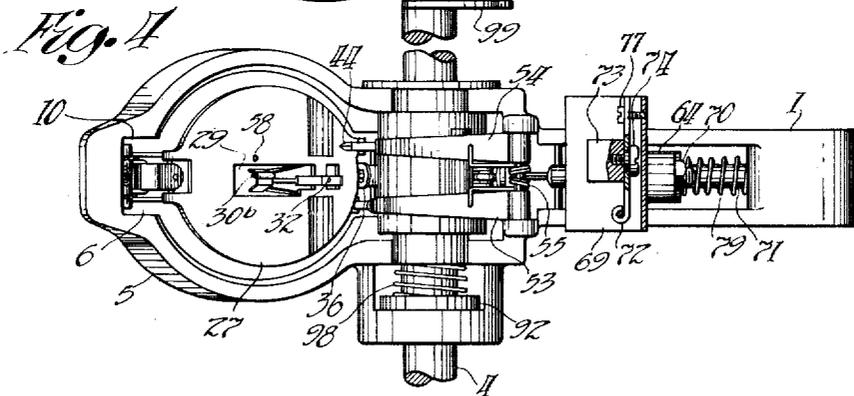
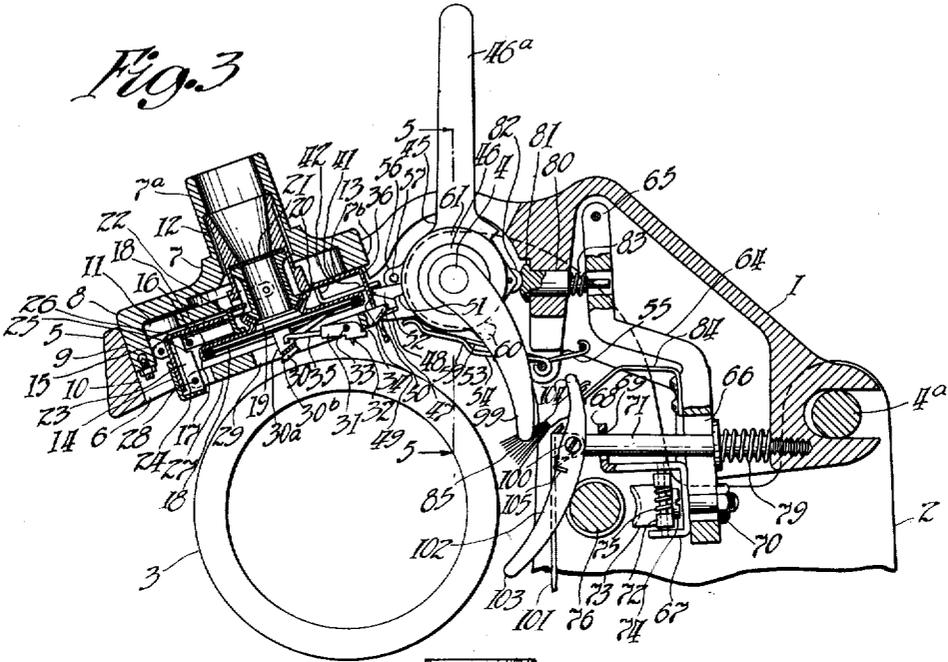
Witnesses:
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Chas. H. Keeler

Inventor:
Newman H. Holland
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His Atty.

1,420,316.

Patented June 20, 1922.

3 SHEETS—SHEET 2.



Witnesses:
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1,420,316.

Patented June 20, 1922.

3 SHEETS—SHEET 3.

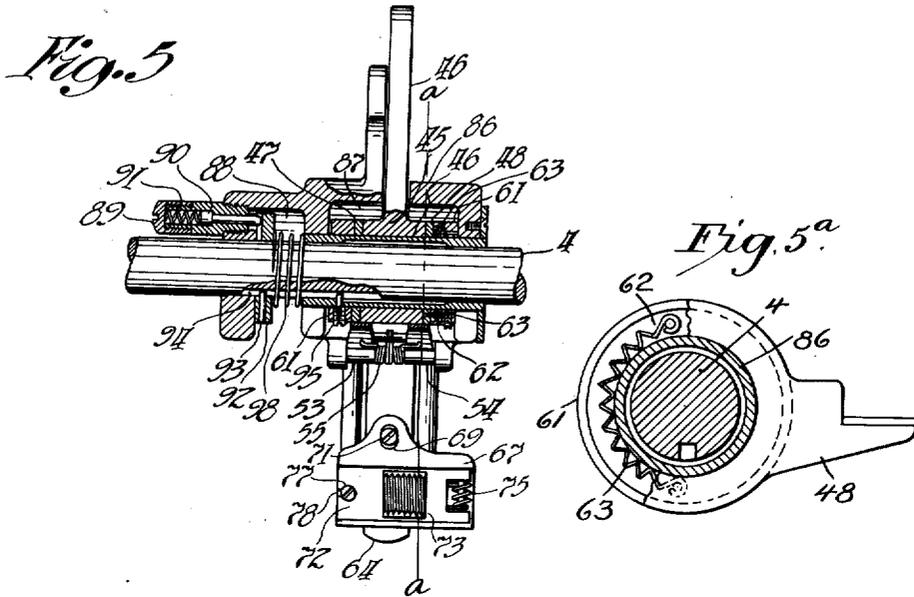


Fig. 7

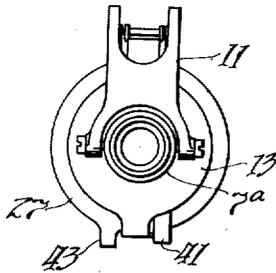


Fig. 6

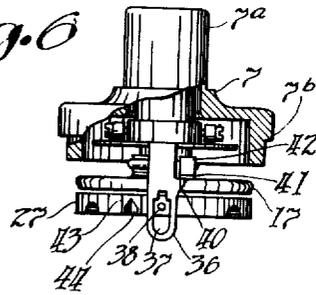
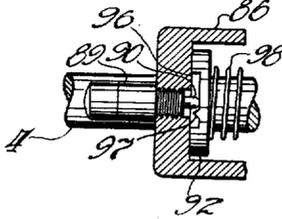


Fig. 8



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UNITED STATES PATENT OFFICE.

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PHONOGRAPH.

1,420,316.

Specification of Letters Patent. Patented June 20, 1922.

Application filed December 28, 1917. Serial No. 208,777.

To all whom it may concern:

Be it known that I, NEWMAN H. HOLLAND, a subject of the King of Great Britain, and a resident of West Orange, Essex County, New Jersey, have invented certain new and useful Improvements in Phonographs, of which the following is a description.

This invention relates to phonographs, and in particular to business phonographs or dictating machines in which there is a combined recorder and reproducer or a single diaphragm co-operating with two styli.

This application, inasmuch as it relates to the hereinafter described guard, is a continuation in part, of co-pending application Serial No. 831,695 filed by me April 14, 1914.

Great difficulty has heretofore been experienced in devising a practical efficient sound box which is suitable for both recording and reproducing. In recording it is preferable that the recording stylus be so mounted that very little pressure is exerted by it upon the record blank. The stylus must also be held against lateral movement. In reproducing, however, it is preferable to weigh down the reproducing stylus and to allow it lateral play so that it will follow the groove in the record and not jump therefrom.

An object of the present invention is to provide a construction in which a recorder and reproducer having the above characteristics are combined in a single sound box.

Another object of the invention is to provide a construction in which the sensitiveness of the instrument will not be impaired by reason of the use of a single diaphragm for both recording and reproducing.

Another object of the invention is to provide a construction which can be easily manipulated to shift from inoperative to either recording or reproducing position and in which the feeding device for moving the phonograph carriage relatively to the blank or record will be inoperative when the recording and reproducing devices are both in inoperative position.

Another object of the invention is to provide an improved construction for moving the feeding device from inoperative to operative position and vice versa.

Another object of the invention is to provide a construction in which the elements of

the feeding device, usually a nut and screw, will accurately engage or mesh when the device is moved to operative position. 55

Another object of the invention is to provide a construction whereby the styli may be back-spaced when desired and also to provide a construction which will prevent the removal of the record or blank from or the positioning of the record or blank upon the instrument when either stylus is in operative position, thereby preventing damage either to the record or blank or to the styli. 60

My invention consists further in the details of construction and combinations of parts hereinafter more particularly described and claimed. 65

In the accompanying drawings which form a part of this specification and in which like reference characters refer to like parts in the several views— 70

Figure 1 is an elevation with parts in section and with parts broken away illustrating the instrument in position for recording. 75

Figure 2 is an elevation similar to Figure 1 illustrating the instrument in position for reproducing.

Figure 3 is a view similar to Figures 1 and 2 illustrating the instrument in inoperative position. 80

Figure 4 is a bottom plan view with parts omitted.

Figure 5 is a sectional elevation on the line 5—5 of Figure 3 looking in the direction of the arrow. 85

Figure 5^a is a detail sectional view on the line *a—*a** of Figure 5.

Figure 6 is a detail view of the sound box in elevation with parts broken away and with parts in section. 90

Figure 7 is a plan view thereof with the top omitted.

Figure 8 is a view partly in horizontal section and partly in plan of a detail of construction shown in Figure 5. 95

In the embodiment of the invention here illustrated a carriage or support 1 is mounted upon a usual phonograph frame 2 and is arranged to be moved upon suitable guide rods 4 and 4^a upon the frame longitudinally of a record or blank 3. The carriage 1 has a substantially annular portion 5 provided with an opening 6 in which is removably mounted a sound box body 7 having a neck 100 105

7^a and a depending flange 7^b. The sound box body has a projecting portion 8 which is provided with a depending lug 9 fitting in a recess 10 at one side of the annular portion 5. A forked link 11 is pivoted at one end to the depending lug 9 and at its forked end embraces a tube 12 slidably mounted within the neck 7^a and pivoted to the link. The tube 12 is movable upwardly and downwardly within the neck and allowed a limited amount of play. The lower end of the tube below the body of the sound box is provided with a horizontal flange 13. One side of the flange 13 has a depending portion 14 provided with lugs 15. Arms 16 are pivotally connected to the lugs and have fixedly attached thereto a light frame 17 supporting a diaphragm 18 and provided with a central opening 19 having a surrounding flared portion 20. Communication is made between the diaphragm and the tube 12 by means of a tube 21 having a head at its lower end engaging the flared portion 20 of the opening and providing a universal joint. The tube 21 is slidably mounted within the tube 12. Suitable retaining means 22 comprising an angular piece as shown in Figs. 1, 2 and 3 is fixed to the top of the diaphragm frame 17 and extends over the head of the tube 21 to keep the same in position relatively to the flared opening of the diaphragm frame.

A post 23 is pivotally mounted between this horizontal flange 13 and a horizontally extending part 24 of the depending portion 14 which is secured to the flange 13. The post 23 is provided with a ledge 25 which co-operates with a pin 26 connecting the arms 16 and limiting the downward movement of the diaphragm frame 17. A floating weight 27 is pivoted at 28 to the lower end of the post 23 on an axis at right angles to the pivotal axis of the post. The weight is located below the diaphragm and is provided with a central slot 29 through which can project a stylus 30 fixed to the central portion of the diaphragm. The stylus 30 comprises a U-shaped member 30^a having a stylus pin 30^b attached to the central portion thereof, while the ends of the member are attached to the diaphragm. The stylus 30 is for recording and is in operative position when located as shown in Figure 1.

A stylus lever 31 provided with a reproducing stylus 32 at one end is pivotally mounted intermediate its ends upon an axis 33 parallel with the axis or pivot 28 of the weight 27 within the slot 29 of the floating weight. The stylus 32 is on the lever 31 at the end thereof remote from the pivot 28 of the weight 27 and the arm of the lever 31 adjacent to the pivot 28 is heavier than the other arm whereby when the parts are in the position shown in Figure 1 the stylus end of the lever will engage the weight as shown

at 34 and the opposite end tend to hang down. The last mentioned end of the stylus lever is provided with a hook 35 which extends within the U-shaped member 30^a and in one position as shown in Figure 1 is out of engagement therewith and in another position, as shown in Figure 2, is in engagement therewith, as will be more fully described hereinafter.

The flange 13 has a depending tongue 36 having a vertical slot 37 therein into which projects a pin or adjustable screw 38 attached to the floating weight. This tongue prevents extreme lateral movement of the floating weight around its vertical axis and allows it to be moved up and down. At one side of the depending tongue 36 is a shoulder 40 with which engages a projection or tongue 41 fastened to the diaphragm frame 17, limiting the downward pivotal movement of the latter relatively to the tube 12. A vertically extending lug 42 is fixed to the frame 17 to limit by engaging the flange 13 the upward movement relatively to the tube 12. The floating weight 27 is provided at one side of the pin 38 with a lug 43 having a V-shaped groove 44 upon the lower side thereof for a purpose more fully disclosed hereinafter.

I have provided means for controlling the positions of the styli and for this purpose I have keyed upon the guide rod 4 which is rotatably mounted in suitable bearings, not shown, upon the phonograph frame a lever or controlling means 45 movable with the carriage and comprising a sleeve 46 on the rod and a handle 46^a having a hub encircling and secured to the sleeve. Rotatably mounted upon the sleeve 46 at each side of the handle 46^a, are dogs 47 and 48. These dogs are provided with noses 49 and 50 adapted to engage and disengage the lower portions of the tongue or projection 41 and the grooved lug 43 allowing the body member 7 to be lifted out of its support without first disconnecting the controlling means. The nose 50 is provided with a raised shoulder 51 and a knife edge 52 engageable with the groove 44. In order to normally cause the dogs to move upwardly into engagement with the floating weight and diaphragm frame to hold them with the tube 12, in raised position, I have provided a pair of pivoted arms 53 and 54 which are controlled by a spring 55 which urges them into engagement with the noses 49 and 50 of the dogs to hold the latter raised. This is clearly shown in Figure 3 where all the parts are in raised position.

Immediately above the noses 49 and 50 of the dogs, the hub of the handle 46^a is provided with a lug 56 having a cross pin 57 projecting over and adapted to engage the tops of the dogs. When the lever is moved in one direction, for instance, counter clockwise looking at the figures, the dogs can be

readily depressed so that the floating weight, the diaphragm frame 17 and tube 12 with its flange can drop upon the record or blank substantially at right angles thereto with the recording stylus in position thereon, the weight supporting the tube 12 and connected parts on the record or blank and the diaphragm frame being movably mounted relatively thereto and exerting just the necessary pressure on the stylus 30^b.

In order to prevent the floating weight 27 from damaging the record or blank a ball or tracking device 58 projects from the lower surface thereof and is adapted to hold the weight away from the blank.

The arm 54, it should be noticed, is provided with a shoulder 59 intermediate its ends. A lug or cam 60 upon the hub of the actuating lever is so arranged that when the lever is moved to another position, for instance, to the position shown in Figure 2, the lug will engage the shoulder 59, moving the arm 54 away from its dog 48 to allow the floating weight only to drop towards the record or blank. It is preferable to provide suitable means for moving this dog downwardly automatically away from the weight when its arm is depressed as described above. To this end, collars 61 secured to the sleeve 46 retain the dogs in position against the hub of the lever. The collar adjacent the dog 48 upon its inner face, see Figs. 5 and 5^a, is provided with a groove 62. Within this groove is a coiled spring 63 attached at its upper end to the grooved collar and attached at its opposite end to the lower side of the dog 48, see Figures 5 and 5^a. This spring tends normally to move or urge the dog 48 downwardly away from the weight and exerts a force less than the force exerted by the spring 55 tending to elevate the dog. When the latter force is removed, the first will move the dog downwardly. It will, therefore, be seen that when the handle 46^a is thrown to the position shown in Figure 2, the floating weight will be allowed to drop carrying with it the lever 31 and the hook 35 of the reproducing stylus lever 31 will then engage the recording stylus member 30^a held in raised position, connecting the lever with the diaphragm and swinging its stylus end into engagement with the record. The lowered position of the floating weight relatively to the member 30^a, the upward pressure on the stylus 32 by reason of its engagement with the blank and the excess weight of the lever 31 maintain the stylus 32 in operative relation to the diaphragm when the parts are in reproducing position. This construction is one in which the reproducing stylus is entirely disconnected from the diaphragm when the parts are in recording position so that the sensitiveness of the diaphragm will be maintained at a maximum, as greater sensitiveness is required in

recording operations. The recording stylus is mounted upon the independently movable frame 17 which is of a minimum weight so that the sensitiveness of the recording stylus will not be impaired by being unduly weighed down by superimposed mechanism. In reproducing, however, a greater weight is necessary. It is for this reason that I have mounted the reproducing stylus upon a separate heavier weight and provided means for detachably connecting the reproducing stylus lever to the diaphragm, the connection being made automatically when the parts are moved to reproducing position.

To center the laterally movable weight as it is raised or lowered the lug 43 with its V-shaped groove engages the knife edge 52 of its co-operating dog, providing a centering device.

Rearwardly of the actuating lever 45 is an arm or supporting means 64 pivoted at its upper end 65 to the carriage and provided with a vertically arranged slot 66. To the lower end of the arm is attached a channel-piece or member 67 having an upturned portion 68 provided with an opening 69 in alignment with the slot. The piece 67 is adjustable along the slot 66 and secured to the arm by a nut 70. A guide pin 71 fixed to the carriage projects through said opening and slot. The arm is thus suitably guided and held steady and the piece 67 is held fixed relatively to the arm. A transverse plate 72 is pivoted at one end to the channel piece within the channel. This plate is provided with a half nut 73 constituting an element of the feeding device, and swivelled thereto by a bolt 74 (see Figure 4) extending at right angles to the plate. The channel piece limits the swivelling. A spring 75 coiled around the pivot of the plate tends normally to project the plate outwardly towards a feeding screw 76 which constitutes the second element of the feeding device and is mounted upon the frame 2. Outward movement of the plate around its pivot is limited by means of a headed pin 77 which extends through a slot 78 at the end of the plate remote from its pivot and is secured to the piece 67. A spring 79 is interposed between the carriage 1 and the arm 64, encircles the guide pin 71 and tends normally to cause the half nut to engage the screw 76. By allowing the half nut to have a limited swivelling movement relatively to the plate and to yieldingly swing with the plate around an axis at one side of it and at right angles to the longitudinal axis of the feeding screw 76 sufficient play is provided to cause the half nut and screw to accurately mesh and insure instant feeding when moved into engagement with each other. In order to disengage the nut from the screw, a pin 80 is slidably mounted in the carriage frame and engages at one end the upper portion

of the arm 64 and at its opposite end is provided with a head 81 having a depression (see Figure 3) and lying in the path of the rotating hub of the actuating lever 45. This hub between the handle 46^a and lug 60 is provided with an anti-friction wheel 82 which engages the head of the pin and slips into the depression to move the pin to force the lower end of the arm 64 back, thus moving the half nut out of engagement with the screw and holding them out of engagement. A spring 83 is interposed between the arm 64 and pin 80 to normally keep the latter in the path of the wheel 82. The above controlling means for the feeding device and the feeding device are clearly illustrated in Figure 3 and it should be noticed that both the recording stylus and reproducing stylus are there shown elevated with the feeding elements disengaged.

A spring arm 84 is attached at one end to the central portion of the arm 64 and projects towards the record or blank. At its free end the spring arm 84 is provided with a brush 85 adapted to brush the record as the mechanism is fed along. The brush will be disengaged simultaneously with the disengagement of the half nut.

I have provided a device, a form of which is illustrated in Figures 5 and 8, for back-spacing the carriage. This device is an improvement over the construction shown and described in Letters Patent No. 1,178,014 granted April 4, 1916 and in my copending application No. 818,892 filed February 16, 1914. As illustrated in said figures, the carriage 1 is provided with a hub 86 slidably mounted upon the guide rod 4 which is rotatable relative to said hub. One portion of the hub 86 is provided with a chamber or recess 87 in which is located the styli controlling means or lever 45 slidably keyed to the rotatable guide rod 4 for actuating the same and movable with the carriage. Another portion of the hub 86 has a second chamber or recess 88. A housing 89 is threaded into the hub 86 and opens into the chamber 88. A pin or element 90 is mounted within the housing 89 and projects into the chamber 88. In order to provide a safety means for a purpose more fully described hereinafter the pin 90, for instance, may be normally held yieldingly projecting into the chamber 88 by a spring 91 interposed between the head of the pin 90 and the housing 89.

The projecting end of the pin engages a face of an annular cam disc or co-operating element 92 which is slidably mounted upon the rod 4 and moves along the same with the carriage 1. The inside diameter of this disc is slightly larger than the diameter of the guide rod 4 and into the central opening through the disc projects a radially disposed pin 93 which engages a keyway 94 extending

along the guide rod substantially from one end to the other thereof. The controlling means 45 is similarly keyed to the guide rod 4 by means of a pin 95 thereon which also projects within the keyway 94. It will be seen that the pin 93 causes the cam disc to rotate with the guide rod whenever the latter is rocked by the controlling means no matter at what point along the guide rod it may be.

To receive the projecting end of the pin 90 the face of the disc 92 towards the pin is provided with a recess 96 of a length sufficient to allow the guide rod 4 with the controlling means 45 to be moved from the recording position to the reproducing position and back. In order that the back-spacing device may be provided with means to cause back-spacing when the controlling means is moved in either direction the cam disc 92, for instance, within the recess 96 adjacent to one end thereof may be provided, as shown, with a V-shaped nose or double cam surface 97 in the path of which the end of the pin 90 lies. A coiled spring 98 encircles the guide rod 4 and is interposed between the hub 86 and the cam disc 92 and tends at all times to move the cam disc into engagement with the pin 90.

The nose 97 is so arranged that when the controlling means 45 is rotated from its central or inoperative position to the reproducing position, the cam disc 92 will be rotated with the guide rod 4 and the nose 97 will engage the pin 90 which remains practically stationary relative to the guide rod. Owing to the fact that the opening through the cam disc is slightly larger than the diameter of the guide rod 4, the cam disc will be tilted and caused to bind or bite upon the guide rod, the resulting cam action between the nose 97 and the pin 90 causing the carriage to be moved bodily toward the left, looking at the Figure 5, slightly back-spacing the same. During normal operation of the back-spacing device when the carriage is free to move the spring 91 will not yield sufficiently to prevent the back-spacing as the force necessary to move the carriage will be less than the force required to depress the pin 90.

As the controlling means 45 is moved from inoperative position to reproducing position as described above both styli will be out of engagement with the record and the half nut and screw of the feeding device will be out of mesh so as not to interfere with the proper operation of the back-spacing device. When the controlling means 45 is returned from reproducing position towards the central or inoperative position the nose 97 moving in the reverse direction will again engage the pin 90 causing the cam to be tilted and to bite the guide rod, thereby moving the carriage back still further. It

will be seen then that the carriage 1 can be back-spaced twice by moving the lever from reproducing position to central position and then back to reproducing position, the nose 97 being the means which enables this to be done. This double movement has a distinct advantage because the back-spacing can be done very quickly and with the same means that controls the styli and elements of the feeding device. A severe strain would be put upon the pin 90 and cam disc if the former were fixed to the carriage and if, by chance, the operator, when actuating the lever 45, should hold the carriage 1 or hub 86 in a way to prevent its sliding movement along the guide rod. It is for this reason that the pin 90 is allowed to yield when the carriage is held by the operator, thereby preventing any tear or strain upon the operating parts and providing a safety means. On the other hand, when the controlling means 45 is properly actuated, the spring 90 is of sufficient strength to act as an abutment causing the carriage to back-space. As soon as the cam nose 97 moves out of engagement with the pin, the cam disc will assume its original position by reason of the engagement of the spring 98 therewith.

From an inspection of Figure 4 it will be seen that the recording stylus is slightly in advance of the reproducing stylus so that after a record is made the reproducing stylus can be lowered into operative relation to the record engaging the sound grooves at point spaced inwardly from the forward part thereof. At the same time the reproducing stylus will be back-spaced by the device above described, so that a material part of the record can be reproduced at any time desired without bodily sliding the carriage back by hand. It will, therefore, be seen that if it is desired to reproduce any of the matter that has just been recorded, all that is necessary is to shift the controlling means 45 from recording to reproducing position when the reproducing stylus will be back-spaced slightly and by reason of the fact that it is spaced normally slightly back of the recording stylus a considerable part of the record can be then reproduced. On the other hand, during reproducing, if the operator should fail to understand fully any part of the record and for this or any other reason should desire to have any part of the record repeated, it is only necessary to shift the controlling means 45 back and forth more or less rapidly between reproducing and central positions whereby the carriage can be easily and quickly back-spaced to the desired amount.

My back-spacing device is very durable and serviceable and does not become easily damaged or disarranged by reason of careless operation. Back-spacing can also be

done twice as fast as with the device described in the patent above mentioned.

I have also provided a guard to prevent the record or blank from being taken off or positioned upon the instrument when the latter is in either recording or reproducing position. This guard comprises a means or device movable into the path of the record or blank when the reproducing stylus is in position on the same and a separate means or device movable in the path of the record or blank when the recording stylus is in position thereon and preferably operated by the first mentioned means. For this purpose an arm 99 is rigidly attached to one end of the guide rod 4 and is of sufficient length to project into the path of the record when the guide rod is rotated by the controlling means 45 to reproducing position as shown in Figure 2. The arm 99 prevents the removal or the positioning of the record or blank when the instrument is in reproducing position. Pivotaly connected at 100 to a screw guard 101 is a lever 102 having arms 103 and 104. The arm 103 is adapted to extend into the path of the record or blank as shown in Figure 1 when the instrument is in recording position and prevents the removal or positioning of the record or blank as long as the instrument remains in this position. In order to move the lever 102 into the path of the record or blank the arm 99 is of such length that it will engage the arm 104 of the lever 102 when the instrument is moved to recording position and will move the arm 103 of the lever in front of or into the path of the record or blank as shown in Figure 1. When the parts are in the neutral position shown in Figure 3, both arms 99 and 102 will be in such position that the record or blank may be easily removed or positioned without interference therefrom. In this position both the recording and the reproducing styli are elevated and out of engagement with the record or blank. A spring 105 normally tends to keep the lever 102 out of the path of the record or blank.

The guard is especially adapted for the particular construction of instrument herein described, but is also of general application and is an improvement upon the invention described in Letters Patent No. 875,309 granted December 31, 1907. This guard is simple in construction and can be easily applied to instruments of the character described and prevents the removal or positioning of the record or blank, except when the instrument is in inoperative position, so that the record or blank or styli can not be damaged.

In my construction the sensitiveness is greatly increased, the parts have been much simplified, while the reproduction is very clear. Furthermore, the instrument can be quickly adjusted for recording or reproduc-

ing by swinging the lever to the extreme positions. When it is desired, however, to remove the record or blank or to place the same in position upon the instrument, the lever can be moved to vertical or intermediate position, as shown in Figure 3, when the parts will be raised out of the way and the half nut will be disengaged.

It is to be understood that my invention is not limited to the embodiments and features specifically shown and described herein, but that such features and embodiments are subject to changes and modifications without any departure from the spirit of the invention.

Having now described my invention, what I claim as new and desire to protect by Letters Patent of the United States, is as follows:

1. In a device of the character described, a sound box body member provided with a diaphragm, a floating weight mounted so as to be capable of moving freely with respect to said diaphragm, a stylus mounted upon said weight and adapted to co-operate with said diaphragm, and a stylus co-operating with said diaphragm and substantially rigidly connected thereto, substantially as described.

2. In a device of the character described, a body member having relatively movable parts including a diaphragm and a stylus adapted to be operatively connected to and disconnected from said diaphragm, the relative movement of said parts automatically affecting said operative relation of the stylus to the diaphragm, substantially as described.

3. In a device of the character described, a body member having a diaphragm, and a plurality of styli movable into operative position against a record or blank and adapted to co-operate with said diaphragm, one of said styli being arranged so as to be automatically connected to or disconnected from said diaphragm, depending upon which stylus is to be in position against the record or blank, substantially as described.

4. In a device of the character described, a diaphragm, a stylus substantially rigidly connected to said diaphragm and movable into operative position against a blank and a floating weight mounted below said diaphragm so as to be capable of moving freely with respect to the latter and provided with a stylus adapted to cooperate with said diaphragm, substantially as described.

5. In a device of the character described, a body member, a tube movably connected to said body member, a light frame having a diaphragm and movably attached to said tube, a stylus attached to said diaphragm, a floating weight universally connected to

said tube and located below said diaphragm and a stylus controlled by said weight and adapted to be operatively connected to said diaphragm, substantially as described.

6. In a device of the character described, a body member, a diaphragm mounted thereon, a stylus movable into engagement with a blank and co-operating with said diaphragm, and a floating weight having a stylus and movable relatively to the first mentioned stylus, one of said styli being disconnectable from the diaphragm when the other is in engagement with the blank or record, substantially as described.

7. In a device of the character described, a body member having a diaphragm, a stylus adapted to co-operate with said diaphragm and movable into operative position against a blank, a floating weight mounted so as to be capable of moving freely with respect to said diaphragm, and a stylus co-operating with said weight, mounted independently of the first stylus and unattached to but adapted to co-operate with said diaphragm, substantially as described.

8. In a device of the character described, a body member having a neck, a movable tube co-operating with said neck, a diaphragm mounted on said tube, a stylus substantially rigidly connected with said diaphragm, a floating weight mounted below said diaphragm so as to be capable of moving freely with respect to the latter, and a stylus controlled by said weight and adapted to co-operate with said diaphragm, substantially as described.

9. In a device of the character described, a body member, a tube movably mounted within said body member, a diaphragm connected to said tube and having a stylus rigidly connected therewith, and a floating weight connected to said tube, freely movable relatively thereto and provided with a stylus adapted to co-operate with said diaphragm, substantially as described.

10. In a device of the character described, a body member, a tube slidably mounted relatively to said body member and provided with a flange, a light frame provided with a diaphragm and pivoted to said flange for movement towards and away from said flange, a stylus connected to said diaphragm, a floating weight universally pivoted to said flange and mounted below said diaphragm and a stylus mounted upon said weight and adapted to co-operate with said diaphragm, substantially as described.

11. In a device of the character described, a body member, a tube slidably mounted within said body member, a guiding and retaining link connecting said tube with said body member, a light frame provided with a diaphragm and pivoted to said tube, a sec-

ond tube slidably mounted within the first mentioned tube and universally connected at one end to said diaphragm frame, a stylus fixed to said diaphragm, means to limit the pivotal movement of said diaphragm frame relatively to said first mentioned tube, a floating weight universally pivoted to said first mentioned tube, mounted below said diaphragm frame and provided with an opening through which said stylus projects when in operative position, and a lever having a stylus, pivotally connected to said floating weight and co-operating with said diaphragm, said lever being automatically disengaged from said diaphragm when said first mentioned stylus is in operative position, substantially as described.

12. In a device of the character described, a body member, a tube movable relative to said body member and provided with a diaphragm, a U-shaped member having a stylus and attached to said diaphragm, a floating weight pivotally connected to said tube, and a lever having a stylus, pivotally connected to said weight and provided with an arm extending into said U-shaped member, said stylus lever being so arranged that it will be out of engagement with said U-shaped member when the stylus of the U-shaped member is in operative position, substantially as described.

13. In a device of the character described, a diaphragm, styli movable to operative position with respect to a record or blank and adapted to co-operate with said diaphragm, one of said styli being substantially rigidly connected to said diaphragm, independently mounted devices controlling the position of said styli and means for controlling said devices, substantially as described.

14. In a device of the character described, a body member, a tube movable relative to said body member, a diaphragm mounted upon said tube, a stylus connected to said diaphragm, a floating weight movable relatively to said diaphragm and stylus, a stylus mounted upon said weight and adapted to co-operate with said diaphragm, dogs controlling the position of said styli, and means for actuating said dogs, substantially as described.

15. In a device of the character described, a body member, a tube movable relative thereto, a diaphragm pivoted to said tube and provided with a stylus, a floating weight pivoted to said tube below said diaphragm and provided with a stylus adapted to co-operate with said diaphragm, dogs controlling the position of said tube and weight and means for controlling said dogs whereby either styli may move into operative position or both be raised out of operative position, substantially as described.

16. In a device of the character described,

a body member having a diaphragm, a floating weight movable laterally and provided with a stylus adapted to co-operate with said diaphragm and means for controlling the position of the stylus, said weight and means being provided with co-operating parts for centering said weight, substantially as described.

17. In a device of the character described, a body member, a diaphragm mounted upon said body member, a floating weight movable relatively to said diaphragm provided with a stylus adapted to co-operate with the diaphragm and having a tapered groove and means comprising a knife edge nose for engaging said groove to raise the weight, said nose and groove constituting a centering device, substantially as described.

18. In a device of the character described, a plurality of styli movable into operative position, dogs independently mounted for controlling the position of said styli, resilient means urging the dogs in one direction and means engaging the dogs for moving them in the opposite direction, substantially as described.

19. In a device of the character described, a diaphragm, a plurality of styli adapted to co-operate therewith and movable into and out of operative position, dogs controlling said styli, means urging said dogs in one direction and a controlling device for moving the dogs in opposite direction when actuated one way and engageable with said means to render the same inoperative as to one of the dogs when actuated another way, substantially as described.

20. In a device of the character described, a diaphragm, a plurality of styli adapted to co-operate therewith and movable into and out of operative position, dogs controlling said styli, means urging said dogs in one direction, a controlling device for moving the dogs in the opposite direction when actuated one way and engageable with said means to render the same inoperative as to one of the dogs when actuated another way and means urging said last mentioned dog in said opposite direction, substantially as described.

21. In a device of the character described, a frame, a body member thereon, a tube movable relatively to said body member and provided with a diaphragm having a stylus, a floating weight movably attached to said tube below said diaphragm and also provided with a stylus adapted to cooperate with the diaphragm, dogs independently and rotatably mounted upon the frame and controlling the position of said tube, diaphragm and said weight, means acting upon said dogs to cause the same to normally raise said diaphragm and weight into inoperative position, means urging the dog controlling the weight in the opposite direction and a

lever provided with means for moving said dogs out of engagement with said tube, diaphragm and weight when it is moved in one direction and with means for rendering said first mentioned means inoperative as to the weight dog when moved in another direction, substantially as described.

22. In a device of the character described, vibratory means, styli each adapted to co-operate with said means so as to vibrate in unison therewith, said styli being independently mounted to move relatively to each other to positions relative to a record or blank, one of said styli being substantially rigidly connected to said means, and means for controlling said movement, substantially as described.

23. In a device of the character described, a carriage, a diaphragm mounted thereon, independently mounted styli on said carriage adapted to co-operate with said diaphragm, a device for feeding said carriage relatively to a record or blank and unitary means for controlling said styli and feeding device, substantially as described.

24. In a device of the character described, a frame having a diaphragm, styli adapted to co-operate with said diaphragm and movable into operative position, dogs controlling the position of said styli, a feeding device for feeding said styli relatively to the record or blank and means controlling the position of said dogs and controlling said feeding device, substantially as described.

25. In a device of the character described, a frame, a carriage movably mounted upon said frame, a feeding device for moving said carriage relatively to the frame and comprising co-operating elements upon the frame and carriage and controlling means for said feeding device comprising a slidable pin having a head with a depression therein and a lever adapted to engage said head for actuating said pin, substantially as described.

26. In a device of the character described, a frame, a carriage movable thereon, an arm movably attached to the carriage, co-operating feeding elements on the arm and frame, a spring tending normally to move the arm in one direction to place the feeding elements in one position, and means for moving said arm in the opposite direction to place the feeding elements in another position comprising a movable pin engaging said arm, means for actuating said pin and means for yieldingly holding said pin in the path of movement of said actuating means, substantially as described.

27. In a device of the character described, a frame, a carriage movable thereon, an arm pivoted to the carriage, co-operating feeding elements on the arm and frame and relatively movable into positions of engagement and disengagement, means tending normally to move the arm to place said elements in one

position, a slidable pin engaging said arm and actuating means for moving said pin to place the feeding elements in another position, substantially as described.

28. In a device of the character described, a frame, a carriage having a diaphragm and movable on said frame, a plurality of styli adapted to co-operate with said diaphragm, dogs controlling said styli, spring controlled devices tending to move the dogs in one direction, one of said dogs being provided with a weaker spring tending to move the dog in the opposite direction, a device for feeding said carriage relatively to the frame, a lever provided with means for moving the dogs against the tension of said first mentioned devices when moved into one position and when moved into another position to render one of said first mentioned devices inoperative, and when moved into a third position controlling said feeding device, substantially as described.

29. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on the frame, a supporting means adjustably mounted upon the carriage and a half nut, movably mounted upon said supporting means and engageable with said screw whereby when such engagement takes place the nut will accurately mesh with said screw to insure instant operation, substantially as described.

30. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on said frame, supporting means adjustably mounted upon said carriage and a half nut yieldingly mounted upon said supporting means and adapted to engage said screw, substantially as described.

31. In a device of the character described, a frame, a feeding screw rotatably mounted upon the frame, a carriage movable on the frame, supporting means adjustably mounted upon the carriage and a half nut adapted to engage said screw and yieldingly supported at one side upon said supporting means upon an axis arranged at right angles to the longitudinal axis of said screw, substantially as described.

32. In a device of the character described, a frame, a feeding screw rotatably mounted thereon, a carriage movable on the frame, an arm pivotally attached to the carriage, means for actuating said arm, a plate pivoted to said arm, a half nut attached to said plate and engageable with the screw and resilient means upon the arm tending to move said plate outwardly relatively to the arm, substantially as described.

33. In a device of the character described, a frame, a feeding screw rotatably mounted upon said frame, a carriage movable on the frame, an arm pivoted to said carriage,

means for moving said arm towards and away from said feeding screw and a half nut yieldingly mounted upon said arm and adapted to engage said screw, substantially as described.

34. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on said frame, supporting means adjustably mounted upon said carriage, a plate pivoted at one end to said supporting means and provided with a half nut, and a spring urging said plate outwardly relatively to said supporting means, substantially as described.

35. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on said frame, supporting means adjustably mounted upon the carriage, a plate pivoted at one end to said supporting means and a half nut adapted to engage said screw, swivelled to said plate and having a limited movement around an axis at right angles thereto, substantially as described.

36. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on the frame, an arm pivoted to the carriage, means for actuating said arm, a plate pivoted at one end to said arm on an axis extending at right angles to the longitudinal axis of said screw and movable towards and away from said plate around its axis towards said screw, means for limiting the outward movement of said plate and a half nut mounted upon said plate, adapted to engage said screw and having a limited swivelling movement upon the plate, substantially as described.

37. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on the frame, supporting means adjustably mounted upon said carriage, a half nut adapted to engage said screw, yieldingly mounted at one side upon said supporting means upon an axis extending at right angles to the longitudinal axis of said feeding screw, and means for limiting the movement of said nut around said axis, said nut having a limited swivelling movement upon an axis at right angles to the first mentioned axis, substantially as described.

38. In a device of the character described, a frame, a feeding screw rotatably mounted upon said frame, a carriage movable on the frame, supporting means adjustably mounted upon the carriage, a channeled member attached to said supporting means, a plate pivotally mounted at one end within the said channeled member, means urging said plate outwardly, means limiting the outward movement of said plate and a half nut adapted to engage said screw and swivelled to said plate, the sides of said

channeled member limiting the swivelling movement, substantially as described.

39. In a device of the character described, a frame, a carriage movably mounted upon said frame, supporting means adjustably mounted upon the carriage, co-operating feeding elements upon said supporting means and frame and a pin for guiding said supporting means, substantially as described.

40. In a device of the character described, a frame, a carriage movable relative to said frame, a feeding element mounted upon the frame, a co-operating feeding element mounted upon the carriage and movable into engagement with the first mentioned feeding element and a pin fixed to said carriage and engaging the last mentioned feeding element for guiding the same, substantially as described.

41. In a device of the character described, a frame, a carriage movable relative to said frame, a supporting means movably mounted upon the carriage, a member attached to said supporting means, a pin fixed to the carriage and engaging the supporting means and member to guide said supporting means and to hold the member immovable relatively to said means and co-operating feeding elements on said frame and member, substantially as described.

42. In a device of the character described, a frame, a carriage movable relative to said frame, an arm pivoted to said carriage, a pin fixed to the carriage and engaging the arm to guide the same, a spring encircling said pin and interposed between said arm and carriage for urging the said arm in one direction, co-operating feeding elements upon said arm and frame and means for actuating said arm in the opposite direction, substantially as described.

43. In a device of the character described, a frame, a carriage movable on said frame, an arm pivoted to said carriage, a pin fixed to the carriage and engaging said arm to guide the same, a spring encircling said pin and interposed between the carriage and arm, a pin slidably mounted upon the carriage and engaging at one end said arm, means for actuating said pin to move the arm against the force of said spring and co-operating feeding elements upon the free end of said arm and said frame, substantially as described.

44. In a device of the character described, a frame, a carriage movable relative to said frame, a slotted arm pivoted to said carriage, a channeled member connected to said arm through the slot, a pin fixed to the carriage and extending through the slot of said arm and the channeled member for guiding the same, a spring encircling said pin and interposed between said arm and carriage for urging said arm in one direction, co-operating feeding elements upon the member

and frame and means for actuating said arm in the opposite direction, substantially as described.

45. In a device of the character described, 5
a frame, a carriage movable relative to the frame, a back-spacing device for the carriage comprising means to render the device inoperative when the carriage is held against movement and means for actuating 10
said device, substantially as described.

46. In a device of the character described, 15
a frame having a guide rod, a carriage movable relative to said frame upon said guide rod, a back-spacing device for the carriage comprising co-operating elements upon the carriage and guide rod and movable with the carriage, one of said elements being adapted to be held upon said guide rod against movement longitudinally thereof 20
and the other of said elements being yieldingly mounted upon the carriage and means for moving said elements relative to each other to back-space the carriage, substantially as described.

47. In a device of the character described, 25
a frame, a carriage movable relative to the frame, co-operating elements upon the carriage and frame movable with the carriage as it is fed along the record or blank and adapted to be moved relatively to each other 30
whereby the carriage is back-spaced, one of said elements being adapted to be held against movement in the direction of movement of the said carriage during back-spacing whereby during the relative movement 35
of the elements the carriage will be back-spaced and the other of said elements being yieldingly mounted whereby when the carriage is held against movement the elements 40
will slip by each other and means for moving the elements relatively to each other, substantially as described.

48. In a device of the character described, 45
a frame, a carriage movable on the frame, controlling means movable in opposite directions and a device for back-spacing said carriage controlled by said means and comprising means whereby the carriage will be back-spaced by the movement of the controlling 50
means in either direction, substantially as described.

49. In a device of the character described, 55
a frame, a carriage movably mounted on said frame, controlling means movable in opposite directions and a device for back-spacing said carriage comprising co-operating elements controlled by said means and comprising means whereby back-spacing takes place when the controlling means is 60
moved in either direction, substantially as described.

50. In a device of the character described, a frame, a carriage movably mounted on the frame, a back-spacing device comprising

a two-faced cam nose and controlling means 65
for the device movable in opposite directions whereby the carriage can be back-spaced when the controlling means is movable in either direction, substantially as described.

51. In a device of the character described, 70
a frame, a carriage movable on said frame, controlling means movable in opposite directions and a device for back-spacing said carriage controlled by said means and comprising a two-faced cam nose engaging the carriage whereby the carriage can be back-spaced by a movement of the controlling 75
means in either direction, substantially as described.

52. In a device of the character described, 80
a frame, a carriage movably mounted on said frame, and a device for back-spacing said carriage comprising co-operating elements including a cam having a two-faced nose whereby the carriage is back-spaced as the 85
elements are moved back and forth relatively to each other, substantially as described.

53. In a device of the character described, 90
a frame, a carriage movably mounted on said frame, a rotatable cam mounted on the frame, normally movable with the carriage, adapted to be held against movement in the direction of movement of the carriage and having a two-faced cam nose engageable 95
with a part of the carriage and means for actuating said cam whereby the carriage will be back-spaced as the cam is moved back and forth, substantially as described.

54. In a device of the character described, 100
a guide rod, a carriage movably mounted on said guide rod and provided with a stylus, means on said guide rod for controlling said stylus and a back-spacing device comprising co-operating elements on said guide rod and carriage and controlled by said means, substantially as described. 105

55. In a device of the character described, 110
a frame, a carriage movably mounted on the frame and a back-spacing device comprising relatively movable elements on the frame and carriage, one of said elements being yieldingly mounted whereby the device is rendered inoperative should the carriage be held against movement during relative movement 115
of said elements, substantially as described.

56. In a device of the character described, 120
a frame, a carriage movable relative to the frame, co-operating elements on the frame and carriage, and movable with the carriage for back-spacing the same, and means for moving said elements relatively to each other whereby one of said elements can be clamped against movement in the direction of movement of the carriage, the other of 125
said elements being yieldingly mounted, substantially as described.

57. In a device of the character described,

a frame, a carriage movable on the frame, a pin yieldingly mounted upon said carriage, a rotatable cam mounted upon the frame and movable with said carriage along the frame and means for rotating said cam clamping the same to the frame against movement in the direction of movement of said carriage, said cam being provided with a two-faced nose with which said pin engages as the cam is rotated whereby the carriage will be back-spaced as the cam is moved in either direction, substantially as described.

58. In a device of the character described, a frame, a carriage having a stylus and movable on said frame, means movable in opposite directions for controlling said stylus, and a back-spacing device controlled by said means and comprising means whereby the carriage will be back-spaced a step by the movement of the controlling means in either direction, substantially as described.

59. In a device of the character described, a guide rod, a carriage movably mounted upon said guide rod and provided with styli, devices independently mounted upon said guide rod for controlling said styli, a device for back-spacing said carriage and common means for controlling all said devices, substantially as described.

60. In a device of the character described, a frame having a guide rod, a carriage movably mounted thereon and provided with a stylus, means for controlling said stylus to move the same into and out of operative position, and co-operating elements upon the carriage and guide rod, movable with the carriage and controlled by said means whereby when the controlling means is actuated said carriage will be back-spaced, substantially as described.

61. In a device of the character described, a frame having a guide rod, a carriage movably mounted upon the rod and having a stylus, means for controlling the position of said stylus relatively to a record or blank, co-operating elements upon the carriage and guide rod, controlled by said means and movable with said carriage whereby when the controlling means is actuated one of said elements will be fixed against movement longitudinally of the rod and relative camming action will take place between the elements back-spacing the carriage, substantially as described.

62. In a device of the character described, a frame having a rotatable guide rod, a carriage slidably mounted on said rod, a cam disc carried by said rod movable along the same with said carriage and having a recess and a nose adjacent to one end of the recess, a pin upon the carriage entering the recess and adapted to engage the nose and means for rotating said cam disc in opposite directions whereby said cam will be tilted

into binding engagement with the rod, causing the carriage to be back-spaced, substantially as described. 65

63. In a device of the character described, a frame having a rotatable guide rod, a carriage movably mounted on the guide rod and a device for back-spacing said carriage comprising an element carried by said rod and adapted to be moved into binding engagement therewith and a yielding element upon the carriage adapted to co-operate with the element on the rod, substantially as described. 70 75

64. In a device of the character described, a frame, a carriage having a stylus and movably mounted on said frame, a cam disc movable with said carriage, slidably and rotatably mounted on said frame and provided with a cam nose, and a pin yieldingly mounted upon the carriage, projecting into the path of said disc and coacting with the nose thereof to tilt the disc into binding engagement with the frame when the disc and pin are moved relatively to each other, substantially as described. 8 8

65. In a device of the character described, a frame provided with a rotatable guide rod, a carriage slidably mounted upon said frame and rod and provided with a stylus, means movable in opposite directions for controlling the position of said stylus with relation to a record or blank and comprising a lever keyed to said guide rod for rotating the same and slidable longitudinally thereof, a cam disc keyed to said guide rod, slidable thereon and provided with a recess having a cam nose therein and a pin yieldingly mounted upon the carriage, projecting into said recess and lying in the path of said cam nose and means for yieldingly retaining said cam disc in engagement with said pin whereby when the actuating means is moved in either direction said cam disc will be tilted into binding relation with said rod causing the carriage to be back-spaced, substantially as described. 90 95 100 105

66. In a device of the character described, a movable guide rod, a carriage having styli and movable along said guide rod, controlling means for controlling the position of said styli relative to a record or blank and for moving said rod and a guard operated by the movement of said guide rod to prevent the removal or positioning of the record or blank when either stylus is in operative position, substantially as described. 110 115 120

67. In a device of the character described, a frame, a carriage movable along said frame and having styli adapted to be placed in operative position relative to a record or blank, a guard to prevent the removal or positioning of the record or blank when either stylus is in operative position relative thereto and common means for con- 125

trolling the position of either stylus relative to the record or blank and for moving said guard into and out of operative position, substantially as described.

5 68. In a device of the character described, a frame, a carriage movably mounted on the frame, a stylus on said carriage and movable into and out of operative position relative to a record or blank, a back-spacing
10 device, a guard to prevent the removal or positioning of the record or blank when the stylus is in operative position and common means for controlling said back-spacing device, stylus and guard, substantially as
15 described.

69. In a device of the character described, a frame, a guide rod movably mounted on the frame, a carriage slidably mounted upon the guide rod and provided with a stylus
20 movable into and out of operative relation relative to a record or blank, a back-spacing device controlled by the movement of said guide rod, a guard to prevent the removal
25 or positioning of the record or blank when the stylus is in operative position and also controlled by the movement of said guide rod and means for controlling the position of said stylus and for moving said guide
30 rod, substantially as described.

70. In a device of the character described, a movable guide rod, a carriage mounted upon said guide rod, movable relative thereto and having styli adapted to be moved into
35 operative relation relative to a record or blank, a back-spacing device for said carriage controlled by the movement of said guide rod, a guard to prevent the removal
40 or positioning of the record or blank when either stylus is in operative position and also controlled by the movement of said guide rod and means for moving said guide rod, substantially as described.

71. In a device of the character described, a frame, a carriage movably mounted on the
45 frame, styli movable relative to said carriage into and out of operative relation relative to a record or blank, means for controlling the position of and moving said styli into and out of operative relation and
50 a guard to prevent the removal or positioning of the record or blank when either stylus is in operative position and controlled by said styli controlling means, substantially as described.

72. In a device of the character described, a frame, a carriage on said frame and provided with styli movable into and out of
55 operative relation to a record or blank, means for controlling said styli, means operated by said styli controlling means and movable to a position in the path of a record or blank when one of said styli is in operative relation relative thereto and means operated by said styli controlling

means and movable to a position in the path
65 of the record or blank when the other of said styli is in operative position relative thereto, substantially as described.

73. In a device of the character described, a sound box carrying a stylus movable into
70 and out of operative relation to a record or blank, a carriage supporting said sound box, a movable guide rod for said carriage, means secured to said rod and normally standing in a position to prevent the re-
75 moval or positioning of the record or blank, and means for moving said rod to move said preventing means out of operative position and for simultaneously causing said stylus to be moved to inoperative position,
80 substantially as described.

74. In a device of the character described, a sound box carrying a stylus movable into and out of operative relation to a record or
85 blank, a carriage supporting said sound box, a movable guide rod for said carriage, means for feeding said carriage along said rod, means secured to said rod and normally standing in a position to prevent the re-
90 moval or positioning of the record or blank, and means for moving said rod to move said preventing means out of operative position and for simultaneously therewith causing
95 said stylus to be moved to inoperative position and said feeding means to be rendered inoperative, substantially as described.

75. In a device of the character described, a frame, a carriage movable relative to said
100 frame and provided with styli movable into and out of operative relation to a record or blank, a plurality of arms movable to positions in the path of the record or blank to prevent the removal or positioning thereof
105 when the styli are in operative position thereon and means for actuating said arms, substantially as described.

76. In a device of the character described, a frame, a carriage movably mounted upon
110 the frame and provided with a plurality of styli movable into and out of operative relation to a record or blank, an arm movable into the path of the record or blank when one of said styli is in operative position, and a second arm movable into the path of
115 the record or blank when the other of said styli is in operative position and controlled by the first mentioned arm, substantially as described.

77. In a device of the character described,
120 a frame having a rotatable guide rod mounted thereon, a carriage movable relative to said frame upon said guide rod, a plurality of styli mounted upon said carriage, movable into and out of operative
125 relation to a record or blank and controlled with said rod, an arm fixed to said rotatable guide rod and movable into the path of a

- record or blank when one of said styli is in operative position, a second arm pivotally mounted upon the frame, movable into the path of the record or blank when the other of said styli is in operative position, and actuated by the first mentioned arm when the latter is moved in a direction away from the record or blank, means tending to move said second arm away from the record or blank, both of said arms being out of the path of the record or blank when both styli are in elevated position and means for rotating said guide rod, substantially as described.
78. In a device of the character described, a frame, a feeding screw rotatably mounted on the frame, a carriage movable on the frame, supporting means adjustably mounted upon said carriage and a half nut swivelled upon said supporting means and adapted to engage said screw, substantially as described.
79. In a device of the character described, vibratory means, a plurality of relatively movable styli one of which is connected to said means, the relative movement of said styli automatically connecting and disconnecting the same, substantially as described.
80. In a device of the character described, a diaphragm and floating weight movable relative to each other and provided with styli connectable with each other, the relative movement of said diaphragm and floating weight connecting and disconnecting said styli, substantially as described.
81. In a device of the character described, a diaphragm having a stylus movable into operative relation against a blank, a floating weight movable relative to said diaphragm and stylus and a stylus mounted on said weight and adapted to be operatively connected to and disconnected from said diaphragm by the relative movement of the weight, substantially as described.
82. In a device of the character described, vibratory means, relatively movable members, a pair of styli respectively associated with said members and each adapted to cooperate with said means, each of said members being mounted to exert pressure on the stylus associated therewith independently of the other member, and means for controlling said members to control the position of the styli and for effecting the operative connection and disconnection of one of the styli with said means, substantially as described.
83. In a device of the character described, a carriage having a neck, sound box mechanism bodily movable vertically relative to said neck in a direction substantially at right angles to a record or blank and comprising vibratory means, relatively movable elements having styli adapted to cooperate with said vibratory means and means including dogs for controlling said elements, substantially as described.
84. In a device of the character described, a carriage, sound box mechanism bodily and vertically movable thereon and comprising vibratory means, relatively movable elements having styli adapted to cooperate with said means and means comprising dogs mounted on the carriage and engageable with said elements to control their position and the position of the styli, substantially as described.
85. In a device of the character described, a sound box body member, a tube movable relative to said body member in a direction substantially at right angles to a record or blank, a light frame having a diaphragm provided with a stylus, said diaphragm having communication with and being movable relative to said tube, a floating weight movable relative to said tube and a stylus controlled by said weight and adapted to be operatively connected to said diaphragm, substantially as described.
86. In a device of the character described, a plurality of independently mounted members, a pair of styli respectively associated with said members, one of said members carrying a diaphragm with which each of the styli is adapted to cooperate, and each of said members being adapted to move independently of the other and to exert pressure on the stylus associated therewith when the latter stylus is in operative engagement with a record or blank, substantially as described.
87. In a device of the character described, a diaphragm, a stylus rigidly secured to said diaphragm, a floating weight and a stylus movably mounted upon said weight and adapted to be operatively connected to said diaphragm upon movement thereof to operative position with respect to a record or blank, substantially as described.
88. In a device of the character described, a sound box body member provided with a neck, a tube cooperating with said neck and movable relatively thereto and substantially at right angles to a record or blank, a diaphragm having a stylus and mounted on said tube, a floating weight mounted on said tube and a stylus controlled by said weight and adapted to be operatively connected to said diaphragm, substantially as described.
89. In a device of the character described, a body member, a floating weight having means adapted to track or engage a record or blank, said weight being movable relatively to said body member, a frame movable independently of said weight, vibratory means, and styli controlled by said frame and weight and adapted to cooperate with said vibratory means, substantially as described.

90. In a device of the character described, a diaphragm, a plurality of styli each movable into position against a record or blank and adapted to be operatively connected to said diaphragm and a separate member for each stylus, each adapted to independently exert pressure on its stylus when the latter is in operative position against a record or blank, substantially as described.

91. In a device of the character described, a carriage having a neck, relatively and vertically movable elements mounted for movement in a direction axially of said neck and substantially at right angles to a record or blank, a diaphragm having communication with said neck, styli adapted to co-operate with said diaphragm controlled by said elements and movable into engagement with a record or blank by the movement of said elements, and means on the carriage to control said elements and thereby the position of the styli relatively to the record or blank, substantially as described.

92. In a device of the character described, a carriage, relatively and vertically movable elements thereon, vibratory means carried by one of said elements, styli controlled by said elements and adapted to cooperate with said vibratory means, and means mounted on said carriage and engageable with the lower portions of said elements to raise and drop the same and thereby to control the position of the styli relative to a record or blank, substantially as described.

93. In a device of the character described, relatively and vertically movable elements, vibratory means carried by one of said elements, styli controlled by said elements and adapted to co-operate with said vibratory means, and means comprising dogs engageable with the lower portions of said elements to raise and drop the same and thereby to control the position of the styli relative to a record or blank, substantially as described.

94. In a device of the character described, a body member having a neck, a tube mounted for movement relative to said neck in a direction substantially at right angles to a record or blank, a diaphragm thereon, a floating weight movable relatively thereto, styli adapted to be operatively connected to said diaphragm and controlled by the movement of said tube and weight, and means for raising and lowering said tube and weight and controlling the position of the styli relatively to a record or blank, substantially as described.

95. In a device of the character described, a movable diaphragm provided with a stylus, a floating weight movable relatively to the diaphragm, a stylus controlled by said weight and adapted to be operatively connected to said diaphragm, and means comprising independently mounted devices engaging the diaphragm and weight for con-

trolling their relative position and the position of the styli relative to a record or blank, substantially as described.

96. In a device of the character described, sound box mechanism movable vertically and in a direction substantially at right angles to a record or blank and comprising a diaphragm and a weight independently movable, said diaphragm and weight each carrying a stylus movable into position against a record or blank, the stylus carried by said weight being adapted to co-operate with said diaphragm, and means for controlling the position of said mechanism and the relative position of the diaphragm and weight, substantially as described.

97. In a device of the character described, a frame, a carriage movably mounted on the frame, styli on said carriage and movable into and out of position relative to a record or blank, a back-spacing device for said carriage and unitary means for controlling the position of each stylus relative to the record or blank and for operating said back-spacing, substantially as described.

98. In a device of the character described, a guide rod, a carriage movably mounted upon said rod, a diaphragm on said carriage, styli on said carriage adapted to be operatively connected to said diaphragm and movable towards and away from a record or blank, devices independently mounted upon said rod and adapted to control the positions of said styli and means for actuating said devices, substantially as described.

99. In a device of the character described, a rotatable guide rod, a carriage movable thereon and provided with styli, independently mounted devices on said rod for controlling said styli, a back-spacing device controlled by the rotation of said rod and means for rotating said rod and actuating said styli controlling devices, substantially as described.

100. In a device of the character described, a body member having a diaphragm, a stylus adapted to co-operate with said diaphragm and movable into and out of operative position with respect to a record or blank by movement of the diaphragm, a floating weight and a stylus co-operating with said weight, mounted independently of the first stylus and adapted to co-operate with said diaphragm, substantially as described.

101. In a device of the character described, a body member having a diaphragm, a stylus carried by the diaphragm and movable into operative position with respect to a record or blank, a floating weight, and a stylus co-operating with said weight, mounted independently of the first stylus and adapted to co-operate with said diaphragm, substantially as described.

102. In a device of the character de-

scribed, a pair of relatively movable members, a diaphragm carried by one of said members, a pair of styli respectively associated with said members and each adapted to cooperate with said diaphragm, each of said members being mounted to exert pressure on the stylus associated therewith independ-

ently of the other member, and means for controlling said members to control the position of the styli, substantially as described. 10

This specification signed this 15th day of December, 1917.

NEWMAN H. HOLLAND.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,420,316, granted June 20, 1922, upon the application of Newman H. Holland, of West Orange, New Jersey, for an improvement in "Phonographs," an error appears in the printed specification requiring correction as follows: Page 2, line 89, after the word "movement" insert the words *of the diaphragm frame 17*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 29th day of August, A. D., 1922.

[SEAL]

KARL FENNING,
Acting Commissioner of Patents.