

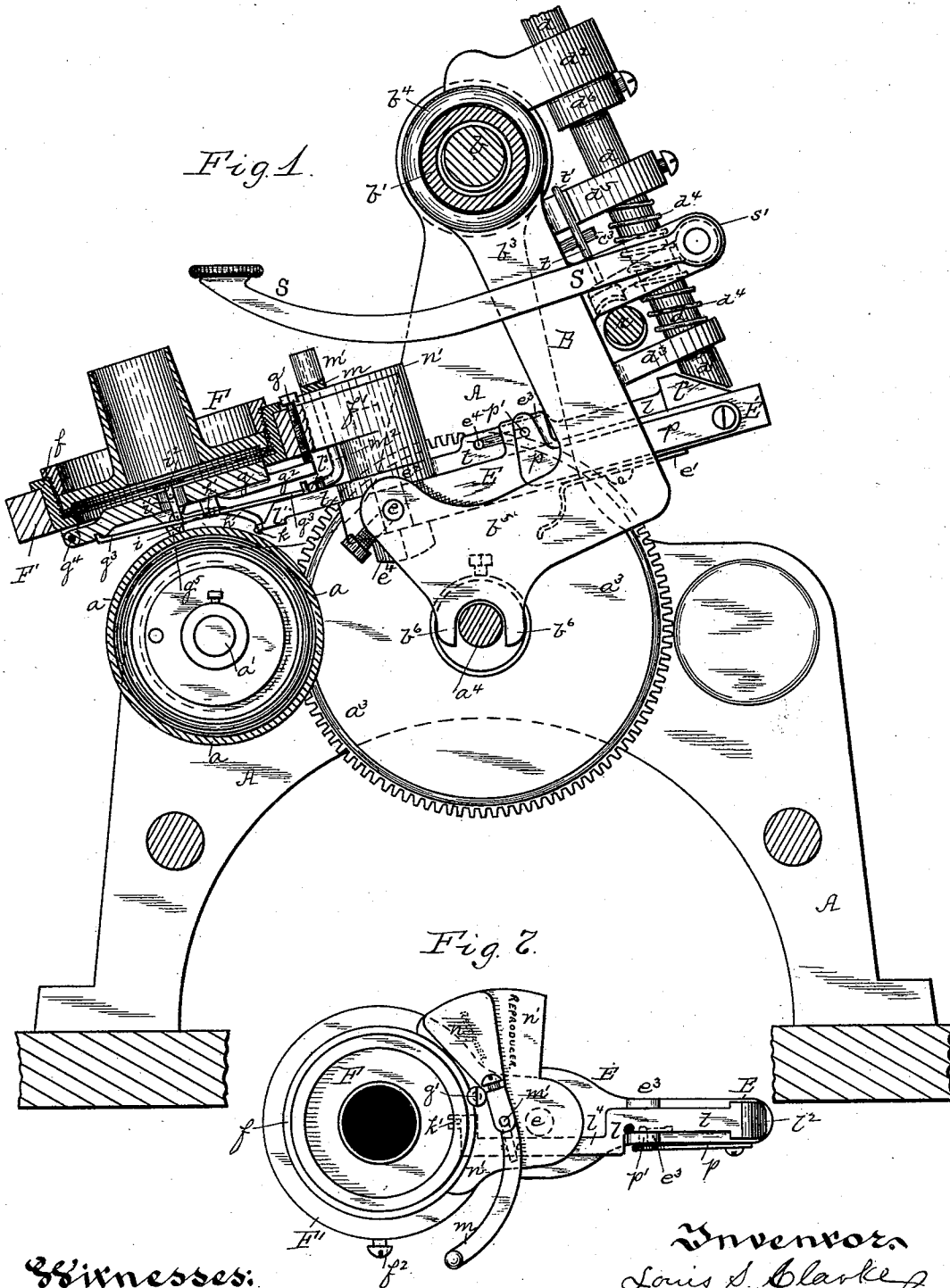
(No Model.)

4 Sheets—Sheet 1.

L. S. CLARKE.
PHONOGRAPH.

No. 474,946.

Patented May 17, 1892.



Witnesses:
J. A. Clarke
Robt. D. Totten

Inventor:
Louis S. Clarke
By James D. Ray
Attorney

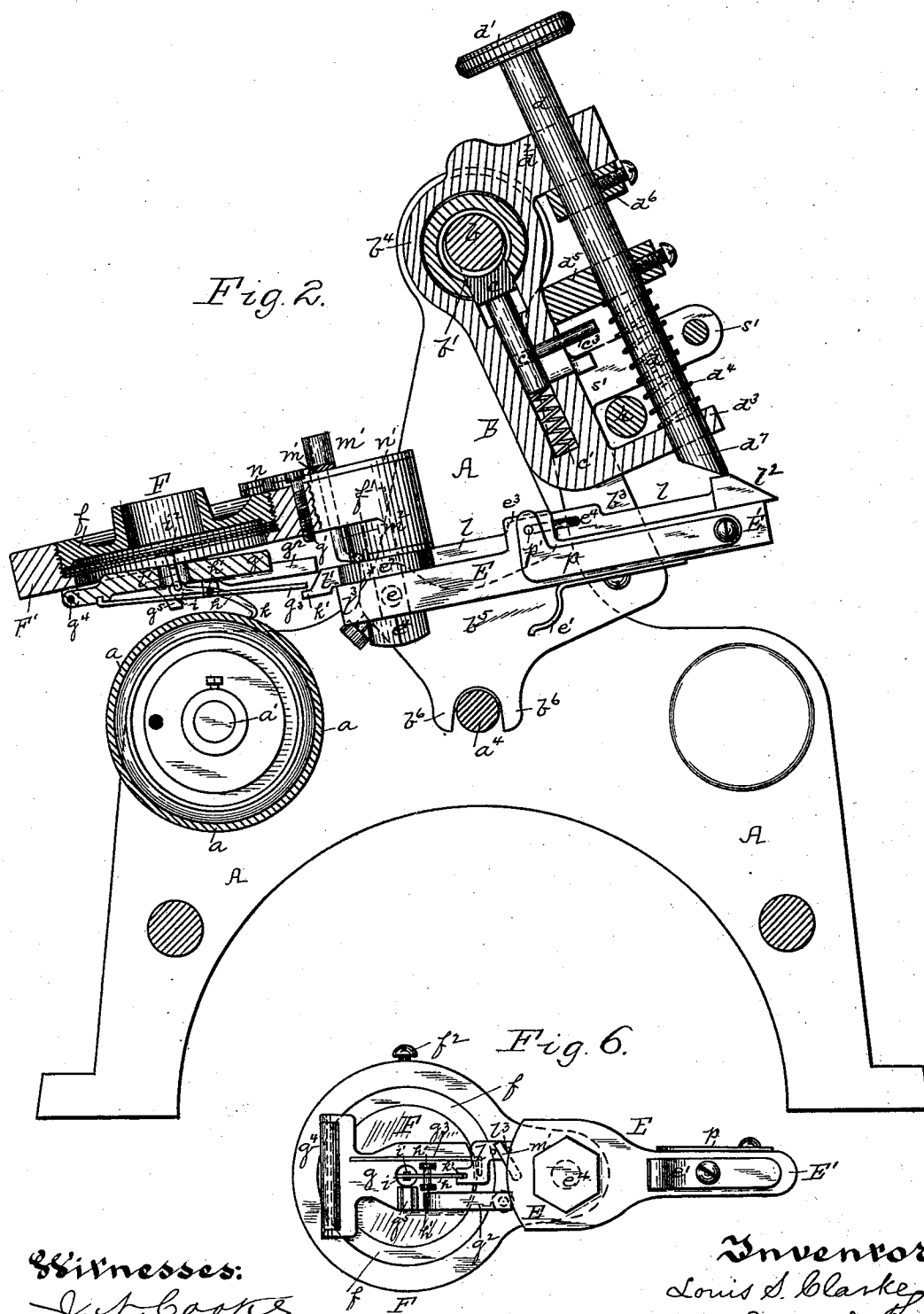
(No Model.)

4 Sheets—Sheet 2.

L. S. CLARKE.
PHONOGRAPH.

No. 474,946.

Patented May 17, 1892.



Sicknesses:

J. H. Barker
Robt. D. Gotten

Inventors

Louis S. Clarke
By James S. Ray
Attorney

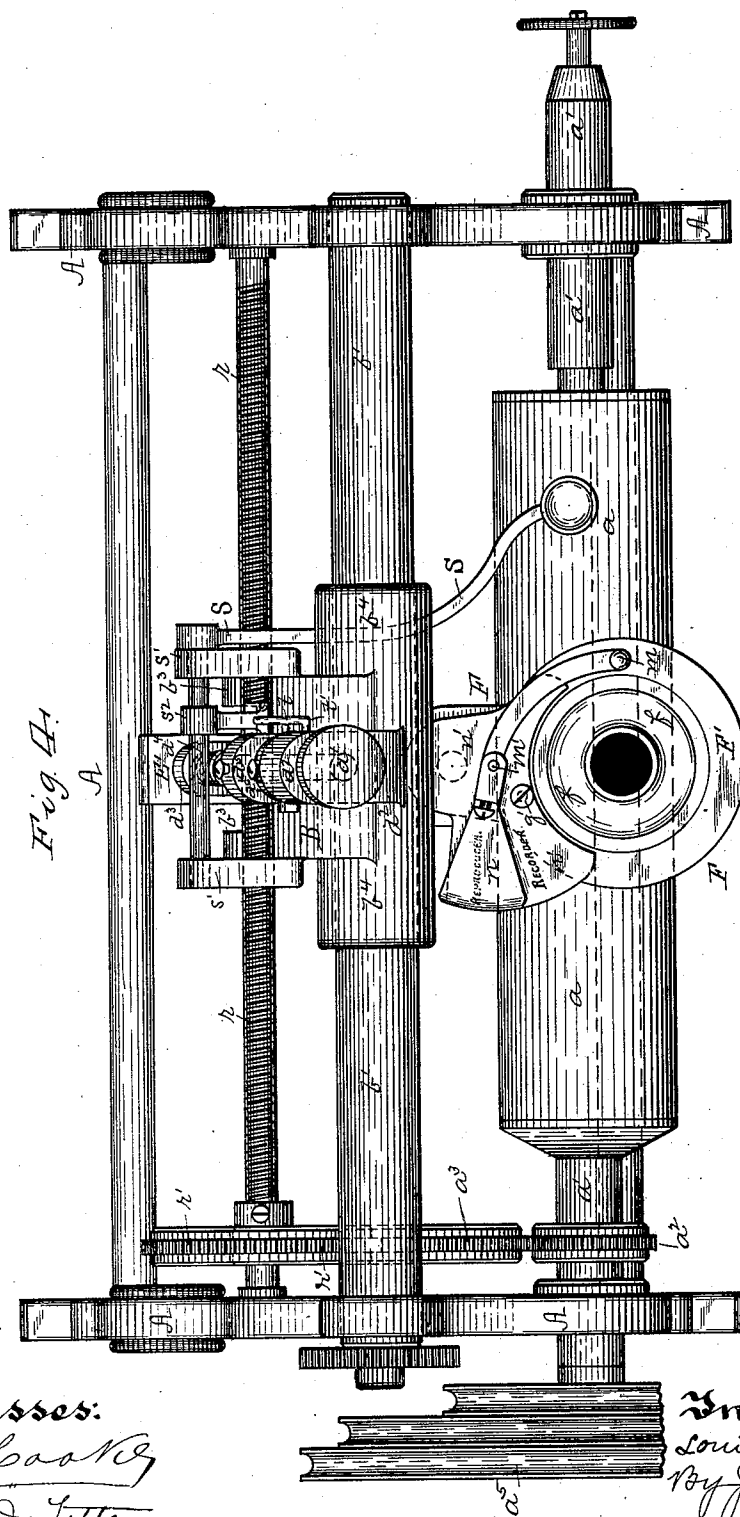
(No Model.)

4 Sheets—Sheet 4.

L. S. CLARKE.
PHONOGRAPH.

No. 474,946.

Patented May 17, 1892.



Witnesses:

J. A. Coakley
Robt D. Follen

Inventor

Louis S. Clarke
By James S. Ray
Attorney

UNITED STATES PATENT OFFICE.

LOUIS S. CLARKE, OF PITTSBURG, PENNSYLVANIA.

PHONOGRAPH.

SPECIFICATION forming part of Letters Patent No. 474,946, dated May 17, 1892.

Application filed December 23, 1889. Serial No. 334,650. (No model.)

To all whom it may concern:

Be it known that I, LOUIS S. CLARKE, a resident of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Phonographs; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to phonographs, its object being to improve these instruments or machines in certain particulars. It is well known that both in the "phonograph" and the "graphophone," as they are termed, it has been considered necessary to employ two diaphragms, one for recording and the other for reproducing, these two diaphragms in the phonograph being arranged in a frame, and it being necessary to swing the frame in order to bring the one or the other diaphragm into position, and in the graphophone-machine the different mechanisms for recording and for reproducing being formed separate and the one removed from the machine in order to apply the other thereto.

One object of my invention is to overcome this difficulty by so improving the machine that the same diaphragm is employed for both recording and reproducing, the shifting of a small lever being all that is necessary to make the change.

Another object of my invention is to provide for the use of the phonograph recorder and reproducer upon the graphophone-machine. It is also found very desirable to provide for the moving back of the diaphragm for a short distance during reproducing in order to provide for the repetition of part of the record made on the cylinder, and by my invention I provide a simple means for obtaining this result.

My invention has also certain further objects, all of which will be hereinafter more fully set forth, and the special improvements embodied in my invention will be particularly claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings, in which—

Figure 1 is a side view showing the instrument in position for recording and showing the diaphragm in sectional view. Fig. 2 is a sectional view, partly in side elevation, show-

ing the machine in position for reproducing, the driving-gearing being omitted. Fig. 3 is a like sectional view, partly in side elevation, showing the position of the machine when the mechanism for drawing the diaphragm backwardly is in operation. Fig. 4 is a top or plan view of the machine. Fig. 5 is a detail back view of part of the machine. Fig. 6 is a detail bottom plan view, and Fig. 7 is a detail top plan view, of the diaphragm and reversing mechanism.

Like letters of reference indicate like parts in each figure.

My invention is illustrated as applied to a graphophone-machine, though it is evident that it can be well applied to the ordinary phonograph-machine, such changes being made therein as would be required, such as in the supporting of the frame and the connections with the feeding mechanism.

As illustrated in the drawings, the frame A of the machine carries the cylinder-holder a' by which the recording-cylinder a is supported, this cylinder-holder being driven by the pulley a^5 and driving, through the gearing $a^2 a^3$, the shaft a^4 , and from it by suitable gearing the feeding-screw b . The shaft a^4 extends the full length of the machine-frame, as in the ordinary graphophone-machine. The feeding-screw b is mounted in the upper part of the machine-frame and inclosed in a sheath b' , and the frame B, carrying the diaphragm-frame E, is mounted on the shaft a^4 and the sheath b' , which incloses the major portion of the feeding-screw b .

The frame B has two side bars or plates b^3 extending down from the sleeve b^4 , fitting around the sheath b' , these two side plates having the inwardly-extending portions b^5 , with forks b^6 at the base thereof, which fit around the shaft a^4 and the frame being thus supported.

The frame B carries the concave face or sectional nut c , which by the spring c' is pressed upwardly into contact with the screw-bar b , the frame being fed forward by the rotation of the screw-bar when it is in engagement with this nut c . The nut c has the extension c^2 , which fits into a seat within the frame, its base pressing upon the spring c' , and this extension c^2 has an arm c^3 extending outwardly through a slot in the frame into such position

as to engage with the mechanism for withdrawing the nut, as hereinafter described. For the ordinary purposes of sliding the frame back and forth on the bars on which it is mounted to disengage the nut from the screw-bar I employ the sliding bar d , having the thumb-piece d' at the upper end thereof and mounted in the lugs or bearings d^2 d^3 of the frame B, the coiled spring d^4 being confined between the lower bearing d^3 and the collar d^5 , secured by a set-screw to the bar d and extending out into position to engage with the arm c^3 of the nut c , and so draw down the nut when the sliding bar is pressed downwardly. The rod has also the collar d^6 confined thereon by a set-screw to limit its upward movement, said collar striking against the bearing d^2 .

The frame E, carrying the diaphragm F, is mounted on the frame B at e , and it may swing upwardly in said bearing, the frame E having the spring e' , which can engage with the shaft a^4 to hold the diaphragm in its raised position, as clearly shown in Fig. 3.

The frame E is formed in two parts—namely, the diaphragm-carrier F' and the rear extension E'—these two parts being connected by the bolt e^4 and being formed in two parts for convenience in securing together the different parts supported in the frame. The diaphragm-carrier F' is simply a ring having an extension f' at one end and having a seat to receive the ring f , within which the diaphragm is clamped, which ring is held therein by the set-screw f^2 , the diaphragm being supported above the recording-cylinder a . Secured to the ring f or diaphragm-carrier F' is the weight g , which is employed with the Edison reproducer, this weight being pivoted at the forward end of the ring or carrier, as shown. For the purposes of recording and reproducing I employ the lever h , having the recording-stylus i directly under the diaphragm F and having the reproducing-stylus k at the other end, this lever h being pivoted at h' to the weight g and being connected by the link i' to the diaphragm F, this link being pivoted at the forward end to the lever h just above the recording-stylus i and at its upper end to the lug i^2 , attached directly to the diaphragm. By such construction it is evident that in making the record, when the recording-stylus i is brought into position upon the recording-cylinder, the vibrations imparted to the diaphragm F are imparted directly through the link i' to the recording-stylus, said stylus being in such case supported by the bearing h' . When, however, the reproducing-stylus k at the other end of the lever is brought into contact with the cylinder, as shown in Fig. 2, the vibrations imparted by the cylinder to the stylus are transmitted through the lever h and link i' to the diaphragm F, so reproducing the sound. This employment of a pivoted lever having the recording-stylus at the one end and a reproducing-stylus at the other end is one of the

main features of my invention, and the lever may of course be mounted in any suitable way, so as to give the desired result—namely, the recording of the sound and the reproduction of the sound through the same diaphragm.

For the purpose of recording, as shown in Fig. 1, it is desirable that the weight g shall be held stationary, in which case the bearing h' thereon acts as a stationary bearing for the movement of the lever in recording, and for this purpose I provide an adjusting-screw g' , passing through the diaphragm-carrier F', against which the arm g^2 of the weight g presses, this adjusting-screw g' providing for the necessary adjustment of the stylus in recording. To hold the weight g up against the screw g' , I employ the spring-bar g^3 , secured to the weight and extending forward, so as to engage with the sliding reversing-bar l , mounted in suitable guides in the frame E, as hereinafter set forth, the spring resting on the upper surface of said bar when holding the weight g up against its seat or adjusting-screw, as shown in Fig. 1, but passing down over the inclined forward end l' of the bar l , when the apparatus is reversed for reproducing and permitting the weight to swing on its pivot g^4 , so as to bring the reproducing-stylus into contact with the recording-cylinder, as shown in Fig. 2, the weight being then free to move and to hold the reproducing-stylus in contact with the recording-cylinder, as in the ordinary operation of the Edison reproducer. It will be noticed that the weight g has thereon what might be termed a "smoothing" block or bridge g^5 , which travels in front of the recording-stylus and supports the diaphragm-frame at its forward end on the recording-cylinder, raising and lowering the diaphragm-frame according to any inequalities found in the surface of the recording-cylinder. This bridge also serves the purpose of smoothing the surface of the cylinder and preparing it for the making of the record thereon, and it also acts in connection with the set-screw g' to regulate the average depth of the record made by the stylus.

It will be noticed that during the recording operation the forward end of the diaphragm-frame, which is heavier than the rear end thereof, is free to rest upon and be supported by the bridge resting on the recording-cylinder, as above stated, but that in reproducing the rear end of the diaphragm-frame is depressed and the frame is held in that position, this being necessary to bring into proper position the reproducing-needle and to permit the weight to move in its bearing to hold that needle in contact with the reproducing-cylinder. In the mechanism shown this is accomplished by means of what I have termed the "reversing-bar" l , this bar extending over the rear portion E' of the diaphragm-frame E and being mounted in guideways or bearings e^2 e^3 thereon and having at the rear end the inclined face l^2 , which engages with a like in-

5 inclined face d' at the base of the releasing-bar d , so that when the bar l is in its forward position, through the spring g^3 , it holds the weight g up against its seat and at the same time, as its rear inclined face does not engage with the bar d , it permits the forward end of the diaphragm-frame to descend and be supported by the recording-cylinder, as above set forth; but on the reversal of the apparatus
 10 as this reversing-bar slides back it drops the weight g , as above described, and at the same time it passes under the bar d in the frame B, as shown in Fig. 2, and presses down the rear end of the diaphragm-frame E, and so
 15 raises the forward end thereof from contact with the recording-cylinder, the inclined face l^2 of the bar l passing under the inclined end d' of the bar d . As the forward end of the diaphragm-frame is thus raised, it necessarily
 20 lifts the recording-stylus i from contact with the cylinder, and as the rear end of the weight g is permitted to drop it lowers the bearing h' of the lever h , and these two movements act to lower the reproducing-stylus k at the
 25 rear end of the lever h and to bring it into contact with the recording-cylinder, as shown in Fig. 2. To produce this movement of the reversing-bar l , I employ the lever m , which is located at one side of the diaphragm and within
 30 easy reach of the operator's finger, this lever being pivoted at m' and extending down through the diaphragm-holder F' , and having at its base a crank m^2 , which engages with the reversing-bar l , extending into a seat l^3 thereon. The movement of said lever m ,
 35 which is shown in the two positions for recording and reproducing in Figs. 4 and 7, respectively, is all that is necessary to change the machine from recording to reproducing,
 40 or vice versa, the lever carrying a plate n , extending over an indicator-plate n' , containing the words "Recorder" and "Reproducer," so that the movement of the lever over the plate n discloses to view the name of the particular
 45 stylus which is in contact with the recording-cylinder. The two parts F' E' of the diaphragm-frame E are bolted together, as above stated, in order to secure the several parts in their proper positions, and the forward end of
 50 the reversing bar l is bent to one side, as shown at l^4 , Fig. 7, so as to pass the bolt e , securing the two parts of the diaphragm together. In order to hold the reversing-bar in whichever way is desired—such as for recording or reproducing—I provide the spring-clip p , secured to the rear portion of the frame E and having the pintle p' passing through the rear bearing e^2 of the reversing-bar l and engaging with seats e^4 in the reversing-bar. It is
 60 of course desirable to protect the points of the recording and reproducing needles when not in use, as these parts are very delicate, and for this purpose it will be noticed that the recording-needle is located close to the bridge g^5 , and when the instrument is arranged for reproducing, as the weight g carrying this bar is lowered, the bridge is brought

below the stylus, and it is protected from injury. For the same purpose I form in the forward end of the reversing-bar l a notch k' ,
 70 into which the point of the reproducing-stylus enters when not in use, these two delicate parts of the machine being thus protected from injury.

It is often found desirable in these machines
 75 to have the last few lines recorded upon the cylinder repeated—such, for example, as where a dictation is interrupted and the operator desires to ascertain the last sentence recorded—and as the instrument having the above-
 80 described improvement applied to it can be quickly changed from recording to reproducing, it is extremely desirable to have a means for carrying back the diaphragm a short distance, in some cases shorter than could well
 85 be accomplished by means of the hand-bar d , above described. For this purpose I provide a second or supplemental screw-bar r , which has a coarser thread upon it than the feeding-screw and might be termed a "receding" or
 90 "return" screw. This screw-bar is mounted in the machine-frame A, and has at one end thereof a gear-wheel r' , which meshes with the gear-wheel a^3 , above referred to. The screw-bar passes between the frame B and the bar d , just above the lower bearing d^3 of said
 95 frame, and extending out from the frame B are brackets s' , in which is pivoted a lever S, which extends to the forward part of the machine, as more clearly shown in Fig. 4. This
 100 lever has rigidly attached thereto an arm s^2 , which extends forward over the screw-bar r and carries at its forward end the sectional nut s , which engages with the screw-bar r , so that when the lever S is depressed the nut s
 105 will engage with the screw-bar, and by the rotation of the screw-bar will cause the frame B, and with it the diaphragm-frame E and the parts carried thereby, to be drawn backwardly. The pitch of the screw-bar and nut
 110 and the speed thereof can be regulated according to the speed to which it is desired to recede or draw back the frame B. It is evident, however, that as the nut c is normally in engagement with the main or feeding
 115 screw b before the frame can be drawn back it would be necessary to disengage the nut c from the screw-bar b . In order to prevent the stylus, either recording or reproducing, which is in contact with the recording-cylinder from scratching said cylinder
 120 and to prevent injury to the stylus, it is also necessary that the diaphragm-frame and mechanism carried by it be raised. For this purpose I provide the arm s^2 with a finger-bar t , having the finger t' , which extends
 125 over the collar d^5 , secured to the sliding bar d , and when the lever S is depressed this finger-bar acts to draw down the sliding bar d and cause it to press upon the rear end of the
 130 frame E or the rear end of the reversing-bar l , and so depress the rear end of the diaphragm-frame and raise the forward end thereof, and as the collar d^5 is drawn down it

engages with the arm c^3 of the nut c and draws it out of engagement with the feeding-screw b . A separate finger on the finger-bar t might engage with the arm c^3 , but it is not necessary. These parts are held in this position as long as the operator's finger is continued on the lever S , and the nut s held in engagement with the receding screw-bar r . As soon as the lever S is released through the spring d^4 on the sliding bar or other suitable mechanism the parts are carried into their normal position, the nut s being disengaged from the screw-bar r , the nut c caused to engage with the screw-bar b , and the regular feeding operation is resumed.

The operation of the apparatus briefly described is as follows: After the insertion of the recording-cylinder in the cylinder-holder the operator shifts the lever m until the recording-stylus is brought into contact therewith, and he talks into the tube in the same way as the phonograph is ordinarily used. If he desires to reproduce the record so made, all that is necessary is to press upon the sliding bar d , which acts by pressure upon the end of the diaphragm-frame to raise the diaphragm from the cylinder, and at the same time through the collar d^5 and arm c^3 of the nut c to disengage said nut from the feeding-screw b , and he slides the frame B backwardly on its supporting or guide arms. He can then, by simply shifting the lever m , bring the reproducing-stylus into contact with the cylinder in the manner above described when the apparatus is ready for reproducing, the shifting of the lever causing the backward movement of the reversing-bar l , which by pressing upon the base of the bar d causes the depression of the rear end of the diaphragm-frame E , raising the forward end thereof and drawing up the recording-stylus, while at the same time, through the inclined forward end of said reversing-bar, the weight g is lowered, thereby lowering the bearing h' of the lever h , and the reproducing-stylus is brought into contact with the recording-cylinder. He can thus shift from recording to reproducing by the movement of said lever and by the opposite movement of the lever shift from reproducing to recording, the movement in such case being, briefly stated, to draw forward the reversing-lever l , so permitting the rear end of the diaphragm-frame to rise and lowering the forward end thereof, so lowering the recording-stylus, and through the incline at the forward end of the reversing-bar pressing on the spring g^3 to raise the weight g and raise the reproducing-stylus away from the recording-cylinder, the weight of the forward end of the diaphragm-frame being supported on the bridge g^5 . The recording and reproducing of the sound is thus accomplished with the single diaphragm through the medium of the lever h , carrying the recording-stylus at one end and the reproducing-stylus at the other, and the necessity for separate diaphragms for this purpose

is entirely overcome, the apparatus being arranged as above described having by practical tests been shown to give as perfect results as could be desired.

For the convenience of the operator—such as where it is desired to read a few lines which have been dictated and recorded—the instrument has very great advantages, as all that is necessary is to depress the lever S , when, through the mechanism above described, the frame will be drawn back as far as is considered desirable, and by shifting the lever m from recording to reproducing the operator can ascertain what was recorded, and as soon as he reaches the end of the record can simply shift the lever m from reproducing to recording and continue his dictation to the instrument.

The instrument is for its purposes simple in construction, overcomes many of the objections to both styles of phonographs now on the market, and practically combines all their advantages and supplies many of the deficiencies in the former machines in points required for practical business use.

I do not claim, broadly, the combination, in a phonograph, with the diaphragm, of a recording-point, and a separate reproducing-point connected therewith and adapted to be brought alternately into operative relation with the same surface, as I am not the first inventor thereof.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a phonograph, the combination, with the recording-surface, of a diaphragm and a pivoted lever below the same and connected thereto and carrying the recording-stylus at one end and the reproducing-stylus at the other end, substantially as and for the purposes set forth.

2. In a phonograph, the combination, with the reproducing-cylinder, of a diaphragm above the same, and a lever pivoted below the diaphragm and having one end connected by a link to the diaphragm and provided with a recording-stylus at the end connected to said link and a reproducing-stylus at the opposite or free end, substantially as and for the purposes set forth.

3. In a phonograph, the combination of a pivoted frame carrying a diaphragm at its forward end and supported at its forward end by a bridge resting upon the recording-cylinder, and a lever pivoted under the diaphragm and having a recording-stylus at one end thereof and that end connected to the diaphragm and a reproducing-stylus at the opposite or free end, substantially as and for the purposes set forth.

4. In a phonograph, the combination of the diaphragm, the weight g , pivoted to the frame thereof and having the bearing h' , and the lever h , pivoted in said bearing and having the recording-stylus at one end thereof and that end connected to the diaphragm and the re-

producing-stylus at the other or free end thereof, substantially as and for the purposes set forth.

5 5. In a phonograph, the combination of the diaphragm, the weight *g*, pivoted to the frame thereof and having the bearing *h'*, the lever *h*, pivoted in said bearing and having the recording-stylus at one end thereof and that end connected to the diaphragm and the re-
10 producing-stylus at the other or free end thereof, and means for holding said weight rigid or permitting the free movement thereof, substantially as and for the purposes set forth.

15 6. In a phonograph, the combination of the diaphragm, the weight *g*, pivoted to the frame thereof and having the bearing *h'*, the lever *h*, pivoted in said bearing and having the recording-stylus at one end thereof and that end connected to the diaphragm and the re-
20 producing-stylus at the other or free end thereof, and the spring *g*³ and sliding bar *l*, having an inclined forward end engaging with said spring, substantially as and for the purposes set forth.

25 7. In a phonograph, the combination of the diaphragm-frame carrying the weight *g*, provided with the bridge *g*⁵ and having the bearing *h'*, and the lever *h*, pivoted in said bearing and connected at one end to the diaphragm and
30 having the recording-stylus at that end and having the reproducing-stylus at the opposite or free end, substantially as and for the purposes set forth.

35 8. In a phonograph, the combination, with the pivoted lever *h*, connected to the diaphragm and having the reproducing-stylus at its free end, of the sliding bar *l*, having a notch *h'* to receive the reproducing-stylus when not in
40 use, substantially as and for the purposes set forth.

9. In a phonograph, the combination of the frame B, the frame E, pivoted therein, and the sliding bar on the frame E, adapted to en-
45 gage with the frame B and to press down the rear end of the diaphragm-frame E and so raise the diaphragm, substantially as and for the purposes set forth.

50 10. In a phonograph, the combination of the frame E, pivoted in the frame B, the reversing-lever *m*, and the sliding reversing-bar *l*, engaging at its forward end with the lever and having the inclined face *l*² to engage with the frame B and so depress the rear end of the
55 diaphragm-frame, substantially as and for the purposes set forth.

60 11. In a phonograph, the combination of the frame E, carrying the diaphragm at its forward end, the weight *g*, pivoted to the diaphragm-frame, and the reversing-bar *l*, having the inclined face *l*², acting to raise the weight *g*, substantially as and for the purposes set forth.

12. In a phonograph, the combination of the

pivoted diaphragm-frame E, the sliding re- 65 versing-bar *l*, having seat *e*⁴ therein, and the spring-clip *p*, engaging with said seat *e*⁴, substantially as and for the purposes set forth.

13. In a phonograph, the combination of a diaphragm-frame carrying thereon an indi- 70 cating-plate, and a reversing-lever provided with a plate extending over said indicating-plate and acting in its movement to cover part thereof and expose part thereof, and the re-
75 versing-bar *l*, operated by said lever, substantially as and for the purposes set forth.

14. In a phonograph, the combination of the feeding-screw *b*, the nut *c*, engaging therewith and having the arm *c*³, and the frame B, hav- 80 ing the sliding bar *d*, provided with a collar *d*⁵, engaging with said arm *c*³, substantially as and for the purposes set forth.

15. In a phonograph, the combination of the frame B, carrying the sliding bar *d*, having an inclined lower end, and the diaphragm-frame 85 E, pivoted in the frame B and carrying the sliding reversing-bar *l*, having the inclined rear end *l*², substantially as and for the purposes set forth.

16. In a phonograph-machine, the combi- 90 nation of the receding screw *r*, the frame B, and the lever S, pivoted therein and having the arm *s*³ rigid therewith and carrying the sectional nut *s*, engaging with said receding screw *r*, substantially as and for the purposes 95 set forth.

17. In a phonograph, the combination of the feeding-screw *b* and its nut *c*, engaging there- 100 with, the receding screw *r*, the frame B, and the lever S, pivoted therein and having an arm *s*², carrying the nut *s* and carrying the finger-bar *t*, engaging with and acting to withdraw the nut *c* when the nut *s* is thrown into en-
105 gagement with the screw-bar *r*, substantially as and for the purposes set forth.

18. In a phonograph, the combination of the receding screw *r*, the frame B, carrying the sliding bar *d*, engaging at its base with the dia- 110 phragm-frame, and the lever S, pivoted in the frame B and having the arm *s*², carrying the nut *s*, engaging with the screw-bar *r* and having the finger-bar *t*, provided with the finger engaging with the collar *d*⁵ on said sliding bar *d*, substantially as and for the purposes 115 set forth.

19. In a phonograph, the combination of the machine-frame A, having the shaft *a*⁴, the frame B, and the diaphragm-frame E, pivoted in the frame B and carrying the spring *e*¹, en- 120 gaging with said shaft *a*⁴, substantially as and for the purposes set forth.

In testimony whereof I, the said LOUIS S. CLARKE, have hereunto set my hand.

LOUIS S. CLARKE.

Witnesses:

J. N. COOKE,

ROBT. D. TOTTEN.