

No. 682,424.

Patented Sept. 10, 1901.

J. B. POWELL.

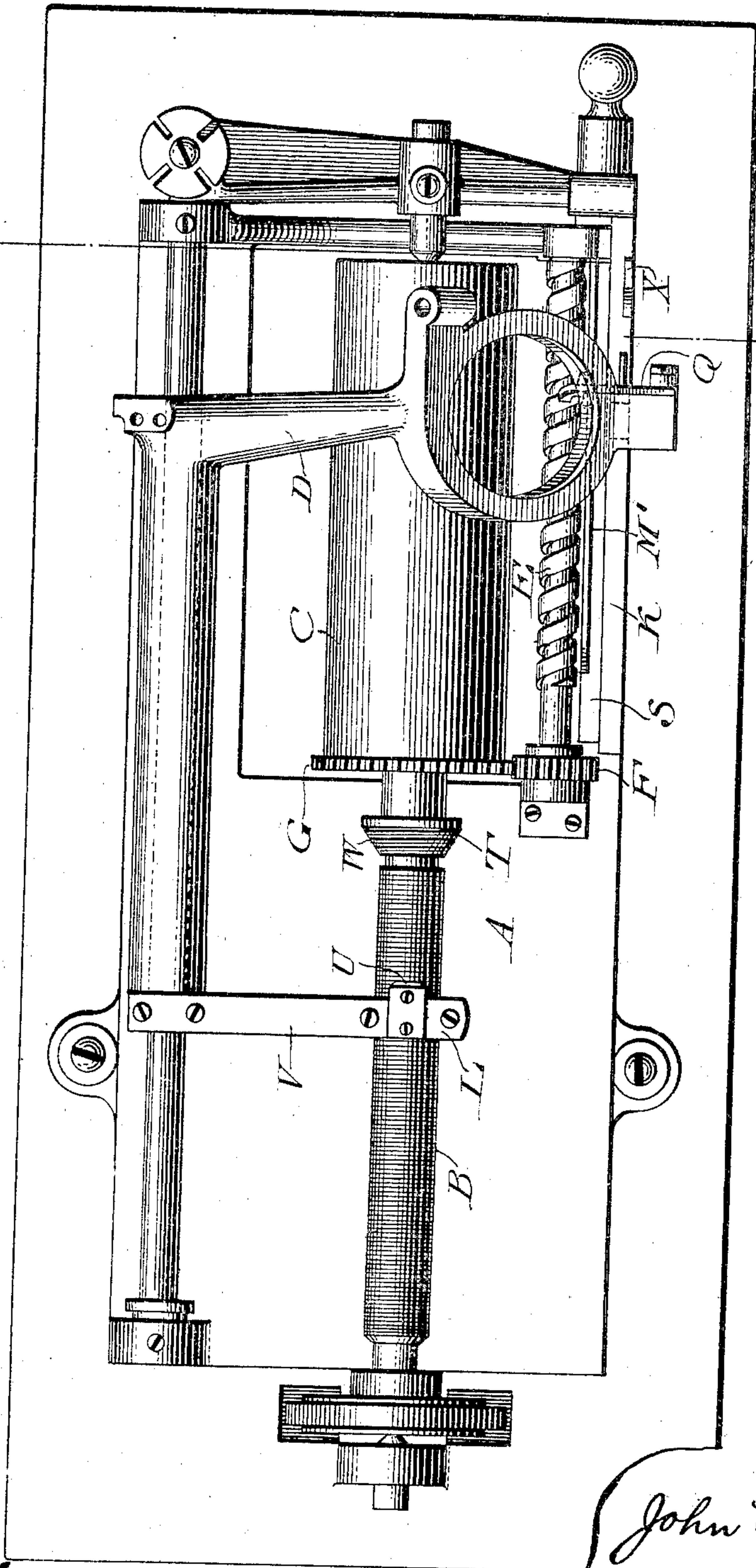
REPEATING MECHANISM FOR PHONOGRAPHS.

(Application filed Jan. 23, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.



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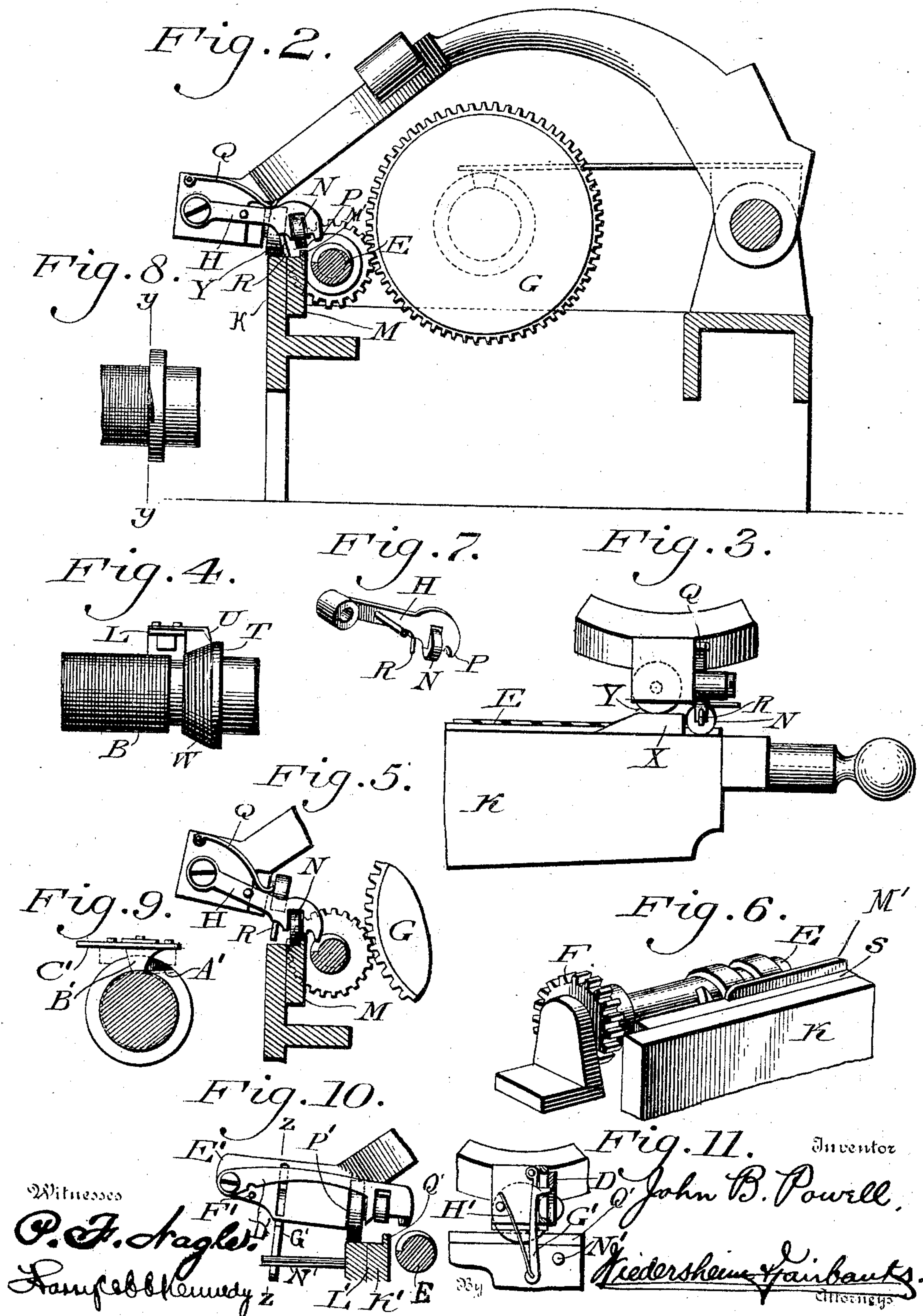
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2 Sheets—Sheet 2.



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# UNITED STATES PATENT OFFICE.

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## REPEATING MECHANISM FOR PHONOGRAPHS.

SPECIFICATION forming part of Letters Patent No. 682,424, dated September 10, 1901.

Application filed January 23, 1901. Serial No: 44,357. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN B. POWELL, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Repeating Mechanism for Phonographs, which improvement is fully set forth in the following specification and accompanying drawings.

My invention consists of a repeating mechanism for phonographs, as will be hereinafter fully described and claimed.

Figure 1 represents a top plan of a phonograph provided with my invention. Fig. 2 represents a vertical transverse section taken on the line *xx* of Fig. 1 and illustrating the parts in the position they assume when a record is being reproduced. Fig. 3 represents a fragmentary front elevation showing the reproducer-arm at the end of its movement just before being reversed and returned by the repeating mechanism. Fig. 4 represents a side elevation of a portion of the feed-shaft and a portion of the arm controlling the reproducer-arm when the latter is about to be reversed and returned to the beginning of the record. Fig. 5 represents a fragmentary vertical transverse section showing the free end of the reproducer-arm and adjacent parts in corresponding position. Fig. 6 represents a perspective view of a portion of the repeating mechanism adjacent the forward end of the record-cylinder. Fig. 7 represents a perspective view of the dog controlling the repeating mechanism. Fig. 8 represents a top plan of another form of device for lifting the reproducer-arm when the reproducer reaches the end of the record. Fig. 9 represents a sectional view of the same, taken on line *yy* of Fig. 8, showing the feed device of the reproducer-carriage in elevation. Fig. 10 represents a fragmentary side elevation of the end portion of the reproducer-arm and adjacent parts and showing a dog of modified construction. Fig. 11 represents a section thereof on the line *zz*.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, A designates the bed or frame, B the feed-shaft, C the record-cylinder, and D the reproducer-arm, of a phonograph of familiar construction.

Mounted in bearings upon the bed A, just in front of the cylinder C, is a screw-shaft E, preferably a right-hand screw, that rotates 55 oppositely to the feed-shaft B and cylinder C. The screw-shaft E is geared to the feed-shaft B, preferably by means of a pinion F upon the shaft E and a gear-wheel G, fastened upon the end of the cylinder C. The 60 said screw-shaft E serves to carry the reproducer-arm D from the end to the beginning of the record, this operation being controlled by a dog H upon the arm D, that is automatically thrown into and out of engagement 65 with the screw-shaft E. When the reproducer-arm D is being fed by the feed-shaft to reproduce the record, the operation of the phonograph is as usual, but parallel with the rail K, upon which the free end of the arm 70 D rests in the ordinary operation of the machine when the feed-nut L engages the feed-shaft B, and rising from a plate M is a guide-rail or ledge-flange M', against which a projection of the dog H is adapted to abut, said 75 projection N consisting of an antifriction-roller. The nose P of the dog H engages the screw-shaft E when the roller engages the rail or flange M'. The said dog is pivoted upon the arm D and is depressed by a spring Q, and 80 when the arm D is feeding forward said dog H rests upon the rail K to hold its nose disengaged from the screw-shaft E and against the tension of the spring Q, as shown in Fig. 2, the weight of the arm D and the projection R 85 upon the dog H serving two purposes. The guide-rail M' terminates near the beginning of the record or at the point where it is designed to arrest the return movement of the arm D, although the screw-shaft E extends 90 beyond this end of said rail M' to carry the dog H beyond the end thereof to withdraw it from engagement with the screw-shaft E. To cause the dog H to engage the screw-shaft E when the reproducer reaches the end of the 95 record, the arm D is raised slightly to allow the spring Q to depress the dog to cause the projection or antifriction-roller N to engage the side of the rail M and the nose P to engage the screw-shaft. One construction for 100 carrying out this operation consists in providing the gear-shaft B at its end adjacent the cylinder C with an enlarged portion or cam T, that is engaged by a finger U upon



the arm V, carrying the feed-nut L. The particular form of cam above shown consists of a cone or flaring portion at the end of the shaft B, in which is the groove or thread W to be engaged by the finger U, the pitch of said threads W being much greater than those of the feed-screw, so that the reproducer-arm D is quickly raised to disengage the feed-nut L and feed-shaft B and to permit the dog H to be depressed into engagement with the screw-shaft E. To relieve the arm V and finger U of the entire strain of lifting the reproducer-arm, the rail K is provided with an inclined portion or cam X in the path of the usual roller Y of the reproducer-arm D, that travels upon said rail K and which supports said arm D when the record is being reproduced. The inclination of said cam X is the same as the cam T, and it is located so that the roller Y of the reproducer begins to ride the same as the finger rides the cam T, whereby the heaviest part of said reproducer-arm rests positively upon said cam Y.

The operation is as follows: When the record is being reproduced, the arm D travels in the usual manner, and none of the parts of my invention are active except the pin or projection R, that travels upon the rail K to hold the dog elevated and disengaged from the screw-shaft E, the parts then being in the position shown in Fig. 3. When the reproducer reaches the end of the record, the roller-finger U engages the cam T and the roller Y rides upon the cam X, thus lifting the arm D slightly, but sufficiently to allow the spring Q to depress the dog H to the position shown in Fig. 4. This forces the roller N against the rail M' and the nose P into engagement with the screw-shaft. The arm D is now supported in this position by the roller N, which bears upon the rail M' and the top of plate, and thus sustains the weight of the arm D. The screw-shaft by engagement with the nose P now moves the arm D in the opposite direction until the roller N arrives at the end of the rail M', and being then unsupported the weight of the arm D moves the parts to the position shown in Fig. 2, the pin or projection R contacting with the top of the rail K to hold the nose P clear of the screw-shaft E. When the arm D thus descends, the roller Y again comes in contact with the rail K and the feed-nut L engages the feed-screw B and the reproducer-arm is again fed forward, as shown in Fig. 2.

In Figs. 8 and 9 I have shown a modification in the mechanism for lifting the reproducer-arm when the reproducer reaches the end of the record and which consists practically of a different form of cam from that shown in Fig. 4. In the latter the pitch of the groove or threads W is considerably greater than the pitch of the threads of the feed-shaft B, and in Figs. 8 and 9 the cam A' is abrupt, and when the finger B' of the arm C' engages the same said arm is lifted quickly and in less than a quarter of a rev-

olution of the shaft B in the particular embodiment shown. When using the form of cam shown in Figs. 8 and 9, and when the reproducer-arm is lifted quickly, the cam at the end of the rail K is usually dispensed with.

In Figs. 10 and 11 I have shown another form of dog that engages a screw-shaft E to return the reproducer-arm and its carriage to the beginning of the record. This construction differs from that heretofore described in that it is not operated by reason of the elevation of the reproducer-arm. In Figs. 10 and 11 the dog D' is pivoted upon the end of the reproducer-arm E', a stop-pin F' being employed to limit this downward movement. A catch G' is pivoted upon the end of the arm E', it being provided with a spring H' to hold said catch G' normally in engagement with the bottom of the dog, as shown, to hold the nose thereof out of engagement with the screw-shaft E and its roller above the guide-rail L' and the raised guide rail or flange Q' on the plate K'. A pin N' upon the frame of the machine is situated in the path of the catch G' to engage the same and disengage said catch from the dog D' at the moment that the reproducer-arm is lifted, it being understood that this form of dog can be used in connection with the lifting mechanism shown in Fig. 4 or 8 equally as well. It will thus be seen that when the reproducer reaches the end of the record the arm is lifted and the dog is released by independent mechanism, although both will depend upon the movement of the reproducer-arm and its carriage. It will be evident that when the dog descends its nose engages the screw-shaft E and its roller engages the guide-rail Q'. The reproducer-arm and carriage are thus returned in the manner above described until the end of said guide-rail Q L' is reached, whereupon the reproducer-arm again descends upon its roller P', which lifts the dog D', so that it is engaged by the catch and held in the position shown in Fig. 10.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a phonograph, of a screw-shaft geared to the driving mechanism thereof, a dog carried by the reproducer-arm of said phonograph adapted to engage said screw-shaft, means for lifting said reproducer-arm and means for moving said dog into engagement with the screw-shaft when the reproducer-arm reaches one limit of its movement, means independent of the means for lifting said reproducer-arm for supporting the same in its raised position, said supporting means terminating near the other limit of movement of the reproducer-arm, whereby the reproducer-arm is lowered, and means for disengaging said dog and screw-shaft when the reproducer-arm is lowered.

2. In a phonograph, a reproducer-arm provided with a dog, a screw-shaft geared to the driving mechanism of the phonograph and adapted to be engaged by said dog to return



the reproducer-arm to the beginning of the record, means independent of said dog for lifting said reproducer-arm and means for moving said dog into engagement with said screw-shaft, when the reproducer-arm reaches one limit of its movement, said dog being provided with means for engaging a portion of the frame of the machine to support said reproducer-arm in elevated position when the dog engages the screw-shaft, said reproducer-arm being lowered at the other limit of its movement when the dog reaches the end of and becomes disengaged from said portion of the frame of the machine and means for disengaging said dog and screw-shaft when the reproducer-arm is lowered.

3. In a phonograph, a feed-shaft, a record-cylinder, a reproducer-arm and its carriage, a screw-shaft geared to the driving mechanism of the phonograph, a dog carried by said reproducer-arm and adapted to engage and be disengaged from said screw-shaft, a cam independent of said dog to engage a portion of the reproducer-carriage when the reproducer reaches the end of its movement to lift said reproducer-arm, means for moving said dog into engagement with said screw-shaft when said reproducer-arm is lifted, said dog engaging a portion of the frame of the machine when the reproducer-arm is lifted to support said arm in said elevated position, said reproducer-arm being lowered at the other limit of its movement when the dog reaches the end of and becomes disengaged from said portion of the frame of the machine and means for disengaging said dog and screw-shaft when the reproducer-arm is lowered.

4. In a phonograph, a feed-shaft provided with a cam, a screw-shaft geared to said feed-shaft, a reproducer-carriage having an arm provided with a finger to engage said cam and adapted to lift the reproducer-arm of said carriage when the latter reaches one limit of its movement, a dog carried by said carriage and adapted to engage said screw-shaft when the reproducer-arm is lifted, said dog engaging a portion of the frame of the machine when the carriage is being fed by the feed-shaft to hold said dog disengaged from said screw-shaft, means for throwing said dog into engagement with said screw-shaft when the reproducer-arm is lifted, said dog engaging a portion of the frame of the machine when the reproducer-arm is lifted to support the reproducer-arm in its raised position, said reproducer-arm being lowered at the other limit of its movement when the dog reaches the end of and becomes disengaged from said portion of the machine, whereby the reproducer-arm can be fed by the feed-shaft and means for disengaging said dog and screw-shaft when the reproducer-arm is lowered.

5. In a phonograph, a feed device provided with a gear, a screw-shaft having a pinion meshing with said gear, a cam upon said feed-shaft, a finger upon the arm of the reproducer-carriage to engage said mechanism, a dog

upon said reproducer-arm adapted to engage said screw-shaft when the reproducer-arm is lifted at one limit of its movement, means for supporting said reproducer-arm in raised position, said supporting means terminating near the other limit of movement of the reproducer-arm, whereby the latter is lowered, and means for disengaging said dog and screw-shaft when the reproducer-arm is lowered.

6. In a phonograph, a feed-shaft, a reproducer-arm, a feed-arm therefor, said reproducer-arm and said feed-arm being adapted to be raised and lowered to disengage and engage the feed-arm and feed-shaft, said feed-shaft serving to feed the reproducer-arm in one direction, a screw-shaft geared to said feed-shaft and adapted to feed in the opposite direction, a guide-rail extending a portion of the length of said screw-shaft, means for lifting the reproducer-arm at one limit of its movement to disengage said feed-arm and shaft; a spring-depressed dog on said reproducer-arm provided with a roller to engage said guide-rail when the reproducer-arm is lifted, and to hold it elevated, a nose on said dog to engage the screw-shaft when the reproducer-arm is lifted, whereby the latter is fed in the opposite direction, said reproducer-arm being lowered at the other limit of its movement when the roller reaches the end of and becomes disengaged from the guide-rail, whereby the feed-arm engages the feed-shaft, and said dog engaging a stationary portion of the machine when the reproducer-arm is lowered and serving to hold the nose disengaged from said screw-shaft, and the roller disengaging from said guide-rail.

7. In a phonograph, a feed-shaft for moving the reproducer-arm in one direction, a screw-shaft having threads of a different pitch for moving the arm in the opposite direction, means for raising said reproducer-arm at one limit of its movement, and means for connecting it with the screw-shaft, and means for supporting said reproducer-arm in its raised position, said means being independent of the means for lifting the same, and terminating near the other limit of movement of the reproducer-arm whereby the latter is lowered and connected with the feed-shaft.

8. In a phonograph, a feed-shaft provided with means for elevating the feed-nut to move the same from engagement therewith, a stationary cam situated in the path of the reproducer-arm to elevate the same when the feed-nut is disengaged from the feed-shaft, and means for moving the said reproducer-arm in the opposite direction to that in which it is moved by said feed-shaft.

9. In a phonograph, a guide-rail, a reproducer-arm having a dog provided with a projection to engage said guide-rail and to support said reproducer-arm in an elevated position, said projection bearing against the side of said guide-rail, a feed device for moving



said reproducer-arm in one direction, a screw-shaft for moving the same in the opposite direction, means for lifting said arm at one limit of its movement to allow said projection to engage said guide-rail and said dog to engage said screw-shaft when the reproducer-arm is lifted, and a rail upon which said arm rests when the projection of the dog passes beyond the end of the guide-rail and allows said arm to descend.

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