

F. F. MURDOCK.
 SPEED CHANGING MECHANISM FOR GRAPHOPHONES.
 APPLICATION FILED JAN. 25, 1909.

937,459.

Patented Oct. 19, 1909.

2 SHEETS—SHEET 1.

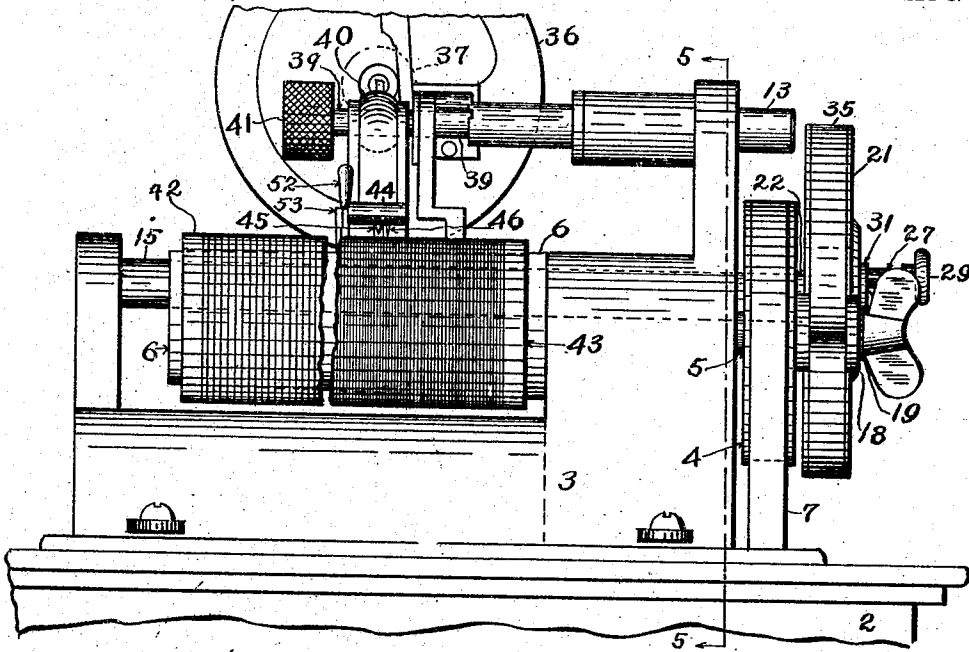


Fig. 1.

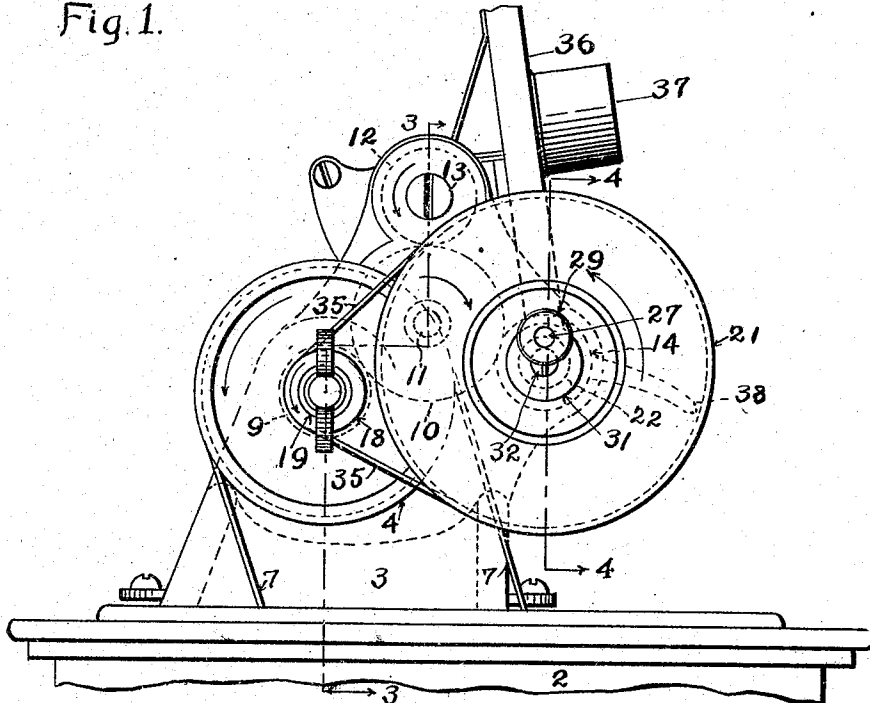


Fig. 2.

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2 SHEETS—SHEET 2.

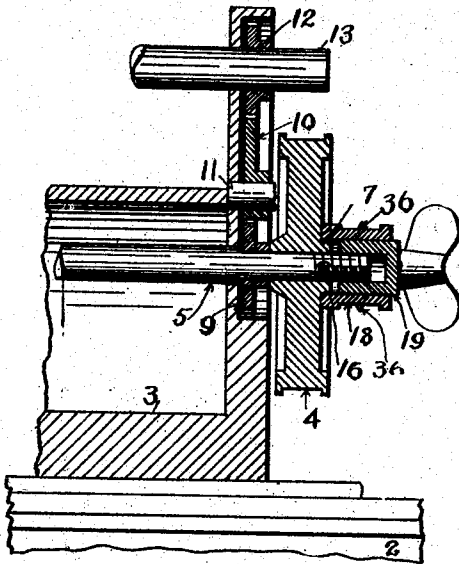


Fig. 3.

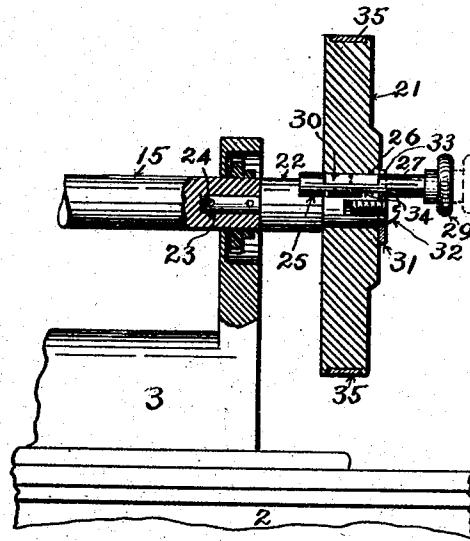


Fig. 4.

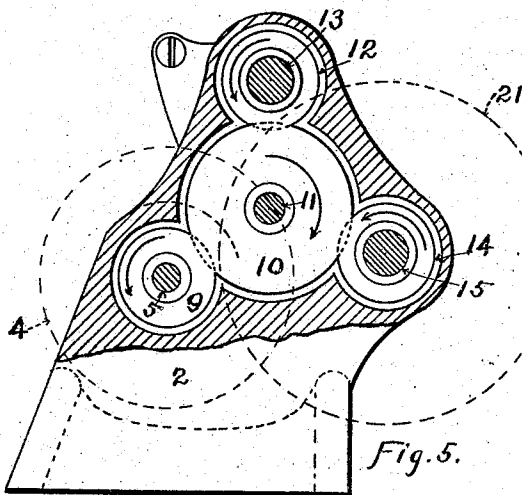


Fig. 5.

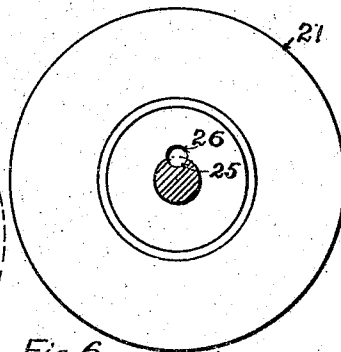


Fig. 6.

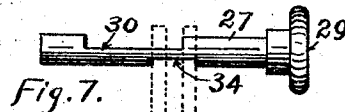


Fig. 7.

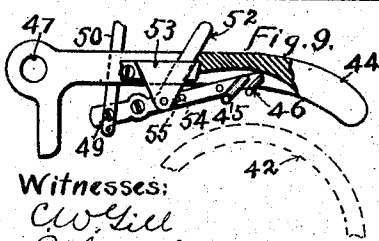


Fig. 9.

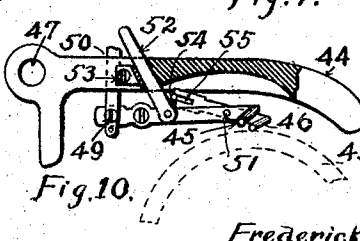


Fig. 10.

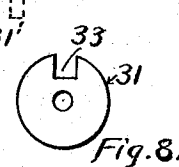


Fig. 8.

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UNITED STATES PATENT OFFICE.

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SPEED-CHANGING MECHANISM FOR GRAPHOPHONES.

937,459.

Specification of Letters Patent.

Patented Oct. 19, 1909.

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To all whom it may concern:

Be it known that I, FREDERICK F. MURDOCK, a citizen of the United States, residing at Syracuse, in the county of Onondaga and State of New York; have invented certain new and useful Improvements in Speed-Changing Mechanism for Graphophones, of which the following is a specification.

This invention relates to improvements in speed changing mechanism for graphophones, and has for its object to provide an additional attachment or mechanism, by means of which both the old and the new machines may be readily adapted to play what is commonly called the standard two minute record, and also a new four minute record which has but recently been produced.

Heretofore the Columbia, Edison and other talking machines have been constructed and geared to play the standard two minute cylindrical records. These records are all about the same length, and have a certain threading, and the driving and feed mechanisms are arranged to rotate the record, and carry the reproducing parts along and play each record in about two minutes. Most of the machines in existence at the present time, so far as known, are built and geared for playing the two minute records. The records produced by the different manufacturers being, for the most part, threaded the same, are interchangeable. Recently a new record has been brought out for use on the phonographs, and this record is more compact, and more finely threaded, and requires four or five minutes to play the same, which is about double the length and time required to play the old record. Owing to the fineness of the threading, the long records cannot be reproduced by the mechanisms which are constructed to play the shorter and coarser records.

It is a particular object of this invention to provide the necessary attachments or parts, by means of which the speed of the old reproducing mechanism may be properly reduced, and the feeding of said parts readjusted, so as to adapt the graphophones for playing the new style of record, the same as the other makes of talking machines are able to do.

The present invention consists of a reduction gearing comprising a large and a small pulley, which are operatively connected by a belt, the smaller pulley being mounted on the old record driving pulley; the larger

pulley being mounted upon the shaft which carries the sound box and other reproducing parts.

The invention further consists of a simple clutch mechanism and cooperating parts, by means of which the machine may be adjusted and set in a ready manner for playing either the long or the short records without requiring any alteration of the machine.

The invention further consists of adjustably arranging two reproducing needles, one coarse and the other fine, by means of which either of the said records may be played without requiring the removal or replacing of the needles or any of the reproducing parts.

The invention further consists of the features and combinations of parts set forth in the detail description which follows, reference being had to the accompanying drawings which form a part of this specification, and in which—

Figure 1 is a side elevation of a graphophone, showing the disposition and arrangement of the principal parts of my improvement; also showing portions of the old and the new records. Fig. 2 is a front end elevation of the machine. Fig. 3 is a sectional view substantially on line 3—3 of Fig. 2. Fig. 4 is a sectional view substantially on line 4—4 of Fig. 2. Fig. 5 is a sectional view substantially on line 5—5 of Fig. 1. Fig. 6 is a detail view of the large auxiliary pulley. Fig. 7 is an enlarged view of the clutch key. Fig. 8 is an enlarged detail view of the plate which holds the large pulley in place and also cooperates with the clutch key. Fig. 9 is an enlarged detail view of the needle support, showing the coarse and fine needles pivotally connected, and disposed in rest position. Fig. 10 is a similar view, showing the fine needle in engagement with the new record, the same being shifted and held in such position by the reversing of the operating lever.

In the accompanying drawings, 2 represents the case or box in which a spring motor or other mechanism for driving a graphophone is disposed.

3 represents the body of the machine which is mounted on the top of the case or box 2.

4 represents a pulley mounted upon a shaft 5, the latter being journaled in the body 3, on the opposite end of which is

mounted a tapering cylinder 6 which carries the records. Pulley 4 is driven by a belt 7 which passes downwardly into the case and connects with the motor or other source of power. In a cavity in the front of body 2 is disposed a spur gear 9, which is also mounted on the shaft 5, and meshes with the idler gear 10 mounted on a shaft 11 supported by the body 2. Gear 10 meshes with a third gear 12 which is mounted upon what is called the "amber" shaft 13; the latter shaft being extensible, as shown in Fig. 1, the inner end supporting certain of the reproducing parts. The idler gear 10 also meshes with a fourth gear 14 which is mounted upon a feed shaft 15, which supports and carries the sound box, needles, horn and other parts.

On all of the old graphophones, so far as known to me, the outer end of shaft 5 is threaded and projects beyond the record pulley 4, to which a nut (not shown) is applied and employed for holding the inner hub of pulley 4 tightly against gear 9, and by this means the said gear is rotated with said pulley and shaft. In the old machines the nut referred to, is always maintained in its tightened position, except when the machine is being taken apart. In the present invention the old nut referred to is removed from shaft 5 and other parts substituted, which will now be described. A sleeve pulley 18 is rigidly secured to the hub 17 of pulley 4 by a pin 16; which latter also secures the pulley 4 to shaft 5. Pulley 18 is bored out to uniform diameter to receive the body of a cylindrical thumb-nut 19, which in turn is bored out and internally threaded for engagement with the threaded end of shaft 5. Under this construction the nut 19 may be screwed inwardly, at the will of the operator, for forcing pulley 4 against the gear 9, for the purpose of driving said gear and the several other gears connected therewith, and thereby effect the driving and feeding of the machine for playing the old two minute record. When nut 19 is screwed in tight, the machine will operate normally as heretofore. When thumb-nut 19 is unscrewed away from the hub of pulley 4 (see Fig. 3), the tension between pulley 4 and gear 9 is relaxed sufficiently to allow shaft 5 to turn freely in said gear. Under this arrangement gears 9, 10, 12 and 14 will remain stationary, unless otherwise driven, while pulley 4 and shaft 5 may be rotated independently by the belt 7.

To further carry out the object of the present invention, I provide a large pulley 21 which is mounted upon an extension 22 of the shaft 15. The extension 22 is connected to shaft 15 by means of a tennon 23 and a pin 24. The outer end of the extension 22 is slightly reduced to form a journal to receive pulley 21. At one side of the

journal of shaft 22, a semi-circular slot or groove 25 is cut, which extends inwardly a short distance beyond the inner face of pulley 21. At one side of the bore of pulley 21 a similar slot 26 is formed, and these two slots when brought into register form a circular key-way or opening to receive an adjustable clutch pin or key 27, which is provided at its outer end with a handle or knob 29. Key 27 is notched or cut-away at 30, and this notch has a length equal to the thickness of pulley 21, and a depth substantially one-half the diameter of the key. Under this construction when clutch key 27 is disposed, as shown in full lines in Fig. 4, pulley 21 may be rotated on shaft 22 as an idler. When, however, key 27 is drawn outwardly to the position shown by dotted lines in Fig. 4, the inner end of the key will be drawn into the pulley, and owing to the arrangement of the ways or grooves 25 and 26, key 27 will then affect the driving of shaft 15-22 when pulley 21 is operated. Pulley 21 is held in place by a cap or plate 31 which is perforated centrally to receive a screw 32, which is threaded into the end of shaft 22. Cap 31 is notched at one side, as at 33, to receive the clutch key 27.

34 represents a notch cut in the under side of key 27, which is employed in connection with cap 31 for limiting the longitudinal movement of the key, as shown in Figs. 4 and 7. The bottom of the notch in plate 31 being cut at right angles to its sides, and the underside of key 27 being rendered flat by the notch 34, serves to prevent the key from being rotated, and limits the same to longitudinal movement only, to the extent of the length of notch 34. Under this arrangement the clutch key is normally held, with relation to the pulley 21, in the positions shown in Fig. 4. Pulley 21 is driven by a belt 35 which connects said pulley with the small pulley 18. Pulley 18 having a much smaller diameter as compared with pulley 21, a series of pointed spikes are placed at intervals in the circumference of the small pulley, in order to prevent the belt from slipping. By this latter provision pulley 21 will be rotated in a positive manner, and through its connection with pulley 18, the large pulley will always be driven in the same direction as the old pulley 4 as indicated by the darts in Fig. 2. This construction is necessary in order that the record operating and the feed mechanism for the reproducing parts may be operated in the same direction at all times as heretofore, whether the old two minute records with their coarse threading which requires rapid feeding be played, or whether the four minute records with their finer threading and which require slower feeding are being played.

36 represents the usual sound box, which

is provided with a rearwardly extending hub 37 to which the horn (not shown) may be attached. The sound box is mounted upon the shaft 15, and is carried along on said shaft when the machine is in operation and playing by the well known mechanism. The sound box is adjustable by hand in either direction along said shaft by means of a lever 38.

39 represents an extension of the shaft 12 which supports an amber wheel 40 forming a part of the reproducing parts, and its outer end is fitted with an adjustable weight 41.

42 illustrates a portion of an old two minute record mounted in operative position upon the cylinder 6 and having a coarse or rapid threading, as shown in Fig. 1.

43 illustrates a part of the new four minute record referred to, also mounted upon cylinder 6, upon which is shown a fine or slow threading, as compared with the old record 42. In practice the record 43 is provided with about double the number of threads as the old record.

44 represents an adjustable support for the reproducing needles 45 and 46. The part 44 is pivotally mounted in the machine by means of a perforation 47 formed in its rear end. Needle 45 is the coarser of the two, and is the same as employed on the old style graphophones for playing the two minute record. This needle is provided with a long shank which is pivoted at 49 to a bar 50, the upper end of which engages the amber wheel in the usual manner. Needle 46 is finer than the old needle, and is constructed expressly for the more finely threaded four minute record. The needles for the different sized records cannot be used interchangeably. Needle 46 is pivotally joined to the side of needle 45 at 51, and is capable of being tilted to different positions, as shown in Figs. 9 and 10 by means of a lever 52, which is pivoted to a hanger 53 mounted on the edge of support 44. Lever 52 is provided with a crank-like rod 54, the inner end of which engages a slot 55 formed in the inner end of needle 46. The arrangement of the lever and its crank are such that when the lever is thrown forward the two needles are brought together in line with each other, as shown in Fig. 9, at which time the coarse needle 45 may be lowered so as to engage the old record 42, and at the same time the finer needle 46 will be held out of engagement with said record. When new record 43 is to be played, the operator should reverse lever 52 to the position shown in Fig. 10, at which time crank 54 will tilt needle 46 and throw its point downwardly below the point of needle 45, in position to engage the finely threaded record 43, as shown in Figs. 1 and 10. Under this construction and arrangement either the long or short record may be played, and the

needles may be adjusted in a moment's time by simply shifting lever 52 as described.

To operate a graphophone having my improvement applied, for the purpose of playing the new long record, the operator should first unscrew thumb-nut 19, so as to break the driving connection between pulley 4 and gear 9. By this means the belt 7 which communicates the power from the motor to pulley 4 for driving the entire machine through the several gears, will operate only pulley 4 and shaft 5 directly. The operator should next pull out the clutch key to the position shown by dotted lines in Fig. 4, so as to connect pulley 21 to shaft 22 for driving the same, through belt 35, and sleeve pulley 18, which is carried by the pulley 4. Under this arrangement and adjustment pulley 21, through its connection with shaft 15 and gear 14, becomes the direct driver for gear 14 and also for the other gears, instead of pulley 4 and gear 9. In order to properly operate the machine for playing the finely threaded four minute record, the speed of the record as well as that of the reproducing parts must be reduced approximately one-half, because the threading of the new record is about twice as fine as the old record. The slowing up of the record and the feed driving mechanism is accomplished by the relative difference between the diameters of the pulleys 18 and 21. To change a machine back to the condition for playing the old two minute record, which requires the same speed for the record but double the speed for the reproducing parts, the operator should shift the clutch key to the position shown by full lines in Fig. 4, and then screw in thumb-nut 19 until it forces and holds pulley 4 tightly against gear 9. Under this adjustment, pulley 4 becomes the driver again for all of the gears, and pulley 21 rotates idly upon shaft 22.

It will be seen from the foregoing description when read in connection with the drawings, that my speed changing mechanism may be readily applied to the Columbia graphophones as they are constructed and operated at the present time, as well as to new machines of the class, and that the new attachment, while rendering the machine more valuable and serviceable, in no way interferes with the carrying out of the original and popular functions of the devices.

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

1. The combination with a graphophone having a record supporting and operating mechanism and a mechanism for feeding the reproducing parts, the said mechanisms being geared for playing the small standard "Columbia" and "Edison" records, of a reduction gearing comprising a small and a large pulley connected with the record and

the reproducing mechanisms respectively, the said pulleys capable of adapting said machine for playing a long record, the difference in the diameters of said pulleys being sufficient to reduce the speed of the reproducing mechanism, while the long record is being played, while the speed of the record operating mechanism remains normal, a belt to connect said pulleys, a clutch carried by one of said pulleys adapted for making or breaking the operative connection between said pulley and said feeding mechanism, and means cooperating with said clutch for adjusting the speed of the said mechanisms for playing either a long or a standard record.

2. The combination with a graphophone geared for playing so-called standard two minute records, of a reduction gearing operatively connected with said machine, comprising a pair of pulleys of unequal diameters, capable of adapting said machine for playing four minute records, the difference in the diameters of said pulleys being sufficient to reduce the speed of the feed mechanism for the reproducing parts of said machine approximately fifty per cent., while the speed of the record driving mechanism remains normal, a belt to connect said pulleys, a clutch-key carried by one of said pulleys adapted for controlling the operative connection between said pulley and the feeding mechanism, and a thumb-nut disposed in the smaller pulley adapted to cooperate with said clutch-key for increasing or diminishing the speed of said feeding mechanism.

3. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing needle and a feed mechanism therefor, the said mechanisms being normally geared for playing the standard "two minute" records, of a pair of pulleys of unequal size, one carried by said record operating mechanism, the other carried by said feed mechanism, the relative difference in the size of said pulleys being sufficient to effect the reducing of the speed of travel of the needle approximately one-half, thereby to adapt said machine for playing a four minute record, a belt to operatively connect said pulleys, a train of gears to connect the said mechanisms, means for driving said train of gears directly by the power which operates the record, and means for driving said train of gears indirectly through said pulleys and said belt, for playing the four minute record.

4. In a graphophone, the combination with a record and an operating mechanism therefor, and a reproducing needle and a feed mechanism therefor, the said mechanism being normally geared for playing standard "two minute" records, of a pair of pulleys of unequal size, one carried by

said record operating mechanism, the other carried by said feed mechanism, the relative difference in the size of said pulleys being sufficient to reduce the speed of travel of the needle approximately one-half, thereby to adapt said machine for playing a four minute record, a belt to operatively connect said pulleys, a clutch key carried by one of said pulleys and a nut carried by said record operating mechanism, adapted for reversing the driving and thereby changing the speed of said feed mechanism for playing records of different length.

5. A speed changing gearing for graphophones, comprising a pair of pulleys of unequal size, one of said pulleys carried by the record operating parts of the machine, the other pulley carried by the reproducing parts of the machine, the said pulleys being arranged so that the smaller drives the larger pulley, thereby to reduce the normal speed of the reproducing parts, a belt to operatively connect said pulleys, a clutch to control the operative connection between the large pulley and the reproducing parts, and means cooperating with said clutch for changing the speed of the reproducing parts from normal to a lower speed and vice versa.

6. A speed changing attachment for graphophones, comprising a pair of pulleys of unequal diameter operatively connected by a belt, one of said pulleys carried by the record operating parts, the other pulley carried by the reproducing parts of the machine, the said pulleys being arranged so that the smaller drives the larger thereby to reduce the normal speed of the reproducing parts, a clutch carried by the larger pulley adapted to control the operative connection between said pulley and the reproducing parts, and means for changing the speed of the reproducing parts from normal to a lower speed and vice versa.

7. A graphophone having a shaft adapted for carrying records of different length, and a shaft for carrying and feeding the reproducing parts, and having a train of gears connecting the said shafts, one of said gears mounted loosely on the record shaft, and one of said gears mounted rigidly on the feeding shaft, an extension rigidly mounted on one end of said feeding shaft, a pulley for driving said record shaft, a source of power, a belt connecting said source of power with said record pulley, a reduction gearing comprising a small pulley rigidly secured to said record pulley, and a large pulley journaled on the extension of said feeding shaft, a nut mounted on the end of said record shaft adapted for frictionally connecting said record pulley with the gear carried by said shaft, for the purpose of driving said train of gears at a given speed when the machine

is playing a short record, the said nut also adapted for breaking the driving connection between said record pulley and said train of gears, and a clutch key carried by the extension of said feeding shaft, adapted for rigidly connecting said large pulley to said shaft, for the purpose of driving said train of gears at a reduced speed when the machine is playing a long record, the said clutch capable of being operated for releasing said large pulley and allowing the same to rotate idly upon said feeding shaft.

8. A graphophone having a record bearing and operating shaft, and a pulley for driving said shaft, and having a train of gears for operating the reproduction parts, one of said gears being mounted upon the record shaft, and a second gear being mounted upon a feeding shaft, in combination with a source of power operatively connected with said record pulley, of a reduction gearing comprising a small pulley rigidly attached to said record pulley, and a large pulley journaled on said feeding shaft, a belt to operatively connect said large and said small pulley, a thumb-nut mounted in the record shaft within said small pulley and capable of forcing and holding said record pulley tightly against the gear carried by said shaft, for driving said train of gears at a certain speed for playing a short record, said nut capable of being unscrewed for the purpose of breaking the driving connection between the record pulley and said train of gears, and a clutch carried by said large pulley, adapted to connect said pulley with the feeding shaft, thereby to drive said train of gears at a lower speed for playing a long record, when said thumb-nut is unscrewed, the said clutch also adapted to disconnect said large pulley from the feeding shaft for allowing the same to rotate idly on said shaft, during the interval in which the record pulley may

be connected for driving said train of gears by the tightening of said thumb-nut. 45

9. An attachment for reducing the speed of the reproducing parts of a graphophone, comprising a small pulley and a large pulley, operatively carried by the machine, a belt to connect said pulleys, a clutch carried by one of said pulleys, and a nut capable of cooperating with said clutch for positively connecting said pulleys with, and for driving the reproducing parts of a graphophone, in slower time than the normal speed of the said parts, thereby to adapt the machine for playing four instead of two minute records. 55

10. A speed reducing mechanism for graphophones, comprising a large and a small pulley operatively connected by a belt, one of said pulleys rigidly connected to a moving member of the machine positively driven by the power employed for operating the machine, the said member being always operated in the same direction at the same speed, the other pulley being adjustably connected to a feed shaft, employed for supporting and feeding the reproducing parts of the machine, by means of an extension to said shaft, a clutch adapted for connecting the last named pulley to said shaft in a manner to effect the positive driving of said shaft at a lower speed than when operated by said moving member, the said clutch being arranged to permit said pulley to rotate idly upon said shaft, for the purpose of allowing the machine to operate at its normal speed, and a nut adapted to cooperate with said clutch for effecting the change of the speed of the machine. 75 80

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK F. MURDOCK.

Witnesses:

WM. C. ANDERSON,
HARRY DE WALLACE.