

No. 745,782

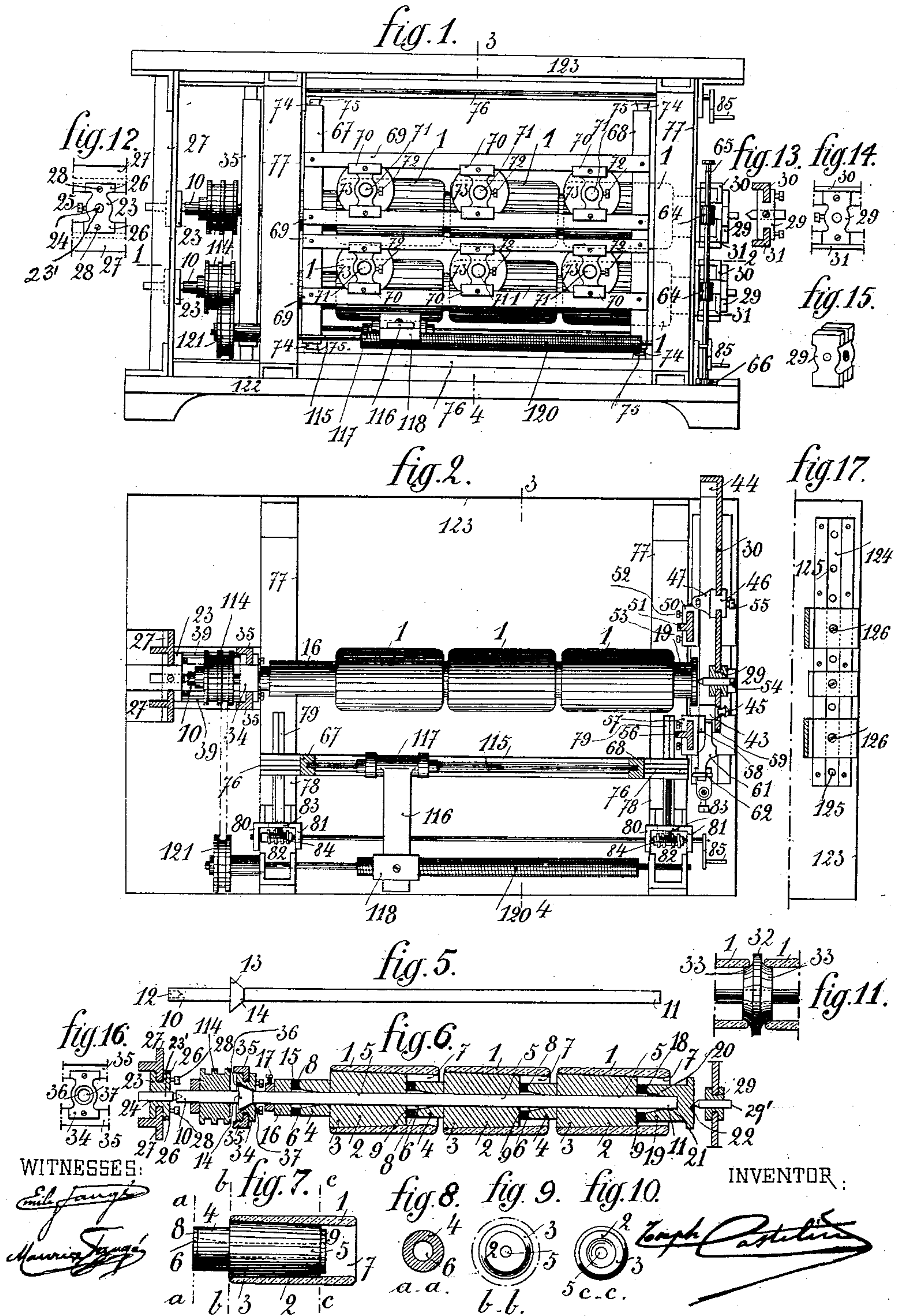
PATENTED DEC. 1, 1903.

J. CASTELIN.  
PHONOGRAPHIC APPARATUS.

APPLICATION FILED DEC. 23, 1899.

NO MODEL.

2 SHEETS—SHEET 1.



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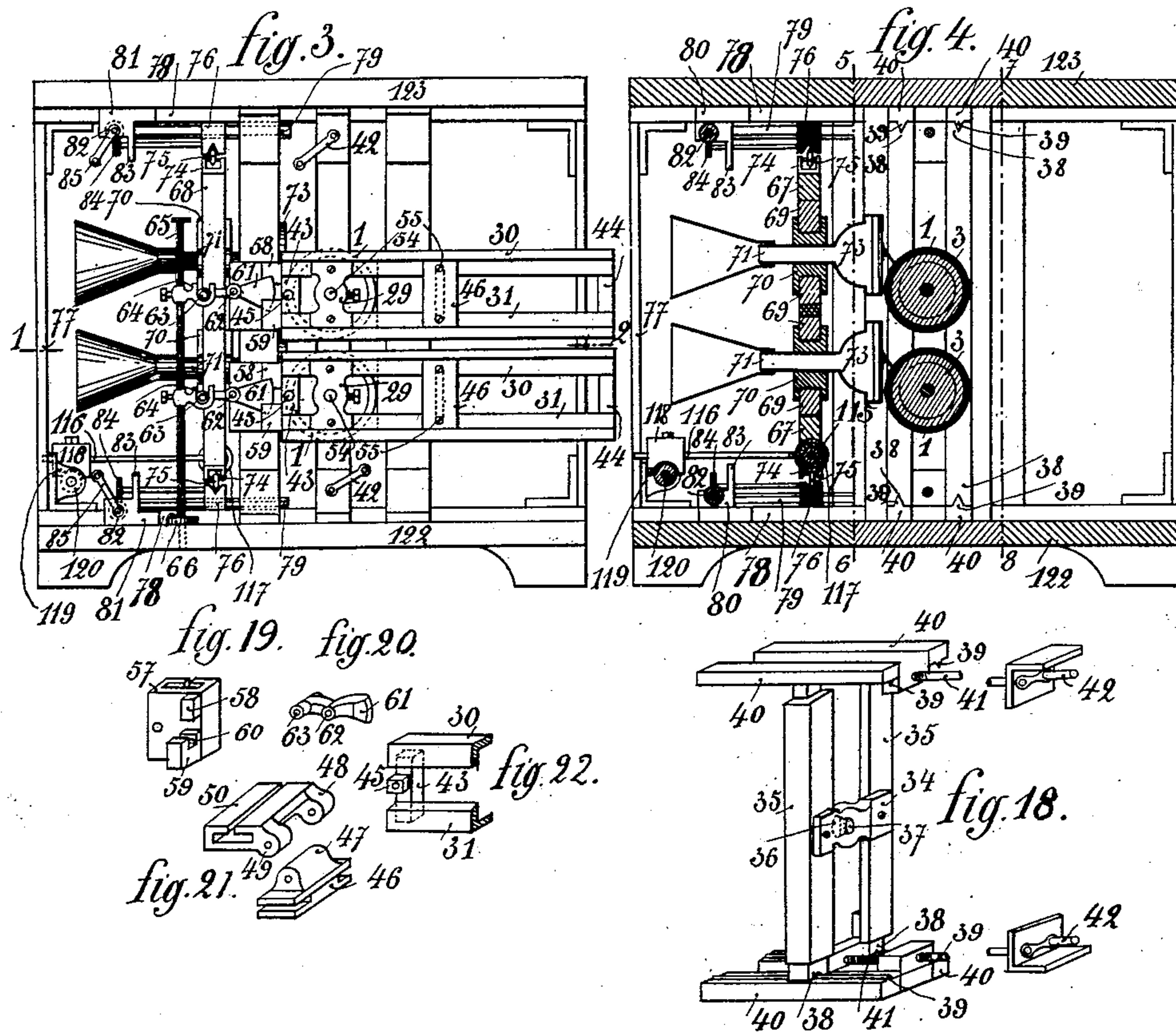
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# UNITED STATES PATENT OFFICE.

JOSEPH CASTELIN, OF PARIS, FRANCE.

## PHONOGRAPHIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 745,782, dated December 1, 1903.

Application filed December 23, 1899. Serial No. 741,471. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH CASTELIN, a citizen of the Republic of France, residing at Paris, France, have invented certain new and useful Improvements Relating to Phonographic Apparatus, (for which I have applied for Letters Patent in France under No. 289,098, dated May 23, 1899,) of which the following is a specification.

The present invention relates to an apparatus which is called the "multiplex," by means of which any number of phonographic cylinders of any diameter and length may be engraved synchronously and at the same time.

The apparatus consists of the following parts, represented in detail in the accompanying drawings, in which—

Figure 1 is a front view of the apparatus with the trumpet device removed. Fig. 2 is a plan view, partly in section, on the line 1 2 of Fig. 1. Fig. 3 is a side elevation showing the movable doors. Fig. 4 is a transverse section on the line 3 4, Fig. 1, which is a section on the line 5 5 of Fig. 4, in order to show a front view of the block. Fig. 5 is a view of one of the movable axles. Fig. 6 is a section of the whole of the cylinders and cylinder-carriers on the movable axles in their position in the apparatus. Figs. 7, 8, 9, and 10 are sections of one of the cylinder-carriers. Fig. 11 is a section of the cylinder-carriers provided with collars. Fig. 12 is a view of a fixed pivot. Figs. 13, 14, and 15 are details of a movable pivot. Fig. 16 is a detail of the block. Fig. 17 is a plan view of the grooves of the base. Fig. 18 is a perspective view of the block. Figs. 19 and 20 show details of the bolt and the catch of the movable doors. Fig. 21 is a detail of the hinge of the movable doors. Fig. 22 is a detail of the end of the movable door.

In order to effect the registering of the phonographic cylinders of a desired length or diameter, the following operation is necessary: The cylinders 1 are threaded on the carriers 2, Figs. 6 to 10, which consist of slightly-conical parts 3, of wood, metal, or other material, terminating at the larger base in a reduced cylinder 4. These two parts, which form one piece, are hollow along their longitudinal axis 5, the cylindrical part being conically bored, as at 6. This arrange-

ment is intended to facilitate the introduction of the sleeves which serve to support the wax cylinders on the movable axles 10 11, Fig. 5. The conical part of the sleeve is of such dimensions that it will fit in an ordinary phonographic cylinder 1, and its base should be in the same plane as the extremity of the wax cylinder. It will be observed that the length of the truncated cone is less than that of the phonographic cylinder, so that there is provided a space 7 for removing the wax cylinder from above its sleeve by inserting two fingers into it. The advantage of this is that the operator is not obliged to touch the cylinder on the parts which are engraved, which certainly would damage them. Each sleeve is also provided at each end with a rubber washer 8 9.

The cylinders 1 can simply be supported by washers, Fig. 11, the extensions 3 of which serve as support 32 to the flanges of the cylinders 1. When the cylinders have been provided with washers or carriers, they should be placed on the movable axles of the apparatus. The movable axles consist of cylindrical rods 10 11, Fig. 5, hollowed out conically at 12 at one end. The hollow part ends in a conical portion 12, made along the axis of this rod at a distance of about 0.05 centimeter from one end 10. This rod is provided with a collar in the shape of a truncated cone 13 14, the end 14 of which is toward its other end, 11. The end 11 has a transverse groove cut upon it. The movable axles are arranged in the apparatus in the following manner: The end 10 is supported by the fixed pivots 23', carried by supporting disks or blocks 23, arranged vertically between the T-shaped brackets of the apparatus. In order to maintain them rigid during the registering of the cylinders, they are screwed into the block 34, Figs. 1, 2, 4, 6, 16, 18. The purpose of the block is to allow the separation of the movable axle from its movable pivot without, however, changing its horizontal position and at the same time to obtain such a rigidity as to allow the removal or insertion of the cylinders. The block consists of a plate 34, identical as regards form and the arrangement of its grooves with those (23 29) used for supporting the pivots. This plate may also be adjusted as regards position between two ver-



tical flanged standards 35 35 and placed parallel to the standards of the fixed pivots 27 27. The plate 34 is bored at the center partly conically, as at 36, and partly cylindrically, as at 37. The conical part is of the same shape as the cone 14, which is arranged on the movable axle. The standards 35 35 are united at the top and bottom by cross members in such a manner as to form a rigid frame. They are also provided at their ends with grooved parts 38, sliding on projections 39 of the bars 40. Screws 41, worked by means of a crank-handle 42, enter into the horizontal cross-bar. It will therefore be easily understood that when these screws, which can only be rotated and cannot move longitudinally, are turned they will move the whole of the framework and cause the two conical parts 14 and 36 of the movable axle 10 and of the block 34 to closely engage, owing to which the axle of the latter becomes immovable, while, on the other hand, the movable axle 10 11 will be free to turn round its pivots.

The cones 13 14 of the movable axles are introduced into the cone 36 of the block 34 with the aid of screws 41, operated at 42, so as to set the block, and the movable axles being made rigid the cylinders and their sleeves or washers are put in place. The arrangement of the sleeves is shown in Fig. 6. The sleeves 2 are arranged one after the other on the movable axles 10 11. The washer 9 of one sleeve rests against the washer 8 of the next sleeve. The washer 8 of the first sleeve presses against a washer 15 of a cylindrical part 16, secured on the movable axle 10 11 by means of a screw 17. In the same manner the washer 9 of the last cylinder presses against the washer 18 of a movable cylindrical part 19, the object of which is, first, to keep in position the movable axle, the end 11 of which enters into a recess 20 21 in this cylindrical part, and, secondly, to serve as a pivot therefor at 22 and to press all the sleeves together to form a single body with them and involving them all in its rotary movement. The end of each movable axle is pivoted on the point of a pivot called the "fixed" pivot 23', because once its position is determined it is not necessary to change its position during the operations for the engraving of the cylinders. This pivot, Figs. 1, 2, 6, and 12, is secured in a part 23, having in its center a hole 24, the diameter of the bore being equal to that of the cylindrical part of the pivot. The pivot is fixed in position by a set-screw 25. The metallic part 23 is provided at either side with grooves 26. By means of these grooves it is possible to raise or lower it vertically along the parallel faces of T-brackets 27 27 of the apparatus, on which it is fixed in position by means of set-screws 28. The pivots of the other extremity of the movable axle, Figs. 1, 2, 3, 6, 13, 14, and 15, are called "movable" pivots to distinguish them from the fixed pivots, because they form part of a system of parts which will be described as the

"movable" support. The movable pivots are mounted on parts 29, similar to those carrying the fixed pivots. There is, however, this difference, that the grooves are so arranged that they permit of the pivots being horizontally adjusted between the right-angled cross 30 31 of the movable support. The point of the movable pivots 29' is intended to enter the recess 22 of the part 19. The supports 29 for the movable pivots are mounted in the movable supports, which consist of two angled bars 30, Figs. 1, 2, and 3, connected at their ends by parts 43 and 44. The part 43 is provided with a projection 45, Figs. 2 and 3 and 22, which serves as a latch for the movable support. The parts 29, Figs. 1, 2, 3, 6, 13, 14, and 15, as before mentioned, are made to slide between the vertical side of the parts 30 and 31. By the side of the said part 29 is arranged another part, 46, Figs. 2 and 3, also provided with grooves and with a projection 47, which fits between the lugs 48 and 49 of a guide 50, Fig. 21. These two parts 46 and 50 are connected by means of a hinge-pin about which they can turn. The guide 50 forms a sheath for a T-shaped bar 51, to which it is fixed by means of screws 52 and 53. The parts 29 and 46 are also provided with set-screws and 55. A vertical single bar 56 of the movable support carries a metallic guide 57, Fig. 2, similar to guide 50. This guide is provided at its upper end with a stop-block 58, Figs. 2, 3, and 19, and its lower end with a grooved projection 59, the face 60 of which is on the same vertical plane as the outer face of the block 58. This guide is adjusted along the T-angle bar 56 in such a manner that the projection 45 of the movable support will exactly fit between the two projections 58 and 59. On the guide 57 is arranged a latch 61, Figs. 2, 3, and 20, pivoted on an axle 62. The head of this latch is intended to enter into the recess of the projection 59 and prevent the projection 45 from leaving its recess, in which case the movable support is closed and all its parts are immovable, the pivot in this position resting against the axle of the cylindrical block 19.

The latches 45, closing the movable doors or supports or gates, terminate at the end in a horizontal pin 63, which engages a hook 64, fixed to the vertical rod 65. The latter can slide along its collars and insert its lower end into the bar; but to do this it is necessary that the part 66 should have pivoted and cleared the hole; otherwise the immovable rod strikes, by means of the hooks 64, the pins 63 of the latches. The latter having been secured, there is no risk of the block of the movable door or support slipping out of its recess.

The cylinders being mounted upon the movable axles, made immovable by the fixed pivots, the block, the movable pivots, and the movable door, as described, they are brought in contact with the carriage carrying the diaphragms. The carriage, Figs. 1, 2, 3, and 4,



is intended to support the diaphragm-holders, which may be displaced horizontally in a regular manner. It consists of two vertical parallel standards 67 and 68, at right angles to which are fixed, by means of set-screws, horizontal cross-bars 69, the ends of which are grooved in such a manner that they can slide up and down the said standards 67 and 68. Between the horizontal cross members blocks 70 can slide, these blocks being identical in shape with those which support the pivots. The center is pierced by a hole, permitting the passage of a tube 71, fixed to the casing of the suitable diaphragm 73, a set-screw 72 fixing the position of the said tube. The lower and upper ends of the vertical standards terminate in brackets 74, in which are mounted rollers 75. There are four such brackets engaging in grooves in the upper and lower horizontal bars 76.

There is the means by which the uniform forward-and-backward movement of the carriage is effected for putting the diaphragms in or out of contact with the cylinders. The parts comprise the two frames 77, at the upper and lower ends of which are plates 78, provided on their outer faces with ledges 79, engaging grooves in the horizontal parts 76, which slide along the ledges. To each of these plates 78 are connected three parts—*i. e.*, the two flanges 80 81, which support an endless screw or worm 82, and an upward projection 83, which serves as a bearing for a threaded rod screwed into the transverse bar 76 and provided at its other end with a toothed pinion 64, engaging with the worm 82, the shaft of which is provided with a crank-handle 85. The object of this device is to effect a uniform forward-and-backward movement of the cylinders either already engraved or about to be engraved. Each diaphragm may be provided with an ordinary funnel; but preferably the distributing device for the sound-waves to the recording-diaphragm (illustrated in Fig. 5) is used. Two funnels 86 87 are connected at their smaller ends by a curved surface 88. The opening of the larger funnel 87 is turned away from the recording apparatus and serves for the reception of the sound-waves produced by the accompanying instrument. The mouth of the funnel 87 is screwed on the plate 89 by means of screws 90. The plate 89 is provided with conical holes 91, the number of which corresponds with the number of the diaphragm to be set in action. The conical holes are terminated by hollow spherical portions 92, into which fit spherical end portions 92 of tubes 93, slidingly mounted in tubes 94, which are fixed to a supporting-plate 96, which is nothing also but the front of the carriage, by means of a ball-and-socket joint 95 and screws 97. The end tubes 98 are connected with the receiving-tubes of the diaphragms to be actuated. In the interior of the funnel 87 there is arranged a trumpet 99, formed as a speaking-trumpet, the curved surface 100 of which

is a continuation of the curved surface of the outer receiver 87. The trumpet 99 is arranged in such a manner that there remains a free circular space between the extremity 100 and the inner face of the part 88, except some points of attachment 101, through which space the sound-waves arriving from the funnel-mouth 86 may penetrate into the funnel end 87. With the exterior end of the trumpet 99 there is connected, by means of a screw 103, a mouthpiece 102, into which the sounds to be recorded are emitted by the singer. The whole is supported at 104 on a solid rod 105, adjustable in height at 106 by means of a screw 107. The socket 106 is fixed to a horizontal tube 108, slidingly mounted in a rod 109, terminating in a bent portion 110, rotatably mounted in a bearing-piece 111, which is fixed, by means of a screw 113, to the plate 96. For fixing the rod 109 in any desired position a screw 112 may be provided. By this arrangement, first, the sound-waves emitted by a singer at 102 are distributed uniformly at 91 to the tubes 93 94, communicating with the diaphragms, and the sound-waves emitted by the accompanying instrument are also connected to the diaphragms; second, the recording-trumpet may be inclined at any desired angle with reference to the diaphragms; third, diminution of intensity of the sound is prevented, equalization of the sound in all diaphragms is obtained. In fact, cylinders of intense recording power are obtained.

During the registering the movable axle should be a rotating motion combined with the regular horizontal motion of the carriage carrying the diaphragm. The rotary movement of the movable axles is obtained by means of double rollers or wheels 114 fixed to the end of these axles, Figs. 1, 2, and 6, one of the said rollers or wheels receiving its movement from a suitable motor and transmitting it to the one immediately above it, and so on. The regular horizontal movement of the carriage is obtained by the following arrangement: A shaft 115, Figs. 1, 2, 3, and 4, fixed at its ends to the lower part 74 of the uprights 67 68, carries at its center a rigid bar 116, which is pivoted upon it at 117. This bar supports a block 118, curved and provided with part of a screw-thread on its lower part 119, so as to engage a cylindrical screw 120, which receives its rotatory movement from a roller or pulley 121, actuated by a motor provided for that purpose. In order to obtain a regular horizontal motion of the carriage corresponding to the rotatory motion of the movable axles, the same motor operates all the pulleys or rollers, and the pulley 121 is practically the driving-pulley, which transmits by a belt the uniform motion to the pulley 114.

The mechanism is supported by a base 122, and a part 123 serves as a cover. It will be understood that cylinders of all lengths and diameters can be arranged upon the same apparatus, as all the parts 23, 29, 34, and 70 are



arranged to slide and can be spread apart or brought together, while to permit the regulation of the supports of the movable doors, as well as those of the shafts, the base 122 and the top 123 are grooved at 124, so as to allow the stop-bolts 126 to be fixed in the holes 125.

The registering being finished, the movable doors are opened by raising the pawls 61, which disengage catches, after which the doors can be turned about the common axle of the parts 46, 47, and 50. The pivot of the axle 22 is separated from the socket 19, which allows the cylinder-carriage to be withdrawn.

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

1. The combination with a shaft of a series of sleeves mounted thereon as described, each sleeve comprising a conical portion and a cylindrical portion, the said cylindrical portion being reduced in diameter, and a series of cylinders mounted on the conical portions of the sleeves, the length of the conical portions of the sleeves being less than that of the cylinders mounted thereon whereby to provide a space between the cylindrical portion of each of the sleeves and the inner wall of the bore of the cylinder for the insertion of the finger, as set forth for the purpose specified.

2. The combination of a shaft with a series of sleeves mounted thereon as described, each sleeve comprising a conical portion and a cylindrical portion, the said cylindrical portion being reduced in diameter, and a series of cylinders mounted on the conical portions of the sleeves, the length of the conical portions of the sleeves being less than that of the cylinders mounted thereon whereby to provide a space between the cylindrical portion of each of the sleeves and the inner wall of the bore of the cylinder for the insertion of the finger, and a rubber washer at each end of each of the sleeves.

3. The combination with a shaft provided with a conical portion intermediate its ends, of a support for the shaft at one end, a support for the shaft at the other end comprising an adjustably-arranged block, a pivot car-

ried thereby in which the end of the shaft is mounted, an adjustably-arranged frame, a block carried thereby and provided with a conical bore adapted to engage with the conical portion of the shaft, and means for adjusting the frame and block carried thereby.

4. The combination with a shaft, of a cylindrical portion thereon, a washer carried by the said cylindrical portion, sleeves mounted on the shaft each comprising a conical portion and a cylindrical portion and washers carried at the ends of the conical and cylindrical portions, all being so arranged that the washers will abut in the manner specified.

5. The combination with a shaft and cylinders carried thereby, of brackets 27, a block having grooves in which parallel portions of the brackets fit, set-screws adjustably securing the block to the brackets, a pivot carried by the block and upon which pivot one end of the shaft is mounted, and means for supporting the opposite end of the shaft.

6. The combination with a shaft, cylinders mounted thereon and bearing a block 19 in which one end of the shaft is mounted, of means for supporting the other end of the shaft, a support comprising angled bars 30, 31, a block 29 carrying a pivot on which the bearing-block 19 is mounted and having grooves receiving portions of the bars 30, 31, on which the block 29 is adjustable.

7. In an apparatus of the character described, a sliding carriage comprising vertical standards, horizontal bars vertically adjustable on the standards, a block slidably arranged on the horizontal bars, and a diaphragm-supporting tube carried by the block, in combination with means for imparting a sliding movement to the carriage.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH CASTELIN.

Witnesses:

EMILE FAUGI,  
MAURICE FAURÉ.