

No. 750,118.

PATENTED JAN. 19, 1904.

A. N. PETIT.

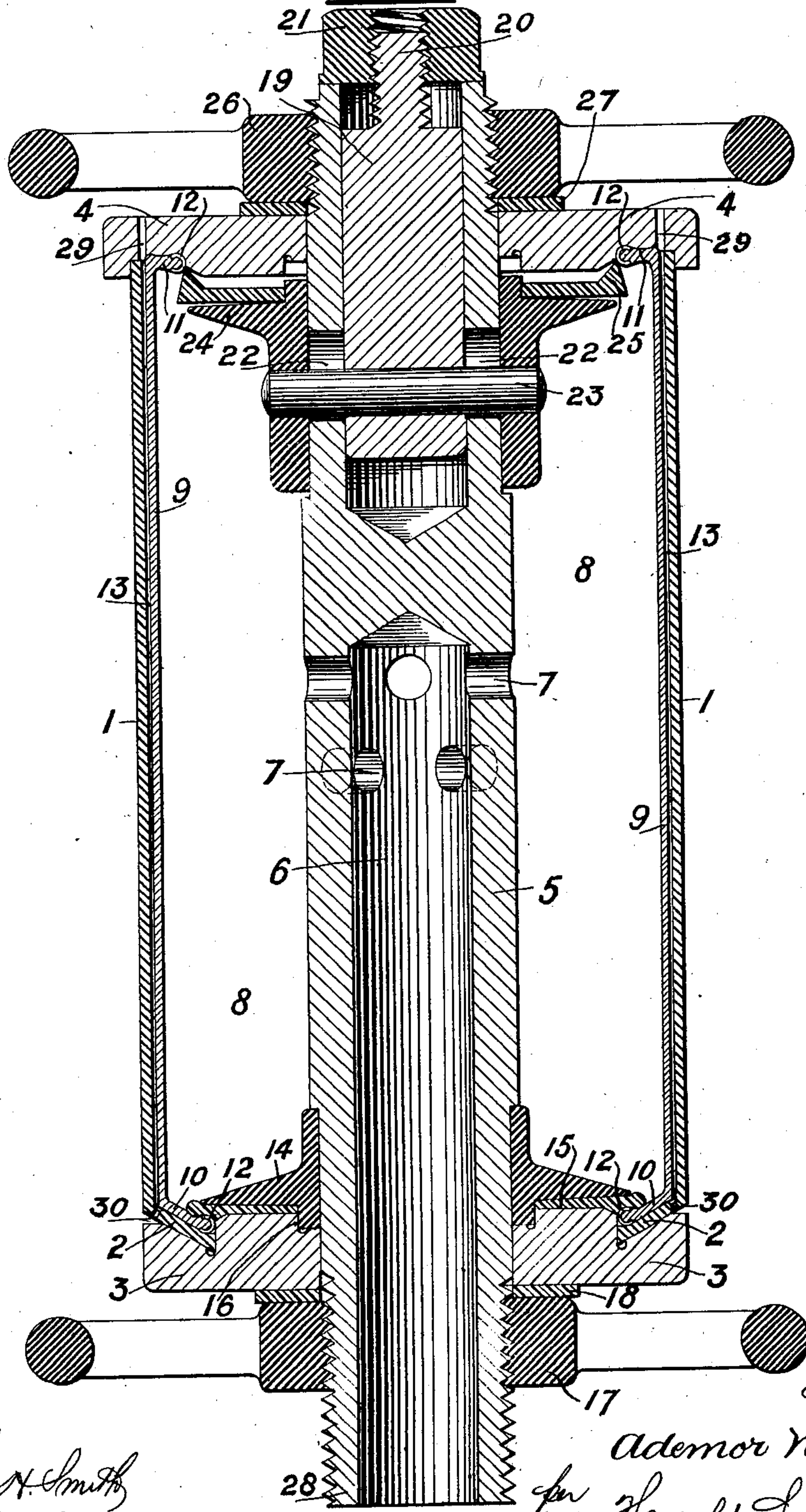
APPARATUS FOR DUPLICATING SOUND RECORD CYLINDERS
OF PHONOGRAPHS, &c.

APPLICATION FILED MAR. 25, 1903.

2 SHEETS—SHEET 1.

NO MODEL.

—FIG. 1.—



Witnesses
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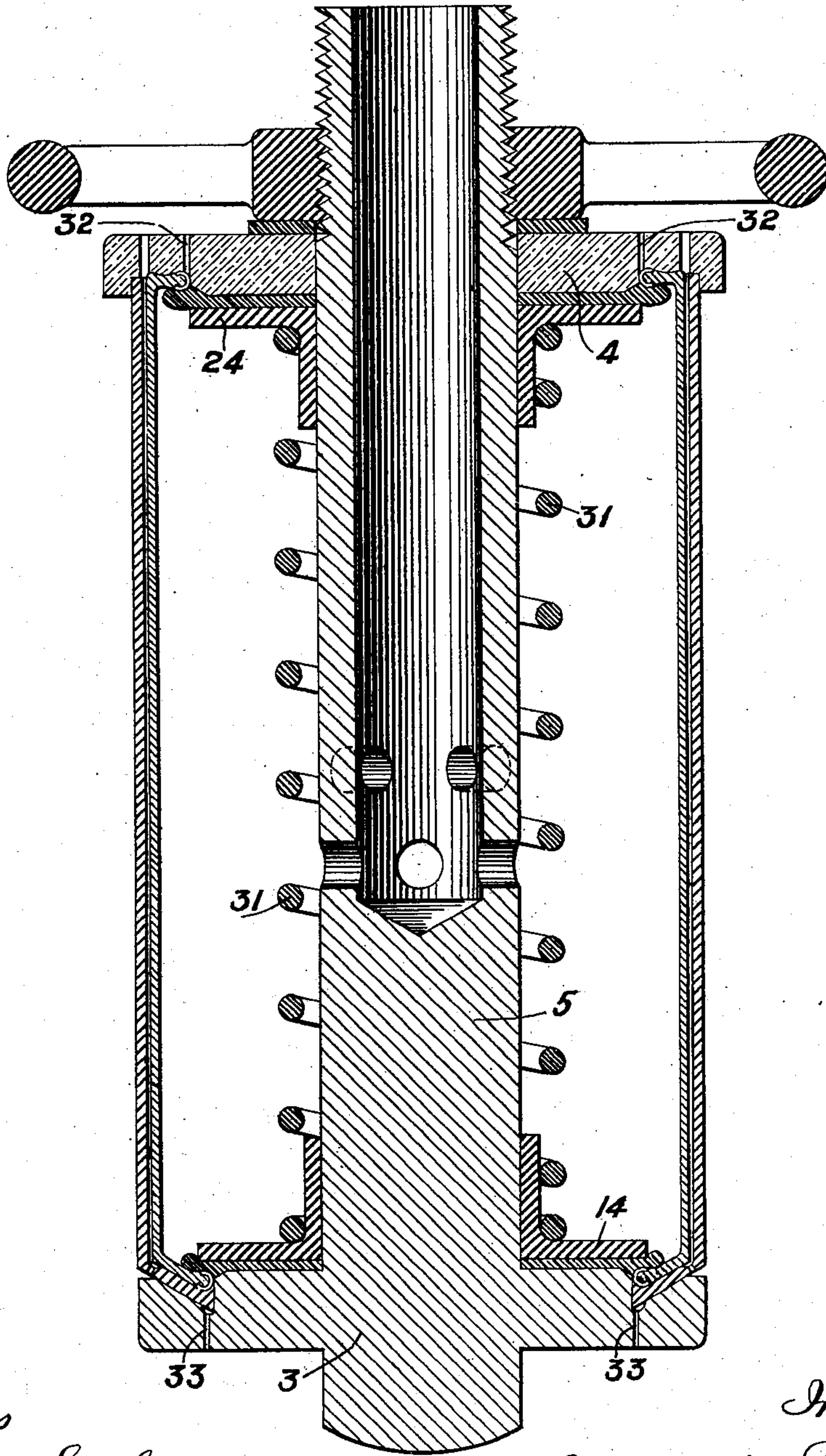
APPARATUS FOR DUPLICATING SOUND RECORD CYLINDERS
OF PHONOGRAPHS, &c.

APPLICATION FILED MAR. 25, 1903.

NO MODEL.

2 SHEETS—SHEET 2.

—FIG. 2.—



Witnesses

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APPARATUS FOR DUPLICATING SOUND-RECORD CYLINDERS OF PHONOGRAPHS, &c.

SPECIFICATION forming part of Letters Patent No. 750,118, dated January 19, 1904.

Application filed March 25, 1903. Serial No. 149,474. (No model.)

To all whom it may concern:

Be it known that I, ADEMOR NAPOLEON PETIT, a citizen of the United States of America, and a resident of Waterloo, near Liverpool, county of Lancaster, England, have invented certain new and useful Improvements in Apparatus for the Manufacture of Duplicate Sound-Record Cylinders of Phonographs and Similar Machines, of which the following is a specification.

Duplicate sound-record cylinders for phonographs and similar machines have been composed of celluloid, and the indented sound-wave record has been produced upon the exterior cylindrical surfaces of the duplicate record-cylinders by pressing the latter within a matrix. These matrices, as is well known, have been made from original sound-records by galvanoplastic processes, and the blank celluloid cylinders have been then introduced within the matrices and the celluloid cylinders pressed by internal pressure with applied heat into contact with the interior surfaces of the matrices. The celluloid cylinders after becoming cool are extracted, and the required indented curves and markings will have been produced upon the exterior surfaces thereof. Such is the ordinary method of manufacture of the celluloid duplicate record-cylinders, and I have found by practice that to successfully carry out the manufacture of these articles it is essential that the molding device employed must be of substantial character on account of the high pressure necessary to force the record-blank against the matrix, the degree of heat necessary to be applied, and the sudden cooling which the mold has to undergo. At the same time the molding device must be simple in construction and be readily made absolutely air-tight in order to produce a good result at each operation and to produce a clear and perfect impression, while the said molding apparatus must be capable of being easily manipulated by comparatively unskilled labor.

My present invention therefore particularly refers to the improved construction and combination of parts composing a molding device which I have found to be well adapted to meet the requirements of its use and whereby there is provided means for allowing of the gradual escape of air between the exterior surface of

the blank record-cylinder and the interior surface of the matrix and to hermetically seal the ends of the record-blank within the matrix preparatory to the application of interior pressure.

In order that my invention may be readily understood I will describe an exemplification of a construction of my apparatus or device.

Figure 1 is a vertical section of the molding apparatus, and Fig. 2 shows by a similar view a modified construction of the same apparatus.

The matrix is produced, as usual, by the electrolytic deposition of metal upon an original cylinder, which latter is afterward removed, and there is thus produced a cylindrical matrix, such as 1, one end of which has an inwardly-bent flange 2, formed integral with the matrix 1, and this end I will term the "base." The matrix 1 is supported at its base end by a metal base-plate 3 of substantial character, the flanged end 2 of the matrix 1 resting in a recess in the face of this base-plate 3, while the plain end of the matrix (the upper end in the drawings) rests in a recess in the other end plate or, as I will term it, the "top plate" 4, and the base and top plates may be in the form of disks, while centrally through the disks there passes a bolt 5, Fig. 1.

Referring to Fig. 1 of the drawings, the bolt 5 is bored centrally and axially from the lower end to near about the central part of the interior of the matrix, and from this bore 6 ports 7 are formed through the walls of the bolt communicating with the interior space of the matrix, and this bore 6 and these ports 7 serve as passages by which fluid-pressure and heat can be introduced to within the matrix. Such fluid-pressure and heat may consist of hot water or other medium; but I preferably employ steam.

Before the end plates 3 4 are adjusted to position upon the bolt the blank record-cylinder 9, of plastic material, such as celluloid, is inserted, and this blank record-cylinder has inwardly-bent flanges at its ends, one such flange 10 being wider than the other flange 11. The inner peripheries of the flanges may have the metal rings or liners 12 fixed upon them, which permanently and effectively maintain the diameters of the end apertures of the cylinder, such as I have described in my two

patent applications of even date with this, Serial Nos. 149,473 and 149,475.

The wider inturned flange 10 of the record-blank 9, with its ring 12, rests against the inturned end 2 at the base of the matrix, which forms a limit-stop for the record-blank, while the smaller inturned flange 11 and the larger diameter ring 12 at the other end of the record-blank 9 rests against a recess made in the face of its end plate 4. The record-blank cylinder 9 is of such a diameter that it freely enters the matrix-cylinder, and a small space 13 remains between the interior of the matrix and the exterior of the blank.

I have found it to be very useful and convenient to have each record-matrix carry a permanent registration of its title in such a manner as to cause the title to be similarly molded upon the blank record-cylinder in the course of the operation, and then the title so molded on the record-cylinder remains as permanent as the sound registration. To this end the integral inwardly-flanged end of the matrix 2 is useful for the registration of the titles, and to obtain this in a simple manner I shape the original sound-record of the desired form at one end, and there engrave the title. Thus in the production of the matrix the title also is produced in the flanged end 2 upon that inner surface with which the flanged end 10 of the blank 9 will lie in contact. In the same way the name of the manufacturer or a trade-mark, &c., may be produced upon the smaller flanged end 11 of the blank by engraving that portion of the end plate against which that flange is in contact.

In order to form the joints at the ends of the matrix, I proceed as follows: Upon the central bolt 5 and adjacent to the inner face of the base-plate 3 there is fixed a flanged collar 14, and located around a shoulder on this flanged collar and between the inner face of the base-plate 3 and the collar 14 there is a gasket or washer 15, of india-rubber or other suitable material, formed around its periphery, with a thickness or edge to come against the interior face of the inwardly-bent flange 10 of the record-cylinder 9. The inner face of the base-plate 3 is formed with a recess 16 around the bolt 5, which when the end plate 3 is slid along the bolt toward the flanged collar 14 will take over the shoulder on the latter part.

Means are provided exterior of the base-plate 3 to press the latter and traverse it with a sliding motion toward the flanged collar 14, and such means may consist of a wheel-nut 17 or the like screwed onto the projecting end of the bolt 5 and having a suitable washer 18 in between the nut 17 and the base-plate 3, so that by rotating the nut 17 the base-plate will be traversed along the bolt 5 with a sliding action, bringing its inner face against the rubber gasket 15 and causing the enlarged periphery of the rubber gasket 15 to be pressed against the inturned end 10 of the record-blank

9, and so produce an air and steam tight joint. The opposite end of the bolt 5 is bored to receive a slide-plug 19, which is rendered incapable of rotation in that bore and which can be slid in the axial direction of the bolt by means of a screwed end 20 on the plug 19 engaging a nut 21, bearing against the annular end of the bolt 5. There are slots 22 in the walls of the bolt in the interior of the pressure-chamber 8, and a stud 23 passes through the slots 22, through the slide-plug 19, and through the shoulder of a flanged collar 24, located in the pressure-chamber 8, capable of sliding motion upon the bolt 5, and the stud 23, passing through the slots and entering the sliding plug, prevents the latter rotating.

A rubber or other suitable gasket 25 is located on the face of the flanged collar 24, between the top plate 4 and that collar, similar to the rubber gasket before described for the other end of the device.

The top plate 4 is pressed against the end of the matrix 1 by a hand-operated nut 26 on the central bolt, there being a washer 27 located between the nut and the top plate 4 to form a secure joint. When so secured, the sliding plug 19 is drawn outward by revolving the nut 21, which has a bearing on the end of the bolt 5, and thus the flanged collar 24 is traversed with a sliding motion toward the interior of the top plate 4, the rubber gasket is pressed between the inner wall of the top plate, and the flange of the collar and the enlarged periphery of the gasket 25 is caused to make a secure joint between the inwardly-turned end of the record-blank and the end plate.

To the projecting lower end 28 of the bolt 5, at what I have termed the "base of the device," a suitable pipe is connected, provided with suitable valves and a branch pipe, one of such pipes being adapted to conduct steam from a steam-boiler, which steam may be admitted when required through the bore of the bolt and the lateral ports into the interior of the pressure-chamber to act upon the record-blank, while also when so required the steam may be cut off and the operation of the valve of the second pipe will admit pressure-air from a suitable pressure-chamber through the bolt in the same manner. The connecting-pipes for the conduct of steam and air are not illustrated in the accompanying drawings; but I already described such in my prior United States Patent Specification No. 692,337, February 4, 1902.

It is to be understood, as I have before explained, that there is an appreciable space 13 between the outer surface of the record-blank and the inner surface of the matrix and this space would contain air. If there was no outlet for that air to escape when the record-blank is closing on the surface of the matrix, there would be formed on the surface of the said blank air holes or depressions, which

would render the record imperfect. To overcome this difficulty, I provide a number of perforations 29 through the top plate 4 to form air-holes in line with the space between the record-surface and the matrix-surface and other perforations 30 through the material of the matrix itself at the base. I have found by practice that when these holes 30 in the base of the matrix are made small the record material will not be pressed through enough to prevent producing the required effect, and I would point out that since the pressure fluid is delivered by the ports 7 about centrally of the pressure-chamber 8 the air in the space between the record-blank and the matrix is forced outwardly toward each end and freely escapes by the aforesaid perforations.

In operating with the device for the production of the record the blank is inserted within the matrix, the pressure-tight joints are closed by the operation of the devices before described, the pressure fluid and heat, such as steam, is admitted to the pressure-chamber, the record-blank is softened or rendered plastic and forced outward with considerable pressure into contact with the matrix-surface, and the air between the surfaces being brought into contact escapes by the end perforations aforesaid. This operation having been sufficiently effected, the steam-pressure is cut off and pressure-air turned on and allowed to communicate with the interior of the pressure-chamber, the device is cooled externally by water or other suitable medium, which causes a slight shrinkage of the record-cylinder, and finally the latter is removed from the device as a finished manufacture.

At Fig. 2 of the drawings I have illustrated a constructional modification the general arrangement and employment of which will be readily understood from the previous description, and therefore I will only now deal with the points of difference. For instance, the central bolt 5 is formed in a piece with the base-plate 3, and the flanged collars 14 and 24 slide freely upon the bolt and are forced, respectively, toward the base-plate 3 and the top plate 4 by a helical spring 31, which surrounds the bolt 5 within the pressure-chamber, and by these means I am enabled to dispense with the slide-plug 19 and the nut 21, (shown at Fig. 1,) although I usually employ the apparatus as described in the latter figure.

If found requisite, I may in some cases form perforations 32 in the top plate 4 and perforations 33 in the base-plate 3 to allow of air escaping from between the outer surfaces of the rubber gaskets and the inner surfaces of the end plates of the apparatus.

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

1. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines; the combination with an electrodeposit cylindrical matrix

to receive a blank celluloid cylinder having inturned ends, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof, and ports through the bolt-walls to the interior of the cylinder-blank, a base-plate near the lower end of the bolt having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and the flange of the blank, a central aperture in the top plate through which the bolt passes, and means for clamping the top plate upon the bolt to clamp the matrix between the top plate and the base-plate; of upper and lower flanged collars on the bolt, an annular elastic washer between the under surface of the top plate and the upper surface of the adjacent flanged collar, an elastic washer between the upper face of the base-plate and the under face of the other flanged collar on the bolt, and means for compressing the elastic washers against the inner surfaces of the top plate and base-plate, substantially as set forth.

2. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines; the combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder having integrally-inturned ends, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder the flange being perforated for the escape of air from between the blank and matrix, a bolt passing centrally and axially through the blank cylinder and the matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof for the entrance of the pressure steam or air, and having lateral ports through the walls to admit the pressure steam or air to within the cylinder-blank to force the latter against the matrix for impressing the blank, a base-plate near the lower end of the bolt, having a circular groove in its upper face to receive the inwardly-turned flange of the matrix, a top plate having a groove on its under surface to receive the upper end of the matrix and the smaller flange of the cylinder-blank, and having perforations through the top plate for the escape of air from between the blank and the matrix, a central aperture in the top plate through which the bolt passes, and a nut on the projecting upper end of the bolt to clamp the matrix between the top plate and the base-plate; of upper and lower flanged collars on the bolt, an annular elastic washer between the under surface of the top plate and the upper surface of the adjacent flanged collar, an elastic washer between the upper face of the base-plate and the under face of the

other flanged collar on the bolt, and means for compressing the elastic washers against the inner surfaces of the top plate and the base-plate to make steam-tight joints between the latter plates and the flanges of the cylinder-blank, substantially as set forth.

3. The combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder, having integrally-inturned ends which is to be impressed with the sound-record, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof, and lateral ports through the walls of the bolt to the interior of the matrix, a base-plate having a circular groove on its upper face to receive the flange of the matrix and a central aperture in the base-plate through which the bolt passes, a collar fixed on the bolt, an elastic washer between the collar and the upper face of the base-plate, and a nut on the lower end of the bolt to compress the elastic washer between the base-plate and the fixed collar to make a tight joint between the base of the blank and the base-plate; of a top plate having a central aperture through which the bolt passes, and having a circular groove to receive the matrix and blank-cylinder end, a nut on the exterior upper end of the bolt to cause the top plate to clamp the matrix, a collar on the bolt opposite the inner face of the top plate and capable of sliding on the bolt, an elastic washer between the collar and the top plate, and means operated from the exterior of the apparatus for sliding the collar on the bolt to compress the elastic washer and so make a tight joint between the top plate and the blank, substantially as set forth.

4. The combination with an electrodeposit cylindrical matrix to receive a blank celluloid cylinder having integrally-inturned ends, which is to be impressed with the sound-record, an inwardly-extending flange at the base of the matrix to support the wider flange of the blank cylinder, a bolt passing centrally and axially through the blank cylinder and matrix, and having a central axial passage-way from the external end of the bolt to about the central part thereof, and lateral ports through the walls of the bolt to the interior of the matrix, a base-plate having a circular groove on its upper face to receive the flange of the matrix and a central aperture in the base-plate through which the bolt passes, a collar fixed on the bolt, an elastic washer between the collar and the upper face of the base-plate, and a nut on the lower end of the bolt to compress the elastic washer between the base-plate and the fixed collar to make a tight joint between the base of the blank and the base-plate; of a top plate having a central aperture through

which the bolt passes, and having a circular groove to receive the matrix and blank-cylinder end, a nut on the exterior upper end of the bolt to cause the top plate to clamp the matrix, a collar on the bolt opposite the inner face of the top plate and capable of sliding on the bolt, an elastic washer between the collar and the top plate, a slide-plug passing from the exterior upper end of the bolt into an axial bore-hole therein, slots in the walls of the bolt below the top plate, a transverse pin connecting the slide-plug and the collar and passing through the slots in the walls of the bolt, and a nut on the exterior end of the slide-plug acting against the end of the bolt for operating the slide-plug to draw up the collar and make the joint, substantially as set forth.

5. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines, the combination with a cylindrical electrodeposit matrix having at one end an inwardly-extending flange and adapted to receive a blank celluloid cylinder having inturned ends, one of which is supported upon the flange of the aforesaid matrix, of a base-plate having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and flange of the blank, means for connecting the said base and top plates and for applying compressive tension thereto, annular elastic washers against the inner surfaces of the base and top plates, and means for applying pressure to the elastic washers to hold the same against the inner faces of the top and base plates, substantially as set forth.

6. In an apparatus for the manufacture of duplicate sound-record cylinders for phonographs and similar machines, the combination with a cylindrical electrodeposit matrix having at one end an inwardly-extending flange and adapted to receive a blank celluloid cylinder having inturned ends, one of which is supported upon the flange of the aforesaid matrix, of a base-plate having a circular groove in its upper face to receive the flange of the matrix, a top plate having a groove on its under face to receive the upper end of the matrix and flange of the blank, means for connecting the said base and top plates and for applying compressive tension thereto, annular elastic washers against the inner surfaces of the base and top plates, upper and lower flanged collars bearing against the said elastic washers, means for compressing the elastic washers against the inner surfaces of the top and base plates, and means providing for the introduction within the matrix and blank celluloid cylinder of a fluid under pressure, substantially as set forth.

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Witnesses:

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