Mar. 3, 1925. 1,528,121

W. W. McWILLIAMS

APPARATUS FOR THE PRODUCTION OF SOUND RECORD TABLETS AND TABLETS MADE THEREBY

Filed Feb. 5, 1923 2 Sheets-Sheet 1

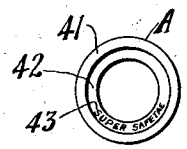

Fig. 4

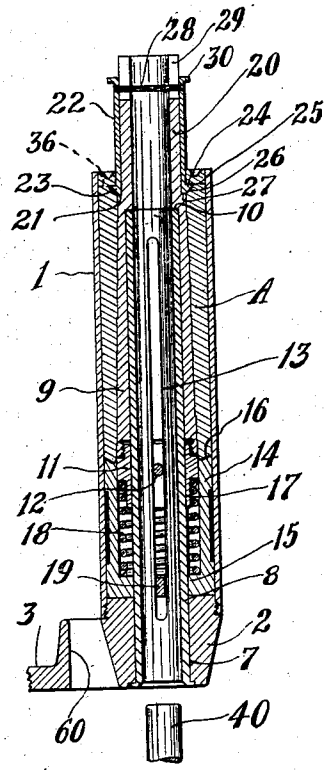

Fig. 1

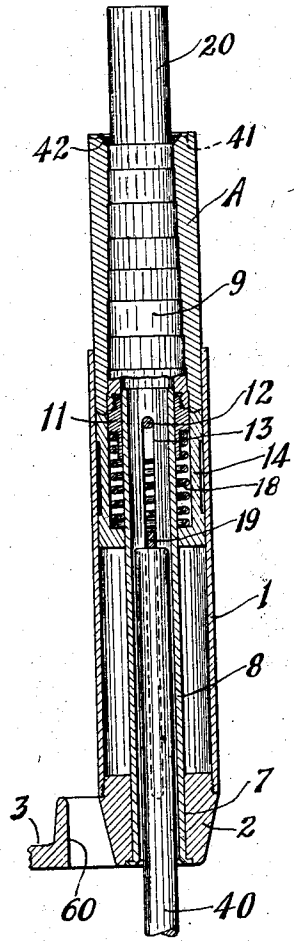

Fig. 2

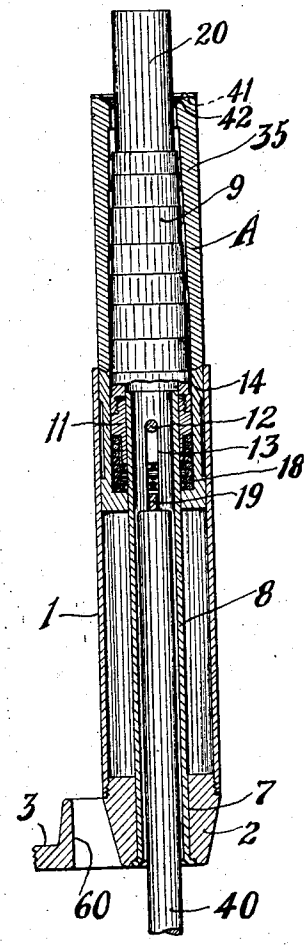

Fig. 3

INVENTOR

William W. McWilliams

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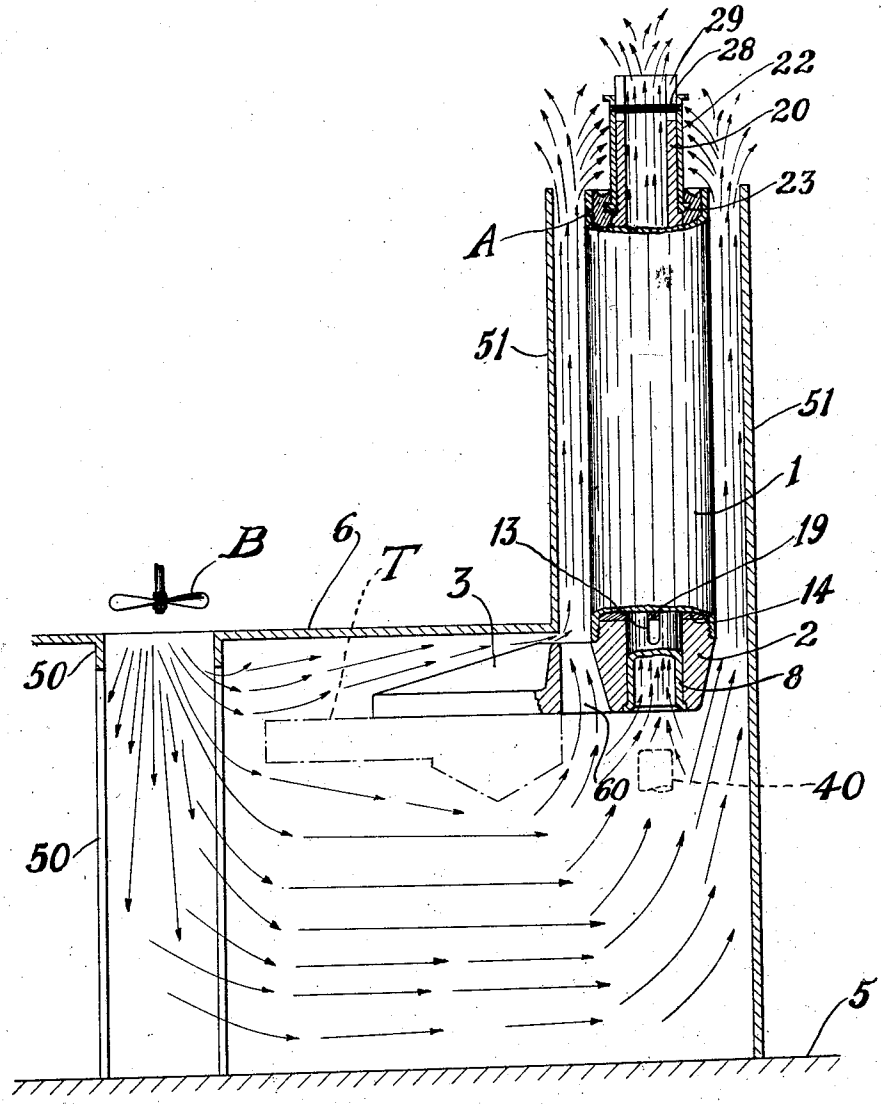

Fig. 5

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Patented Mar. 3, 1925. 1,528,121

UNITED STATES PATENT OFFICE.

WILLIAM W. McWILLIAMS, OF EAST ORANGE, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THOMAS A. EDISON, INCORPORATED, OF WEST ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

APPARATUS FOR THE PRODUCTION OF SOUND-RECORD TABLETS AND TABLETS MADE THEREBY.

Application filed February 5, 1923. Serial No. 616,935.

To all whom it may concern:

Be it known that I, WILLIAM W. McWILLIAMS, a citizen of the United States, and a resident of East Orange, Essex County, New Jersey, have invented certain new and useful Improvements in Apparatus for the Production of Sound-Record Tablets and Tablets Made Thereby, of which the following is a description.

My invention relates to sound record tablets and especially to cylindrical sound record tablets or blanks designed for use on business phonographs or dictating machines. My invention also relates to an improved apparatus.

In some aspects my invention is an improvement on the invention described and claimed in Patent No. 1,323,197, granted to me November 25, 1919.

One of the objects of my invention is to produce an improved form of hollow cylindrical sound record tablet or blank, especially of the type designed for use with business phonographs, having suitable wording or characters, identifying or descriptive of or otherwise relating to the tablet, so applied thereto that the same will be protected against defacement or damage and will not be obliterated or cut away in the repeated shaving operations to which such tablets are usually subjected.

Further objects of my invention reside in an improved molding apparatus for producing sound record tablets or blanks, especially those made of wax or wax-like material and of the type described in my Patent No. 1,323,197 referred to above, whereby such tablets may be made, preferably mechanically, more economically, at a greater rate and of a more uniform character than those produced by the methods and apparatus now commonly employed.

Other objects and features of my invention will be hereinafter more fully described and claimed.

In order that my invention may be more clearly understood, attention is directed to the drawings accompanying and forming part of the specification, and in which,—

Figure 1 is a central sectional view, partly in elevation, illustrating one of the molding devices of my improved apparatus and a sound record tablet or blank cast or molded therein and with the parts of the molding device in normal position;

Figure 2 is a view similar to Figure 1 showing the molded or cast tablet partially ejected from the mold;

Figure 3 is a view similar to Figure 1 showing the cast or molded tablet fully ejected from the mold;

Figure 4 is an end view of the finished record tablet; and

Figure 5 is a fragmental sectional view, partly in elevation and partly diagrammatic, of my improved molding apparatus illustrating one of the steps in the method of producing sound record tablets by the use of such apparatus.

Referring to the drawing, each of the molding devices of my improved molding apparatus comprises a tubular cylindrical mold 1, having a smooth cylindrical bore and preferably formed of bronze, removably secured at its lower end to a base member 2 as by being threaded on a reduced cylindrical extension thereof. The molding device is secured to a suitable support, for example, to an annular table T, as by means of a bracket 3 which is preferably formed integrally with the base member 2. Where the annular support or table T is employed, molding devices similar to the one illustrated are preferably mounted in spaced relation about the entire periphery of the table, and the latter is preferably mounted to rotate about a fixed axis so that the molding devices carried thereby may be successively moved to filling and ejecting positions and through a zone at room temperature and a cooling zone, as will presently appear. The table T may be supported on suitable standards (not shown) carried by the floor or like support 5, and together with the molding devices is almost entirely enclosed in a casing 6 formed of sheet metal or the like.

The base member 2 of each molding device is provided with a central cylindrical opening 7 within which is rigidly secured, as by means of a driving fit, a hollow cylindrical or tubular supporting member 8 extending upwardly into the mold 1 and axially there-

of. A stepped core 9 is slidably mounted on the supporting member 8, said core having a cylindrical bore with which the member 8 has a loose fit. The upper end of the supporting member 8 is somewhat below the top of the mold 1, and the core 9 when in its normal or lowermost position, as shown in Fig. 1, is supported by the member 8 by the engagement of the said upper end of the latter with a shoulder 10 formed on the bore of the core. At its lower end the core 9 is removably secured, as by a threaded connection, to a sleeeve 11 which is slidably mounted on and has a loose fit with the supporting member 8. A horizontal pin 12 is secured in the sleeve 11 and extends through diametrically opposed longitudinally extending slots 13 (only one of which is shown), which are formed in the supporting member 8 and terminate short of the ends thereof. Within the mold 1 and normally resting on the base member 2 below the core 9, is a cylindrical cup-shaped bottom or closure member 14. The bottom 15 of the closure member 14 is provided with a central opening through which the supporting member 8 extends with a loose sliding fit. The member 14 has a lose sliding fit with the bore of the mold 1, and also on the inside thereof it has a loose sliding fit with the sleeve 11 and the lower end portion of the core 9. In this connection, it may be noted that the outer surfaces of the sleeve 11 and of the lower end portion of the core 9 are flush. At its upper end the member 14 is provided with an annular molding surface 16 for forming one end of a sound record tablet or blank, such as indicated at A, cast in the mold. Disposed between the bottom 15 of the closure member 14 and the sleeve 11 and surrounding the supporting member 8 and a lower reduced extension 17 of the sleeve 11, is a heavy coil spring 18. A horizontal bar or pin 19, rectangular in cross-section, is secured to the bottom 15 of the closure member 14 and extends across the central opening in said bottom and through the slots 13 in the supporting member 8. The core 9 is circular in cross-section and preferably stepped from its lower end to a point adjacent its upper end by forming the exterior of the same with a series of substantially cylindrical stepped portions, the diameters of which decrease from the lower to the upper end of the series. Because of the provision of the stepped core 9 a record tablet A cast or molded in the molding device shown, may be separated from the mold and from the core by straight line movements. Such a record tablet when reamed out will have a bore similar to that of the record tablet shown and described in my prior patent referred to above. The core 9 is provided with a cylindrical upper end portion 20 of reduced diameter whereby a shoulder 21 is formed on the core at the lower end of such portion. The shoulder 21 will be slightly below the top of the mold 1, when the parts of the molding device are in normal position, as shown in Fig. 1. Removably mounted on and having a loose sliding fit with the reduced upper end portion 20 of the core 9 is a tubular mold cap 22. The mold cap 22 is provided at its lower end with a flange 23 having a substantially flat annular upper surface 24, an outer very narrow cylindrical surface portion 25, and, on its under side, with an annular bevelled molding surface 26 which intercepts and inclines upwardly and outwardly from the flat annular end surface 27 of the cap. The end surface 27 of the cap 22 is of substantially the same width as the shoulder 21 on the core 9 and is adapted to engage the same to thereby support the cap from the core. The flange 23 is spaced from the bore of the mold 1 so as to permit the mold to be readily filled with the molten wax or wax-like material from which the sound record tablets are molded. The annular bevelled molding surface 26 of the cap 22 is provided with wording or other characters in negative identifying or descriptive of, or otherwise relating to the tablets or blanks to be cast and which, in the operation of molding or casting such a blank, are molded into an end surface portion of the latter. For a purpose which will presently appear, the mold-cap 22 is formed of metal such as tin capable of absorbing and radiating heat at a high rate. A horizontal pin 28 is secured to the mold-cap 22 adjacent its upper end, and extends diametrically of the opening therethrough. When the mold-cap is mounted in operative position on the reduced upper end portion 20 of the core 9, as shown in Fig. 1, the pin 28 engages opposed slots 29 formed in said end portion and prevents relative turning movement of the mold-cap 22 and the core, both when the cap is in operative position and during removal thereof from the core. The mold-cap 22 is also provided with an annular flange 30 at its upper end for facilitating the removal of the mold-cap from the core 9 prior to the operation of ejecting a blank or tablet from the mold 1.

It will be apparent that in the molding device described, the core 9, together with the sleeve 11, and also the bottom or closure member 14, are movable relatively to the mold 1 axially thereof. The bottom or closure member 14 is also movable within the mold 1 and axially thereof relatively to the core 9 and the sleeve 11. The resilient means comprising the coil spring 18, between the sleeve 11 and bottom or closure member 14, however, is of sufficient strength so that when, with a cast or molded tablet A in the mold 1, the bottom or closure member 14 is moved upwardly in the mold from the posi-

tion shown in Fig. 1 as by applying upward pressure to the bar 19, such movement will be imparted to the sleeve 11 and core 9 through the spring. The core member 9 and its sleeve 11 and also the tablet A will accordingly then move upwardly with reference to the mold 1 with the bottom or closure member 14, until the pin 12 engages the upper end of the slots 13 of the supporting member 8. The tablet or blank A will thus be separated and partially ejected from the mold 1 and the parts will be in the position shown in Fig. 2. The engagement of the pin 12 with the upper ends of the slots 13 will, of course, prevent further upward movement of the core 9 and sleeve 11; but if the application of upward pressure to bar 19 is continued, the member 14 will be moved upwardly still further with respect to the mold 1 and also with respect to the core 9, against the action of the coil spring 18, to the position shown in Fig. 3. This further movement of the bottom or closure member 14 will result in separating the record tablet or blank A from the core 9 and wholly ejecting such blank from the mold 1, as clearly shown in Fig. 3. It is clear from the above, that the core member 9 and the sleeve 11 to which it is secured, together with the bottom or closure member 14, constitute means which is movable as a whole relatively to mold 1 and axially thereof, and that the bottom or closure member 14 is also movable axially of the mold and relatively to the core member.

In casting or molding a record tablet or blank in the molding device described, the mold 1, with the parts of the molding device in normal position, as shown in Fig. 1, is first completely filled with molten wax-like or other material from which the blank is to be cast, by pouring such material into the top of the mold. The molding device with the record material therein is now allowed to cool at ordinary or room temperature until such material reaches a semi-liquid state; this for the purpose of allowing such material to settle and air which may be present therein to rise and escape. The provision of the mold-cap 20, at its lower end, with the upwardly inclined beveled surface 26, facilitates the escape of the air and prevents the same being entrapped below the flange 23. A cooling medium is now applied to the outside of the mold 1 and to the inside of the core 9, preferably by forcing currents of cooling fluid, preferably air, past the outside of the mold and through the tubular supporting member 8 and the hollow core 9 until the blank or tablet A sets or hardens sufficiently. The currents of air or other cooling fluid, of course, greatly hasten the setting or hardening of the record material. During the congealing or setting of the record material, especially where wax or wax-like material is employed, the same rapidly contracts and results in an annular cavity or trough being formed in the upper end portion of the molded material, as shown in Fig. 1. Moreover, air pockets are likely to be formed in the upper end portion of the blank. When the blank is still soft but no longer sticky, that is shortly before the blank becomes sufficiently set to eject or extract the same, the end portion thereof above the point indicated by the dotted line 36 in Fig. 1, is cut off or removed. The removal of this upper end portion by means of a knife or other implement is facilitated by the provision of the flange 23 at the lower end of the mold-cap 22, as the upper annular surface 24 of this flange serves as a guide for such knife or implement. The mold-cap 22 is now removed and the molded tablet A is separated from the mold 1 and the core 9 by successive straight line movements and fully ejected from the mold in the manner described above, and preferably by means of a rod 40, which may be termed the ejector rod, which is moved upwardly into the tubular supporting member 8 and against the bar 19 from the position shown in Fig. 1 and to the position shown in Fig. 3. The ejector rod may be operated either manually or mechanically, preferably the latter. Upon the return of the ejector bar 40 to its lower position, shown in Fig. 1, the movable parts of the molding device will return to normal position under the action of gravity. The bore of the record tablet or blank A is now reamed out, and the flat outer annular surface portion of the thicker end of the blank is turned off to produce a smooth finished surface 41 meeting the outer end of the inner annular bevelled surface portion 42 thereof. This bevelled surface portion 42, formed by the annular surface 26 of the mold-cap 22, has molded therein the wording or other characters indicated by reference characters 43. The outer cylindrical surface of the record blank is also finished, as by subjecting the same to a rough and then a smooth cut.

Where a plurality of molding devices, such as described, are supported on an annular support such as the table T shown in Fig. 5, this table, as hereinbefore stated, is almost entirely enclosed by a sheet metal casing 6. This casing is provided in the top thereof, and preferably centrally thereof, with an opening 50 through which cooling fluid such as air may be forced into the casing as by means of a fan or blower B. The casing 6 is provided with an outer upwardly extending peripheral portion open at the top and substantially enclosing the molding devices by means of spaced extensions 51. The extensions 51 of the casing 6 terminate at their upper ends substantially on a level with the upper end of the molds

of the molding devices and are preferably spaced substantially equidistant from such molds. As indicated above, the support or table T is preferably mounted for rotary movement. Suitable motive means (not shown) may be and preferably is provided for imparting to the table T and the molding devices carried thereby, a step-by-step rotary movement to successively bring each of the molding devices into filling postion, through a zone or space at room temperature, through a cooling zone and then to ejecting position. The zone or space at room temeprature is provided adjacent the point where the molds are filled, as by interrupting the casing 6 or forming the same with a cut-away portion or segment of such extent that the molding devices in being moved through such cut-away portion from filling position will be exposed therein to room temperature, at the rate at which the table is rotated, for a period of time just sufficient to allow the molten record material therein to reach a semi-liquid stage. As explained above, during this period the record material will settle and any air therein will rise and escape. From the zone at room temperature the molding devices move into the cooling zone formed by the casing 6 where they are subjected to the currents of air forced into the casing by the blower B and escaping from the open upper end of the outer portion of the casing formed by the spaced extensions 51. These currents of air pass through the casing substantially as indicated by the arrows in Fig. 5; it being noted that such currents of air are forced upwardly both past the outside of the mold 1 and through the tubular supporting member 8 and the core 9 of each molding device. To facilitate the passage of the air past the molding devices, the base member 2 of each of the latter is provided with a conical downwardly inclined outer surface, and such member is joined to its supporting bracket 3 by a thin web 60. The parts of the molding devices are so proportioned as to be what may be termed "heat balanced," so that when such a device is subjected to currents of air in the manner shown and described, heat will be abstracted from the outer and inner portions thereof by the air at such rates as to effect substantially uniform congealing or setting of the record material from the outer and inner surfaces of the body thereof towards a conical surface constituting the locus of the points midway between such outer and inner surfaces. This results in the production of tablets or blanks of very uniform quality and strength. In this connection, the use of the tubular mold-cap 22 formed of tin or other metal capable of absorbing and radiating heat at a very high rate is important as such a cap absorbs heat very rapidly from the core 9 and due to the air currents impinging on the outer surface thereof; as indicated, this heat is very rapidly dissipated or radiated.

By the method described, I am not only able to produce sound record tablets or blanks which are very uniform in quality and strength, but I am also enabled, because of the cooling operation described, to produce them much more rapidly than is possible by the methods now employed of producing blanks of the type employed for business phonographs. For example, in the usual methods of molding sound record blanks for business phonographs, it takes anywhere from 12 to 15 minutes for such tablets or blanks to harden or set sufficiently to extract the same; whereas with my improved method this requires only about 5 to 6 minutes. The speed of rotation of the table T is preferably so timed that when the record material in any of the molding devices has set or hardened sufficiently, such device will then be in ejecting or extracting position directly over the ejecting member or rod 40. This rod may be and preferably is connected to the means for driving the table T so that as each molding device is brought to ejecting position, it will be automatically moved upwardly into the tubular supporting member 8 of such molding device to eject the blank or tablet A therefrom, in the manner described above, and then returned to its lower position. Where the support or table T for the molding devices is stationary or manually rotatable, care should be taken after filling a molding device or devices with record material, not to subject such device or devices to the cooling step until the record material has reached the semi-liquid state. This may be accomplished, in an arrangement such as shown, by starting and stopping the fan or blower B at the proper times.

While I have described my invention, particularly in connection with the production of record tablets or blanks formed of wax or wax-like material, it is to be understood that some of the features thereof are also applicable to the production of other types of cylindrical record tablets, as, for example, those comprising a thin outer tube of celluloid and a comparatively thick backing of plaster of Paris or other material. It is also to be understood that both the method and apparatus specifically described herein are subject to various changes and modifications without any departure from the spirit of the invention or the scope of the appended claims.

Having now described my invention, what I claim as new and desire to protect by Letters Patent is as follows:

1. A hollow cylindrical sound record tablet having the inner annular portion of one end surface thereof bevelled and inclined

inwardly with respect to the corresponding end of the tablet, said inner bevelled portion being provided with wording or characters, substantially as described.

2. A hollow cylindrical sound record tablet having an end surface comprising an outer annular portion and a bevelled inner annular portion inclined inwardly with respect to the corresponding end of the tablet and intersecting the bore thereof, said inner portion being provided with wording or characters, substantially as described.

3. In apparatus for molding sound record tablets, a tubular mold, a core within said mold, and a mold-cap supported solely on the upper end portion of said core and having its outer periphery spaced from the bore of the mold, substantially as described.

4. In apparatus for molding sound record tablets, a tubular mold, a core within said mold, a mold-cap removably supported on the upper end portion of said core and having its outer periphery spaced from the bore of the mold, and means for preventing relative turning movement of said core and mold-cap, substantially as described.

5. In apparatus for molding sound record tablets, a tubular mold, a core within said mold, a mold-cap supported on the upper end portion of said core and provided with a flange the outer periphery of which is spaced from the bore of the mold, said flange having an annular molding surface, and means for preventing relative turning movement of said core and mold-cap, substantially as described.

6. A mold-cap for sound record tablet molding apparatus, having a bevelled annular molding surface provided with wording or characters in negative, substantially as described.

7. A tubular mold-cap for sound record tablet molding apparatus, provided at one end with an annular molding surface and formed of a metal such as tin capable of absorbing and radiating heat at a high rate, substantially as described.

8. A tubular mold-cap for sound record tablet molding apparatus, provided at one end with a substantially flat annular surface portion intercepting the bore of the cap and an annular bevelled molding surface portion outwardly of said flat annular portion, substantially as described.

9. A tubular mold-cap for sound record tablet molding apparatus, provided with an outwardly extending flange at the lower end thereof, the lower side of said flange being provided with an annular bevelled molding surface, substantially as described.

10. A tubular mold-cap for sound record tablet molding apparatus, provided at its lower end with an inner substantially flat annular surface portion, an intermediate annular bevelled molding surface portion and an outer substantially cylindrical surface portion, substantially as described.

11. A tubular mold-cap for sound record tablet molding apparatus, provided with a flange at each end, the flange at the lower end of the mold-cap being provided on its under surface with an annular bevelled molding surface, substantially as described.

12. The combination of a tubular mold, a core within the mold and a tubular mold-cap removably mounted on the upper end portion of the core, said mold-cap being spaced from the bore of said mold, substantially as described.

13. The combination of a tubular mold, a core circular in cross-section disposed within the mold, said core being provided with a shoulder adjacent its upper end, a tubular mold-cap removably mounted on the upper end portion of the core and supported on said shoulder, said mold-cap being spaced from the bore of said mold, and means to prevent relative turning movement of the core and mold-cap, substantially as described.

14. In apparatus for molding sound record tablets, a tubular mold, and a device within said mold comprising a core and a bottom or closure member, said device and mold being relatively movable axially of the mold and said core and bottom member being relatively movable axially of the core, substantially as described.

15. In apparatus for molding sound record tablets, a tubular mold, and a device within the mold movable axially thereof, said device comprising a core and a bottom or closure member having means for forming one end of a tablet cast in the mold, said core and bottom member being relatively movable axially of the core, substantially as described.

16. In apparatus for molding sound record tablets, a tubular mold, a bottom or closure member within said mold movable axially thereof, said bottom member having means for forming an end of a tablet cast in the mold, a core disposed within said mold and movable axially thereof, said core and bottom members being relatively movable, and resilient means between said core and bottom member, substantially as described.

17. In apparatus for molding sound record tablets, a tubular mold, means within the mold movable axially thereof, comprising relatively movable core and bottom members, and means for first producing movement of said core and bottom members axially of the mold and then movement of one of said members relative to the other of said members, substantially as described.

18. In apparatus for molding sound record tablets, a tubular mold, and means within said mold comprising a core member and a member having an annular end molding

surface, said core member and mold being relatively movable axially of the mold, and one of said members being movable relatively to the other member axially of the mold, substantially as described.

19. In apparatus for molding sound record tablets, a tubular mold, a core within the mold and movable with respect thereto, and a bottom or closure member for the mold movable with respect to the mold and core, substantially as described.

20. In apparatus for molding sound record tablets, a tubular mold, a core within the mold movable axially thereof, a bottom or closure member for the mold movable axially of the mold with respect to the mold and core, and means for first producing movement of said core and bottom member axially of the mold and then movement of said bottom member with respect to said core, substantially as described.

21. In apparatus for molding sound record tablets, a tubular mold, a supporting member disposed within the mold axially thereof, a hollow core mounted on said supporting member for movement thereon, a bottom or closure member within the mold below said core and movable axially of the mold, and means for limiting upward movement of said core, substantially as described.

22. In apparatus for molding sound record tablets, a tubular mold, a supporting member disposed within the mold axially thereof, a hollow core mounted on said supporting member for limited movement thereon, a bottom or closure member within the mold below said core and movable axially of the mold, and resilient means disposed between said core and bottom or closure member, substantially as described.

23. In apparatus for molding sound record tablets, a tubular mold, a supporting member disposed within said mold, a hollow core mounted on said supporting member for movement thereon axially of the mold, said core being normally supported by said member, said member and core having coacting means for limiting the upward movement of said core, a bottom or closure member mounted in said mold below the core for movement axially of the mold, and resilient means between said bottom or closure member and said core, substantially as described.

This specification signed this 1st day of Feby., 1923.

WILLIAM W. McWILLIAMS.