T. A. EDISON.

PROCESS OF MOLDING.

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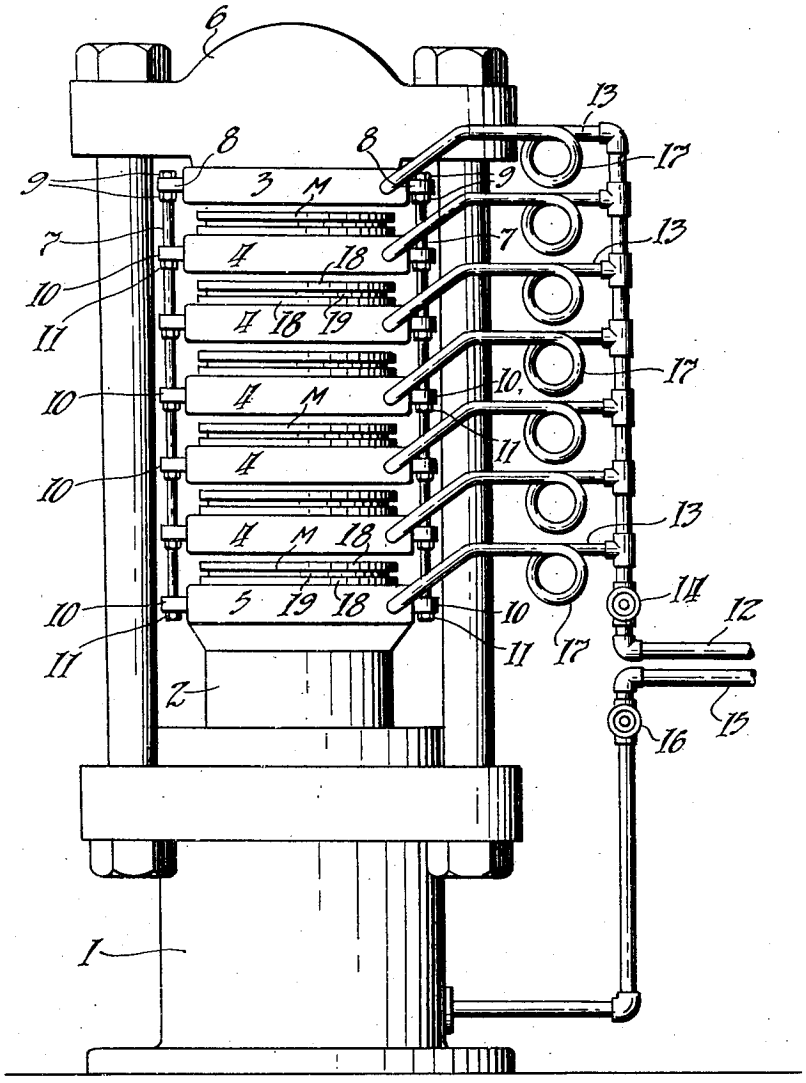

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UNITED STATES PATENT OFFICE.

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PROCESS OF MOLDING.

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To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, and a resident of Llewellyn Park, West Orange, Essex county, New Jersey, have invented certain new and useful Improvements in Processes of Molding, of which the following is a description.

My invention relates to the production of molded articles such as sound records, and more particularly to the production of disk sound records, such as those of the Edison type, which are molded from substantially flat blanks or tablets. The blanks from which Edison disk records are molded are in the form of substantially flat disks, each comprising a main body portion formed of a suitable filler, such as a mixture of wood flour and powdered chalk, mixed with a comparatively small amount of a suitable binder, such as a shellac or resin, and a surface layer or coating of a phenolic condensation product for receiving the record impression. The phenolic condensation product is preferably made in the form of a varnish and is suitably applied to the body portion of the blank as by brushing. Blanks of this character are hard and practically non-plastic at normal temperatures and only slightly plastic when highly heated, as contradistinguished from the soft "gobs" or lumps of highly plastic material from which the so-called "shellac" records are pressed, such, for example, as disk records of the Victor and Columbia type.

In producing disk records it is customary to make a matrix of copper or other suitable metal by electroplating the metal on a master record previously rendered electro-conductive by a coating of graphite or other suitable material, and to secure this matrix to a heavy backing, such as a plate of steel, in order to give the matrix sufficient rigidity for use as a stamp or die to impress the record into the blank or tablet. When it is desired to produce a record on both faces of the blank, a mold comprising a pair of such dies arranged in opposed relation is employed, the blank is disposed in such mold between the dies, and the latter are then forced together under high pressure and heat in a suitable press. If it is desired to produce a record on but one face of the blank, a blank matrix is substituted for the sound record matrix in one of the dies of the mold. As the hard, substantially flat blanks from which Edison disk round records are formed have scarcely any plasticity at normal temperatures and are only slightly thermoplastic, it is necessary to employ a high heat and also an exceptionally high pressure in molding such records in order to press out all unevenness in the surfaces of the blank and produce records of exactly uniform thickness with the sound record grooves clearly impressed in the surfaces thereof.

Heretofore in the molding of disk sound records of the Edison type, it has been customary to disposed a plurality of molds containing the hard and substantially flat and non-plastic blanks to be impressed on the platens or press plates of a hydraulic press, to admit just enough pressure to the press to raise the platens sufficiently to bring the uppermost mold into light contact with the uppermost stationary platen or head of the press, to then admit highly heated fluid to the platens so as to heat the molds and the blanks therein sufficiently to render the latter somewhat plastic throughout, and to then apply the full molding pressure to the press in order to impress the sound records into the softened blanks and at the same time press out all the uneven spots and produce perfectly flat records of uniform thickness. The raising of the platens supporting the loaded molds prior to the application of heat to the press for the purpose of rendering the blanks plastic, as just described, has heretofore been considered necessary, as it was believed that the blanks, especially the upper portions thereof, could not be rendered sufficiently plastic by the use of practicable heating temperatures unless heated from the respective adjacent platens of the press by conduction. This method of procedure, however, is objectionable, for when the platens are raised as described, each of the blanks, which, it is to be borne in mind, are then very hard, is in engagement with the delicate surfaces of the record matrices of the mold in which it is disposed and is called upon to support the weight of all the loaded molds and movable platens of the press above the same. In the case of those blanks disposed in molds supported on the lower platens of the press, this weight is

very considerable. Consequently, the minute delicate projections of the negative sound records on the surfaces of the matrices of the respective molds are subjected to considerable wear and are very apt to be injured by contact with the hard blanks under the weight of the superposed molds and platens of the press. The result is the surfaces of the matrices soon become defaced or impaired to such a degree that it is impossible to mold satisfactory sound records therefrom, and the number of sound records it is possible to obtain from a given matrix is therefore quite limited.

The principal object of my invention resides in an improved process of molding, whereby the foregoing objections will be obviated and whereby the number of satisfactory sound records or other molded objects obtained from a given sound record or other matrix is greatly increased.

I have discovered that with the press open and the platens thereof spaced the maximum distance apart, if the platens are maintained heated for a long enough period at a high temperature, somewhat less, however, than that which would cause blistering of the surfaces of the blanks to be molded, the blanks will, if disposed in molds supported on the platens, become sufficiently plastic to prevent any injury to the record faces of the matrices upon application of the molding pressure; and I preferably carry out my improved process by rendering the blanks somewhat plastic, in the manner just described, without the admission of any pressure whatever to the press, and in then subjecting such blanks to the full molding pressure in the press.

For a clearer understanding of the manner in which my process is carried out in the molding of sound records, attention is directed to the accompanying drawing in which the single figure is a view in front elevation of a conventional form of hydraulic press shown in inoperative condition, and with a plurality of sound record molds containing blanks or tablets to be impressed disposed on the platens thereof.

Referring to the drawing, the press 1 comprises a base portion provided with a cylinder for the vertically movable hydraulically operated piston 2 which extends upwardly from the said base portion, and a plurality of platens or press plates 3, 4 and 5 disposed between the piston 2 and a rigid stationary head 6 comprising a part of the frame of the press. The upper platen or press plate 3 is suitably secured to the stationary head 6 and is provided with a pair of lugs 8, 8 extending laterally therefrom at diametrically opposite points. The upper ends of a pair of vertical rods 7, 7 respectively extend through the lugs 8, 8 and are respectively secured thereto as by means of nuts 9, 9. These rods 7, 7 depend from the lugs 8, 8 and respectively extend loosely through lugs 10, 10 provided on each of the platens or press plates 4 and 5 and corresponding to the lugs 8, 8 of the platen or press plate 3. The rods 7, 7 are each provided with a series of spaced stops preferably in the form of nuts 11 threaded thereon, the corresponding pairs of which respectively coact with the lugs 10, 10 of the platens or press plates 4 and 5 to limit the downward movement of such platens or press plates under the action of gravity when the hydraulic pressure is removed from the press, and to support the same in their lowermost position and spaced from each other, as shown in the drawing. Each of the platens or press plates 3, 4 and 5 is provided with chambers or passageways (not shown) into which steam or other heating fluid is adapted to be admitted. Reference character 12 represents a pipe leading from a suitable source of supply steam or other heating fluid (not shown) and provided with a plurality of branches 13 respectively connected to the platens or press plates 3, 4 and 5, and reference character 14 represents a valve for controlling the flow of steam or other heating fluid through the pipe 12 and the branches 13 to the platens or press plates. The cylinder of piston 2 is connected with a source of hydraulic pressure (not shown) by a pipe 13 provided with a controlling valve 16. Each of the branches 13 leading from the pipe 12 is preferably formed with a loop or coil 17 in order to render the same resilient so as to permit ready upward and downward movement of the platens or press plates under the actions of piston 2 and gravity.

In carrying out my invention in producing Edison disk records, I first preferably place a mold M comprising a pair of opposed dies 18 and containing the hard substantially flat sound record blank 19 disposed between such dies, on each of the platens or press plates 4 and 5 of the press, when the latter is open and in inoperative condition with the platens in maximum spaced relation as shown, and with the valve 14 as well as the valve 16 closed. Valve 14 is then opened so as to admit the heating fluid, preferably steam, through the branches 13 to each of the platens or press plates 3, 4 and 5. This steam is preferably maintained at a temperature of approximately 320 degrees Fahrenheit. The valve 16 is maintained closed until each of the record blanks 19 has been sufficiently heated by conduction and radiation of heat from the adjacent steam-heated platens or press plates to render the same somewhat plastic throughout. In the case of blanks from which Edison records are produced, this takes about three minutes when the temperature of the heating fluid is approximately that specified above. The valve 16 is then opened, whereupon the hydraulic

pressure will move piston 2 upwardly into engagement with the lowermost platen or press plate 5 and force the press plates 4 and 5 upwardly toward the head 6 of the press until the blanks 19 in the molds M disposed between adjacent platens or press plates are subjected to the full molding pressure. Due to the plastic condition of the record blanks, the latter will then be pressed perfectly flat to a uniform thickness and the surfaces thereof will take clear impressions of the sound record matrices of the molds without injury to the record faces of the matrices. As is customary, the valve 14 is then closed and the molded blanks suitably cooled to harden the same without removal of the molding pressure. After the blanks have been sufficiently cooled and hardened, the molding pressure is turned off or removed by closing valve 16, whereupon the piston 2 and the platens or press plates will, under the action of gravity, assume the positions shown in the drawing, thus permitting the molds M with the molded records therein to be removed from the press.

While I have specifically described my preferred process, it is to be understood that my invention is limited only as defined by the terms of the appended claims.

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

1. The process of molding a hard substantially flat blank or tablet which consists in disposing such blank in a suitable mold, then applying heat to said mold, without the application of pressure thereto until the blank is rendered somewhat plastic, and then subjecting said mold with the blank therein to the molding pressure, substantially as described.

2. The process of molding a hard substantially flat tablet or blank which consists in disposing the same in a suitable mold, supporting the mold containing the blank on the platen of an open press, then applying heat to said platen until the entire blank is rendered somewhat plastic, and then closing said press under the full molding pressure, substantially as described.

3. The process of molding a hard and substantially flat sound record blank, which consists in disposing said blank in a suitable mold, then subjecting said blank to a temperature of approximately 320 degrees Fahrenheit for a period of about three minutes while maintaining the mold free from extraneous weight or pressure, and then subjecting such blank to the molding pressure in the mold, substantially as described.

4. The process of molding hard substantially flat sound record blanks which consists in respectively supporting molds containing such blanks on the platens of an open press, applying heat to said platens until the blanks are rendered somewhat plastic, and then closing the press under the full molding pressure, substantially as described.

This specification signed this 1st day of August, 1919.

THOS. A. EDISON.