March 28, 1950 H. B. LEEDOM 2,501,823

RECORD FORMING DIE

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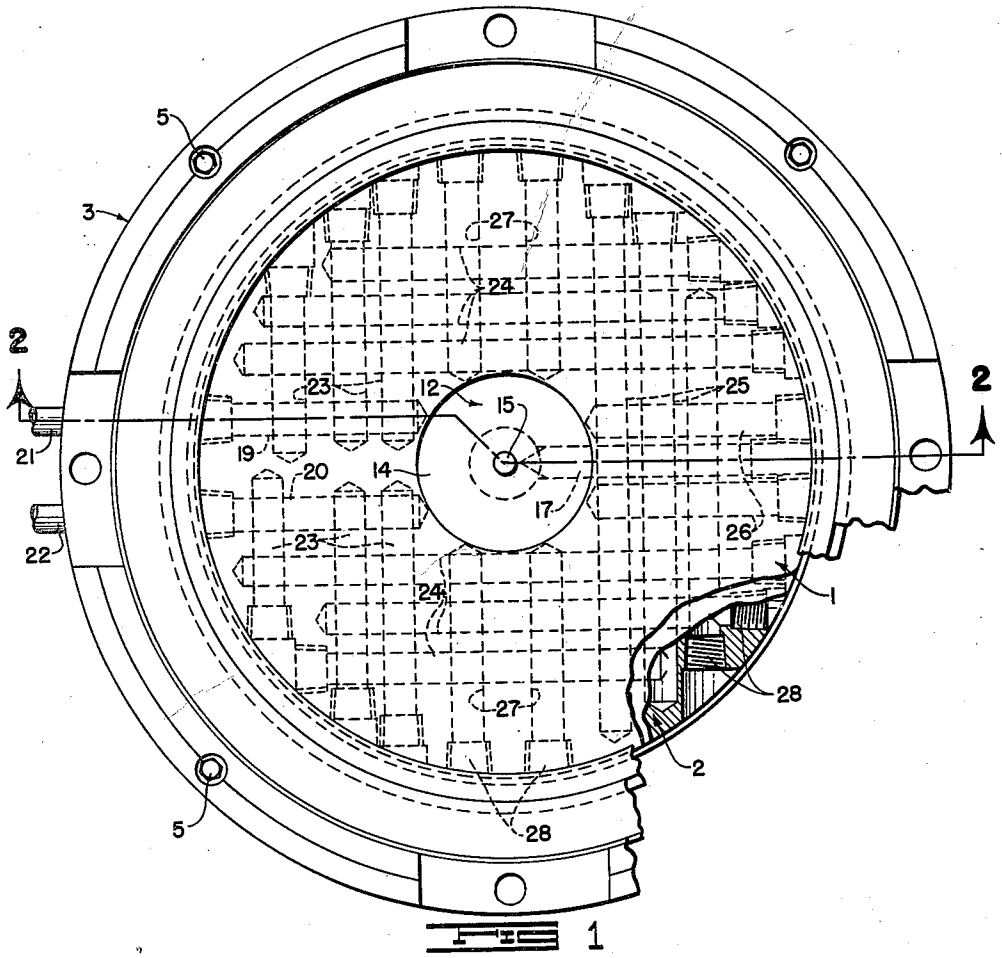


FIG 1

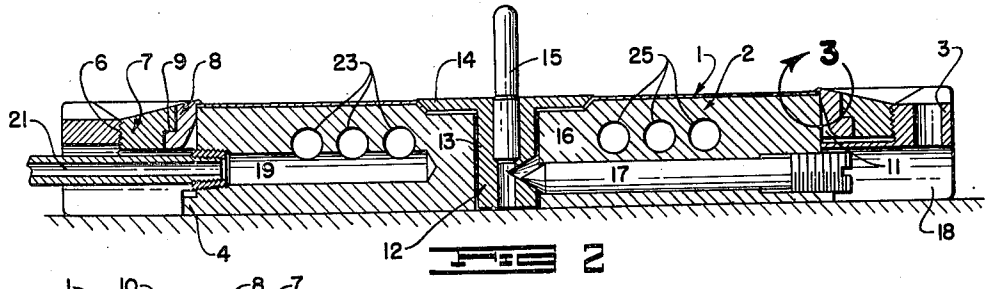


FIG 2

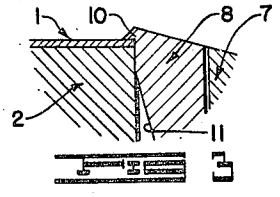


FIG 3

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RECORD FORMING DIE

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3 Claims. (Cl. 18—5.3)

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My invention relates to record forming dies; that is, to dies employed in the molding of phonograph records, and included in the objects of my invention are:

First, to provide a forming die of this character which incorporates a novel stamper backing block so arranged with passageways that steam or a coolant may be alternately introduced in a quantity to effect extremely rapid heating and cooling of the stampers and the record material therebetween so that the cycle of operation is reduced to a minimum;

Second, to provide a stamper backing block which is provided with sets of parallel sockets drilled into the edges of the block at right angles and plugged at their outer extremities to form an intersecting network of passages;

Third, to provide a novel arrangement for securing record stampers in place in such a manner that the stamper may be quickly removed or interchanged without removing the die structure from the press; and

Fourth, to provide a record forming die which is so arranged as to minimize heat transfer from the stamper and its die block to the mounting means therefor or to other parts of the press in which the die is mounted.

Further objects, advantages and features appear hereinafter in the annexed specification in which:

Figure 1 is a plan view of my record forming die with a portion thereof broken away and in section.

Figure 2 is a transverse sectional view through 2—2 of Figure 1.

Figure 3 is an enlarged sectional view of the encircled portion marked "3" in Figure 2.

My record forming die includes an upper and a lower unit which are in most respects identical to each other. In the drawings the lower unit only is shown. The actual die face employed in my record forming die may be a conventional stamper plate 1.

Record stampers are formed by an electroplating process, one side of the stamper bearing the reproduction of the master record.

The stamper 1 is supported on a die block 2 which is in the form of a relatively thick disk. The die block must have an extremely smooth flat surface on which is placed the stamper. Any imperfections will result in a corresponding deformation of the stamper and the record formed thereby.

The die block is held on the surface of a press by means of a mounting ring 3. The mounting

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ring fits around the die block and is provided with an undercut step in its lower inner periphery which mates with a flange 4 provided around the die block 2. The mounting ring is secured to the press by means of bolts 5. The upper portion of the mounting ring 3 is counterbored and threaded as indicated by 6. The threaded counterbore receives a clamp ring 7. Between the clamp ring 7 and die block 2 there is interposed a pressure ring 8. The clamp and pressure rings are provided with mating steps which form a bearing means 9 so that the clamp ring 7 may be rotated relative to the pressure ring. The pressure ring is provided with a small lip 10 which is adapted to overlie the outer margin of the stamper 1 as shown best in Figure 3. As will be brought out hereinafter, the die block is periodically heated. Consequently it is desirable that there be a minimum of heat transferring contact between the die block and the surrounding rings. This is aided by relieving the inner side of the pressure ring 8 as indicated by 11.

The die block 2 is provided with a central bore and its upper surface surrounding this bore is recessed. The bore and recess receive a center clamp 12. The center clamp 12 includes a stem 13 and a flange or disk 14, the periphery of which is beveled. The recess in the die block is correspondingly beveled and these mating beveled portions are adapted to clamp the inner margin of the stamper 1. The center clamp of the lower die unit shown in the drawings is provided with an upstanding pin 15 whereas the corresponding center clamp of the upper die unit not shown is provided with a mating socket.

The stem 13 is provided with a laterally directed notch 16 and adapted to receive a wedge bar 17, the inner end of which is conical in form so that when forced into the notch 16 the stem 13 is drawn downwardly thereby to cause the beveled disk to clamp the inner periphery of the stamper 1. The outer end of the wedge bar 17 and its bore is threaded for this purpose. In order to provide access to the wedge bar 17 the mounting ring 3 is provided with clearance slot 18.

The die block is alternately heated and cooled in the process of molding phonograph records. It is essential that the heating and cooling cycles take place as rapidly as possible. This requires alternately the introduction of steam and water rapidly throughout the die block. In order to provide such passages it has been the previous custom to cast the die block or to fabricate the

die block by a welding process. Neither of these arrangements is completely satisfactory for it is difficult to provide the necessarily smooth face for the stamper which would be free from warpage or imperfections. In order to form the backing block by the casting process it has been necessary to select a material such as aluminum or copper alloys, which does not have the desired hardness and which is much more subject to damage than if formed from alloy steels. I have overcome this problem by constructing the die block from a solid mass of material, such as a heavy plate of alloy steel, and forming the necessary circulation passages therein by a novel gridwork of sockets. These sockets are drilled edgewise into the die block and include supply and return header sockets 19 and 20 disposed adjajacent to and parallel with each other, preferably at the side of the block opposite from the bore which receives the wedge bar 17. The sockets 19 and 20 are suitably connected to supply and return lines 21 and 22 respectively.

The supply and return sockets 19 and 20 are intersected by right angularly disposed or lateral sockets 23, preferably in a plane offset upwardly from the sockets 19 and 20. Two sets of three such sockets are shown. The members of each set terminate adjacent each other but do not communicate. Each set of sockets 23 is intersected by a set of longitudinal sockets 24 which are parallel with, but offset above the plane of the wedge bar 17. The two sets of longitudinal sockets are connected by cross sockets 25 which pass over the wedge bar 17. To complete the crisscross network formed by the sockets, sockets 26 are provided between the sets of longitudinal sockets 24, and sockets 27 between the two sets of sockets 23 and the set of cross sockets 25. The outer ends of the various sockets are so disposed as to avoid interference with each other and are internally threaded to receive plugs 28.

It will be seen from Figure 1 that fluid may flow into the supply socket 19 and then follow multiple passageways to occupy the area between the outer periphery of the die block and its central portion and discharge through the other or return header socket 20.

The rate at which heat may be applied by the circulation of steam and the rate at which heat may be extracted by circulation of a coolant, such as water, is extremely rapid by means of the crisscross network of passages.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A phonograph record forming die wherein a record stamper constitutes the record forming face, said die comprising: a die block presenting a backing surface for a record stamper; said die block having a central aperture, a countersunk recess and a lateral bore intersecting said aperture; a clamp member including a stem having a cam face adapted to register with said bore, and a clamping flange cooperating with said recess; and a wedge pin screw-threaded in said bore and engageable with said cam face thereby to clamp the inner periphery of said record stamper between the margin of said flange and said recess.

2. A phonograph record forming die wherein a record stamper constitutes the record forming face, said die comprising: a die block presenting a backing surface for a record stamper; a mounting ring surrounding said die block, and having an internally threaded counterbore; a clamp ring threaded in said mounting ring; a pressure ring having a lip adapted to overlie the margin of a stamper placed on said die block; bearing means on said clamp ring and pressure ring whereby upon threading said clamp ring into said mounting ring the lip of said pressure ring is pressed axially against said stamper; said die block having a central aperture, a countersunk recess and a lateral bore intersecting said aperture; a clamp member including a stem having a cam face adapted to register with said bore, and a clamping flange cooperating with said recess; and a wedge pin screwthreaded in said bore and engageable with said cam face thereby to clamp the inner periphery of said record stamper between the margin of said flange and said recess.

3. A phonograph record forming die wherein a record stamper constitutes the record forming face, said die comprising: a die block presenting a backing surface for a record stamper; a mounting ring surrounding said die block, and having an internally threaded counterbore; a clamp ring threaded in said mounting ring; a pressure ring having a lip adapted to overlie the margin of a stamper placed on said die block; bearing means on said clamp ring and pressure ring whereby upon threading said clamp ring into said mounting ring the lip of said pressure ring is pressed axially against said stamper; said die block having a central aperture, a countersunk recess and a lateral bore intersecting said aperture; a clamp member including a stem having a cam face adapted to register with said bore, and a clamping flange cooperating with said recess; a wedge pin screwthreaded in said bore and engageable with said cam face thereby to clamp the inner periphery of said record stamper between the margin of said flange and said recess; said die block defining a grid-work of intersecting passages for multiple path circulation of heating and cooling fluids.

HARRY B. LEEDOM.

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