W. T. BONNER.

MOLD.

APPLICATION FILED JULY 17, 1919.

1,396,158. Patented Nov. 8, 1921.

3 SHEETS—SHEET 1.

Fig. 1.

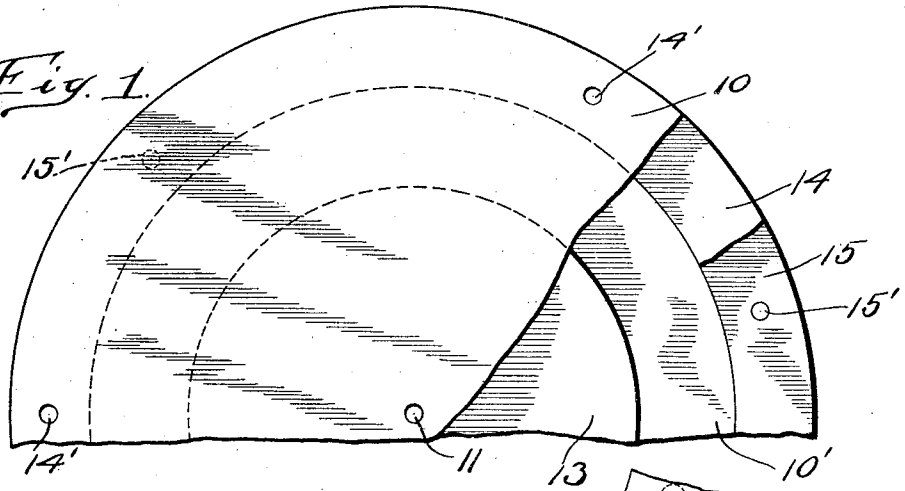


Fig. 2.

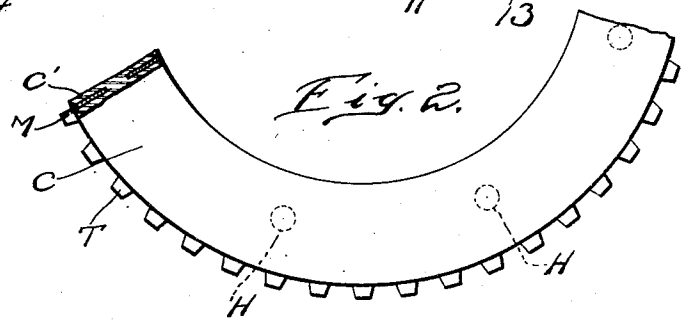


Fig. 3.

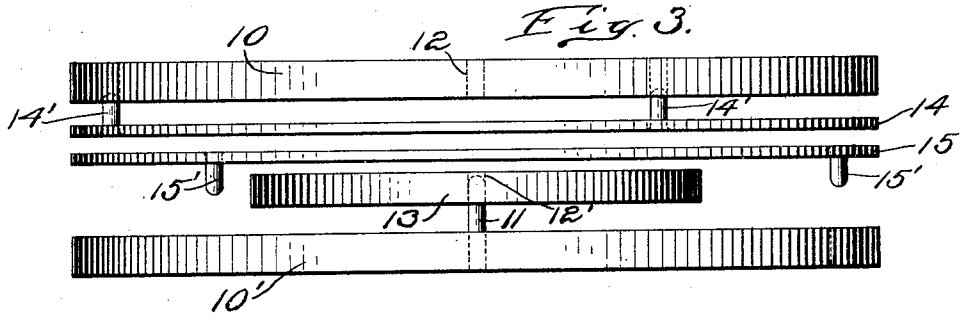
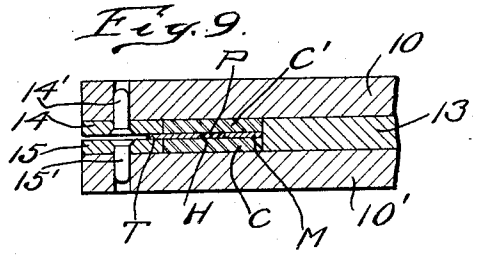


Fig. 9.



Inventor:
William T. Bonner
By Clyde L Rogers
his atty.

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3 SHEETS—SHEET 2.

Fig. 4.

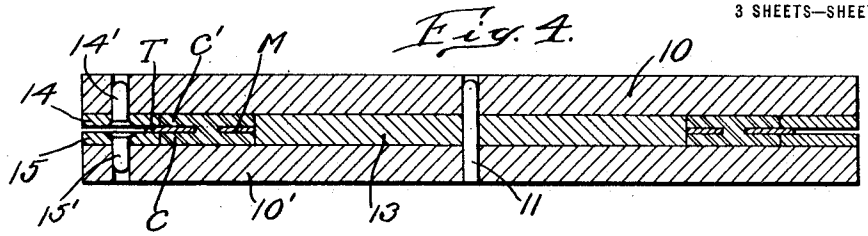


Fig. 5.

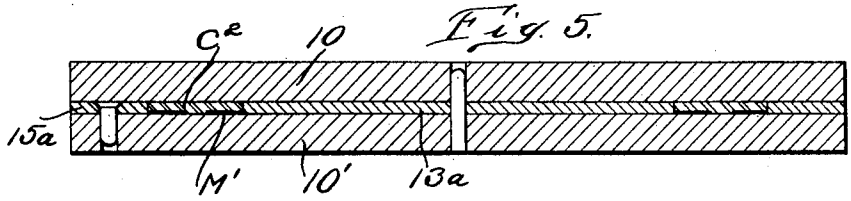


Fig. 6.

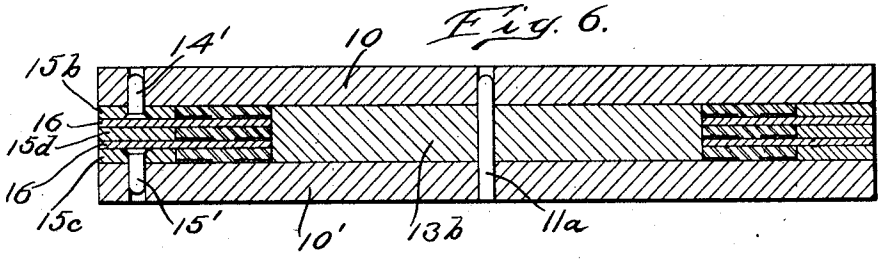


Fig. 7.

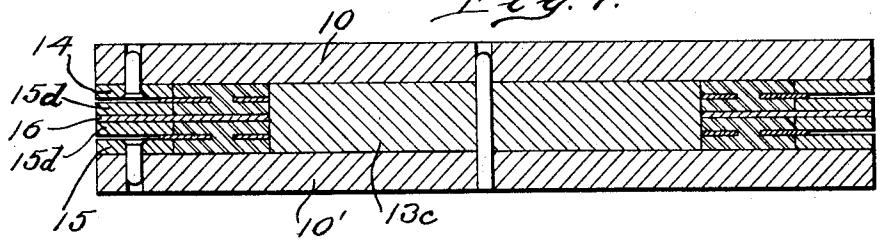
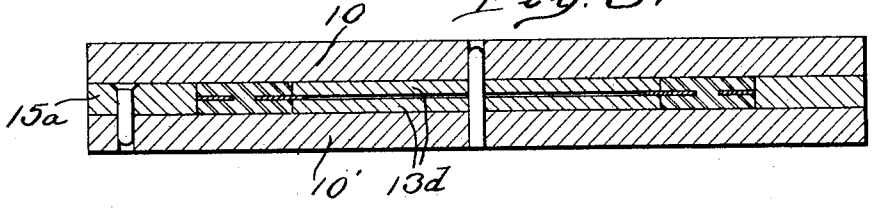


Fig. 8.



Inventor:
William T. Bonner
by Clyde L. Rogers
his Atty.

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3 SHEETS—SHEET 3.

Fig. 10.

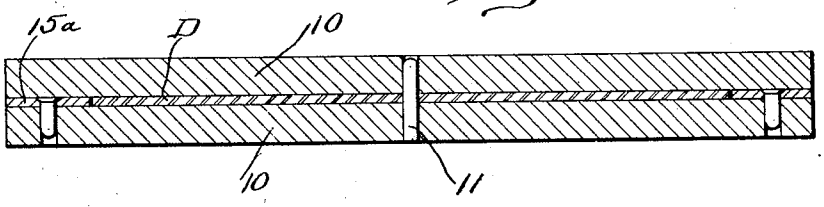


Fig. 11.

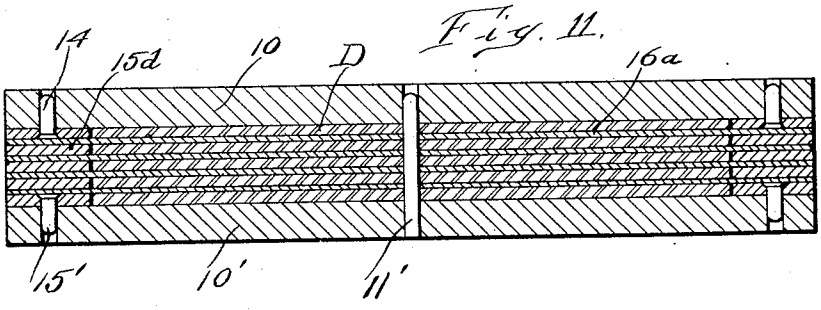
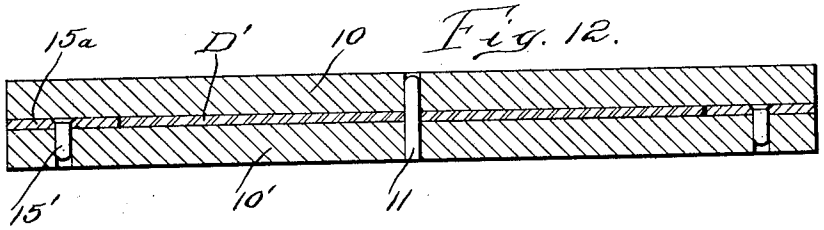


Fig. 12.



Inventor:
William T. Bonner
by Clyde L. Rogers
his atty.

UNITED STATES PATENT OFFICE.

WILLIAM T. BONNER, OF TRENTON, NEW JERSEY, ASSIGNOR OF ONE-HALF TO MAX BROWN AND ONE-HALF TO MAX BROWN, TRUSTEE, OF BOSTON, MASSACHUSETTS.

MOLD.

1,396,158. Specification of Letters Patent. Patented Nov. 8, 1921.

Application filed July 17, 1919. Serial No. 311,418.

To all whom it may concern:

Be it known that I, WILLIAM T. BONNER, a citizen of the United States, and resident of Trenton, county of Mercer, State of New Jersey, have invented an Improvement in Molds, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts in each of the several views.

This invention relates to molds for the making of rings and disks, such as friction clutch rings of the type employed in multiple disk friction clutches as used in automobiles and for other purposes. Heretofore it has been usual to have a separate mold made for each size or type of clutch ring. Furthermore only one clutch ring could be made in a single mold at one time. This necessitates the making of a different mold for every type or size of clutch ring to be produced. This involves a large amount of labor and expense as will be readily seen. The principal object of the invention is to provide a mold whereby several sizes and types of clutch rings may be molded therein by interchanging certain parts of said mold. A further object is to provide means for making several clutch rings in a single mold by the building up of the interchangeable parts thereof and providing a full metallic conductor for the heat as it is applied thereto with the required pressure.

In carrying out my invention I provide top and bottom plates which constitute the main parts of the mold. In conjunction with these plates I employ filling rings, blanking rings and center disks detachably fitted to said main plates and adapted to be conveniently interchanged to conform to the different sizes and types of clutch rings. These interchangeable parts may also be built up to provide a means for making several clutch rings in a single mold at one time. The foregoing and other objects and advantages of the invention will more fully appear from the following detailed description, and the distinctive features of novelty will be pointed out in the appended claims.

Referring to the drawings:

Figure 1 is a plan view of a mold constructed in accordance with my invention with portions broken away;

Fig. 2 is a fragmentary view of one of a well known type of clutch ring generally used in automobiles and the like and which may be made in my improved mold;

Fig. 3 is a side elevation of a complete mold with the parts in position for assemblage;

Fig. 4 is a sectional view of an assembled mold showing the method of making a clutch ring of the type shown in Fig. 2;

Fig. 5 is a similar sectional view showing the method of making a clutch ring with a composition friction face at one side thereof only and with a thin metallic reinforcing member molded with and embedded with respect to the friction facing at one side thereof;

Fig. 6 is a similar sectional view illustrating the method of molding simultaneously a plurality of clutch rings of the type shown in Fig. 5;

Fig. 7 is a like sectional view showing the method of molding simultaneously a plurality of clutch rings of the type shown in Fig. 4;

Fig. 8 is a sectional view showing a modification of the mold structure for producing a clutch ring with interior clutch teeth;

Fig. 9 is a fragmentary view showing a portion of the mold with a clutch ring therein of the type shown in Fig. 2 before the heat and compression are applied, and illustrating the method of vulcanizing the two side rings together by means of filling plugs which are placed in holes which are produced in the center metallic ring;

Fig. 10 is a sectional view illustrating the application of the invention for making of disks;

Fig. 11 is a sectional view illustrating the invention for producing a plurality of disks simultaneously; and

Fig. 12 is a sectional view similar to Fig. 10 illustrating the adaptability of the mold for making different sizes of disks.

10, 10′ indicate the top and bottom plates respectively of a mold constructed in accordance with my invention and these plates constitute the main elements of the mold.

The plate 10′ is equipped with an upwardly projecting pin 11 in the center thereof which is adapted to fit into a corresponding hole 12 drilled in the center of the top plate 10. In conjunction with these top and bottom plates I provide a center disk 13 which is also provided with a hole 12′ adapted to receive the pin 11. 14, 15 indicate annular filling and confining rings which are provided with pins 14′, 15′ respectively adapted to fit detachably into corresponding holes drilled to receive them in the top and bottom plates. The mold shown in Fig. 4 has the parts thereof designed for the production one at a time of a clutch ring with friction faces at both sides thereof. In assembling this mold the center disk 13 is fitted on to the center pin 11 which projects up from the bottom plate 10′, this center disk being of a thickness corresponding to that of the completed clutch ring. In Fig. 2 C, C′ respectively indicate the friction faces of a common clutch ring with a metallic ring M interposed therebetween which is provided with the usual projecting teeth T. The annular ring 15 is then fitted to said bottom plate and is positioned by means of the pins 15′. The composition ring C being previously produced of the required size and thickness is then fitted around the disk 13 filling the space between said disk and the annular ring 15. The metallic reinforcing ring M also being produced of the requisite size is next placed in position, fitting snugly around the disk 13 as does the composite ring C, the teeth T projecting over the top surface of the annular ring 15. The ring M is provided with holes H at intervals therethrough which are adapted to receive filling plugs P of the friction composition material as shown in Fig. 9. When heat and compression are applied to the mold these filling plugs and the composition rings on each side thereof are vulcanized together to form a unitary mass with the friction rings at both sides held firmly together with the metallic reinforcing ring embedded therebetween. After said filling plugs have been placed in said holes the second composition ring C′ is fitted around the center disk 13 and the second annular ring 14 is placed therearound resting upon the projecting teeth T. The top plate 10 is then mounted on top of the whole assembly and is positioned by means of the center pin 11 and the pins 14′ which project upwardly from the ring 14. The mold is then completely assembled and ready for the application of heat and pressure to compress the elements of the clutch ring into a unitary coherent mass as shown in Fig. 4, the friction composition material being extruded and vulcanized under pressure so that it is firmly and permanently united.

In Fig. 5 which shows the method of making one at a time clutch rings with a friction facing C^2 on one side thereof only and with a metallic reinforcing ring M′ exposed at the other side thereof I employ the same main top and bottom plates 10 and 10′ but make use of a single annular ring 15. A thinner center disk is used as shown at 13^a. The parts of the mold and the clutch ring to be made therein are assembled in the same manner as those in Fig. 4.

In Fig. 6 I show my method of building up the intermediate parts of the mold for the making of a series of clutch rings of the type shown in Fig. 5. With this object I employ spacing rings 16 to separate the adjacent clutch rings as they are built or superposed one over the other. I also employ a center disk of a thickness equal to the total thickness of all the clutch rings contained in the mold plus the total thickness of the spacing rings 16 separating said rings as shown at 13^b. In the assemblage of the mold of this form the center disk 13^b is first placed in position on the center pin 11^a and an outer confining ring 15^c is positioned on the base plate 10′ by the locating pins 15′. The parts for the lowermost ring to be molded including the metallic reinforcing backing and the friction composition facing are then applied. Then one of the spacing rings 16 is fitted thereover. Then an intermediate confining ring 15^d is applied and the parts for an intermediate ring to be molded are put in place between the ring 15^d and the center disks 13^b. Then another spacing ring 16 is fitted thereover. It will be understood that this building up operation may be further continued if desired with the further use of like parts. As shown I apply however to the top surface of the second spacing ring 16 a confining ring 15^b with locating pins 14′ to engage with the top plate 10. Then the parts for another ring to be molded being put in place the cover plate 10 is applied and the assemblage is then complete ready for the application of heat and pressure. It will be observed that the same top and bottom plates 10, 10′ are used in this operation as in the previous ones.

Fig. 7 shows the method of building up the intermediate parts of the mold for the making of a series of clutch rings of the type shown in Fig. 4. To this end I build the mold and the parts contained therein precisely as in Fig. 4 but making use of the metal spacing rings 16 to separate adjacent clutch rings from one another. To this end I also make use of a center disk equal to the total thickness of the clutch rings contained in the mold plus the thickness of the spacing ring or rings separating said clutch rings as shown at 13^c. In this form the confining rings 14, 15 are mounted and arranged in the same way with reference to the top and bottom plates as are the corresponding rings

in Fig. 4, while the intermediate confining rings 15^d rest against opposite sides of the spacing ring 16 and engage the toothed projections of the reinforcing members of the clutch rings to be molded.

In Fig. 8 I show means by which I may mold a smaller clutch ring with internal clutch teeth in the same mold by simply changing the sizes of center disks and filling rings used therewith. The same top and bottom plates 10, 10′ are employed but in this case I use an annular filling ring of a thickness equal to the thickness of the clutch ring or rings to be molded as shown at 15^a and the inside diameter of said filling ring being of course cut to conform to the outside diameter of the clutch ring to be made. In this case I employ two center disks 13^d cut to conform the inside diameter of the clutch ring and placed in position so that the inwardly protruding teeth of said clutch ring will be held between them. In this case the mold and the rings held therein are built up in the same manner as shown in the preceding views as will be obvious.

It will be noted that in my improved clutch mold I may manufacture one or more clutch rings of any size, type or description that may be required, the diameters and thicknesses of the clutch rings merely necessitating the changing of the diameters and thicknesses of the intermediate filling rings, blanking rings and center disks. This it will be observed involves little expense as compared with the old way of molding clutch rings wherein a complete new mold would have to be made for each size or type of ring desired. It will also be seen that in building my mold as herein described I provide a complete metal conductor for the heat to which the mold is subjected, in this manner assuring a positive and even heat throughout the mold. While I have herein shown and illustrated my improved mold as adapted to the molding of clutch rings with a metallic reinforce or ring embedded therein or molded therewith it may also be used for molding rings of any size or type either with or without a metallic reinforce, as in some cases it is required to produce a composition clutch ring which is afterward intended to be riveted or attached in any suitable manner to a metallic ring.

In Figs. 10, 11 and 12 I show my improved mold arranged and adapted for molding disks such for example as phonograph record disks, this dispensing with the use of the center disk 13. In this application of the invention the top and bottom plates 10, 10′ are the same as already described and with the same centering pin 11 projecting upwardly from the lower plate 10′. The annular confining ring 15^a as seen in Figs. 10 and 12 is disposed in the same manner as already described and located by means of pins 15′ projecting therefrom into holes therefor in the lower plate 10′, this ring in Fig. 12 being shown as wider, *i. e.*, extending in farther toward the center than in Fig. 10 to provide for molding a smaller disk D′ when the mold is set up in Fig. 12 than as seen at D in Fig. 10. The mold space thus formed permits the production of disks with a center hole as provided by the centering pin 11, being thus suitable for producing ordinary disk phonograph records or the like. For the production of disks or rings with a center hole therein larger than provided by the center pin 11 it will be understood that center filling disks corresponding to the disk 13 as already described may be employed but of selectively smaller dimension. Fig. 11 illustrates the application of the invention for molding simultaneously a series of disks D with a center hole therein. The mold for this purpose is built up in a way corresponding to that already described in connection with Figs. 6 and 7, the spacing disks 16^a corresponding to the spacing rings 16 already described and the intermediate confining rings 15^b being substantially the same as the correspondingly designated rings in Fig. 6. I am aware that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and I therefore desire the present embodiment to be considered in all respects as illustrative and not restrictive, reference being had to the appended claims rather than to the foregoing description to indicate the scope of the invention.

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

1. A mold, comprising top and bottom plates with a centering member extending from one thereof and fitted into the other thereof, a center filling member between said top and bottom members engaged with said centering member, and a peripheral ring confining member engaged with one of said plates to be held in position thereby.

2. A mold, comprising spaced apart plates equipped with means for holding them in relative alinement, and means determining the outline of a ring to be molded fitted between said plates and detachably engaged therewith to be held from displacement with respect thereto.

3. A mold, comprising spaced apart plates equipped with a centering pin extending from one thereof into engagement with the other thereof, and means serving as a spacing element fitted between said plates and detachably engaged with one thereof serving to determine the peripheral outline and dimension of a ring or disk to be molded.

4. A mold, comprising spaced apart

plates equipped with a centering pin extending from one thereof into the other thereof, a center filling disk engaged with said pin and filling the space between the central portion of said plates, and peripheral ring members detachably engaged with said plates respectively and adapted to receive between them projecting teeth of a clutch ring or the like.

In testimony whereof, I have signed my name to this specification.

WILLIAM T. BONNER.