No. 731,748. PATENTED JUNE 23, 1903.

W. BRINTON.

METHOD OF MAKING STAMP SHOES OR DIES.

APPLICATION FILED APR. 8, 1902.

NO MODEL.

Fig. 1.

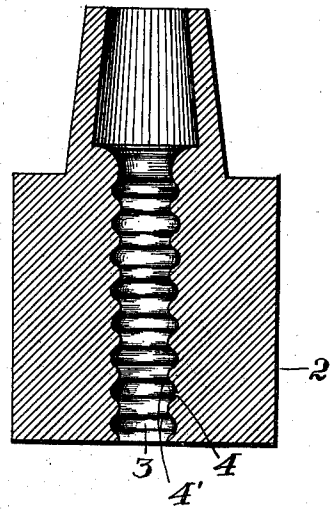
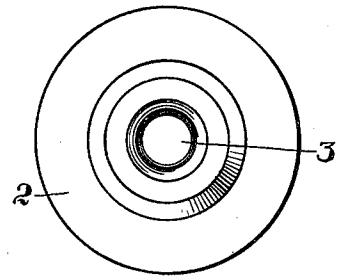


Fig. 2.



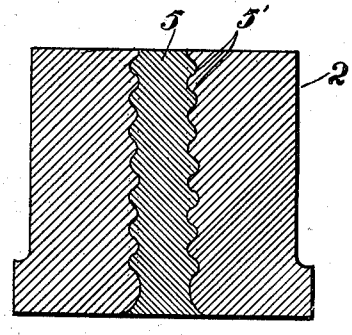


Fig. 3.

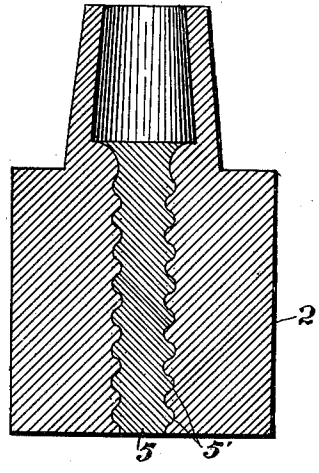


Fig. 4.

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No. 731,748. Patented June 23, 1903.

UNITED STATES PATENT OFFICE.

WALTER BRINTON, OF HIGHBRIDGE, NEW JERSEY.

METHOD OF MAKING STAMP SHOES OR DIES.

SPECIFICATION forming part of Letters Patent No. 731,748, dated June 23, 1903.

Application filed April 8, 1902. Serial No. 101,891. (No model.)

To all whom it may concern:

Be it known that I, WALTER BRINTON, a citizen of the United States, residing in Highbridge, in the county of Hunterdon and State of New Jersey, have invented certain new and useful Improvements in Methods of Making Stamp Shoes or Dies, of which the following is a specification.

This invention relates to stamp shoes and dies for use in rock or other crushing mills, the object of the invention being to provide an improved method of making such shoes and dies and by means of which such articles may be made in sections of a particular structure, thereby to facilitate the heat treatment thereof, and whereby they may be interlocked in such manner that the separatiou of one from the other or the displacement thereof relatively to each other is not possible.

Stamp shoes or dies for use in rock or other crushing mills have been manufactured in several ways—as, for instance, by making them solid—so as to obtain the requisite weight and resistance; but when it was desired to subject the shoe or die to heat treatment the solid mass of metal interfered materially with this step, since as such a mass of metal would conduct heat relatively slowly the interior of the shoe or die was heated or cooled much more slowly than the exterior, so that if rapid cooling was desired the interior would in consequence be less benefited than the exterior, this being especially true of manganese steel, which to be serviceable should be cooled very rapidly throughout the mass, the tendency of such steel being to cool irregularly on account of its poor heat conductivity. To obviate this defect, the stamp shoes or dies were made with openings or holes therein or therethrough, such heat-equalizing hole or holes thus facilitating very materially the heat treatment of the device, the hole being usually subsequently filled by a solid plug. In practice, however, it was found that in the constant use of the die and shoe the plugs work loose, frequently falling out and interfering materially with the proper working of the device, and while it has been attempted to wedge or otherwise secure these plugs in position dies or shoes constructed in this manner have not been free of the defects specified, since in the casting of the main body of the shoe or die irregularities due to the shrinkage of the metal caused settling around the opening—that is, the drawing away of the metal from the opening—and so left holes of irregular shape, so that when the plug (which heretofore has been in the form of a solid body) was fitted into the opening these irregularities in the wear of the device appear at the working surface of the die or shoe, permitting the plug to become loose and frequently drop out. By the present method of constructing the dies and shoes, however, I am enabled to overcome these difficulties, since while still retaining the heat-equalizing opening or openings in the die or shoe, thereby to facilitate the heat treatment of such device, the wall of the opening is formed in such manner that it cooperates with the filling-section or plug, which is inserted not in the form of a solid plug, but cast therein, so that the sections of the die or shoe are so interlocked together, owing to their construction and without an independent or separate means, that to all intents and purposes the die or shoe is an integral structure having all the advantages of such structure—namely, a filling-section not movable or separable from its body during the life of the shoe or die.

In the drawings accompanying and forming part of this specification, Figure 1 is a vertical section of a shoe with its heat-equalizing opening unfilled. Fig. 2 is a top view thereof. Fig. 3 is a vertical section of a die with its heat-equalizing opening filled, and Fig. 4 is a vertical section of the shoe shown in Fig. 1 with its opening filled.

Similar characters of reference indicate corresponding parts in the different figures of the drawings.

As a preface to a further description of this improved method of constructing dies and shoes it will be understood that such dies and shoes may be made of various shapes and forms, being, however, illustrated herein as circular, and, if preferred, they could have one or more openings, one, however, of proper size being usually sufficient, and the opening or openings could extend into or all the way through the body of the device, as found most desirable in practice.

Since the die and the shoe are constructed in the same manner, a description of one will be deemed sufficient.

In the manufacture of this improved die or shoe the body 2, preferably formed of suitable unmachinable metal, although this is not absolutely necessary—such, for instance, as manganese steel, which has been found to be particularly well adapted for the construction of devices of this character—is first cast with a heat-equalizing opening 3. This opening has its wall 4 formed with an irregular surface comprising projections and grooves, forming a corrugated wall 4', adapted to interlock with the filling or plug. After the casting is cooled or cool enough to permit handling it is heated up to a predetermined temperature or condition and then subjected to a cooling medium, such as a fluid—for instance, water. Various modes of cooling, however, according to the characteristics to be imparted to the device, may be used. After the toughening step is completed the body is placed in position to receive the filling-section 5, which may be of the same character of material as the body or of a different material, as found desirable, it being first in the form of molten metal, which is poured into the opening, filling the same and forming corresponding corrugated surfaces 5', interlocking rigidly with the surfaces of the body as such filling metal solidifies, thus fastening the section or plug against all possible displacement or separation during the life of the device. This mode of forming a shoe or die or analogous article results in the provision of a superior device, which while still retaining the heat-equalizing opening, so as to obtain the advantages resulting therefrom, enables the opening to be filled in such manner that the body and its filling-section are permanently interlocked, so that the device in use is equal in all respects to a solid piece of metal and even superior thereto, since it has received a more thorough heat treatment.

The corrugations or interlocking surfaces not only afford an interlock for retaining the filling-plug in position, but from practical experience it is known that they facilitate to a large extent the heat treatment of the article, since there is less likelihood of internal strains setting up while taking up heat and also less likelihood of the casting being affected by internal strains while giving up the heat or cooling. This mode of forming the heat-equalizing opening thus insures a more uniform expansion during the heating of the article and a more uniform contraction thereof during the cooling, thereby preventing abnormal and irregular strains and subsequent cracking of the casting, and by this process I have been able to produce a shoe or die of manganese steel commercially superior to anything heretofore produced.

The corrugations, it is believed, afford increased surface exposure of the castings, which thus assists the more equal distribution of heat throughout such casting, also the giving off of heat during the cooling thereof. Furthermore, owing to the corrugations it is believed that there is less rigidity of the castings at critical periods of expansion and contraction during the heat treatment, there being less likelihood of rigid and intense arches of resistance setting up in the broken lines than there would be in straight plane surfaces.

It has been found in some instances that by having the surfaces of the projections and depressions of the walls of the opening in the shoe or die directly intersecting each other in curved angles, as shown, there is still less liability of the article being affected by internal stresses either in the heat-treating of the article or in the cooling of the same, although this may not be said to be absolutely essential in other instances.

By this improved method a sufficient toughening of the filling or plug is also obtained without independent heat treatment thereof owing to the molten metal of which said filling is composed coming in contact with the cold corrugated walls of the casing or body. Moreover, owing to this mode of forming the device the necessity of filling the upper part, or that part which may be designated the "shank" of the shoe, is avoided, and since this is thrown into the scrap-heap after the body of the shoe is worn out a material reduction in the weight of scrap metal is obtained.

Having described my invention, I claim—

1. The method of manufacturing stamp shoes or dies, which consists in forming a body of unmachineable metal with an opening throughout having irregularly-shaped walls, heating the body, cooling the same, and filling said opening.

2. The method of manufacturing metal articles which consists in casting a manganese-steel body with an opening having an interior irregular surface, heating said body to a predetermined temperature, cooling the same by subjecting it to a fluid, and filling said opening by pouring metal thereinto.

3. The method of manufacturing stamp shoes or dies, which consists in casting a body with a heat-equalizing opening, having an irregular wall-surface, heat-treating said body by heating and cooling it, and pouring into the opening of the cooled body molten metal to form a plug which as it solidifies, interlocks with the walls of said opening and owing to its contact with the cooled wall of said opening is toughened.

4. The method of manufacturing stamp shoes or dies, which consists in casting a body of manganese steel with a heat-equalizing opening, the walls of which are made up of projections and depressions, heating the body to a predetermined temperature, cooling the same by means of a fluid, and finally filling said opening.

5. The method of manufacturing manganese-steel stamp shoes or dies, which consists in casting a manganese-steel body with a heat-equalizing opening therein provided with an irregular wall-surface, heating said body, cooling the same by subjecting it to a fluid, and filling said opening by pouring molten metal thereinto.

6. The method of manufacturing stamp shoes or dies, which consists in casting a body of unmachineable material with a heat-equalizing opening having throughout an irregular wall-surface, subjecting such body to heat treatment by heating and cooling, and pouring into said opening molten metal which, as it solidifies, interlocks with such surface.

7. The method of manufacturing stamp shoes or dies, which consists in casting a manganese-steel body with an opening having an irregular wall-surface, heating and cooling such casting, and pouring molten metal into said opening to interlock with said wall-surface, as it solidifies, and form a filling for such opening.

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