Aug. 14, 1945. H. F. HAGEMEYER 2,382,053

MOLD FORM

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Fig. 1.

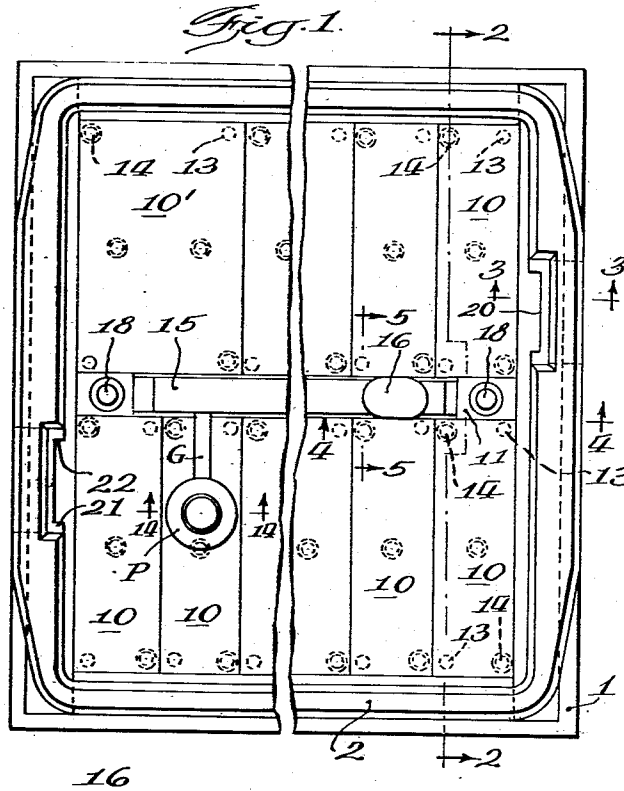
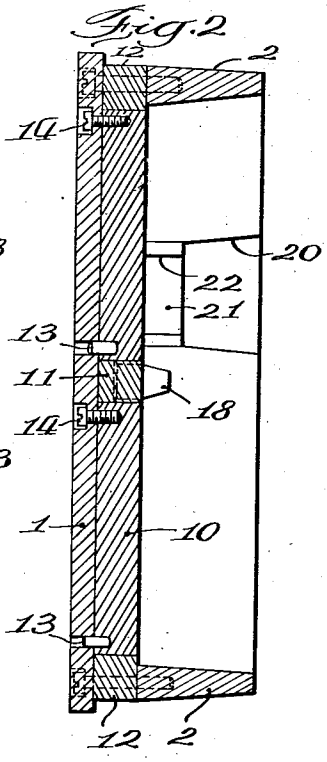


Fig. 2.



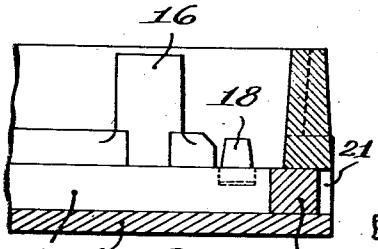


Fig. 4.

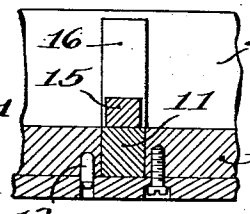


Fig. 5.

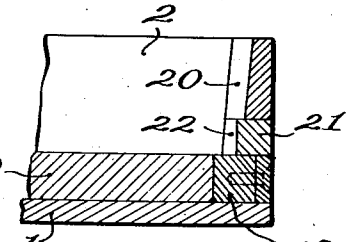


Fig. 3.

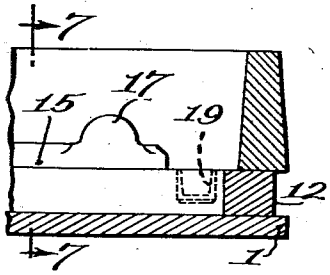


Fig. 6

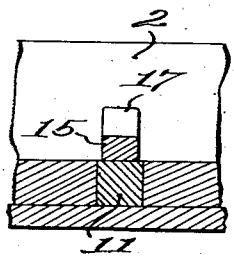


Fig. 7

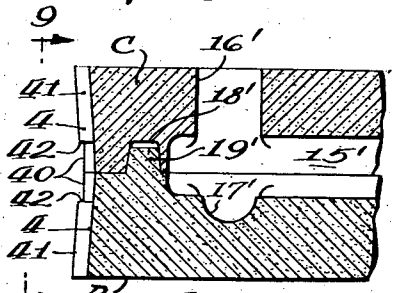


Fig. 8

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Fig. 10.

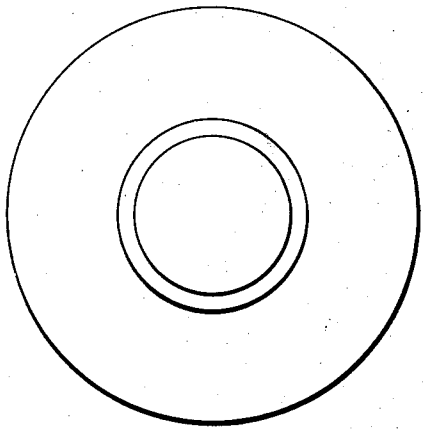


Fig. 12.

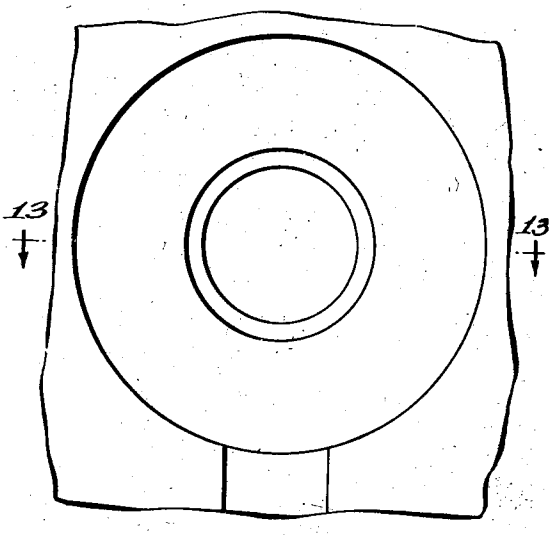


Fig. 13.

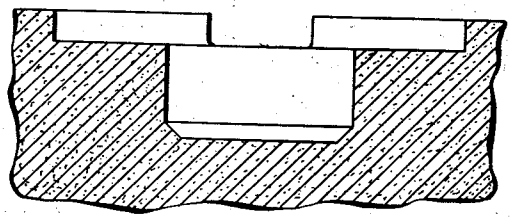


Fig. 11.

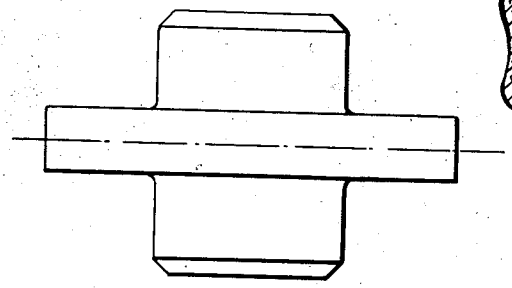
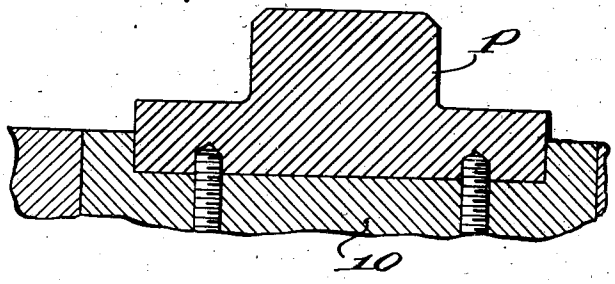


Fig. 14.



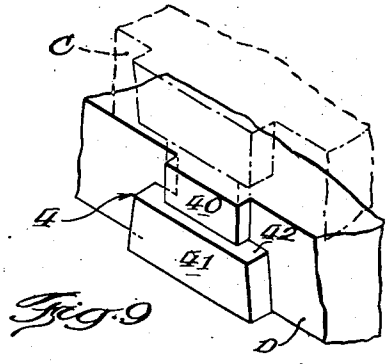


Fig. 9

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UNITED STATES PATENT OFFICE

2,382,053

MOLD FORM

Henry F. Hagemeyer, Chicago, Ill., assignor to Castings Patent Corporation, Chicago, Ill., a corporation of Illinois

Original application June 14, 1938, Serial No. 213,595. Divided and this application April 2, 1942, Serial No. 437,306

3 Claims. (Cl. 22—157)

My invention pertains to mold forms for making molds which in turn are for use in making metal castings. This application is a division of my copending application Serial No. 328,215, filed April 6, 1940, and entitled Molds and mold forms, which is a division of application Serial No. 213,595, filed June 14, 1938, entitled Molds and mold forms and which issued July 2, 1940, as Patent No. 2,206,034.

In conventional casting practice, where a continually changing variety of castings is made in small lots, the match plates used for only one job and then discarded are a source of considerable expense. Such match plates are relatively costly because they must be machined accurately to provide a true parting surface on each mold section. Heretofore it has been customary to affix the individual patterns directly to the match plate, so that it can be used with no other pattern group and becomes obsolete when the run of its particular group of castings is completed. It is extremely infrequent that repeat orders will be received at one time for equal quantities of all castings corresponding to the patterns on a match plate. A choice must be made, therefore, between devoting a whole match plate to one type of pattern, which usually is not warranted by the quantity of units required, or by shifting patterns for castings, a larger number of which is required, to new match plates with a different pattern assembly, when the quantity of castings corresponding to some of the patterns on the match plate has been made. The old match plates are then discarded and the patterns whose jobs are completed are removed from such match plates and stored.

I have devised a match plate assembly which employs a plurality of individual pattern plates, each carrying a pattern, which may be assembled in parquet fashion on a base plate. These unit pattern plates are all of the same size, or in size a simple multiple of the smallest pattern plate, so that a selected group of such plates can be assembled onto a base plate of standard size adapted to accommodate a predetermined number of unit pattern plates of the smallest size. Such assembly will, of course, exactly cover the entire pattern plate receiving surface of the base plate.

A further difficulty arises in conventional practice in the assembly of the mold sections. Occasionally there are parts of a mold section projecting beyond the general plane of the parting surface; for example, there may be dowels of a dowel and socket registering arrangement. When the mold sections are being placed together the parting surfaces are hidden from view, and it is difficult to tell whether the corresponding parts of the sections are in exact registry as the sections approach each other. Mold material, such as that of the gypsum base type, for example, is quite fragile and if a projecting part of one mold section is not in precise alignment with its complemental recess in the other mold section, either the projection, or the surface of the other mold section accidentally struck by such projection, or both, may be damaged. Even an injury only to a dowel may be serious, for its purpose is to prevent misalignment of the adjoining mold sections so that an accurate casting, rather than a lopsided one, will be produced by the metal poured into the mold cavity.

To insure accurate positioning of the mold sections during the assembling operation, I have devised registering elements for their edges which may be engaged by a suitable guiding device prior to contact of their parting surfaces. This mechanism will guide the movement of the mold sections as they approach engagement and preferably also will support at least one of such sections during such operation. The registering element may consist of ribs, one on each of two opposite edges of each mold section, extending perpendicular to the parting surface and so disposed that the cope ribs will be aligned with the drag ribs when the mold sections are assembled. The cope ribs may be provided with shoulders intermediate their ends which may be employed in supporting the cope.

The principal object of my invention, therefore, is to provide a match plate assembly having a plurality of interchangeable pattern plates all of a uniform size, or the size of each of which is a simple multiple of the smallest pattern plate, which may be assembled to cover a base plate in parquet fashion.

A further object is to provide such a match plate assembly in which the runner and sprue cavity forming portions of the pattern need not be disturbed, and preferably also the patterns for forming dowels and dowel sockets for the mold sections will remain fixed when the pattern plates are interchanged.

Still another object is to provide means for forming on the mold sections during the molding operation registering elements for use in guiding complemental mold sections while they are being assembled to form the complete mold.

Additional objects, and especially those resulting from the particular construction of my flask

and match plate assembly, will be understood from a study of the following detailed description in conjunction with the accompanying drawings. I have illustrated a flask rim or ring and match plate assembly which I have found to be practical, but obviously many variations may be made in its structural details within the spirit of my invention as defined in the claims appended to this specification.

Fig. 1 is a plan view of the cope flask rim and match plate assembly showing a representative casting pattern mounted on a pattern plate.

Fig. 2 is a transverse section taken along line 2—2 of Fig. 1.

Fig. 3 is a fragmentary longitudinal section taken along line 3—3 of Fig. 1.

Fig. 4 is a fragmentary longitudinal section taken along line 4—4 of Fig. 1.

Fig. 5 is a fragmentary transverse section taken along line 5—5 of Fig. 1.

Fig. 6 is a fragmentary longitudinal section corresponding to Fig. 4, but illustrating the drag flask rim and match plate assembly.

Fig. 7 is a fragmentary transverse section taken along line 7—7 of Fig. 6.

Fig. 8 is a fragmentary central longitudinal section through assembled cope and drag mold sections.

Fig. 9 is a fragmentary perspective view of the drag mold section showing the projecting rib used to assist in guiding it during the operation of assembling the cope and drag mold sections into the complete mold.

Fig. 10 is a plan view of a representative casting.

Fig. 11 is an elevation view of the casting of Fig. 10.

Fig. 12 is a fragmentary plan view of one mold section employed in forming the casting of Fig. 10.

Fig. 13 is a transverse section taken on line 13—13 of Fig. 12.

Fig. 14 is a fragmentary transverse section taken on line 14—14 of Fig. 1, and showing the pattern employed in forming the mold section of Fig. 12.

In the match plate and flask assemblies shown in Figs. 1 to 7, inclusive, the individual pattern plates, 10, each of which will be provided with some useful casting pattern P, are mounted in parquet fashion on a base plate 1, which extends preferably beyond all the elements assembled thereon. Thus the entire pattern plate receiving area of base plate 1 will be covered by edge-adjoining pattern plates. These pattern plates may all be uniform in size, or if larger plates are required to accommodate certain patterns, they may be made double the size of the smallest plate 10, as indicated by 10', or the size may be even three or four times the size of the minimum plate. Preferably the length of all the plates between the center plate 11 and a marginal plate 12 is the same, although the widths of different sized plates, parallel to the center plate 11, may vary in simple multiples of the width of the narrowest plate. These pattern plates may, therefore, all be said to be in width a simple multiple of the smallest plate size, the term "simple multiple" including unity, to embrace the situation where all the plates are of the same size.

On each pattern plate will be mounted permanently a useful casting pattern, and when the presently required number of molds have been made from this pattern as it is incorporated with its pattern plate in a match plate assembly, the pattern and pattern plate as a unit may be removed from the base plate and stored, while a pattern plate of the same size but bearing a different pattern will be inserted in the match plate assembly in its place. No other pattern plate of the assembly need be disturbed during such substituting operation. The flask rim and match plate structure is such that even a complete interchange of the individual pattern plates may be made without disturbing any of the uniformly necessary elements such as the flask rim, sprue post, and main runner pattern, which remain permanently secured to the base plate 1.

Moreover all pattern plates of the same size are provided with uniform means for securing them to the base plate 1, which may consist of dowels 13 carried by two diagonally opposite corners of the pattern plate and engageable in holes formed in the base plate 1. Into the other diagonally opposite corners may be screwed bolts 14 extending through the base plate 1 which is recessed to receive the bolt heads. A further similar holding bolt may be provided at the center of each pattern plate. The disposition of the dowels and bolt receiving apertures will, of course, correspond on each of the pattern plates no matter what the plate width may be. In each of the various pattern plate positions of the base plate 1 the screw and dowel holes will be arranged in the same relative positions.

The center plate 11 and the marginal plates 12 may be permanently secured to the base plate 1 in any suitable manner. A flask rim or ring 2 may also be secured in permanent relationship to the match plate, preferably resting on the marginal plates 12. On the center plate 11 a runner pattern strip 15, shorter than the center plate, is mounted, which may be the same shape and size for both the cope and drag match plates, and both ends of which stop short of the rim 2. I prefer, however, that the runner pattern in the cope match plate be higher than that in the drug match plate, to allow any dross which may flow into the runner cavity to accumulate in the upper portion thereof above branch gates provided in the cope mold section. In the cope match plate a sprue pattern post 16 is also provided, preferably located at one end of the runner pattern 15. The runner pattern of the drag also has a sprue pattern projection 17 which produces a sprue sump in the drag section of the mold immediately below the sprue aperture in the cope section of the mold.

Between each end of the center plate 11 and the adjacent end of the runner pattern 15, I provide means constituting a pattern for either the dowel or the socket of a dowel and socket mold section registering device. Preferably in the cope match plate a boss 18 is provided to serve as a pattern for forming a dowel socket in the cope mold section. In the drag match plate assembly, on the other hand, will be provided a cup 19, of slightly less depth than the height of boss 18, serving as a pattern for a dowel complemental to the dowel socket formed in the cope mold section. It will, therefore, be seen that the patterns for forming the dowel registering mechanism, the runner cavity, the sprue aperture, and the sprue sump are all permanently secured to the base plate 1, and are entirely separate from and mounted independently of the interchangeable pattern plates 10 and 10'.

The manner in which the cope and drag mold sections fit together is illustrated in Fig. 8, in which the cope section C is provided with the sprue aperture 16' and a portion of the runner cavity 15', whereas the drag section D has the sprue sump 17', located immediately below the sprue aperture 16', and the remainder of the run-

ner cavity 15'. The sprue aperture and sump, as well as the portions of the runner cavity and complemental mold cavities formed in other portions of the cope and drag, are held in registry by the dowels 19' of the drag seated in the dowel sockets 18' provided in the cope. The purpose of the sprue sump 17' is to prevent the molten metal from rushing violently and in a pulsating fashion into and through the runner cavity 15', and from there into the useful casting forming portions of the mold cavity. As the metal flows through the aperture 16' into the sprue sump 17' its inrushing force is somewhat absorbed by the impact and turbulence therein, and its flow becomes consolidated and smooth as it enters the runner cavity.

It is extremely desirable that the mold sections be so disposed in registry prior to their assembly that there will be no lateral movement of the parting surfaces at the time of their contact. Some provision should, therefore, be made to confine the mold sections to strictly linear movement as their parting surfaces approach each other during the assembling operation. For this purpose I provide mold section registering elements on each mold section, such, for example, as the ribs 4 formed on each end of each mold section generally perpendicular to their respective parting surfaces, as shown in Figs. 8 and 9. Preferably each rib, immediately adjacent to the parting surface of the mold, has a portion 40, provided with side and end faces in planes precisely normal to the parting surface, the two side faces, moreover, being parallel. The ribs are complementally located and aligned so that the side and end surfaces of the portions 40 on the respective ends of the cope and drag mold sections are in coplanar relationship. Between the portion 40 of each rib 4 and the flared portion 41 thereof, a shoulder 42, projecting beyond both the sides and end of the portion 40, is provided, which should be of sufficient width to enable the mold section to be supported by a device only in engagement with such shoulder. As the mold sections approach each other, therefore, suitable means should be provided to maintain the sides of the portions 40 on the corresponding cope and drag ribs 4 in coplanar relationship as the parting surfaces are brought into engagement.

A convenient method of forming the ribs 4 is to provide pattern recesses 20 in the wall of the flask ring or rim 2. To increase the accuracy of the registering operation, the sides of the portion 40 of each rib 4 should be formed to precise dimensions and shape. These factors may be more easily controlled if the recess in the flask is provided with a separate pattern block 21 accurately positioned with respect to the match plate assembly and in which the recess for forming the rib part 40 is cut. Such blocks may in turn insure precise positioning of the flask rim 2 with respect to the match plate. The blocks 21 may be secured to the marginal plates 12 at each end of the match plate, since these plates are secured in fixed relationship to the base plate 1 and in turn are definitely located with respect to the center plate 11 and to the pattern plates 10. The flask rim 2 is provided with a notch in its lower edge of proper width and depth to fit snugly over the pattern block 21. For forming the portion 41 of each rib 4 of a size to leave the intermediate shoulder 42 between the ends of the rib, the portion of groove or recess 20 in the flask rim proper remote from the base plate should be wider and deeper than the groove 22 in the block 21, but should be in alignment with such groove. When located in proper lateral relationship by the blocks 21 fitted within its grooves the flask rim 2 may be secured permanently to the base plate 1 by any suitable means. As is evident from Fig. 1, the pattern plates 10 or 10' may be removed from or inserted into the match plate assembly without removing the flask ring or disturbing the location of the blocks 21 which are secured to the marginal plates 12.

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

1. A mold form, comprising a base plate, a center plate secured thereon, a runner pattern strip of a uniform width slightly less than said center plate upstanding therefrom, and extending lengthwise of said center plate in a position intermediate its edges to leave a marginal strip of the top thereof exposed along each side of the runner pattern strip, marginal plates secured on said base plate, one along each edge of said base plate, parting surface pattern plates, each interengaged between said center plate and marginal plate, and a flask wall secured to said base plate and resting on said marginal plates, said wall being conformed to provide registration projections on the mold.

2. A mold form, comprising a base plate, and a marginal flask rim upstanding above said base plate, said rim being provided on its inner face with means constituting a pattern for forming a mold section registering device on the side of a mold section.

3. In a mold form for producing multiple castings in a single mold, a pair of base plates, a central longitudinal gate pattern on each of said plates including mold register doweling means, a pair of flasks mounted in coacting relationship on said base plates, mold registering means constituting a pattern for forming mold section registering devices on the sides of the mold sections, multiple pattern match plates removably mounted on the base plates to cover the pattern plate areas of the base plates, the arrangement providing structure to permit interchange of pattern plates without disturbing the accuracy of alignment in the pair of molds.

HENRY F. HAGEMEYER.