April 13, 1943. R. H. OSBRINK 2,316,280

METHOD AND APPARATUS FOR PRODUCING CASTINGS

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Fig. 1

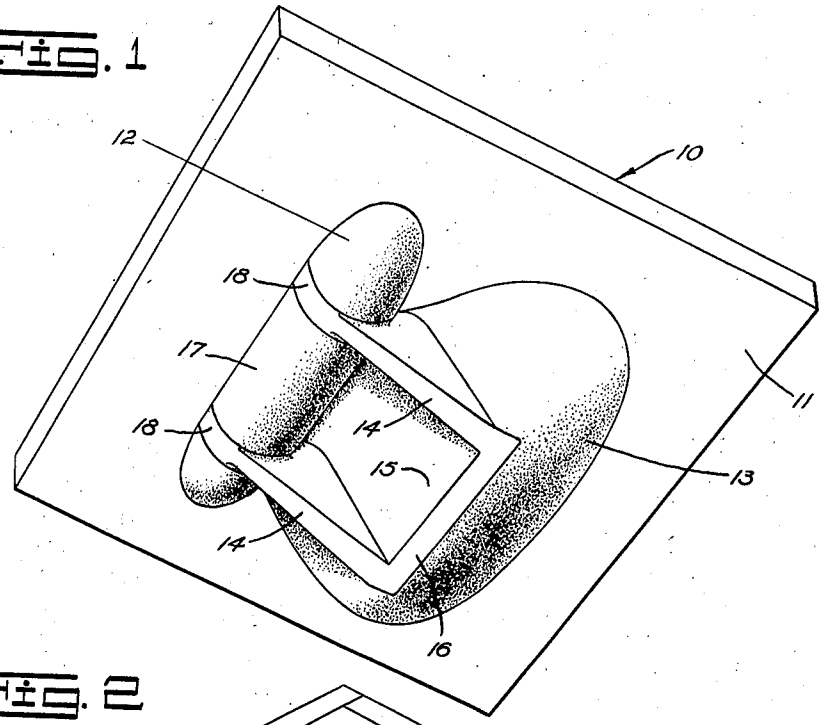


Fig. 2

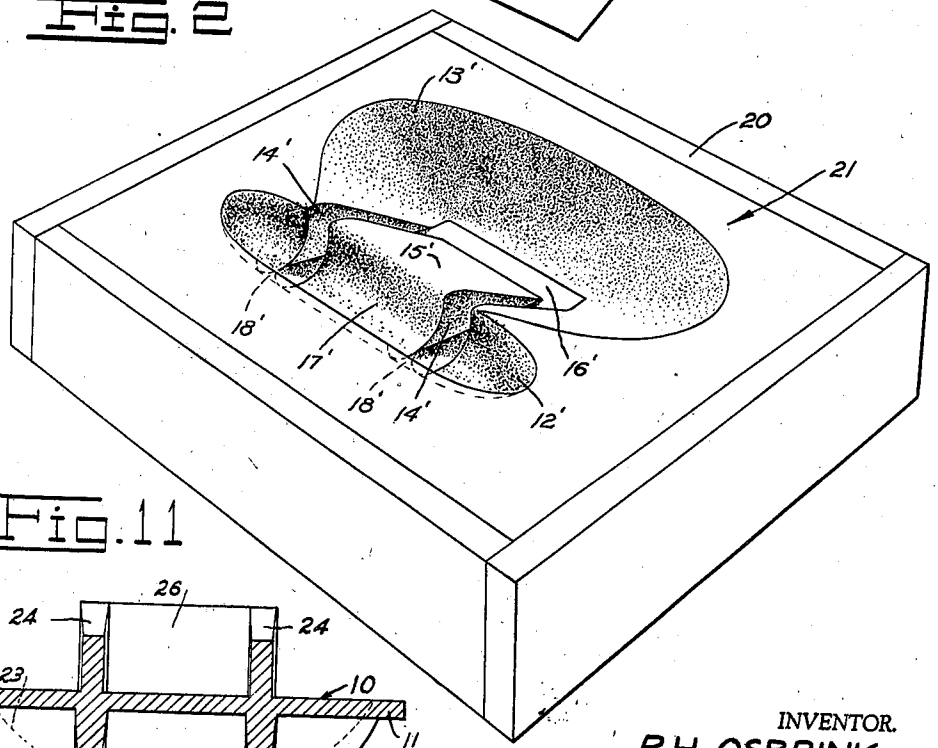


Fig. 11

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Fig. 3

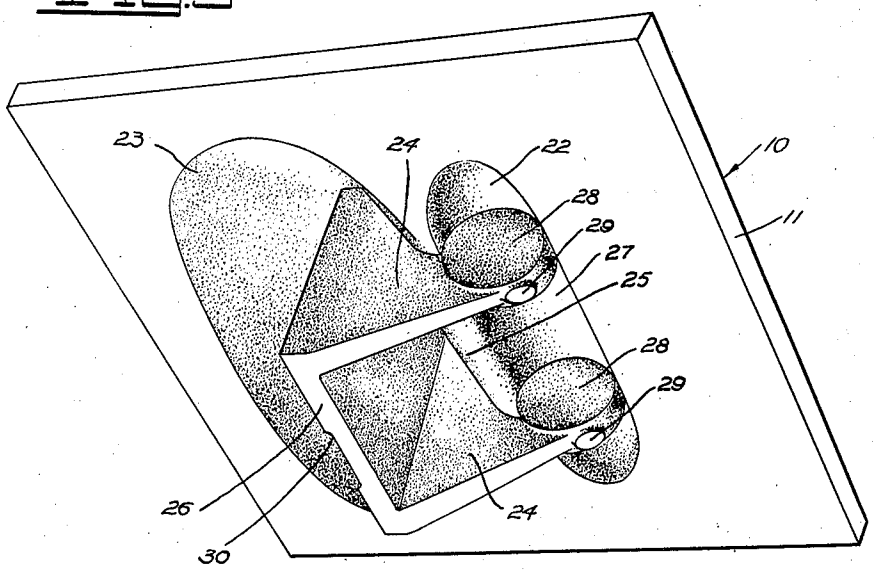
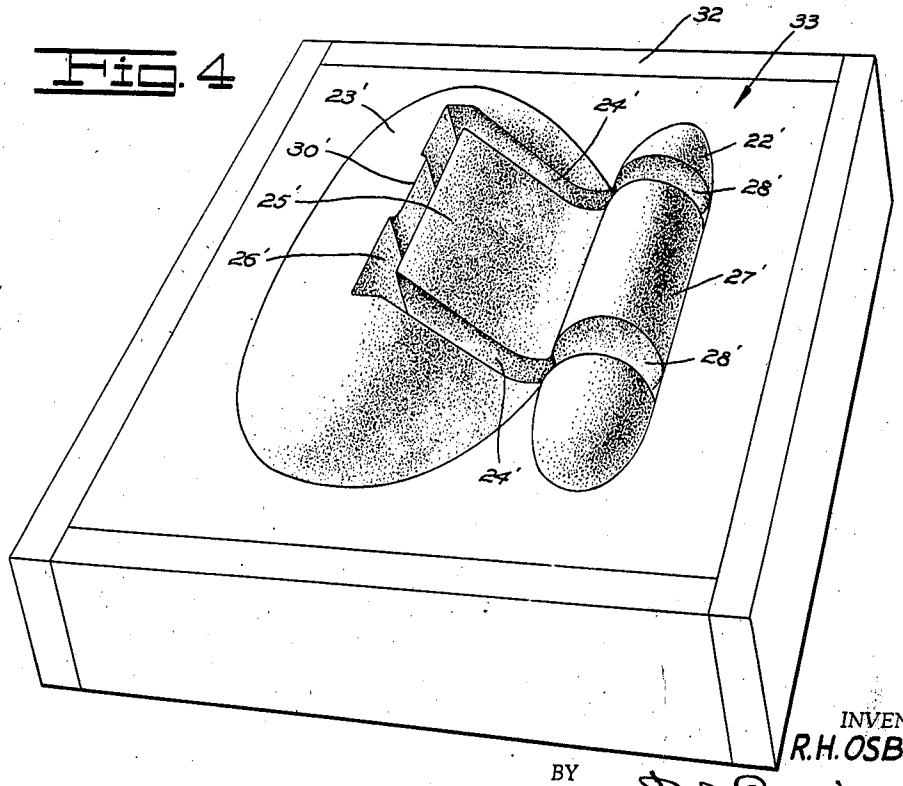


Fig. 4



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Fig. 5

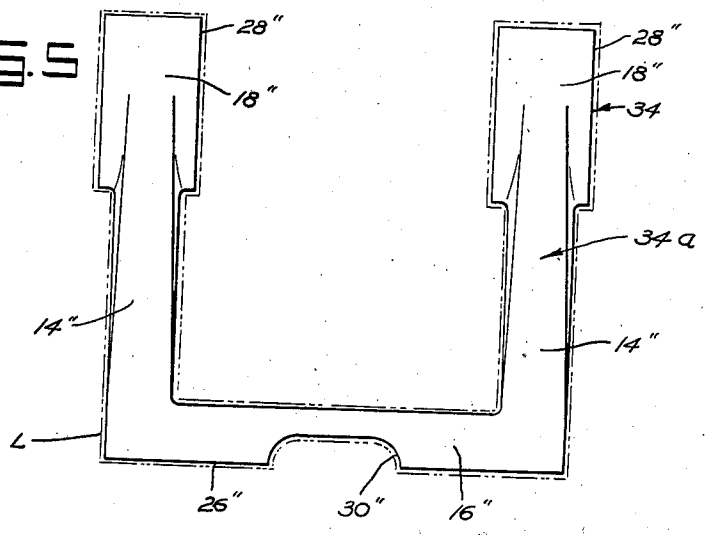


Fig. 7

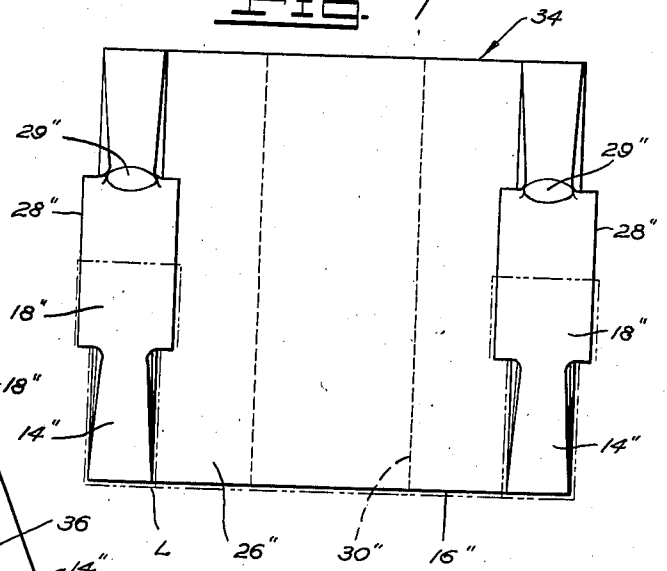
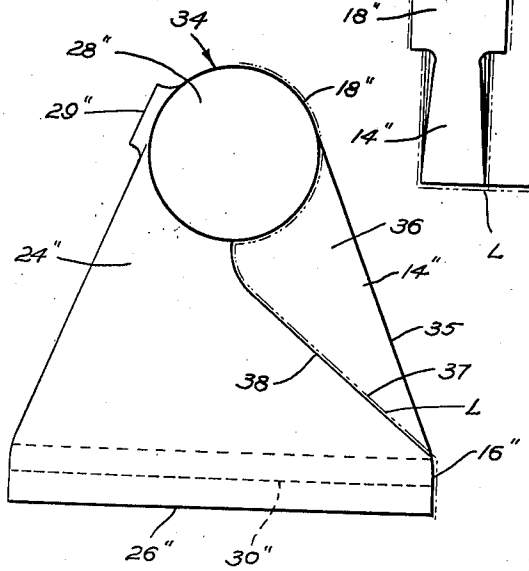


Fig. 6



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Fig. 8

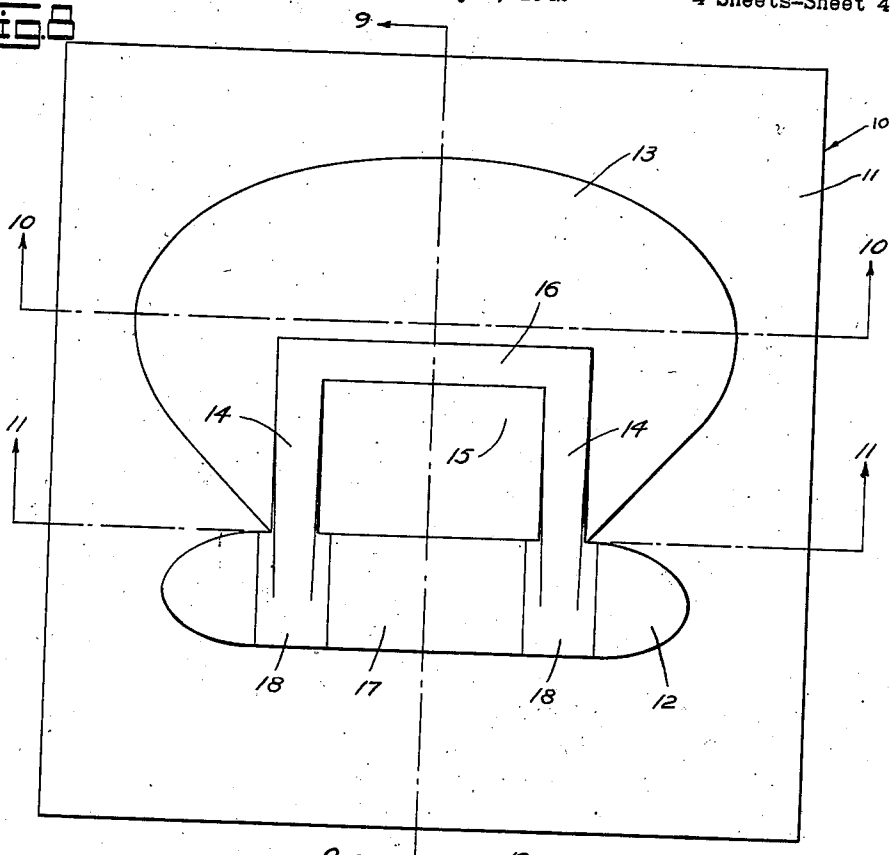


Fig. 9

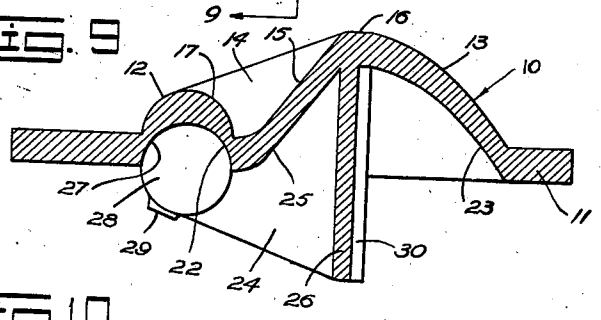
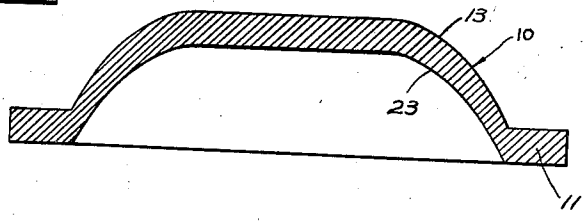


Fig. 10



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Patented Apr. 13, 1943 2,316,280

UNITED STATES PATENT OFFICE

2,316,280

METHOD AND APPARATUS FOR PRODUCING CASTINGS

Raymond H. Osbrink, Los Angeles, Calif.

Application May 5, 1942, Serial No. 441,771

5 Claims. (Cl. 22—157)

This invention relates to a new and novel method and apparatus for producing castings which possess novel characteristics.

An object of this invention is to provide a novel casting which has dimensional accuracy and which is easily cleaned or filed to remove excess metal left on the parting line of the casting.

Another object of the invention is to provide pattern equipment for molding which is so constructed that it locates the parting line largely on angular portions of the castings rather than on flat faces thereof, thereby eliminating the laborious dressing of flat surfaces with parting lines cutting across the face where a slight shift between the cope and drag would necessitate extensive cleaning work.

Yet another object of the invention is to provide a novel method of reducing the dressing of a casting having a parting line cutting across a flat surface by elevating the surface on one side of the parting line adjacent to the parting line whereby it is necessary to dress off only the small elevated portion to remove the unevenness caused by a parting line shift instead of having to dress off the entire surface of the casting as would be required with the former method.

Other objects and advantages of the invention will be apparent from the accompanying illustration wherein:

Fig. 1 is an oblique bottom view of a match plate embodying my invention;

Fig. 2 is an oblique top view of a mold produced by the side of the match plate shown in Fig. 1;

Fig. 3 is an oblique bottom view showing the match plate shown in Fig. 7 turned over;

Fig. 4 is an oblique top view of a mold produced by the side of the match plate shown in Fig. 3;

Fig. 5 is a side view of a casting produced by the molds shown in Figs. 2 and 4;

Fig. 6 is an end view of the casting shown in Fig. 5;

Fig. 7 is a top plan view of the casting shown in Figs. 5 and 6;

Fig. 8 is a plan view of the match plate shown in Figs. 1 and 3;

Fig. 9 is a reduced section taken on line 9—9, Fig. 8;

Fig. 10 is a section taken on line 10—10, Fig. 8, and

Fig. 11 is an enlarged section taken on line 11—11, Fig. 8.

In the illustrations the customary match plate and flask hardware consisting of clamps and alignment devices which are old in the art have not been shown to avoid complication of the illustrations. In the interest of simplicity the customary gates, risers, etc., also old in the art, are not shown on either the match plates or molds.

Although the illustrations show the use of my invention to produce a bracket, it will be understood that my method and apparatus are equally applicable in the manufacture of other forms of castings.

As shown in the accompanying drawings, the match plate is not provided with draft and the mold is to be separated by vibration and by an accurately controlled machine which performs the drawing. Such a drawing machine is described in my copending application, Serial Number 436,744, filed March 30, 1942. However, the features of my invention are equally applicable to the customary method using match plate draft.

Referring to the drawings by reference characters, I have indicated my improved match plate generally at 10. As shown, the match plate comprises a flat double faced body portion 11. The lower side of the flat portion 11 has an elongated elliptical convex, raised, portion 12, and an arcuate, somewhat circular, higher raised portion 13 thereon (see Figs. 1, 9, and 10). Joining these two portions 12 and 13 I provide a pair of generally triangular tapered wall or bridge portions 14 and between these bridge portions 14 I provide a sloping portion 15 of single curvature. This portion 15 extends from a flat portion 16 at the crown of the portion 13 to a cylindrical portion 17 of the elliptical portion 12. The upper face of the bridge portions 14 is planar and merges at one end into the portion 16. The upper face of the bridge portion slopes downwardly and at the other end merges into a cylindrical portion 18. The portions 17 and 18 are of the same diameter and are coaxial so that the two portions lie in the same surface.

The mold produced by the lower side of the plate 10 is shown in Fig. 2 and comprises the customary flask 20 in which the sand is shaped into a mold member indicated generally at 21. Using single primed reference characters in Fig. 2 to refer to the equivalent surfaces of Fig. 1, I show an elongated concave, elliptical, recess 12' and an arcuate somewhat circular, deeper, recessed portion or depression 13'. The portions 12' and 13' are connected by a pair of channels 14' formed by the bridges 14 of the match plate 10. Between the channels 14' I provide a raised portion 15' of single curvature merging at its lower end into a flat portion 16' and at the other end merging into a cylindrical portion 17' which is a part of the elliptical recess 12'. The channel

portions 14' merge at the lower end into the flat portion 16' and at the other end into cylindrical portions 18'.

The mold portions 12', 13', 15' and 17' are adapted to match mold portions to be hereinafter described. The channels 14', the flat portion 16' and the cylindrical portions 18' are adapted, in conjunction with the other mold member to be hereinafter described, to form the cavity for producing the casting.

The reverse side of the match plate 10 is shown in Fig. 3 and includes an elongated, elliptical depression 22 and a somewhat deeper, rounded, depression 23. The depressions 22 and 23 are of dimensions corresponding to the raised portions 12 and 13 respectively. A pair of somewhat triangular plates 24 extend between the depressions 22 and 23. A surface of single curvature 25 extends between the plates 24 merging at one end into an upright plate 26, and at the other end merging into the intermediate semi-cylindrical portion 27 of the depression 22. Each of the side plates 24 terminate in cylindrical portions 28 which are of the same curvature and are coaxial with the semi-cylindrical portion 27. Small bosses 29 are provided on the cylindrical portions 28 and a channel 30 is cut in the surface of the plate 26.

A mold produced by the match plate side shown in Fig. 3 is illustrated in Fig. 4 and includes the customary flask 32 in which the same is shaped into a mold member indicated generally at 33. Using single primed reference characters in Fig. 4 to refer to the equivalent surfaces of Fig. 3, I show an elongated elliptical raised portion 22' and a somewhat circular large raised portion 23' which are connected by a pair of channels 24' formed by the plates 24 of the match plate. Between the channels 24' I provide a sloping portion 25' of single curvature terminating at its upper end at a trench 26' formed by the plate 26 and terminating at its lower end in the semi-cylindrical raised portion 27'. The channel portions 24' terminate at their lower end in cylindrical recesses 28'. The cylindrical recesses 28' include small circular depressions (not shown) which are formed by the bosses 29. The bead 30' located in the trench 26' is formed by the channel 30 of the match plate.

In the molding operation when the two halves of the mold are placed together the surfaces of 12' and 22' meet in contact and allow no space for metal. The same is true of the following surfaces: 13' and 23'; 15' and 25'; and 17' and 27'.

The castings resulting from the use of the mold formed by the two halves shown in Figs. 2 and 4 are illustrated in Figs. 5, 6, and 7. In order to show the genesis of the various surfaces they are referred to by using double primed reference characters to designate parts which correspond to similar portions of the mold and match plates.

The casting produced is indicated generally at 34 and comprises a base portion 26'' which has a channel 30'' extending thereacross and having an end face 16''. A pair of upright plates indicated generally at 34*a* are composed of sections 14'' and 24'' and in turn support cylindrical portions 28'' which include semicylindrical surfaces 18'' and bosses 29''.

The parting line of the casting has been noted in Figs. 5, 6, and 7 by a line designated L and composed of a dash and two dots to illustrate how the parting line is entirely located on edges of the casting with the exception of that portion of the parting line which is disposed between the plate section 14'' and 24''. The front outer edge of the section 14'', indicated at 35, lies in the same plane as the outer face of the section 24''. The thickness of the wall 36 of the section 14'', however, increases upwardly towards the joint between the sections 14'' and 24'' which point is indicated at 37. This construction is similar to the construction of the match plate which is shown in Fig. 11.

The purpose of the taper to the surface 36 is to simplify the process of cleaning the casting. By having the edge along the joint 37 raised as at 38 it is always easy to dress off by filing or grinding a raised portion such as is provided by my construction even in the event of a shift of one mold in relation to the other. If two surfaces meet at the parting line in exactly the same plane, the shift will produce one surface lower than the other thus necessitating the removal of suffcient metal to bring the entire surface down to the level of the displaced portion. In my construction there is always an excess of metal to be removed, regardless of the shift between the molds and it is never necessary to remove the entire surface as is required by standard practice. It is only necessary to dress down a portion of the tapered surface 36 until all of the parting line is removed.

For comparison I have illustrated in Fig. 12 and Fig. 13 the regular method which would be employed to produce a mold for a casting similar to that described above. The match plate 40 has pattern members 41 and 42 mounted on opposite sides thereof and the parting line 43 is disposed to cut through the cylindrical bosses 44 across the plates 45 and the base plate 46 necessitating the removal from these flat surfaces of a large amount of parting line irregularity. The match plate 40 is used in conjunction with the flask 48 to produce the mold indicated generally at 49. The mold includes semi-cylindrical portions 44' and trench portions 45' connecting therewith and a third trench portion 46' connecting the portion 45' previously mentioned.

From the foregoing it will be apparent that with my method and apparatus the main dimensions of the casting are controlled by the portion of the match plate shown in Fig. 3 or by the equivalent mold shown in Fig. 4. A shift of the other mold portion will for example not seriously influence the distance from the center line of the cylindrical portion 28'' to the base 26''. In the regular method of production if a shift occurs, the cylindrical portions 44 will be displaced relative to each other and the base portions 46 will also be displaced relative to each other necessitating the removal of considerable metal from one half of the base 46, which will reduce the effective distance from the base to the center line of the cylindrical portions 44, thus destroying the accuracy of the casting.

A similar advantage is obtained in maintaining the distance between the cylindrical portions 28'' as compared to maintaining the distance between the cylindrical portions 44 of the standard type of match plate.

This dimensional accuracy is of great value in producing various types of castings including brackets, support plates, stanchions, forks, wing fittings and other parts used in the manufacture of aircraft. It is possible by employing my method and apparatus and eliminating the parting line from the surfaces to omit a portion of the machinery operations which are normally re-

quired to finish parts of this character. This results in a great saving of time and cost. The number of rejected castings is also greatly reduced.

From the foregoing it will be apparent that I have invented a new and useful apparatus, method and product which produces an article of superior accuracy and which is produced with a saving of time and of materials.

Having thus described my invention, I claim:

1. The method of making a casting having at least one flat surface and having edges defined by intersecting faces comprising making a pair of complementary mold members and providing said mold members with a parting line which extends along certain edges of the casting and across a flat surface of the casting and wherein the part of the mold member which is to form the flat surface is recessed at one side, the recess beginning at the parting line, the recess being of decreasing depth as it recedes from the parting line, whereby the casting is provided with an elevated portion of decreasing height as it recedes from the parting line, and thereafter removing the elevated portion of the casting.

2. The method of making a casting having at least one flat surface and having edges defined by intersecting faces comprising making a pair of complementary mold members which have a mold cavity corresponding to the casting to be made, providing said mold members with a parting line which extends along certain edges of the casting and across a flat surface of the casting and wherein the part of the mold member which is to form the flat surface is recessed at one side, the recess beginning at the parting line and being of decreasing depth as it recedes from the parting line, whereby the recess provides an elevated portion in the casting, which elevated portion in the casting is of decreasing thickness as it recedes from the parting line and thereafter removing the elevated portion of the casting.

3. As an article of manufacture, an unfinished casting having a plurality of faces including at least one plane face and having an edge portion defined by the meeting of the plane face and another face of the casting, said casting including an elevated portion on said one plane face, said elevated portion decreasing in thickness towards the said edge of the casting, the elevated portion being adapted to be removed to finish the casting.

4. A mold device for making a casting having at least one flat surface and having edges defined by intersecting faces, comprising a pair of complementary mold members, said mold members having a parting line which extends along certain edges of the casting forming cavity and across a flat face thereof and wherein the part of the mold member which forms the flat surface is recessed at one side, the recess beginning at the parting line and with the recess of decreasing depth as it recedes from the parting line.

5. In a match plate for producing a mold for making a casting, a body having planar faces, a pair of pattern members disposed in equivalent positions on opposite sides of said body, a surface on one of said pattern members being substantially perpendicular to the planes of said body, a surface on the other of said pattern members having its edge most remote from the body in the same plane as said first mentioned surface and having its edge adjacent to the body elevated above the plane of said first mentioned surface and the remote edge whereby said two surfaces are adapted to form a mold which is adapted to make a casting having a pair of surfaces having the remote edge of the first surface lying in the plane of the second surface and having the adjacent edge of the first surface lying above the plane of the second surface, whereby the casting may have the parting line removed by removing a portion of the raised portion of the second surface.

RAYMOND H. OSBRINK.