W. D. BUTZ.

ART OF CASTING METALS.

APPLICATION FILED OCT. 30, 1914.

1,207,495.

Patented Dec. 5, 1916.

4 SHEETS—SHEET 1.

Fig. 1.

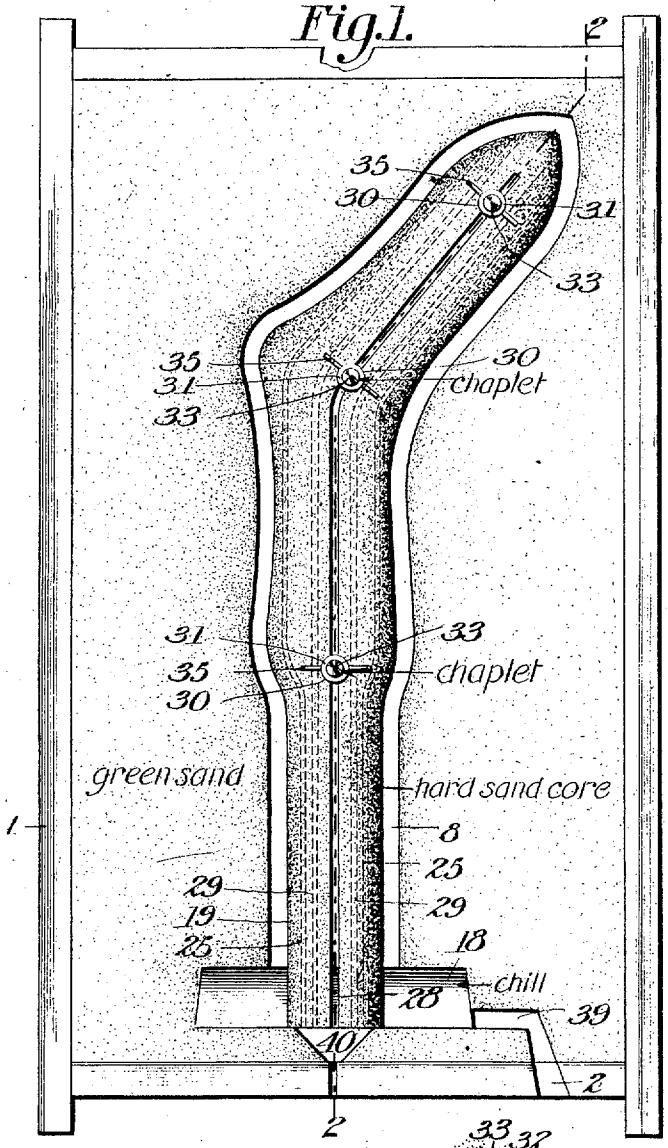


Fig. 2.

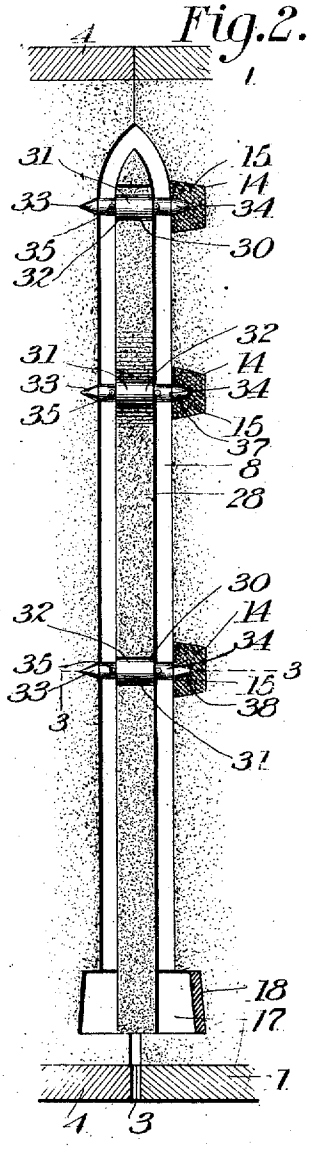
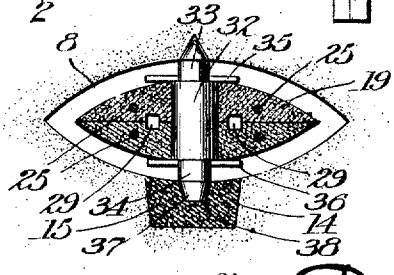


Fig. 3.



Witnesses

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4 SHEETS—SHEET 2.

Fig. 4.

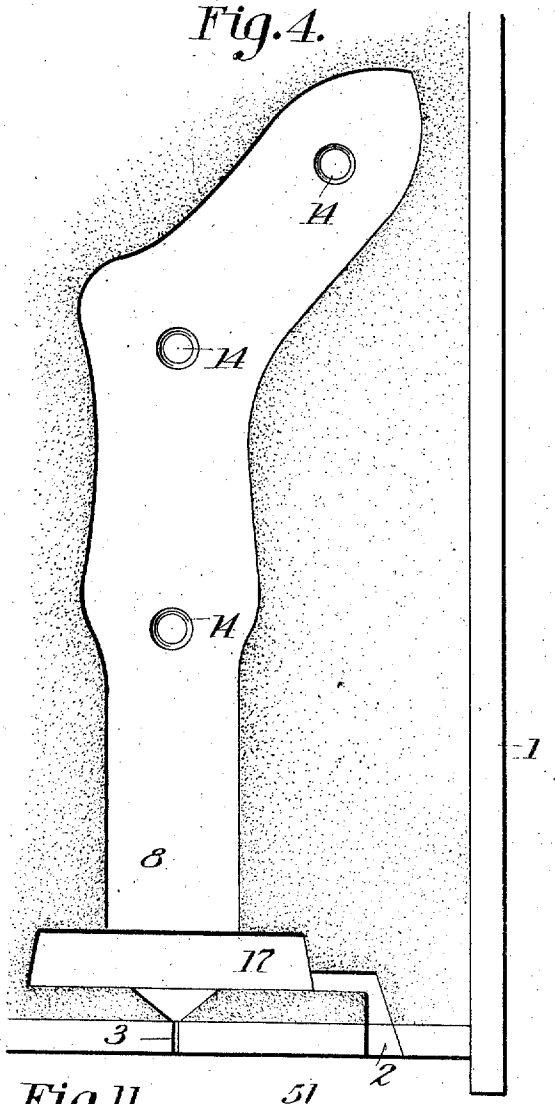


Fig. 9.

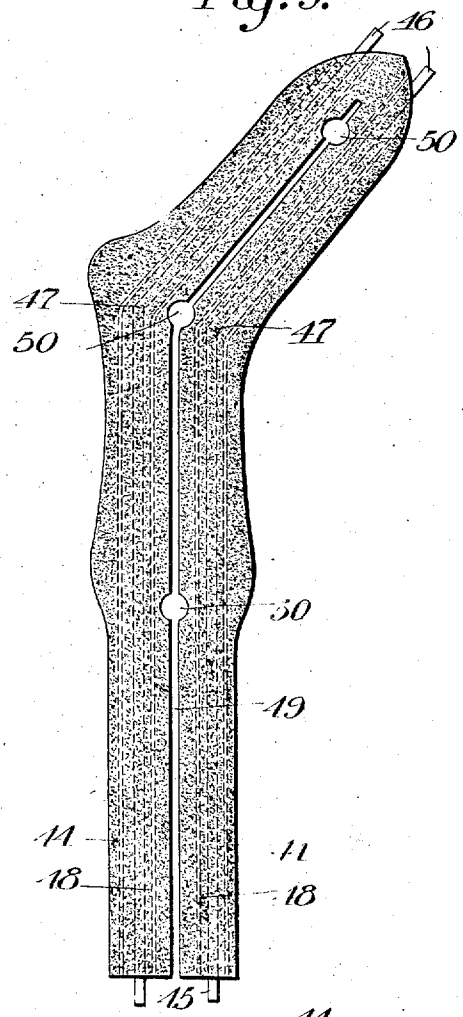
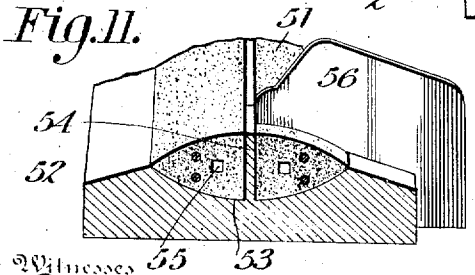


Fig. 11.



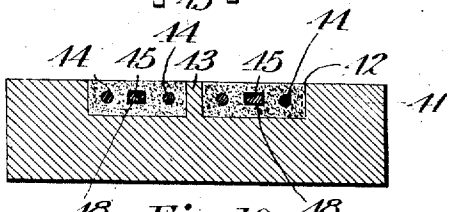


Fig. 10.

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ART OF CASTING METALS.

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1,207,495.

Patented Dec. 5, 1916.

4 SHEETS—SHEET 3.

Fig. 5.

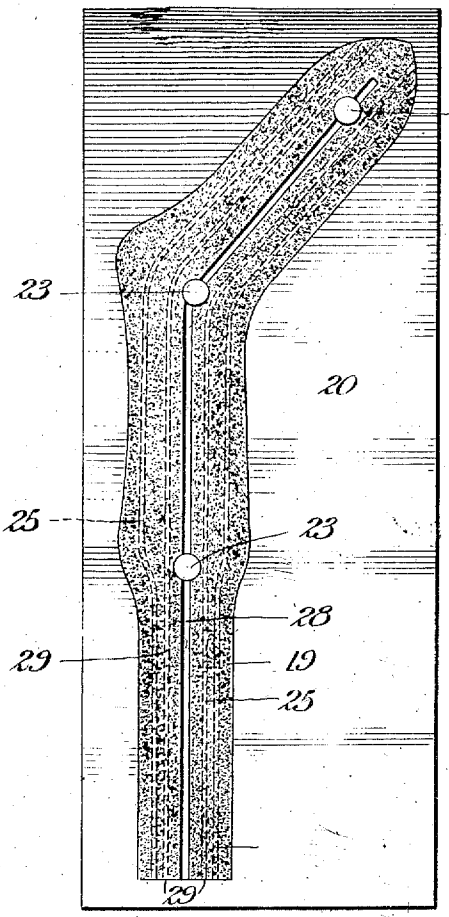


Fig. 6.

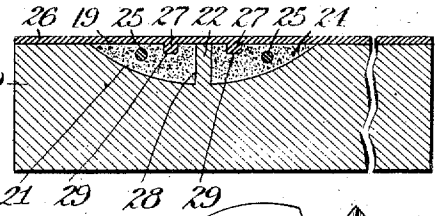


Fig. 7.

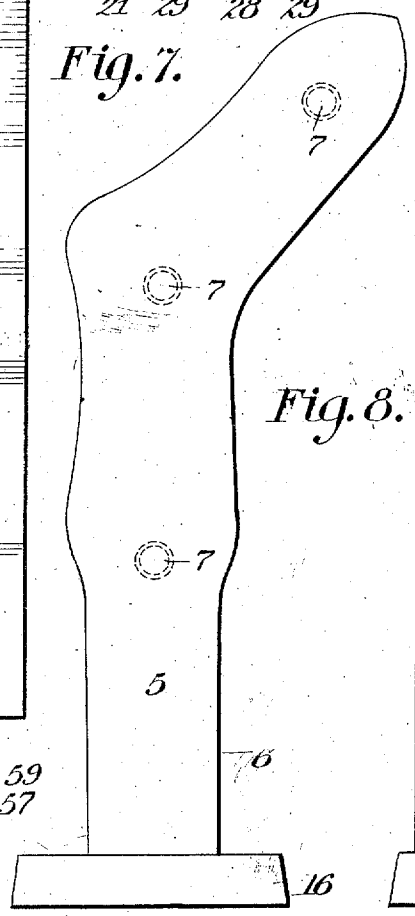


Fig. 8.

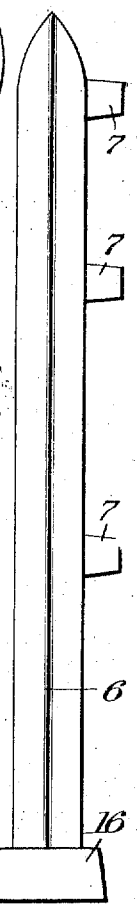


Fig. 12.

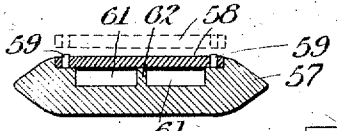
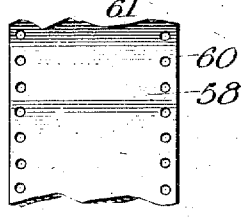


Fig. 13



Witnesses

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ART OF CASTING METALS.

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1,207,495.

Patented Dec. 5, 1916.

4 SHEETS—SHEET 4.

Fig. 18

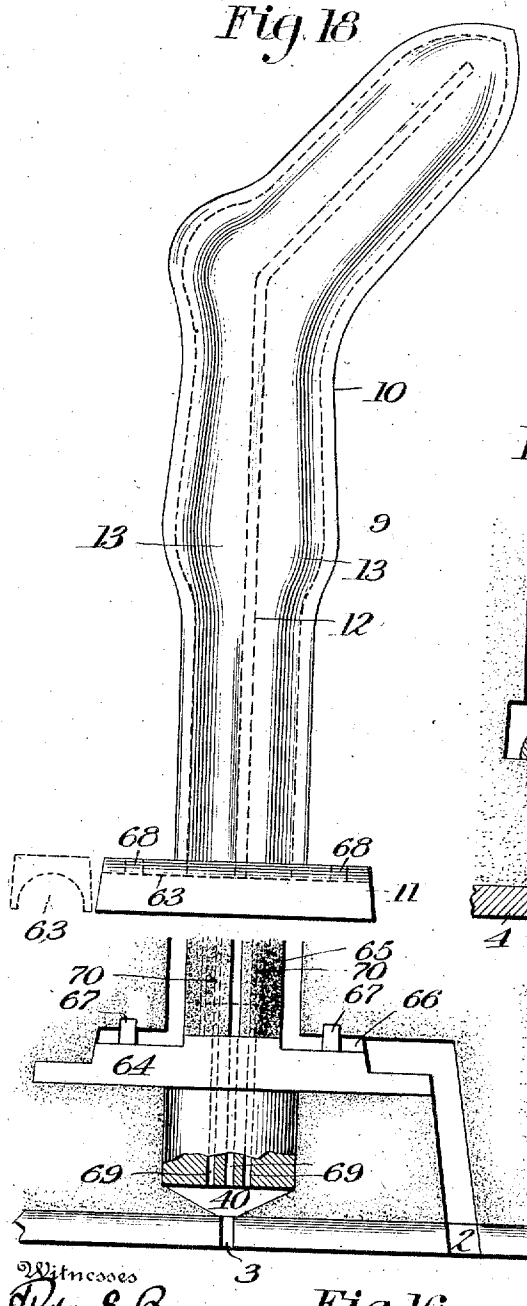


Fig. 16.

Fig. 14.

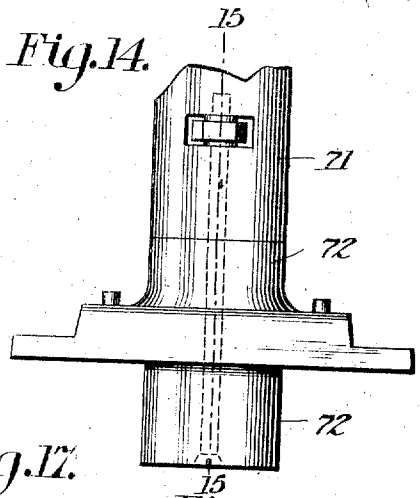


Fig. 17.

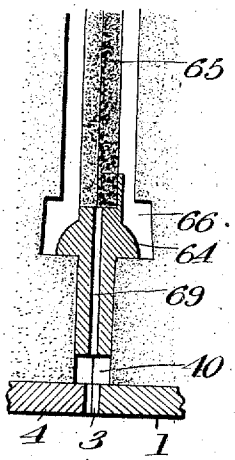
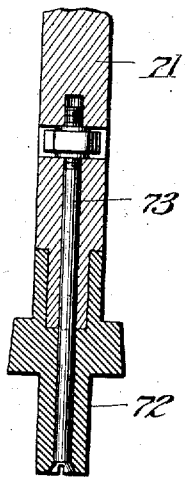


Fig. 15.



Witnesses

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UNITED STATES PATENT OFFICE.

WALTER D. BUTZ, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PARAMOUNT HOSIERY FORM DRYING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ART OF CASTING METALS.

1,207,495. Specification of Letters Patent. Patented Dec. 5, 1916.

Application filed October 30, 1914. Serial No. 869,401.

To all whom it may concern:

Be it known that I, WALTER D. BUTZ, a citizen of the United States, residing at Norristown, in the county of Montgomery and State of Pennsylvania, have invented certain new and useful Improvements in the Art of Casting Metals, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates broadly to the art of casting metals and specifically to methods of casting drying and shaping forms for hosiery and the like.

One object of the invention is, in a novel and simple manner, to cast (of aluminum or aluminum-alloys especially) a channeled shaping-form in which a heating medium is to be maintained to heat the form from within.

Another of the objects of the invention is to provide a novel method of casting an aluminum structure, whereby the cost of production thereof is relatively small; the casting-operations are simple and convenient; the metal of the resulting casting is even and firm so that, if the structure is subjected to a relatively high pressure, it will not thereby be ruptured or weakened; the casting will not ordinarily be distorted from the required shape, nor be cracked while cooling in the mold; and the exterior surface of the structure will be smooth and of proper configuration.

Another object is to cast metals—and more particularly aluminum alloys—in molds comprising ordinary foundry sand and a destructible core suitably supported within the mold.

Another object is so to cast a mass of aluminum-alloy in a mold (comprising ordinary foundry sand, a suitably supported preformed core, and a chill) that the casting will be sound throughout its entire body and free from flaws and pockets due to "blowing" by the evolution of gases produced when hot metal comes into contact with the sand and core.

Still another object of the invention is to produce a destructible core of such construction and in such form that, when it is supported in the mold, the desired internal chambers are produced and the resulting casting is free from imperfections.

The invention will now be described more particularly in its application to a system in which both half-molds or flasks contain, on their sides, counterparts of the same pattern-print; that is to say, the intaglio print on one side of the mold-flask is the counterpart of that on the other side thereof.

Prior to my invention, it was found difficult and well nigh impracticable to cast a satisfactory metallic hosiery form (having a smooth exterior surface and an internal conducting channel) which was free from flaws and other defects. The difficulty appeared to arise from the shrinkage of the metal around the core and also from the fact that one portion of the casting contained a larger mass of the metal than other portions thereof. This resulted in "blows" and, also, in the shifting of the core so that the mass of metal forming the walls of the channel were too thin to withstand all required pressures.

The problem solved by the present invention is the proper positioning and supporting of the core within the mold in such manner as to preclude its movement while the molten metal is forming around the same; and this is accomplished by anchoring the preformed core—preferably made of sand—by means of a series of chaplets preformed and preferably of the same character of metal as that of which the casting itself is composed.

Other objects and advantages will in part be obvious from the annexed drawings, while other objects and advantages will be brought out in the following description.

The invention resides broadly in the method herein contemplated, as well as in the manner of using the components (of particular form and character) employed in the operation of making the casting; all as exemplified in the disclosure hereinafter set forth, and the scope of application of which will be indicated in the claims hereto appended.

In order that the invention may be more clearly comprehended by those skilled in the art, drawings (illustrating some of the principal components utilized in carrying my invention into practice) are hereto appended as a part of this disclosure; it being manifest that other forms of components, employing the underlying principles of the invention, fall within the spirit thereof and within the objects contemplated thereby. I herein shall aim to set forth the principles

of the invention, and the principal and advantageous features thereof.

In these drawings, Figure 1 is a view in top plan of the lower half-mold or flask with a two-part preformed core shown in place therein; Fig. 2 is a view in vertical horizontal section, on the line 2—2, Fig. 1; Fig. 3 is a view in vertical transverse section, on the line 3—3, Fig. 2, showing more clearly the manner of supporting the core in the mold; Fig. 4 is a fragmentary view, in plan, of the lower half-mold or flask after the imprint has been made in the sand by the pattern; Fig. 5 is a view in plan of a half-section of the preformed core, the same appearing as lying in a core-box; Fig. 6 is a view in vertical transverse section of a core-box for preforming a half-section of a two-part core; Figs. 7 and 8 are views in plan and edge elevation, respectively, of one type of pattern utilized to form the intaglio-outline in the sand shown in Fig. 4; Fig. 9 is a view in plan of a modified form of a preformed, one-part core; Fig. 10 is a view in vertical transverse section of a core-box in which the one-part core, shown in Fig. 9, is formed; Fig. 11 is a similar view of another form of a one-part core; Fig. 12 is a view in vertical transverse section, showing a drying and shaping form produced by casting one portion thereof upon another (preformed) portion embedded in the sand of the mold; the portion which is cast last being shown in full lines in place and, also, in dotted lines above the preformed portion; Fig. 13 is a fragmentary view in plan of the cast portion of the form; Fig. 14 is a fragmentary view in elevation of a modified form of pattern adapted to form in the sand an imprint for receiving the core and a chill; Fig. 15 is a view in central section on the line 15—15, Fig. 14; Fig. 16 is a fragmentary view in plan, and partly in section, of the lower half-mold or flask, showing the chill and a portion of the preformed sand-core disposed thereon; Fig. 17 is a fragmentary view in central section; and Fig. 18 is a view of the completed casting, the outline of the base-portion thereof being shown in dotted lines to the left of the illustrated casting.

It will be understood that, in practising my method of casting hosiery forms, I employ a complement of instrumentalities, preferably of a particular type, and these will now be described in order that the steps of the method may be understood.

Mold box.—The reference-character 1 designates the frame of a lower half-mold or flask which, as usual, is provided with a pouring opening 2 and with a gas vent 3. Adapted to be superposed upon the frame 1 is the frame 4 of an upper half-mold or flask. As usual, these flasks are packed with sand 5 and preferably the foundry sand commonly employed in foundry practice.

Pattern.—A pattern 6, provided with pendant recess-making lugs 7, is pressed in the sand to form the print 8 (Fig. 4). In this instance, the print is of a configuration corresponding to a hosiery drying form similar to that illustrated in Patent No. 1,114,966, granted October 27th, 1914, and as herein shown in Fig. 18, the same therein being designated by the reference-character 9. This includes a body-portion 10 and a base-portion 11. It is provided with a partition 12 which forms a channel 13 which extends upward from the base-portion 11 to near the end of the toe-portion and then back to the base-portion. This channel is adapted to contain a heat-producing medium, such as steam supplied from a suitable source. The recess-making lugs 7 on the pattern form three circular recesses 14, spaced-apart and of predetermined depth. After these recesses have been formed, in the sand in the lower flask, chaplet-receiving instrumentalities, in the form of hard sand cup-members 15, are disposed therein so that their upper surfaces are flush with the imprinted surface of the sand, as shown in Fig. 2. The base-portion 16 of the pattern 6 produces an enlarged space 17 in the sand which, in the final casting, forms the base-portion 11.

Chill.—Into the lower portion of the space 17 is disposed a chill-instrumentality 18 which, in this instance, is preferably a plate of iron. Because of the fact that, in the space 17 is cast the largest mass of metal of the hosiery form, it has been found desirable, in practice, to accelerate the cooling of that mass to correspond approximately to the cooling of the remaining portion of the casting as formed in the imprinted space 8, and this is accomplished by the chill-plate.

Core.—To produce the internal channel 13 in the casting, I have found it desirable in practice to employ a destructible core. To this end, I preform such a core and it is preferably of much the same outline, in general, as the body-portion 10 of the casting 9. In Figs. 5 and 6, I have, by way of example, disclosed one manner of forming a half-section 19 of a two-part core. This includes a core-box 20 provided with an elongated cavity 21 having, as shown, a concave bottom, an upstanding, central slot-producing rib 22, and a plurality of spaced-apart, upstanding posts or lugs 23.

As shown in Fig. 6, hard sand 24 mixed with linseed oil, etc., (as usual in practice) is packed into the cavity with strengthening wires 25 embedded therein. Then, a plate 26, provided with ribs 27 formed on its lower surface, is laid upon the upper surface of the core-box 20 and thereby fur-

ther packs the sand in the cavity 21 and simultaneously forms in the core-section 19 a partition-producing slot 28, gas-conveying channels 29, and vertical, spaced-apart holes 30. It will be understood that two core-boxes, of similar construction, are employed to form the right and left sections of the two-part core. After each core-section shall have been formed, as thus described, it is placed upon an elongated metallic plate and baked in an oven suitable for the purpose. In lieu of producing the gas channels in each core-section in the manner above described, I may dispense with the vent-forming ribs 27 on the plate 26 and manually incut or scratch—by a suitable implement—a half portion of the vent in each core-section. Then, the two core-sections are cemented together in an appropriate manner, so that the half portions of the core vents in each section will be in register. The destructible core is, then, ready for use. It is a desideratum of my method to support the core in anchored and spaced relation in the imprint in the molding sand in such manner that it shall be prevented from any movement therein while the metal is being poured into the mold-box, and, moreover, that its accurate and convenient disposition therein shall be facilitated.

Core supporting chaplets.—After the sections of the two-part core have been cemented together, as already explained, a core-supporting chaplet 31 is positioned in each of the vertical holes 30 in the core. As shown on an enlarged scale in Fig. 3, these chaplets include an elongated, cylindrical body-portion 32, a pointed, sand-penetrating portion 33, and a cup-entering portion 34. Wires 35 and 36, respectively, project through the portions 33 and 34. The cylindrical portion 32 is of such diametral dimension that it will fit in the hole 30 in the core, while the wires 35 and 36 are sufficiently spaced-apart as to overlie and underlie the upper and lower surfaces of the core. To position a chaplet in its respective hole in the core, the portion 34 is inserted therethrough, with the wires 35 and 36 alining with the partition-producing slot 28. Then, the chaplet is turned to position the wires 35 and 36 at right angles to said slot 28. The portion 34 of the chaplet is provided with a conical extension 37 which is adapted to fit in a correspondingly formed recess 38 in the cup-member 15.

Method.—The core having been preformed, in the manner already explained, and as a part of my improved method of casting aluminum forms, the lower flask is filled with a suitable amount of green or molding sand and packed. The pattern 5 is then pressed into the sand to produce the lower portion of the imprint or wall-forming space 8 therein. At the same time, and as already explained, the lugs 7 on the pattern produce the cup-receiving recesses 14 and the base-producing space 17. Then, the upper flask, properly packed with sand, is superposed upon the lower flask so that the pattern will form in the molding sand thereof the upper portion of the imprint or wall-forming space 8. This is, then, temporarily removed, whereupon the foundryman forms a pouring channel 39 in the sand between the opening 2 in the frame 1 and the base-forming space 17. Similarly, he cuts away the sand to provide a vent-space 40 leading into the vent 3 in the form 1, and with which vent space the vent-channels 29 in the core communicate. Then, he lays the chill-plate 18 in the bottom of the space 17 and inserts the cups 15 in each of the recesses 14 so that their upper surfaces will be flush with the surface of the imprint 8. It is here to be noted that the recesses 14 will always be formed in the same spaced relation and to a nicety of size so as exactly to be fitted by the cup-members 15. This feature is of importance, and will presently be referred to again. The mold-box is then ready to receive the core. This having been preformed, as already explained, and the chaplets 31 having been positioned therein, the core is then positioned so that the conical ends 37 of the chaplets will extend into the recesses 38 in the cores or cup-members 15. In this manner and by these means, the core will be disposed in accurately spaced relation to the walls of the space 8 so that the metal-receiving cavity, constituted by the space 8, will be accurately predetermined and of invariable thickness. It will now be apparent that, to insure this result, the posts 23 in the core-box are arranged in a precise spaced relation in predetermined correspondence to that of the lugs 7 on the pattern so that, when the chaplets shall have been disposed in the opening 30 in the core and the recesses 14 shall have been formed in the molding sand by the lugs 7, the chaplets are, in every instance, bound to have a registering relation to the cups 14. In consequence, the positioning of the core in the mold is not only easily and conveniently accomplished, but such positioning is achieved with an accuracy in each molding operation that insures a perfect casting.

Continuing the explanation of procedure, it will be understood that after the core shall, in the manner already explained, have been disposed in supported position on the cup-members 15, the upper flask is again superposed upon the lower flask, and this causes the pointed portions 13 of the chaplet to penetrate the packed sand in the upper flask. The flask frames are then clamped together and disposed on the foundry floor so that the pouring opening 2 will be uppermost. Thereupon, the foundryman having

brought the molten metal to a predetermined condition, he pours. The molten mass enters the pouring opening 2, traverses the channel 39 and proceeds along the surfaces of the molding sand and the core until the wall-forming space 8 at each side of the core is filled and, also, the partition 12 of the casting, produced by the elongated slot 28, which is formed integral with the casting.

I will now state that the chaplets may be composed of any desired material; but, in practice, I have found it desirable to make them of the same metal, whether it be aluminum or aluminum alloy, as that of which the casting is to be made. The result is that the molten metal, as it comes into contact with the chaplets, effects a fusion of these so that they unite with the poured metal and become an integral part of the casting. As the metal comes into contact with the core, it tends to burn out the binder—if it be, for instance, linseed oil—and produces an evolution of gases which are conveyed, through the channels 29, into the vent-opening 40 and, thence, through the opening 3 to the atmosphere. The strengthening wires 25 will, when the casting has cooled, occupy a position in the channel 13 so that, when the core disintegrates, the wire can be withdrawn. As the base 11 of the casting includes a considerable mass of metal, the chill-plate 18 will tend to effect a cooling of the metal, which forms the same, in rather accurate ratio to the action of the cooling of the body portion of the casting.

As soon as the metal has sufficiently cooled, the mold may be opened and the casting removed. The core, being destructibly formed—of sand, for instance, and as already explained—it will be in part, if not entirely, disintegrated by the time that the metal has cooled. If still intact, it can then be disintegrated by shaking the casting or hammering it. The ends of the portions 33 and 34 of the chaplet will extend somewhat beyond the face of the casting, but can readily be cut off without injury to the casting. Moreover, the portions of metal which form in the vent-opening 40 and in the channel 39 can also be removed before the casting is polished, which is the final operation of finishing it.

I have found it of advantage—and especially when the atmospheric conditions are abnormal, to preheat the effective molding surfaces of the core and sand. To this end, I may, for instance, heat the same by igniting gasolene poured upon such surfaces while the mold is open and just before the pouring operation.

By the method above described, I have not only been able to secure a uniformity of casting as regards absence of "blows," etc.; but, by means of the accurate registering of the chaplets with the cup-members 15 and the supporting, thereby, of the core, in a precise spaced relation to the walls of the space 8, the thickness of the walls of the channeled casting gives a uniformity which is not only desirable but absolutely necessary because of the fact that the castings, when employed as hosiery drying and shaping forms, are subjected to an internal variable pressure for which provision must be made.

Modifications.—In the development of my invention, I have devised various modifications of some of the components employed in carrying out my improved casting method. For instance, as shown in Figs. 9, 10 and 11, I have revealed two forms of a one-part core and, also, core-boxes in which these are produced. Referring to Figs. 9 and 10, it will be observed that a core-box 41 is provided with a cavity 42 having vertical walls and a flat bottom surface and with a central rib 43. Hard sand is packed into the cavity 42, with strengthening wires 44 and vent-producing strips 45 and 46 embedded therein. The strips 45 extend through the leg portion of the core, while the strips 46 extend through the foot portion thereof, and the two strips at each side meet at the points 47, Fig. 9. After the sand in the core has become "fixed," the strips 45 and 46 are carefully withdrawn so as to produce vent-openings 48 at each side of the core. The rib 43 will produce an elongated slot 49 in the core, and posts (not shown) upstanding from the bottom of the cavity 42 and alining with the rib 43, will produce chaplet-receiving holes 50 in the core. This is then baked, after which chaplets, of the kind already described, are positioned in the holes 50, whereupon the core is ready to be placed in a mold. An advantage of this particular form of core is that it enables the casting of a hosiery form of relatively thin dimensions.

In Fig. 11, a one-part core 51 is produced in the core-box 52 having a concaved recess 53 and an upstanding slot-producing rib 54. In this instance, the vent openings 55 are produced in a manner similar to that explained in connection with the core illustrated in Figs. 9 and 10. A surface rounding implement 56 is provided to traverse two surfaces of the core-box and form the upper surface of the core.

In Fig. 12, a somewhat different type of hosiery form is illustrated. In this instance, a primary section 57 is cast in an appropriately formed mold (not shown) after which it is embedded in molding sand in a suitable mold and permitted to remain there so that the metal to produce the secondary section 58 can be poured into the mold and said section be, thus, formed practically as an integral part thereof. To facilitate the anchoring of the section 58 to the section 57, the

latter is formed with upstanding projections 59 adapted to register in and be fused with the walls of apertures 60 in the secondary section 58. Where this type of hosiery form is produced, the channel 61 may be produced while the primary section 57 is being cast, and a partition 62 is formed at the same time and which, when the secondary section unites with the primary section 57, will effect a union with said secondary section.

As shown in Fig. 18 (and in dotted lines to the left thereof), the base portion 11 is provided with an elongated groove 63. Usually, this is produced by milling out the base portion. It is within the contemplation of my invention, however, to form this groove 63 while the base portion itself is being cast. To this end, a chill-member 64 is disposed at the base of the core 65 and in the base-forming space 66 in the molding sand. In this instance, the chill not only is utilized to produce the groove 63 but its function as a chilling instrumentality is also availed of. Moreover, being provided with integral posts 67, it forms bolt holes 68 in the base 11 while the latter is being cast. The chill member 64 is provided with channels 69 which register with the gas channels 70 in the core 65. To provide the necessary imprint in the molding sand, to receive the chill member 64, the body portion 71 of the pattern is provided with a chill portion 72 which preferably is of metal and, by means of the bolts 73, is removably secured to the portion 71 so that the same chill portion can be used on a number of patterns.

From the foregoing, it will be observed that I have devised a new method of producing channeled castings, one novel feature thereof residing in the mounting in a preformed channel-producing core of a plurality of chaplets adapted to be positioned in and accurately register with chaplet-receiving cup-members disposed in predetermined spaced-apart relation in the molding sand, so that, as the molten mass is poured into the mold, danger of shifting of the core when the metal comes into contact with the same is obviated and, moreover, the procurement of castings characterized by the desirable feature of uniformity is made possible. Another feature of novelty is the arrangement, in precise correspondence, of the cup-forming recesses in the molding sand and the chaplet-receiving holes in the core, for convenient and accurate registration one with the other. The invention also contemplates not only the use of the components herein disclosed but also their particular form and character, whereby the results obtained, in practising my method, are accomplished.

What I claim is:

1. The method of making castings which consists in forming in a mass of molding material a print of the structure to be cast, effecting registering recesses in the material within the limits of the print thus formed, disposing in said recesses preformed fusible chaplet-receiving instrumentalities, preforming a core of destructible material, disposing therein a series of spaced-apart chaplets of fusible material which extend through the core and beyond its exterior surfaces, positioning the preformed core and its contained chaplets as an entity in said instrumentalities and in spaced relation to the surface of said molding material, pouring metal into the space between said core and molding material and around said chaplets to fuse and amalgamate the same with the poured metal and thereby anchor said chaplets in the metal mass thus cast, and disintegrating and removing the core from within the casting without disturbing the chaplets.

2. The method of making castings which consists in preforming a core and providing the same with gas channels, forming in a mass of molding material the outline of the structure to be cast, recessing said material at predetermined spaced-apart points, within the limits of the outline disposing in said recesses preformed chaplet-receiving registering cores, mounted in said first-named core a series of preformed chaplets of fusible material, the ends of the chaplets extending beyond the exterior surface of the core, positioning the core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, pouring metal similar to that of the chaplets into the mold and around the chaplets to fuse the same, and disintegrating and removing the core.

3. The method of making castings which consists in forming in a mass of molding material a print of the device to be cast, effecting registering recesses in said material within the limits of the print thus formed, disposing in said recesses preformed infusible chaplet-receiving instrumentalities, preforming a core, disposing therein a series of spaced-apart chaplets of fusible material which extend through the core and beyond its exterior surfaces, positioning the preformed core and its contained chaplets as an entity in said instrumentalities and in spaced relation to the surface of said molding material, disposing at one end of said core a chill-instrumentality, pouring metal into the space between said core and molding material and around said chaplets to fuse and amalgamate the same with the poured metal and thereby anchor said chaplets in the metal mass thus cast, and disintegrating and removing the core.

4. The method of making castings which consists in forming in a mass of molding material an intaglio outline of the device to be cast, effecting registering recesses in said

material, disposing in said recesses preformed chaplet-receiving core-instrumentalities, preforming a core, disposing in the core a series of fusible, metallic chaplets so as to extend through and beyond the exterior surfaces thereof, positioning this preformed core and its contained chaplets as an entity in said core-instrumentalities and in spaced relation to the surface of said material, disposing at one end of said core a chill-instrumentality, pouring metal into the space between said core and molding material and around said chaplets to fuse the same and thereby anchor the chaplets in the metal mass, and disintegrating and removing the core.

5. The method of making castings which consists in preforming a hard sand-core provided with an elongated slot and with gas channels and vents, forming in a mass of molding material the outline of the article to be cast, recessing said material at predetermined spaced-apart points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said hard sand-core a series of preformed chaplets of fusible metal, the ends of the chaplets extending beyond the exterior surfaces of the core, positioning said sand core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, and pouring metal similar to that of the chaplet into the mold and around said chaplets to melt the same.

6. The method of making castings which consists in forming a hard-sand-core provided with an elongated slot and with gas channels and vents, producing in a mass of molding material the outline of the article to be cast, recessing said material at predetermined points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said hard sand-core a series of preformed chaplets of fusible metal, the ends of the chaplets extending beyond the exterior surfaces of the core, positioning said sand core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, pouring metal similar to that of the chaplet into the mold and around said chaplets to melt the same, and disintegrating and removing the core.

7. The method of making castings which consists in forming a hard-sand-core provided with an elongated slot and with gas channels and vents, producing in a mass of molding material the outline of the article to be cast, recessing said material at predetermined points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said hard sand-core a series of preformed chaplets of fusible metal, the ends of the chaplets extending beyond the exterior surfaces of the core, positioning said sand core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, disposing a chill-instrumentality at the point where the greatest mass of the metal is to exist, pouring metal similar to that of the chaplet into the mold and around said chaplets to melt the same, and disintegrating and removing the core.

8. The method of making aluminum castings which consists in forming a hard-sand-core provided with an elongated slot and with gas channels and vents, producing in a mass of molding material the outline of the article to be cast, recessing said material at predetermined points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said sand-core a series of preformed, aluminium chaplets so that they will extend through the core and beyond its exterior surfaces, positioning the sand-core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, pouring metal similar to that of the chaplets into the mold and a und said chaplets to melt the same, and isintegrating and removing the core.

9. The method of making aluminum castings which consists in forming a hard-sand-core provided with an elongated slot and with gas channels and vents, producing in a mass of molding material the outline of the article to be cast, recessing said material at predetermined points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said sand-core a series of preformed, aluminium chaplets so that they will extend through the core and beyond its exterior surfaces, positioning the sand-core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, effecting a warming of the molding material, pouring metal similar to that of the chaplet into the mold and around said chaplets to melt the same, and disintegrating and removing the core.

10. The method of making aluminum castings which consists in forming a hard-sand-core provided with an elongated slot and with gas channels and vents, producing in a mass of molding material the outline of the article to be cast, recessing said material at predetermined points, disposing in said recesses preformed chaplet-receiving and registering cores, mounting in said sand-core a series of preformed, aluminium chaplets so that they will extend through the core and beyond its exterior surfaces, positioning the sand-core and its contained chaplets as an entity in said chaplet-receiving cores and spaced from the molding material, pouring on the molding material an inflammable fluid and lighting it to preheat the same, pouring

metal similar to that of the chaplet into the mold and around said chaplets to melt the same, and disintegrating and removing the core.

11. The method of making castings which consists in forming an intaglio outline or print in a mass of molding material, recessing said mass to receive chaplet-sustaining instrumentalities, placing fusible chaplets in a preformed fragile core so that their ends project beyond the exterior surfaces thereof, positioning the core and chaplets, as an entity, in said instrumentalities and in spaced relation from the molding material throughout the exterior area of the core, pouring the metal into said outline and around said core and into contact with said chaplets, and chilling a portion of the metal to effect a cooling thereof in corresponding ratio to the cooling of the remainder thereof.

12. The method of making castings which consists in forming an intaglio outline or print in a mass of molding material, recessing said mass to receive chaplet-sustaining instrumentalities, placing fusible chaplets in a preformed fragile core so that their ends project beyond the exterior surfaces thereof, positioning the core and chaplets, as an entity, in said instrumentalities and in spaced relation from the molding material throughout the exterior area of the core, pouring the metal into said outline and around said core and into contact with said chaplets, chilling a portion of the metal to effect a cooling thereof in corresponding ratio to the cooling of the remainder thereof, and, finally, disintegrating the core.

13. The herein described method of casting aluminum articles consisting in preparing a mold including a hard-sand core, mounting in the core a series of fusible metal core-supporting chaplets so as to form a part thereof, heating the core and chaplets to prevent sudden chilling of metal flowing around the same, pouring molten aluminum into the mold and around the chaplets to effect fusing thereof and their amalgamation with the molten metal while the latter is forming around and solidifying about the core, and then disintegrating and removing the core.

14. The method of producing a metallic casting which consists in forming a pattern with a series of spaced-apart recess-producing instrumentalities; disposing the pattern and instrumentalities in molding material to form an outline of the structure to be cast and simultaneously to recess the molding material; preforming a destructible core with chaplet-receiving apertures spaced apart to correspond to the spacing of said instrumentalities; positioning core-supporting chaplets in the apertures; inserting chaplet-receiving cup-members in the recesses in the molding material; positioning the core and its contained chaplets as an entity in the mold with its chaplets registering with and supported by the cup-members and spaced apart from the surface of the molding material; pouring metal similar to the chaplets into the mold and into fusing contact with the chaplets and around the core whereby the chaplets are fused and combine with the poured metal and become a part of the casting; and disintegrating and removing the core from the casting.

15. The method of making metallic castings which consists in forming a print in the molding-sand, said print including a series of spaced-apart cup-receiving recesses; positioning in said recesses a series of recessed cup-members; forming a destructible core with a series of chaplet-receiving apertures spaced apart in precise correspondence to the recesses in the molding sand and with an elongated partitic forming slot approximately alining with said apertures; positioning core-supporting chaplets in said apertures; positioning said core and its contained chaplets, as an entity, in the mold-box with the chaplets in register with and supported by said cup-members and spaced apart from the surface of the imprinted molding-sand; and then pouring metal in the mold and into fusing contact with said chaplets, around the core, and into said elongated slot, whereby a partitioned and channeled casting is formed.

16. The method of making metallic castings which consists in forming a print in the molding-sand, said print including a series of spaced-apart cup-receiving recesses; positioning in said recesses a series of recessed cup-members; forming a destructible core with a series of chaplet-receiving apertures spaced apart in precise correspondence to the recesses in the molding-sand and with an elongated partition-forming slot approximately alining with said apertures; positioning core-supporting chaplets in said apertures; positioning said core and its contained chaplets, as an entity, in the mold-box with the chaplets in register with and supported by said cup-members and spaced apart from the surface of the imprinted molding-sand; then pouring metal in the mold and into fusing contact with said chaplets, around the core, and into said elongated slot, whereby a partitioned and channeled casting is formed; and, finally, disintegrating the core.

17. The method of making metallic castings which consists in forming a print in the molding-sand, said print including a series of spaced-apart cup-receiving recesses; positioning in said recesses a series of recessed cup-members; forming a destructible core with a series of chaplet-receiving apertures spaced apart in precise correspondence to the recesses in the molding-sand, with an

elongated partition-forming slot approximately alining with said apertures, and with gas-channels extending approximately longitudinally of the core and venting at one end thereof into the atmosphere; positioning core-supporting chaplets in said apertures; positioning said core and its contained chaplets, as an entity, in the mold-box with the chaplets in register with and supported by said cup-members and spaced apart from the surface of the imprinted molding-sand; then pouring metal in the mold and into fusing contact with said chaplets, around the core, and into said elongated slot, whereby a partitioned and channeled casting is formed; and, finally, disintegrating the core.

In testimony whereof I affix my signature in presence of two witnesses.

WALTER D. BUTZ.

Witnesses:
FRANK BROOKS KELLY,
LLOYD JOHNSON.