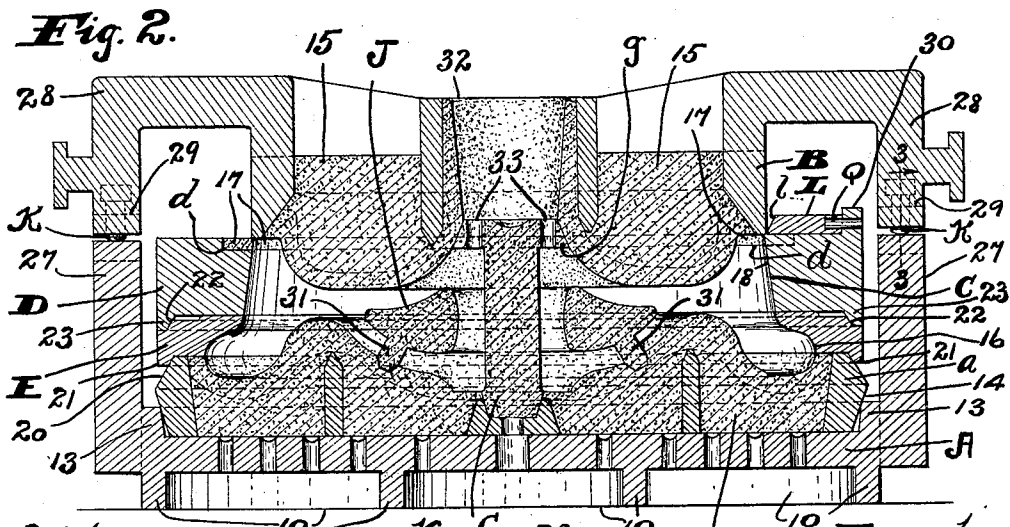
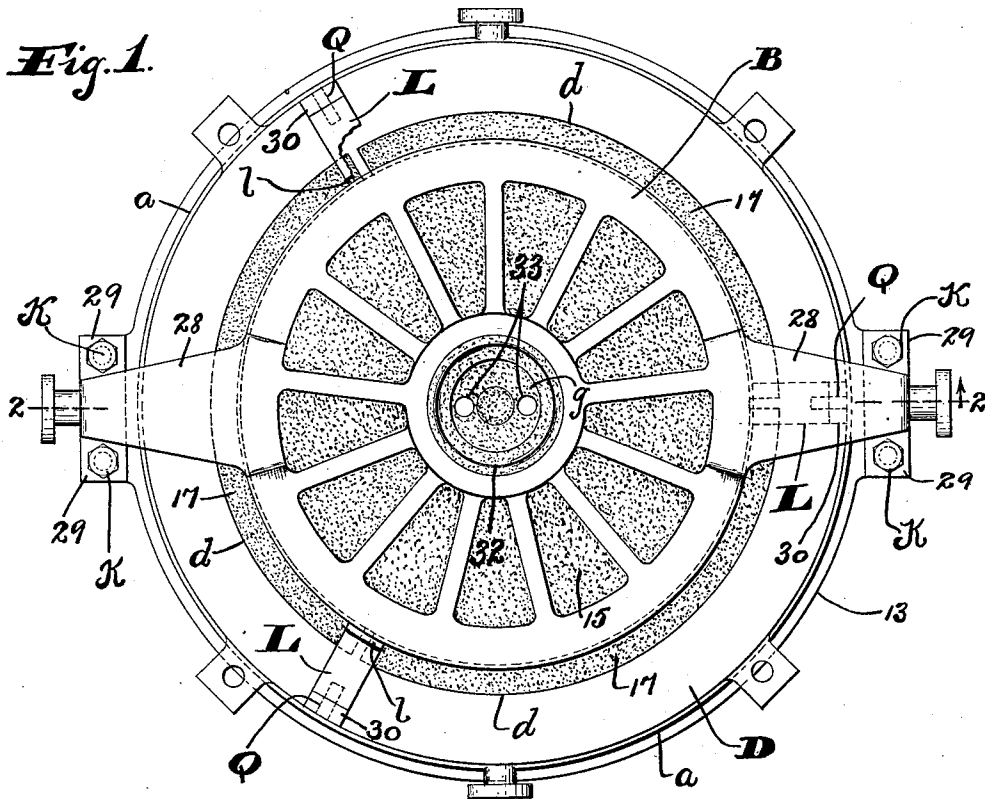


T. D. WEST.
MOLD FOR MAKING METAL CASTINGS.
APPLICATION FILED MAY 20, 1912.

1,042,734.

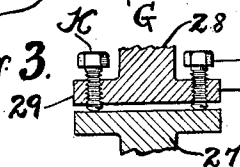
Patented Oct. 29, 1912.

2 SHEETS—SHEET 1.



Witnesses:
H. J. Gattina.
Bl. Brown.

Fig. 3.



Inventor:
Thomas D. West
By *[Signature]*
his Attorneys.

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2 SHEETS—SHEET 2.

Fig. 4.

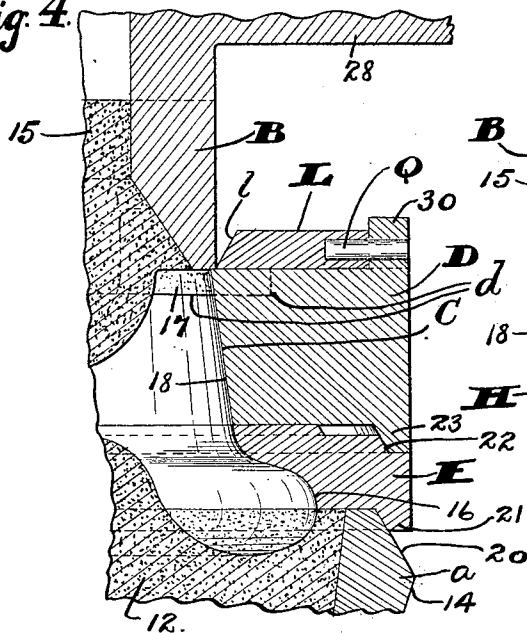


Fig. 5.

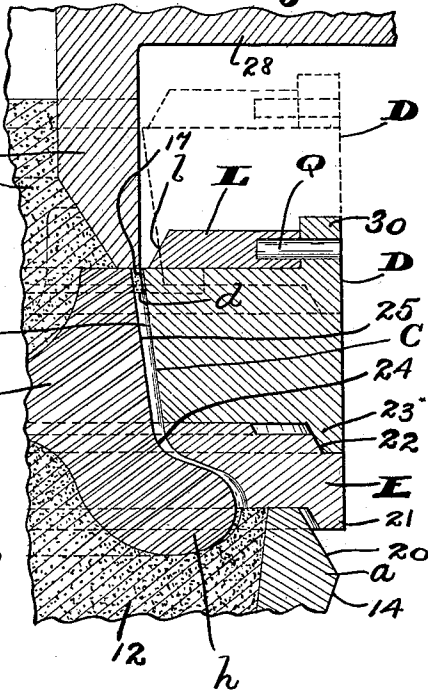
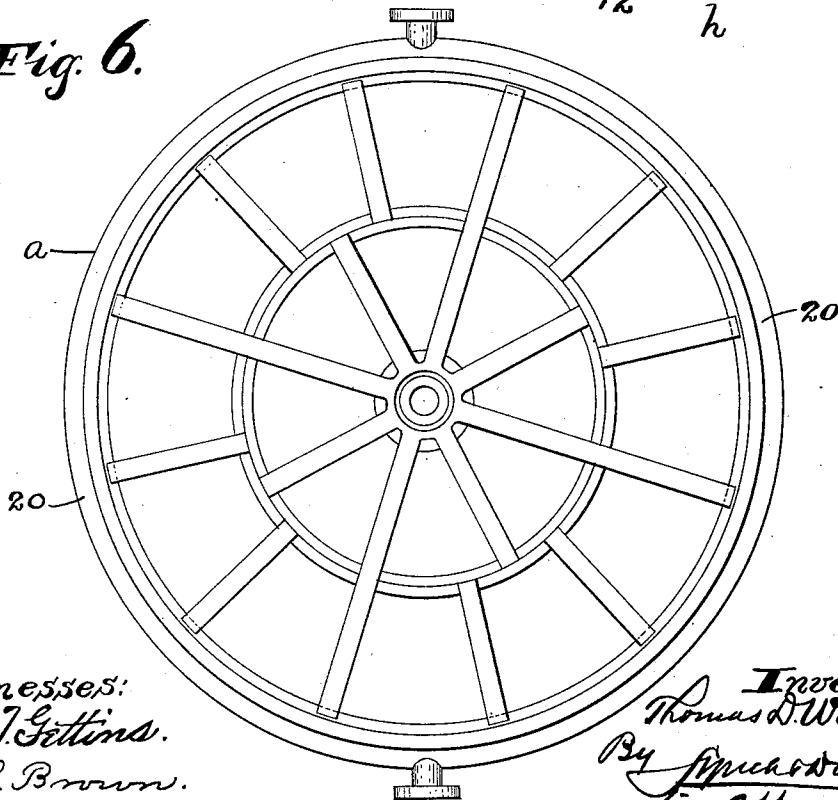


Fig. 6.



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H. J. Gettins.
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Inventor:
Thomas D. West
By Spencer
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UNITED STATES PATENT OFFICE.

THOMAS D. WEST, OF CLEVELAND, OHIO.

MOLD FOR MAKING METAL CASTINGS.

1,042,734.

Specification of Letters Patent.

Patented Oct. 29, 1912.

Application filed May 20, 1912. Serial No. 698,459.

To all whom it may concern:

Be it known that I, THOMAS D. WEST, a citizen of the United States of America, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Molds for Making Metal Castings; and I hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use the same.

This invention relates to improvements in molds for making metal castings, and pertains more especially to a mold suitable for use in casting an annular object, such, for instance, as a car-wheel.

One object of this invention is to have the central mold-part, which participates in forming the surrounding wall of the molten-metal-receiving chamber of the mold, comprising a chilling section capable of being elevated while the casting formed in the mold is within the mold so as to permit of the introduction, below said chilling section, to the casting, of any fluid, substance, or matter by which the quality or character of the casting may be beneficially influenced.

Another object is to have the central mold-part divided substantially horizontally into sections, and to have said sections capable of being relatively separated while the casting is within the mold so as to permit the introduction, between said sections of said mold-part, to the casting, of any fluid, substance or matter for treating the casting.

Another object is to have the central mold-part not only comprise a chilling section instrumental in forming the aforesaid chamber, but to have the top of said chilling section somewhat normally overlapped adjacent said chamber by a portion of the casing of the cope of the mold, to have the lateral and outward expansion of said chilling section during the operation of the mold result in completely removing said chilling section from under said portion of the cope-casing, and to have said chilling section shiftable vertically upwardly upon its expansion to effect the formation, below said chilling section and next exteriorly of the casting, of a space adapted to permit the introduction of any fluid, substance or matter for treating the casting.

Another object is to form a fluid-tight joint between said chilling section and the cope, and to provide means whereby the cope is supported independently of said chilling section, so as to prevent any pressure by the cope on the casting upon the elevation of said chilling section independently of the cope.

Another object is to render the component parts of the mold capable of being assembled with facility and to render all parts capable of being readily separated preparatory to the removal of the casting from the mold.

Another object is to have the sand-body of the drag of the mold carried by a frame which is removably seated and centered on a substantially horizontally arranged plate forming the bottom of the drag and can be readily rammed with sand preferably on a molding machine preparatory to the application of said frame to said plate.

With these objects in view, and to the end of attaining other advantages hereinafter appearing, this invention consists in certain features of construction, and combinations and arrangement of parts, hereinafter described, pointed out in the claims, and illustrated in the accompanying drawings.

In said drawings, Figure 1 is a top plan of my improved mold ready for pouring, and a portion is broken away in this figure to more clearly show the construction. Fig. 2 is a central vertical section on line 2—2, Fig. 1. Fig. 3 is a vertical section on line 3—3, Fig. 2, looking outwardly. Fig. 4 is an enlarged view of a portion of Fig. 2. Fig. 5 is a view corresponding with Fig. 4, except that Fig. 5 illustrates the lateral and outward expansion of the chill by heat during the horizontal contraction of the casting, and in dotted lines shows the upper portion of the chill elevated to form a space next below said portion. Fig. 6 is a top plan of the frame adapted to carry the sand-body of the drag. Figs. 3 and 4 are drawn on a larger scale than Figs. 1, 2, and 6.

The mold illustrated consists in the main of an upper mold-part or cope, a lower mold-part or drag, and a central or intermediate mold-part which is shown formed in the main by a sectional chiller or chill.

Referring to Fig. 2 of the drawings, A indicates a horizontally arranged metal

plate forming the bottom of the lower mold-part or drag and provided with vertically downwardly projecting annular flanges 10 serving to elevate said bottom above the floor or support on which the mold is to be placed. Said drag (see Figs. 2 and 6) also comprises an externally circular frame *a* which is mounted on and removable vertically upwardly from the plate A. The drag-frame *a* is in the form of a grille or grating and is rammed with sand or substantially non-chilling material, and the top or upper portion of the body of packed sand 12 of said drag-frame has the contour required to form the bottom of the casting. The plate A is provided at its upper side with an upwardly projecting annular flange 13 which is arranged externally of and surrounds the frame *a*. The flange 13 is concentric relative to the frame *a* and concentric relative to the center of the plate A. The lower portion of the frame *a* (see Fig. 2) is provided with a laterally outwardly and downwardly facing sloping surface 14 which is in contact with the flange 13 and coöperates with said flange in centering said frame relative to the plate A.

The upper mold-part or cope comprises an externally circular metal casing B. The cope is rammed with sand, and the body of packed sand 15 of the cope has its bottom or lower portion contoured as required to form the top of the casting.

The cope and the drag are spaced vertically to effect the formation between them of the molten-metal-receiving chamber C of the mold, which chamber is enlarged diametrically and annularly at its lower end, as at 16, (see Figs. 2, 4, and 5).

The central or intermediate mold-part (see Figs. 2, 4, and 5) is instrumental in forming the surrounding wall of the chamber C and comprises a substantially vertically arranged annular chiller or chill which is divided substantially horizontally into two sections D and E which are therefore annular and arranged substantially vertically, and of course the upper chilling section D is seated on and therefore supported from the lower chill-section E. The sections D and E are preferably of cast iron. Preferably the chilling-section D is provided internally of its upper end with recesses *d* which are spaced circumferentially of the chamber C and filled with a non-chilling material 17 such, for instance, as sand, and the cope-casing B rests between adjacent recesses *d* on top of said chilling section. The material 17 and the internal surface 18 of the chilling section D participate in the formation of the surrounding wall of the chamber C.

The lower chill-section E is mounted on the drag-frame *a*, and preferably said drag-frame is provided externally of its upper

portion with a laterally outwardly and upwardly facing annular sloping shoulder 20 which is overlapped by a downwardly projecting annular flange 21 formed on the lower end of said chill-section. The shoulder 20 and the flange 21 are instrumental in centering the lower chill-section E relative to the drag-frame *a* during the assemblage of the component parts of the mold, are obviously relatively arranged to accommodate lateral and outward expansion of the chill by heat independently of the drag.

The lower chill-section D is provided at the top thereof with a laterally outwardly and upwardly facing annular sloping shoulder 22 which is overlapped by a downwardly projecting annular flange 23 formed on the upper and main chilling section D. The shoulder 22 and the flange 23 coöperate in centering the chilling section D relative to the section E of the chill in the assemblage of the parts and permit lateral and outward expansion by heat of the upper chill-section independently of the lower chill-section. With the relative dimensions and contour of the chill-sections D and E as illustrated lateral and outward expansion of the lower chill-section independently of the upper chill-section is impossible, but by the relative arrangement of the shoulder 22 and flange 23 hereinbefore described any possible lateral and outward expansion of the upper chill-section independently of the lower chill-section is accommodated.

Fig. 5 of the drawings shows a wheel-forming casting H in the mold, and, referring to said Fig. 5, *h* indicates the annular flange formed on and externally of said casting at one end of the casting, which flange is shown formed at the lower end of the casting, and the throat 24 of the wheel is formed at the junction of the inner side of said flange with the tread 25 of the wheel. The flange of a car-wheel to be cast in the mold illustrated is obviously therefore formed next above the outer portion of the sand-body 12 of the drag-frame *a*. The lower chill-section E is contoured internally,—that is, gradually reduced in internal diameter toward its lower end,—as required to form the upper portion of the surrounding wall of the diametrical enlargement 16 of the chamber C. The outer portion of the body of packed sand 12 of the drag-frame *a* is contoured and arranged as required to form the lower portion of the surrounding wall of said enlargement of said chamber. It will be observed therefore that the tread 25 of the car-wheel to be cast is formed at the internal surface 18 of the upper chill-section D, that the throat 24 and the inner portion of the flange *h* are formed at the internal surface of the lower chill-section E, that the outer portion of said flange is formed at the sand-body 12

of the drag-frame *a*, and that the non-chilling material 17 in the upper end of the upper chill-section D prevents undue chilling of the tread of the car-wheel at the inner end of the wheel.

The plate A (see Fig. 2) is provided at the outer side of its flange 13 with two standards 27 which are arranged at opposite sides respectively and spaced circumferentially of the mold, and the cope-casing B (see Figs. 1 and 2) is provided at its upper end with two laterally and outwardly projecting elbowed arms 28 which are arranged at opposite sides respectively of and spaced circumferentially of the cope and overhang the chill and rest on the standards 27. Preferably each arm 28 (see Figs. 1, 2, and 3) is provided at its outer end with two lugs 29 which are arranged at opposite sides respectively of said arm and provided with vertically arranged set-screws K which are screwed into and extend below said lugs and rest on the adjacent standard 27.

Means for centering the cope relative to the chill during the assemblage of the component parts of the mold and maintaining the cope centered relative to the chill are provided and comprise plates or members L which rest on and are arranged substantially radially of the top of the chilling section D and spaced circumferentially of the cope. Each cope-centering member L abuts at its outer end against a lug 30 which is formed on the chilling-section D. Each lug 30 serves therefore as an abutment for the other end of the adjacent cope-centering member L and prevents outwardly endwise displacement of said cope-centering member, and a pin Q which is arranged substantially horizontally and radially of the chill extends through said lug and into said cope-centering member and prevents displacement of said cope-centering member circumferentially of the cope. Each cope-centering member L is interposed between the adjacent lug 30 and the cope-casing B and has its inner end face sloping and facing inwardly toward said cope-casing and upwardly and in contact with said cope-casing at the lower end of said face at which end said face is spaced from the chamber C so as to permit the cope-casing to overlap the upper chilling section D between the lower extremity of the inner end face of each cope-centering member and said chamber.

The cope and the drag of the mold illustrated are shown rammed to fit them for casting a car-wheel which has a hub provided with a central bore extending there-through and has an interior annular cavity spaced from but arranged concentric relative to and surrounding said bore. Hence a baked sand-core G (see Fig. 2) is arranged vertically and centrally of the

chamber C and shown extending upwardly through said chamber from the drag-frame *a* and surrounded by an annular sand-body J which is arranged within said chamber and concentrically relative to and spaced from said core and connected at any suitable number of points, as at 31, with the sand-body 12 of said drag-frame. The core G is provided at its upper end with a head *g* which forms the bottom of a suitably formed pouring-basin 32, and said head is provided with gates 33 which establish communication between said basin and the chamber C and consequently form inlets for the passage of molten metal to said chamber.

It will be observed that the cope is free to be lifted at all times independently of the chill or intermediate mold-part, and hence the cope without interfering with the chill or intermediate mold-part is removable, if required, for setting and centering of the core, finishing of the mold, or other purposes.

The casting formed in the mold obviously contracts horizontally or diametrically when it cools and thereby frees the chill, and obviously during the first cooling and contraction of a casting formed in the mold the chill expands laterally and outwardly by heat.

By the construction and relative arrangement of the parts hereinbefore described it will be observed that the chill, and more especially the upper chilling section D, is expansible by heat laterally and outwardly independently of the cope as well as independently of the drag, and I would here remark that the cope only overlaps the top of the chill to such an extent that the lateral and outward expansion of the chill by heat during the horizontal contraction of the casting formed in the mold results in the removal of the chilling section D from under the chill-overlapping portion of the cope and thereby renders the said chilling section free to be elevated, independently of the cope and the drag, to the extent shown in dotted lines Fig. 5 if desired, and the elevation of said chilling section results in the formation of an annular space next below said chilling section and next exteriorly and circumferentially of the casting,—that is, between said chilling section and the lower chill-section E,—so as to permit the introduction, into said space and to the casting, of air or other heat-absorbing medium or any fluid, substance or material with which the casting is to be beneficially influenced or treated. By means of the set-screws K the cope can be readily adjusted to normally rest at the lower end of the cope-casing B on top of the chill and at the same time rest at the lower ends of said set-screws on the standards 27, but not unimportant is the support of the cope from the standards 27

to avoid pressure by the cope on the casting when the chill, upon lateral and outward expansion of the chilling section D by heat, no longer affords a seat or support to the
5 cope.

Illustration and description of means for introducing a heat-absorbing medium or other substance or matter to the casting between the mold-sections D and E upon the
10 elevation of the upper of said sections independently of the remainder of the mold is not considered necessary. Suffice it to state that such heat-absorbing medium or other substance or matter is introduced in any ap-
15 proved manner next below the chilling section D immediately upon the elevation or separation of the said chilling section, and that before the laterally and outwardly expanded upper chilling section D materially
20 contracts horizontally it is lowered to its original or normal position. The chilling section D is lifted and held elevated the desired length of time in any approved manner.

Of course the elevated mold-section D is
25 lowered as soon as the casting has been treated with said heat-absorbing medium or other substance or matter, and by the construction hereinbefore described it is obvious that both mold-sections D and E can be
30 assembled before the mounting of the chill or central mold-part on the drag, and the mold-section E is removable upwardly with the mold-section D to permit upward re-
35 moval of the drag-frame *a* from the plate A.

The provision of the drag-frame *a* for independently carrying the sand-body of the drag and the mounting of said frame removably on the bottom-forming plate of the
40 drag, in lieu of having said plate directly carrying the sand-body, are important because said frame can be readily rammed with sand in a molding machine with economy in labor and a saving of time, but more
45 especially important is the provision of a drag-frame *a* in the form of a substantially horizontally arranged grill or grating as illustrated in Fig. 6 so as to render said
50 drag-frame capable of carrying said sand-body independently of said plate.

What I claim is:—

1. In a mold for making metal castings, a lower mold-part or drag instrumental in forming the bottom of the molten-metal-receiving chamber of the mold, an upper
55 mold-part or cope instrumental in forming the top wall of said chamber, and an intermediate mold-section participating in the formation between the cope and the drag of said chamber, said intermediate mold-section being capable of being moved upwardly
60 independently of the top wall of said chamber and independently of the drag while the casting formed in the mold is within the mold, and the cope being removable up-
65 wardly independently of said intermediate mold-section.

wardly independently of said intermediate mold-section.

2. In a mold for making metal castings, a drag, a cope instrumental in forming the top wall of said chamber, and a chilling
70 section participating in the formation between the cope and the drag of said chamber, said chilling section being capable of being moved upwardly independently of the top wall of said chamber and independently
75 of the drag upon a lateral and outward expansion by heat of said chilling section, and the cope being removable independently of said chilling section.

3. In a mold for making metal castings, a drag, a cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a chilling
80 section participating in the formation between the cope and the drag of said chamber, said chilling section being normally overlapped by the cope and capable of being removed from the casting upon the lateral and out-
85 ward expansion by heat of said chilling section, and the cope being free to be lifted independently of said chilling section and the drag.

4. In a mold for making metal castings, a drag; a cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and an intermediate
95 mold-part participating in the formation between the cope and the drag of said chamber and comprising two superimposed sections forming different portions respectively of the surrounding wall of said chamber and capable of being relatively separated
100 vertically and independently of the cope and the drag and arranged when relatively separated to afford access, between the relatively separated sections, to the casting formed in the mold, said sections being also liftable
105 together from over the drag.

5. In a mold for making metal castings, a drag; a cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a central mold-
110 part participating in the formation between the cope and the drag of said chamber, the upper portion of the central mold-part comprising a chilling section movable upwardly independently of the lower portion of the
115 central mold-part upon the lateral and outward expansion by heat of said chilling section, and both of said portions of said central mold-part being liftable together from over the drag.

6. In a mold for making metal castings, a drag; a cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a chilling
125 section participating in the formation between the cope and the drag of said chamber, which chilling section is normally overlapped adjacent the aforesaid chamber by a portion of
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the cope and free to expand laterally and outwardly by heat independently of the cope and drag, the cope and said chilling section being relatively arranged to permit movement of said chilling section upwardly upon the lateral and outward expansion by heat of said chilling section.

7. In a mold for making metal castings, a lower mold-part or drag, an upper mold-part or cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a chilling section participating in the formation between the cope and the drag of said chamber, which chilling section has the top thereof normally overlapped adjacent the aforesaid chamber by the adjacent portion of the cope and is free to expand laterally and outwardly by heat independently of the cope and drag, the cope and said chilling section being relatively arranged to permit elevation of said chilling section upon lateral and outward expansion of said chilling section.

8. In a mold for making metal castings, a substantially vertically arranged chilling section participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold; an upper mold-part or cope instrumental in forming the top wall of said chamber and normally overlapping the top of and resting on said chilling section adjacent said chamber, said chilling section being free to expand laterally and outwardly by heat independently of the cope and upon lateral and outward expansion thereof being free to be elevated, and means for supporting the cope independently of said chilling section.

9. In a mold for making circular metal castings, a substantially vertically arranged annular chilling section participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold; a cope instrumental in forming the top wall of said chamber and overlapping said chilling section adjacent said chamber, said chilling section being free to expand laterally and outwardly by heat independently of the cope and upon the lateral and outward expansion thereof being free to be elevated, and means for supporting the cope independently of said chilling section.

10. In a mold for making circular metal castings, a substantially vertically arranged chilling section participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold; an upper mold-part or cope instrumental in forming the top wall of said chamber and having a circumferentially extending casing somewhat overlapping the top of said chilling section adjacent said chamber, said chilling section being free to expand laterally and outwardly by heat independently of the cope and upon lateral and outward

expansion thereof being free to be elevated, and means for supporting the cope independently of said chilling section.

11. In a mold for making metal castings, a substantially vertically arranged central mold-part participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold, standards spaced circumferentially of the mold, a cope instrumental in forming the top wall of said chamber and having members which extend over said standards, and means whereby the cope may be adjusted vertically relative to said standards at said members of the cope.

12. In a mold for making metal castings, a substantially vertically arranged central mold-part participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold, standards spaced circumferentially of the mold, and an upper mold-part or cope instrumental in forming the top wall of said chamber and having a circumferentially extending casing provided with laterally and outwardly projecting arms which extend over said standards and are provided with substantially vertically arranged set-screws which rest on said standards.

13. In a mold for making circular metal castings, a substantially vertically arranged chilling section participating in the formation of the surrounding wall of the molten-metal-receiving chamber of the mold, standards spaced circumferentially of the mold, and an upper mold-part or cope instrumental in forming the top wall of the aforesaid chamber and having a circumferentially extending casing normally overlapping the top of said chilling section adjacent said chamber, the cope-casing being provided with laterally and outwardly projecting arms which extend over and rest on the aforesaid standards, the aforesaid chilling section being free to expand laterally and outwardly by heat independently of the cope and upon lateral and outward expansion thereof being free to be elevated.

14. In a mold for making metal castings, the combination, with a substantially horizontally arranged circular drag-plate, of a circular frame removably mounted on and arranged concentrically relative to said plate and rammed independently of said plate with sand forming the bottom of the molten-metal-receiving chamber of the mold, said frame and said plate being provided with means for centering the frame relative to the plate.

15. In a mold for making metal castings, the combination, with a substantially horizontally arranged circular plate which forms the bottom of the lower mold-part or drag, of a frame removably mounted on and arranged concentrically relative to said plate and adapted to independently carry rammed

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sand to form the bottom of the molten-metal-receiving chamber of the mold, said frame being provided externally of its lower portion with a laterally outwardly and downwardly facing sloping surface, and said plate being provided at its upper side with an annular flange which is in contact with said surface and surrounds the said frame.

16. In a mold for making metal castings, the combination, with a drag, a cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a central mold-part participating in the formation between the cope and the drag of the surrounding wall of said chamber, of cope-centering members mounted on the top of and arranged substantially radially of said central mold-part and spaced circumferentially of the cope, said cope-centering members having upwardly facing sloping inner end faces, and means for preventing outwardly endwise displacement of said cope-centering members.

17. In a mold for making metal castings, the combination, with a lower mold-part or drag, an upper mold-part or cope arranged above and spaced from the drag to form a chamber between the drag and the cope, and a central mold-part participating in the formation between the cope and the drag of the surrounding wall of said chamber, of cope-centering members mounted on the top of and arranged substantially radially of said central mold-part and spaced circumferentially of the cope, said cope-centering members having upwardly facing sloping inner end faces and being in contact at the lower ends of said faces with the cope, and means for preventing outwardly endwise displacement of said cope-centering members.

18. In a mold for making metal castings, the combination, with a lower mold-part or drag, an upper mold-part or cope which is circular externally and arranged above and spaced from the drag to form a chamber between the drag and the cope, and a substantially vertically arranged chill participating in the formation between the cope and the drag of the surrounding wall of said chamber and provided at its upper end with upwardly projecting lugs spaced laterally and outwardly from and circumferentially of said chamber, of cope-centering members mounted on the top of the chill and spaced circumferentially of the cope, said cope-centering members being interposed between the exterior of the cope and the aforesaid lugs, and pins extending into said cope-centering members from within said lugs.

19. In a mold for casting car-wheels, a lower mold-part or drag, an upper mold-part or cope which is arranged above and spaced from the drag to form a chamber between the drag and the cope, and a substantially vertically arranged chill participating in the formation between the cope and the drag of the surrounding wall of said chamber and provided in its upper end and internally with recesses which are spaced circumferentially of said chamber and filled with non-chilling material, the cope normally resting between said recesses on said chill.

20. In a car-wheel-casting mold having a molten-metal-receiving chamber enlarged diametrically at its lower end, a drag forming the bottom of said chamber and the lower portion of the surrounding wall of the chamber; a cope instrumental in forming the top wall of said chamber, and an intermediate mold-part participating in the formation between the cope and the drag of the surrounding wall of said chamber and comprising an annular chilling section which is free to expand laterally and outwardly by heat independently of the cope, said chilling section being movable upon the lateral and outward expansion thereof by heat to afford access to the wheel-tread-forming surface of the casting.

21. In a car-wheel-casting mold having a molten-metal-receiving chamber enlarged diametrically at its lower end, a lower mold-part or drag forming the bottom of said chamber and the lower portion of the surrounding wall of the diametrically enlarged lower end of the chamber; a cope forming the top wall of said chamber; a substantially vertically arranged central annular mold-part participating in the formation between the cope and the drag of the surrounding wall of said chamber and divided horizontally and above said enlarged end of the chamber into two sections, and means for supporting the cope independently of said central mold-part, the upper portion of the central mold-part comprising an annular chilling section which is free to expand laterally and outwardly by heat independently of the cope, said chilling section being free to be lifted upon the requisite lateral and outward expansion thereof by heat.

In testimony whereof, I sign the foregoing specification, in the presence of two witnesses.

THOMAS D. WEST.

Witnesses:

B. C. BROWN,

N. L. McDONNELL.