R. T. HARRIS.

MOLD FOR CASTING METAL.

APPLICATION FILED JAN. 11, 1910. RENEWED OCT. 11, 1911.

**1,017,970.** **Patented Feb. 20, 1912.**

3 SHEETS—SHEET 1.

Fig. 1.

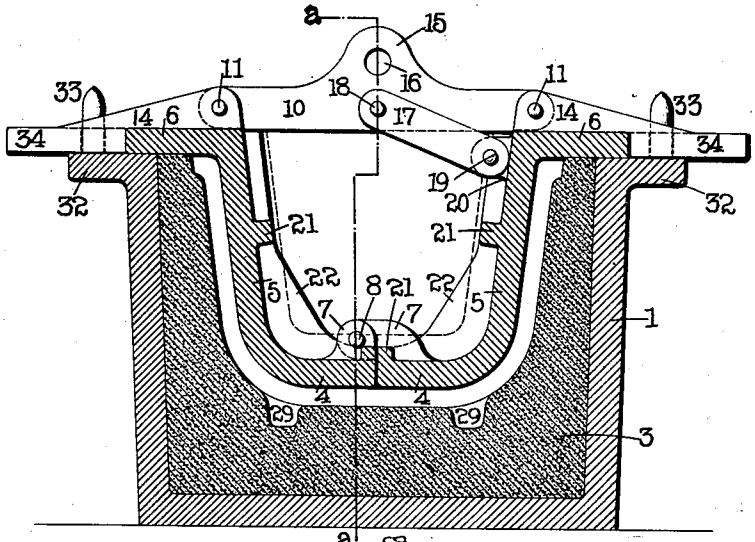
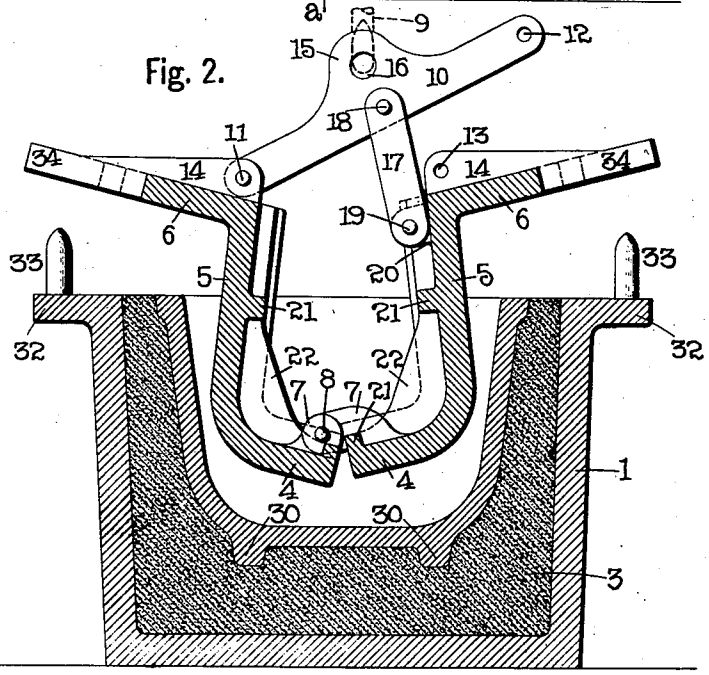



Fig. 2.




Witnesses.

L. M. Saugster.

George A. Neubauer.

Inventor.

Reese T. Harris.

By A. J. Saugster Attorney.

R. T. HARRIS.

MOLD FOR CASTING METAL.

APPLICATION FILED JAN. 11, 1910. RENEWED OCT. 11, 1911.

**1,017,970.** Patented Feb. 20, 1912.

3 SHEETS—SHEET 2.

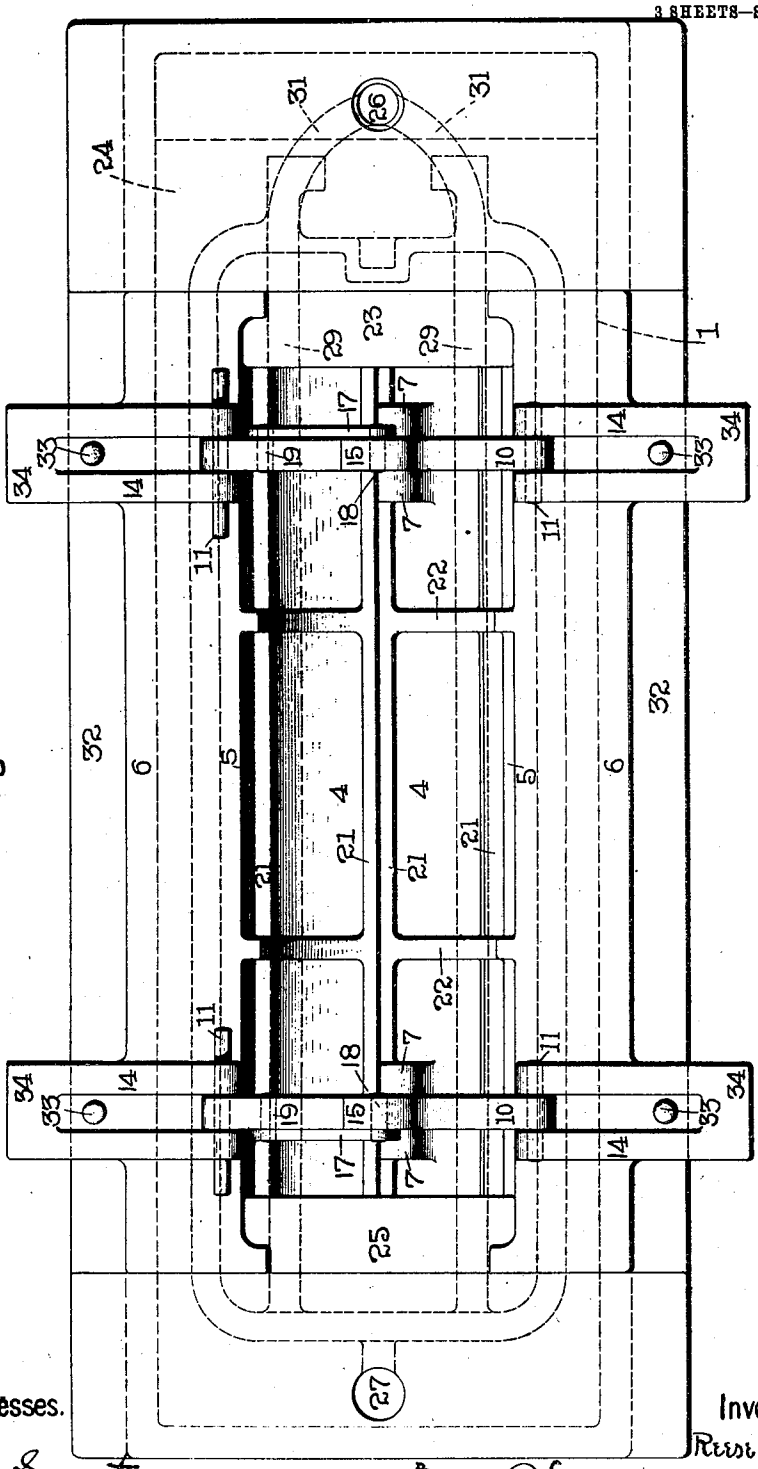



Fig. 3.

Witnesses.

L. M. Saugster

George A. Neuhauer.

Inventor.

Rossi T. Harris

By A. J. Saugster Attorney.

R. T. HARRIS.

MOLD FOR CASTING METAL.

APPLICATION FILED JAN. 11, 1910. RENEWED OCT. 11, 1911.

**1,017,970.**

Patented Feb. 20, 1912.

3 SHEETS—SHEET 3.

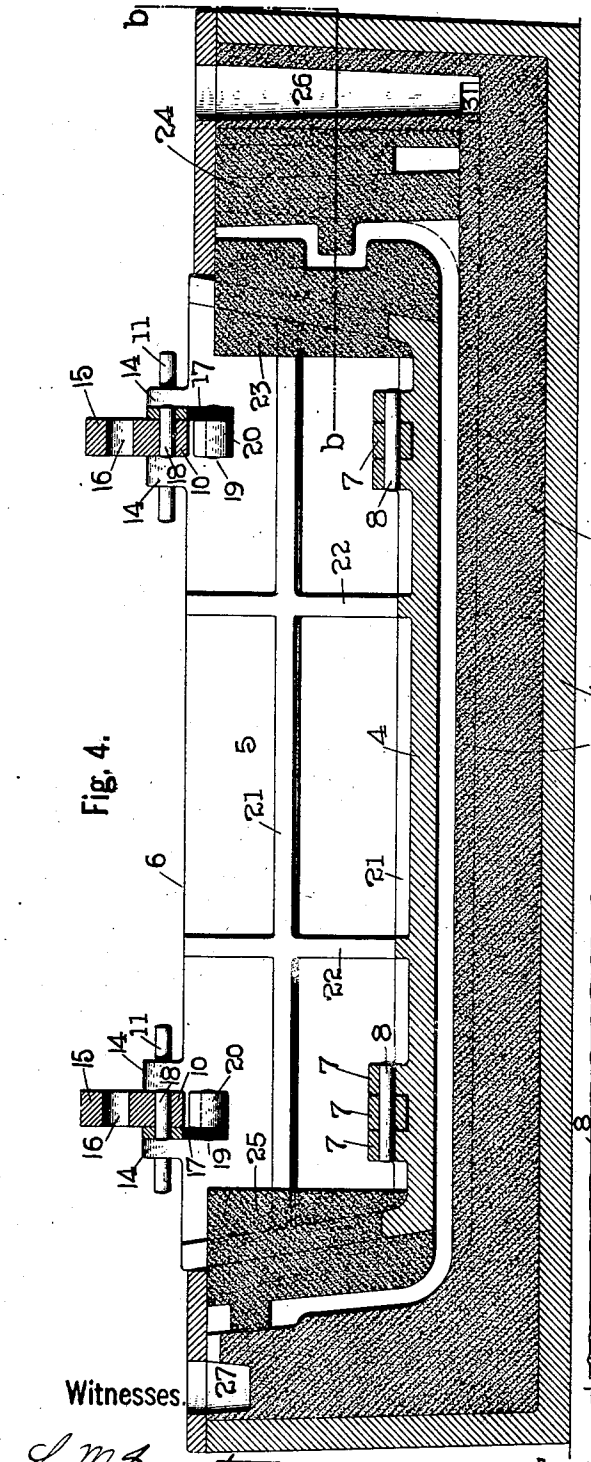



Fig. 4.

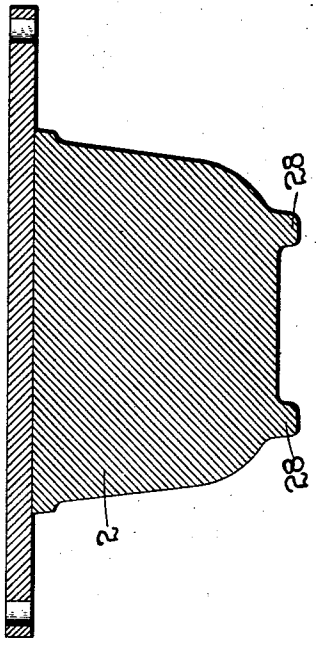



Fig. 6.

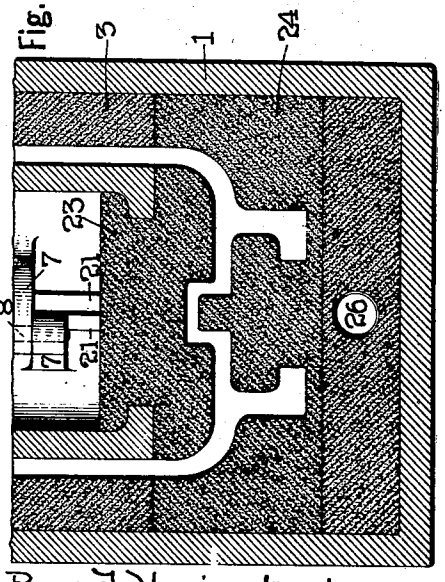



Fig. 5.

Witnesses.

L. M. Zaugetig

George A. Neubauer.

Reese T. Harris. Inventor.

By A. J. Hauptman Attorney.

# UNITED STATES PATENT OFFICE.

REESE T. HARRIS, OF BUFFALO, NEW YORK.

## MOLD FOR CASTING METAL.

1,017,970. Specification of Letters Patent. Patented Feb. 20, 1912.

Application filed January 11, 1910, Serial No. 537,521. Renewed October 11, 1911. Serial No. 654,162.

*To all whom it may concern:*

Be it known that I, REESE T. HARRIS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a certain new and useful Improved Mold for Casting Metal, of which the following is a specification.

This invention relates to improvements in molds used in casting metals, and principally to the collapsible construction of a metallic core.

The main object of the invention is to materially reduce the cost of producing molds and castings by dispensing with the usual green sand core and in lieu thereof utilizing a permanent collapsible metal core which may be easily withdrawn from the casting.

The invention also relates to certain details of construction of the mold and the metal core, which will be hereinafter described and claimed, reference being had to the accompanying drawings in which,—

Figure 1 is a transverse section through the mold. Fig. 2 is a transverse section through the mold similar to Fig. 1, but including the metal casting and illustrating the metal core partially withdrawn from the mold. Fig. 3 is a top plan view of the improved mold. Fig. 4 is a central longitudinal section through the mold on line *a a*, Fig. 1. Fig. 5 is a fragmentary horizontal longitudinal section through the mold on line *b b*, Fig. 4. Fig. 6 is a transverse section through the wooden pattern.

In referring to the drawings in detail like numerals designate like parts.

This improved mold is chiefly designed to be used in casting charging boxes and the like, and briefly it consists of a drag, a pattern and a collapsible metal element which forms both the cope and core.

The drag has a flask 1 and a wooden pattern 2 which forms the exterior contour of the metal casting and is fitted in the flask 1 in the usual manner. Green sand is then tamped into the flask around the pattern to secure the imprint of the sides of the pattern and form the lower green sand portion 3 of the mold. The interior contour of the box is formed by a metal element which is fitted on the flask 1 after the mold portion 3 is completed and the wooden pattern 2 is withdrawn. This metal element is preferably constructed of two parts or members which are hinged together so that they can collapse or fold together. The members are practically similar in size and shape but extend oppositely and are opposed to each other so that when in open position the metal element will be of a dished or barrel like form, or a hollow or troughlike structure. The members each consist of a lower approximately horizontal inwardly extending portion 4, a vertical medial portion 5 and a horizontal outwardly extending top flange portion 6.

The hinges for connecting the members consist of lugs 7 which extend up from the top surfaces of the horizontal portions 4 near the inner margins thereof and lap each other, and hinge pintles 8 which are loosely fitted through eye openings in the lugs. Two hinges each consisting of three lugs and a pintle are preferably utilized, each of which is located near one end of the metal element.

It will be noted that the junction of the lower horizontal portion 4 and the medial vertical portion 5 is of a rounded form. The object of this is to give a similar rounding contour to the interior of the casting and also to enable the members of the metal element to be easily turned on their hinges and withdrawn from the casting.

When the metal element is in position to form the interior contour of the casting as shown in Fig. 1, the lower inner edges of its members butt closely together, so that an extremely smooth and practically unbroken surface is presented to the molten metal as it flows in.

The hinges are located within the metal element above the bottom surface thereof, and are thus thoroughly and completely protected from contact with the molten metal as the casting is poured.

The metal element is collapsed and withdrawn after the molten metal is poured in the mold by means of a crane or other suitable machine (not shown) from which lifting hooks 9 depend. A fragment of one of the hooks 9 is shown in dotted lines in Fig. 2.

The two members of the metal element or core are held in their separated position as shown in Fig. 1, by bridge bars 10 which extend transversely between members and are connected at their respective ends to the members by pins 11, which pass through holes 12 in the bridge bars and holes 13 in raised cross ribs 14 on the top flanged por-

tions of the members. Each bridge bar has a central upwardly extending lug 15 which is provided with an opening 16 in which one of the hooks 9 engage. Each of the bridge bars is additionally connected to one of the members of the metal element or core by a link 17 which is pivoted at its inner end by a pin 18 to the bridge bar at a point vertically below the opening 16 in the lug 15, see Fig. 1. The outer end of the link is pivoted by a pin 19 to an inwardly projecting lug 20 located near the top of the vertical medial portion 5 of one of the members.

The members of the metal element or core are each stiffened and strengthened on their inner surface by longitudinal and transverse ribs 21 and 22. The ends of the core are closed by end pieces which are formed of sand inserted in place between the end margins of the members of the metal element or core in their separated position, as in Fig. 1.

As the charging box designed to be cast with the form of the invention shown in the accompanying drawings has a slotted end and a plain end, one of the end pieces is formed in two separated sections 23 and 24 which are fitted together as shown in Fig. 5 and shaped to leave the necessary slot in the slotted end and the other in one solid piece 25.

The pouring hole 26 is located at one end of the sand portion 3 of the mold and the vent hole 27 at the opposite end of said sand portion.

This mold is utilized chiefly for casting thin, narrow elongated pieces of dished form which are difficult to cast with ordinary sand cores and practically impossible to cast with solid metal cores.

In forming this improved mold the wooden pattern 2 is first placed in the flask 1 and green molding sand is then rammed into the space between the flask and pattern to form the lower sand portion 3 of the mold. The pattern is now withdrawn and the metal element or core is fitted on the flask and the sand end pieces placed in the ends of the metal element or core. The mold is now complete ready for pouring. The molten metal is poured in the pouring hole 26 until it runs out of the vent 27 at the opposite end. After the casting is poured, the metal element is quickly withdrawn in the following manner. Each of the bridge bars is disconnected from the rib 14 of one of the members linked thereto by removing the pins 11 and the metal element is collapsed and lifted from the casting by the hooks 9 in the manner shown in Fig. 2. The collapsing of the metal element also breaks up the sand end pieces of the core, so that the casting when sufficiently cooled can be easily removed from the lower sand portion 3 of the mold.

But one flask is required with this construction as the metal element serves not only as a core and a cope but also as the entire top portion of the mold. The advantages of this are that it is not necessary to wait for the casting to cool before removing the core, nor to knock the core out as with a sand core, that the casting is permitted to freely contract while cooling owing to the removal of the metal element which prevents distortion or cracking of the casting, and that owing to the permanent character of the metal element, the molding and casting operations are essentially quicker and cheaper than with the ordinary sand core and the resulting casting is even and uniform.

The wooden pattern 2 is provided on its bottom with two parallel longitudinal ribs 28 which press channels 29 in the surface of the lower sand portion of the mold. These channels constitute gates for the flowing molten metal and also serve to form corresponding parallel longitudinal ribs 30 on the bottom of the casting. After the wooden pattern is removed converging grooves or channels 31 are formed which extend from the ends of the channels 29 to the pouring hole or gate.

The flask and metal core are pinned to each other so that they will register properly together. This is accomplished by providing flanges 32 or the like on the outer margins of the top portions of the flask sides and providing such flanges with vertical pins which are adapted to enter openings in the lateral extensions 34 of the metal core. End plates are fitted on the ends of the flask over the ends of the mold and are held in place by weights or clamps. These plates serve to close the top ends of the flask as the core is not as long as the flask and also to prevent the sand from being forced out over the top of the molten metal as it is poured in.

One of the principal purposes for which this improved mold is utilized is in the casting of charging boxes from open hearth and Bessemer and other forms of steel and directly from the ladle, the iron being converted into steel and then carried to and poured into the mold while still in a molten state.

The metal element or core is preferably constructed of cast iron and it is washed with a composition of graphite and fire clay or any other suitable composition for producing a smooth non-adhesive surface to contact with the molten metal.

The main advantages of this improved mold reside in its simplicity and quickness and ease of construction as it is only necessary to form the lower portion and the end pieces of the core of sand; in the permanent character of the main portion of the core,

and the expeditious manner in which the casting is formed and removed from the mold.

I claim:

1. In a mold for casting discharge boxes, a drag having a flask and a sand mold portion and a collapsible combined core and cope on the flask over the sand mold portion, said combined core and cope consisting of two opposed metal sides movably connected to each other at their lower edges, and sand end pieces fitted between the ends of the sides.

2. In a mold for casting metal, a drag having a flask and a sand mold portion and a collapsible element on the flask over the sand mold portion which constitutes both a core and a cope, said collapsible element consisting of two side members of angular form in cross-section hinged to each other on the bottom and two sand end pieces which are fitted between the ends of the members and are adapted to be crushed by the movement of said side members toward each other when the element is collapsed.

3. In a mold for casting metal, a drag having a flask and a sand mold portion and a collapsible element on the flask over the sand mold portion composed of two side members, a hinge for connecting said side members together at their lower edges, said hinge being located within the collapsible element, and end pieces of friable material fitted between the ends of said members.

4. In a mold for casting metal, an outer mold portion of sand, and an inner core composed of metal sides hinged to each other, and end pieces fitted between the metal sides, said end pieces being formed of friable material and being adapted to be crushed by the collapsing of the sides.

5. In a mold for casting metal, an outer mold portion of sand, and an inner core composed of two angular hinged together metal side members and sand end pieces fitted between the ends of the sides.

6. In a mold for casting metal, a collapsible metal core consisting of two opposed metallic side members, and end pieces of friable material fitted between the metallic side members.

7. In a mold for casting metal, a collapsible metal element consisting of two opposed side members each composed of a lower inwardly extending horizontal portion, a vertical medial portion, and a top outwardly extending flanged portion, and hinged means for connecting the lower inwardly extending horizontal portions of said side members.

8. In a mold for casting metal, a collapsible metal element consisting of opposed members each consisting of a lower inwardly extending horizontal portion, a vertical medial portion, and a top outwardly extending flange portion, a hinge lug extending from the lower horizontal portion of each member and a hinge pintle loosely fitted in said lugs.

9. In a mold for casting metal, a collapsible metal element consisting of opposed members, hinge lugs extending from said members, hinge pintles loosely fitted in said lugs and transverse bridge bars extending across the members.

10. In a mold for casting metal, a collapsible metal element consisting of opposed members each consisting of a lower inwardly extending horizontal portion, a vertical medial portion and a top outwardly extending flange portion, hinges connecting the lower horizontal portions and bridge bars extending transversely across and connecting the top flange portions.

11. In a mold for casting metal, a collapsible metal element consisting of opposed members each consisting of a lower inwardly extending horizontal portion, a vertical medial portion and a top outwardly extending flange portion; said flange portion having top ribs and a bridge bar extending across and pivoted to the ribs.

12. In a mold for casting metal, a collapsible metal element consisting of opposed members each consisting of a lower inwardly extending horizontal portion, a vertical medial portion and a top outwardly extending flange portion; said flange portion having top ribs, a bridge bar extending across and pivoted to the ribs, and a link pivoted at one end to the center of the bridge bar and at the opposite end to one of the members.

13. In a mold for casting metal, a collapsible metal element consisting of opposed members each consisting of a lower inwardly extending horizontal portion, a vertical medial portion and a top outwardly extending flange portion; said flange portion having top ribs, a bridge bar extending across and pivoted to the ribs and a link pivoted at one end to the center of the bridge bar and at the opposite end to an interior lug on the vertical medial portion of one of the members.

14. In a mold for casting metal boxes, a drag having a hollowed-out sand portion and a flask around said sand portion in combination with a metal core consisting of angular side members having lower inwardly extending flanges and upper outwardly extending flanges, and a hinge connecting the lower inwardly extending flanges to each other.

15. In a mold for casting metal, a collapsible element consisting of a hollow or trough-like collapsible metal structure having open ends, and end pieces of friable material fitted in the open ends of said collapsible structure.

16. In a mold for casting metal, a collapsible core consisting of angular metallic side

members and end pieces of friable material fitted between the ends of said members.

17. In a mold for casting metal, a collapsible core consisting of hinged-together metallic side members of angular form in cross-section, and end pieces of friable material fitted between the ends of said side members.

18. In a mold for casting metal, a transversely collapsible core consisting of metallic side members movably connected to each other, and end pieces of friable material.

19. In a mold for casting metal, a collapsible core consisting of a transversely collapsible hollow or trough-like metal structure, and sand end pieces.

20. In a mold for casting metal, a core having hinged-together metal sides and sand end pieces.

21. In a mold for casting an open box of the character described, the combination with a matrix, of a core consisting of an open-ended trough-like metallic structure formed with out-turned flanges bearing on the top of the matrix, and separable end pieces closing the ends of said structure.

22. In a mold for casting an open box of the character described, the combination with a matrix, of a core consisting of an open-ended trough-like collapsible metallic structure, oppositely disposed channel bar-like members, each having one edge hinged to the edges of the other, an arm pivotally connected at one end to one member, means for detachably securing the other end of the arm to the other member, and a link pivotally connected at one end to said arm and at the other end to said other member; and supportable end pieces closing the ends of said structure.

23. In a mold for casting an open box of the character described, the combination with the matrix of a core consisting of an open end trough-like collapsible metallic structure and separable end pieces closing the ends of said structure, said end pieces being in the form of molded core parts and being seated in the ends of said structure.

REESE T. HARRIS.

Witnesses:
W. H. EBSWEY,
GEORGE A. NEUBAUER.