Oct. 24, 1933. W. G. NEWTON 1,931,769

CASTING APPARATUS

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Fig. 1.

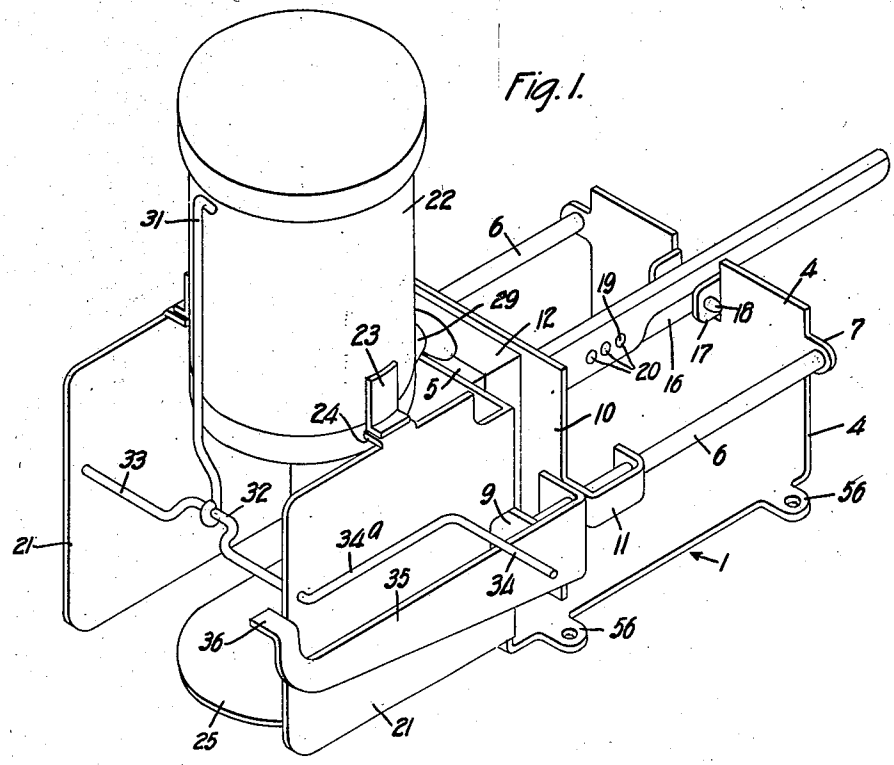
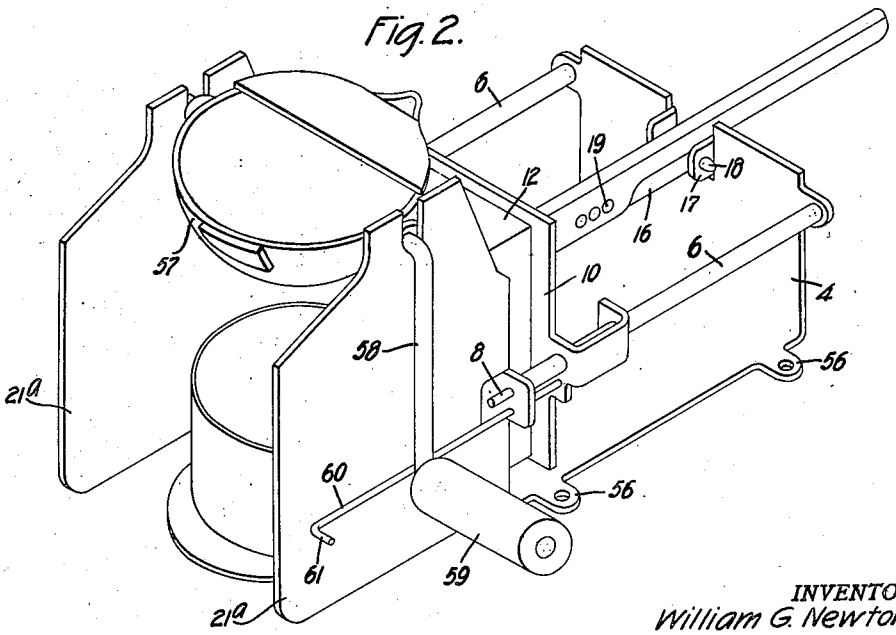


Fig. 2.



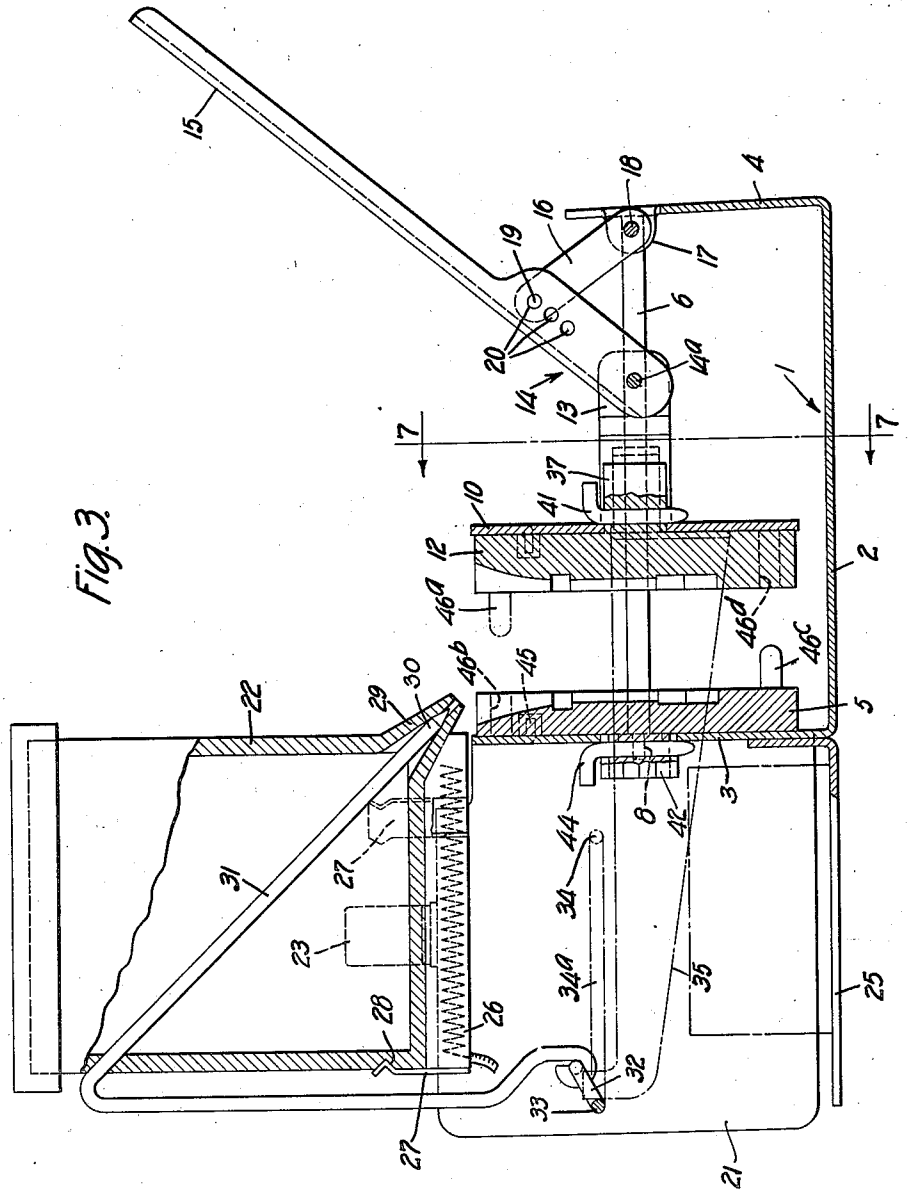
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Fig. 3.



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CASTING APPARATUS

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Fig. 4.

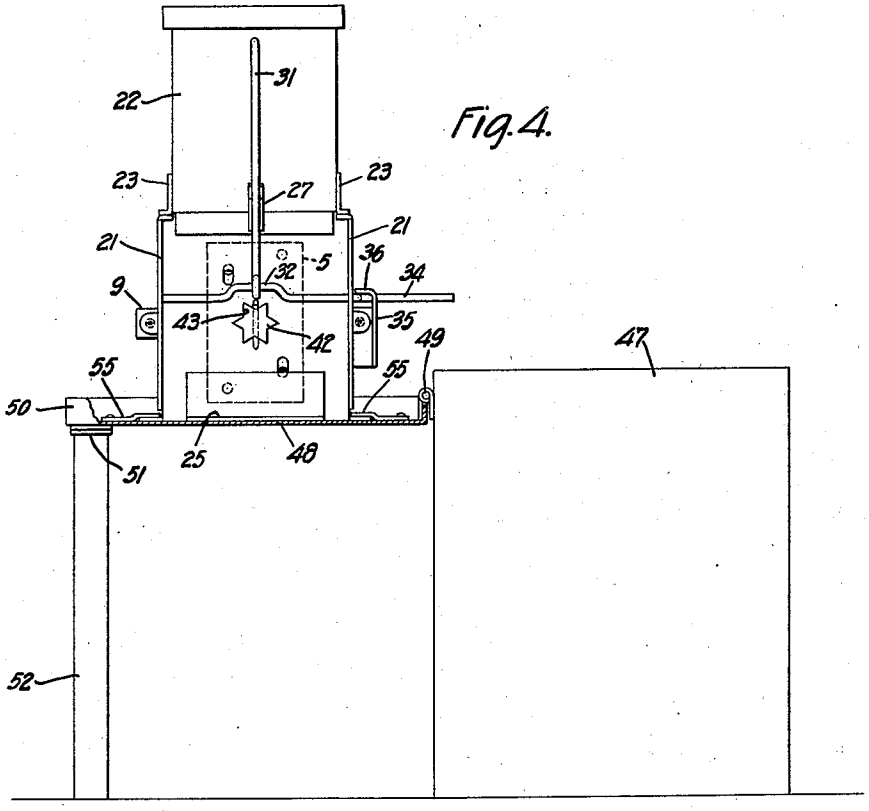
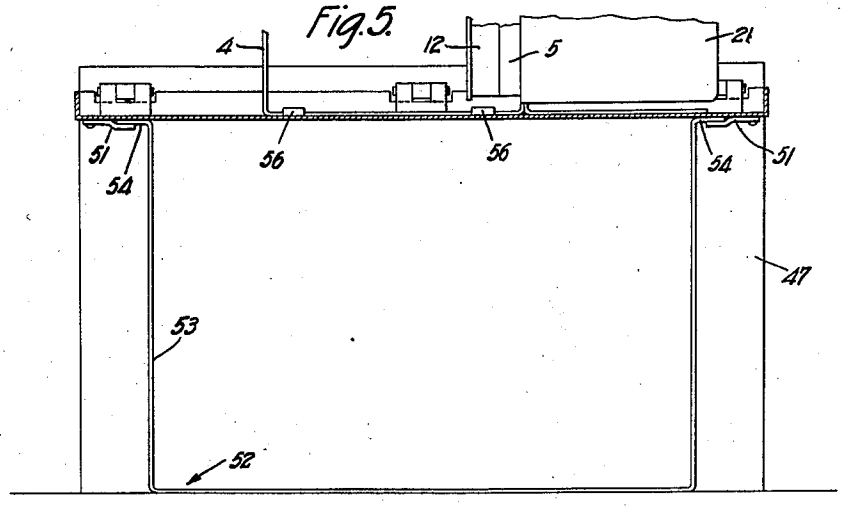


Fig. 5.



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CASTING APPARATUS

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Fig. 6.

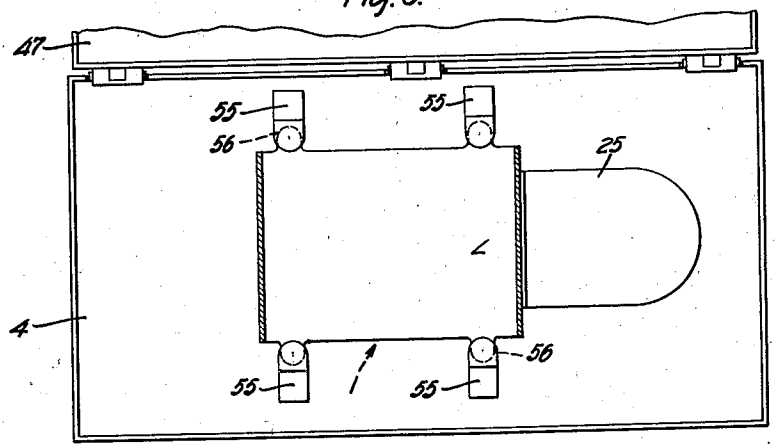


Fig. 7.

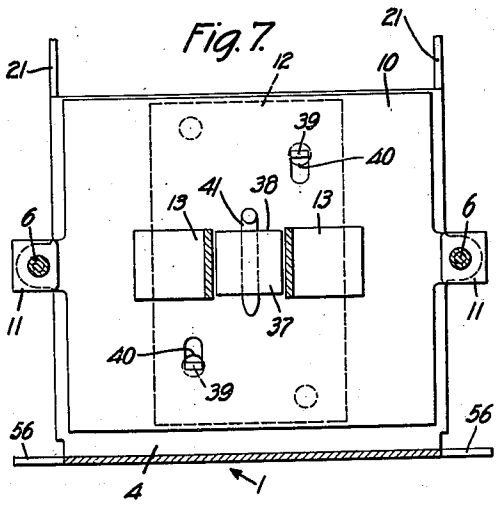


Fig. 8.

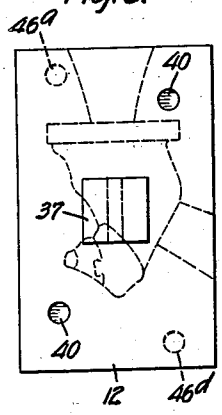
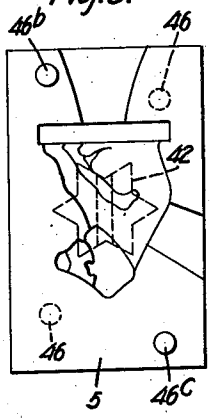


Fig. 9.



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Patented Oct. 24, 1933 1,931,769

UNITED STATES PATENT OFFICE

1,931,769

CASTING APPARATUS

William G. Newton, Hamden, Conn., assignor to Newton Junior Corporation, New Haven, Conn., a corporation of Delaware

Application May 2, 1930. Serial No. 449,169

11 Claims. (Cl. 22—57)

This invention relates to the making of cast articles, and has for its principal object to provide a small, inexpensive and safe casting machine adapted to be sold as a toy for use by children in casting toy soldiers, dolls, guns, rings, and other objects which appeal to the child's fancy.

Certain features of the invention have particular advantage in a small machine of the type adapted to be used as a toy, especially features designed to render the apparatus safe and foolproof. Certain of these features, however, are of more general applicability and are not to be regarded as confined to the toy art.

One important feature of the invention relates to the provision of a supporting frame for the mold sections, adapted, itself, to act as a spring for holding the mold sections pressed firmly together and for preventing separation thereof.

A further important feature of the invention relates to the permanent mounting of the melting pot in such relation to the mold sections that the metal may be poured without the necessity for bodily moving the melting pot or directly handling it in any way.

In accordance with another feature of the invention, provision is made of safety means for preventing the pouring of any molten metal when the mold sections are separated.

In accordance with still another feature of the preferred form of the invention, provision is made for heating the melting pot either electrically or by flame, so that the same structure may be employed with an electric heater when used by children too young to be safely trusted with fire, or by a flame when used by older children.

A further feature of the invention has to do with the construction of the casting apparatus and the container in which it is packed, so that a stable support is provided for the casting apparatus in use, of such nature that the spilling of molten metal is prevented. The support also prevents the heat present in the apparatus being transmitted to the table, or the floor, or the floor covering on which the apparatus is set up. Thus all liability of ruining table or floor varnish or of charring a table, table cover, floor, rug or linoleum is avoided.

Still another feature of the invention has to do with the provision of means for rendering the mold sections of a pair non-interchangeable, that is, for compelling the proper mold section to be located nearer the furnace. In this connection it is generally desirable that the thinner mold section be situated nearer the furnace, so that the heat from the furnace may penetrate more quickly to the surfaces of the mold sections which are to engage the molten metal. The die section remote from the furnace is the movable section, and it is desirable that the cast figure adhere to this section when the casting has been made and the mold sections are separated. This result is promoted by making the movable section of larger mass than the stationary section. To this end each mold section is made of such configuration at the rear or outer side thereof that it will interfit only with the mold support for which it is intended.

In accordance with still another feature of the invention the mold sections themselves are made as die castings so that they are adapted for economical quantity production and may be sold at attractive prices to children who own the apparatus.

Other objects and advantages will hereinafter appear.

In the drawings forming part of this specification:

Figure 1 is a perspective view of a molding apparatus embodying features of the invention;

Figure 2 is a perspective view of a modified form of apparatus;

Figure 3 is a sectional, side elevation of the apparatus illustrated in Figure 1;

Figure 4 is an end view of the apparatus of Figure 1, showing the same mounted upon the out-turned lid of the box in which the apparatus is kept when not in use;

Figure 5 is a fragmentary, sectional, side elevation of the structure shown in Figure 4;

Figure 6 is a fragmentary, horizontal, sectional view of the structure of Figure 4, taken just above the bottom of the mold supporting frame;

Figure 7 is a transverse, vertical, sectional view taken on the line 7—7 of Figure 3, looking in the direction of the arrows;

Figure 8 is a view in elevation of a mold section; and

Figure 9 is a view in elevation of a complementary, stationary mold section.

In the illustrative embodiment of Figures 1 and 3 to 9, inclusive, disclosure is made of a U-shaped sheet metal frame 1 for supporting the mold sections and the operating mechanism therefor. This frame comprises a base 2 and upright members 3 and 4 in the form of plates. The upright plate 3 constitutes a support for a stationary mold section 5. Horizontal guide rods 6 are fixed to ears 7 of plate 4 and have reduced portions 8 slidably extending through ears 9 of the upright plate 3. A movable die supporting plate 10 is provided with guiding and supporting brackets 11. Each bracket 11 is U-shaped and has both legs thereof impaled upon the associated guiding and supporting rod 6. The plate 10 serves as a movable support for carrying a movable mold section 12. Brackets 13 on the outer face of the plate 10 embrace a lever 14 and carry a pivot pin 14a on which the lever is pivotally supported. The lever 14 is provided with an operating handle 15 and forms one element of a toggle, the other

element of the toggle being a link 16 pivoted between ears 17 of plate 4 upon a pivot pin 18. The link 16 is pivotally connected to the lever 14 by a pivot pin 19. The lever 14 is of channeled form and is provided with a series of pairs of aligned openings 20. The pivot pin 19 may be secured in any one of the aligned pair of openings to adjust the throw of the toggle and thereby provide for the employment of mold sections of different thicknesses. When the handle 15 is in an elevated position, the mold sections are separated, as seen in Figure 3. The handle is adapted to be depressed to move the movable mold section 12 toward the relatively stationary mold section 5, the plate 4 being provided with a recess in the upper portion thereof, and the lever being so cut away that the toggle may move downward slightly beyond the dead center position. The toggle is preferably so adjusted that the full depression of the handle causes relative movement of the movable die section and the end plate 4 greater than would be necessary to barely close the mold. The support 1 being formed of rather light resilient sheet metal, however, is not rigid, and the end 4 thereof may be readily flexed outward, particularly when acted upon with the mechanical advantage provided by the handle lever 14 and the toggle of which the lever forms a part. Since the depression of the handle 15 produces relative separation of the end plates 3 and 4, the frame is put under stress tending to return the end plates toward one another. When the toggle is moved slightly beyond dead center, the stress of the frame is effective, therefore, to lock the toggle below the dead center position, and hence to maintain the mold sections firmly clamped against one another.

The plate 3 is desirably provided with rearwardly extending wings or plates 21 which serve as a protection against exposure of the child to flames and also serve as a support for the melting pot 22. The plates 21 also reinforce end plate 3 and tend to confine distortion to the other portions of the frame. Brackets 23 are desirably welded to ears 24 on the plates 21 and to the melting pot. A furnace supporting plate 25 is secured to the lower portion of plate 3 and extends rearwardly between and beneath the side plates 21. A can of prepared fuel of the kind sold in drug stores and ordinarily referred to as "canned heat" may desirably be employed as the furnace element of the device. The use of a furnace element of this character has the advantage over an electric heater that besides melting the metal it preheats the mold, as will be hereinafter pointed out. On the other hand, an electric heating element has a distinct advantage for use by small children who cannot be safely trusted with fire. Provision is accordingly made of an electric heating element 26 adapted to be detachably secured in intimate engagement with the bottom of the melting pot 22 by spring clips 27 that interfit with notches 28 in the periphery of the melting pot and serve by combined spring and camming action to draw the electric heating element firmly and uniformly against the bottom of the melting pot.

The melting pot 22 is provided with a spout 29 so situated that it will discharge metal directly into the closed mold formed by the sections 5 and 12. This spout is provided interiorly with a valve seat adapted to be controlled by a needle valve 30. The valve 30 has a stem portion 31 which extends diagonally upward and out through the rear of the melting pot wall above the level of the molten metal in the pot. The stem 31 continues downward outside the melting pot adjacent the wall thereof and is connected to a crank 32 of an operating shaft 33 which is pivotally supported in the side plates 21. The shaft 33 is provided with an operating handle 34 being preferably integral with said handle. When it is desired to pour metal into the mold, the operating handle 34 is raised, thus raising the crank 32 and operating the valve stem 31 to withdraw the valve 30 from its seat. To cut off the flow of metal the handle 34 is moved in the reverse direction.

In order to avoid the likelihood of a child discharging the metal from the melting pot while inadvertently leaving the mold open, provision is desirably made of means for preventing actuation of the handle 34 to unseat the valve 30 when the mold sections are separated. To this end provision is made of a bracket 35 carried by the movable mold supporting plate 10 and provided with a finger 36 adapted to overlie a crank portion 34*a* of handle 34 whenever the mold is not closed or substantially closed. As seen in Figure 3, the finger 36 is in a position to prevent elevation of the handle 34.. As seen in Figure 1, however, the mold sections have been moved to closed position and the finger 36 has been carried rearwardly by the plate 10 far enough to clear the crank 34*a* so that no obstruction is presented to the raising of handle 34.

It is intended, of course, that the child shall be supplied with a number of mating mold sections which he may use in the machine at his pleasure. It is accordingly important that provision be made for mounting the mold sections on the respective supporting plates 3 and 10 with provision for ready substitution and for assuring that each mold section of a pair will be mounted upon the proper support. As seen best in Figures 3 and 7, the die 12, which will ordinarily be the thicker die of a pair, is provided with a square boss 37 adapted to pass through and substantially fit a square opening 38 in the movable plate 10. The plate 10 is further provided with rearwardly struck lugs 39 designed to interfit with openings 40 in the outer face of the mold section 12. In order for a mold section to be attached to the plate 10 it is necessary, therefore, for the attaching boss 37 of the mold section to be capable of being passed through the opening 38 of the plate 10 and for the back of the mold section to be capable of receiving the lugs 39 of the plate 10. The attachment of a properly fitting mold section 12 to the plate 10 is effected by passing the boss 37 through the opening 38 and then inserting a locking pin 41 through an opening in the boss 37.

The plate 3 and mold section 5 are purposely made different from the plate 10 and mold section 12, so that plate 3 and mold section 5 may cooperate properly with one another, but plate 3 cannot receive a mold section 12 and a mold section 5 cannot be secured upon the plate 10. To this end the mold section 5, as seen best in Figure 4, is provided with a star-shaped attaching boss 42 adapted to be passed through a star-shaped opening 43 in the plate 3 and to be retained to said plate by passing a retaining pin 44 through an opening in the boss. The plate 3 is provided with forwardly struck lugs 45 adapted to fit into recesses 46 in the back of the mold section 5. It will be noted by a comparison of Figures 8 and 9 that recesses 40 adapted to cooperate with the lugs 39 of plate 10 would not match with the lugs

45 of plate 3, and that the recesses 46 of mold section 5 adapted to cooperate with the lugs 45 would not match with the lugs 39. Bosses 37 and 42 are of such shape and dimensions that neither can enter the hole which the other is intended to fit.

The mold section 12 is provided with a dowel pin 46*a* adapted to enter a hole 46*b* in mold section 5, and the mold section 5 is provided with a dowel pin 46*c* adapted to enter a hole 46*d* in the mold section 12. The dowel pins have rounded ends and are, therefore, adapted to find their way readily into the cooperative holes. They are long enough to assure that the mating faces of the dies will be brought squarely into engagement, so that one of the dies will not be canted with reference to the other.

There is another advantage in making the boss 42 star-shaped, namely, that this boss is situated where it will be exposed directly to the heat of the furnace and may lie directly in the furnace flame. This boss is adapted, therefore, to absorb considerable heat and transmit it to the dies so that the dies will not be cold when the metal is poured into them. This is a desirable, though not an indispensable, feature, and the formation of the boss to have a large superficial area facilitates the rapid absorption of heat by it, and hence the rapid transmission of heat to the molding surfaces of the mold sections. The chief advantage of a flame heater over an electric heater lies in this capacity for preheating the mold.

The mold sections 5 and 12 are themselves die castings. This is regarded as an important feature of the invention. The die-cast mold sections may be made cheaply in quantity production, so that they can be attractively priced and may be manufactured with the molding faces so smoothly and perfectly finished that the articles cast by them will have a smooth and attractive finish, free from flaws and defects.

The machine employing die-cast molds is adapted to be used with wax or clay, as well as molten metal, and this is a feature of importance, since the machine then constitutes a toy which may be played with by children too small to be trusted with a device adapted to melt metal. The smoothness of finish which may be secured in die-cast mold sections adapts the mold sections to be used with cold moldable material, such as wax or clay, since it enables articles formed of such materials by a mere pressing operation, to be withdrawn readily from the mold without disfiguration.

In Figures 4, 5 and 6 disclosure is made of the box in which the apparatus thus far described is kept when not in use, and upon which it is mounted when in use. The box really constitutes a part of the apparatus as well as a means for storing the other parts and the material supplies.

The box is desirably made of sheet metal and comprises a body portion 47 and a lid 48 connected to the box body by suitable hinges 49. The box lid 48 is in the form of a tray having a peripheral flange 50 extending completely around it. This tray-shaped lid is of substantial capacity and constitutes a safety feature of great importance, since it will serve to catch the metal in case overflowing is carelessly permitted, or in case the mechanism through damage or defect hinders the closing of the valve 30. The cover is provided on the outer face thereof, which becomes the lower face, as seen in Figures 4 and 5, with small brackets 51 having portions thereof extending substantially parallel to the cover and at a slight distance from the cover. A U-shaped supporting member 52 comprising upright legs 53 is provided with outwardly extending ears 54 adapted to be received between the brackets 51 and the lid 48. The supporting member 52 is of just the proper height to cooperate with the box body 47 in supporting the lid 48 in a horizontal position. It is attached in supporting relation to the lid by springing its legs inward and then permitting the ears 54 to spring outward into interengaging relation with the brackets 51.

On the inner side of the lid 48 (that is, the upper side, as seen in Figures 4 and 5) provision is made of brackets 55 having spring portions adapted to lie adjacent and substantially parallel to the lid 48. The base portion 2 of the supporting frame 1 of the machine proper is provided with outwardly extending ears 56. The machine proper is set upon the lid and then slid longitudinally to bring the ears 56 beneath the brackets 55. The ears 56 may be recessed to coact with burrs or knobs on the brackets to prevent accidental movement of the mechanism relative to the supporting lid 48. These devices do not, however, substantially hinder the removal of the apparatus from the lid when it is desired to store the apparatus in the box.

The apparatus of Figure 2 is in most respects the same as that of Figure 1. Corresponding reference numerals have accordingly been applied to corresponding parts, and the description of these parts will not, therefore, be repeated. In this embodiment of the invention, however, the side plates 21*a* are slotted at the top and provide bearings for the trunnions of a tiltable melting pot 57. This melting pot is provided with an operating crank 58 which includes an operating handle 59. When the mold is closed and the metal in the pot 57 is sufficiently heated, the pot is tilted to pour the metal into the mold by moving the handle 59 toward the left, as viewed in Figure 2. A rod 60 carried by the movable plate 10 is provided with a finger 61 which clears the crank 58 when the mold sections are closed, but which stands in position to obstruct the crank 58 and hinder the operation of handle 59 toward the left when the mold sections are open.

While I have illustrated and described in detail certain preferred forms of my invention, it is to be understood that changes may be made therein and the invention embodied in other structures. I do not, therefore, desire to limit myself to the specific construction illustrated, but intend to cover my invention broadly in whatever form its principle may be utilized.

I claim:

1. In a casting device, a unitary frame comprising a base and a pair of upright members, a fixed mold section supported by one of said upright members, a movable mold section supported between the upright members, and operating means interposed between the movable mold section and the other of said upright members, for operating the movable mold section between open and closed positions, the frame being yieldable to permit further operation of the operating means after the mold sections are closed.

2. In a casting device, a unitary frame comprising a base and a pair of upright members, a fixed mold section supported by one of said upright members, a movable mold section supported between the upright members, and a toggle interposed between the movable mold section and the other of said upright members for operating the movable mold section between open and closed positions, the frame being yieldable to permit

further operation of the toggle after the mold sections are closed, the toggle being operable to and slightly beyond dead center position in closing the mold and being so retained by the resiliency of the frame.

3. In a casting apparatus, in combination, a fixed mold section, a movable mold section, a fixed support for the fixed mold section, a movable support for the movable mold section, each of said supports having an opening therethrough, and each of the mold sections having a boss adapted to fit through the opening of the associated support, the bosses of the respective mold sections being of different configurations to render them non-interchangeable with reference to the supports.

4. In a toy casting machine, a frame comprising a base and front and rear walls projecting upwardly therefrom, guide rods extending between said front and rear walls and supported thereby at a substantial distance above said base, a fixed mold section removably attached to the forward face of said rear wall between said guide rods, a movable mold section carrier mounted to slide upon said guide rods, a movable mold section detachably connected to said carrier between said guide rods, means interposed between said movable mold carrier and said front wall member for forcing said movable mold carrier towards said rear wall and for locking said mold sections in contact, a support in rear of said rear wall, and a melting pot mounted on said support above and in rear of said rear wall, said melting pot having a spout extending over said rear wall and above the gate to said mold sections when said sections are brought into contact.

5. In a toy casting machine, a frame comprising a unitary base and upright members extending from the front and rear ends of said base, said base and uprights being made of spring metal and capable of yielding to a limited extent under pressure, parallel guide rods carried by said front and rear uprights at a substantial distance above said base, said guide rods having a loose connection with at least one of said upright members whereby they will not prevent the upright members from springing apart when force is applied thereto, a fixed mold member mounted on said rear upright between said guide rods, a movable mold member carrier mounted to slide on said guide rods, a movable mold member carried by said carrier, and means interposed between said carrier and said front upright for sliding said carrier and movable mold member towards said fixed mold member and for locking said mold members in contact.

6. In a toy casting machine, a frame comprising a base, an upright wall projecting therefrom, a stationary mold section removably attached to said wall, a yielding abutment projecting upwardly from said base at a distance from said upright wall, an upright mold carrier, supporting and guiding means for said carrier for supporting the same between said upright wall and said yielding abutment and permitting movement thereof toward and from said wall, a mold section removably attached to said carrier, and toggle means interposed between said carrier and said yielding abutment, for moving said carrier so as to bring said mold sections into contact.

7. In a casting toy, an upright member forming a carrier for a fixed mold section, wall members in rear of said upright member and forming therewith a furnace housing, a fixed mold section carried by said upright member, a movable mold section carrier, supporting and guiding means for said movable mold section carrier connected with said upright member and supporting the carrier in a position to be moved towards and from said upright member, a movable mold section carried by said carrier and adapted to be moved into juxta-positon with said fixed mold section, and a melting pot carried by said furnace housing in such relation to said mold sections as to be adapted to pour by gravity into the mold formed thereby.

8. In a casting toy, a spring sheet metal frame comprising a base and front and rear upright members, a fixed mold section carried by said rear upright member, guide means carried by said spring frame, a movable mold carrier supported by said guide means and movable thereon towards and from said rear upright member, a movable mold section carried by said carrier, toggle means for moving said carrier interposed between said carrier and said front upright member, and sheet metal members mounted in rear of said rear upright member forming therewith a furnace housing, and a melting pot carried by said furnace housing in position to discharge metal into the mold formed by said fixed and movable mold sections.

9. In a toy casting machine, a mold carrier frame comprising an integral U-shaped piece of resilient sheet metal, one end wall of which comprises a carrier for a fixed mold section, a fixed mold section mounted thereon, guide means carried by said U-shaped metal frame, a movable mold section carrier mounted to slide on said guide means, a movable mold section carried by said carrier and adapted to be moved thereby towards and from said fixed mold section, and toggle means interposed between said movable mold carrier and the end of said U-shaped sheet metal frame opposite to that carrying the fixed mold section.

10. A pair of mold sections for use in toy casting apparatus each having a mold recess in the face thereof and having a half gate recess communicating with said mold recess and each section having an attaching boss on the back thereof, said bosses being of different cross sectional configurations so as to render each section non-interchangeable with the other section of said pair.

11. In a toy casting machine, a frame comprising a base, an upright wall projecting therefrom, a stationary mold section removably attached to said wall, an abutment located at a distance from said upright wall, means for supporting the abutment from the base and positioning the same including spring means serving yieldingly to resist movement of the abutment away from a normal position, an upright mold carrier, supporting and guiding means for said carrier for supporting the same between said upright wall and said abutment and permitting movement thereof toward and from said wall, a mold section removably attached to said carrier, and toggle means interposed between said carrier and said abutment for moving said carrier so as to bring said mold sections yieldingly into contact.

WILLIAM G. NEWTON.