

June 30, 1925.

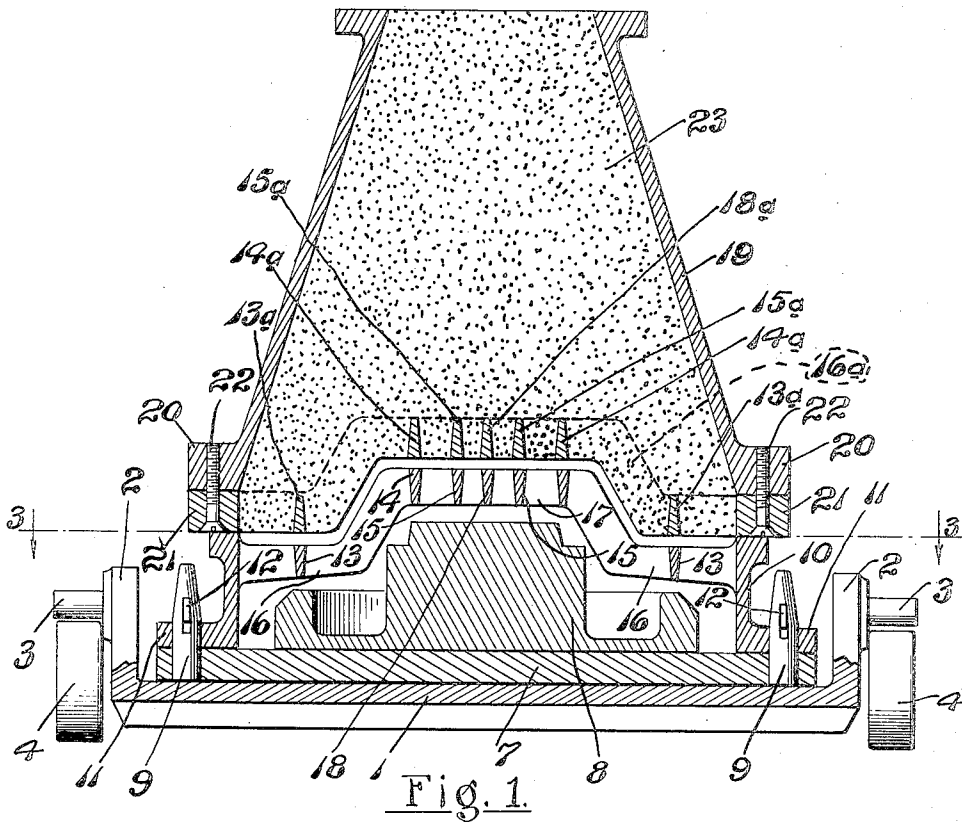
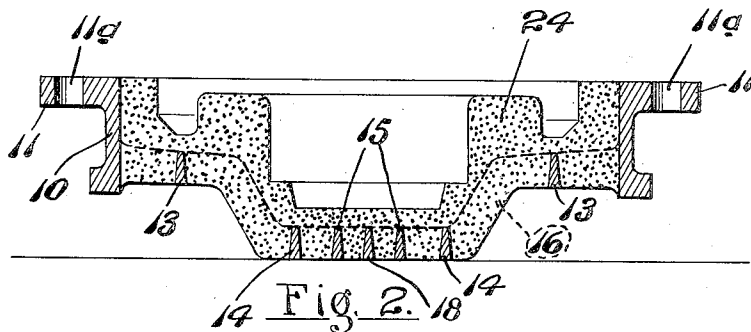
1,544,216

D. J. CAMPBELL

MOLDING APPARATUS

Original Filed Aug. 11, 1921

4 Sheets-Sheet 1



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4 Sheets-Sheet 2

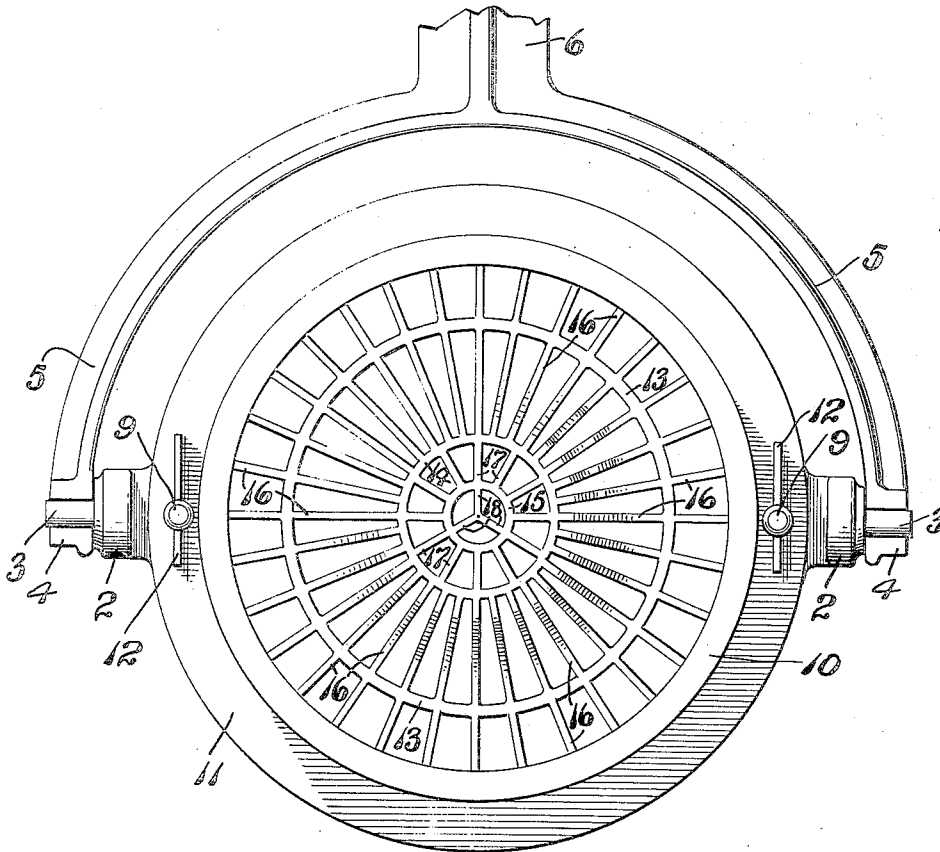


Fig. 3.

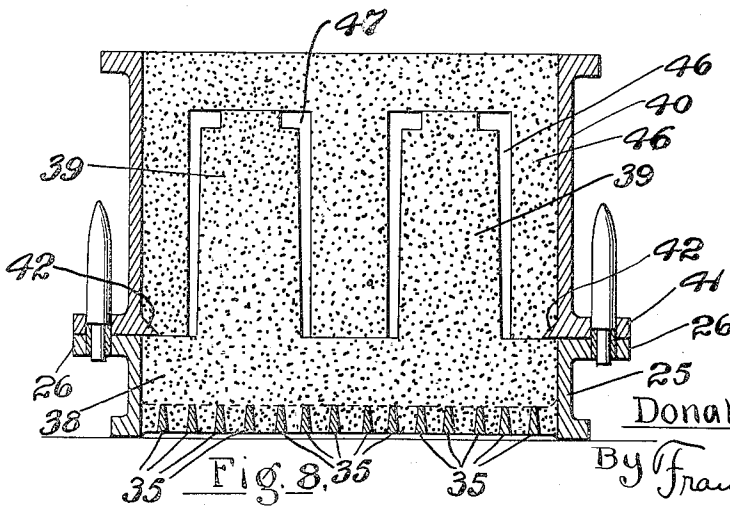


Fig. 8.

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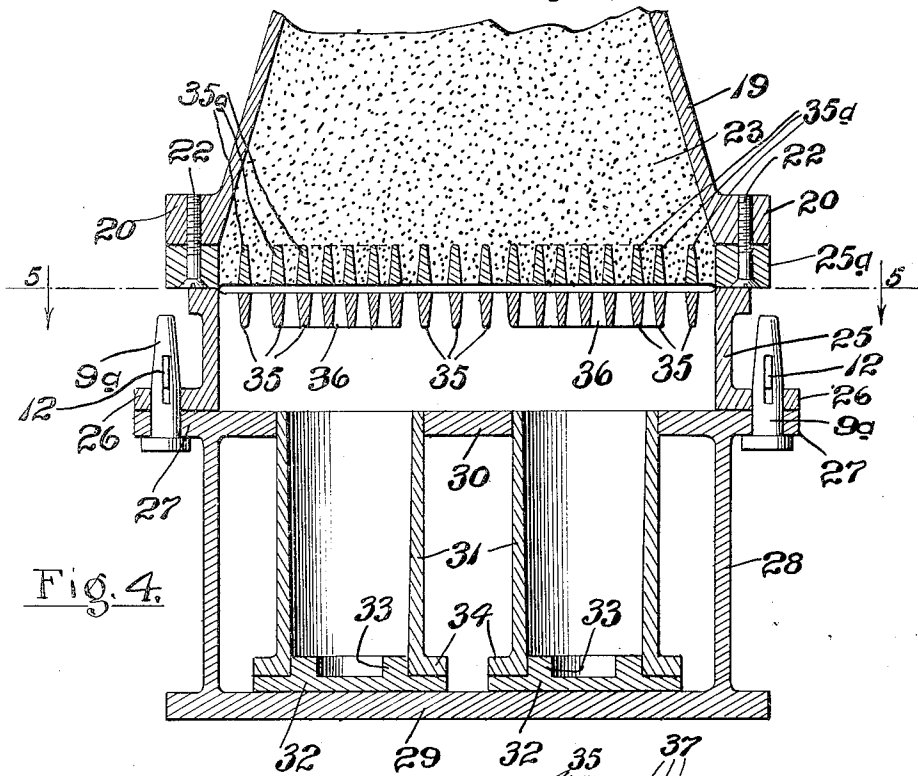
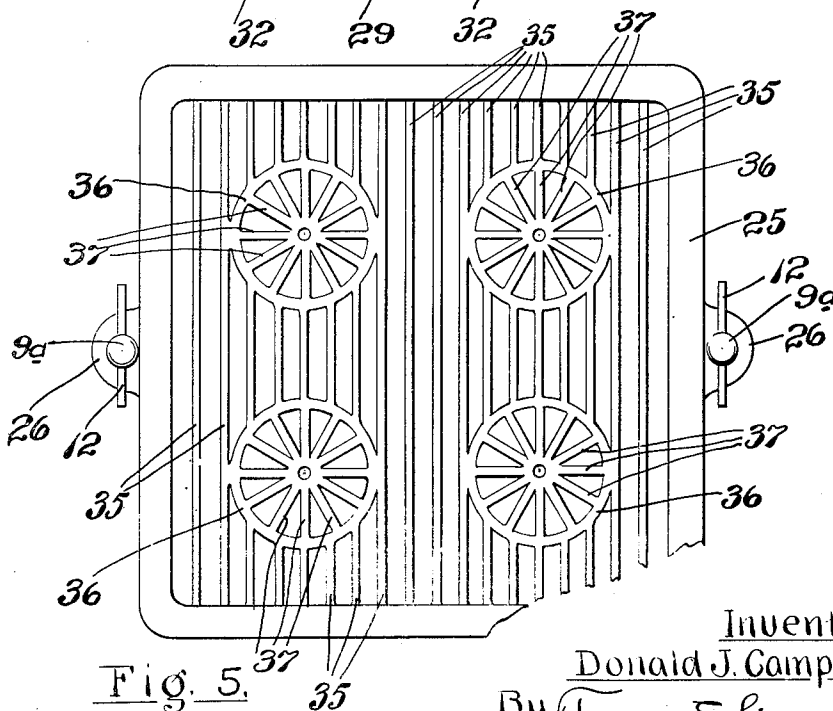
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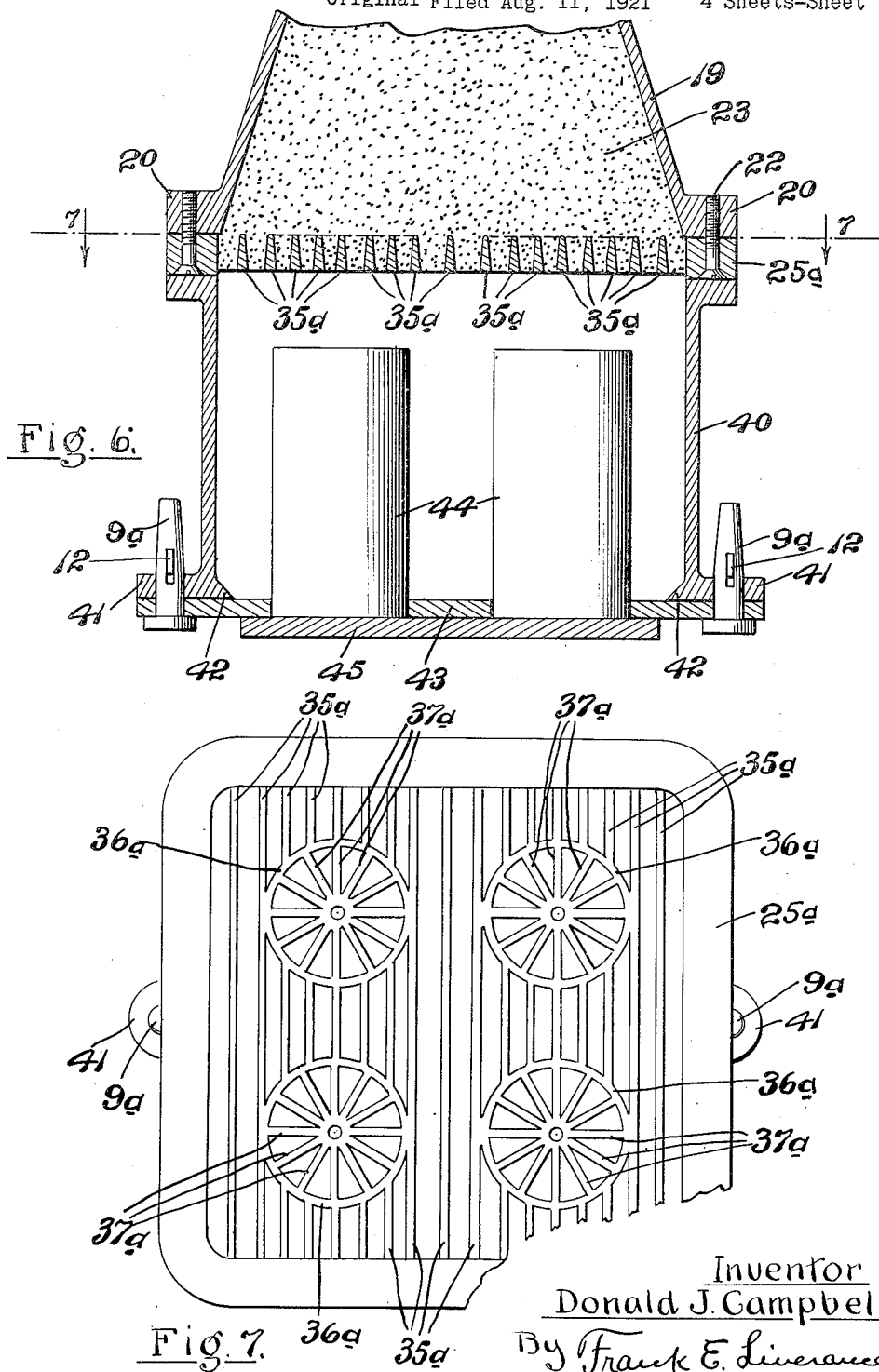
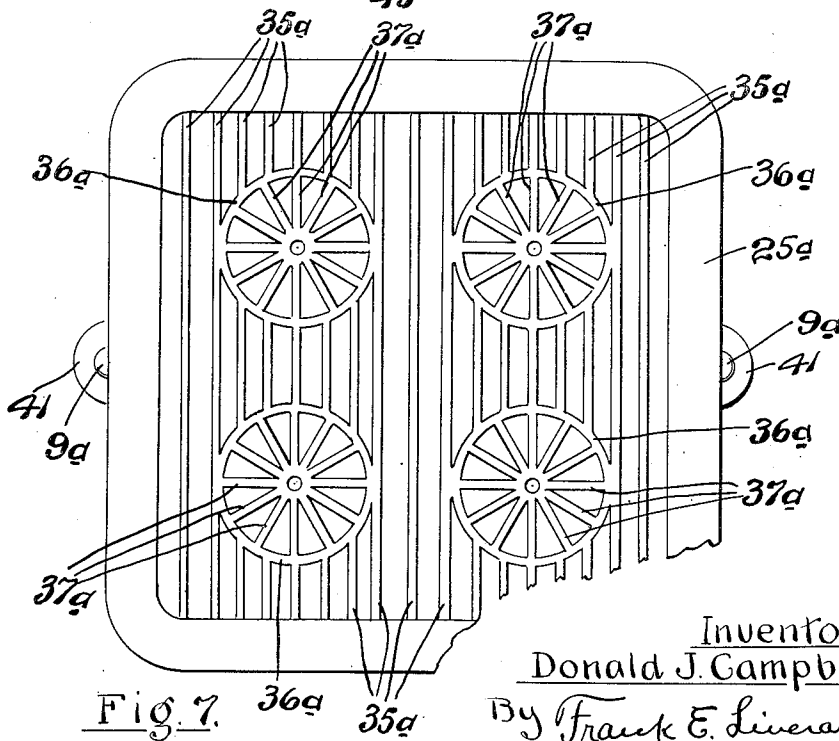
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MOLDING APPARATUS

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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

DONALD J. CAMPBELL, OF MUSKEGON HEIGHTS, MICHIGAN.

MOLDING APPARATUS.

Application filed August 11, 1921, Serial No. 491,351. Renewed April 25, 1925.

To all whom it may concern:

Be it known that I, DONALD J. CAMPBELL, a citizen of the United States of America, residing at Muskegon Heights, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Molding Apparatus; and I do 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 appertains to make and use the same.

This invention relates to a flask and hopper construction adapted for the handling of green molding sand, and the same is a further carrying forward and improvement on the constructions shown in my prior applications for Patent Serial No. 454,192, and Serial No. 454,193, both filed March 21, 1921. In the present invention, means are provided for the forcing of sand under the pressure of compressed air into a flask part from a sand holding hopper and evenly distributing and pressing the sand around a pattern, irrespective of the particular size or shape thereof, and at the same time allowing the sand to be forced from the lower end of the hopper when needed, yet hold the sand in the hopper at other times, while the flask part, particularly the drag is so constructed that the sand may be entered therein with the drag in inverted position, such construction serving as a support for the sand mold within the drag when it is turned to proper position and the pattern drawn therefrom. It is a primary object and purpose of the invention to accomplish the above described ends, as well as many others not at this time specifically stated, in a comparatively simple yet effective manner, whereby the quantity production of molds for casting therein is attained very economically.

For an understanding of the invention and the constructions embodying the same, reference may be had to the following description, taken in connection with the accompanying drawings, in which,

Fig. 1 is a vertical section through a sand hopper and drag constructed in accordance with my invention and operatively associated together for filling the drag from the hopper.

Fig. 2 is a similar section showing the drag reversed in position and with the sand mold therein.

Fig. 3 is a plan view of the structure

shown in Fig. 1 below the line 3—3 thereof.

Fig. 4 is a vertical section, similar to that shown in Fig. 1, showing my invention modified and changed for the production of the drag mold for a different article than that produced by the construction in Fig. 1, but working on the same principle.

Fig. 5 is a plan view of the construction below the plane of line 5—5, of Fig. 4.

Fig. 6 is a vertical section similar to Fig. 4, showing the invention utilized for the filling of the cope part of the flask and which is to be used with the drag portion shown in Fig. 4.

Fig. 7 is a plan view of the construction below the plane of line 7—7, of Fig. 6, and

Fig. 8 is a vertical section through the completed mold showing the drag of Fig. 4 inverted and the cope of Fig. 6 placed thereon.

Like reference characters refer to like parts in the different figures of the drawings.

In the construction shown in Figs. 1 and 3, the plate 1 is used to support the flask parts in filling the same with sand and from opposite sides thereof two ears 2 extend upwardly, each being provided with an outwardly extending stud shaft 3 adapted to rest in an open socket 4, the same being formed at the ends of two arms 5 forked from a supporting member 6, the same being a part of the machine shown in my prior application for patent, Ser. No. 443,739, filed Feb. 10, 1921. On this plate a second circular plate 7 is secured and the pattern 8 is fixed to the upper side of plate 7. Two pins 9 are secured to and extend upwardly from the plate 7 at opposite sides thereof to serve as guides and positioners for the flask part placed on plate 7 around the pattern. This plate 1, with attached plate 7 and pattern is readily detachable from the arms 5, and may be replaced by other similar plates with different patterns for different jobs.

The drag of the flask comprises an outer frame 10 of proper shape to go around the pattern and the same is inverted in position on the plate 7, having an outwardly extending flange 11 with openings 11^a therethrough for the passage of the pins 9. The pins are transversely slotted and wedge blocks 12 pass therethrough for tightly securing the drag to the plate 7, as shown in Fig. 1.

The lower side of the drag is equipped with a grating structure which, in the in-

verted position of the drag, as in Fig. 1 and Fig. 3, comes at the upper side of the drag. This grating consists of a larger ring 13 and two inner smaller rings 14 and 15, and a plurality of radial bars 16, 17 and 18, all joined together and disposed as shown in Fig. 3, the bars 16 extending from the outer frame 10 of the drag to the ring 14, bars 17 from the ring 14 to ring 15, and bars 18 from the ring 15 to a common center. The drag frame and the grating are integrally cast of metal and it will be noted that the radial bars 16 may be shaped to correspond to the form of the pattern below so as to raise over the same and leave space between the pattern and bars of the grating for the body of sand necessary for the making of the mold around the pattern.

The sand hopper 19 is a shell, preferably of conical form and having open upper and lower ends, the shell at its lower end being formed with an outwardly extending flange 20. To the under side of the flange 20 a frame 21 for a grating similar to that used in the lower side of the drag is secured by screws 22, this permitting the replacement of gratings for different classes of work. The grating used in the frame 21 is an exact complement of that in the drag, including rings 13^a, 14^a and 15^a and radial bars corresponding, one being indicated in dotted lines at 16^a and so shaped that the bars of the grating in the frame 21 come directly over the bars of the grating in the drag. It will be noted that the bars of the grating in the drag, in the position thereof shown in Fig. 1 are wider at their upper than at their lower sides, and that the reverse is true of the grating bars in frame 21.

The sand in the hopper 19, indicated at 23, is normally held from escape from the hopper by the grating at the lower end thereof. When compressed air is entered into the upper end of the hopper, as outlined in my prior application for patent, above noted, the sand is forced through the grating between the bars and also through the grating in the drag, completely covering the pattern and pressing the sand to the desired and required density for molds around the same. After the sand has been forced through the two gratings, the plates 1 and 7 are moved from beneath the hopper and the drag removed, as by turning the plate 1 over and lowering the drag on any mold drawing device, the drag with its contained part of the mold thereupon coming into the position shown in Fig. 2. It will be evident that in such position, the grating at the lower side of the drag serves to support the mold therein, indicated at 24, and that the grating further serves to hold the sand in place against displacement during the operation of pouring the iron or other metal into the mold, yet with full opportunity for

gases produced to escape through the sand between the bars of the grating. No additional bottom board is required.

Other forms of gratings for different types of molds may be made working on the same principle. In Fig. 4, the drag portion of the flask includes an outer frame 25 with outwardly extending flange ears 26 at opposite sides with openings therethrough for the passage of pins 9^a which extend through similar ears 27 extending outwardly from the upper part of a lower box-like enclosure having sides 28 and a bottom 29, the upper side thereof being closed by an integral cross plate 30 through which a plurality of openings, circular in form, are made through which cylinders 31 are passed, the same at their lower ends resting on plates 33 located on the bottom 29 on which plates locating ribs 33 are formed to project upwardly into the cylinders as shown, the cylinders at their lower ends being formed with outwardly extending flanges 34 to make a base for supporting the cylinders. In the construction shown, there are four of the cylinders 31, though this number may be varied and changed as desired.

The grating in the upper side of the drag when it is inverted as shown in Fig. 4 comprises a series of bars 35 paralleling each other and two of the sides of the drag, in which at proper positions to come over the upper ends of the cylinders 31, rings 36 are positioned with a plurality of radiating arms 37 therein connected at their outer ends to the rings and extending inwardly to a common center. The grating attached detachably to the lower end of the sand hopper 19 comprises an outer frame 25^a with corresponding parallel bars 35^a, rings 36^a and radiating arms 37^a to come directly over the corresponding parts of the grating in the drag. When the sand is forced by compressed air pressure through the gratings into the drag, it fills the drag and the cylinders 31 and when the drag and box underneath are removed from the hopper and the drag disconnected from the box under the same, the mold 38 in the drag has cores 39 projecting therefrom, the same extending upwardly when the drag is turned over into the position shown in Fig. 8 to form the lower part of the mold. The grating in this case, though of different form from that shown in Figs. 1 and 3, serves identically the same purposes and has the same functions.

In filling the cope of the flask, no grating is used therein. In Fig. 6, the cope includes an outer frame 40 having ears 41 projecting from the lower end and being formed with an inwardly extending tapered interior flange 42 around the same at its lower edges. This cope has a board 43 detachably secured thereto at its lower end by pins 9^a and

wedge blocks 12, as shown, cylinders 44 extending upwardly through suitable openings in the board 43 into the cope, said cylinders being secured to a second board 45 under the board 43. The sand forced through the grating at the lower end of the hopper 19 fills the cope and around the cylinders and when the cope is taken from the boards 43 and 45 and the cylinders 44, its mold 46 has openings therein, indicated at 47 sufficiently large to pass over the cores 39 of the drag portion of the mold previously made and leave spaces around said cores for the entrance of the molten metal. The flange 42 holds the sand of the cope from falling out as it is taken from the bottom board and placed on the drag. This is for the casting of pot castings for the production of piston rings, but in every case, the cope from the fact that it does not have to be inverted and does not support the sand weight therein or that of the metal entered into the mold, does not have to be supplied with a grating as does the drag.

I have shown two variations in structure of the gratings, but it must be obvious that many other specific forms of gratings may be used with different forms of work to be produced. The functions which the same fulfil when attached to the lower end of the hopper, or to the under side of the drag, coming to the upper side when inverted for filling, are the same in any case. The construction is very practical in all respects and serves the purposes for which designed perfectly. The appended claims define the invention and I consider myself entitled to all forms of construction coming within their scope.

I claim:

1. In combination, a sand containing hopper having a grating located across the lower end thereof, said grating including a plurality of bars spaced apart with spaces between the same for the passage of sand therethrough, but close enough together to normally hold the sand from escape, and a flask part located directly under the sand hopper having a similar grating at its upper side when in operative position under the hopper, said grating having like bars located directly under the bars of the grating in the hopper, substantially as described.

2. In combination, a sand containing hopper having a grating located across the

lower end thereof, said grating including a plurality of bars spaced apart, the spaces between the same being for the passage of sand therethrough, said bars being located close enough together to normally hold the sand from escape, said bars of the grating being wider at the bottom than at the top, and a flask part located directly under the sand hopper having a like grating at its upper side when in operative position under the hopper, said grating being comprised of like bars located directly under the bars of the grating of the hopper but wider at their upper than at their lower sides, substantially as described.

3. A sand hopper comprising a shell open at its upper and lower ends, and a grating located across the lower end of the hopper including a plurality of bars spaced apart whereby relatively elongated and narrow openings are made between the bars, the spaces between the bars being for the passage of sand from the hopper, said bars being located close enough together to normally hold the sand in the hopper.

4. A construction containing the elements in combination defined in claim 3, said grating bars being trapezoidal in cross section and wider at the lower than at the upper sides.

5. A sand hopper comprising an open vertical shell, and a grating formed of narrow bars wider at their lower sides than at their upper sides located across the lower end of the shell, substantially as described.

6. A sand hopper comprising a shell open at its upper and lower ends, and a grating located across the lower end of the hopper, said grating including a plurality of radial bars and concentric rings cast integral with each other.

7. In combination, a sand containing hopper having a grating located across the lower end thereof for the normal retention of sand but allowing the passage of sand therethrough on application of pressure to the sand in the hopper, and a flask part located directly under the sand hopper having a like grating at its upper side and formed with parts which are located directly under the like parts of the grating in the lower end of the hopper, substantially as described.

In testimony whereof I affix my signature.

DONALD J. CAMPBELL.