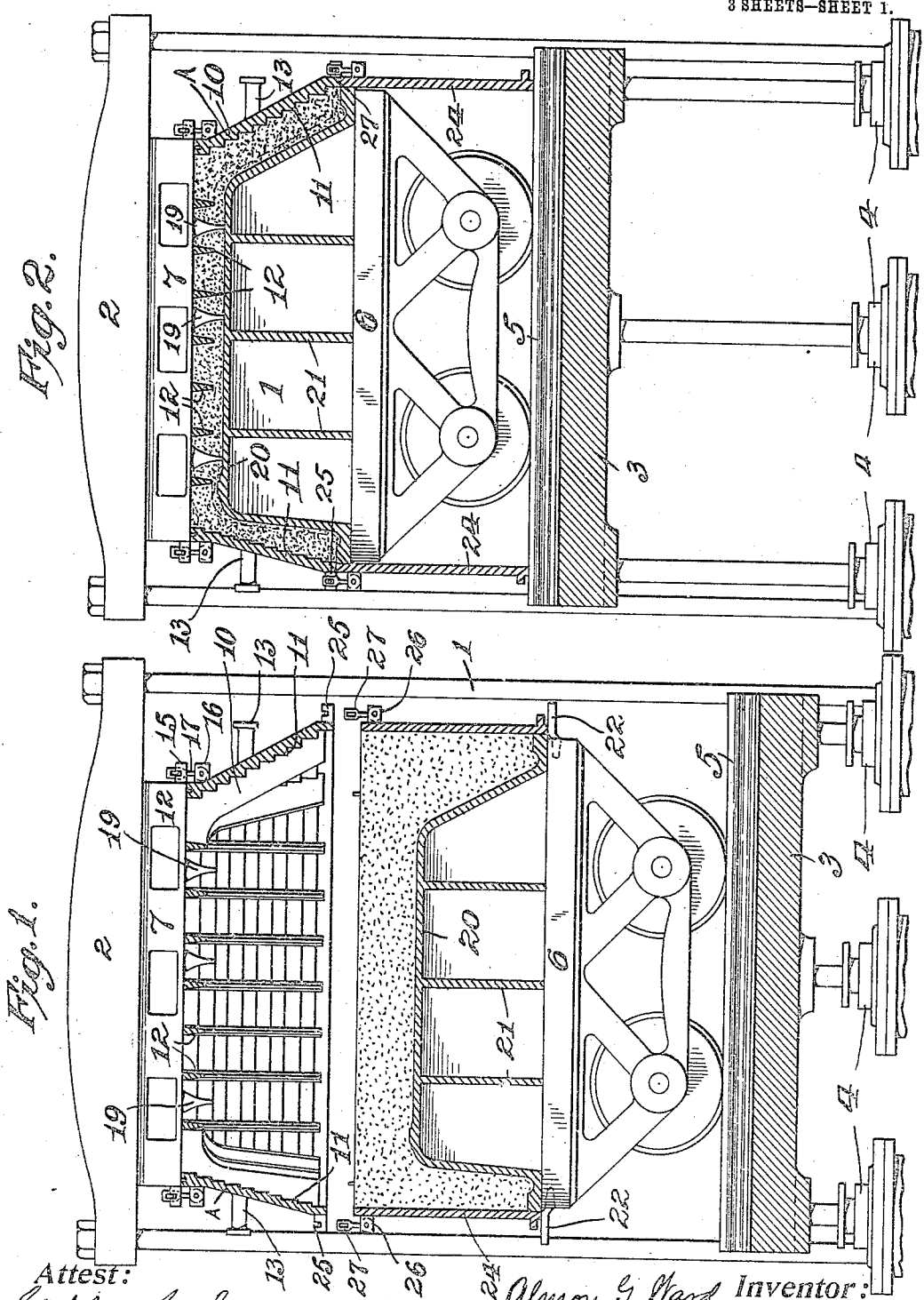


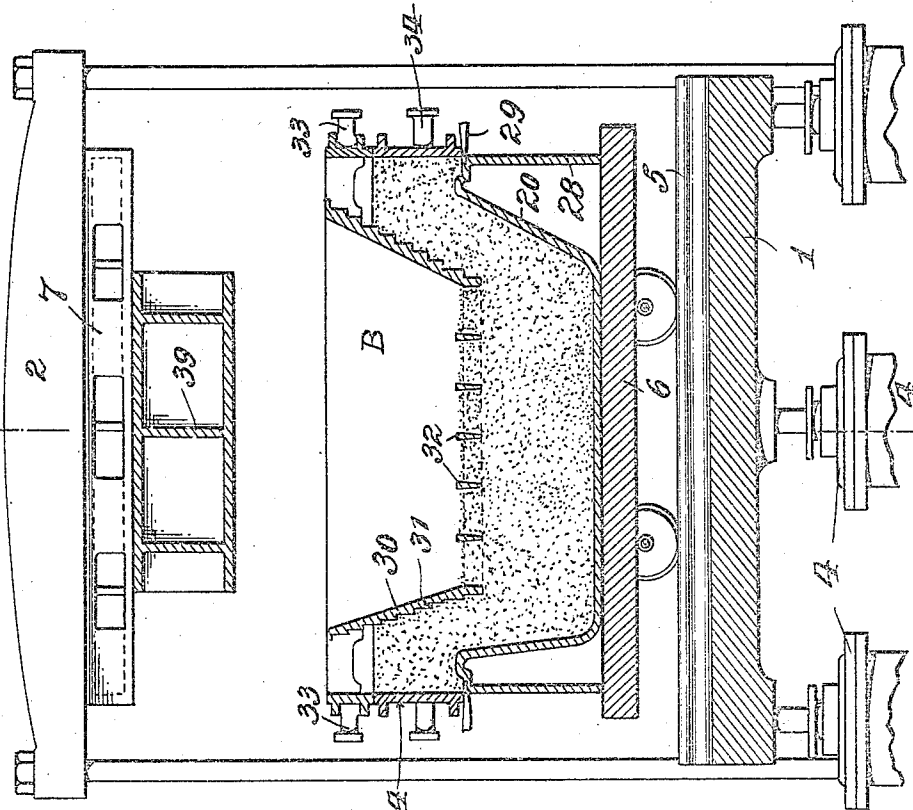
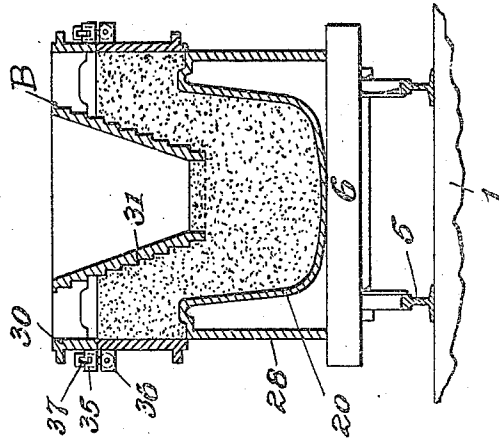
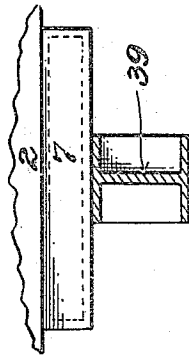


Attest:
Stephen E. Newton
Alan C. Mc Donnell

Almon G. Ward, Inventor:
 by *William R. Baird*
 his Atty.

951,861.

3 SHEETS--SHEET 2.



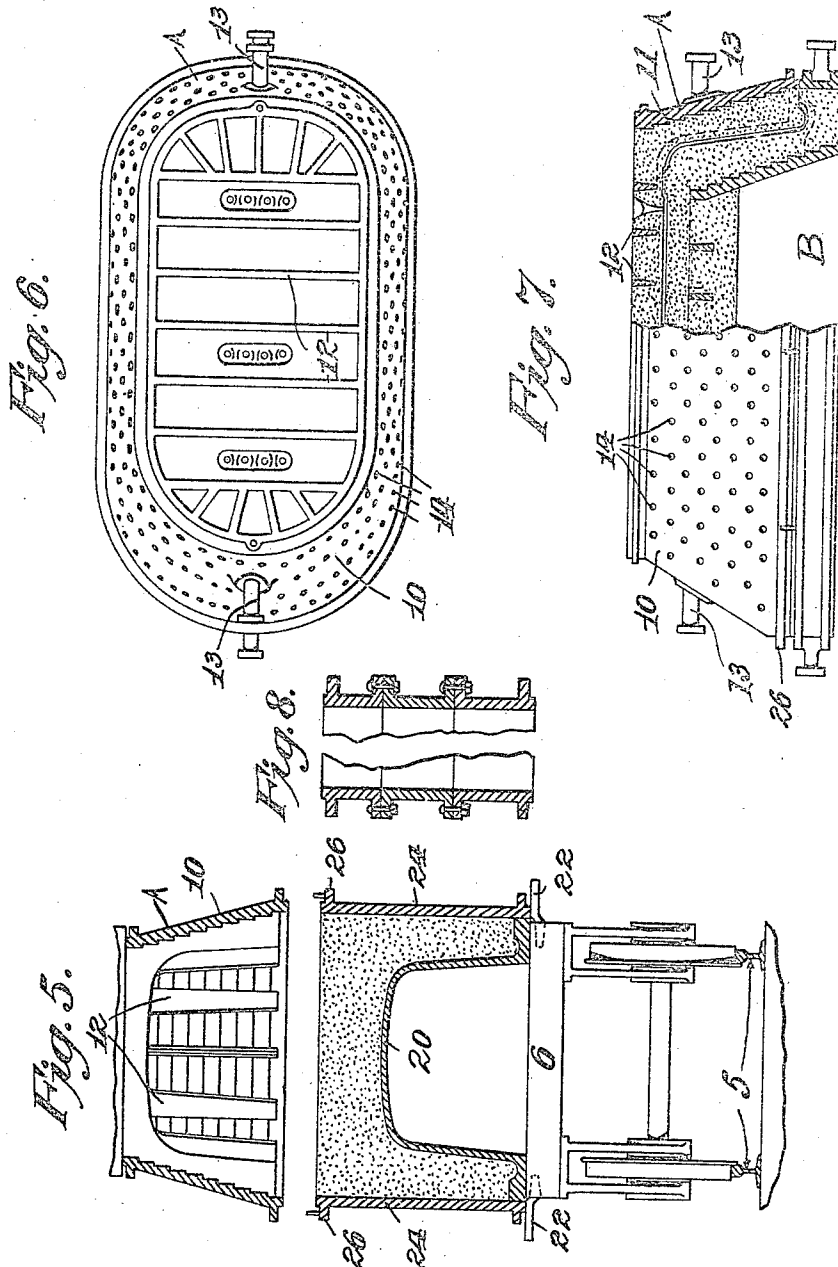
Stephen E. Newton
Alan C. Mc Donnell.

his Atty.

951,861.

Patented Mar. 15, 1910.

3 SHEETS—SHEET 3.



Attest:
Stephen B. Hewson
Alan C. Mc Donnell.

Almon G. Ward, Inventor:
by William R. Bards
his Att'y.

UNITED STATES PATENT OFFICE.

ALMON G. WARD, OF WARREN, OHIO, ASSIGNOR TO THE DAY WARD COMPANY, OF WARREN, OHIO, A CORPORATION OF OHIO.

MOLDING APPARATUS.

951,861.

Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed February 24, 1909. Serial No. 479,816.

To all whom it may concern:

Be it known that I, ALMON G. WARD, a citizen of the United States, and resident of Warren, Trumbull county, Ohio, have
5 invented certain new and useful Improvements in Molding Apparatus, of which the following is a specification.

This invention relates to an apparatus for forming sand into molds into which molten
10 metal can be poured to form castings and its novelty consists in the construction and adaptation of the parts as will be more fully hereinafter pointed out. In an apparatus of this kind it is necessary in forming molds
15 for castings of large articles that the sand should be packed tightly but not too tight to prevent proper venting during the casting operation, that the parts of the apparatus should be simple because it must be handled
20 by comparatively unskilled labor and that it must be economical in use in order to offer any advantage over the employment of hand labor. I believe that I have secured all of the desired advantages and require-
25 ments in the apparatus herein described.

In the drawings, Figure 1 is a partial side elevation and central vertical section of an apparatus embodying my invention, the flask and outer pattern being shown with the sand
30 in place but not compressed; Fig. 2 is a similar view showing the sand compressed; Fig. 3 is a view similar to Fig. 1 showing the inner pattern; Fig. 4 is a central transverse vertical section on the plane of the line 4—4
35 in Fig. 3; Fig. 5 is a central transverse vertical section on the plane of the line 5—5 in Fig. 1; Fig. 6 is a top plan view of the combined flask and compressor; Fig. 7 is a partial side elevation and vertical section
40 of the assembled molds and flasks and Fig. 8 is a detail of a modified form of the sand ring.

In the drawings, the machine comprises uprights 1, a head 2 and a platform 3, the
45 latter adapted to be vertically moved in the uprights by means of a hydraulic press indicated at 4, 4, 4. The platform is supplied with suitable rails or tracks 5 adapted to receive a car 6 on which the pattern is placed.
50 A false head 7 is suitably secured to the head 2 and is adapted to receive and support the flask members.

10 is a flask-member A adapted to coöperate with the outer pattern of the article
55 to be molded, in the case shown, a bath tub.

It comprises sloping sides 11, 11, made internally in the form of steps and it is provided with transverse ribs 12. Trunnions 13, 13, are made integral with, or secured to, its outer surface, which is perforated at 14 to
60 increase the strength of adhesion of the sand and to afford ventilation. Means are provided for detachably securing this flask-member to the false head 7 consisting of lugs
15 and 16 projecting respectively from the
65 false head and the flask-member comprising a rod 17 pivoted to the lug 16 and having an eye at its upper end and a key adapted to pass through the eye and an aperture in the lug 16. Gate forming members 19 are
70 secured to the false head 7, or to the flask-member 10, as may be most convenient.

A pattern 20 is suitably supported on the car 6. In Figs. 1, 2 and 5 this pattern is the one used for forming the outer mold.
75 It is made with internal reinforcing ribs 21 on account of its large size and needs no special description.

The car 6 is provided with removable projecting brackets or pegs 22. On them
80 and encircling the pattern 20 is a sand retaining device 24 in the shape of an oblong ring which completely surrounds the pattern. It is provided at its upper edge with
85 lugs 26 each provided with a pivoted eye 27 adapted to engage lugs 25 projecting from the lower edge of the flask-member and to which lugs they are coupled by keys, or in any other suitable manner.

The manner of operating the device above
90 described is as follows:—The parts are assembled in the positions shown in Fig. 1. The space between the pattern 20 and sand ring 24 is then filled with sand. The hydraulic press is then operated to move the
95 platform 3 and head 2 toward each other and the flask-member 10 is coupled to the sand ring 24 by means of the lugs 25 and 26 and eye pieces 27. The pegs 22 are then re-
100 moved, so that the sand ring 24 is supported solely from the flask-member. The press being again operated to move the parts together the flask-member and pattern approach each other and the sand is compressed between them, until it reaches the
105 proper degree of compression illustrated in Fig. 2. The sloping stepped sides of the flask-member 10 serve as a compressor to press the sand against the pattern in the direction of the movement of the flask-mem- 110

ber and pattern, the false head 7 pressing the sand directly against the flat upper surface of the pattern and any lateral movement or distribution of the sand is prevented by the
 5 transverse ribs 12. The gate forming members have during the movement of the flask-member and pattern formed proper pouring depressions in the sand. These members are of such size that when the compressive movement is completed the mouth
 10 of the apertures is at a level with the outer surface of the pattern. It will be noted that as the pattern and flask-member move toward each other the sand retaining ring
 15 24 is forced downward past the flat tip of the car 6 but that the body of sand is always supported by that portion of the ring above the pattern's upper surface. When
 20 the molding operation has thus been completed, the movement of the press is reversed and the pattern is withdrawn from the flask-member until it regains its former position. The pegs 22 are again reinserted
 25 and the ring 24 uncoupled from the flask-member which contains the compressed mold. The flask-member is then disengaged from the false head of the press and removed by means of the trunnions 13 with
 30 the pattern and sand ring are removed to be again charged with sand and another flask-member is inserted in the press.

In Figs. 3 and 4, 30 designates a flask-member B adapted to cooperate with the
 35 inner pattern of the article to be molded. This flask-member B comprises sloping sides 31, made externally in the form of steps and it is provided with transverse ribs 32. Trunnions 33 are made integral with or secured
 40 to its outer surface. In this case the pattern 20 is made with an external reinforcing framework 28 and is provided with pegs 29 to support the sand retaining ring 24, which, in this case, is provided with
 45 trunnions 34 by which it may be moved. It is also provided with lugs 36 and eyes 37 by which through lugs 35 on the flask-member it may be coupled to the latter. The false head of the press 2 is in this case supplied
 50 with a presser 39. The manner of operating these parts is substantially similar to that employed when the flask-member A is used. The parts are assembled as shown in Fig. 3. The interior of the pattern is first
 55 filled with sand, then the sand ring is placed in position and the flask-member inserted and the remainder of the space between it and the pattern and ring filled with sand. The flask-member and sand ring are then
 60 coupled together and the supporting pegs 29 are removed. The car 6 and head are then moved together until the presser 39 fits inside of the flask-member and the false head 7 presses against its upper surface, when the
 65 movement being continued the sand is com-

pressed between the flask-member and the pattern to form the mold. As before, any lateral movement or distribution of the sand with respect to the pattern is prevented by
 70 the ribs 32 and the stepped sides of the flask-member and the compression of the sand is directly in line with that of the movement of the parts. When the molding operation has thus been completed the movement of
 75 the press is reversed until the car 6 regains its original position, the flask-member and sand ring are then uncoupled and reversed and the pattern is removed, and the sand ring and pattern are ready for another
 80 charge of sand. After the flask-members A and B have been both filled with molded sand in the manner described, they are assembled in the usual manner as illustrated in Fig. 7 and the casting operation takes
 85 place, the molten metal being poured through the gate aperture formed in the mold within the flask-member A.

In Fig. 8 a modified form of the sand ring is illustrated. In this case it is shown made
 90 in sections secured together by bolts, or in any other suitable manner, so that when the sand is wet or it is desired for any other reason to use less of it, the effective depth of the sand ring may be varied.

By the use of this apparatus the operation
 95 of making molds of large articles is facilitated and made much cheaper.

What I claim as new is:—

1. In a molding apparatus, a plurality of relatively movable opposing members, one of
 100 which is for the pattern, and a separate member which moves with one of said members during a part of such relative movement and relatively thereto during the remainder of the same. 105

2. In molding apparatus, the combination with relatively movable flask and pattern members, of a sand retaining device that surrounds the pattern member, the sand retaining device and each of the members being
 110 relatively movable, and relatively fixed during different portions of the relative movement of the members.

3. In molding apparatus, the combination with means for supporting a flask member, of a pattern, a sand retaining device that surrounds the pattern, and means for effecting the initial simultaneous movement of
 115 the pattern and device, and a subsequent movement of the pattern with respect to the device. 120

4. In molding apparatus, the combination with means for supporting the flask member, of a pattern, means for moving the pattern, a sand retaining device, and means
 125 for alternately supporting the device on the pattern moving means and the flask member.

5. In molding apparatus, the combination with a combined presser and flask member, 130

of means for fixedly supporting the same, a pattern member movable toward and from the combined presser and flask member, a sand retaining ring that surrounds the pattern member, means for temporarily connecting the pattern member and ring to cause the same to move together, and means for detachably securing the ring to the combined presser and flask member.

6. In an apparatus of the kind described, the combination with a pattern and its support, a compressor and means for moving the support and compressor relative to each other, of a sand retaining device, and means for holding it fixed with relation to the compressor when desired, and comprising a coupling adapted temporarily to join the two together.

7. In an apparatus of the kind described, a combined flask and presser, a pattern and its support, means for moving these parts relative to each other, and a sand ring, means for temporarily securing it to the pattern support and means for relatively moving the sand ring and support.

8. In an apparatus of the kind described, a combined flask and presser, a pattern and its support, means for moving these parts relative to each other, a sand ring, means for temporarily securing it to the pattern support, means for relatively moving the sand ring and support, and means whereby it may be attached to the flask.

9. In molding apparatus, the combination with a pattern member, of a combined flask and presser member having a sand pressing

portion provided with means for preventing relative lateral movement of the sand under pressure toward the pattern.

10. In molding apparatus, the combination with a pattern member, of a pressure member, generally sloping wall provided with a series of abutment shoulders that are opposed to the direction of pressure, and prevent general deviation of the sand under pressure toward the pattern.

11. In molding apparatus, a combined flask and presser member, having sloping sand engaging sides provided with sand engaging steps.

12. In an apparatus of the kind described, a flask-member having outwardly sloping sides, the interior surface of which is arranged in a series of relatively fixed sand-engaging steps.

13. In an apparatus of the kind described, a flask-member having inwardly sloping sides, the exterior surface of which is arranged in a series of relatively fixed sand-engaging steps.

14. A sand molding machine comprising a pattern and means for supporting the same, a sand retaining device having an unobstructed interior and adapted to encircle the pattern, and means for varying the effective size of the said retaining device.

Witness my hand this 20th day of February, 1909, at Warren, Ohio.

ALMON G. WARD.

Witnesses:

WILLIAM R. BAIRD,
ALAN C. McDONNELL.