

No. 644,425.

Patented Feb. 27, 1900.

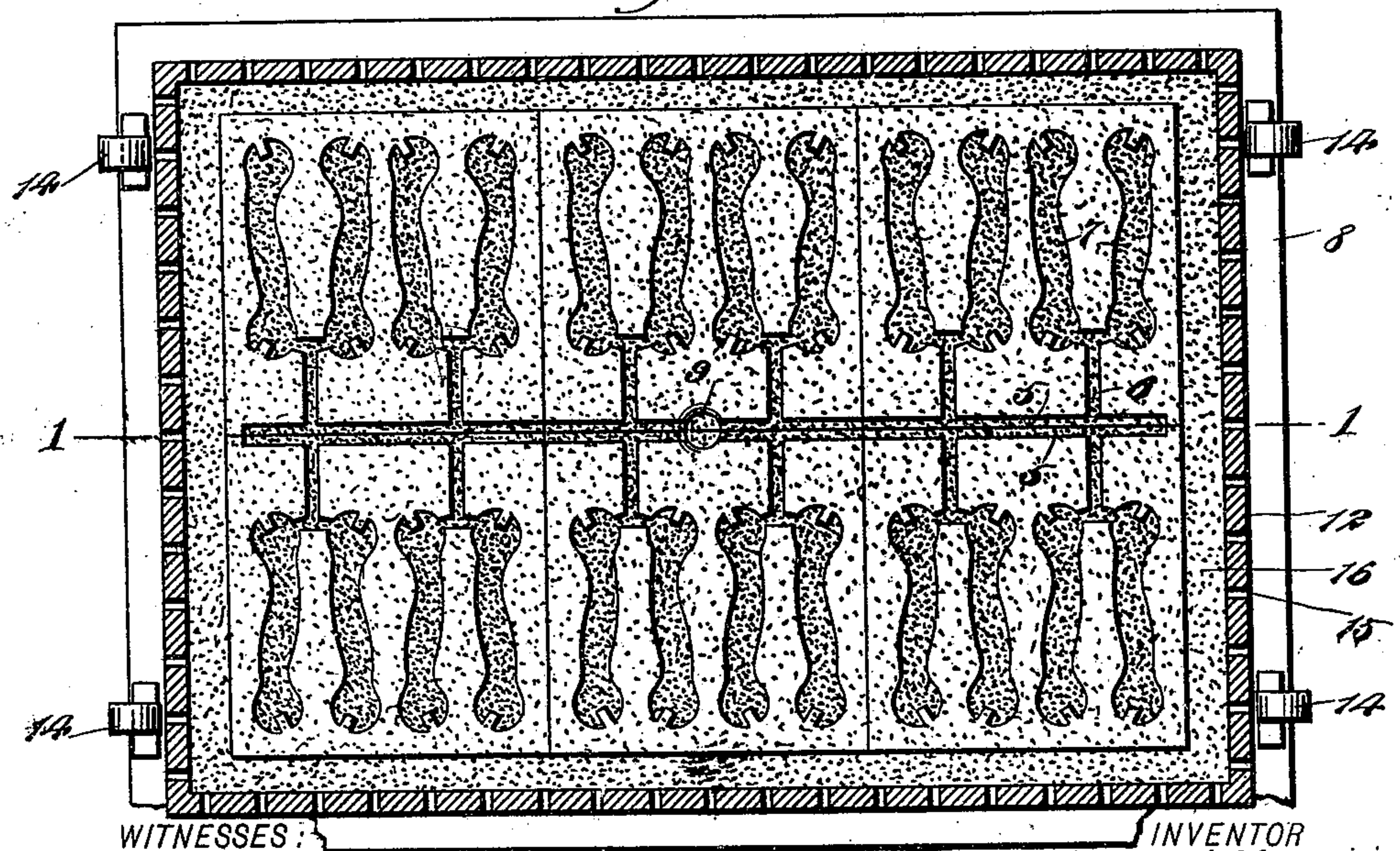
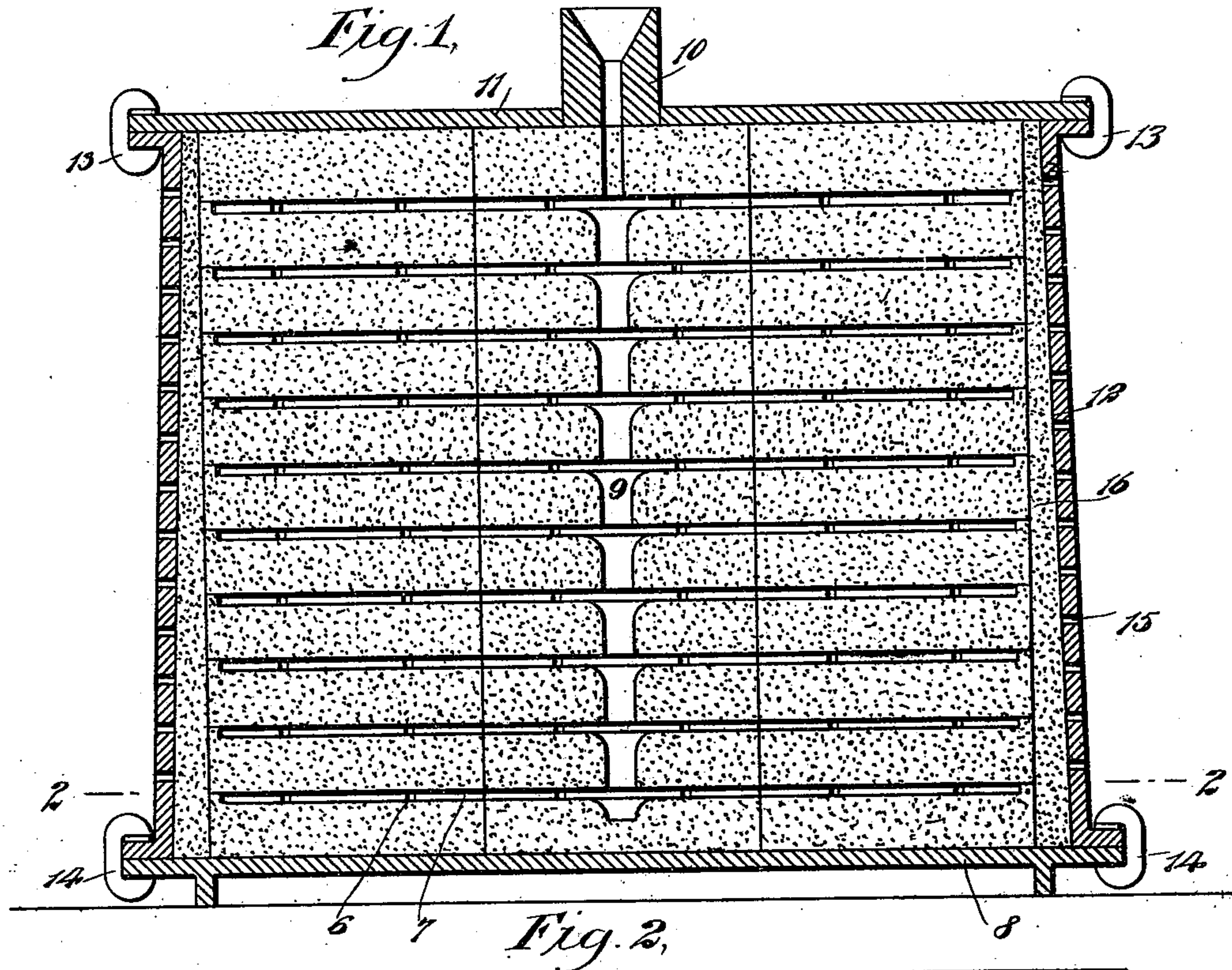
J. W. HARRISON.

APPARATUS FOR CASTING METAL.

(Application filed Feb. 4, 1899.)

(No Model.)

2 Sheets—Sheet 1.



WITNESSES:  
*Edward Thorpe*  
*C. R. Ferguson*

INVENTOR  
*Joseph W. Harrison*  
BY *[Signature]*  
ATTORNEYS.

No. 644,425.

Patented Feb. 27, 1900.

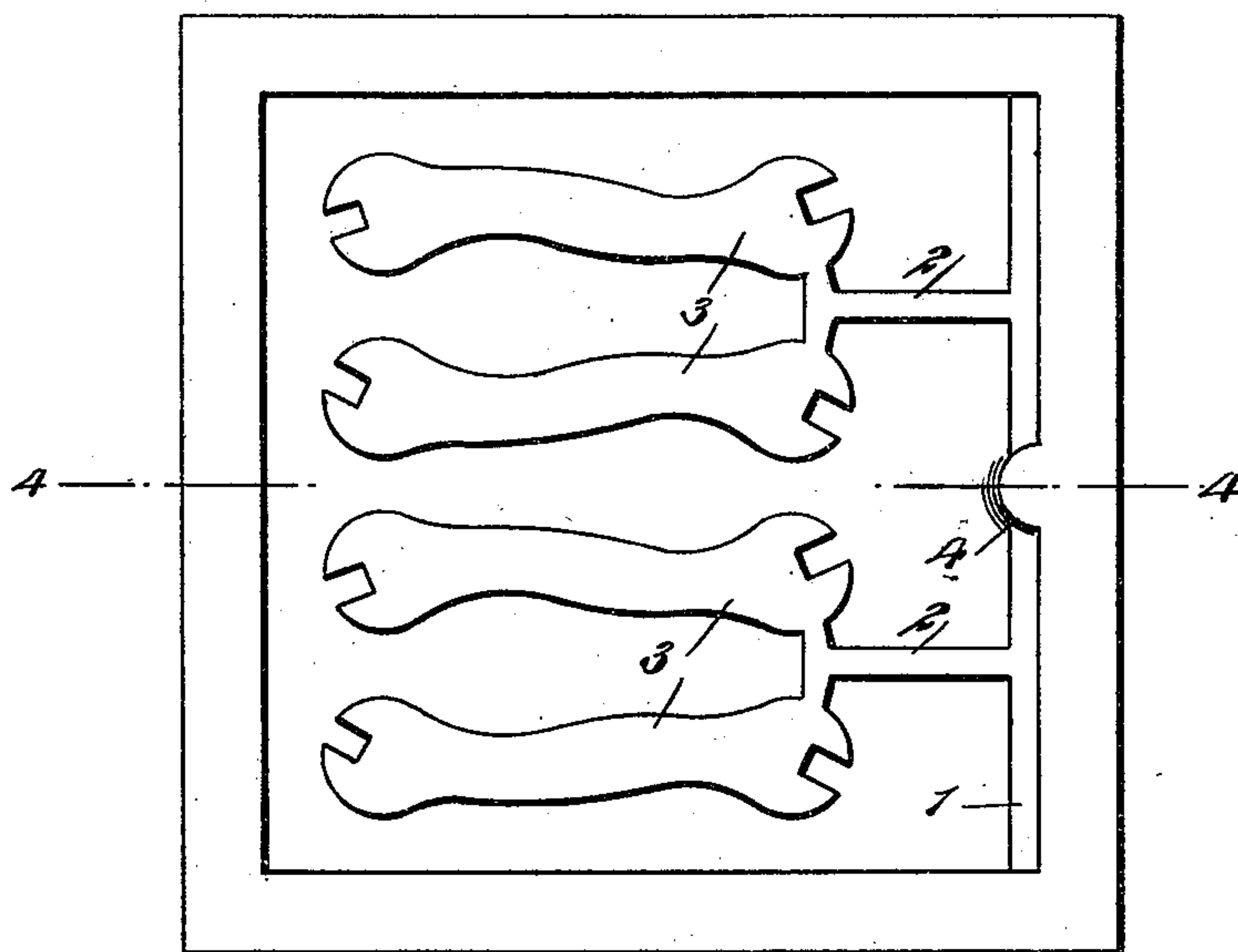
J. W. HARRISON.  
APPARATUS FOR CASTING METAL.

(Application filed Feb. 4, 1899.)

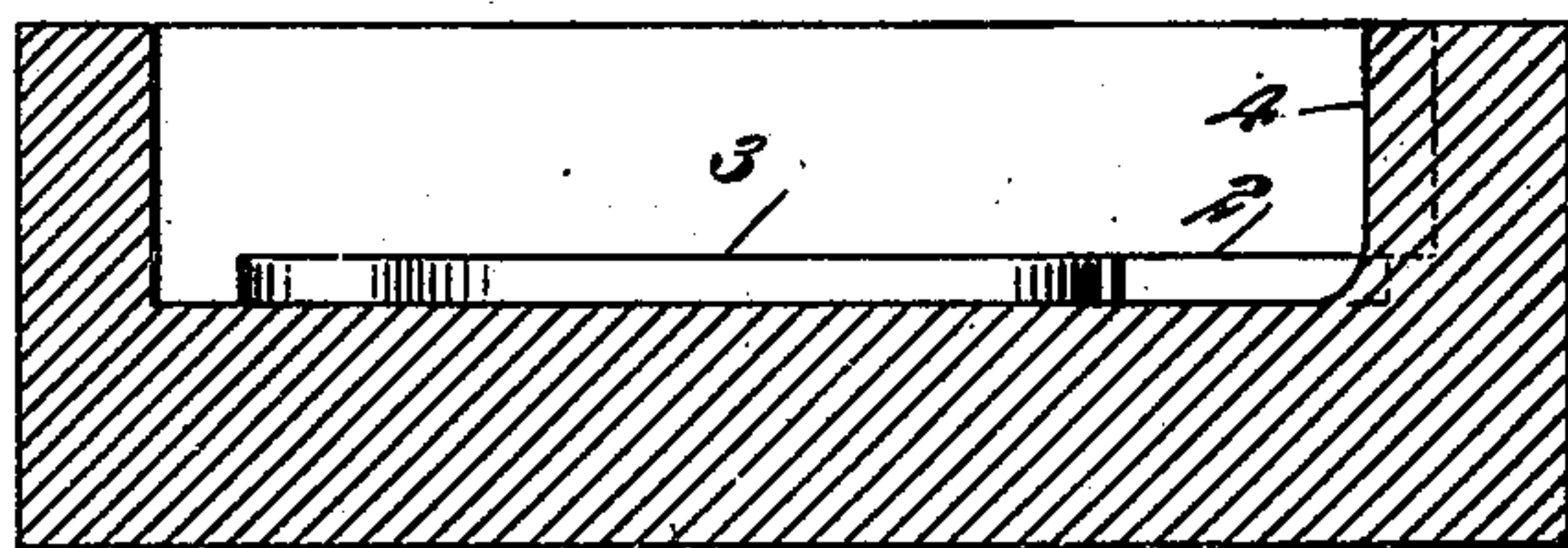
(No Model.)

2 Sheets—Sheet 2.

*Fig. 3.*



*Fig. 4.*



WITNESSES:

*Edward Thorpe*  
*C. R. Ferguson*

INVENTOR  
*Joseph W. Harrison*  
BY *Wm. H. Harrison*  
ATTORNEYS.



# UNITED STATES PATENT OFFICE.

JOSEPH WM. HARRISON, OF CONVERSE, INDIANA.

## APPARATUS FOR CASTING METAL.

SPECIFICATION forming part of Letters Patent No. 644,425, dated February 27, 1900.

Application filed February 4, 1899. Serial No. 704,461. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH WM. HARRISON, of Converse, in the county of Miami and State of Indiana, have invented a new and Improved Apparatus for Casting Metal, of which the following is a full, clear, and exact description.

This invention relates to improvements in apparatus for casting metal and is especially adapted for small steel castings.

A great problem for years in steel-founding has been that of successfully making small castings from soft steel. Obstacles have been encountered in a large degree. The expense of conveying tons of molten metal from open-hearth furnaces in large ladles or other vessels to small molds has been a tedious and costly experiment. The opening up of a large stream of metal into a small mold soon clogs up the gate. The outlet from the ladle is so large and the stream is so fast from the force of the tons of steel in the ladle that the gate is choked up instantly, and by shutting off the stream the force is lost, the inlet to the molds being so small that when the stream is shut off and the force lost the steel refuses to run up to a sharp edge. If pouring is done slowly, as the metal comes into contact with the air and the chilling effect of the mold with the sluggish nature and condition of the steel it is impossible to successfully cast small work. The loss of steel under these conditions is very great. Further, in the present methods and where flasks are used it is necessary in shaking out to use small sledges and bars, and by continual pounding and digging the sand falls out of the flask. This is a slow and expensive work, as a large per cent. of flasks are broken and have to be replaced.

The object of my invention therefore is to employ an apparatus whereby a great number of castings may be made by one pouring of metal and in which no flasks are used, and, further, to cause molten metal to completely fill the molds or complete the sharp angles of the cast articles, thus reducing the loss to a minimum, and, still further, to so arrange the parts of the apparatus that the molds may be dried in a comparatively-short time.

I will describe an apparatus for casting metals embodying my invention and then point out the novel features in the appended claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a sectional elevation on the line 1 1 of Fig. 2, showing the arrangement of molds for carrying out my invention. Fig. 2 is a section on the line 2 2 of Fig. 1. Fig. 3 is a plan view of a pattern-box in which the molds are drawn, and Fig. 4 is a section on the line 4 4 of Fig. 3.

In carrying out my invention the sand mold is first formed in a pattern-box—such, for instance, as shown in Fig. 3. This pattern-box has the die or pattern of the article to be cast at its bottom, and at one side of the box is a rib 1, adapted to form one-half the width of the main gate of adjacent molds, and this rib 1 is connected by runner-forming ribs 2 with the patterns 3 in the box. Connected with the rib 1 is an upward extension 4 for forming one-half of the vertical or pouring gate. This extension is shown as semicircular in cross-section and flared outward at the bottom to make a funnel-shaped opening at the top of the pouring-gate formed between adjacent molds. In some instances the extension 4 will of course be omitted, as will hereinafter appear.

The several molds formed in the pattern-box are to be arranged in tiers one upon another, and, as shown in the drawings, several molds may be placed in each layer and so arranged that the horizontally-disposed main-gate sections 5 will abut, forming a complete gate across the layer of molds. From the main gate 5 runners or branches 6 connect with the depressions or molds 7, into which the metal is to run. In placing the several molds the bottom layer thereof will be placed upon a moldboard or plate 8 with the molds 7 upward. Then successive layers of molds will be built up in such manner that the bottom of the upper mold will form the top of the mold immediately below it. The several adjacent central molds or, in fact, any adjacent vertical series of molds above the bottom set of molds will be provided with a pouring-gate 9, and of course the several pouring-gates will be in vertical alinement.

The upper portions of the pouring-gates 9 are flared outward or made funnel-shaped, so



as to present a greater diameter than the diameter of the lower portion of the gate immediately above it. The object of this is that when metal is poured through the funnel 10 on the top 11 of the casing 12 the said metal will first run directly downward to the lower layer of molds, and when this lower layer of molds is filled the next upper layer will be filled, and so on upward until the top layer 10 is filled. The weight of the metal being poured will cause it to run into the sharp angles of the molds. When the several layers of molds are built up as desired, the casing 12 is to be lowered around the same, and the 15 space between the inner surface of the casing and the molds is to be filled with green or soft sand and tightly tamped. After this the cover 11 is to be placed in position and secured by means of clamps 13 or otherwise, and the lower 20 portion of the casing 12 will also be clamped to the moldboard or plate 8, as at 14.

The casing 12 is provided with perforations 15 to permit the escape of gases, and, further, it will be noted that the walls of said casing 25 are flared outward and downward, thus making it convenient to lift said casing from the sand packing 16 after the casting operation. After the casting operation and before the removal of the casing 12 the several molds, 30 with the sand packing 16 thereon, are to be removed to a suitable place for shaking out, which shaking out may be done in a comparatively-short time, and after the shaking out the castings will be somewhat annealed, being left in the hot sand to cool off slowly. 35 Obviously the casing 12 may be made of any desired size and shape, and while I have illustrated molds for small articles it is to be un-

derstood that larger articles may be cast in suitable molds arranged in the manner described. By using the bottom of an upper mold and the top of the bottom mold a considerable saving in expense and labor is obtained in forming the molds. As there is but one gate for the several molds and as the 45 molds are packed closely together, there is a considerable reduction of the amount of metal necessary for casting over that of the old methods, and the solidity of castings by this method is much more perfect, and by this 50 method the elevation and force of the stream coming in contact with itself give the required pressure to solidify the steel and press it into the sharp corners or angles of the mold while becoming congealed. 55

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

In an apparatus for casting small steel articles, a series of molds arranged in tiers and 60 having horizontal gateway-sections at the edge, and certain of the molds having vertical gate-sections flared at the top, the said vertical gate-sections when placed in alignment forming a single pouring-gate common 65 to all the horizontal gates, and a perforated casing flared downward and outward and engaging around the tiers of molds, there being a space between the tiers of molds and the casing to receive sand, substantially as specified. 70

JOSEPH WM. HARRISON.

Witnesses:

JOHN W. DAVIS,  
W. A. RUTH.