

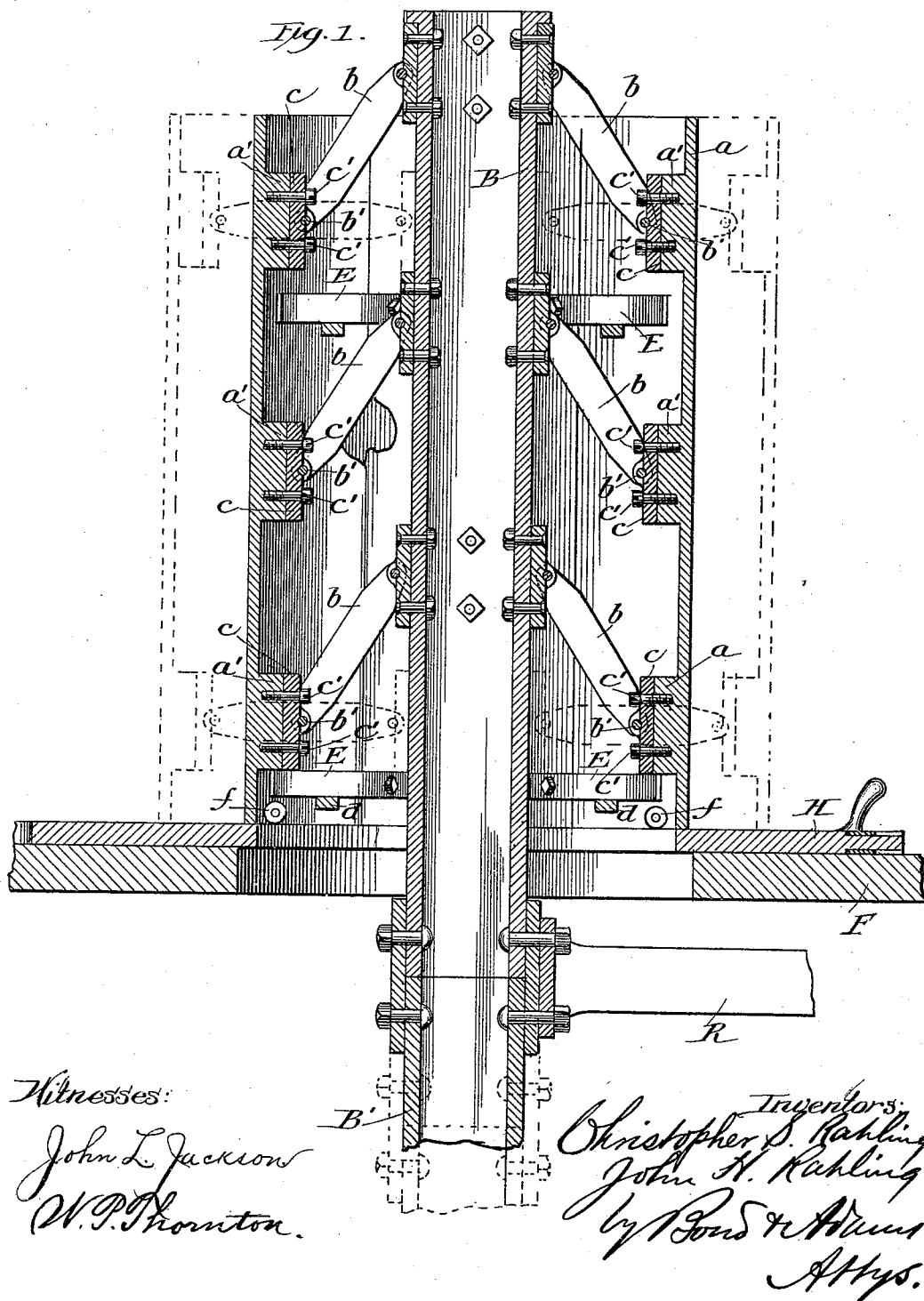
(No Model.)

3 Sheets—Sheet 1.

C. S. & J. H. RAHLING.
INGOT MOLD MAKING MACHINE.

No. 461,487.

Patented Oct. 20, 1891.



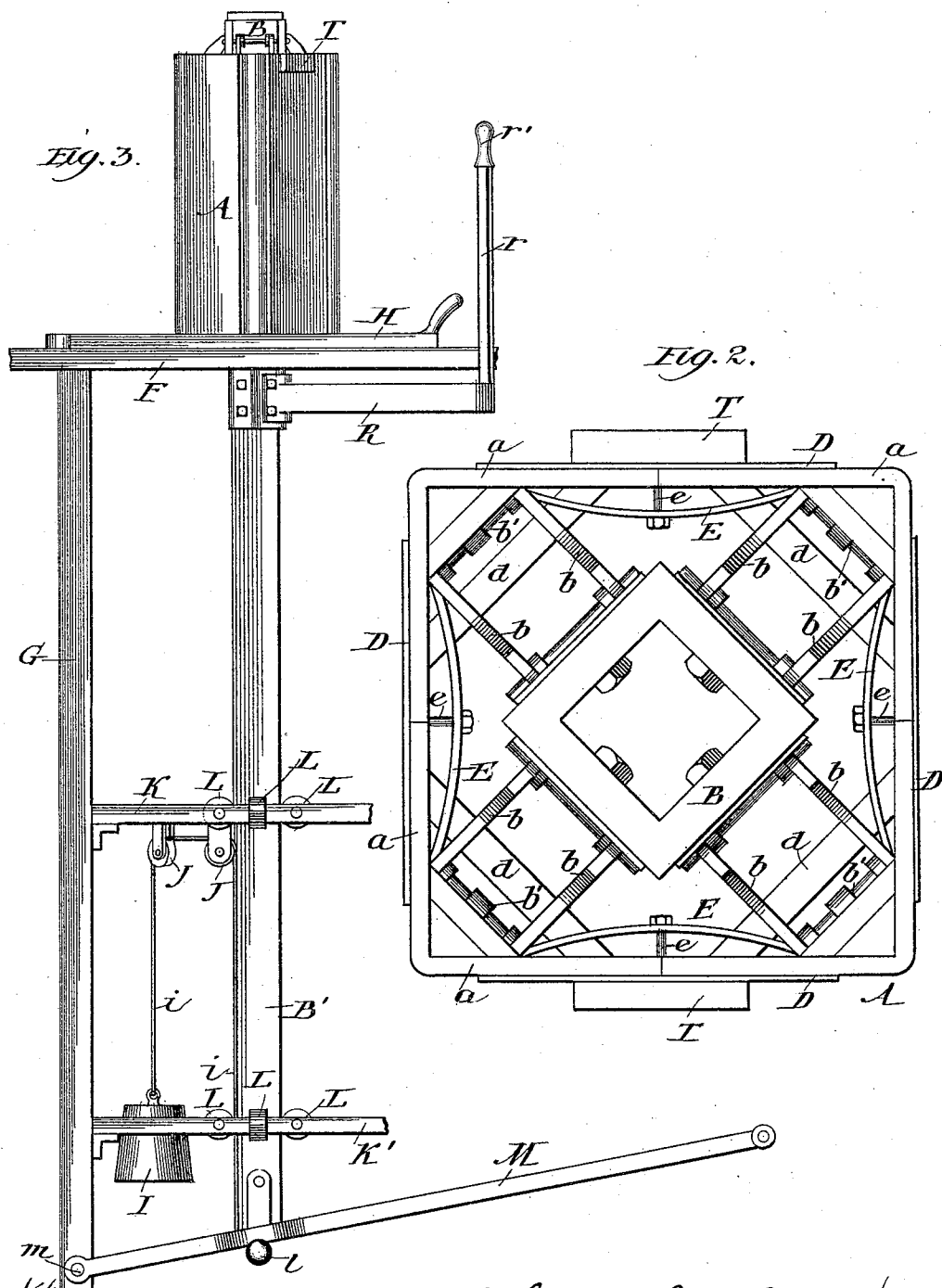
(No Model.)

3 Sheets—Sheet 2.

C. S. & J. H. RAHLING.
INGOT MOLD MAKING MACHINE.

No. 461,487.

Patented Oct. 20, 1891.



Witnesses:

John L. Jackson.
W. P. Thomson.

Inventors:
Christopher S. Rahling
John H. Rahling
by Bond & Adams
Attys.

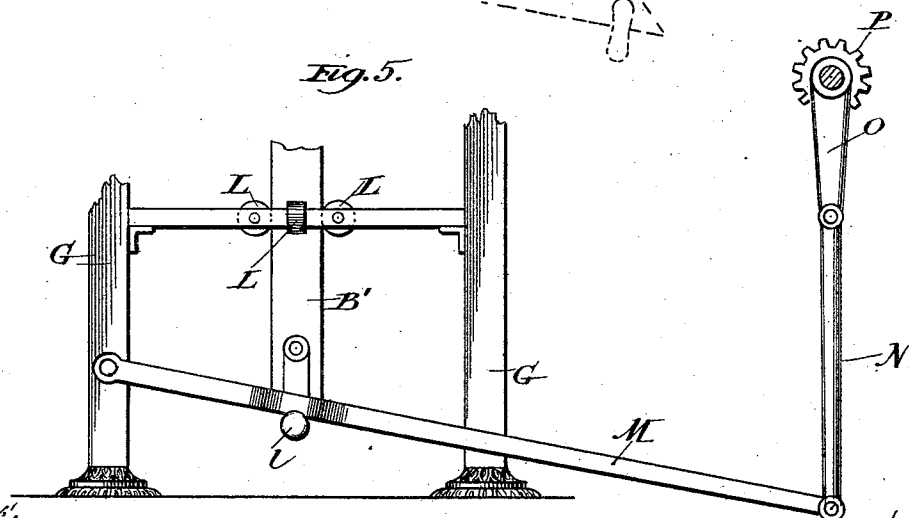
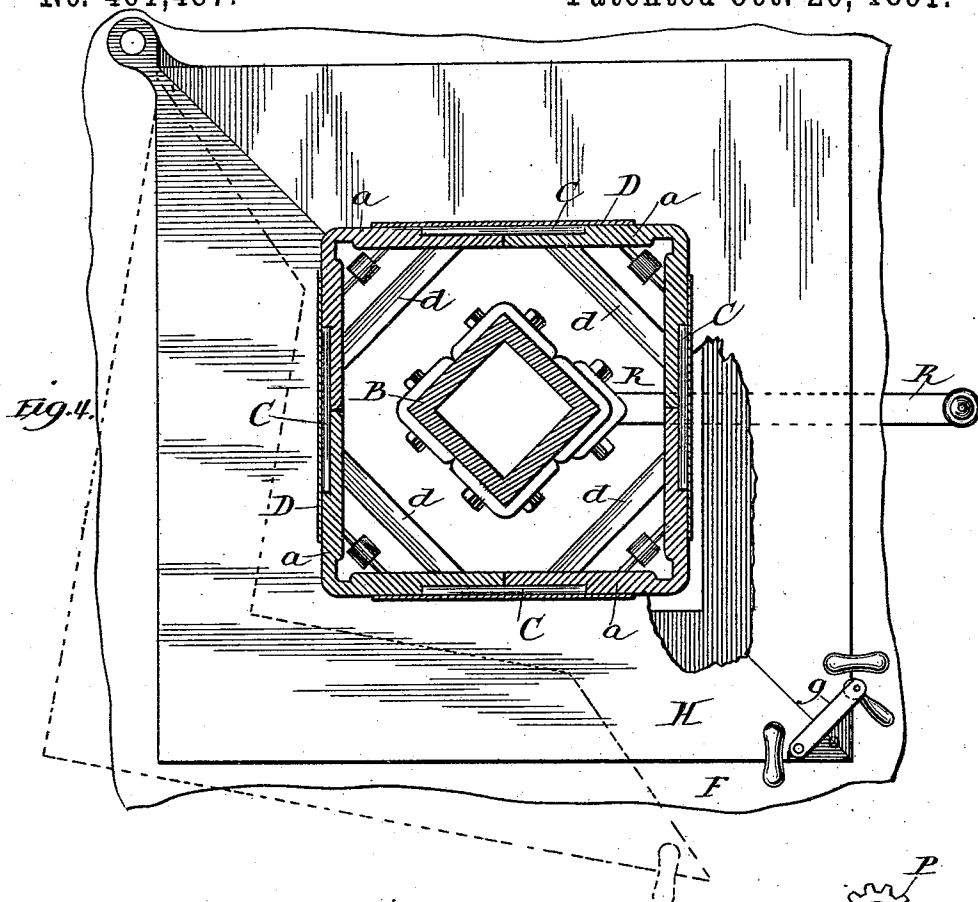
(No Model.)

3 Sheets—Sheet 3.

C. S. & J. H. RAHLING.
INGOT MOLD MAKING MACHINE.

No. 461,487.

Patented Oct. 20, 1891.



Witnesses:

John L. Jackson
W. P. Thornton.

Inventors:
Christopher S. Rahling.
John H. Rahling.
By Bond & Adams
Attys.

UNITED STATES PATENT OFFICE.

CHRISTOPHER S. RAHLING AND JOHN H. RAHLING, OF CHICAGO, ILLINOIS.

INGOT-MOLD-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 461,487, dated October 20, 1891.

Application filed February 24, 1891. Serial No. 382,359. (No model.)

To all whom it may concern:

Be it known that we, CHRISTOPHER S. RAHLING and JOHN H. RAHLING, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Making Molds for Ingot-Molds, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a diagonal vertical section. Fig. 2 is a top or plan view. Fig. 3 is a perspective view showing a part of the operating mechanism. Fig. 4 is a horizontal section; and Fig. 5 is a detail, being a side elevation of a part of the operating mechanism.

Our invention relates to molding-machines, and particularly to machines designed to shape the interior of molds to be used in casting articles of various kinds.

Our invention has for its object to provide a machine for shaping the sand in molds to be used in casting molds for steel ingots; but it may, however, be used in shaping various kinds of molds in which the interior of the mold is capable of being pressed into the shape desired.

We accomplish our object as shown in the drawings and as hereinafter specified.

That which we regard as new will be set forth in the claims.

Similar letters of reference refer to similar parts throughout the drawings.

In the drawings, A indicates the exterior shaping surface or frame of the machine, which is of the length and shape of the ingot-mold, and is made of iron, steel, or other suitable material. The molding-frame A is vertically divided into four equal rectangular sections *a*, as best shown in Figs. 2 and 4, the parts being so constructed as to unite closely and smoothly, as shown.

B indicates a central rod or shaft, which is located at the center of the frame A, and to which each section *a* of the frame is secured. The shaft B is square and hollow, made of iron, steel, or other suitable material, and extends from a short distance above the top of the frame A to a point below the frame, as best shown in Fig. 1.

B' indicates an extension of the shaft B, which is suitably secured thereto at its lower

end and projects downward, as best shown in Fig. 3, for convenience in operating the device. Each section *a* is secured to the shaft B by straps *b*, which are arranged in pairs, as best shown in Fig. 2, and of which several pairs are employed on each section, as best shown in Fig. 1. The straps *b* are hinged to the sections *a* at the corners of the sections by hinges *b'*, which are mounted on plates *c*, which are secured by screws *c'* to lugs *a'*, formed in the corners of the sections *a*. The straps *b* may, however, be hinged to the sections *a* in any other suitable manner. The straps *b* are all of equal length and are hinged to the shaft B at a point some distance above the plane of their connection with the sections *a*, so that when the sections *a* lie close together the straps will be downwardly and outwardly inclined, as best shown in Fig. 1. By this construction, when the frame A is supported and the shaft B is drawn downward, the straps *b* will be drawn into a more nearly horizontal position, whereby the sections *a* of the frame will be forced outward, as indicated in dotted lines in Fig. 1.

D D represent flat plates of suitable metal, one of which is placed over the meeting edges of each pair of sections *a*, as best shown in Fig. 2. The plates D are of equal length with the frame A and are of such width that when the sections *a* are separated to their greatest extent the plates D will cover the space opened by the separation of the edges of the sections. The plates D are held in position on the sections *a* by means of horizontal curved springs E and bolts *e*. The ends of the springs E bear upon the inner sides of adjacent sections *a* and are connected to the plates D by the bolts *e*, which pass through the springs at their center and through holes in the meeting edges of the sections *a* into the plates D, as best shown in Figs. 1 and 2.

When the sections are separated, as above described, the springs E will by their tension hold the plates D in close contact with the exterior of the sections, the sections sliding on the inner surfaces of the plates. When the sections are again closed, the plates will resume the position shown in Fig. 2.

The plates D are strengthened by means of transverse bars C, which are fitted in suitable grooves or depressions in the outer sur-

faces of the sections *a*, as best shown in Fig. 4, which bars *C* are so arranged as to unite the sections *a* when they are separated and operate in a manner similar to the operation of the plates *D*. The springs *E* are also held in position by braces *d*, upon which they rest, which braces serve the double purpose of supporting the springs *E* and strengthening the sections *a*, as shown in Figs. 2 and 1.

In order to avoid excessive friction of the bottom of the frame *A* upon its support when the sections *a* are being separated or closed, each section *a* is provided at the bottom with a caster or roller *f*, which projects sufficiently below the lower edge of the section to aid in carrying the section out and back.

F indicates a platform, which is located at any suitable height above the ground, and is adapted to support the molding machinery. The platform *F* is mounted on posts or columns *G*, or in any other suitable manner, and is provided at its center with an opening sufficiently large to permit of the passage of the frame *A*.

Upon the platform *F* is placed a flat table *H*, which is divided diagonally into two equal sections, which sections are pivoted at one end to the platform *F* and are adapted to swing horizontally outward, as indicated by dotted lines in Fig. 4, their other ends being provided with a suitable lock or fastening *g*, by means of which the sections may be secured together in closed position.

The table *H* is provided at a point over the opening in the platform *F* with a square opening, which is somewhat smaller than the frame *A*. In use the frame *A* is placed over the openings above described, the shaft *B* extending through the openings and the frame *A* resting upon the table *H* around the opening in said table.

The box which is to contain the sand to be molded is placed on the table *H*, over or around the frame *A*. Molding-sand is then poured in and slightly packed. The shaft *B* is then drawn downward, causing the sections *a* to move outward on the rollers *f*, thereby pressing the sand into the proper form. When the sand is sufficiently compressed, the shaft *B* is returned to its raised position, closing the sections *a*. The box containing the molded sand may then be removed and the operation repeated. By reason of the construction above described great power can be brought to bear upon the sand to tightly pack it into place.

The plates *D* cover the openings between the edges of the sections *a* and mold the sand at those points. When the sand has been pressed into shape, the box containing it is removed and another substituted.

T T indicate lugs or ears formed on the exterior of the frame *A* at the top, as best shown in Figs. 2 and 3. The lugs *T* are preferably formed only on two opposite sides, as shown, their object being to form corresponding depressions in the molded sand adapted to form similar lugs on the upper part of the outer sur-

face of the ingot-mold, by means of which the ingot-mold may be lifted.

The shaft *B* is held in its raised position by means of a counterbalancing-weight *I*, which is provided with a rope *i*, adapted to work in pulleys *J J*, mounted on a cross-beam *K*, secured to the columns *G*. The end of the rope *i* is secured at some suitable point to the extension *B'* of the shaft *B*. By this construction the shaft *B* will be held at its raised position in the absence of pressure to lower it.

The extension *B'* of the shaft *B* is held in its perpendicular position by rollers *L*, mounted on cross-beams *K K'*, as best shown in Fig. 3, between which rollers the shaft *B* is adapted to move.

M indicates a lever for depressing the shaft *B*, which lever is attached at *m* to one of the supports *G* at a point lower than the extension *B'*, so that when the lever is attached to the extension *B'* of the shaft *B* by depressing its outer end the shaft *B* will be drawn downward. In order to draw the shaft *B* perpendicularly downward, the lever *M* passes over a roller or pin *l* on the extension *B'* of the shaft *B*, whereby the lever *M* will move over the roller *l* as it is moved up or down. The outer end of the lever *M* is pivoted to a connecting-rod or pitman *N*, which is mounted upon a crank-shaft *O*, operated through a gear-wheel *P*, as best shown in Fig. 5. The gear-wheel *P* is operated by any suitable driving mechanism. By operating the gear-wheel *P* the crank will be rotated, causing the raising and lowering of the lever *M*, each rotation of the crank effecting a complete operation of the molding-machine.

R indicates a horizontal bar, which is attached to the shaft *B* immediately below the platform *F*, and is provided with an upwardly-extending rod *r* and handle *r'*, by means of which the shaft *B* may be depressed by hand when the machine is not in use.

That which we claim as new, and desire to secure by Letters Patent, is—

1. The combination of a platform and an exterior box for containing the sand to be molded with a laterally-expandible sectional frame arranged above and supported by the platform, a central lengthwise-movable shaft, a series of straps pivoted to the frame-sections and to the shaft, and means for moving the shaft lengthwise to expand the frame and shape the sand in the box, substantially as described.

2. The combination of a platform having an opening, a table on the platform, and an exterior box for containing the sand to be molded with a laterally-expandible sectional frame adapted to pass through the opening in the platform and rest on the table, a lengthwise-movable shaft extending through the frame and the opening in the platform, a series of straps connected to the frame-section and to the shaft, devices for automatically elevating the shaft, and means for lowering the shaft against the power or force of the

$\Gamma(L_1)$	$r_6(L_3)$	$\Gamma(L_4)$
$K = 1.0$	$K = 1.0$	$K = 0.0$
$C_2 = 0.0$	$C_2 = 0.0$	$C_2 = 0.0$
$C_4 = -0.15691 \times 10^{-6}$	$C_4 = +0.95381 \times 10^{-7}$	$C_4 = -0.22891 \times 10^{-5}$
$C_6 = -0.40068 \times 10^{-10}$	$C_6 = -0.73871 \times 10^{-10}$	$C_6 = +0.12283 \times 10^{-9}$
$C_8 = +0.21016 \times 10^{-13}$	$C_8 = +0.12280 \times 10^{-13}$	$C_8 = +0.84230 \times 10^{-13}$
$C_{10} = -0.37683 \times 10^{-17}$	$C_{10} = -0.33177 \times 10^{-17}$	$C_{10} = -0.20592 \times 10^{-16}$