

No. 827,416.

PATENTED JULY 31, 1906.

J. H. B. BRYAN.
APPARATUS FOR DRAWING PATTERNS FROM MOLDS.

APPLICATION FILED DEC. 11, 1900.

2 SHEETS—SHEET 1.

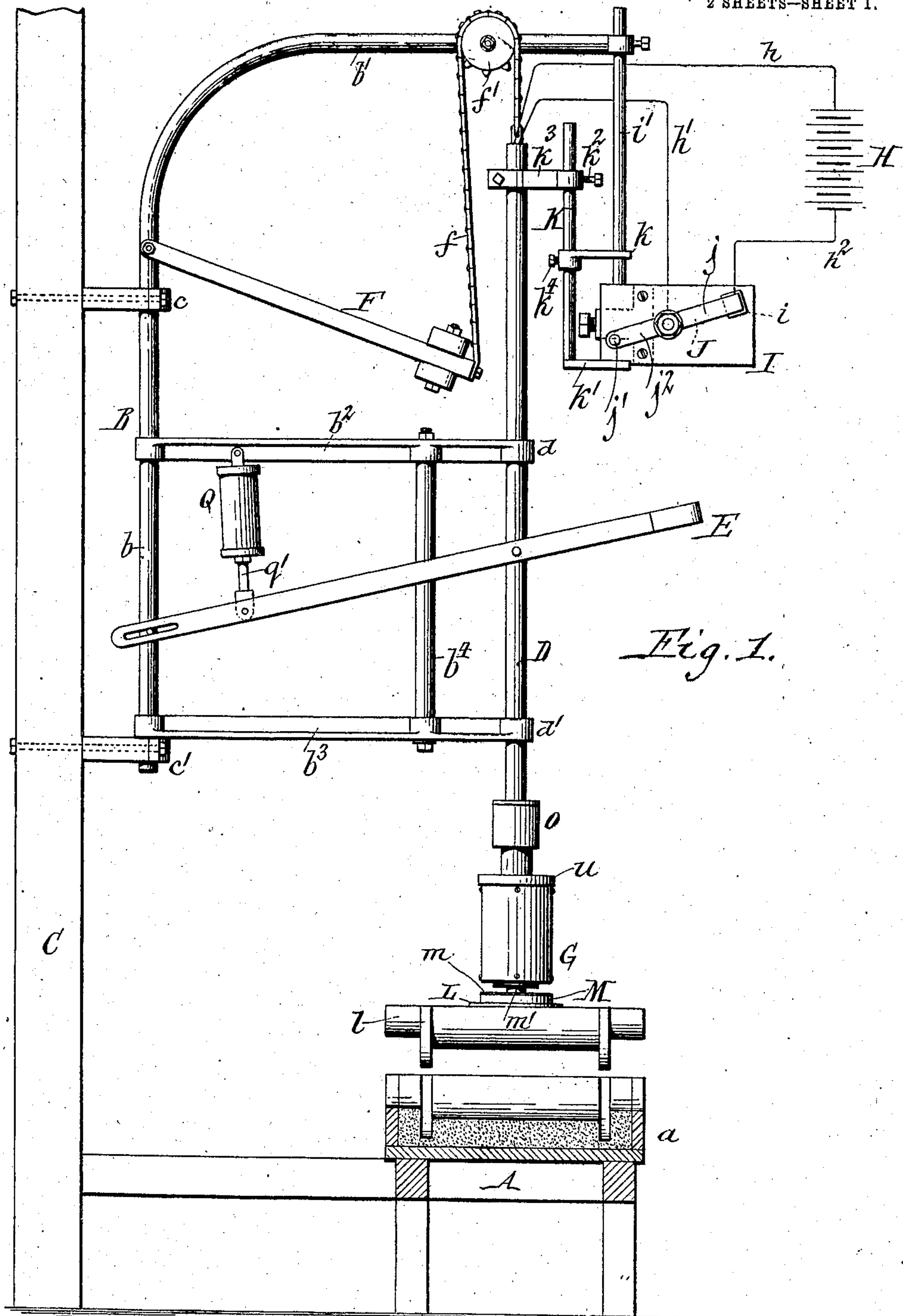


Fig. 1.

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F. F. Schiringer } Witnesses. John H. B. Bryan Inventor.
By Wilhelm B. B. Bryan Attorneys.

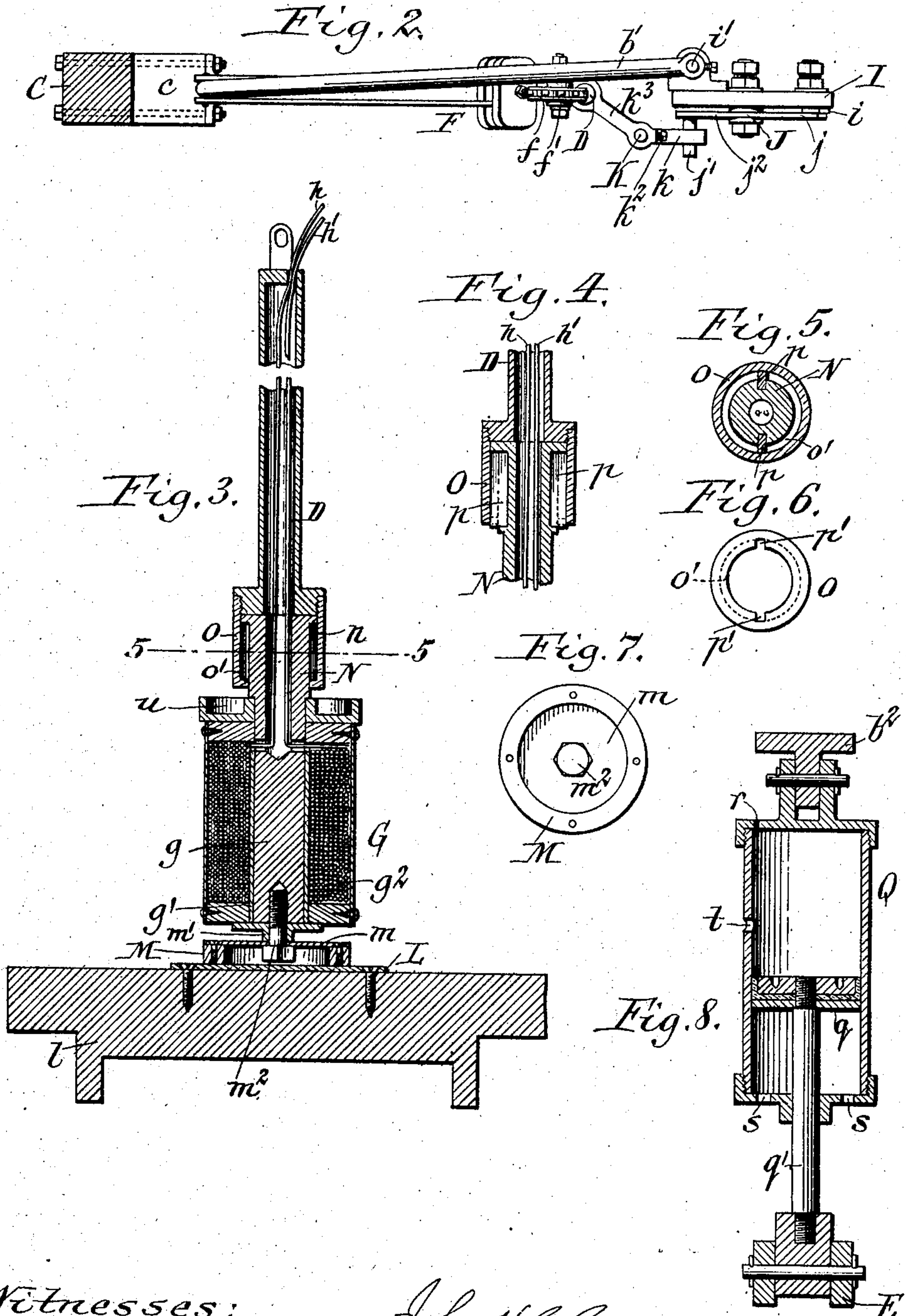
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Witnesses:
E. A. Volk.
F. F. Schuringer.

John H. B. Bryan Inventor
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UNITED STATES PATENT OFFICE.

JOHN H. B. BRYAN, OF BUFFALO, NEW YORK.

APPARATUS FOR DRAWING PATTERNS FROM MOLDS.

No. 827,416.

Specification of Letters Patent.

Patented July 31, 1906.

Application filed December 11, 1900. Serial No. 39,579.

To all whom it may concern:

Be it known that I, JOHN H. B. BRYAN, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Apparatus for Drawing Patterns from Molds, of which the following is a specification.

The object of this invention is to produce an electric lifting apparatus whereby patterns may be drawn out of sand molds after the latter have been formed in the flasks without damaging or distorting the molds.

In general my improved apparatus consists of an electromagnet which is attached, with its pole, to an armature on the pattern by closing the electric circuit containing the magnet and which is mounted on a vertically and horizontally movable support, whereby the magnet, together with the pattern, may be first lifted until the pattern is withdrawn from the sand in the flask and then moved laterally, so as to clear the space above the flask and permit the molder to operate freely.

In the accompanying drawings, consisting of two sheets, Figure 1 is a side elevation, partly in section, of my improved pattern-lifting apparatus, showing the pattern lifted. Fig. 2 is a top plan view of the same. Fig. 3 is a vertical section, on an enlarged scale, of the electromagnet and connecting parts, showing the position of the parts preparatory to lifting the magnet and the pattern. Fig. 4 is a fragmentary vertical section of the slack connection or coupling between the magnet and the movable support, the section being taken at right angles to Fig. 3. Fig. 5 is a horizontal section in line 5 5, Fig. 3. Fig. 6 is a bottom plan view of the outer sleeve of the slack connection between the magnet and its support. Fig. 7 is a bottom plan view of the pole-piece of the magnet. Fig. 8 is a vertical section of the cushioning device whereby the vertical movement of the lifting apparatus is checked.

Like letters of reference refer to like parts in the several figures.

A represents the molding-bench, upon which the molding-flask *a* is placed in the usual manner for molding the pattern in the same.

B represents a horizontally-movable support or frame, which is arranged above the molding-bench and which consists, essentially, of an upright shaft *b*, provided with an upper arm *b'*, an intermediate arm *b²*, and a

lower arm *b³*, which project forward from the shaft, and an upright brace *b⁴*, connecting the intermediate and lower arms *b² b³*. The shaft *b* is journaled in bearings *c c'*, so as to be capable of turning horizontally, these bearings being secured to a wall, post, or other support C in rear of the molding-bench.

D represents an upright hollow lifting-rod, which is capable of sliding vertically in guides *d d'* at the outer ends of the intermediate and lower arms *b² b³*. This rod is raised and lowered by means of a hand-lever E, which is pivotally connected near its front end to the lifting-rod and loosely connected at its rear end to the rock-shaft *b*. The weight of the lifting-rod and the parts connected therewith is counterbalanced by a weighted arm F, pivoted at its rear end to the shaft *b* and connected at its front end with the lifting-rod by a chain *f*, which passes over a guide-pulley *f'* on the upper arm *b'*.

Upon the lower end of the lifting-rod an electric attaching device is mounted, whereby the pattern to be drawn from the mold is connected with the lifting-rod and which is constructed as follows:

G represents an electromagnet, the core *g* of which is arranged vertically and has a spool *g'* on its lower end which carries the surrounding coil of wire *g²*. The ends of the electromagnet-coil are connected with two wires *h h'*, which are arranged in the hollow lifting-rod and the hollow upper part of the core. The wire *h* is connected with one pole of an electric generator H, while the other pole thereof is connected by a wire *h²* with a contact *i* on a switchboard I. The wire *h'* is connected with a vertically-swinging switch-lever J, which is pivoted on the switchboard and adapted to engage its arm *j* with or disengage the same from the contact *i* for closing or opening the circuit, which includes the electric generator and the electromagnet. The switchboard is mounted on the lower end of a vertical rod *i'*, which is secured at its upper end to the upper arm *b'* of the horizontally-rocking frame, so that the switchboard moves with the frame.

K represents a vertical shipper-rod, which moves up and down with the lifting-rod and which is provided with two tappets *k k'*, whereby the switch-lever is turned for automatically opening and closing the electric circuit. The shipper-rod is adjustably secured by a screw *k²* to an arm *k³* on the upper part of the lifting-rod. The tappets *k k'* are

arranged above and below a pin or projection j' on the arm j^2 of the switch-lever. The lower tappet k' is preferably formed integrally with the shipper-rod; but the upper
 5 tappet k is adjustably secured thereto by a set-screw k^4 . The position of the tappets is so adjusted relatively to the lifting-rod that the upper tappet k engages with the pin of the switch-lever and turns the arm j thereof
 10 into engagement with the contact i during the last part of the downward movement of the lifting-rod, thereby closing the electric circuit and energizing the magnet, and during the last part of the upward movement of
 15 the lifting-rod the lower tappet k' engages the pin of the switch-lever and turns the same so as to disengage its arm j from the contact i , thereby breaking the electric circuit and deenergizing the magnet.

20 L represents an iron plate secured to the upper side of the pattern l and forming an armature which is attracted by the pole of the magnet, and whereby the pattern is connected with the lifting device.

25 In order to permit of a slight variation or unevenness in the position of the armature-plate, the pattern, or the flask, the magnet is provided with a pole-piece M, which is flexibly connected with the core of the magnet,
 30 so that the pole-piece can adjust itself to any unevenness which may exist in these parts. The pole-piece is preferably of circular form, as shown in Figs. 3 and 7, and is secured to the under side of a flexible disk of metal m .
 35 The latter is separated from the lower end of the coil and the core preferably by an interposed washer m' , so as to give the pole-piece freedom of movement. The flexible disk and the washer are secured to the core by a
 40 screw m^2 passing centrally through the disk.

When the switch is operated automatically by the vertical movement of the lifting-rod, it is necessary to provide means which permit the magnet during its descent to engage
 45 its pole-piece with the armature on the pattern before the circuit is closed. Otherwise the magnet if energized while approaching closely to the pattern-armature would be liable to attract the armature and lift the
 50 pattern unevenly or displace the same, thereby distorting the mold and defeating the advantage sought to be gained by the use of this apparatus. For this purpose the electromagnet is connected loosely with the lifting-rod by a slack connection or coupling,
 55 which permits the lifting-rod after the same has lowered the magnet upon the pattern-armature to continue its descent a short distance independent of the magnet, and the
 60 upper tappet k is so adjusted that it turns the switch-lever and closes the circuit during the time that the lifting-rod moves downwardly independently of the magnet.

The slack connection between the lifting-rod and the magnet for this purpose, which is

shown in the drawings, is constructed as follows: The core of the magnet projects above the coil, so as to form a stem N, and the latter is provided at its upper end with an outwardly-projecting flange n . O repre- 70
 sents a coupling head or sleeve which is arranged around the upper end of the magnet-stem and secured at its upper end by a screw connection with an enlargement at the lower
 75 end of the lifting-rod. The lower end of the coupling-sleeve is provided with an inwardly-projecting flange o' , which is adapted to be engaged by the flange n of the magnet-stem. While the mold is packing the sand around
 80 the pattern in the flask the magnet is elevated by the lifting-rod, and the movable supporting-frame, together with the parts mounted thereon, is swung to one side, so as to permit the mold to operate freely. While the
 85 magnet is thus elevated by the lifting-rod it is supported by means of the shoulder n on its stem engaging with the shoulder o' of the coupling-sleeve. After the pattern has been packed in the sand of the flask and the latter
 90 has been turned on the bench, so that the pattern, with the armature-plate, is on the upper side, the movable supporting-frame is shifted so that the electromagnet is arranged with its pole-piece over the armature-plate of the
 95 pattern. The lifting-rod, together with the magnet carried thereby, is now lowered, during the first part of which movement the position of the switch-lever is such that the electric circuit is open and the magnet is inactive. Before the lifting-rod reaches the
 100 end of its downward movement the pole-piece of the magnet engages the armature-plate of the pattern, whereby the further downward movement of the magnet is arrested. During the continued downward
 105 movement of the lifting-rod to the end of its stroke in this direction the coupling-sleeve on the lifting-rod slides down on the magnet-stem, as shown in Fig. 3. While the lifting-rod is thus moving downward independently
 110 of the magnet the upper tappet k engages the switch-lever and turns the same sufficiently to engage the contact i , thereby closing the electric circuit and rendering the magnet active, whereby the latter attaches its pole-
 115 piece to the armature-plate of the pattern by electromagnetic attraction. Upon now raising the lifting-rod the internal shoulder o' of the coupling-sleeve engages with the external shoulder n of the magnet-stem, whereby the
 120 magnet and the pattern are lifted and the latter is withdrawn from the sand mold in the flask, as shown in Fig. 1. This movement is perfectly vertical, so that the pattern is drawn upwardly in a straight line, thereby
 125 producing a perfect mold of the pattern in the sand of the flask. During the last part of the upward movement of the lifting-rod the lower tappet k' turns the switch-lever so
 130 as to open the electric circuit, thereby deen-

ergizing the magnet and releasing the pattern.

The latter when released from the magnet is held by the operator and placed in the next flask for producing the next mold. The magnet is held against turning on the lifting-rod in order to prevent lateral deflection of the pattern while being withdrawn from the mold, thereby avoiding distortion of the mold, which otherwise would be liable to occur. The means for preventing the magnet from turning on the lifting-rod consist of one or more splines or keys *p*, secured lengthwise to the outer side of the magnet-stem and engaging with notches or recesses *p'* in the internal flange *o'* of the coupling-sleeve, as shown in Figs. 4 and 5.

In order to prevent the lifting-rod and the parts connected therewith from being moved suddenly and jarring the machine and the mold, a cushioning device is provided, which is constructed as follows: *Q* represents an air-cylinder which is pivoted at its upper end to the intermediate bar *b'* of the rocking frame, and *q* is a plunger arranged in the cylinder and provided with a rod *q'*, which is pivoted at its lower end to the lifting-lever *E*, as shown in Figs. 1 and 8. The upper head of the cylinder is provided with a small hole *r*, the lower head thereof is provided with one or more large holes *s*, and the side or bore of the cylinder is provided with a large hole *t*, compared with the hole in the upper head. Upon depressing the hand-lever *E* for engaging the magnet with the pattern-plate the plunger is moved toward the lower end of the cylinder. As the plunger passes downwardly below the side opening *t* in the cylinder air is admitted freely above the plunger and reduces the tendency to form a vacuum above the plunger which would have to be overcome by the operator. The air in the cylinder below the plunger escapes through the lower openings *s* sufficiently free to permit of engaging the magnet promptly with the pattern-plate; but the escape of the air through the openings *s* is retarded sufficiently to offer a slight resistance to the downward movement of the magnet and prevent jarring the pattern. During the first part of the upward movement of the plunger, together with the lifting-rod, the air in the upper end of the cushion-cylinder escapes freely through the side opening *t*, thereby permitting the pattern to be lifted comparatively fast until the plunger passes above the side opening *t*. The last part of the upward movement of the plunger and the lifting-rod is checked or cushioned by reason of the slow escape of the air from the upper end of the cylinder through the small upper opening *r* after the plunger passes above the side opening *t*. By thus cushioning the lifting-rod and connecting parts during the last part of the upward movement thereof the operator can release the hand-lever *E* after the pattern has been

released from the magnet, and the upward movement of the parts will be completed by the weighted arm *F* without jarring the apparatus. Any lubricating-oil which may drop from the guides of the lifting-rod is caught by a drip or waste pan *u*, which is arranged on top of the magnet, thereby preventing the oil from reaching the pole-piece and interfering with the attraction of the magnet.

I claim as my invention—

1. The combination of a vertically-movable lifting-rod, an electromagnet, guide devices whereby the lifting-rod is caused to move in a vertical line, a switch whereby the electric circuit containing the magnet may be opened and closed, and means whereby said switch is operated automatically while the lifting-rod moves vertically, substantially as set forth.

2. The combination with a vertically-movable lifting-rod, and a guide whereby the same is guided in its vertical movement, of an electromagnet mounted on said rod, a switch having a lever whereby the electric circuit containing the magnet may be opened and closed, and tappets which move with the lifting-rod and whereby the switch-lever is operated, substantially as set forth.

3. The combination with a vertically-movable lifting-rod and a horizontally-movable frame provided with guides whereby the lifting-rod is guided in its vertical movement, of an electromagnet mounted on the lifting-rod, a switchboard mounted on the movable frame and provided with a switch-lever whereby the electric circuit containing the magnet may be opened and closed, and tappets which move with the lifting-rod and whereby the switch-lever is turned for opening and closing said circuit, substantially as set forth.

4. In an apparatus for drawing patterns from molds the combination with a vertically-movable support, and means for guiding the support and causing it to move in a vertical line, of an electromagnet mounted on said support and provided with a yielding pole-piece adapted to attach itself to an armature on the pattern, substantially as set forth.

5. In an apparatus for drawing patterns from molds, the combination with a vertically-movable support, of a magnet mounted on said support, and a pole-piece connected with the core of the magnet by a flexible disk and adapted to attach itself to an armature on the pattern, substantially as set forth.

6. The combination with a vertically-movable electromagnet, of an annular pole-piece, and a flexible metal disk which is connected at its outer edge to the pole-piece and at its center to the core of the magnet, substantially as set forth.

7. The combination with a vertically-movable support, of a magnet having a slack connection with said support so that the support can move independently of the magnet

when the latter is arrested, a switch which is adapted to open and close the electric circuit containing the magnet, and means for operating said switch while the support moves independently of the magnet, substantially as set forth.

8. The combination with a vertically-movable lifting-rod, and an electromagnet, of a coupling whereby a slack connection is formed between the lifting-rod and the magnet and which comprises one member connected with the lifting-rod and having a projecting part and another member arranged on the magnet and having a projecting part which is adapted to engage said other projecting part, a switch which is arranged in the circuit containing said magnet, and means for operating said switch while the lifting-rod moves independently of the magnet, substantially as set forth.

9. The combination with a lifting-rod and an electromagnet, of a coupling whereby a slack connection is produced between the magnet and lifting-rod so as to permit the rod to move independently of the magnet when the latter is arrested and which is provided with a spline whereby the magnet is held against turning on the lifting-rod, a

switch which is arranged in the electric circuit containing the magnet, and means for operating said switch while the lifting-rod moves independently of the magnet, substantially as set forth.

10. The combination with a lifting-rod, and an electromagnet, of a stem projecting upwardly from the magnet and provided with an external flange, a coupling-sleeve surrounding the stem and secured at its upper end to the lifting-rod and at its lower end provided with an internal flange having a notch, which flange is adapted to be engaged by the external flange of the magnet-stem, a key or spline arranged on said stem and engaging with the notch in the flange of the coupling-sleeve, a switch having a lever and arranged in an electric circuit containing the magnet, and tappets moving with the lifting-rod and adapted to turn said switch-lever for opening and closing the electric circuit, substantially as set forth.

Witness my hand this 23d day of November, 1900.

JOHN H. B. BRYAN

Witnesses:

NATHAN M. CLARK,
HORACE H. FLAGLER.