

(No Model.)

2 Sheets—Sheet 1.

S. J. ADAMS.
FORMING MOLDS FOR CASTINGS.

No. 257,992.

Patented May 16, 1882.

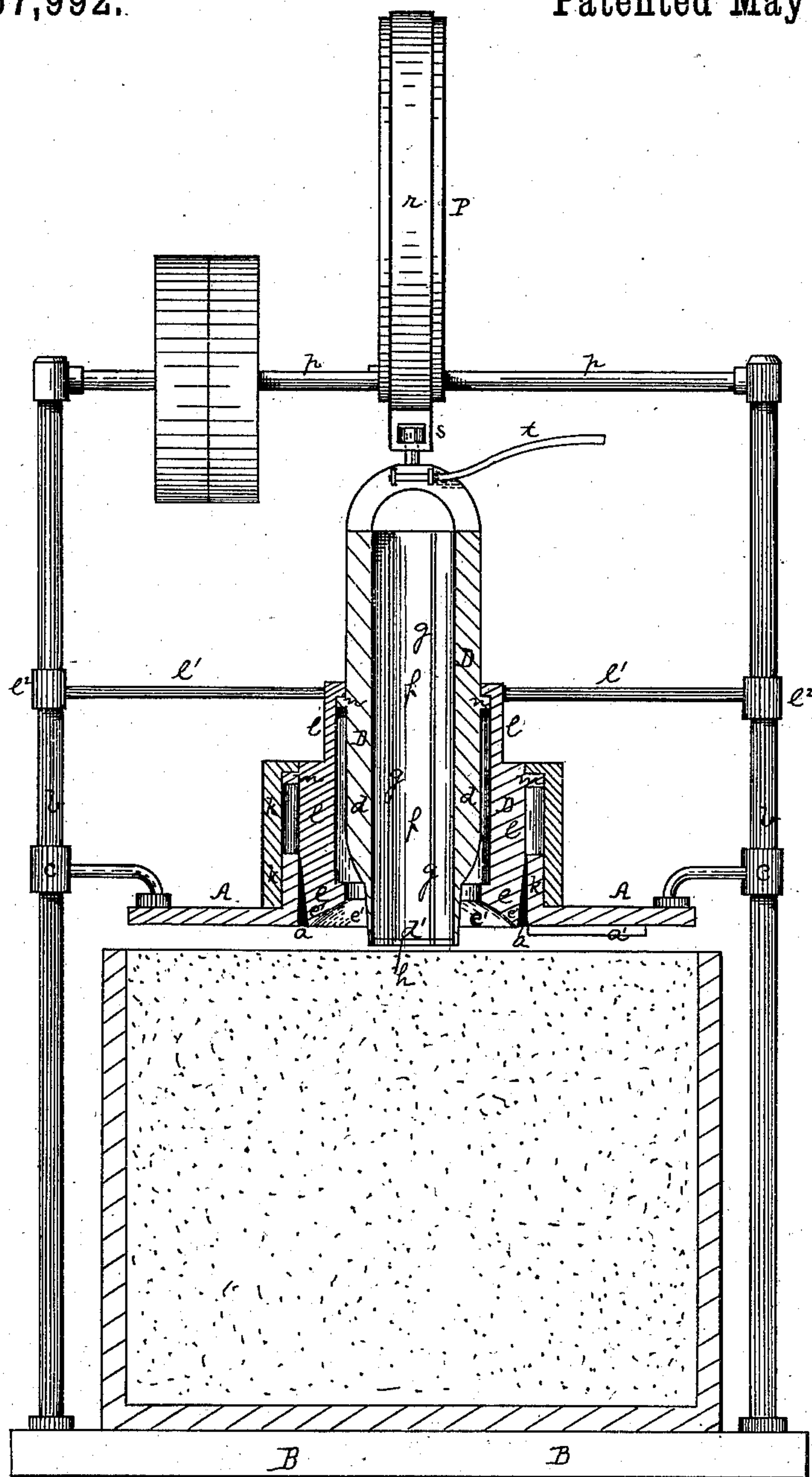


Fig. 1.

Witnesses

Alex. Scott
Paul Sullivan

Inventor

S. Jarvis Adams
by James I. Roy
Attorney

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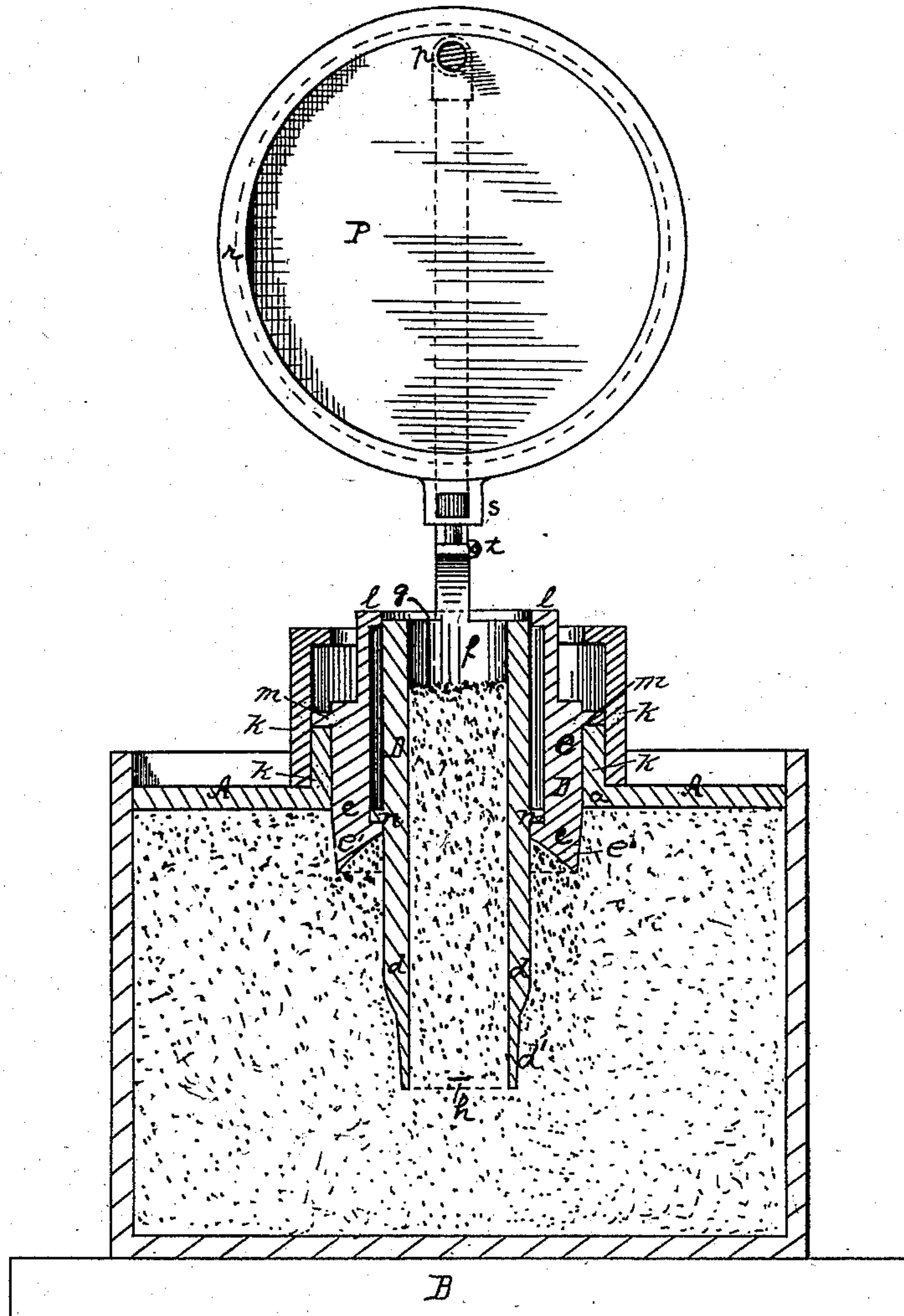


Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

S. JARVIS ADAMS, OF PITTSBURG, PENNSYLVANIA.

FORMING MOLDS FOR CASTINGS.

SPECIFICATION forming part of Letters Patent No. 257,992, dated May 16, 1882.

Application filed June 8, 1881. (No model.)

To all whom it may concern:

Be it known that I, S. JARVIS ADAMS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Forming Molds for Castings; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a vertical central section of the apparatus employed in carrying out my invention before it enters the sand to form the mold. Fig. 2 is a like view where the mold has been formed and the apparatus is ready to be withdrawn.

Like letters of reference indicate like parts in each.

My invention relates to the formation of molds in sand for making castings of iron, steel, or other metals, its object being to so press the pattern and the templet-plate or follower into the sand as to obtain a more evenly packed mold than by the usual pressing operation.

It consists, first, in forming cylindrical molds in a body of sand by first forcing the pattern into the sand by direct compression longitudinally of its axis, and subsequently rotating the pattern so forced in circumferentially of its axis, this rotation of the pattern, while wholly encompassed with the sand, serving to smooth or finish the mold-walls; second, in forming the pattern with a hollow central passage, through which a portion of the sand passes as the pattern is pressed in, so that the pattern does not have so large a mass of sand to press aside; and, third, in certain improvements in the construction of the apparatus employed.

To enable others skilled in the art to carry out my invention, I will describe the same fully.

In the drawings my invention is illustrated in connection with the formation of molds for pipe-welding balls, this being a mold of simple construction, and illustrating the operation of the apparatus, the only change necessary to make molds of other shape being in the form of the patterns and their templet-plates, or in the throw of the cams. The templet-plate A, through which the pattern works,

is mounted on suitable guide-rods, *b*, secured in the frame B of the apparatus by means of the sleeves *c*, attached to the top of the templet-plate, the exact vertical movement of the templet-plate being thus secured. In the center of the templet-plate is the opening *a*, through which the pattern passes to form the mold.

The pattern D shown is in two parts—the pattern proper, *d*, for pressing the mold the proper shape for the casting to be made, and the core-print below the mold, and the annular cope-head *e*, for pressing the cope-print or seat for the head of the core above the mold.

The pattern proper, *d*, is arranged to move through the cope-head *e*, and the cope-head has a like movement through the passage *a* of the templet-plate, so that the pattern proper can first be advanced when the sand is loose and easily penetrated, and afterward the cope-head can follow to compact the sand against the pattern proper in the upper part of the mold, while the templet-plate is afterward pressed forward to compact the sand around the cope-head of the pattern, as well as pack the upper sand of the flask, and, if necessary, form the pouring-gates by means of ridges *a'* on its lower surface. The pattern may, however, be formed in one piece, having the cope-head above the pattern proper, if necessary, and the single pattern be advanced through the templet-plate.

Where it is desired to form molds for hollow castings—such as pipe-welding balls, as shown—the pattern is formed with a central passage, *f*, extending longitudinally through it, through which a portion of the sand may rise or pass as the pattern is pressed into the sand, so that the pattern is not required to press so large a mass of sand aside. This central passage may be made almost as large in diameter as the base of the core-print *d'*, the walls of this core-print being formed of thin sheet metal. In the central passage, *f*, are formed two or more longitudinal ridges, depressions, or other irregularities, *g*, which extend out from or into the surface of the passage, so as to hold the sand which rises in the passage as the pattern is pressed in. If desired, also, a wire, *h*, may extend across the lower end of the passage to sustain the sand

in the passage and act as a cut-off, as herein-
after referred to. Where the pattern is formed
in one piece similar openings may be formed
in the horizontal part of the patterns—such as
5 at the base of the cope-heads—to permit a por-
tion of the sand to enter the pattern, and these
parts of the mold could be smoothed off on the
revolution of the pattern, as hereinafter de-
scribed.

10 The lower face of the cope-head *e* is prefer-
ably curved downward as it extends out from
the pattern proper, so as to form an annular
downwardly-extending lip, *e'*, which has the
tendency to press the sand inwardly against
15 the pattern proper, and so compact the upper
walls of the mold.

Around the opening *a* of the templet-plate
is formed a guide-ring, *k*, within which the
cope-head extension *l* moves, the upper part of
20 the guide-ring *k* being hollowed out for the re-
ception of the annular lip *m* on the extension *l*,
the lip forming a telescopic joint between the
extension and guide-ring. The vertical move-
ment of the cope-head of the pattern is insured
25 by the arms *l'* extending out from the exten-
sion, the sleeves *l''* of which fit around the
guide-rods *b*.

The pattern proper, *d*, extends through the
cope-head and its extension, and slides verti-
30 cally therein. The upper part of the cope-head
extension *l* is hollowed out for the reception
of the annular lip *n*, which forms a telescopic
connection between the cope-head and pattern
proper. When the pattern is formed in one
35 piece but one telescopic joint between the pat-
tern and templet-plate is required.

The apparatus is operated by the cam or ec-
centric *P*, mounted on the horizontal shaft *p*,
the yoke *r* of the cam being connected to the
40 top of the pattern *D*, and the cam being turned
by hand or steam power, as desired.

Where the mold is circular in cross-section,
as in pipe-welding balls, it is desirable that the
mold be smoothed after the entrance of the
45 pattern. To accomplish this I form a swivel-
joint, *s*, between the cam-yoke and pattern and
secure an arm, *t*, to the upper part of the pat-
tern, by means of which arm a partial revolu-
tion can be imparted to the pattern.

50 The molding apparatus above described is
operated in the following manner: The flask
U is filled with sand, and the sand is lightly
and uniformly compacted therein by the pat-
ent jarring process. It is then placed under
55 the apparatus, so that the templet-plate will fit
within the side of the flask. Upon the move-
ment of the cam *P* it first forces the pattern
down into the sand, which, as it is rather loose,
will permit the pattern to enter more easily. If
60 the pattern is formed in two parts, as shown,
the annular lip *n*, on the pattern proper, *d*, com-
ing to the base of the telescopic joint, carries
forward the cope-head *e* and presses it into the
sand above the pattern proper. As the pat-
65 tern proper and cope-head are advanced the
downwardly-curved lip *e'* of the cope-head
presses the sand inwardly against the sides of

the pattern proper so as to compact the sand
against it, thus insuring the proper packing of
the sand in the most particular part of the 70
mold. The downwardly-curved lip on the cope-
head may also be employed to advantage where
the pattern proper and cope-head are formed
in one piece, it acting in the same manner to
press the sand in against the upper part of the 75
pattern proper and pack the sand solidly at
the top of the mold. After the pattern has ad-
vanced as far as it extends beyond the templet-
plate by means of the annular lip *m* striking
the base of the telescopic joint, it then carries 80
the templet-plate forward with it, and this
plate presses the sand down around the pattern,
compacting the upper part of the mold, and, if
desired, forming the pouring-gates therein by
means of the ridges *a'* on its lower surface. 85
Where a pattern with a central passage, *f*, is
employed, the sand rises within the passage, so
that the pattern has not so large an amount of
sand to press aside and can enter more easily.
Where a pattern for forming cylindrical molds 90
is employed, I impart to the pattern a partial
revolution, by means of the arm *t*, in order to
sleek or polish the sides of the mold and give
a more perfect finish to it.

I have described means for imparting but 95
a partial rotation to the pattern; but it is
evident that the same result would be ob-
tained by the rotation of the pattern, whether
turned but part way or for several revolu- 100
tions, and both are considered within my in-
vention. This partial rotation of the pattern
also serves to cut off the sand which has risen
in the central passage, *f*, during the pressing
operation by means of the longitudinal ridges,
depressions, or irregularities *g*, which hold the 105
sand so that it turns with the pattern, and is
lifted out when the pattern is withdrawn, the
wire or knife across the base of the pattern also
serving to cut off the sand and support it when
the pattern is lifted out. Though the irregu- 110
larities on the face of the central passage ma-
terially aid in supporting the sand when the
pattern is withdrawn, they may in some cases be
dispensed with, as the damp sand compressed
in the passage will be supported by it without 115
such irregularities.

To withdraw the apparatus the rotation of
the eccentric *P* is continued, and it then draws
out the pattern *D*, (the pattern proper, *d*, being
lifted first if it is in two parts, the cope-head 120
being lifted next by the telescopic joint,) and
the templet-plate being lifted by the telescopic
joint after the pattern has been raised out of
the mold.

The apparatus has been illustrated where the 125
pattern enters the sand from above. Where
it is arranged to enter from below, the flask
filled with sand is placed above the templet-
plate, which serves to support the sand in the
flask, and the pattern is pressed through the 130
templet-plate into the sand, and the apparatus
operated in substantially the same manner as
above described. In this case the sand which
enters the central passage of the pattern may

either fall through the passage or be withdrawn by the pattern.

By my improved apparatus molds which are firmly packed and perfect in finish can be rapidly formed.

By first advancing the pattern into the sand and then rotating it when encompassed with the sand, as above described, in forming cylindrical molds, I am enabled to smooth or polish the mold-surface in two different directions—longitudinally of its axis as the pattern is forced in, and circumferentially of its axis on the rotation of the pattern. Where nests of patterns are arranged to advance through the same templet-plate, the guide mechanism and telescopic joints need only be formed on a few of the molds.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The method herein described of forming cylindrical molds in a body of sand, consisting in first forcing the pattern into the sand by direct compression longitudinally of its axis, and subsequently rotating the pattern so forced in circumferentially of its axis to smooth or finish the mold, substantially as and for the purposes set forth.

2. A pattern, D, for forming molds in sand by compression, provided with a cope-head, e, for molding the cope-print above the mold, said cope-head having an annular downwardly-extending lip, e', for compacting the sand at the top of the mold, substantially as set forth.

3. A pattern for forming molds, constructed

in two parts, the pattern proper, d, adapted to be first advanced into the sand, and the cope-head e, adapted to be afterward advanced, and provided with an annular downwardly-extending lip, e', to compress the sand against the pattern proper, substantially as set forth.

4. A pattern for forming molds in a solid body of sand by direct compression, provided with a passage extending longitudinally through the pattern, to permit a portion of the sand to enter the pattern as it is pressed into the sand and fall through or be withdrawn by the pattern, substantially as set forth.

5. A pattern for forming molds in sand by compression, provided with a central passage to permit a portion of the sand to enter the pattern, said central passage having an irregular face to hold the sand, substantially as and for the purposes set forth.

6. In machines for forming molds in sand by compression, the combination of the pattern D, templet-plate A, and cam P, or equivalent power apparatus, the pattern and templet-plate being so connected by a telescopic joint that both are advanced and retracted by the movement of the power apparatus, substantially as and for the purposes set forth.

In testimony whereof I, the said S. JARVIS ADAMS, have hereunto set my hand.

S. JARVIS ADAMS.

Witnesses:

H. B. BRUNOT,
JAMES I. KAY.