

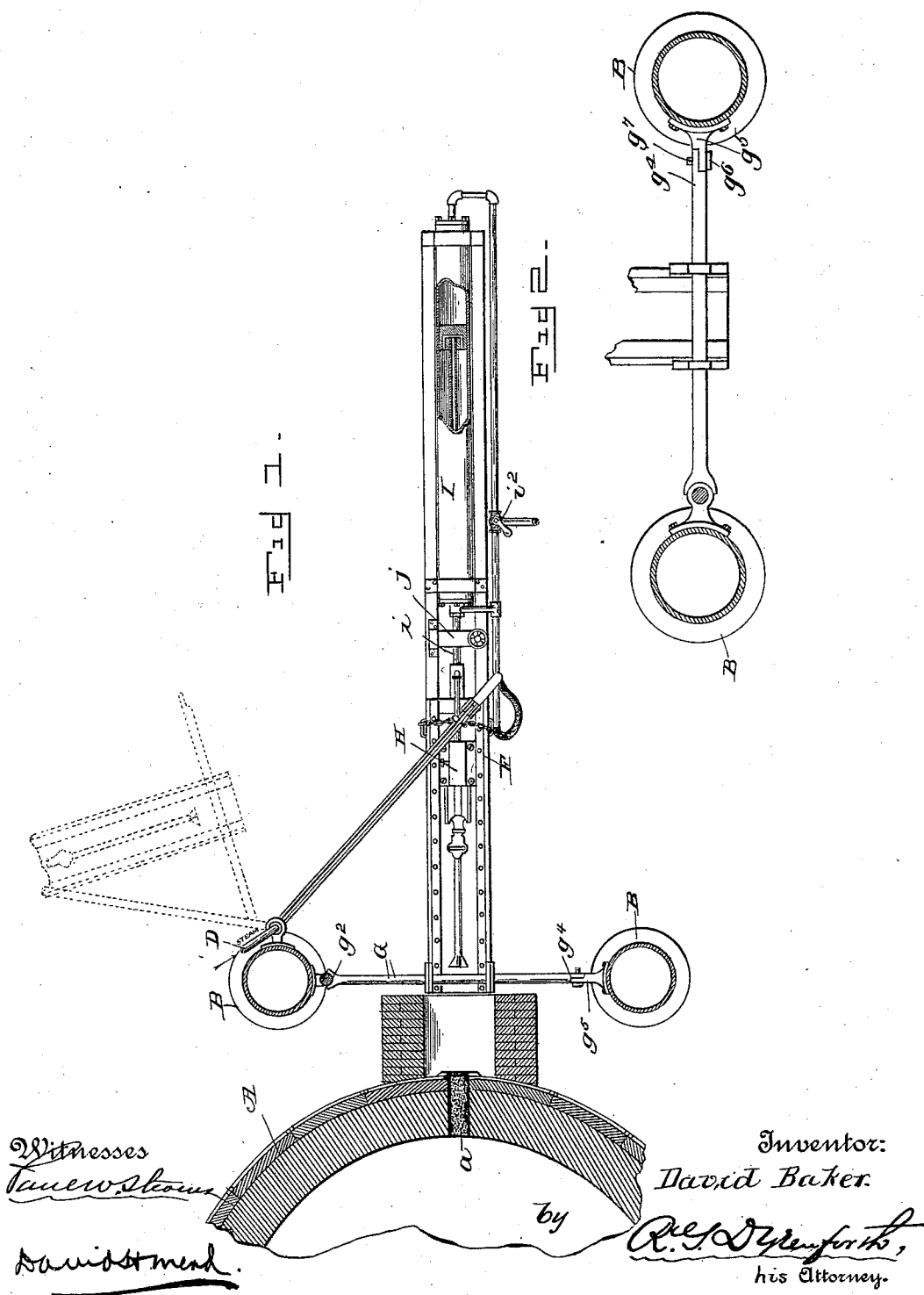
(No Model.)

2 Sheets—Sheet 1.

D. BAKER.
DRILL.

No. 529,996.

Patented Nov. 27, 1894.



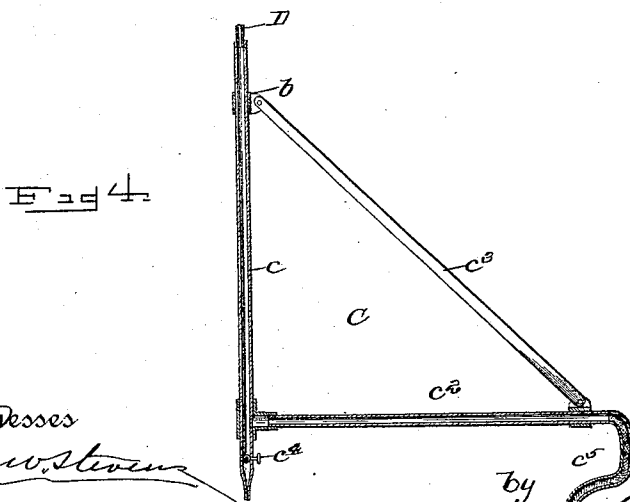
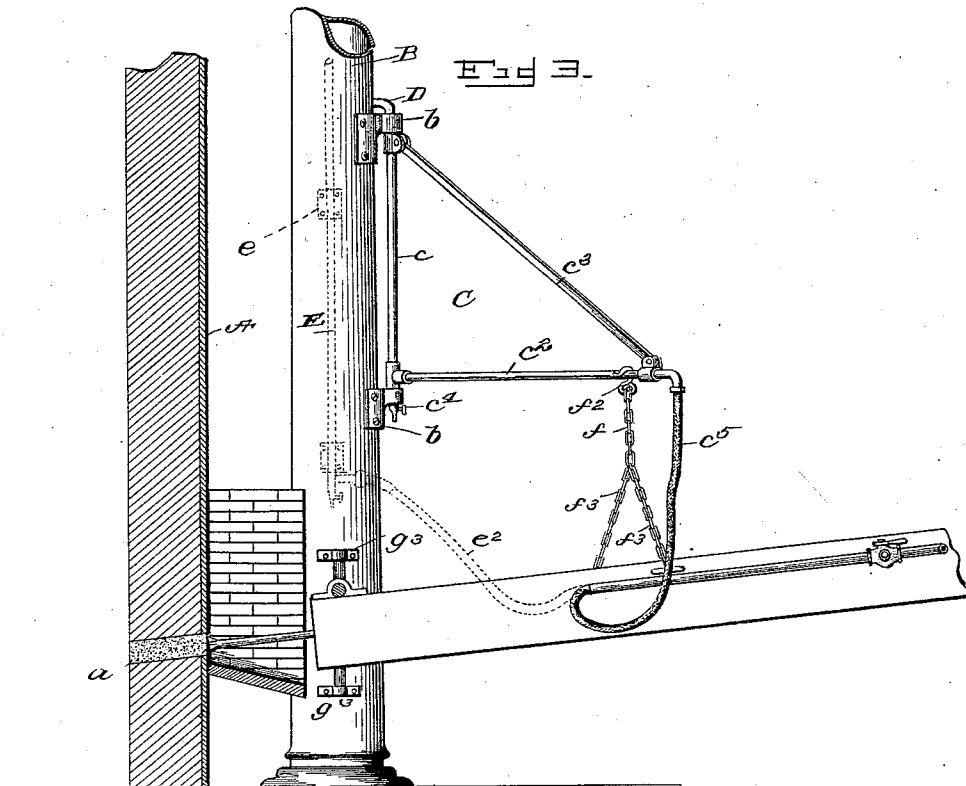
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2 Sheets—Sheet 2.

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28 witnesses
Taney & Stevens
David & med.

Inventor:
David Baker

by A. S. Dyrenforth,
his Attorney.

UNITED STATES PATENT OFFICE.

DAVID BAKER, OF SPARROW'S POINT, MARYLAND.

DRILL.

SPECIFICATION forming part of Letters Patent No. 529,996, dated November 27, 1894.

Application filed April 8, 1893. Serial No. 469,571. (No model.)

To all whom it may concern:

Be it known that I, DAVID BAKER, a citizen of the United States, residing at Sparrow's Point, in the county of Baltimore and State of Maryland, have invented certain new and useful Improvements in Drills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to drills, and it relates particularly to the mounting of a drill designed for opening tapping-holes in blast-furnaces. The great desideratum in a device of this kind is to be able to rapidly adjust the drill in position for use, to penetrate the clay or other substance stopping the hole with great rapidity and without requiring the presence of an operator near the furnace, and then to remove the drill and its appurtenances from the tap hole instantly after the clay or other obstruction in the hole is pierced, to avoid injury to the tool by contact with the molten metal and to allow a free discharge of the metal from the furnace.

The object of the present invention is to produce a comparatively inexpensive apparatus whereby a drill designed to be operated by steam, compressed air or other fluid, may be suspended adjacent to a blast-furnace, moved into position for operation and out of that position with great rapidity, and whereby the position of the drill may be adjusted to adapt it to penetrate the tapping-hole at any required angle.

The invention consists essentially of an apparatus for sustaining and adjusting a drill for penetrating tapping-holes of blast-furnaces, comprising a movable support mounted adjacent to a blast-furnace, and a frame carrying a drill and adjustably attached to the support.

Furthermore, the invention consists of an apparatus for sustaining and adjusting a drill for penetrating tapping-holes of blast-furnaces, comprising a swinging support mounted adjacent to a blast-furnace, a frame carrying a drill tool and an adjustable connection between the support and the frame.

Furthermore, the invention consists of an apparatus for sustaining and adjusting a drill for tapping-holes of blast-furnaces, compris-

ing a movable support mounted adjacent to a blast-furnace, a frame carrying a drill attached to the support, and means for detachably securing the frame in operative position.

Furthermore, the invention consists of an apparatus for sustaining and adjusting a drill for penetrating tapping-holes of blast-furnaces comprising a swinging support constructed of hollow rods, a frame carrying a drill designed to be operated by steam, compressed air, or the like, and a connection between the support and the drill.

Furthermore, the invention consists of various novel details of construction whereby the objects of the invention are attained and the effectiveness of the apparatus insured.

The invention is illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my apparatus, the same being shown in position for operation; a section of a blast-furnace showing its tapping-hole being illustrated, the position of the tool when not in use being shown in dotted lines. Fig. 2 is a plan view of a portion of the end of the frame supporting the drill, showing the means for retaining the tool in operative position. Fig. 3 is a side elevation of the apparatus in position for use, showing in dotted lines a modified form of steam or air conduit to the drill; and Fig. 4 is a sectional view of the swinging frame.

In the drawings, A represents a section of a shell of a blast-furnace which is provided with a tap hole *a*, filled with clay or the like, during the operation of the furnace, which filling becomes very hard by reason of its exposure to the heat of the furnace, and is therefore difficult to remove.

B, B, represent columns usually of iron which surround the furnace, and support the upper parts and appurtenances of the same.

Attached to one of the columns, B, by brackets *b*, *b*, is a swinging frame C. This frame is preferably composed of a vertical piece *c*, a horizontal piece *c*², and a brace or stay *c*³. The parts *c*, *c*², are preferably hollow, and as they are joined to each other they form a passage for the conduct of steam, compressed air, or the like, by which the drills used are operated. Attachment is made at the top of the vertical piece *c* with a pipe or conduit D, leading from any suitable source of steam, com-

pressed air, or the like. The bottom of the piece *c*, is provided with an opening governed by a stop-cock *c*⁴, whereby condensation may be allowed to escape. To the end of the horizontal piece *c*² is attached a flexible connection *c*⁵ forming means for conducting steam, compressed air, or the like, from the frame to the drill.

Instead of making the frame C of hollow material as described, the steam, compressed air, or the like, by which the drill is to be run, may be conducted to the drill through a pipe E, which is shown in dotted lines in Fig. 3 of the drawings. This pipe E is attached to one of the columns B by suitable brackets *e*, *e*, in such manner as to permit any necessary turning required by the movement of the drill and the carriage upon which it is mounted. The pipe E is designed to receive steam, compressed air, or the like, through the upper end, and it is provided at its lower end with a flexible extension *e*², adapting it for connection with the drill.

The frame upon which the drill is mounted is designated in the drawings by the letter F. This frame is made of wood or metal as desired, preferably the latter, to avoid danger of injury by contact with the molten metal from the furnace, and the frame is suspended from the swinging frame in any suitable way to allow it to be adjusted readily, to change its height or its angle. The preferred means of suspending it is by a chain *f*, attached to the frame by a hook *f*², and the height at which the frame is suspended may be regulated by passing the end of the chain around the piece *c*² of the frame and engaging the hook *f*² with one of the links of the chain. The branches *f*³, *f*³, of the chain engage the frame one on each side thereof, the points of attachment being opposite each other, so that the angle of the frame may readily be changed by simply tilting it.

Attached to and forming part of the frame F, at the end which, when the drill is in use is adjacent to the furnace, is a cross bar G. One end of this bar is forked as shown, and is designed to receive a short rod or bar *g*² which is attached to one of the columns B, by suitable brackets, *g*³. The form of the forked end *g* is such that, when the frame is in position for use, as shown in full lines in Fig. 1 of the drawings, movement toward or away from the furnace of the frame to which the bar is attached, will be prevented and when the frame is thrown in to the position shown in dotted lines, the bar will be released from the rod or bar *g*². The other end *g*⁴ of the bar G is indented as shown in the drawings, and is designed to be brought into contact with a bracket *g*⁵, attached to one of the columns B and to be retained therein by a bolt *g*⁶ which is locked in place by a small pin *g*⁷.

By the means described, it will be clear that when the frame is turned into position for use, the forked end *g* will engage the rod or bar *g*², and a fastening is formed at the end

*g*⁴, which may be rapidly disconnected when it is desired to remove the frame from the tap-hole.

Arranged upon the frame F, is a drill H which may be of any of the well-known types in common use. The drill is mounted in such position as to permit of its sliding longitudinally on the frame, and the sliding movement of the drill is regulated by a feed-cylinder I. The piston-rod *i* thereof is attached to the drill.

Connection is made between the supply of a steam, compressed-air, or the like, with each end of the cylinder I through suitable pipes, and the inlet and outlet of the impelling fluid is regulated by a cock *i*². The piston rod *i* is tubular, and it connects with the operative parts of the drill so that steam, compressed-air, or the like, admitted into the feed-cylinder is conducted to the drill and serves to operate the same when the device is in use.

A clamp J, of any suitable construction, is placed upon the piston-rod *i*, for the purpose of limiting the sliding movement of the drill.

In the operation of the drill, the swinging support carrying the frame, drill and its appurtenances, is swung from the position shown in dotted lines in Fig. 1, into the position shown in full lines therein, and the bar G is secured to the brackets on the columns B, as before described. Steam is then admitted into the feed-cylinder, at both ends, and, as the superficial area of the piston is greater at the rear end, an advance movement is given to the piston and its rod, and, consequently, to the drill, forcing it forward toward the tap-hole. When the proper position for operation is reached, the clamp J is brought down upon the piston-rod and steam is then admitted into the chamber of the drill, starting its operation. The operation is continued until the tap-hole is pierced by the tool, when the drill is withdrawn and the bar *g*² released from the bracket *g*⁵. Then the entire apparatus is swung into the position shown by the dotted lines of Fig. 1.

From the foregoing, it will be clear that by my device, I provide a simple and inexpensive means whereby tap-holes of blast furnaces may be pierced with great rapidity and, whereby, also, any danger of injury to the drill, its tool, or other attachments, by reason of contact with the molten metal, &c., emerging from the furnace, is obviated.

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

1. The combination with a movable support, of a frame adjustably suspended from the support and having one of its ends detachably and adjustably mounted on a separate support, and a drill movable upon the frame, substantially as described.

2. In an apparatus for adjustably supporting a drill for penetrating tapping holes of blast-furnaces, a movable support and a frame carrying a drill attached to the support, the

frame being provided with a bar and means for securing the bar in place adjacent to the tapping-holes, substantially as described.

3. In an apparatus for adjustably supporting a drill for penetrating tapping holes of blast-furnaces, comprising a movable support, a frame carrying a drill tool, the frame being provided on the end which in use, is adjacent to the furnace, with a bar, the bar being provided at one end with a fork and at the other, with an opening, a rod engaging the forked end, and a projection from the stationary part of the furnace engaging the other end, and a pin for securing the bar in position, substantially as described.

4. The combination with a swinging support, of a frame carrying a drill-tool and suitably attached to the support, means for raising and lowering either end of the frame, a feed cylinder attached to the frame and having its piston connected with the drill-tool, a source of steam or air supply and a flexible connection leading from the supply to the feed-cylinder, substantially as described.

5. The combination with a swinging sup-

port, of a frame suspended from the support and having its ends independently adjustable whereby it may be tilted to any angle, a drill mounted to slide upon the frame, a feed-cylinder having a hollow piston-rod attached to the drill, a source of steam or air supply, and a flexible connection between such supply and the feed-cylinder, substantially as described.

6. The combination with a swinging support, of a frame suspended from the support and means for raising and lowering either end of the frame whereby it may be made to assume any angle, a drill slidingly mounted upon the frame, a feed-cylinder also mounted on the frame and attached to the drill, means for operating the feed-cylinder, and a clamp engaging the piston of the feed cylinder, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID BAKER.

Witnesses:

FELIX R. SULLIVAN,
SIDNEY S. MARTIN.