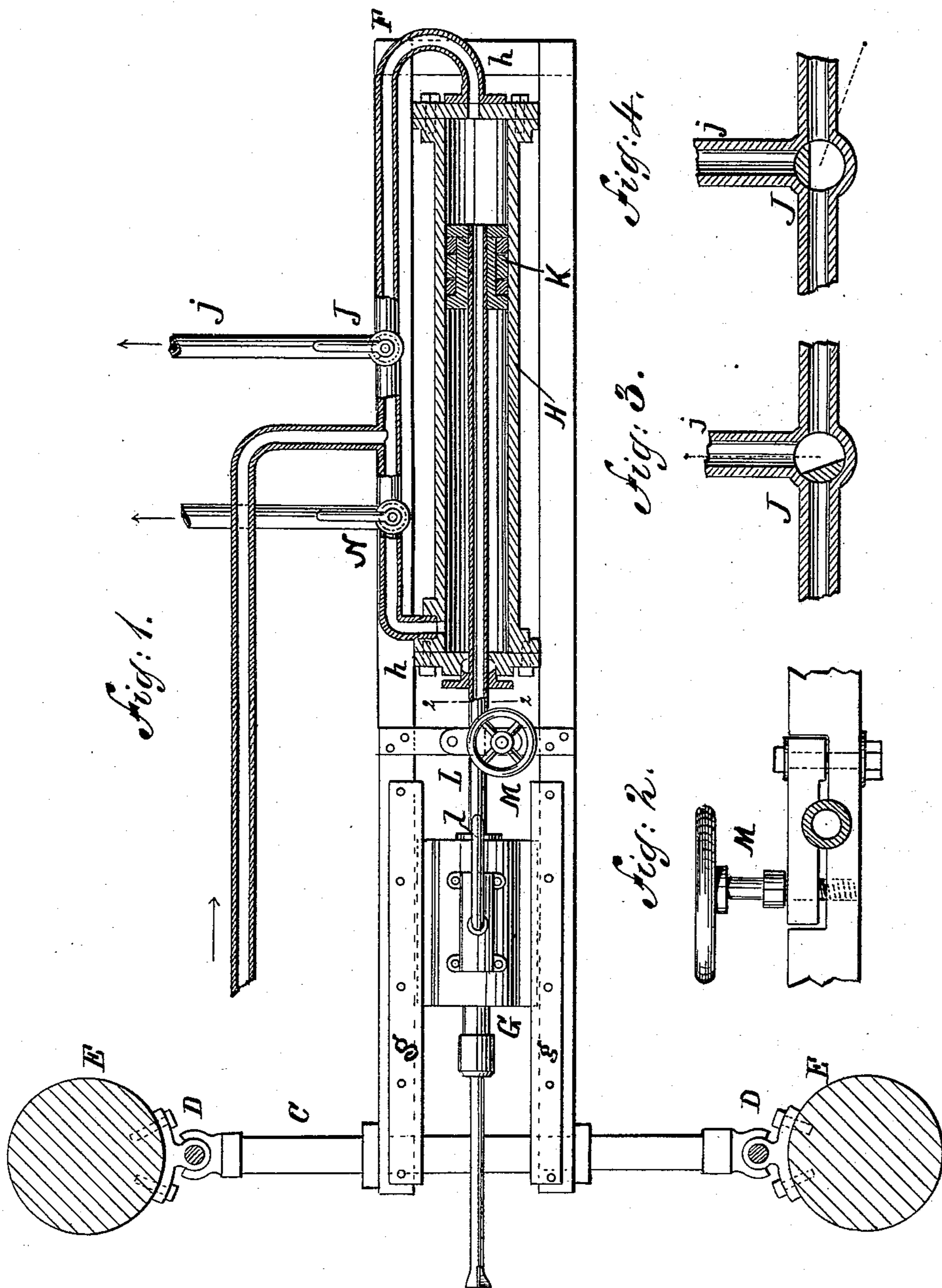


(No Model.)

D. BAKER.  
DRILL.

No. 488,050.

Patented Dec. 13, 1892.



WITNESSES:

*May G. Ridley*

INVENTOR:

David Baker

BY

*James M. Smith*  
ATTORNEY

# UNITED STATES PATENT OFFICE.

DAVID BAKER, OF SPARROW'S POINT, MARYLAND.

## DRILL.

SPECIFICATION forming part of Letters Patent No. 488,050, dated December 13, 1892.

Application filed June 21, 1892. Serial No. 437,493. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID BAKER, of Sparrow's Point, Maryland, have invented certain new and useful Improvements in Drills for Tapping Blast-Furnaces and Like Uses, of which the following is a description, reference being taken to the accompanying drawings, which form part of this specification.

It has heretofore been customary in using drills to open the tapping-holes of blast-furnaces to feed the drill forward by means of a hand-screw or like device. This necessarily consumes much time, and is therefore in many cases a serious inconvenience.

The purpose of my invention is to produce a quickly-operated and readily-controllable drill which may at once be simple in its operation, effective, and quick in action.

To these ends it consists of the new method of operating and is embodied in the apparatus and the several features thereof constructed, arranged, combined, and used substantially as and for the purposes hereinafter described, illustrated, and claimed.

In the accompanying drawings, Figure 1 is a plan view of my invention partly in section to show construction. Fig. 2 is a detail of a clamp by which I retain my drill at any position and prevent its being fed forward. Figs. 3 and 4 are details of my controlling-valve.

In the several figures like letters of reference indicate like parts.

In constructing and operating a drill according to my invention I mount the drill on sliding or swinging frame, so that it may readily be pushed or swung up and so removed from the tap-hole. The frame is also angularly adjustable, so that the hole may be drilled at the proper angle. The weight of the frame with the drill and its attachments is counterbalanced at each end by weights and chains or in any other suitable manner, so that it may be more readily moved into or out of operative position. The drill, which may be of the Rand or any other suitable type, travels upon suitable slides on the frame, so that it can be fed forward or backward. Instead of advancing and withdrawing the drill by a hand-screw or other feed, I secure to the rear of the drill a tubular rod, which forms at once the piston-rod of a cylinder for feed-

ing the drill forward or backward and a pipe for admitting the air or steam to the operating-cylinder of the drill. The feed-cylinder is provided with an air or steam port and a three-way cock therefor at its forward end. By this air, steam, or other fluid may be admitted to drive the piston to the rear end of the cylinder, and thereby withdraw the drill from the tap-hole, or may be exhausted to permit the reverse motion. At the other end of the cylinder is another port connected either with the supply-pipe or an exhaust-pipe by another three-way cock. Owing to the relative size of piston and piston-rod, a much greater effective surface is had upon the rear end of the piston than upon the annular portion of its front face. When, therefore, both three-way cocks are open to admit pressure to both ends of the feed-cylinder, the piston is driven forward by the difference of pressure and feeds the drill toward the tap hole, or the cock for the front end of the piston may be set at exhaust and greater pressure obtained. To control this feed, I place a friction-clamp in a position to grip the exposed portion of the tubular piston-rod. By tightening this clamp I may regulate or stop the feed. The drill is supplied with steam or air through the hollow piston-rod which connects with the front or rear of the piston. I prefer the latter construction, as by it certain advantages are had, and therefore I will describe the latter type of my invention. When steam or air is admitted to the rear of the piston, it passes through the hollow tubular piston and piston-rod into the drill, setting it in operation. When, on the other hand, the rear cock is turned to shut off the admission of steam from the rear of the cylinder and to open the exhaust, the drill is quickly withdrawn from the tap-hole by the unbalanced pressure upon the annular front face of the feed-piston. It is therefore possible by my invention to feed, withdraw, and control my drill with great ease and rapidity by the mere adjustment of one three-way cock with the aid, if necessary, of the friction-clamp.

I do not limit myself to the use of three-way cocks or any particular means for controlling the admission and exhaust. Other ways, though perhaps not so simple, may be

employed, and if the drills have a separate supply-valve that may be used to assist in regulating the speed.

In the foregoing sections I have set forth the general nature of my invention, and now, referring to the drawings, I will describe one embodiment of it.

At B is indicated the tap-hole of the furnace. At C is shown the horizontal support-  
ing-rod or cross-bar for the carriage of my  
drill, arranged to slide vertically upon guides  
D, secured to the columns E. The frame upon  
which my drill and feeding apparatus are  
mounted consists of two parallel angle-irons  
F, eight or ten inches apart and pivotally  
supported at one end on the cross-bar C. The  
drill itself, of the Rand, Ingersol, or other  
suitable type, is shown at G, mounted upon  
slides *g* at the front of the frame. At the  
rear of the drill is shown the feed-cylinder H,  
which may be made of heavy five-inch  
wrought-iron or drawn-brass piping provided  
with suitable heads. At each end of the cylinder  
are steam-ports *h*, connected with the supply-  
pipe. The supply-pipe may be run down one  
column or in any other suitable manner. In the  
branch pipe which connects with the port at the  
rear end of the cylinder is a three-way cock J  
and exhaust-pipe *j*, so arranged that the admis-  
sion of steam or air to the port may be cut off  
and the exhaust opened. In Fig. 3 is shown the  
position for the exhaust-valve, and in Fig. 4 its  
position for admission. In the branch pipe which  
connects with the front of the cylinder is a similar  
three-way cock and exhaust-pipe N. Within the  
feed-cylinder is the piston K, axially cored to  
receive the hollow piston-rod L. The piston-rod  
is preferably of inch-and-a-half "double-extra-  
heavy" pipe and runs through the piston to its  
rear face. The other end of the piston-rod pro-  
jects through a suitable packing-box in the cylinder-  
head and is secured to the rear of the drill in a  
manner similar to the ordinary feed-screw. A  
short pipe *l* from the steam-chest of the drill to a  
T on the tubular piston-rod L, as shown, connects  
the steam-chest of the drill directly with the rear  
end of the feed-cylinder H. At a suitable point  
between the operating-cylinder G and the feed-  
cylinder H, I place a hand-clamp M, which grips  
the tubular piston-rod, and thereby regulates the  
feeding of the drill or clamps it in a fixed position.  
A detail of this clamp is shown in Fig. 2, though  
any desirable form of hand-clamp may be used.

The operation of my drill is as follows: When  
not in use, it is pushed up out of the way. To  
enable the operator readily to raise and lower it,  
of course it is suitably counter-balanced, preferably  
at each end separately, so that either end may be  
raised or lowered

independently of the other. To bring it into use,  
it is drawn down and clamped opposite the tapping-  
hole, the cross-bar C sliding down the guides D.  
The rear end of the frame may then be tilted up  
or down to give the proper angle for boring. Steam  
or air being turned on, the valve J set for exhaust,  
and the valve N for admission, the drill is at the  
rear end of its travel. The cock J is now set to  
admit pressure to the rear end of the feed-cylinder  
and the difference between the total pressure upon  
the rear of the piston and that upon the front face  
drives it forward and advances the drill. At the  
same time the steam or compressed air forces its way  
from the rear of the feed-cylinder through the tubular  
piston-rod and connection *l* into the operating-  
cylinder of the drill and starts the drill. The feed  
may be regulated or stopped by the hand-wheel M,  
and the speed of the drilling by the drill-valve or  
by the three-way cocks. The drill may be stopped  
and withdrawn simultaneously by merely turning the  
three-way cock J and relieving the pressure from  
the rear of the feed-cylinder, causing the piston to  
be driven back by the unbalanced pressure in front  
of it. The whole apparatus may then be shoved up  
out of the way and the operation is complete.

I have now set forth my invention and the manner  
in which it may be used, and therefore, without  
limiting myself to the details shown and desiring  
to secure by these Letters Patent the many immaterial  
modifications which may be made in the construction  
of parts and which may readily suggest themselves  
to the skilled mechanic, I claim as my own, and  
desire to secure by these Letters Patent, the following:

1. In combination, for the purposes described,  
a feed-cylinder, piston, and piston-rod, a drill  
traveling with the said piston-rod, admission and  
exhaust ports for the said cylinder, and a valve  
therefor, substantially as set forth.

2. In combination, for the purposes described,  
a feed-cylinder, piston, and tubular piston-rod,  
a frame therefor, connections for admitting fluid-  
pressure to the said cylinder, a drill mounted upon  
the said frame and secured to the said piston-rod,  
a fluid connection between the said tubular piston-  
rod and the said drill, and means for controlling the  
fluid-pressure upon the said piston, substantially  
as set forth.

In testimony whereof I have hereto set my hand  
this 17th day of June, 1892.

DAVID BAKER.

Witnesses:

FELIX R. SULLIVAN,  
HEBER H. STRYKER.