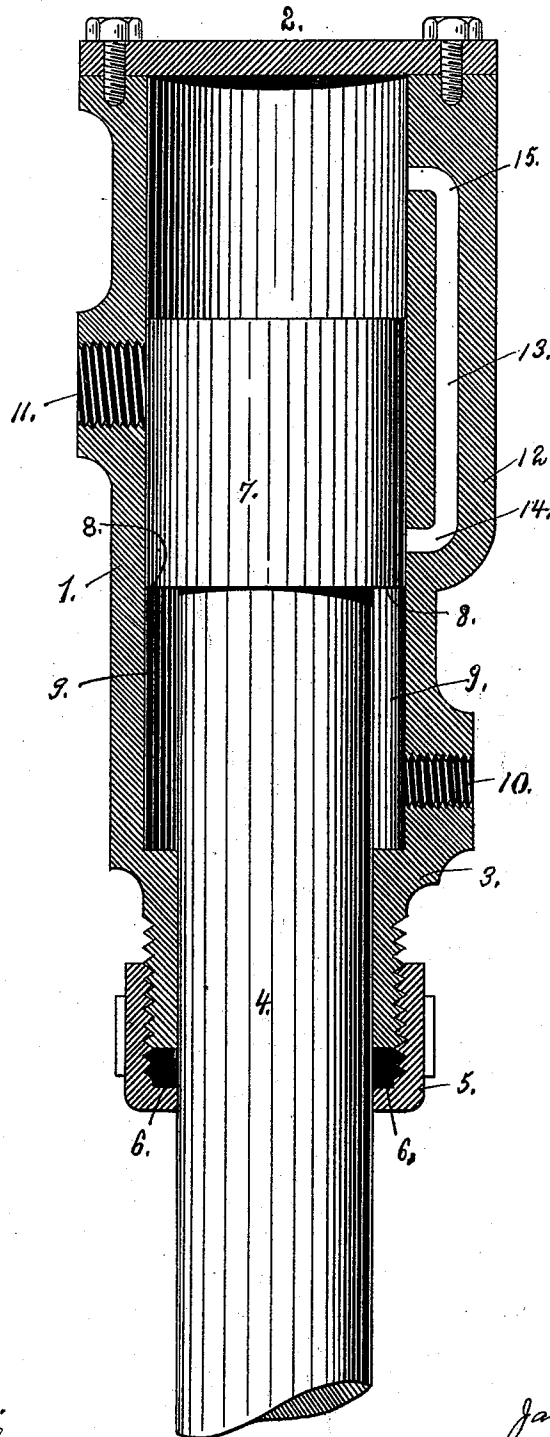


(No Model.)

J. KIDD.
DIRECT ACTING ENGINE.

No. 528,299.

Patented Oct. 30, 1894.



Witnesses:

J. P. Horsten.
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UNITED STATES PATENT OFFICE.

JAMES KIDD, OF BUFFALO, NEW YORK.

DIRECT-ACTING ENGINE.

SPECIFICATION forming part of Letters Patent No. 528,299, dated October 30, 1894.

Application filed January 27, 1894. Serial No. 498,211. (No model.)

To all whom it may concern:

Be it known that I, JAMES KIDD, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have
5 invented certain new and useful Improvements in Direct-Acting-Engine Cylinders and their Pistons; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others
10 skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawing, and to figures of reference marked thereon, which form a part of this specification.

15 My invention relates to improvements in the arrangement and construction of cylinders and their pistons of direct acting engines used in connection with steam or compressed air engines, and is specially adapted
20 for use in connection with rock-drills and steam-hammers or any machinery driven by steam or compressed air which is subjected to severe shocks, or which require action with the least possible resistance and wear to the
25 working parts.

The form of piston and cylinders to which my improvements are applied consists of a piston having a narrow annular shoulder at the piston-rod end, a cylinder of uniform interior dimensions throughout its length having an inlet passage at one end for the admission of steam under pressure or compressed air into the cylinder and against the annular shoulder of the piston for sending
30 the piston forward, a single exhaust passage leading therefrom which is alternately opened or closed by the piston in its travel and a passage in the side wall of the cylinder opening at both ends into the cylinder for conducting the steam under pressure or the compressed air to the cylinder space in front of the piston, to cause the forward stroke, the piston in its travel alternately opening and closing the ends of the passage in the side
40 wall of the cylinder.

45 As at present constructed the piston in its travel, strikes both ends of the cylinder with damaging effect especially when used in connection with rock-drills. The object of my
50 invention is to prevent this pounding of parts

and to that end it consists in arranging the inlet-port and the rear port in the passage in the side wall, in such manner that a tight space is left at each end of the cylinder beyond these ports, to provide a cushion of
55 steam or compressed air at these points to prevent the contact of the piston with the end walls of the cylinder.

The figure of the drawing represents my improved cylinder and piston in central longitudinal section in which 1 is the cylinder having the steam-tight head 2 at one end and the seat 3 at the other end for the passage of the piston-rod 4, made steam-tight by the screw-threaded cap 5 which holds the
60 packing ring 6 in position around the piston-rod. At the end of the piston-rod 4 within the cylinder is the piston 7. It will be noted that the diameter of the piston-rod 4 is not much smaller than that of the piston 7 which
65 leaves the comparatively narrow annular shoulder 8 against which the pressure of the steam or compressed air in the annular space 9 is exerted to cause the return stroke of the piston. The steam under boiler pressure or compressed air, is admitted to this
70 annular space 9 behind the piston 7 through the inlet 10 which enters the cylinders at a point beyond its end, thereby leaving a tight space for a steam or air cushion to form and
75 prevent the piston from coming in direct contact with the end of the cylinder. The exhaust port 11 is located just beyond the middle portion of the cylinder as shown.

On the opposite side of the cylinder within
80 the enlargement 12 is located the longitudinal passage 13 having the front and rear ports 14 and 15 respectively, which lead to the interior of the cylinder. The front port 14 is located about midway of the length of
85 the cylinder and the rear port 15 a short distance within the end of the cylinder to allow a tight space for a steam or air cushion the same as at the other end.

In operation it will be seen that, in the
90 drawing, the piston is about midway of its travel. The steam under boiler pressure or the compressed air is admitted to the annular space 9 behind the piston and exerting pressure against the annular shoulder 8 of
100

the piston 7 forces it forward in the cylinder shutting the exhaust port 11 in its return travel and opening the forward port 14 in the passage 13 just as it completes its return stroke. This permits the steam under boiler pressure or the compressed air, from the annular cylinder space 9 to be forced through the passage 13 and admitted through the rear port 15 just as the piston starts back on its forward stroke. This start is effected by the cushion of compressed steam left in that end of the cylinder, it being assisted by the weight of the drill or hammer secured to the piston rod, in case either a rock-drill or steam hammer is being operated and also prevents a concussion of parts and the consequent forcing open of the head 2. The forward stroke of the piston is made against the steam under boiler pressure or the compressed air, in the annular cylinder space 9 at the other end, which is provided with no exhaust-port, but this is effected by the expansion of the steam or compressed air, admitted through port 15, and exerted against the entire end area of the piston 7, as against the back pressure exerted upon the annular shoulder 8 upon the other end of the piston, its aggregate area being very much smaller than the entire end area of the opposite end of the piston. In this manner the piston is forced ahead upon its forward stroke until the exhaust port 11 is passed which releases the pressure and

permits the piston to commence its next return stroke as already described.

I claim—

An improved form of cylinder and piston for steam or compressed air engines consisting essentially of a piston having a narrow annular shoulder at the piston rod end, a cylinder of uniform interior dimensions throughout its length having an inlet-passage entering the cylinder away from its end to provide a tight space for a steam or air cushion, a single exhaust passage leading therefrom which is alternately opened and closed by the piston in its travel and a passage in the side wall of the cylinder, one end opening near the middle of the cylinder and the other one away from the end of the cylinder to provide a tight space for a steam or air cushion, such passage conducting the steam under pressure or the compressed air to the cylinder space in front of the piston to cause the return stroke, the piston in its travel alternately opening and closing the ends of the passage in the side wall of the cylinder.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES KIDD.

Witnesses:

FRANKLYN J. KIDD,
W. T. MILLER.