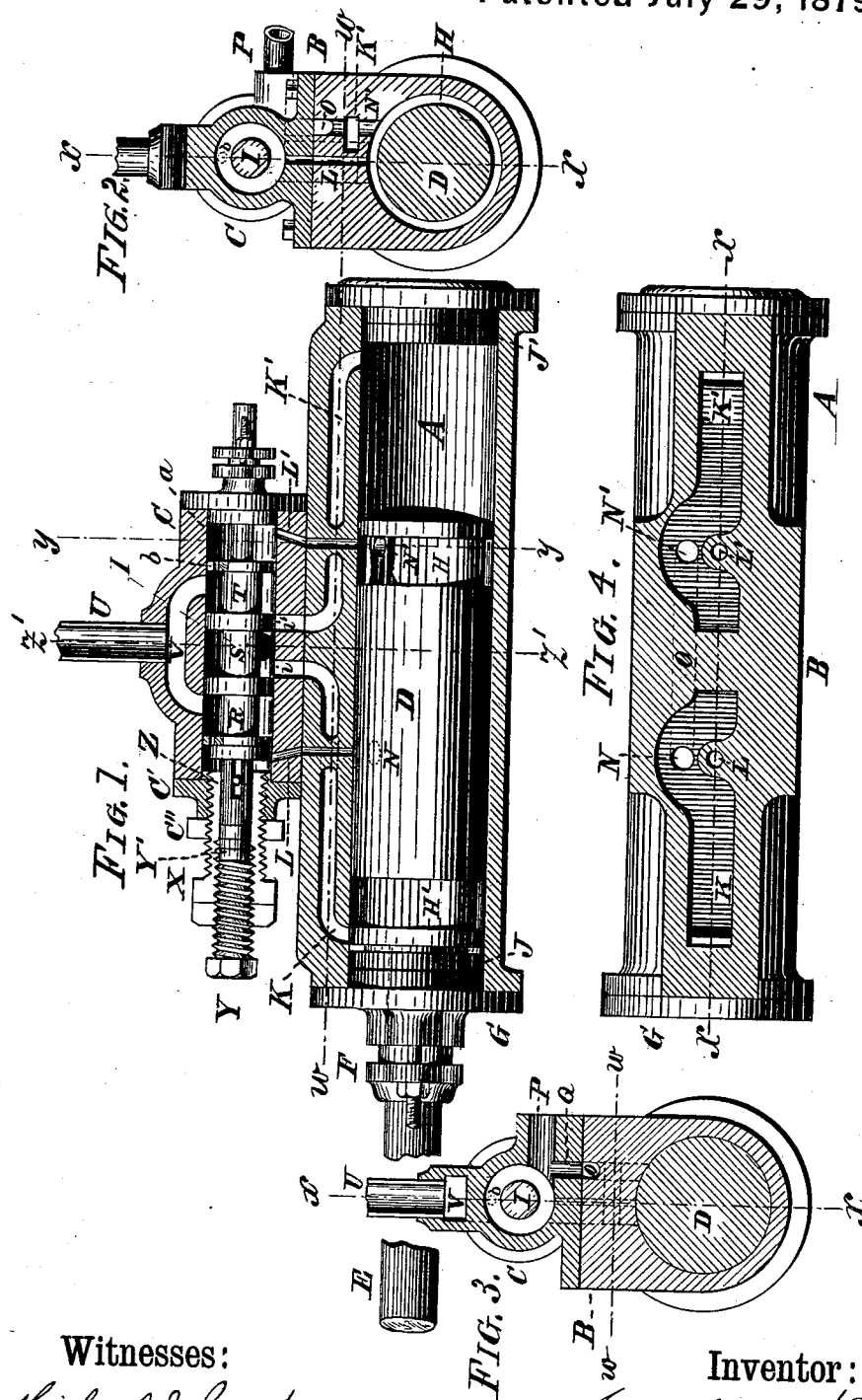


J. NEFF.
Steam-Drill.

No. 217,952.

Patented July 29, 1879.



Witnesses:

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UNITED STATES PATENT OFFICE.

JONATHAN NEFF, OF HUMBERSTONE, ONTARIO, CANADA.

IMPROVEMENT IN STEAM-DRILLS.

Specification forming part of Letters Patent No. **217,952**, dated July 29, 1879; application filed May 19, 1879.

To all whom it may concern:

Be it known that I, JONATHAN NEFF, of Humberstone, in the county of Welland and Province of Ontario, Canada, have invented certain new and useful Improvements on a Steam-Drill; and I do hereby declare that the following description of my said invention, taken in connection with the accompanying sheet of drawings, forms a full, clear, and exact specification, which will enable others skilled in the art to which it appertains to make and use the same.

This invention has general reference to steam-drills; and it consists in the peculiar combination of parts and details of construction, as hereinafter first fully set forth and described, and then pointed out in the claims.

In the drawings already referred to, which serve to illustrate my invention more fully, Figure 1 is a longitudinal sectional elevation in line *x x* of Figs. 2, 3, and 4. Fig. 2 is a transverse sectional elevation in line *y y* of Fig. 1. Fig. 3 is a similar view in line *z' z'* of said Fig. 1. Fig. 4 is a sectional plan in line *w w* of Figs. 2, 3, and 4, the passage O in this figure, which is above the line of section, and therefore not actually seen, being shown in dotted lines to indicate the manner of connection of the passages N N'.

Like parts are designated by corresponding letters of reference in all the figures.

The object of my present invention is to simplify the construction of the operating mechanism for steam rock-drills, &c., and to provide for means of adjustment of the stroke of the piston-valve, whereby the drill-bar may be caused to strike with more or less force, and no more steam admitted to the cylinder than is necessary to cause a proper return-stroke.

A is the cylinder of a rock-drill, steam-pump, steam-hammer, or similar machine. It has centrally a projecting part, B, upon which is secured the steam-chest C in any well-known manner.

D is the piston, having the usual piston-rod E passing through a stuffing-box, F, in the cylinder-head G. This piston has, near both its extremities, annular grooves H H', serving as steam-passages to operate the piston-valve I

in a manner hereinafter to be described, and it (the piston) strikes against elastic cushions J J', placed in the cylinder A at both ends thereof.

K K' are the two main ports or passages, terminating at one end in the cylinder A, and at the other end, at *i i'*, respectively, in the steam-chest C.

L L' are two supply-ports furnishing steam to the valve-chambers, and N N' are two supply-ports regulating said supply, in conjunction with the grooves H H' in the piston D. These latter ports are connected with each other by a passage, O, in the face of the projecting part B on the cylinder A and with the main supply-pipe P by a short vertical passage, Q.

The piston-valve I has three grooves, R, S, and T, respectively, the central one, S, serving as a live-steam passage, and the side grooves, R T, answering as exhaust-passages, the latter being connected with the exhaust-pipe U by a passage, V, in the steam-chest.

In the cover C' of the steam-chest there is an internal screw-thread receiving a hollow externally screw-threaded plug, X, provided with a lock-nut, C'', to retain it in any desired position. Part of the bore of said plug is likewise screw-threaded to receive a set-screw, Y, and the remainder of said bore is fitted with an elastic cushion, Y', and a bumper, Z, the latter being retained within the plug X by means of a groove and pin, as clearly indicated in Fig. 1.

The action of the device heretofore described is as follows: Supposing steam to be admitted through the pipe P and the piston D moving toward the head G. In this case the piston-valve I will be in such position that the groove S will allow steam to pass into the port *i' K'* until the groove H in the piston D discloses the passage N', when steam will be admitted to the valve-chamber *a* through the port L', and thus push the piston-valve I forward into the position shown in Fig. 1. This movement of said piston-valve will allow live steam to enter the port *i K*, and thereby cause a reverse movement of the piston D. When said piston nearly reaches the opposite end of the

cylinder A the passage N will be disclosed, and thus live steam admitted through the groove H' and port L into the steam-chest, and reverse the position of the piston-valve to that originally assumed.

In this manner a continuous reciprocating action of the piston D is maintained, the exhaust of the cylinder passing through the ports K' i' V and groove T on one side and ports K i V and groove R on the other side, while the exhaust of the steam-chest chambers passes through small apertures b in the ends of the valve I.

It will now be observed that the piston-valve I encounters the bumper Z in its forward movement, which bumper, being backed by the elastic cushion Y', receives and absorbs the momentum of the piston-valve, and thereby avoids thumping. This bumper is rendered adjustable by the screw-plug X, whereby the forward movement of the piston-valve may be varied, so as to disclose the end i of the port K more or less, according to the distance the said screw-plug enters the steam-chest. This arrangement is a very essential and desirable one, inasmuch as it saves considerable steam when drilling overhead, where the weight of the drill-rod and piston, in conjunction with their rebounding, is in most cases sufficient to return the piston with but very little, if any, steam assistance. This adjusting device of the stroke of the piston-valve may be placed on both ends of said piston-valve, if desired, and thereby render the admission of steam adjustable for both strokes of the piston D, which, when sinking shafts, test, or blast holes, where the weight of the piston and its accessories has to be lifted, but will also assist in the downstroke, is a very desirable feature.

In steam drills, hammers, &c., it is desirable that as few parts enter the construction of the machine as is consistent with the nature of the device.

In my drill there are, virtually, but four essential parts, viz: the cylinder, the piston, the valve-chest, and the piston-valve. The piston and valve are moved without mechanical devices by steam entering the peculiar arrangement of ports and passages. There are, therefore, but few parts to get out of order, and these are of such a nature as to withstand the rough and severe usage of a machine of the kind described for a sufficient length of time to render the same practically durable and economical.

The adjusting and bumper device of my piston-valve is capable of being readily used in other steam engines, pumps, hammers, &c.,

where a reciprocating movement of the piston and piston-valve is attained with or without the intervention of crank-shafts, eccentrics, and similar mechanism.

The cushion Y' consists, preferably, of rubber blocks introduced into the screw-plug X by removing the set-screw Y, by means of which tension is likewise given to said cushion. When worn it is readily removed and replaced by a new one without stopping for a single moment, such removal and renewal being capable of being performed when the engine is under steam and without interfering with its proper working.

Having thus fully described my invention, I claim as new and desire to secure to me by Letters Patent of the United States—

1. In steam drills, pumps, and similar motors, the combination, with the piston-valve, of the adjustable bumper described, whereby the movement of the said valve is limited and the momentum of the valve absorbed, substantially as and for the object specified.

2. In steam-drills and similar motors, the combination, with the steam-chest C, of the piston-valve I, bumper Z, adjustable screw-plug X, and cushion Y', as specified.

3. The combination, with the steam-chest C, of the piston-valve I, bumper Z, adjustable screw-plug X, cushion Y', and the set-screw Y, as and for the object stated.

4. The combination, with the steam-chest C, provided with the piston-valve I, having the three annular grooves R S T, of the cylinder A, provided with the piston D, having the annular end grooves H, H', said cylinder having the ports K i K' i' and passages L L' arranged in relation to each other and the grooves R S T and H H', as described, and the passage O in the face of the cylinder connecting the passages N N', and the passage Q connecting said passage O with the live-steam pipe or passage P, the whole being constructed for operation substantially as and for the object specified.

5. The combination, with the cylinder A, having the ports N N' and L L', of the piston D, provided with the grooves H' H, and the piston-valve I, operating within the steam-chest C, in a manner as and for the object specified.

In testimony that I claim the foregoing as my invention I have hereto set my hand and affixed my seal in the presence of two subscribing witnesses.

JONATHAN NEFF. [L. S.]

Attest:

MICHAEL J. STARK,
JNO. STARK.