

G. G. PICKING & W. HOPKINS.
Steam-Cylinders and Piston-Valves.

No. 144,788.

Patented Nov. 18, 1873.

FIG. 2.

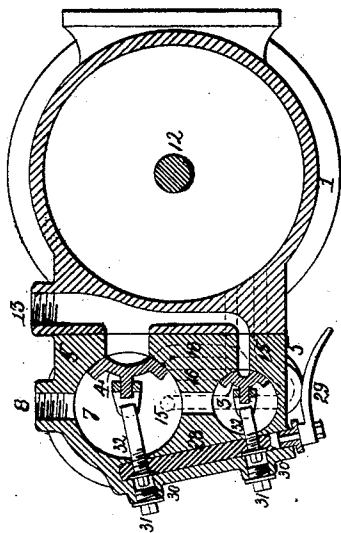


FIG. 4.

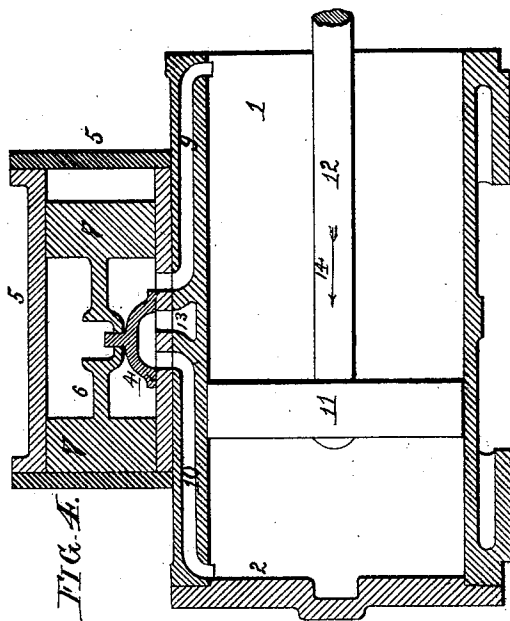


FIG. 1.

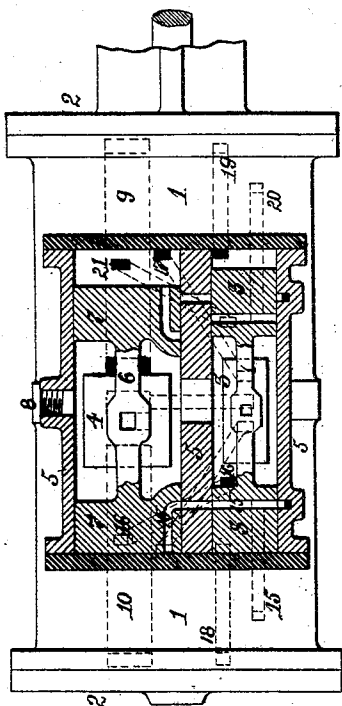
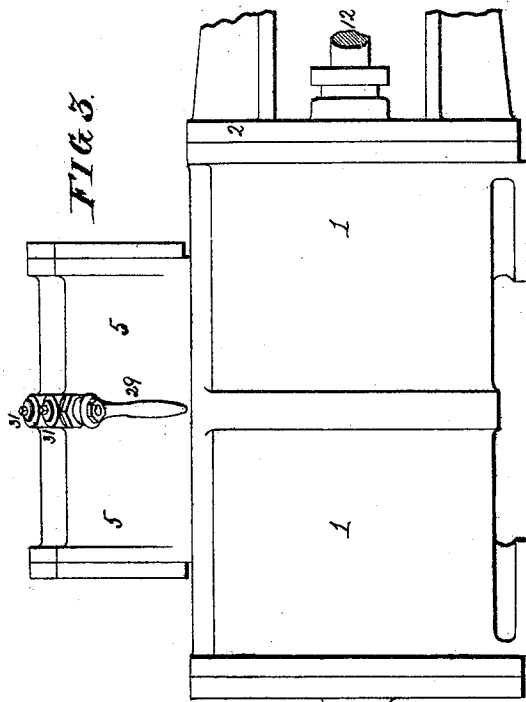


FIG. 3.



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UNITED STATES PATENT OFFICE.

GEORGE G. PICKING, OF KINGSLAND, AND WILLIAM HOPKINS, OF ISLINGTON, ASSIGNORS TO THEMSELVES, JAMES HART, AND JAMES L. SAMPSON, OF LONDON, ENGLAND.

IMPROVEMENT IN STEAM-CYLINDERS AND PISTON-VALVES.

Specification forming part of Letters Patent No. **144,788**, dated November 18, 1873; application filed May 19, 1873.

To all whom it may concern:

Be it known that we, GEORGE GORDON PICKING, of Kingsland, in the county of Middlesex, England, and WILLIAM HOPKINS, of Islington, in the same county, engineers, have invented certain new and useful Improvements in Steam-Cylinders and Piston-Valves, for use in steam pumping machinery and in steam-engines, of which the following is a specification:

The invention consists, principally, in the arrangement and combination of a steam-cylinder with a reciprocating bar and a slide-valve, each of which is provided with certain ports and passages, in such relative positions as to cause the reciprocation of the piston and rod in the cylinder, as hereafter described, without the employment of any mechanical appliance or gear for directing the flow of steam actuating the same. Such being the nature and object of our said invention for improvements in the construction, arrangement, and working of steam-cylinders for use in steam pumping machinery, and in steam-engines, we will now proceed to describe more in detail the manner in which the same is to be or may be performed or carried into practical effect; and in order that the same may be distinctly understood, we have annexed hereunto two sheets of drawings illustrative thereof, and have marked the same with figures and letters of reference corresponding with those in the following explanation thereof—that is to say:

On the accompanying drawings, one modification, showing the application of the invention to a steam-pump, is illustrated in Figures 1, 2, 3, and 4, the first of which represents a sectional plan through the valve-chest, slide-valve, and bar.

1 represents the cylinder, of ordinary construction, and provided at each end with a cover, 2, secured in the usual way by bolts and nuts, surmounted by the bar 3, which is placed at the side of the slide-valve 4. (See Fig. 2.) The D-slide proper is seated on the bottom of the steam-chest or valve, or bar-casing 5, and is fitted in a rod, 6, connecting two enlarged heads, 7, which work in its casing, so as to be moved by and act therewith, and which form

with the D-slide what is hereafter called the valve 4.

The operation of this modification will be readily ascertained on reference being had especially to Figs. 1 and 4. Live steam is first admitted into the interiors of the valve 4 and bar 3, which latter is of the construction shown, through a common pipe, 8, Figs. 1 and 2, and has constant access from the former, through either one of two main steam-ports, 9 10, to alternate opposite ends of the cylinder 1, to cause the desired reciprocation of the piston 11 and rod 12 therein, and exhausts through an opening, 13, common to both the valve 4 and the bar 3. Suppose the parts to be in the position shown in these figures. In passing from the valve 4 through the port 9, the steam causes the piston 11 and rod 12 to make a stroke in the direction of the arrow 14, on or near the termination of which the piston 11 passes over or uncovers a port, 15, in and near the end of the cylinder 1, (see Fig. 1,) which communicates therefrom, through a port or passage, 15, in the bar 3, and one, 15, in the casing 5 and valve-head 7, with one end of the interior of that part of the casing 5 containing the valve 4, when the steam passes from behind the piston 11 through this passage 15, and, acting against the end of the casing containing the valve 4, between it and the enlarged head 7 at this end, causes the shifting of the valve 4 part of its stroke to the right, but sufficient to close or obstruct the through-passage 15, and to open a second port, 16, leading from this end of the interior of its casing to a port, 16, opening in the interior of that part of the casing containing the bar 3, and, at the same time, in communication with the live steam being supplied thereto. The steam, therefore, passes from the interior of the bar 3, through this passage 16, behind the same head of the valve 4, and completes the stroke of the same, the exhaust-port 17, at the end toward which the stroke was made, being open through an exhaust-port, 17, in the bar 3 and the opening 13 to the air. The slide 4, being constructed as an ordinary slide-valve, and either flat or radial, now changes the direction of the steam through the port 10 into the cylinder 1, at the

same time opening the exhaust 9 from the end toward which the next stroke is to be made, and causes the piston 11 to begin to make its return stroke. As soon as it begins to move, steam passes through a port, 18, which the piston had previously covered in the main cylinder and passage 18, leading from this end of the latter to the same end of that part of the casing containing the bar 3—a similar passage, 19, at the other end being now open to the exhaust of the cylinder—and thereby moves the bar 3 in the direction of the movement of the piston 11 into the position ready to cause the return movement of the valve 4 to that above described, as soon as the piston has passed a port, 20, in the cylinder 1 at this end, corresponding to the one 15 at its other end, which, as above described, caused the first movement of the valve 4. The ports and passages 18 and 19, leading from each end of the cylinder 1 to the same ends of the casing containing the bar 3, may be made to run into the main steam ports and passages 9 and 10, if desired, so that the commencement of the movements of the piston 11 and bar 3 may be simultaneous. The above-described action is thus continued, the next strokes of the valve 4 and bar 3 being caused by the action of the steam through ports and passages 20, 21, and 19, respectively, at opposite ends of the cylinder to those 15, 16, and 18, above described, but bearing an exactly similar relation to each other as regards their position and functions.

The invention consists further in the provision of simple and effectual means for readily shifting the valve 4 and bar 3 in the event of their "sticking" during the action, (see Figs. 2 and 3.) At the upper part of the casing 5 we fit a spindle, 28, having a handle, 29, at its outer end. The casing is provided with two outer female bosses, 30, into which are inserted screw-plugs 31, prior to which screw-pins 32 are passed through the bosses 30, and into the spindle 28, so as to project through it and into slots in or against projections on the valve 4 and bar 3, so that in the event of their stick-

ing they can both be immediately started again by simply touching the handle.

It will be understood that this part of the invention is equally applicable to steam-cylinders working in connection with any number of valves by simply providing the requisite number of pins 32.

Having now described the nature and object of our said invention for improvements in the construction, arrangement, and working of steam-cylinders for use in steam pumping machinery and in steam-engines, together with the manner in which the same is to be or may be performed or carried into practical effect, we would remark, in conclusion, that we claim as our invention—

1. The combination of a steam-cylinder, a reciprocating bar, and a slide-valve, each having a cavity for receiving live steam, with ports 15 16 17 18 19 20 21, so as to partly shift or start the main valve, for the ulterior purpose of changing the flow of steam to the main cylinder by steam from the cylinder, and complete its movement by steam from the bar steam-chamber, and the shifting of the bar by steam from the cylinder, as described.

2. The simple arrangement of ports 15 16 20 21, in combination with the steam-chamber, of the bar for causing the slide-valve to commence its stroke by steam from the cylinder, and complete it by steam from the bar.

3. The combination, with a valve-casing, of a spindle, 28, handle 29, bosses 30, plugs 31, pins 32, and projections 33, for preventing the stopping or sticking of the valve and bar, and to allow of them both being moved by one movement of the handle.

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