

L. C. BAYLES.
VALVE MOTION FOR PERCUSSIVE TOOLS.
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1,057,701.

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Fig. 1.

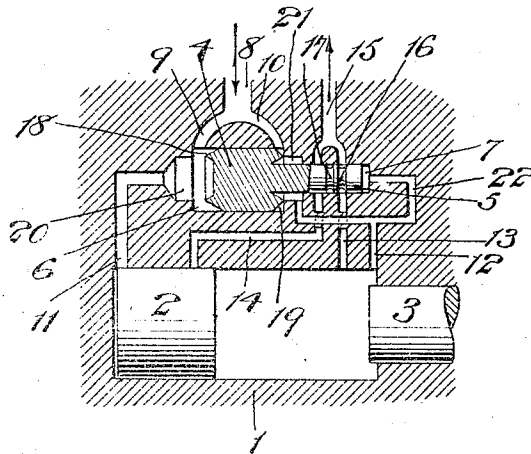
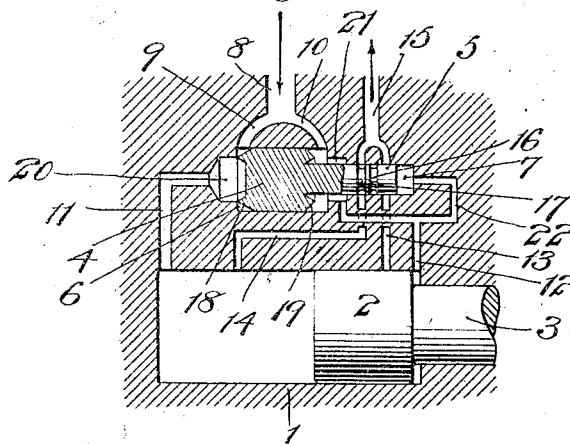


Fig. 2.



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UNITED STATES PATENT OFFICE.

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VALVE-MOTION FOR PERCUSSIVE TOOLS.

1,057,701.

Specification of Letters Patent.

Patented Apr. 1, 1913.

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To all whom it may concern:

Be it known that I, LEWIS C. BAYLES, a citizen of the United States, and resident of Easton, in the county of Northampton and State of Pennsylvania, have invented a new and useful Improvement in Valve-Motions for Percussive Tools, of which the following is a specification.

This invention relates to a valve motion for motive fluid operated percussive tools, and has for its object to provide certain improvements in the construction, form and operation of the valve mechanism whereby a valve may be employed which is very simple in construction, rapid in operation and positive in action.

This invention is more particularly directed to a reciprocating valve having a head and stem, the head being arranged to control the inlet ports for both ends of the cylinder and the stem being arranged to control the exhaust ports for both ends of the cylinder.

A practical embodiment of the invention is represented in the accompanying drawings, in which—

Figure 1 is a diagrammatic section through a motive fluid operated percussive tool of the piston hammer type, the parts being in the positions which they assume when the inlet port for the back end of the cylinder is opened to the motive fluid supply, the inlet port for the front end of the cylinder being closed and the exhaust port for the front end of the cylinder being opened to external atmosphere, and Fig. 2 is a similar view with the parts in the positions which they assume when the inlet port for the front end of the cylinder is opened to the motive fluid supply, the inlet port for the back end of the cylinder being closed and the exhaust port for the back end of the cylinder being opened to external atmosphere.

In the accompanying drawings, the percussive tool is shown diagrammatically and may be considered as a riveting hammer, the cylinder being denoted by 1, the piston hammer by 2, and the riveting set which projects into the front end of the piston chamber, by 3. The valve which controls the operation of the tool has a head 4 fitted to slide in the chamber 6 of the valve chest and a stem 5 fitted to slide in the chamber 7 of the valve chest. The motive fluid supply passage 8 is provided with small branch passages 9, 10, leading to the opposite ends of the chamber

6. The back and front inlet ports 11, 12, for the cylinder open into the back and front ends of the chamber 6, opposite the back and front faces of the valve head 4, so that the said ports are opened and closed by a movement of the valve head in a line perpendicular to the surface through which said ports open. The front exhaust port 13 for the cylinder 1 opens into the chamber 7 of the valve chest in position to be opened and closed by the valve stem 5. The rear exhaust port 14 for the cylinder 1 also opens into the chamber 7 of the valve chest in position to be opened and closed by the valve stem 5. A continuation 15 of these exhaust ports 13, 14, leads to external atmosphere, and the stem 5 of the valve is provided with grooves or ports 16, 17, which are arranged to alternately open and close the front and rear exhaust ports as the valve reciprocates. The opposite ends of the head 4 of the controlling valve are preferably tapered as shown at 18, 19, for facilitating the rapid operation of the valve.

Referring to Fig. 1 in which the valve is shown at the forward end of the valve chest; the air enters the inlet opening 8 and then passes through the ports 9 and 10. The air passing through 10 fills the space left at the end of the valve chest due to the taper on the valve head. The pressure in this space will tend to force the valve to the left with a force equal to the unit pressure times the projecting area of the tapered end 19 of the valve head. But the air also passes through port 9 producing in the rear end of the valve chest the same pressure as in the inlet 8 and as this is exerted over the entire rear end of the valve head, the valve is forced firmly against its front seat. As the piston travels on its forward stroke, it increases its speed and the velocity of the air passing through port 9, likewise increases. As before mentioned the port 9 is a small port and the velocity of the air through it soon becomes so great that a marked difference will exist between the pressure of the motive fluid in inlet 8 and in the rear end of the valve chest 6. By the time the piston has completed its stroke, the pressure in the rear end of the chest will be so reduced that a slight compression of the air ahead of the piston will, producing a pressure in the port 12 and on the forward end of the valve, be sufficient to result in the movement of the valve.

The mouth of the back inlet port 11 of the valve chest is preferably enlarged, as shown at 20, and the mouth of the front inlet port is also preferably enlarged at the valve chest, as shown at 21. A vent 22 is provided for the chamber 7, which vent leads to the front inlet port 12.

It will be seen from the above description that the reciprocation of the valve will alternately open the mouth of the fluid pressure supply passage 8, through its branches 9 and 10, to the back and front inlet ports 11 and 12 of the cylinder, and will alternately open and close the front and rear exhaust ports 13, 14, of the cylinder to external atmosphere.

It is to be understood that the intermediate, front and back exhaust ports may be located at any desired position along the hammer piston chamber to secure the desired operation of the tool, by throwing the controlling valve at an earlier or later moment.

While I have referred to this valve mechanism in connection with a riveting tool, it is to be understood that I do not wish to limit myself to this use, but contemplate the use of the valve mechanism wherever applicable in percussive machines and tools.

What I claim is:—

1. A cylinder having front and rear ends, its piston and a valve having a head for controlling the admission of fluid to both ends of the cylinder and a stem for controlling the exhaust from the rear end of the cylinder.

2. A cylinder having front and rear ends, its piston and a valve having a head for controlling the admission of fluid to both ends of the cylinder and a stem for controlling the exhaust from both ends of the cylinder.

3. A cylinder having separate front and rear inlet and exhaust ports, its piston and a valve having a head for controlling the inlet ports and a stem for controlling a rear exhaust port.

4. A cylinder having separate front and rear inlet and exhaust ports, its piston and a valve having a head for controlling the inlet ports and a stem for controlling the exhaust ports.

5. A cylinder having separate front and rear inlet and exhaust ports provided with mouths, its piston and a valve having a head for opening and closing the inlet ports by a movement directly toward and away from the mouths of said ports and a stem for opening and closing a rear exhaust port by a sliding movement across the mouth of said port.

6. A cylinder having separate front and rear inlet and exhaust ports provided with mouths, its piston and a valve having a head for opening and closing the inlet ports by a movement directly toward and away

from the mouths of said ports and a stem for opening and closing the exhaust ports by a sliding movement across the mouths of said ports.

7. A cylinder having front and rear ends, inlet ports therefor and intermediate front and rear exhaust ports, its piston and a valve having a head for opening and closing the inlet ports and a stem for opening and closing the rear exhaust ports.

8. A cylinder having front and rear ends, inlet ports therefor and intermediate exhaust ports, its piston and a valve having a head for opening and closing the inlet ports and a stem for opening and closing the intermediate exhaust ports.

9. A cylinder, its piston, a valve chest, a valve therein comprising a head having faces and a stem, front and rear inlet ports for the cylinder leading into the valve chest opposite the faces of the valve head, whereby the movement of the valve alternately opens and closes the inlet ports and an exhaust port for the cylinder leading to the valve chest into position to be opened and closed by the valve stem.

10. A cylinder, its piston, a valve chest, a valve therein comprising a head having faces and a stem, front and rear inlet ports for the cylinder leading into the valve chest opposite the faces of the valve head, whereby the movement of the valve alternately opens and closes the inlet ports and front and rear exhaust ports for the cylinder leading to the valve chest into position to be opened and closed by the valve stem.

11. A cylinder, its piston, a valve chest, a valve therein comprising a head having faces and a stem, front and rear inlet ports for the cylinder leading into the valve chest opposite the faces of the valve head, whereby the movement of the valve alternately opens and closes the inlet ports and a rear exhaust port for the cylinder leading to the valve chest into position to be opened and closed by the valve stem.

12. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into the valve chest opposite the front and back faces of the valve head, a motive fluid supply passage having branches leading therefrom to the opposite ends of the valve chest and intermediate exhaust ports for said cylinder, one of said exhaust ports being controlled by said valve stem.

13. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into the valve chest opposite the front and back faces of the valve head, a motive fluid supply passage having branches leading therefrom to the opposite ends of the valve

chest and intermediate exhaust ports for said cylinder controlled by said valve stem.

14. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into the valve chest opposite the front and back faces of the valve head, a motive fluid supply passage having branches leading therefrom to the opposite ends of the valve chest and a rear exhaust port for the cylinder controlled by the said valve stem.

15. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into the valve chest opposite the front and back faces of the valve head, intermediate exhaust ports leading to the valve chest in position to be opened and closed by the valve stem and a motive fluid supply passage having small branches leading to the opposite ends of the valve chest.

16. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into

the valve chest opposite the front and back faces of the valve head, a rear exhaust port leading to the valve chest in position to be opened and closed by the valve stem and a motive fluid supply passage having small branches leading to the opposite ends of the valve chest.

17. A cylinder, its piston, a valve chest, a valve therein comprising a head having front and back faces and a stem, front and rear inlet ports for the cylinder opening into the valve chest opposite the front and back faces of the valve head, intermediate exhaust ports one of which leads to the valve chest in position to be opened and closed by the valve stem and a motive fluid supply passage having small branches leading to the opposite ends of the valve chest.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this thirty-first day of October, 1911.

LEWIS C. BAYLES.

Witnesses:

F. GEORGE BARRY,
HENRY C. THIEME.