

N. P. STEVENS.
Steam-Engines.

No. 152,052.

Patented June 16, 1874.

Fig. 1.

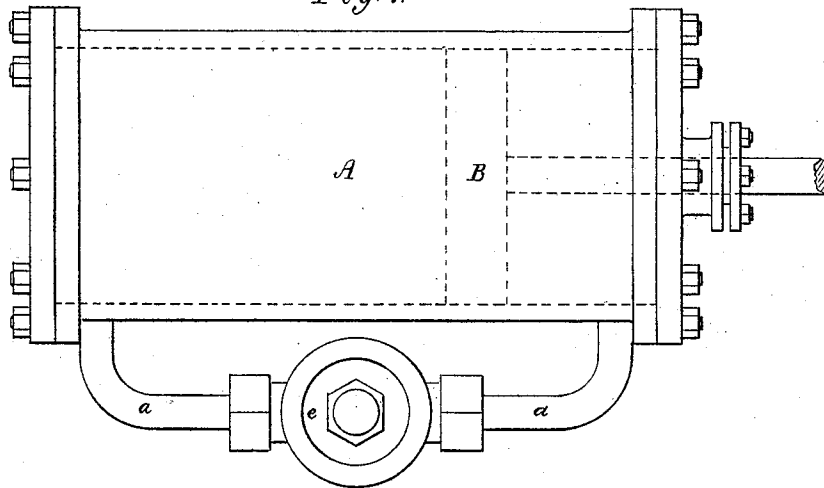


Fig. 2.

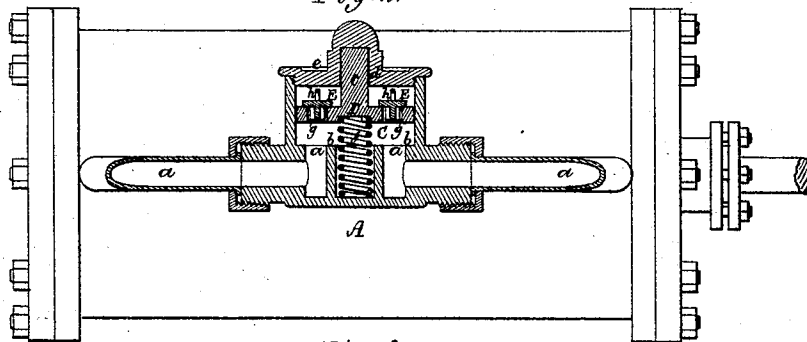


Fig. 3.

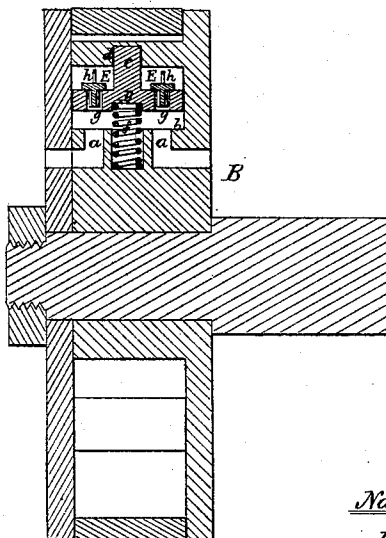


Fig. 4.



Fig. 5.



Witnesses:
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UNITED STATES PATENT OFFICE.

NATHAN P. STEVENS, OF HOPKINTON, ASSIGNOR TO HIMSELF AND JAMES N. LAUDER, OF CONCORD, NEW HAMPSHIRE.

IMPROVEMENT IN STEAM-ENGINES.

Specification forming part of Letters Patent No. **152,052**, dated June 16, 1874; application filed April 22, 1874.

To all whom it may concern:

Be it known that I, NATHAN P. STEVENS, of Hopkinton, of the county of Merrimac and State of New Hampshire, have invented a new and useful Improvement in Steam-Engines; and do hereby declare the same to be fully described in the following specification and represented in the accompanying drawings, of which—

Figure 1 is a top view, and Fig. 2 a vertical section, of the automatic valve apparatus, to be hereinafter described, as applied to the cylinder of a steam-engine. Fig. 3 denotes a transverse section of it as applied to the piston of such a cylinder.

The purpose of the apparatus (which apparatus is automatic in its operation) is to prevent what is termed "vacuum obstruction" of the piston when in movement in the cylinder and steam is shut off. On steam being shut off or stopped from entering the slide-valve chest of the cylinder, the main valve of the automatic apparatus will be relieved from downward pressure, and at once, by its spring, it will be thrown or forced off its seat, so as to open free communication between those parts of the bore of the cylinder which are on opposite ends of the piston-head, in which case the piston will travel freely in the cylinder without such vacuum obstruction.

In the drawings, A denotes a steam-engine cylinder, and B the head of the piston thereof.

In carrying out my invention, the spaces or those parts of the cylinder-bore which are separated from each other by the piston-head, or are at opposite ends of said head, are to be made by two passages, ports, or conduits, *a a*, to communicate with and open upward into a valve through a valve-seat, *b*, into a valve-chest, C, all being as shown. Upon the seat *b* is a main valve, D, provided with a guide-stem, *c*, to enter a corresponding recess, *d*, made in cap *e* of the chest, such recess being to fit to the stem and with it guide the valve in its vertical movements. A helical spring, *f*, arranged beneath the valve and between the openings *a a* in its seat, serves to force

the valve upward off the seat at the proper time—that is, as soon as the steam is shut off. There are, through the said valve D, two holes or passages, *g g*, which are arranged, as represented, immediately over the ports of the valve-seat, and are provided with two small auxiliary valves, E E, to move upward. Each of these valves E E is formed as shown in side view in Fig. 4, and in bottom view in Fig. 5, each being prevented from rising too high by a staple or arch, *h*, extending across it, and inserted in the main valve D.

While steam may be driving the piston in the cylinder, the main valve D will be closed on its seat, so as to cut off communication between the two conduits *a a*; but as soon as the steam may be shut off the valve will be relieved from downward pressure of steam, and will be forced upward off its seat by the spring.

The reason why the valve D will be forced down upon its seat, while the piston is being driven in either direction by steam, may be explained as follows: When the piston is being moved in either direction, the steam that may be creating such movement will force up one of the auxiliary valves, and, flowing into the valve-chest, will press the main valve and the other auxiliary valve closely down upon their seats, and this because there will be underneath that portion of the main valve which is over the port through which the steam is not flowing a partial if not a complete vacuum. Thus, during each movement of the piston induced by steam, the main valve and one of the auxiliary valves will be forced hard down upon their seats, so as to prevent any communication between the two conduits *a a*. On steam being shut off, the valve D will be elevated or thrown up, whereby a free communication between the ends of the bore of the cylinder will take place, and continue while the piston may be in movement without being moved by the steam. Thus vacuum obstruction of the piston will be avoided.

From the above, it will be seen that the

apparatus is automatic in its operation, and may be applied either to the piston or the cylinder.

In practice, it has been found to operate to excellent advantage, and with all the results as stated.

I claim—

An automatic valve apparatus, substantially as described, combined with the cylinder or piston of a steam-engine, and consisting of the

valve-chest C, the insulated ports or conduits *a a*, the main and auxiliary valves D E E, passages *g g*, and spring *f*, all arranged and applied substantially in manner and to operate as and for the purpose specified.

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Witnesses:

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