(No Model.)

E. F. SMITH.

CUSHIONING DEVICE FOR STEAM PISTONS.

No. 377,840. Patented Feb. 14, 1888.

Fig. 1.

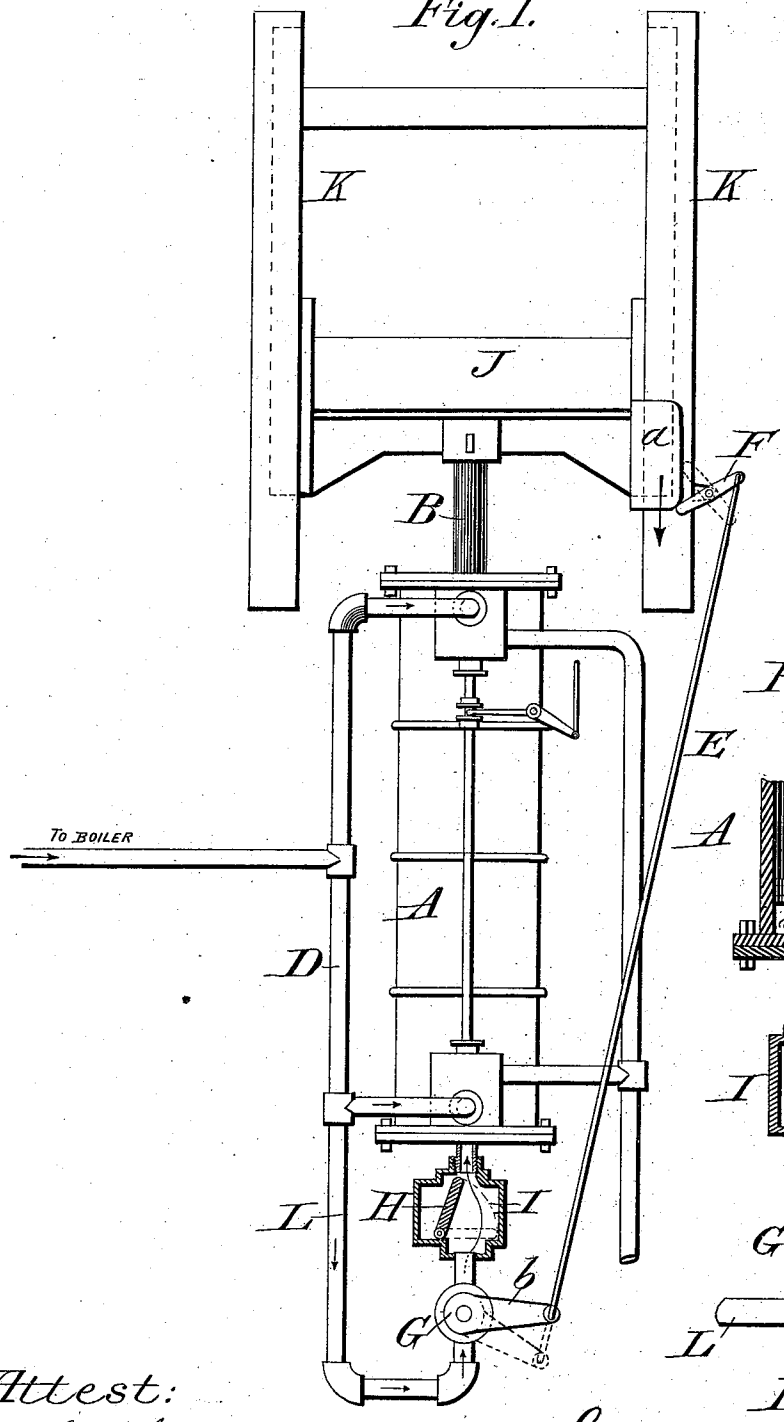
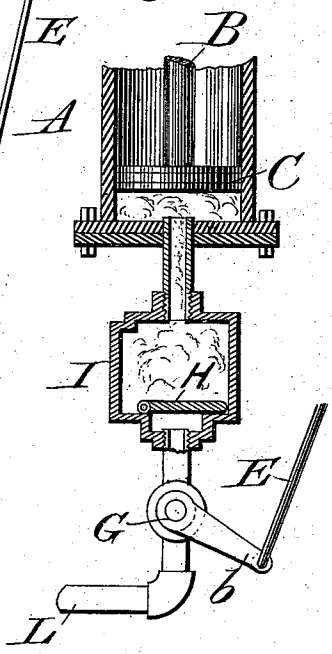


Fig. 2.



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UNITED STATES PATENT OFFICE.

EDWIN F. SMITH, OF BROOKLYN, ASSIGNOR TO THE H. S. SMITH MANUFACTURING COMPANY, (LIMITED,) OF GENEVA, NEW YORK.

CUSHIONING DEVICE FOR STEAM-PISTONS.

SPECIFICATION forming part of Letters Patent No. 377,840, dated February 14, 1888.

Application filed April 16, 1886. Renewed December 22, 1887. Serial No. 258,698. (No model.)

To all whom it may concern:

Be it known that I, EDWIN F. SMITH, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Cushioning Devices for Steam-Pistons; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to a device for cushioning a steam-piston at the lowermost extremity of its stroke within a steam-cylinder, especially in cases when the descent of the piston is forcible and violent, and where it is necessary and indispensable to provide some means for keeping the piston from driving through the cylinder-head by the force of its own momentum.

In the annexed drawings, Figure 1 is an elevational view of an upright steam-cylinder provided with my improved cushioning device and the mechanism for automatically operating the same at the proper point in the stroke. Fig. 2 is a sectional detail view of the lower cylinder-head, the piston, and the valves of my device.

Like letters of reference designate the same parts in both figures.

A represents an upright steam-cylinder, within which works a piston, C, attached to a piston-rod, B. The rod B is secured at its upper end to a cross-head, J, sliding in ways K K. Such an arrangement as this is found in many machines operated by the direct action of steam upon a steam-piston within a steam-cylinder—as, for instance, steam-actuated knives for cutting lumber, &c., steam-actuated saws, deep-well pumps, steam-drills, &c. In all these and various other cases the piston-rod either is provided with or, in order to serve the purposes of my invention, may easily be provided with a cross-head, transverse bar, or other equivalent means which can be brought into contact with a trip-lever for operating the valves to admit an additional amount of steam to the lower end of the cylinder for cushioning the piston, and in all these and like cases, while the tool or mechanical device attached to the piston-rod is doing its work—as, for instance, when a knife is cleaving a log—the movement of the piston must necessarily be much retarded, the internal pressure of the steam thereon will be increased, and consequently when the tool leaves its work the piston will be accelerated, it will jump forward to the end of its stroke, and there will be danger of its crashing through the cylinder-head. It is to obviate this danger that I have devised my present invention, whereby an amount of steam is admitted to the lower end of the cylinder in addition to the amount required to reciprocate the piston, this additional amount serving to provide a soft cushion upon which the piston will strike and rebound.

The steam which is admitted to the cylinder A for the purpose of reciprocating the piston comes through a pipe, D, from the boiler and enters a steam-chest on each end of the cylinder, as shown; but it is not necessary to herein show or describe further the valves, &c., for producing such reciprocation, as this is not of the essence of the invention. A pipe, L, is connected with the steam-supply pipe D, and extends around the bottom end of the cylinder until it enters the same. At a suitable point in the pipe L and near to the cylinder is situated a valve-chamber, I, containing a hinged check-valve, H, and below the chamber I, and likewise in the pipe L, is situated a second valve, G, of any ordinary form, such as a butterfly-valve. The valve G is provided with a crank, *b*, which is connected by a link, E, with a pivoted trip-lever, F, located somewhere above the top of the cylinder, where it will be in the path of the cross-head or projections *a* upon the piston-rod, in the present example being pivoted upon one of the guides K. Such being the arrangement of parts, it is evident that as the piston descends the lever F, link E, and crank *b* will be actuated in such a manner as to open the valve G and allow steam to pass through. This steam, having passed the valve G, will open the valve H and enter the cylinder, when, through the continued descent of the piston

and the consequent compression of the admitted steam, the pressure of the latter within the cylinder becomes greater than the boiler-pressure of the steam in the pipe, the valve H will be closed, and the piston will be effectually cushioned, so that there will be no danger of its driving through the head. The valve G will close of its own accord through its own weight and that of the link E.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a steam-cylinder containing a steam-piston, of a cushioning device for the piston at the lower extremity of its stroke, consisting of a pipe connecting the steam-supply with the lower cylinder-head, a swinging check-valve within said pipe, and a supply-valve, also in the pipe and automatically opened by a suitable leverage connection having a tripper that is acted upon at the proper point by contact with mechanism upon the piston-rod, substantially as described.

2. The combination, with the steam-cylinder containing a steam-piston whose piston-rod carries a slide moving in guideways, of a supplemental steam-supply pipe entering the lower cylinder-head, a swinging check-valve within said pipe, a second valve, also within the pipe, and having a crank connecting by a link with a trip-lever pivoted on one of the guideways in the path of the moving slide, all adapted to operate in the manner shown and set forth.

3. The combination, with a steam-cylinder containing a steam-piston, of a supplemental steam-supply device for admitting an additional amount of steam to the lower end of the cylinder to cushion the descending piston, said device being automatically operated by suitable leverage connections with the piston-rod, substantially as shown and set forth.

4. The combination of the steam-cylinder A, guides K K, piston B, having slide J, supply-pipe I, having valves H and G, and the operative mechanism for said valve G, consisting of crank *b*, link E, and tripper F, all arranged to operate substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

EDWIN F. SMITH.

Witnesses:
H. S. SMITH,
R. J. LUCKEY.