G. H. CORLISS.

DASH-POT.

No. 178,275. Patented June 6, 1876.

Fig: 1.

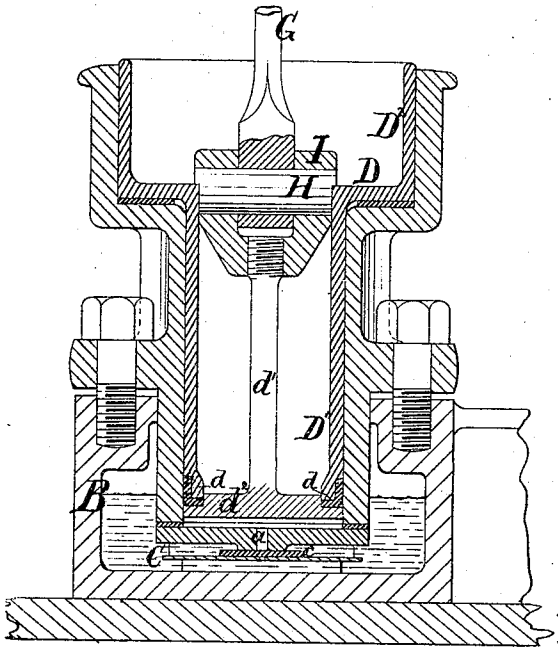


Fig: 2.

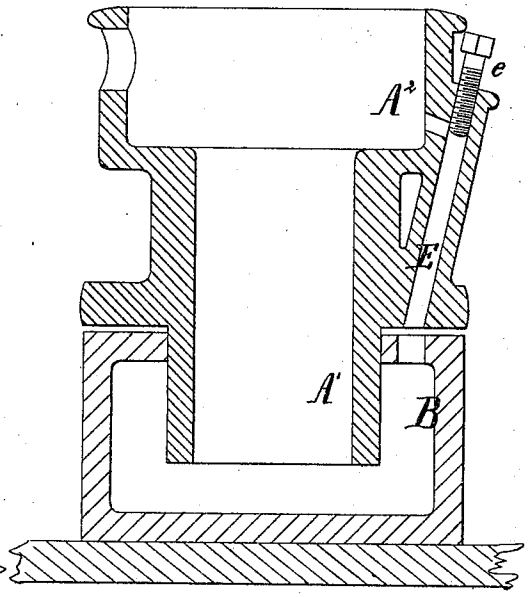


Fig: 4.

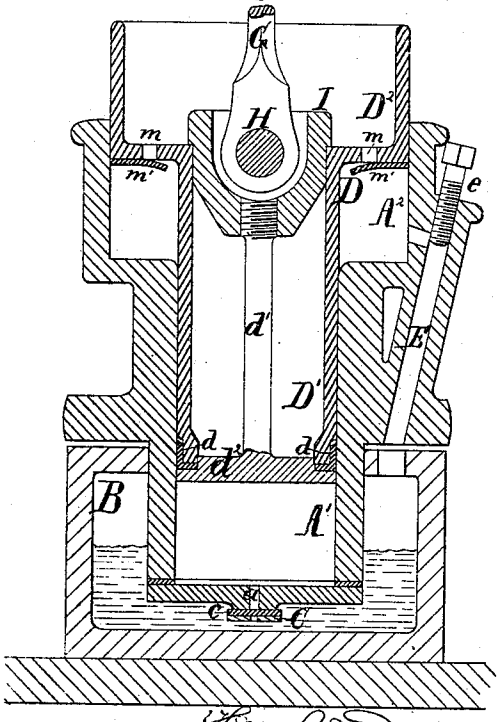
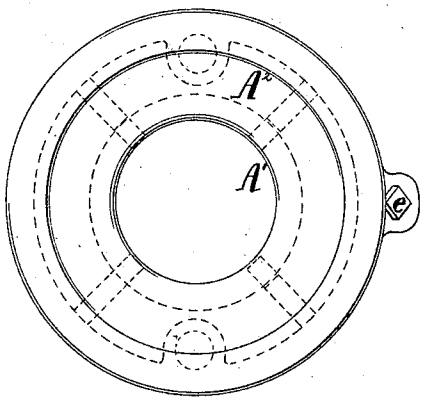


Fig: 3.



Witnesses: Henry Gaines, R. S. Turner

Inventor: George H. Corliss by his attorney Thomas D. Stetson.

UNITED STATES PATENT OFFICE.

GEORGE H. CORLISS, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN DASH-POTS.

Specification forming part of Letters Patent No. **178,275**, dated June 6, 1876; application filed October 27, 1875.

To all whom it may concern:

Be it known that I, GEORGE H. CORLISS, of Providence, in the State of Rhode Island, have invented certain Improvements in Valve-Shutting Device for Steam-Engines, of which the following is a specification:

In all those classes of steam-engines in which the steam-valve is liberated and caused to close by means independent of the power by which it is opened, it is important to provide means for moving the valve rapidly, so that the steam shall be cut off with very little wire-drawing. It is also important to gradually arrest the motion at its close, so as to avoid shock. My invention is for these purposes.

Springs of ordinary character are liable to change their tension with changes of temperature and with lapse of time. They also act with varying degrees of force, as they are more or less strained. It is important that the force of the closing-means applied to the valve shall be practically constant, analogous to the force of gravity acting on a heavy weight. A weight is objectionable for the reason, among others, that its inertia forbids its starting rapidly from a state of rest, and makes it difficult to arrest its motion gently, when the valve has been closed.

It has been found that a piston actuated by the pressure of the atmosphere forms a desirable means for securing these conditions. Some have tried to maintain a vacuum below such piston by keeping open a communication therefrom to the condenser, when a condensing-engine is employed. One of the objections to this is the absence of a vacuum under some conditions, especially in the act of starting. Another lies in the variations of the vacuum at other periods.

I have constructed an improved apparatus making its own vacuum, always freely lubricated, and maintaining its vacuum with practical uniformity under all conditions, and maintaining it throughout the entire closing motion. The motion is arrested after the valve is closed by an air-cushion, sufficient to overcome the force of the vacuum, and arrest the momentum of the liberated mechanism. The construction also provides for a suppression of the hissing noise ordinarily produced by the escape of air under pressure.

The accompanying drawings represent what I consider the best means of carrying out the invention.

Figure 1 is a central vertical section of the entire apparatus for closing the steam-valve. In this figure the piston is in its lowest position, corresponding to that which it maintains when the valve is shut, and all the parts are at rest. Fig. 2 is a cross-section through some of the parts in the plane, at right angles to the section in Fig. 1. Fig. 3 is a corresponding plan view, and Fig. 4 is a section corresponding to Fig. 2, but with all the parts. In Fig. 4 the piston is being raised.

Similar letters of reference indicate like parts in all the figures.

A^1 is a hollow cylinder, and A^2 a corresponding cylinder of larger diameter formed in the same casting therewith. B is a foundation-chamber firmly supporting the duplex cylinder A^1 A^2. The bottom of the cylinder A^1 is tightly closed by a plate, as represented, with the exception of a small central orifice, *a*. This orifice is closed by a tight-fitting valve of leather, or other suitable material, marked *c*, which is held up to the lower side of the orifice *a* by means of a spring, C. The cylinder bottom and the spring C are both firmly held up in their places by shoulders or webs formed in the interior of the chamber B, as indicated in Figs. 1 and 3. It follows that the bottom of the cylinder A^1 is able to discharge through the valve-orifice *a* any oil or other contents when sufficiently forced to overcome the spring. The piston which is raised and dropped in the cylinder A^1 A^2, I will designate, when required, by the single letter D. Its two diameters correspond to the diameters of the cylinders A^1 A^2. The small part of the piston I will designate as D^1 and the larger as D^2. The small part, D^1, is tightly packed by a cup-leather, *d*. A screw-thread on the stem or shank d^1 of the lower piece d^2 allows this cup-leather *d* to be held firmly. In the annular portion of the casting D^1 D^2 are a series of air-holes, *m*, covered on the under side by valves *m'* of leather or other flexible material. E is a passage cored through the

casting A^1 A^2, and communicating with an orifice in the top of the casting B. The effective area of this passage is controlled by the screw *e*. Its point of communication with the interior of the cylinder A^1 is considerably above the bottom of said cylinder. G is a link or rod, the upper end of which takes hold of the valve mechanism, (not represented,) so that, by pulling down on the rod G, the steam-valve (not shown) is closed. The lower end of this rod G takes hold of the compound piston D through the pin H and center-casting I. When the steam-valve is opened, the opening action lifts on the rod G and raises the piston B into the position shown in Fig. 4. During this motion the valves *m'* open downward and fill the annular space below the large part D^2 with air, while the space below the small piston D^1 is a vacuum. The moment the valve is liberated the piston descends rapidly by virtue of the vacuum under the small piston D^1; but when the piston has descended nearly to its lowest position, the air in the annular space under the large piston D^2—which has been escaping through the passage E—is cut off by the descent of the large part D^2 below the port or upper ends of the passage E. The air below the large piston D^2 now serves as a cushion, and rapidly but gently arrests the motion.

In cases in which the oil has entered the vacuum under the small piston D^1 it will be driven out through the orifice *a* by a slight opening of the valve *e* at each descent of the piston. Oil is to be added at proper intervals, or constantly at the top, and allowed to work down, keeping all the rubbing surfaces well lubricated.

The central casting I serves as a nut to connect with a thread at the upper end of the stem or shank d^1 below. The lower portion of the casting I applies within the small portion D^1 of the piston, while its upper end is larger, and rests on the shoulder or offset between the large and small parts. The pin H, which engages with the valve-rod G, is correspondingly formed and correspondingly supported by the offset in the piston. It is thus firmly held against any movement, either endwise or rotatory, and all the parts may be readily separated for cleaning or repairs. If desired, two or more rods may, in any instance, engage with the same pin, H. So, also, other means than the screw *e* may be used for controlling the area of the passage E, or the device may work successfully with the passage E always freely open so long as its upper end or port is sufficiently above the offset which forms the bottom of the large cylinder A^2.

The air which is forced down the passage E at each closing of the valve may be allowed to escape through a passage specially provided, or through the joints between the castings B A^1 A^2. I esteem it important, however, that it shall not be discharged from the passage E directly into the atmosphere, but into an inclosed space, like the oil-chamber B, from whence it may emerge gently and without objectionable noise.

I claim as my invention—

1. In combination with a connection, G, leading to the steam-valve of a steam-engine, the valve-shutting device described, having a piston working in a cylinder, and a self-acting valve opening outward therefrom, the whole adapted to form a vacuum each time the piston is raised, substantially as herein specified.

2. The compound or duplex piston D^1 D^2 and connection G therefrom, in combination with the cylinders A^1 A^2, so arranged that one part of the piston is equipped to serve with a vacuum to induce motion, and the other part to cushion the air to arrest motion, as herein specified.

3. In combination with a large or cushioning piston, D^2, and the connection G, leading therefrom, as shown, the air-passage E, leading from the large cylinder D^2 to a capacious chamber, B, and adapted to soften and reduce the sound of the escaping air, as herein specified.

4. The central casting I and pin H, formed with an offset, as shown, in combination with the threaded stem d^1, and with a piston having an offset in its interior adapted to engage therewith, as and for the purposes herein specified.

In testimony whereof I have hereunto set my hand this 6th day of October, 1875, in the presence of two subscribing witnesses.

GEO. H. CORLISS.

Witnesses:

GEORGE G. PHILLIPS,

ED. W. RAYNSFORD.