(No Model.)

U. HASKIN.
Steam Engine.

No. 239,493. **Patented March 29, 1881.**

FIG. I.

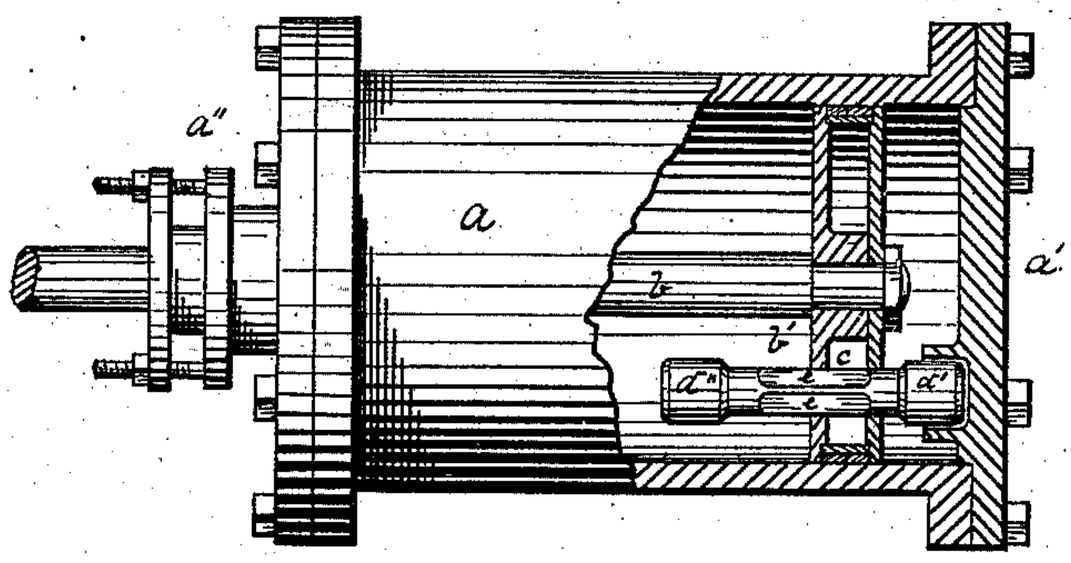
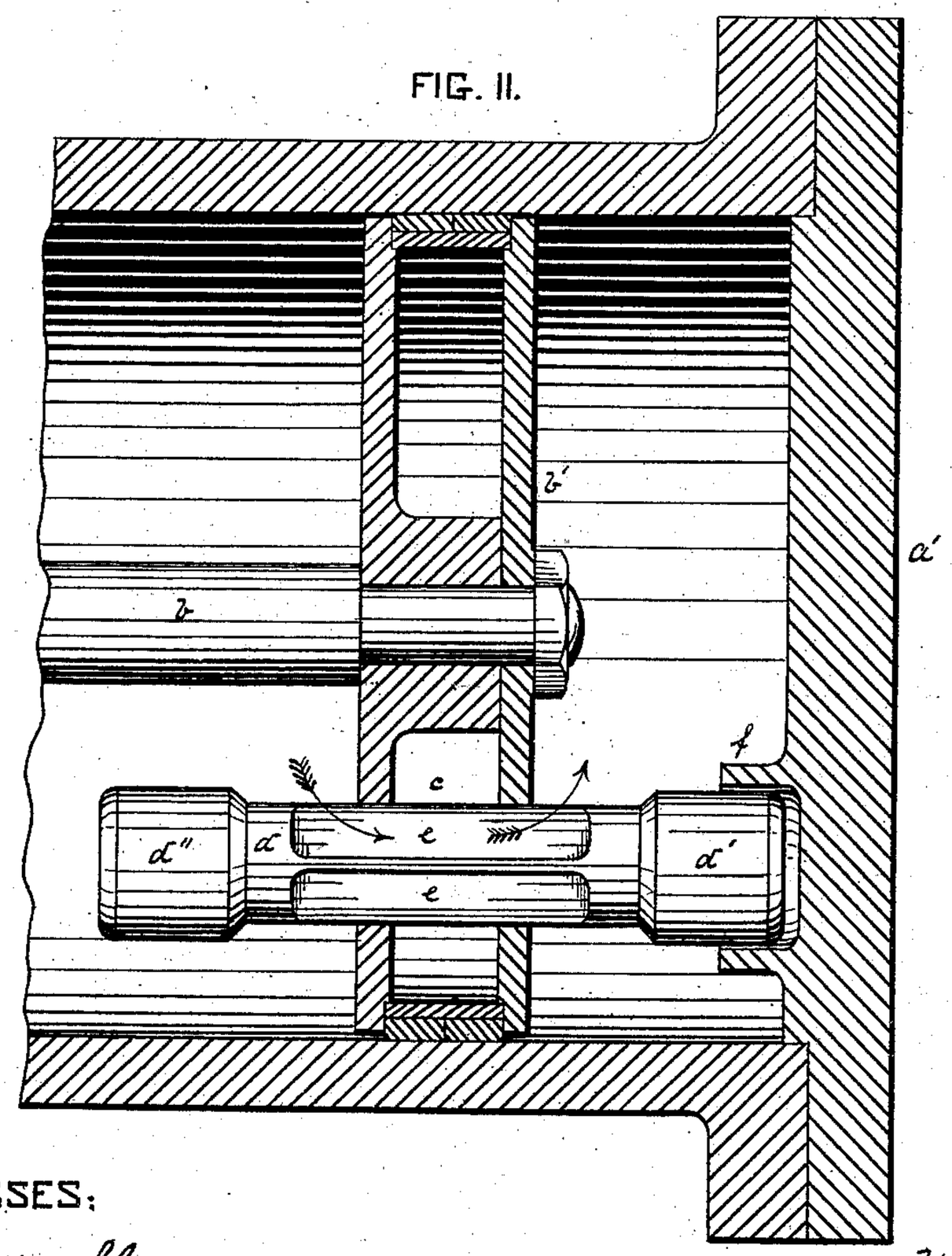


FIG. II.



WITNESSES:

J. W. Bakewell
Jno H Smith

INVENTOR:

Uri Haskin
by his attorneys
Bakewell & Kerr

UNITED STATES PATENT OFFICE.

URI HASKIN, OF PITTSBURG, PENNSYLVANIA, ASSIGNOR TO HIMSELF, JOSEPH DILWORTH, AND S. T. OWENS, OF SAME PLACE.

STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 239,493, dated March 29, 1881.

Application filed November 1, 1880. (No model.)

To all whom it may concern:

Be it known that I, URI HASKIN, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure I is a plan view of the cylinder of a steam-engine, partly in section, showing my invention. Fig. II is an enlarged view of one end of the cylinder.

Like letters refer to like parts wherever they occur.

The object of my invention is to utilize a portion of the steam which is used as a motive power on one side of the piston-head in the cylinder of a steam-engine, to serve as a cushion on the other side of the piston-head and to furnish the power to commence or start the return-stroke of the piston; and it consists in a valve so arranged in the piston-head that just before it has finished its stroke a certain amount of steam is allowed to pass from one side of the piston-head to the other.

I will now describe my invention so that others skilled in the art may manufacture the same.

In the drawings, *a* represents the cylinder of the steam-engine; *a'*, the cylinder-head; *b*, the piston; *b'*, the piston-head. Passing through the piston-head *b'*, parallel with the piston *b*, is the cylindrical hole *c*, into which is placed a ring of bearing metal or other packing. Through this opening *c* passes a plug, *d*, of sufficient diameter to fill the opening *c* and yet work back and forth freely in the same. This plug *d*, which is in length about four times the thickness of the piston-head *b'*, is made larger at both ends than the diameter of the opening *c*, so as to form on the ends of the plug *d* the heads *d' d''*. The plug *d* is provided with a groove or grooves, *e*, running longitudinally along the surface of the plug, commencing at a distance of about one-third the thickness of the piston-head *b'* from the head *d'* of the plug *d*, and extending to within the same distance from the head *d''* at the other end of the plug *d*. The distance between the two heads *d'* and *d''* of the plug *d* is about two and one-third times the thickness of the piston-head *b'*. The length of the grooves *e* is about one and two-thirds time the thickness of the piston-head *b'*. The ends of the heads *d' d''*, which are next to the piston-head *b'*, are beveled so as to fit into and against the cylinder-opening *c*, the edges of which are correspondingly beveled. The other and outer ends of the heads *d' d''* of the plug *d* are also beveled, the purpose of which will hereinafter appear.

On the surface of each of the cylinder-heads *a'* and *a''*, inside of the cylinder *a*, is formed a ring, *f*, or other suitable device, so as to form a cup, *f*, in depth about half the length of the heads *d' d''*, so placed in each of the cylinder-heads that when the piston-head *b'* approaches the end of the cylinder *a* the head of the plug *d* will enter the cup. The edges of the cups *f* may be slightly beveled to correspond to the beveled edges on the heads *d' d''* of the plug *d*, and thereby allow said heads to enter the cups *f* with ease and precision.

The operation of my invention is as follows: The steam entering the cylinder *a* at the end *a''* forces the piston-head *b'* to the other end, *a'*, of the cylinder *a*, and also keeps the head *d''* of the plug *d* close against the piston-head *b'*, thereby stopping the opening *c*. Just before the piston-head reaches the end of the stroke the head *d'* of the plug *d* enters the cup *f*. The plug *d* then remains stationary, while the piston-head *b'* continues its stroke and moves along the plug *d* until the grooves or ports *e* open on both sides of the piston-head *b'*, as shown in Fig. 3, and a certain amount of the steam thereby escapes from behind the piston-head *b'*, through the ports *e*, into the cylinder in front of the piston-head; but the piston continues its stroke until the piston-head passes over and covers the ends of the ports *e* nearest the head *d'*. It has then completed its stroke, (see Fig. 1,) and the steam in the end *a''* of the cylinder *a* passes out of the cylinder through the escape-valve; but the steam which has passed in front of the piston-head remains in the cylinder *a* and acts as a cushion for the piston-head, and as soon as the pressure is removed from the other end, *a''*, of the cylinder *a* by the steam escaping through the escape-

valve, the steam in front of the piston-head at the end *a'* of the cylinder, by its expansive force, commences the return-stroke of the piston, which is carried on by the fresh steam entering from the steam-valve, and the same operation is performed at the other end of the cylinder in the same manner. The cups *f* form a guide for the heads *d' d''* when they enter the same, and the steam caught in the bottom of the cups by the heads *d' d''* entering the same acts as a cushion to prevent the plug from striking against the cylinder-head.

In the drawings I have not represented any slide-valve or other valve or steam-ports to the steam-cylinder, as my invention has no special relation to any particular form or description of steam-valve, and may be applied to steam-cylinders having slide or other valves of well-known construction.

The advantages of my invention are that the expenditure of steam is greatly reduced, as the steam used to commence the stroke is not fresh steam from the boiler, but steam which has already been used in the cylinder; the engine runs freely and easily, without strain on the cylinder and piston-head, as the steam in the end of the cylinder acts as a perfect cushion; and the improvement can be easily and cheaply adapted to any engine without regard to the kind or form of steam-valve used, as it acts entirely independent of the same.

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

1. The piston of a steam-cylinder having a port in its head, communicating with the opposite ends of the cylinder, provided with a valve which is shifted at or near the end of the stroke to permit the passage of a certain amount of steam from one end of the cylinder to the other, substantially as and for the purpose described.

2. An auxiliary valve for steam-engines, consisting in a plug or stopper passing through the piston-head inside of the steam-cylinder of a steam-engine, said plug being provided with heads at each end of the same and grooves or ports opening in the sides of said plugs, the whole being arranged to allow steam to pass from one end to the other of the steam-cylinder, substantially as and for the purpose specified.

3. In combination with a plug-valve placed in the piston-head of a steam-engine, inside of the cylinder, the cups *f* formed on the cylinder-heads inside of the cylinder, substantially as and for the purpose described.

In testimony whereof I have hereunto set my hand.

URI HASKIN.

Witnesses:
JAMES H. PORTE,
L. C. FITLER.