(No Model.)

U. HASKIN.

Steam Engine.

No. 239,494. **Patented March 29, 1881.**

FIG. I.

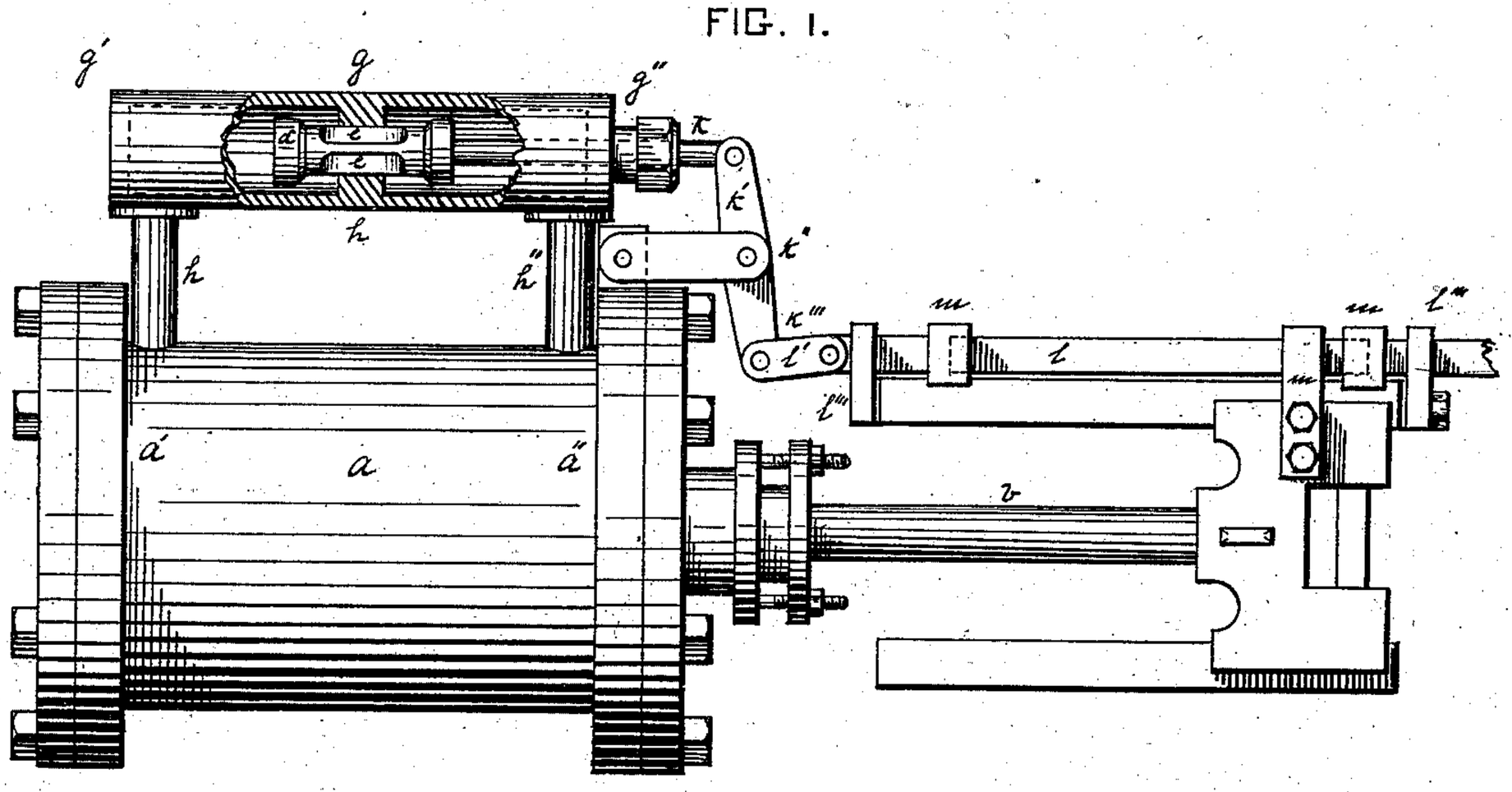
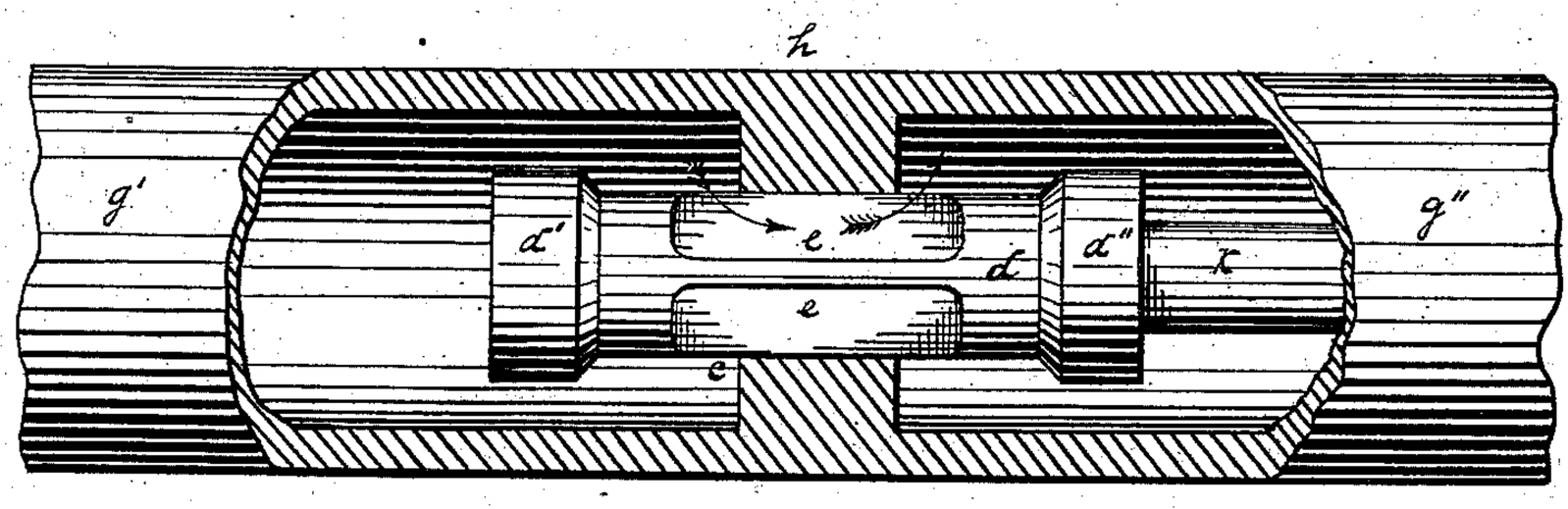


FIG. II.



WITNESSES:

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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. 239,494, dated March 29, 1881.

Application filed January 8, 1881. (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 side elevation, partly in section, of my invention. Fig. II is an enlarged detached view of a portion of the same.

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 also to furnish the power to commence or start the return-stroke of the piston; and it consists in a valve placed in a chamber or cylinder, which chamber or cylinder connects with both and opposite ends of the steam-cylinder of the engine, and mechanism for operating the same, the whole being so arranged and operated that just before the piston of the engine has completed its stroke a certain portion of the steam which has been used as a motive power in one end of the cylinder is allowed to escape into the other end of the cylinder on the other side of the piston-head, and there act as a cushion to protect the cylinder-head and piston-head of the steam-engine from injury by reason of the jar which to a greater or less extent occurs in all steam-engines not provided with devices to obviate the same when the piston has completed its stroke, and also by its expansive force to commence the return-stroke of the piston, the said arrangement of devices being entirely unconnected and independent of the valve which supplies live steam from the boiler to the cylinder, and also independent from the exhaust.

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

In the drawings, *g* represents a cylinder or chamber, connected at each end *g' g''* with corresponding ends *a' a''* of the cylinder of the steam-engine by pipes or other suitable ports, *h' h''*. The cylinder *g* is divided into two close chambers by the diaphragm or partition *h*, extending across the middle of the cylinder from side to side. In the center of this partition *h* is an opening or cylindrical hole, *c*, in 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 diaphragm *h*, 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 diaphragm *h* 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 diaphragm *h*. The length of the grooves *e* is about one and two-thirds times the thickness of the diaphragm *h*. The ends of the heads *d' d''* next the diaphragm *h* may be beveled, so as to fit into and against the opening *c*, the edges of which may be correspondingly formed. From the head *d''* of the plug *d* extends a piston-rod, *k*, which passes out of the end *g'* of the cylinder *g*, and connects with a crank-arm, *k'*, which is pivoted at its center *k''*. The other end, *k'''*, of the crank-arm *k'* is connected with a sliding rod, *l*, by a connecting-link, *l'*. The sliding rod *l* lies parallel with the piston-rod *b* of the engine in bearings *l'' l'''*. Upon the rod *l* are two collars, *m' m''*, and extending from the piston *b* is an arm, *m*, inclosing the sliding arm *l* between the collars *m' m''*. When the piston *b* of the steam-engine has nearly completed its stroke toward the end *a''* of the cylinder *a* of the steam-engine, the arm *m* engages the collar *m''*, and thereby moves the sliding rod *l*, from which the motion is communicated by the crank-arm *k'* to the piston-rod *k*, and the plug-valve *d* is pushed through the diaphragm *h*, allowing a certain portion of the steam from the end *a'* of the cylinder *a*, passing into the end *g'* of the cylinder *g* by the pipe *h'*, to pass through the grooves or ports *e*

into the other end, g'', of the cylinder g, and thence through the pipe h'' into the end a'' of the cylinder a, where it acts as a cushion to the piston-head b of the steam-engine; and as soon as the pressure is removed from the other end, a', of the cylinder a by the steam escaping through the exhaust, it, 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 by the parts working in the reverse direction.

In the drawings I have not represented any slide-valve or other valve or ports for supplying the steam-cylinder with live steam, as my invention has no immediate connection with the form or kind of valve used for that purpose.

The advantages of my invention are, that the expenditure of steam is greatly reduced, as the steam used to commence the stroke of the piston 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 engines, so as to act entirely independent of the main steam-valve and exhaust of the same.

Other devices besides the one described may be used to operate the valve in the chamber or auxiliary cylinder g, and the form of the valve d may be changed, according to the discretion of a skilled mechanic, as I do not limit myself to the peculiar form of the devices shown; but

What I claim as new, and desire to secure by Letters Patent, is—

In combination with the cylinder of a steam-engine, a valve arranged in a chamber outside of the said cylinder, and communicating by suitable ports with the opposite ends of the same, and mechanism, substantially as described, to operate the said valve independently of the main and exhaust valves, for the purpose of permitting a certain amount of steam to pass from the rear to the front of the piston at or near the end of each stroke, all arranged substantially as and for the purposes described.

In testimony whereof I have hereunto set my hand.

URI HASKIN.

Witnesses:
T. B. KERR,
L. C. FITLER.