

J. A. BURNAP.
Steam-Pump.

No. 207,590.

Patented Sept. 3, 1878.

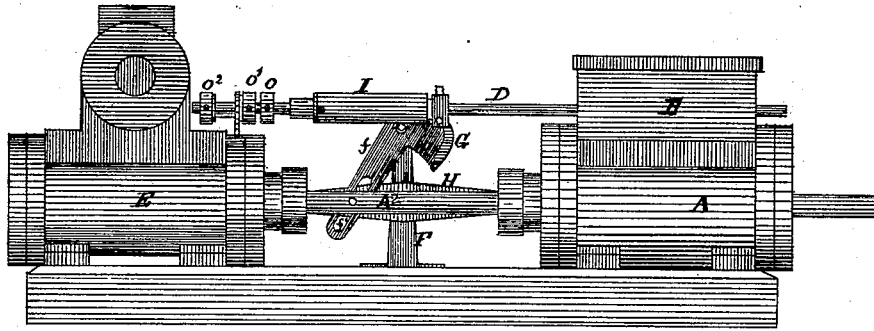


Fig. 1.

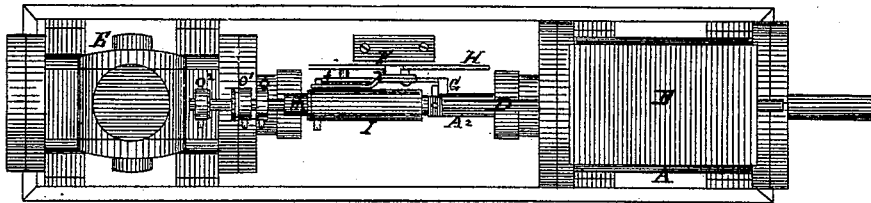


Fig. 2.

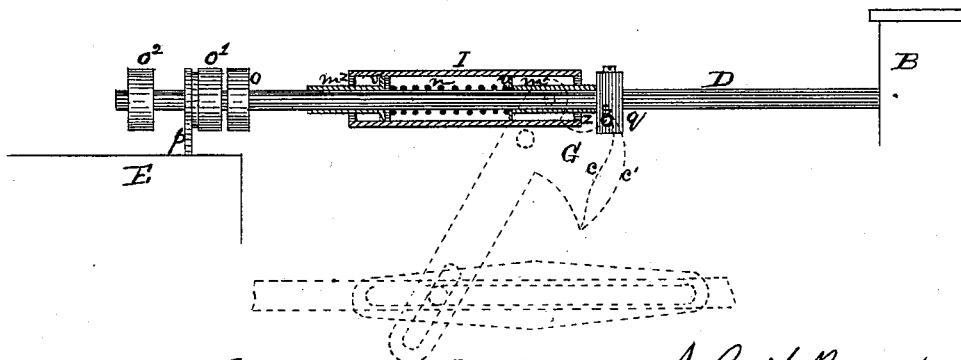


Fig. 3.

Witnesses:

Chas. J. Selkirk
James Corman

John A. Burnap
Per his attorney
Alex. Selkirk

Inventor.

J. A. BURNAP.
Steam-Pump.

No. 207,590.

Patented Sept. 3, 1878.

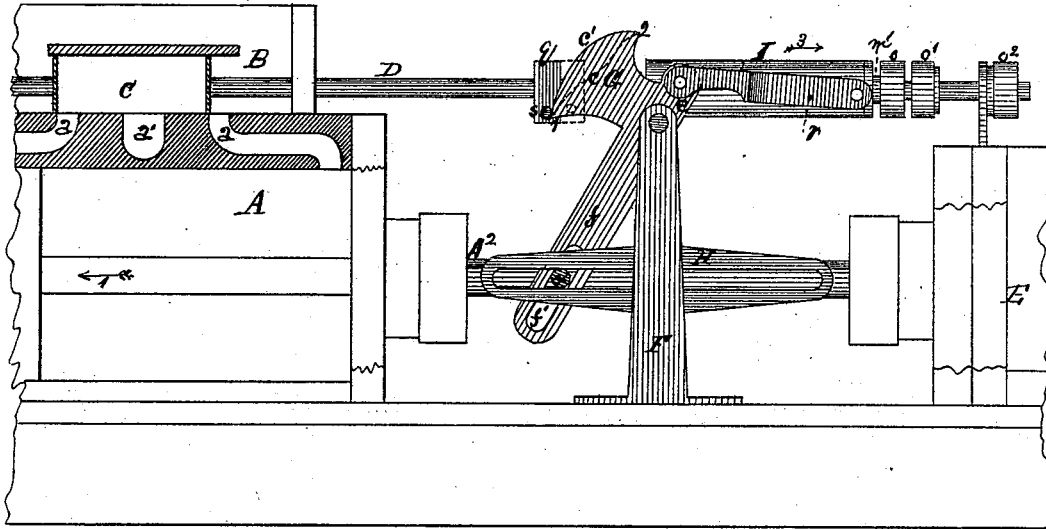


Fig. 4.

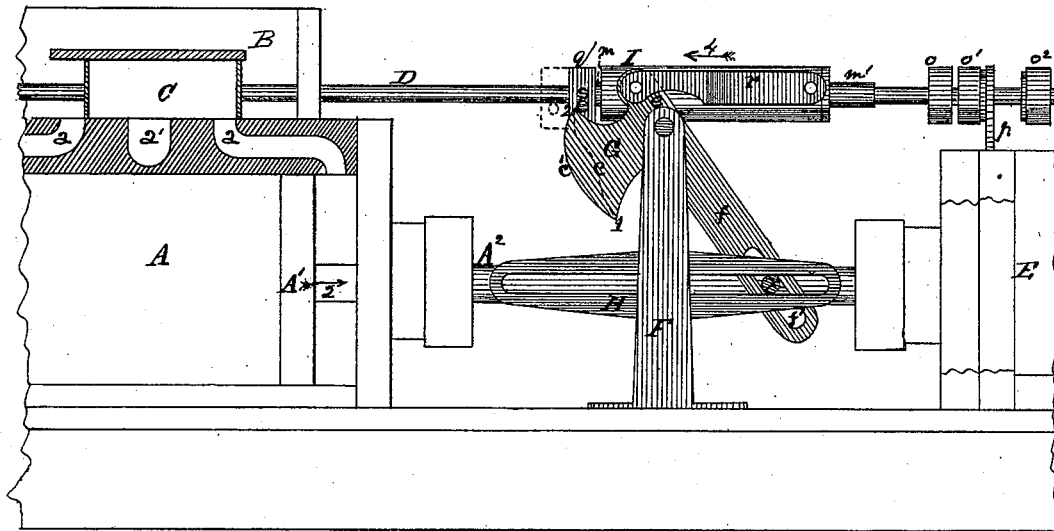


Fig. 5.

Witnesses:
Chas. J. Beecher
James Comma

John A. Burnap
per his atty
Alex. Bellbird
Inventor.

UNITED STATES PATENT OFFICE.

JOHN A. BURNAP, OF ALBANY, NEW YORK.

IMPROVEMENT IN STEAM-PUMPS.

Specification forming part of Letters Patent No. 207,590, dated September 3, 1878; application filed February 18, 1878.

To all whom it may concern:

Be it known that I, JOHN A. BURNAP, of the city and county of Albany, State of New York, have invented certain Improvements in Steam-Pumps; and I do hereby declare that the following is a description thereof, reference being had to the accompanying drawings, in two sheets, forming a part of this specification, in which—

Figure 1 is a side view of the apparatus. Fig. 2 is a view from above of the same. Fig. 3 is a longitudinal sectional view through the valve-stem, on an enlarged scale. Fig. 4 is an elevation of the operating parts of the apparatus, on an enlarged scale, viewed from the side opposite to that shown in Fig. 1, illustrating the operating parts in one position. Fig. 5 is an elevation, illustrating the said parts in an opposite position.

My invention relates to direct-acting steam-pumps; and consists in the several devices or parts, and combinations of the same, hereinafter described, reference being had to the drawings, and letters of reference marked thereon, the same letters indicating like parts.

In the drawings, A represents the steam-cylinder. B is the steam-chest, provided with ports *a a* and *a'*, communicating with said cylinder. C is the steam-valve. D is the valve-stem. A¹ is the piston. A² is the piston-rod. E is the pump-cylinder, provided with proper valves and ports, and operated by the piston-rod A² in a direct manner from the piston in the steam-cylinder, all of which are old, and too well known to require any description. F is a standard, secured in a firm manner to the bed-plate of the apparatus. Pivoted to the upper end of the said standard is the duplex cam detent G, provided with the concave and convex surfaces *c c'*, Figs. 1, 3, 4, and 5, and with the short lever *e* and long lever *f*, provided with the slot *f'*.

Secured to the standard F, near its base, or at a line about central with the axis of the piston-rod A², is the horizontal way H, running parallel with said piston-rod. Secured to the said piston-rod is the pin *x*, which works in and through the slot *f'* of the lever *f*, and in the way H, as shown, the said way and pin operating to prevent the piston from turning from its normal position by the pressure

of the lever *f*, and the said pin operating to carry the lever *f* from position shown in Fig. 4 to that shown in Fig. 5 as the piston is operated.

The valve-stem D passes through a cylinder, I, Fig. 3. Working in said cylinder are the short sleeves *m m'*, through which the said stem also works. Within the said cylinder is placed a spring, *n*, bearing against the inner ends or heads of said sleeves, as shown in said Fig. 3. The said cylinder, inclosed spring, and sleeves are free to move on the stem D in either direction. The ends of the sleeves *m m'* within the cylinder I are each provided with a radial flange, *v*, while the ends of the said cylinder are also provided with flanges *z z*, closing from the shell of the same to said sleeves, as shown in Fig. 3, and the spring *n* is placed between said flanges *v v*.

It will be observed that by this arrangement the said several parts—viz., the cylinder I, sleeves *m m'*, and spring *n*—are all loose on the valve-stem D. The said cylinder may be moved in either direction, and slip longitudinally on the said sleeves to a distance allowable by the flanges *v v* and *z*.

Secured to the valve-stem D at one end are the adjustable stops *o o'*, capable of being set to any desired point on the said valve-stem by set-screws screwing in the said stops and against the said stem.

A standard, *p*, secured to the cylinder of the pump or other equivalent stationary piece, operates to support the said end, and also acts as a stop to control the movement of the said valve-stem in either direction by the co-operation of the adjustable stops *o' o''*, as shown. Secured to the valve-stem at some point intermediate between the sleeve *m* and the steam-chest is the adjustable carrier *q*, which may be fixed by a set-screw nigher to or farther from the stop *o*. The said carrier is provided with a pin, *s*, standing out from the side opposite to the duplex cam detent G, as shown, to a distance sufficient to engage with the concave and convex surfaces *c c'* of the said detent.

To the cylinder I is pivoted the rod or arm *r*, the opposite end of which arm is pivoted to the short lever *e*, Figs. 4 and 5, in such a manner that when the long arm *f* is thrown in one

direction the cylinder I will be carried in the opposite direction.

The manner in which the several parts of this apparatus operate is as follows, to wit: The steam is introduced in the steam-chest in the usual manner, and passes through the ports in the direction indicated by arrows 1 and 2, to give the piston a reciprocating movement. When the movement of the piston has carried the piston-rod in the direction indicated by arrow 1 in Fig. 4 to the limit of the stroke of the piston, the piston-rod attached thereto will have carried the pin *x* to the position shown in Fig. 4, and will have given to the duplex cam detent, through its lever *f*, a movement up and back, as indicated in said figure, to carry the convex face *c'* of the duplex cam detent against the pin *s*, secured to the carrier *g*, from point 2 to point 1, as shown in said Fig. 4. When the piston has reached its full length of stroke in direction of arrow 1, the duplex cam detent G will have been moved to such a distance as to cause the cylinder I, through the arm *r*, to be thrown in a direction opposite, as indicated by arrow 3, Fig. 4, to carry the same over the sleeve *m'* and compress the spring *n*, when the pin *s* of the carrier *g* will slip the point 1, and the carrier will be carried to the position shown by dotted lines in Fig. 4 by the spring *n*, by which means the valve-stem will be thrown back, and with it the valve C, to a position over the ports of the steam chest and cylinder, as shown in Fig. 5. When the said valve is thus thrown as in Fig. 5, the steam will operate to carry the piston in the opposite direction, as indicated by arrow 2 in Fig. 5, and cause the pin *x*, secured to the piston-rod, to carry the long arm *f* of the duplex cam detent to the position shown in said figure, and cause the concave cam-face *c* to be moved down in contact with the pin *s*, secured to the valve-stem, by the carrier *g*, from the point 1 to point 2, as shown in Fig. 5. In this movement of the said cam-surface *c* from said point 1 to point 2 the arm *r*, connected with the lever *e* and cylinder I, will throw the said cylinder forward in direction of arrow 4, so as to carry the end of said cylinder over the sleeve *m* to the carrier *g*, as shown in said Fig. 5, and draw the sleeve *m'* forward to compress the spring *n* from its rear.

When the piston has made its full stroke in the direction of arrow 2 in Fig. 5, the concave cam-face *c* will pass off from contact with the pin *s* of the carrier, and the spring *n* will react to throw the valve C to the position in Fig. 4, to permit the operation of the steam in the cylinder to act with the piston in the first-described manner. When the spring *n* has thus thrown the valve and its stem forward, the carrier *g* will be carried from position shown by full lines in Fig. 5 to that shown by dotted lines in said figure and by full lines in Fig. 4. In all cases when the spring is free to react it will carry the valve C to the full distance the

stops *o* *o*¹ *o*² and carrier *g* will allow by their adjustment or set on the valve-stem, and the valve C will be held to the point it may be carried to by the spring while the spring is being compressed in the next operation by the cylinder I as it moves in the opposite direction.

The alternate and successive movements of the piston and its rod will operate with the cam-surfaces *c* and *c'* to so affect the movements of the cylinder I as to cause it to slip or move over the sleeves *m* *m'*, and compress the spring alternately in each direction, and thereby cause a succession of alternate throws or movements of the valve C in the steam-chest, to open and close the proper ports at proper and alternate times, and thereby cause the piston to operate in the steam-cylinder in a reciprocating manner.

It will be observed that, whether the carrier *g* and stops *o* *o*¹ *o*² are set with the valve-stem for a longer or shorter cut-off of the steam from the steam-chest to the cylinder, the duplex cam-detent will, in all cases, retain the valve to the point it may have been moved to in either direction by the spring until the piston has made its full stroke; and that in no case do the cam-faces of the said detent give any movement to said valve, but simply hold the same firmly in position until the full stroke of the piston is made and the spring in the cylinder I has been compressed for a subsequent action.

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

1. The pin *x*, carried by the piston-rod of the steam-cylinder, lever *f*, provided with slot *f'* and pivoted to the standard F and carrying the duplex cam detent G, in combination with the adjustable carrier *g*, attached to the reciprocating valve-stem D, substantially as and for the purpose set forth.

2. The piston-rod A², pin *x*, way H, standard F, and lever *f*, worked by pin *x*, when combined with a cut-off mechanism of a reciprocating engine, substantially as and for the purpose set forth.

3. The duplex cam detent G, provided with the faces *c* and *c'*, and oscillated by means of lever *f*, operated by pin *x* upon the piston-rod A², in combination with the pin *s*, connected with the valve-stem D, sleeves *m* and *m'*, cylinder I, spring *n*, and lever *r*, connected to cylinder I and operated by lever *f*, substantially as and for the purpose set forth.

4. The combination of the stops *o*, *o*¹, and *o*², standard *p*, pin *s*, and oscillating duplex cam G, operated by the piston-rod A², with the valve-stem D, movable cylinder I, sleeves *m* and *m'*, working with said cylinder, and spring *n*, substantially as and for the purpose set forth.

JOHN A. BURNAP.

Witnesses:

CHAS. J. SELKIRK,
JAMES CONNER.