J. L. LOWRY.

PUMPING ENGINE.

No. 75,284. Patented Mar. 10, 1868.

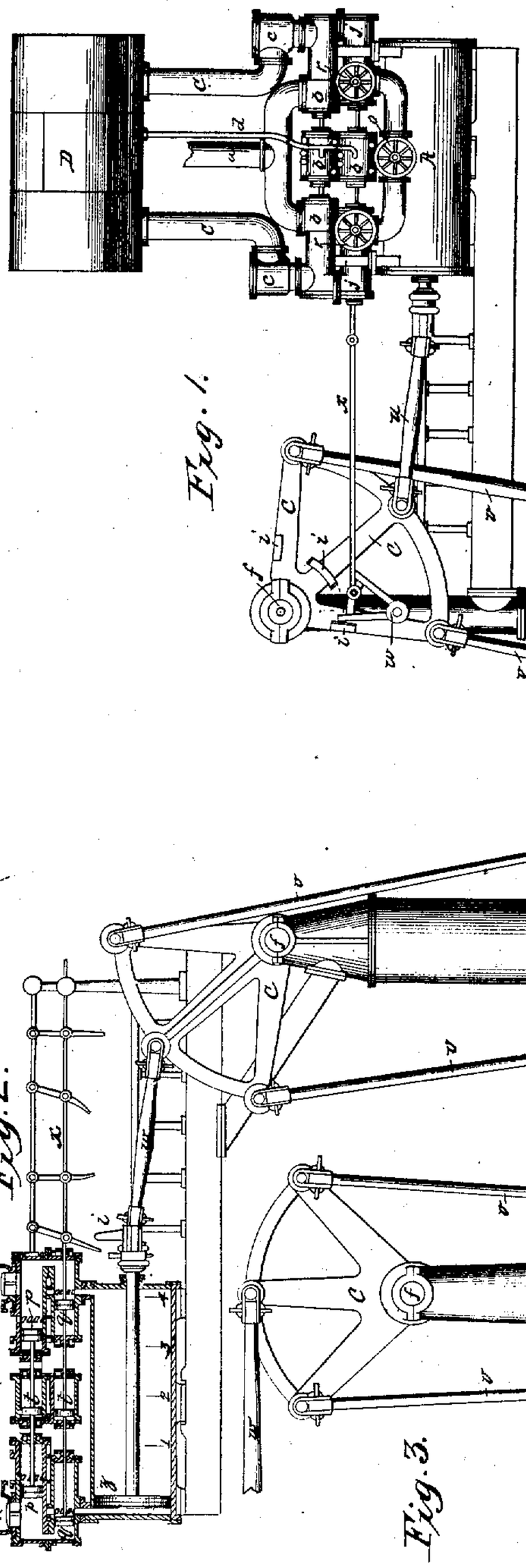

Fig. 1.

Fig. 2.

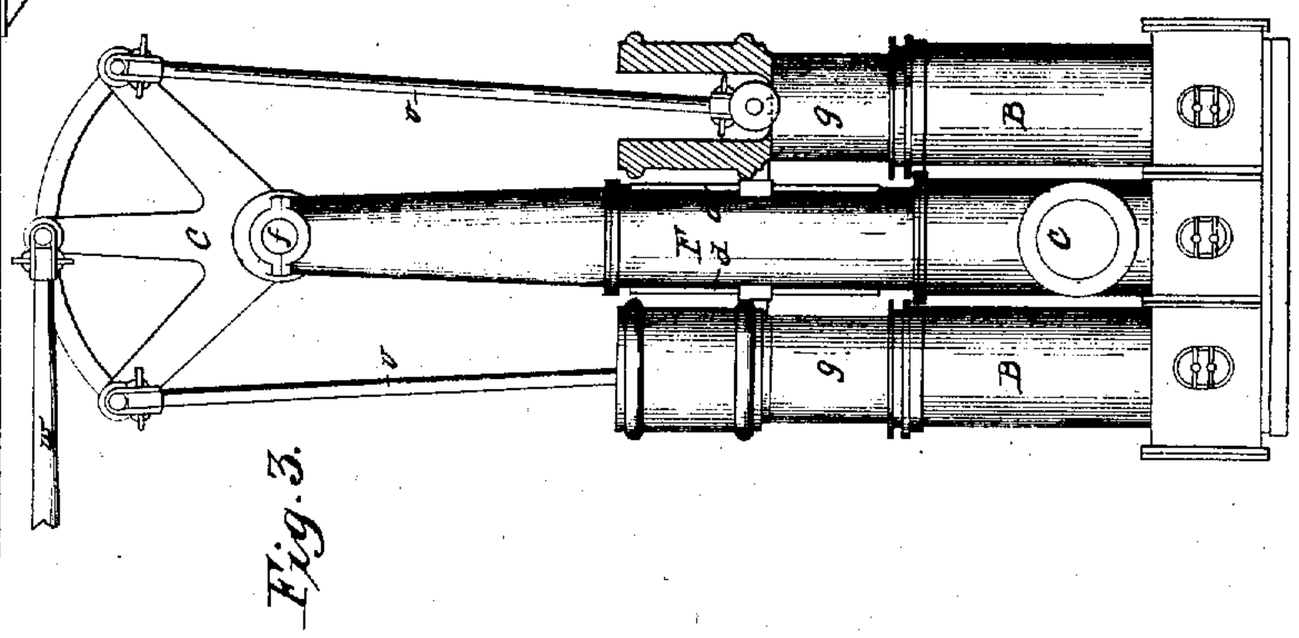

Fig. 3.

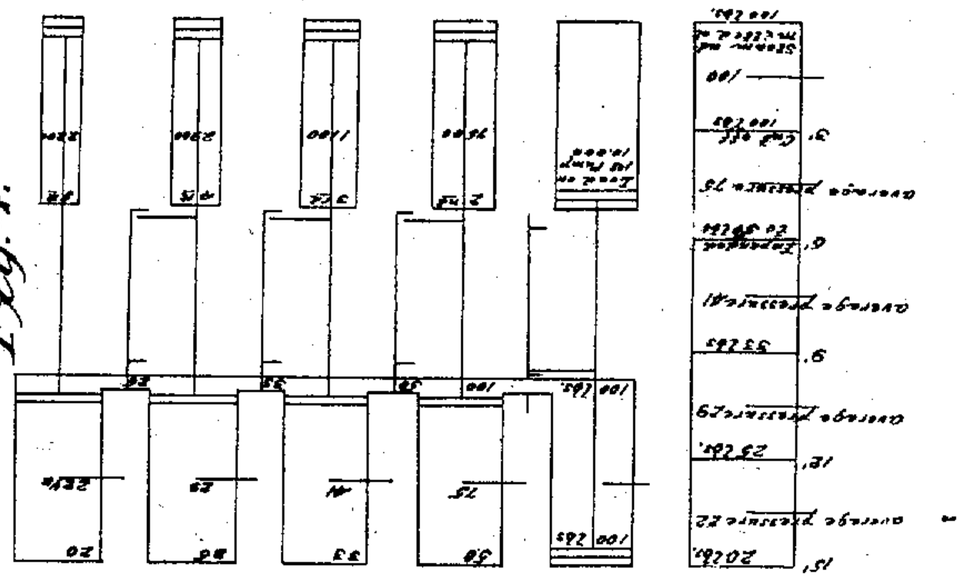

Fig. 4.

Witnesses:
David Lowry
Edmund Burke

Inventor
Joseph L Lowry

United States Patent Office.

JOSEPH L. LOWRY, OF PITTSBURG, PENNSYLVANIA.

Letters Patent No. 75,284, *dated March* 10, 1868; *antedated February* 24, 1868.

IMPROVEMENT IN PUMPING-ENGINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JOSEPH L. LOWRY, of the city of Pittsburg, in the county of Allegheny, and State of Pennsylvania, have invented a new and useful Improvement in Steam-Engines for Pumping and other purposes; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, and to the letters of reference marked thereon, in which—

Figure 1 represents a front elevation of the pumps, and view of steam-engine.

Figure 2 represents a sectional view of the same engine working lifting-pumps.

Figure 3 represents a vertical elevation of pumps working with loaded plungers.

Figure 4 represents modifications of working steam expansively.

All the drawings are lettered, and similar letters denote corresponding parts in the several views.

The object of my invention is, that the steam having been admitted into the cylinder at sufficient pressure to put the piston with its load in motion, and then cut off, say, one-fourth of the stroke, as the steam gradually decreases in pressure by expansion, the labor or load on the piston to be correspondingly reduced, so that every pound of the elastic force, or expansive power of the steam may be applied to operate the engine before it is exhausted as worthless. And my invention consists in the herein-described arrangement of the engine, with reference to the pump, and its combination therewith.

To enable others skilled in the art to understand and make my invention, I will proceed to describe its construction and operation by reference to the accompanying drawings.

I construct my pumping-engine similar, in many respects, to those already in use, but in order to use or apply the whole expansive force or power of the steam to operate the engine, I connect or couple the steam-piston and pump-plunger or head in such a manner that when the steam is first admitted into the cylinder, and has sufficient power or pressure to move or drive the pump-head at full speed, both the piston in the cylinder and the pump-head travel about the same speed, or through equal distances in equal space of time, the pump-head travelling a little the fastest; but as soon as the steam is cut off in the cylinder, and gradually reduces its pressure by expansion, as not to be able to carry its load without stopping, the pump-head gradually reduces its speed in proportion as the steamer is getting weaker in the cylinder, until at the end of the stroke the pump-head is not travelling or moving at one-sixth of the speed of the steam-piston, giving to the piston leverage over the pump equal to the reduced pressure of the steam by expansion.

This graduating movement of the piston and pump-head can be produced by several mechanical arrangements, such as cams, levers, chain and wheel, or with gearing, or as shown in diagrams, fig. 4, the steam being first admitted into the first cylinder under the piston, raises it up with its load to the upper end of the stroke. The piston now halts, when a valve opens into the second cylinder, and permits the steam in the first cylinder to expand under the piston of the second cylinder, raising it up with its load to the upper end of its stroke. A valve now opens into the third cylinder, and permits the steam to expand out of the first and second cylinders into the third cylinder, raising the third piston with its load of water similar to the first and second cylinders, and so on till the fourth and fifth pistons have been raised, the steam expanding out of each of the cylinders. When their pistons have been raised into the next cylinder, each of the pistons, from the first to the last, is connected with pumps, gradually reduced in size, and to correspond with the reduced pressure of the steam by expansion, so that the piston may always be able to raise the pump-head with its load.

Fig. 1 represents a forcing-engine with one steam-cylinder working two single-acting pumps, the cylinder working horizontally, the pumps vertically, the steam-piston being connected with the pump-head by means of a quadrant, or quarter circle, which gives the pump-head the advantage in leverage at the beginning of the stroke, but gradually decreases its speed until at the end of the stroke the piston has from six to eight times the leverage over the pump-head. The quadrant revolving but one-quarter of a circle in making the stroke, each of the arms of the quadrant to which the connection-rods of the pumps are connected rises alternately to a level or horizontal line with the shaft, and falls to a perpendicular line at the end of the down stroke. A is the steam-cylinder, D the reservoir where the steam is permitted to expand after it has been worked in the cylinder, and there held in reserve to be applied in working the condensing and feed-pump engines. C is the

quadrant, to which connecting-rods of the pumps and steam-cylinder are connected. B B are the pumps, marked 1 and 2. *o* is the throttle-valve to admit the steam to the cylinder. *r r* are valves to shut off the steam from either end of the cylinder, so as to work either pump separate, if required. *j j* are the piston-valve chambers, which admit the steam into the cylinder. *l l* are the chambers of the exhaust-valves. *b b* are cataracts to govern the steam and exhaust-valves. *d* is a pipe to supply water from reservoir to the cataracts. *a* is the exhaust-pipe of the engine. *c c* are the check-valve chambers, which rise and permit the steam to expand out of the cylinder into the reservoir, and then, falling, retains the steam in the reservoir, the cataract preventing the exhaust-valve from opening until the steam has had time to pass into the reservoir. *e e* are pipes which connect the reservoir with the check-valves. *w* is a small quadrant, which is moved by tappets *i i* on the large quadrant C, and gives motion to steam-piston valves by means of rod *x*. *f* is the shaft on which the quadrant C moves or vibrates. *v v* are the connecting-rods that connect the pump-head to the quadrant or quarter circle C. *s s* are the pump-rods. *d d* are the slides to guide the pump-head or plungers. *k k* are the valves of the pump. *g* is the pump-head. F is the air-chamber of the pump. C′ is the opening for the discharge-pipe. *w* is the connecting-rod or pitman of the steam-cylinder.

Figure 2 represents a sectional view of the same engine working two single-acting lifting-pumps. *h h* are the check-valves for retaining the steam in the reservoir D. *t t* are the pistons in the cataracts *b b*. *p p* are the exhaust-valves. *q q* are the piston-valves that admit the steam to the cylinder. *z* is the piston of the cylinder. The lines or spaces in the cylinder and pump, numbered 1, 2, 3, and 4, represent or show the distance travelled by the steam-piston and pump-head in the same space of time.

Figure 3 represents two forcing-pumps working with loaded plungers, and embodies the other two plans described, the engine working as a lifting-engine while the pumps are forcing the water. Either the steam-cylinder or pump may be worked horizontally or vertically, or one steam-cylinder and one pump can work together.

Having thus described my invention, what I claim is—

The herein-described engine, when arranged as shown, and in combination with pumps for raising water, substantially as shown and described.

JOSEPH L. LOWRY.

Witnesses:

EDWARD BURKE,

DAVID LOWRY.