

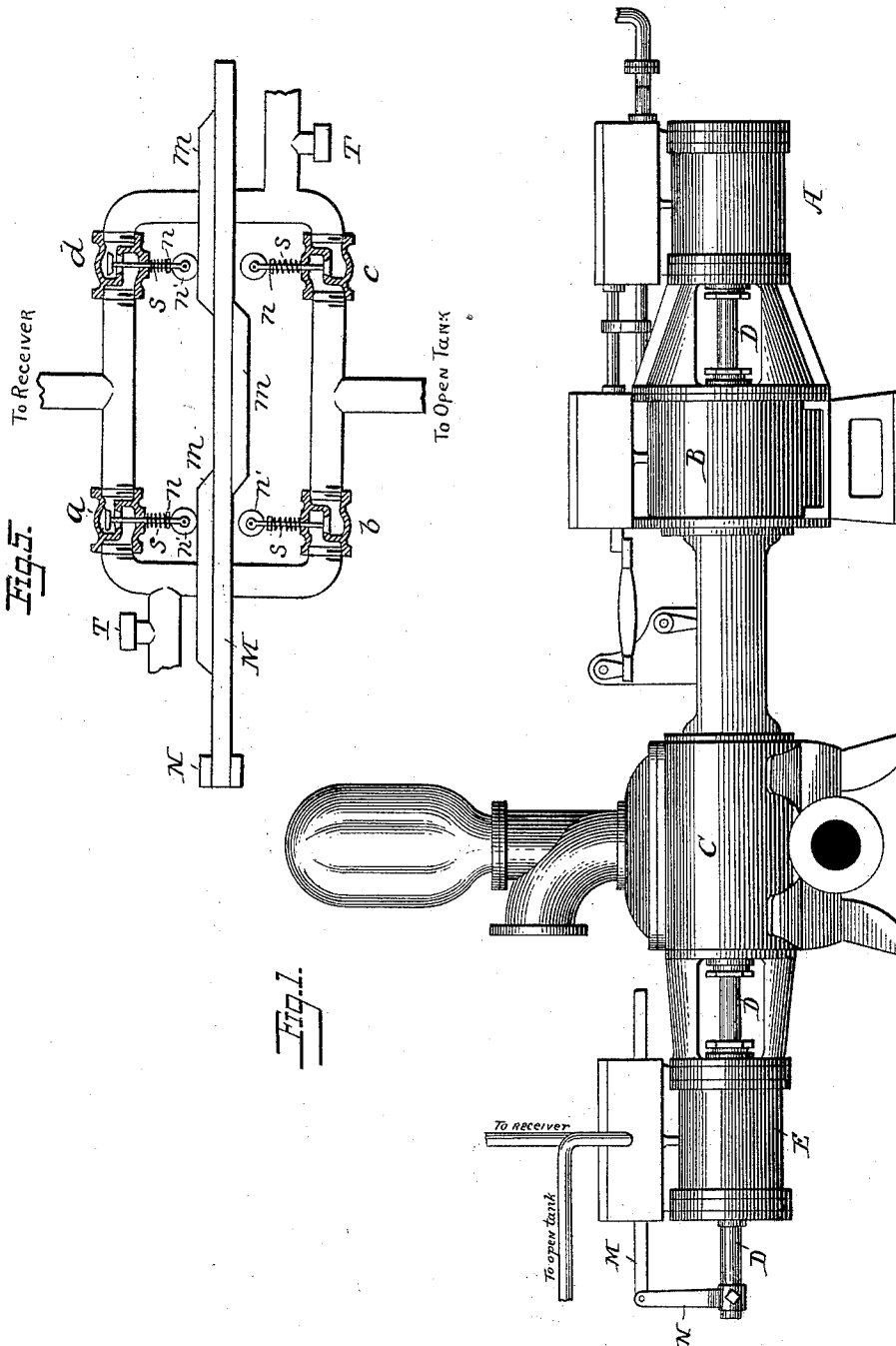
(No Model.)

2 Sheets—Sheet 1.

J. POLLOCK.
PUMPING ENGINE.

No. 462,061.

Patented Oct. 27, 1891.



WITNESSES
Geo. G. Hinkel
Wm. E. Neff

INVENTOR
James Pollock
by J. Watson
his Attorney

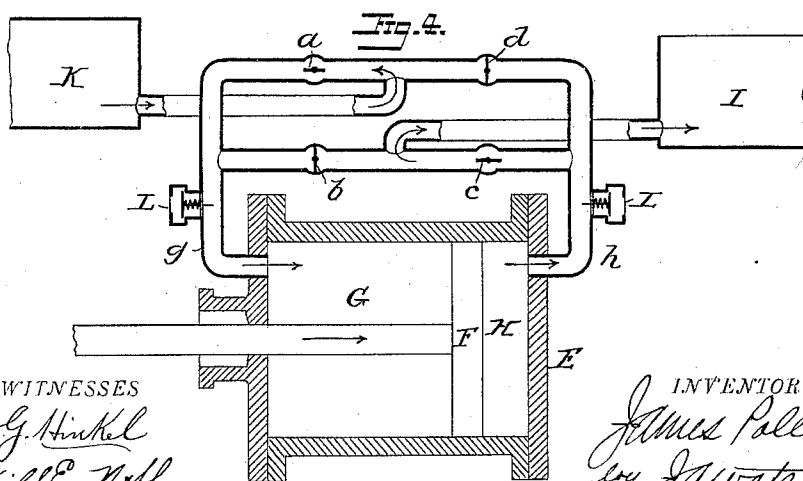
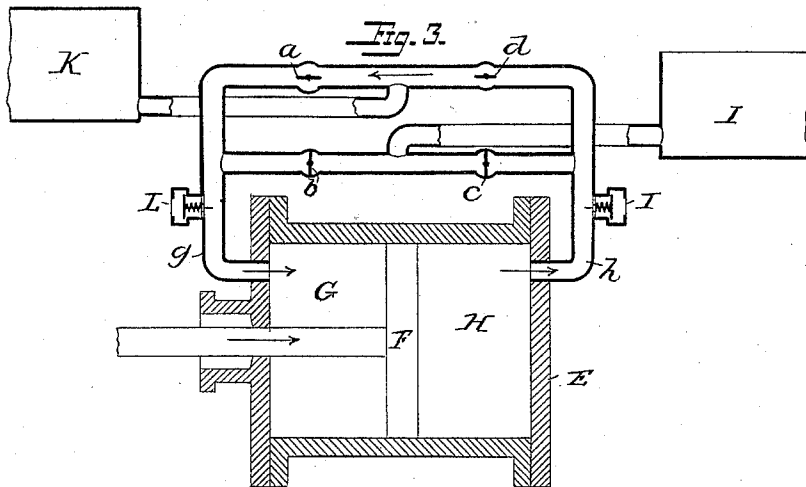
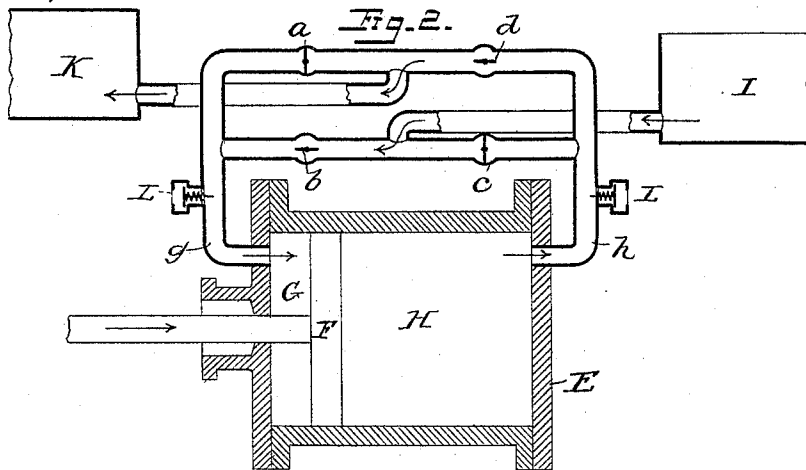
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UNITED STATES PATENT OFFICE.

JAMES POLLOCK, OF WILKES-BARRÉ, PENNSYLVANIA.

PUMPING-ENGINE.

SPECIFICATION forming part of Letters Patent No. 462,061, dated October 27, 1891.

Application filed July 22, 1891. Serial No. 400,344. (No model.)

To all whom it may concern:

Be it known that I, JAMES POLLOCK, a citizen of the United States, residing at Wilkes-Barré, in the county of Luzerne and State of Pennsylvania, have invented certain new and useful Improvements in Pumping and other Engines, of which the following is a specification.

My invention relates to pumping and other engines in which steam is used expansively and which act directly against a substantially uniform resistance; and its object is to equalize the power of the engine, or, in other words, to compensate for the gradually-decreasing pressure of the steam as it expands. In accomplishing this object I provide, besides the steam-cylinder, an additional cylinder, which I will call the "compensating cylinder." The piston of the compensating cylinder is connected with the piston of the engine, and the space within the compensating cylinder upon either side of the piston is connected by suitable passages with an open tank containing water or other fluid, and also with a receiver containing water or other fluid under a yielding pressure, such as a column-pipe or a closed tank partially full of water and containing gas or air under pressure. Suitable valves are provided for the passages, and valve-operating devices connected to the engine are arranged to open and close the valves periodically. During the first portion of the stroke the compensating-cylinder draws water from the open tank and forces it into the receiver under pressure, thus storing up the excess of power developed in the steam-cylinder. During the middle portion of the stroke both ends of the cylinder are in communication with either the receiver or the open tank, and the piston is in equilibrium, and during the latter portion of the stroke the excess of power stored in the pressure-tank is utilized by admitting water from said tank to the rear of the piston and permitting the water in front of the piston to pass into the open tank. Thus by properly regulating the pressure in the receiver the variation in steam-pressure may be compensated for and the pressure on the pump-piston or other resistance rendered substantially uniform.

In the accompanying drawings, Figure 1 is

a side elevation of a steam-pump having my compensating device connected thereto. Figs. 2, 3, and 4 are diagrams showing the piston of the compensator in different positions, and Fig. 5 is a diagram of the valve-operating device.

The high-pressure cylinder A, the low-pressure cylinder B, and the pump-cylinder C may be of any ordinary or suitable form. As shown, they are arranged in line, with a common piston-rod D connecting their several pistons. The compensating cylinder E may also have its piston upon the piston-rod D, as illustrated in the drawings, or it may be located in any desired position with reference to the pumping-engine, and its piston may be connected thereto either directly or indirectly.

Referring to Figs. 2, 3, and 4, F indicates the piston of the compensating cylinder, and G and H indicate portions of space inside of the cylinder upon either side of the piston F. I indicates an open tank, and K a receiver in the form of a closed tank partly filled with water or other fluid and partly filled with air, gas, or steam under pressure, a column-pipe, or any other device for receiving and retaining fluid under a yielding pressure. The spaces G and H are in communication with the tanks I and K through passages *g* and *h*, respectively, and these passages are provided with valves *a*, *b*, *c*, and *d* for cutting off communication between the cylinder and the tanks when desired.

During the first portion of the stroke, the valves being arranged as shown in Fig. 2, water is drawn from the open tank I into the space G and forced from the space H into the pressure-tank K, thus offering a resistance to the steam-engine and storing the excess power developed in the low-pressure cylinder during the first portion of the stroke in the tank K. When the piston F has traveled about one-third of its stroke the valve *b* is closed and the valve *a* opened, as shown in Fig. 3, thus establishing communication between both sides of the piston F and the pressure-tank and putting the piston in equilibrium. This condition holds until the piston has traveled through the middle third of its stroke, after which the valve *d* is closed and the valve *c* opened, as seen in Fig. 4, permitting the fluid

under pressure in the tank or column-pipe to enter the space G and assist the engine, while the fluid in the space H passes freely into the open tank. On the return stroke the valves remain as shown in Fig. 4 until the first third of the stroke is accomplished, after which the valves are opened and closed in the reverse of the order above stated, the piston being retarded during the first portion, in equilibrium during the middle portion, and assisted during the last portion of the stroke. In order to prevent the bursting of the cylinder or the pipes connected to it should the valves accidentally become misplaced, I provide safety or relief valves L L, through which the fluid from the cylinder will pass when the pressure becomes excessive.

As shown in Figs. 1 and 5, the valves *a b c d* may be operated by a rod M, connected with an arm N on the piston-rod D and provided with raised or cam portions *m*, which operate the valves at the proper times through rods *n*, having anti-friction rollers *n'* upon them. The valves are automatically closed by springs S as the cams *m* leave the rollers. It is immaterial what kind of valves are used. In Figs. 2, 3, and 4 I have shown one common form of valve, while in Fig. 5 I have shown another.

Having described my invention, what I claim is—

1. The combination, with an engine, of a compensating cylinder having a piston operated by the engine, a receiver under pressure,

an open tank, passages connecting each end of the cylinder with both the receiver and the tank, valves for said passages, and valve-operating devices, substantially as described.

2. The combination, with an engine, of a compensating cylinder, a receiver under pressure, an open tank, a piston within the cylinder and connected with the engine, valved passages connecting the cylinder space upon either side of the piston with the receiver and the tank, and valve-operating devices arranged to open and close said valves periodically, whereby the piston is first resisted, then put in equilibrium, and lastly aided during each stroke, substantially as described.

3. The combination, with an engine and pump having a common piston-rod, of a compensating cylinder having its piston upon said common rod, a receiver under pressure, an open tank, passages leading from each end of said cylinder to both the receiver and the tank, valves for the passages, and suitable valve-operating devices, substantially as described.

4. The combination, with an engine, of the compensating cylinder, the receiver, the open tank, the passages, the valves *a b c d*, and the safety-valves L, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES POLLOCK.

Witnesses:

W. S. PARSONS,
JOHN C. SWEENEY.