W. WRIGHT.

Compound Engines.

No. 144,817. Patented Nov. 18, 1873.

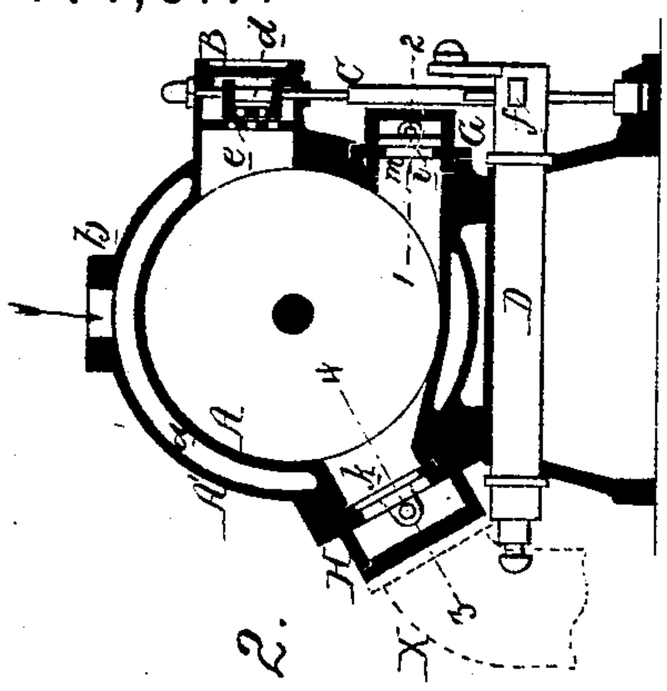

FIG. 2.

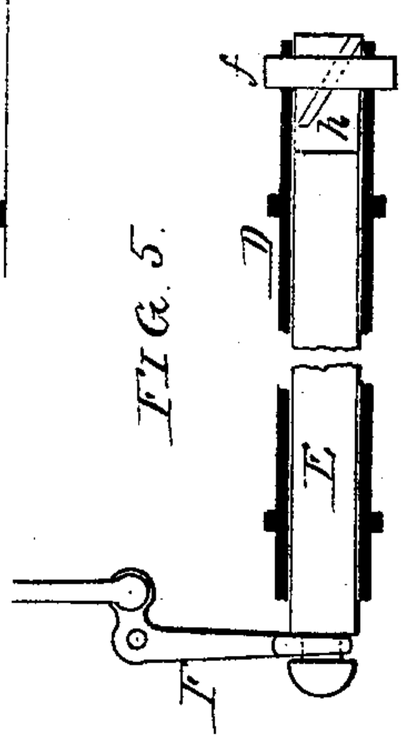

FIG. 5.

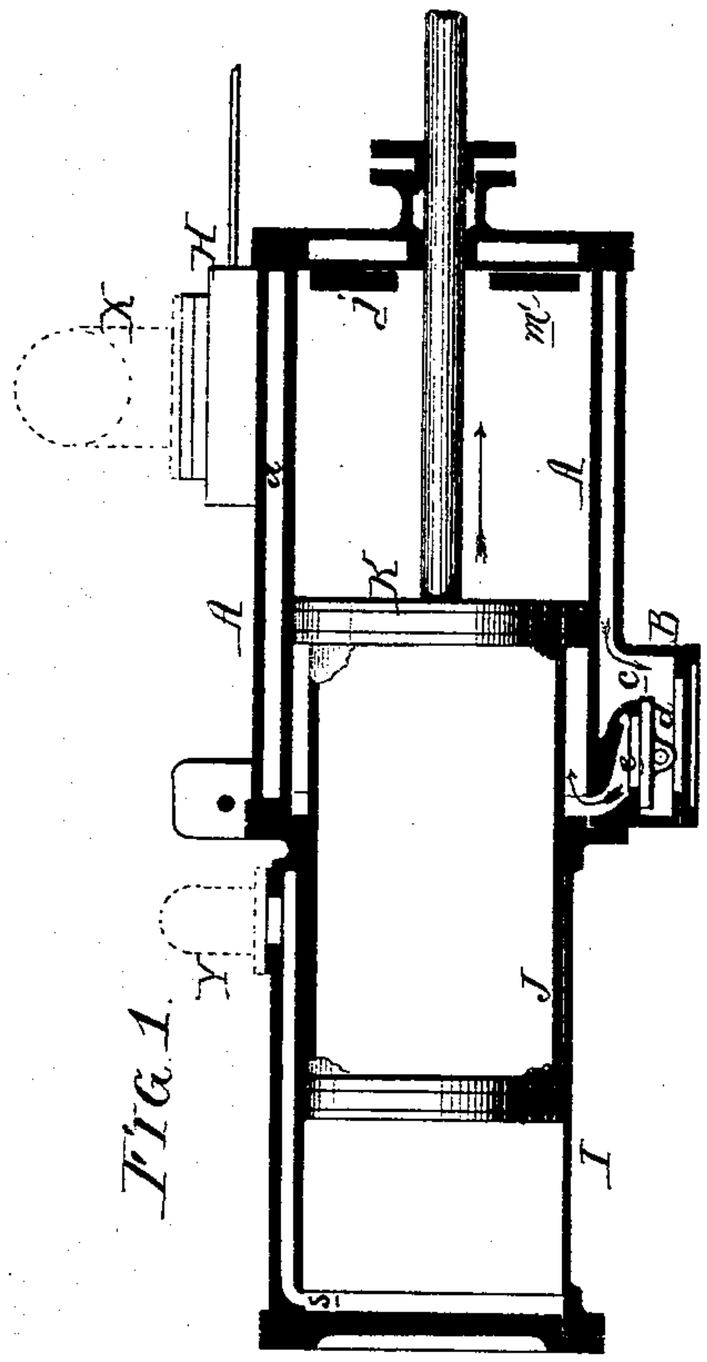

FIG. 1.

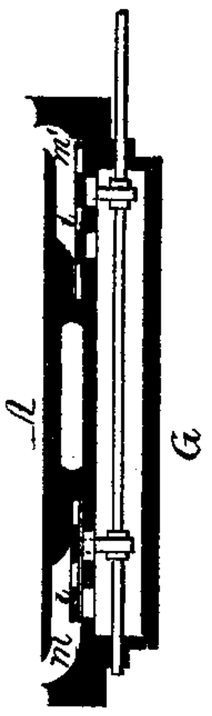

FIG. 3.

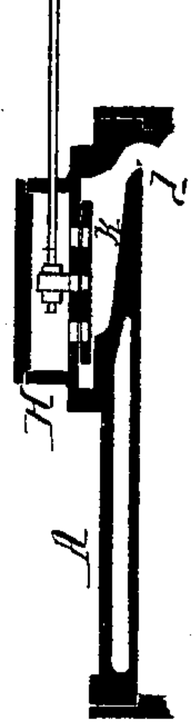

FIG. 4.

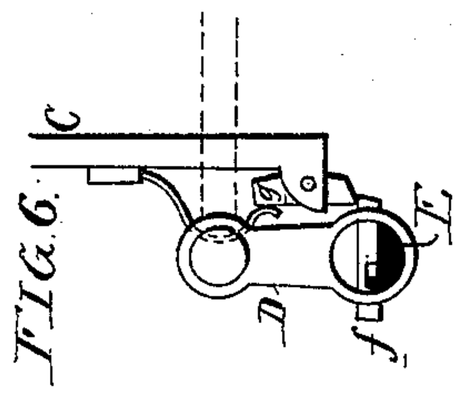

FIG. 6.

WITNESSES,

Harry Smith

Hubert Howson.

William Wright
by his Attys.
Howson and Sons

UNITED STATES PATENT OFFICE.

WILLIAM WRIGHT, OF NEWBURG, NEW YORK.

IMPROVEMENT IN COMPOUND ENGINES.

Specification forming part of Letters Patent No. **144,817**, dated November 18, 1873; application filed August 15, 1873.

To all whom it may concern:

Be it known that I, WILLIAM WRIGHT, of Newburg, Orange county, State of New York, have invented certain Improvements in Compound Engines, of which the following is a specification:

The object of my invention is economy in the construction of compound steam-engines, an object which I attain by so making the engine that a complete movement of the piston (that is, a movement from one end of the cylinder to the other and back) shall be effected by a volume of steam admitted on once opening the valve; also, by combining with an engine thus constructed a valve, the movement of which is regulated by the pressure of steam.

Figure 1 is a sectional plan of sufficient of the engine to illustrate my improvements; Fig. 2, a transverse section; Figs. 3 and 4, sectional views of the valves; and Figs. 5 and 6, views illustrating devices for operating one of the valves.

The cylinder A of the engine is surrounded by a steam-tight jacket, A′, forming an annular steam-chamber, *a*, which communicates through a neck, *b*, Fig. 2, with the steam-pipe, and through a passage, *c*, Fig. 1, with a valve-chest, B. A valve, *d*, secured to a vertical spindle, C, is adapted to ports *e*, through which the steam admitted to the chest B communicates with the interior of the cylinder, the valve being operated from a hollow rock-shaft, D, Figs. 2, 5, and 6, a slide, *f*, in which, when the shaft turns, catches a spring-dog, *g*, hung to the spindle, and elevates the latter. This cutting-off device forms the subject of a separate application for a patent, which I am about to make; hence, a further explanation of it here will be unnecessary, especially as no part of my present invention is dependent on this special device, any other equivalent cut-off being available. The extent to which the slide *f* projects from the shaft, and, consequently, the movements of the valve, depend upon the action of the governor, which, through the medium of a bell-crank lever, F, operates a rod, E, arranged to slide in the shaft D. An inclined feather or rib, *h*, near the outer end of the rod, fits into a recess in the slide *f*, and projects or retracts the latter as the rod is moved in or out. Below the valve-chest B is a second chest, G, in which are valves *i*, adapted to ports *m m′* terminating at the front end of the cylinder. An exhaust-port, *j*, near the front end of the cylinder, communicates with a valve-chest, H, in which slides a valve, K, a pipe, X, leading from the valve-chest to the condenser. The rear head of the cylinder A is extended to form a cylinder, I, of smaller diameter than the said cylinder A, to receive a trunk, J, projecting from the rear face of the piston K, a port, *s*, extending from the rear end of the cylinder I to a pipe, Y, which has a continuous communication with the condenser. Steam, passing directly from the boiler to the chamber *a*, maintains the cylinder at a high temperature; and, on the valve *d* being raised, passes through the ports *e* into the annular chamber behind the piston K, and carries the latter forward in the direction of the arrow. This annular chamber takes the place of the small high-pressure cylinder of the ordinary compound engine; and its proportion to the large low-pressure cylinder must be made in accordance with the pressure of steam to be used to equalize the power on both ends of the piston. On the piston reaching the outer end of the cylinder, (the ports *e* being closed,) the valves *i i* are moved so as to open simultaneously the ports *m m′*, through which, and through the valve-chest G, the steam passes to the cylinder in front of the piston, where, upon the closing of the port *m′*, it will expand and force back the piston to the rear end of the cylinder. As the piston again moves forward, the valve K uncovers the exhaust-port, through which the steam escapes to the condenser, the vacuum in front of the piston being partly counterbalanced by that upon the smaller surface of the end of the trunk, and this smaller end of the trunk has also piston-packing at its end, and works tightly in the bore of the cylinder I. Its face is also closed to prevent the cooling of the inner surface of the trunk by the action of the vacuum which exists in cylinder I continually. When the piston is moving to the rear the vacuum in the cylinder I re-enforces the steam-pressure upon the front of the piston, and compensates, in part, for the decreasing pressure of the expanding steam. It will be seen that a single volume of steam admitted on

once opening the steam-ports *e*, and acting with nearly boiler-pressure first on the annular face on one side of the piston, and then expansively on the whole face on the other, imparts to the same the back-and-forth movement required to effect a complete revolution of the crank-shaft. By the combination, with the valve *d*, of devices which render the extent and duration of its movement dependent upon the governor, the steam may be admitted, without throttling, direct from the boiler, and without affecting the continuous uniform movement of the engine.

It has not been deemed necessary to illustrate the regulator, nor the connections for transmitting motion to the shaft D, as any of the well-known appliances may be employed.

I claim—

1. A compound engine, having two cylinders and two pistons, provided with a single induction-valve, and with ports and passages, substantially as described, so that a volume of steam, admitted on once opening the said valves, will be the sole agent for effecting a complete backward-and-forward movement of the piston, as specified.

2. The combination, with the single steam-valve *d* of the compound engine, of a regulator, operating as described, so that the volume of steam admitted to the small cylinder is rendered dependent on the pressure of the steam.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WM. WRIGHT.

Witnesses:

HARRY SMITH,

HUBERT HOWSON.