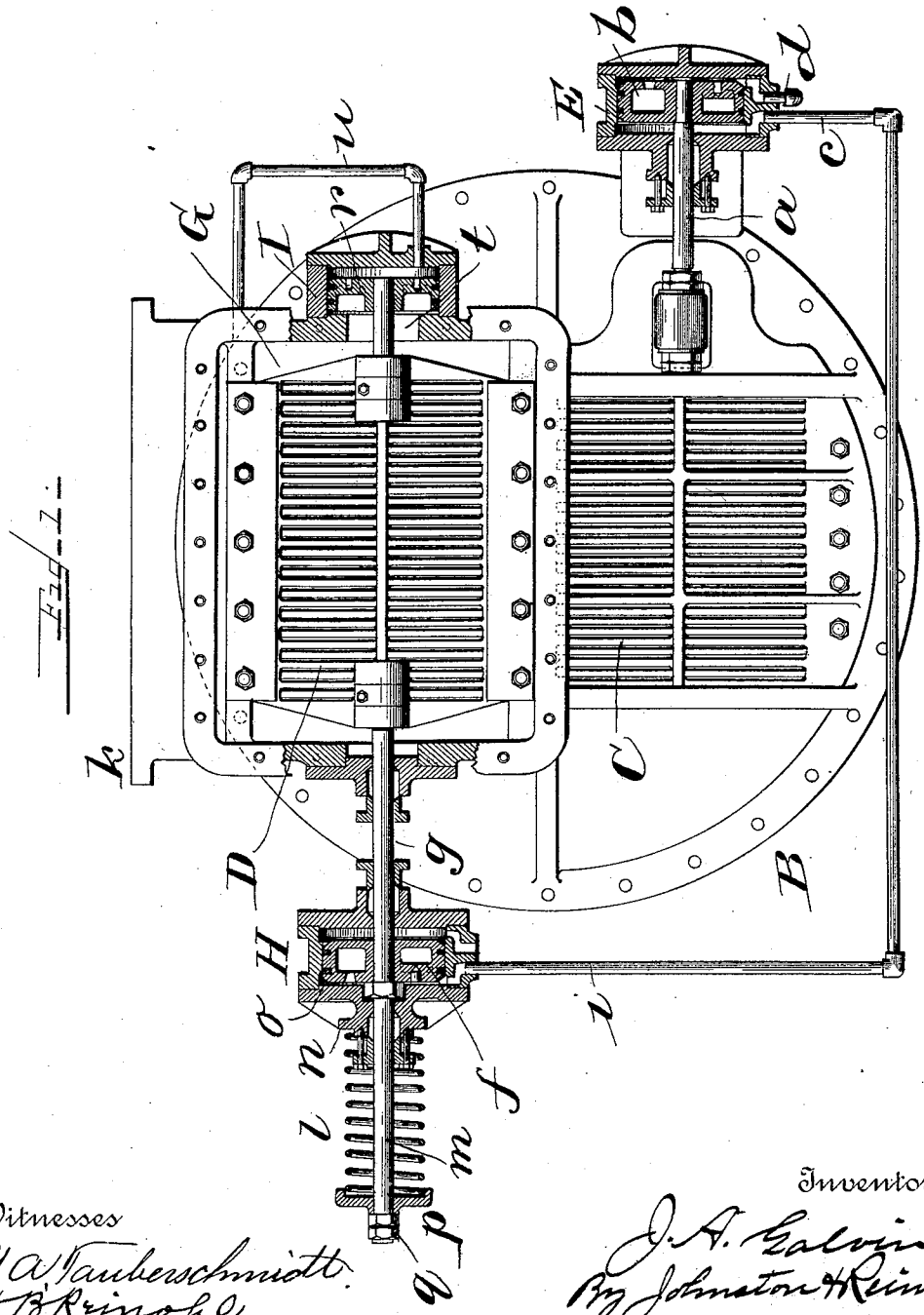
(No Model.) 3 Sheets—Sheet 1.

J. A. GALVIN.

COMPRESSING OR BLOWING ENGINE.

No. 484,495. Patented Oct. 18, 1892.



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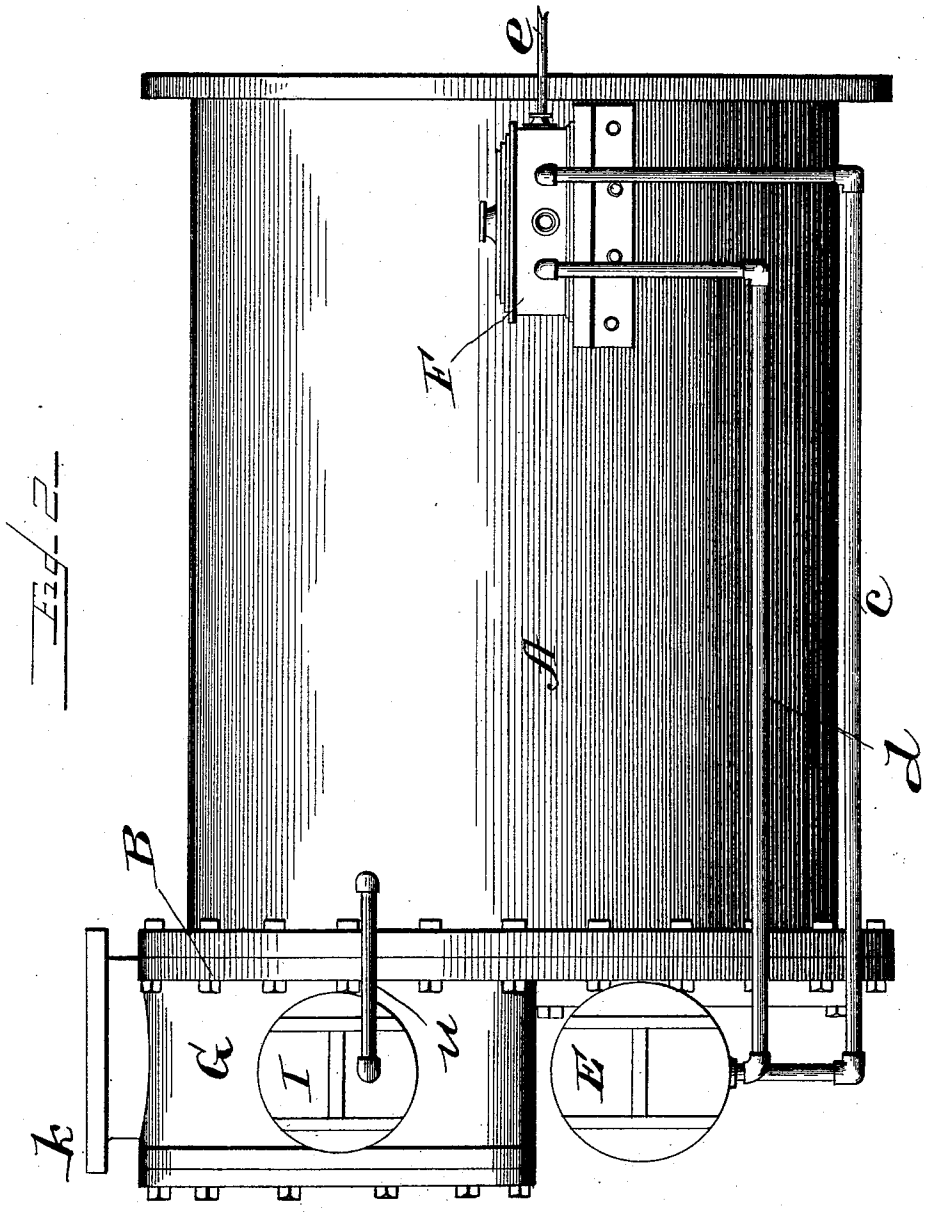

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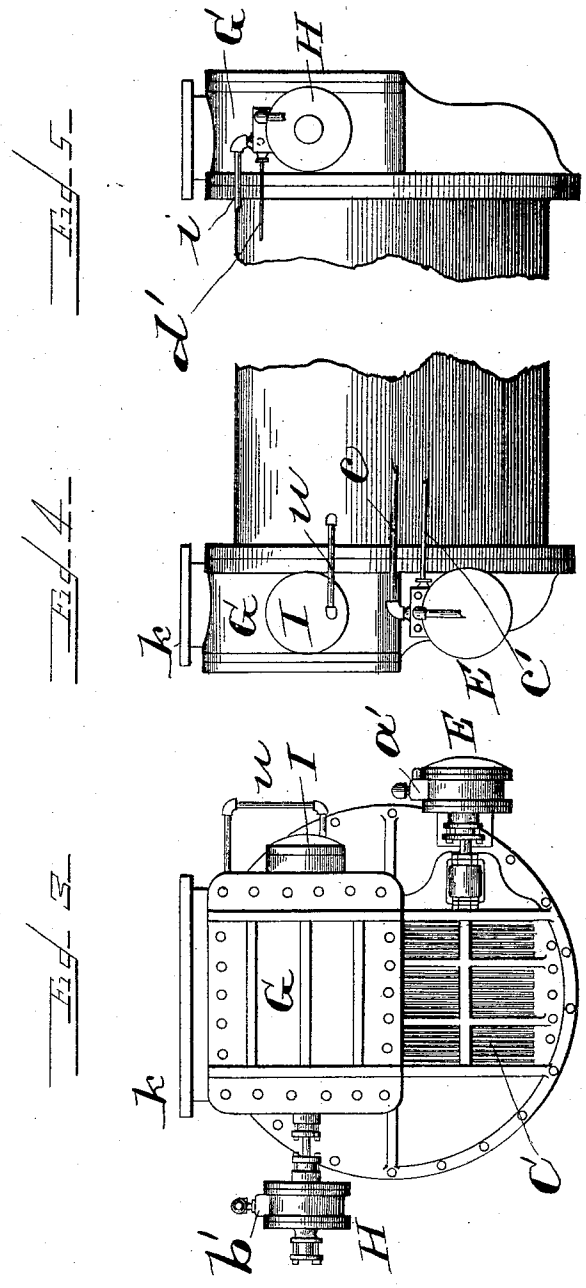

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UNITED STATES PATENT OFFICE.

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COMPRESSING OR BLOWING ENGINE.

SPECIFICATION forming part of Letters Patent No. 484,495, dated October 18, 1892.

Application filed April 8, 1892. Serial No. 428,263. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. GALVIN, a citizen of the United States, residing at Steelton, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Compressing or Blowing Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My present invention relates to compressing or blowing engines, and has for its object certain improvements in the construction of valve-operating mechanism for the compressing or blowing cylinder to secure steady and regular action, avoid undue strain upon the engine, and waste of power by automatically opening the discharge-valve at the point in the stroke of the piston when the pressure in the compression-cylinder and that in the discharge-conduit are equal.

The invention consists in the valve-operating mechanism hereinafter fully disclosed and claimed, whereby the cams, eccentrics, levers, and connecting-rods heretofore used for the purpose are dispensed with and the valves operated by motors and positive operating devices not liable to excessive wear and tear.

In the accompanying drawings, which form part of this specification, I have illustrated the best forms in which I have contemplated embodying my invention.

In the drawings, Figure 1 represents an end view, partly in section, of a compression-cylinder of a blowing-engine with the bonnet of the discharge-valve chest removed. Fig. 2 is a side elevation of the compression-cylinder; Fig. 3, an end view of the same, showing a modification in the valve-operating mechanism on a reduced scale; Fig. 4, a side elevation of one end of the cylinder, and Fig. 5 a similar view of the opposite side of the same end of the cylinder.

Reference being had to the drawings and the letters thereon, A indicates a compression-cylinder for air or gases, and B the head of the cylinder, in which the air ingress and egress ports are formed and are controlled by the air-inlet valve C and the air-discharge valve D, which may be of any approved form of construction, preference, however, being given to the grid-valve and to which either a reciprocating or oscillating motion may be imparted. In the present construction the motion imparted to the valves is reciprocating, and to effect the same there is attached to the rod *a* of the inlet-valve C a piston *b*, which operates in a cylinder E, supplied with a motor fluid, which may be steam or compressed air, through pipes *c d*, the former supplying motor fluid for opening the valve and the latter for closing the same, which communicate with a motor-fluid-supply chamber or chest F, which is controlled by a valve, (not shown,) to which the valve-rod *e* is attached and operated from the main engine in any approved manner, such as by a lever or an eccentric imparting motion from the piston-rod or from the shaft of the engine. This connection can be readily made by a mechanic skilled in the art to which my invention relates, and therefore requires no further elucidation. The piston *b* moves the valve C in both directions to open and close the ingress-ports to the cylinder A. The discharge-valve D is closed by a piston *f*, attached to the valve by a rod *g* and supplied with motor fluid by pipe *i*, which is an extension of pipe *c*, and also communicates with the chamber or chest F and is opened when an equilibrium is established between the pressure of the air in the cylinder A and in the discharge-valve chest G, or in the conduit, (not shown,) which in practice is attached to the flange *k* on the chest G and leads to a receiver or place of consumption. The opening of the valve D is effected by a spring *l*, which surrounds a rod *m*, also attached to the piston *f*, and is seated upon a flange *n* on the cover *o* on one end of the cylinder H, in which the piston *f* operates, and is confined in position by a head *p* on the outer end of rod *m* by nuts *q*, which apply the requisite tension to the spring *l* to move the valve.

The equilibrium, to which reference has been made, is effected by exposing the inner end of piston *r* in cylinder I to the pressure of the air in the chest G through an opening

t and the opposite end of the piston to the pressure of the air in the compression-cylinder A by a pipe *u*, which communicates with the cylinders I and A, as shown in Figs. 1, 2, 3, and 4. As the piston of the compression-cylinder moves back from the ingress-ports on its instroke the inlet-valve C is opened by the piston *b* in the cylinder E, operated by a motor fluid controlled by a valve operated continuously from same moving part of the engine and air admitted to the cylinder, and as the piston of the compression-cylinder advances in its compression-stroke the instant the pressure in the cylinder equals the pressure in the chest G and the discharge-conduit the piston *r* is balanced, when the resiliency of the spring *l* draws the valve D across its seat and opens the egress-ports and holds them open until the piston has reached the end of its stroke. Should the spring, from any cause, not act to draw the valve D to open it, the piston *r* will move and effect the same as soon as the pressure in the compression-cylinder exceeds that in the chest G sufficiently to push the valve across its seat. By this means an effective fluid-pressure regulator is produced and all strain on the engine obviated, while the power expended by the engine is applied only to accomplish the work for which it was designed, and the cams, eccentrics, toggles, levers, and connecting-rods heretofore used for this purpose are dispensed with.

In Figs. 3, 4, and 5 is shown a modified construction of the cylinders or the motors for operating the inlet and discharge valves. In this construction valve-chests *a' b'* are provided for the cylinders E and H, respectively, the valves of which cross the cylinders and are provided with rods *c' d'* to be connected to the main engine-shaft or the piston-rod in similar manner as rod *e* is operated, and thereby time the operation of the inlet and discharge valves to coincide with the stroke of the engine.

Having thus fully described my invention, what I claim is—

1. In a compressing or blowing engine, an air-supply valve, in combination with a fluid-pressure motor for operating said valve, a separate discharge-valve and a fluid-pressure motor attached to said valve to move it in one direction, means independent of the motor for moving said valve in the opposite direction, and motor-fluid-supply pipes communicating with both motors.

2. In a compressing or blowing engine, an air-supply valve, a fluid-pressure motor for opening and closing said valve, a discharge-valve, and a fluid-pressure motor for closing said valve, in combination with means independent of the motor for opening said valve.

3. In a compressing or blowing engine, a supply-valve and operating mechanism therefor, a discharge-valve having a pneumatic pressure-equalizing device attached thereto, and a fluid-pressure motor for closing the valve, in combinationn with a device separate from the motor for automatically opening the valve.

4. In a compressing or blowing engine, an air-supply valve and operating mechanism therefor, in combination with a discharge-valve having at one end a cylinder provided with a piston and communicating with the compressed-air chest or conduit at one end and with the compressing-cylinder at the opposite end, and a fluid-pressure motor connected to the opposite end of said valve for closing the valve, and a separate device for opening the valve.

5. In a compressing or blowing engine, a motor-fluid-supply chamber and a valve for controlling the same, operated from the engine, an air-supply valve, a motor for operating the same, a discharge-valve, and a motor attached thereto, and both motors communicating with said motor-fluid-supply chamber, in combination with a pressure-equalizing device connected to the discharge-valve and suitable means for operating said discharge-valve in one direction independent of its motor.

6. In a compressing or blowing engine, the combination of an air-supply valve, a motor for operating the same and provided with a motor-fluid-supply valve controlled from the main engine, an air-discharge valve, a motor for closing said valve and provided with a motor-fluid-supply valve, also controlled from the main engine, a fluid-pressure equalizing device attached to the discharge-valve, and a positively-operated device for opening said discharge-valve when an equilibrium of pressure is established in the discharge-conduit and in the compressing-cylinder.

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

JAMES A. GALVIN.

Witnesses:
D. C. REINOHL,
H. B. REINOHL.