

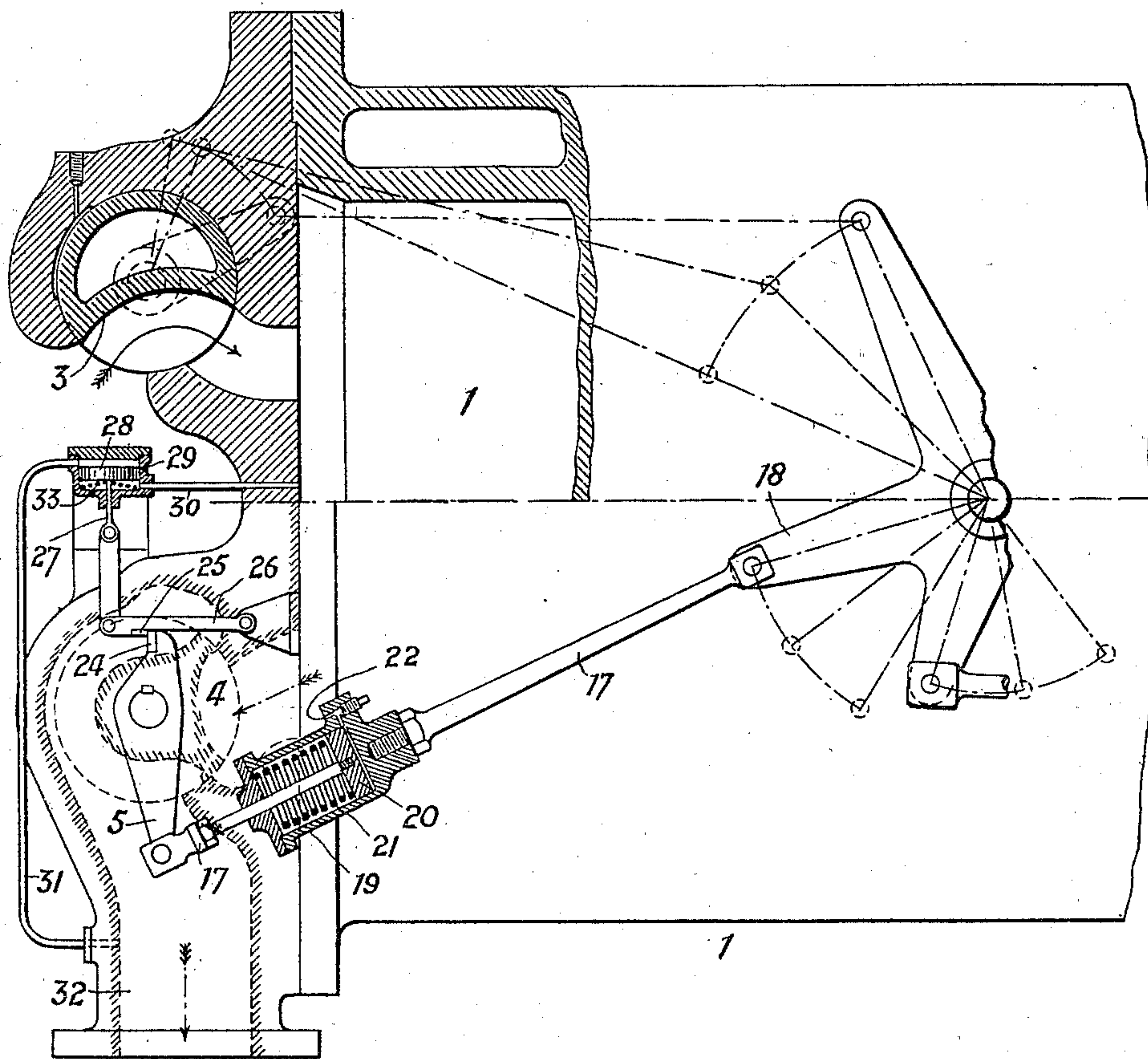
No. 725,047.

PATENTED APR. 14, 1903.

E. CROWE.
VALVE GEAR FOR PUMPS OR THE LIKE.

APPLICATION FILED MAY 17, 1901.

NO MODEL.



Witnesses
R. Abernethy
John G. Latta

Inventor
Edward Crowe
By
Brice & Smith
His Attorneys

UNITED STATES PATENT OFFICE.

EDWARD CROWE, OF SHEFFIELD, ENGLAND.

VALVE-GEAR FOR PUMPS OR THE LIKE.

SPECIFICATION forming part of Letters Patent No. 725,047, dated April 14, 1903.

Application filed May 17, 1901. Serial No. 60,651. (No model.)

To all whom it may concern:

Be it known that I, EDWARD CROWE, engineer and chief draftsman, a subject of the King of Great Britain, residing at Birchholm, Bushey Wood, Totley Rise, Sheffield, England, have invented new and useful Improvements in Valve-Gear for Pumps, Air-Compressors, Blowing-Engines, or the Like, of which the following is a specification.

10 This invention relates to improvements in actuating the delivery-valves or both the suction and the delivery valves of pumps, gas and air compressors, blowing-engines, and the like, and has for its objects to prevent
15 loss and consequent waste of power, to lessen clearance or dead spaces, to insure the more instantaneous action of the valves, and thereby to enable a lesser valve area to suffice for a given amount of work, and also facilitate
20 the running of such machinery at a higher speed with safety than has generally heretofore been possible.

In applying this invention the valves, whether delivery or suction and whether of
25 the rotary sliding, rectilinear sliding, or lifting type, are closed at the required moments positively by the action of cam-gear or equivalent mechanism driven from the engine and instead of being opened by fluid-pressure or
30 positively, are opened by springs or weights, the valves being kept closed by fluid-pressure (acting directly or through friction) until the pressure within the working cylinder so
35 nearly equals that upon the other side of the valves that the springs or weights are free to open the valves automatically and suddenly.

Reference is to be had to the accompanying drawing, which is a sectional view of a pump or compressor cylinder with my invention applied thereto, showing valves of the Corliss
40 type opened by springs.

Valves of the Corliss type would in any case be connected to their respective spindles by the usual radial tongue-and-slot connection, whereby to allow of the valve moving
45 radially to take up wear of the valve face or seat while the axial position of the spindle remains constant. This form of connection admits of the valves when in the closed position being held stationary against their seats
50 by the fluid-pressure, the suction-valve 3 being so held by pressure from within the cyl-

inder and the delivery-valves 4 by the back pressure in the delivery-pipes.

In the drawing the application of the invention is only illustrated in respect of the delivery-valve, it being understood that the construction may be similar in the case of the suction-valve.

The delivery-valve 4 is operated through a
60 motion-rod 17 from a wrist-plate 18, (or it may be any other suitable device,) the motion-rod being in two sections connected by a coupling formed by a cylinder 19 and piston 20, a spring 21 being confined between
65 the piston and one end of the cylinder, while the other end of the cylinder is provided with an air-vent 22, so that it serves the purpose of an air-cushion or dash-pot. The end section of the motion-rod 17 is connected to the
70 valve-lever 5, and this lever is provided with an extension or nose 24, adapted to engage with a catch 25 on a trip-lever 26, to which is connected the rod 27 of a piston 28, working
75 in a cylinder 29, whereof the lower end is in permanent connection by a passage 30 with the interior of the main cylinder 1, while the upper end of the cylinder 29 is in permanent
80 connection by a pipe 31 with the delivery-outlet 32. A spring 33 beneath the piston 28 tends to press the latter upward and to raise the trip-lever 26, but is normally overcome by
85 the opposing back pressure from the delivery-outlet 32 acting on the piston 28. This trip-gear is provided as a safeguard in case the friction at the valve-face, due to the pressure at the back of the valve, may not alone
90 be sufficient to keep the valve closed against the stress of the spring 21, the operation being as follows: The valve is brought to the closed position by the operation of the wrist-plate 18, (or its equivalent,) and by the reverse movement of the wrist-plate during the
95 suction-stroke the spring 21 becomes compressed, the valve 4 being held stationary against the stress of the spring 21 by the friction consequent on the back pressure in the delivery-outlet acting on the back of the valve to press it to its seat. In moving the
100 valve to the closed position the lever 5 moves past the catch 25 of the trip-lever, so as to bring its nose 24 into position for engagement with the catch 25. Should the pressure on the back of the valve be (or prematurely

become) insufficient to retain the valve in the closed position, the valve will be arrested in the position shown—*i. e.*, just before it commences to open—by the engagement of the nose 24 with the catch of the trip-lever 26. When, however, during the next compression or delivery stroke the fluid in the working cylinder 1 attains a pressure equal to that in the delivery-pipe 32, the pressure on the back of the valve will be counterbalanced and the valve will be relieved of the consequent friction at the same time that the fluid-pressure on the two sides of the piston 28 will be equalized through the passages 30 and 31, and the catch of the trip-lever 26 will consequently be disengaged from the nose 24 of the valve-lever 5 by the action of spring 33. The valve 4 being then relieved both of the back pressure and of the positive engagement with the trip-gear will be quickly opened under the stress of the spring 21, controlled by the air-cushion at the other side of the piston 20. The suction-valve 3 would be operated by similar gear (of which only the center lines are indicated in the drawing) or it may be ordinary reciprocating gear. The construction and operation of the valve-operating gear would be essentially similar in the case of gridiron or other rectilinear reciprocating valves.

It is to be understood that whether the valves be of the Corliss reciprocating or lifting type the invention may be applied to the

delivery-valves only, since the time of opening of the delivery-valves varies with the pressure, whereas the time of opening of the suction-valves remains practically constant. The suction-valves may therefore be opened and closed by positive gear, as these last-mentioned valves may without disadvantage in many cases be opened and closed at fixed periods.

I claim—

In a pump, fluid-compressor, or blowing-engine the combination with valves of the Corliss or other type, of springs or weights so applied as to cause the valves to open when the fluid-pressure on the back of the valve ceases or is counterbalanced, positively-acting valve-gear operating to close the valves at the proper moments and to keep them closed until they are so retained by the fluid-pressure, and trip-gear engaging the valves so as to lock them in the closed position, said trip-gear being adapted to be operated by a spring which is permitted to act by the equalization of the pressure on the two sides of a piston in communication respectively with the main cylinder and with the passages controlled by the distributing-valves, as specified.

EDWARD CROWE.

In presence of—

CHURCH HOWE,
ALFRED C. TEVIS.