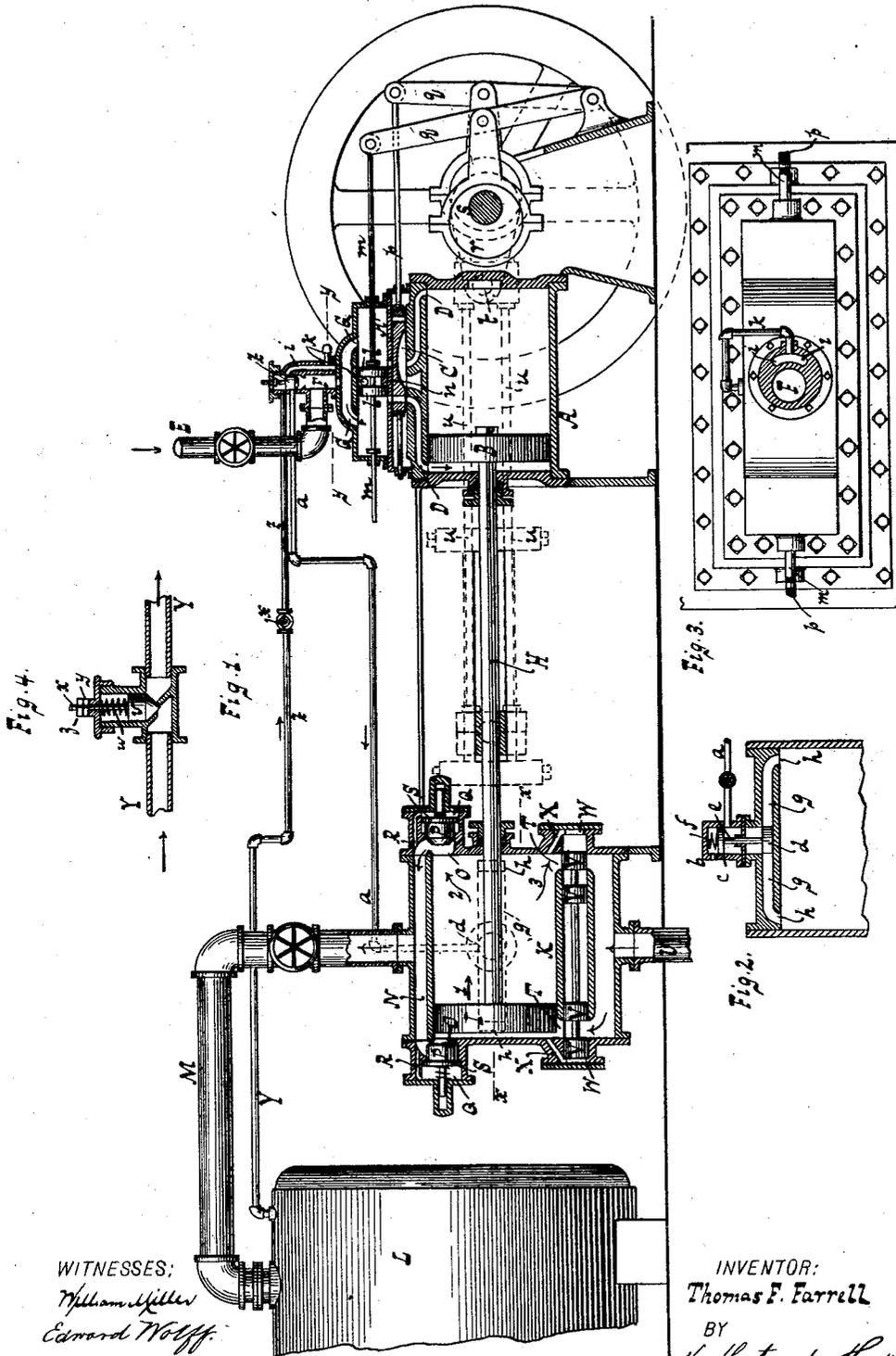


(No Model.)

T. F. FARRELL.
AIR COMPRESSOR.

No. 479,260.

Patented July 19, 1892.



WITNESSES:
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UNITED STATES PATENT OFFICE.

THOMAS F. FARRELL, OF PATERSON, NEW JERSEY.

AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 479,260, dated July 19, 1892.

Application filed July 9, 1891. Serial No. 393,944. (No model.)

To all whom it may concern:

Be it known that I, THOMAS F. FARRELL, a citizen of the United States, residing at Paterson, in the county of Passaic and State of New Jersey, have invented new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention relates to an improvement in air-compressors; and the invention consists in the details of construction set forth in the following specification and claims, and illustrated in the annexed drawings, in which—

Figure 1 is a sectional side elevation of the compressor. Fig. 2 is a section along $x x$, Fig. 1. Fig. 3 is a section along $y y$, Fig. 1. Fig. 4 is a section along $z z$, Fig. 1.

In the drawings, the letter A indicates a cylinder, in which a piston B moves back and forth, and C is the slide-valve, alternately admitting steam through the ports D D into the cylinder. The steam is supplied through pipe E and chamber F and openings or mouths G G to the ports D.

The piston-rod H actuates a piston I in cylinder K, so as to pump or force air from said cylinder into receiver L. The cylinder K is made to communicate with receiver L by means of a pipe M, which pipe communicates with a channel N, whose mouths O lead into cylinder K. The valves P alternately open and close these mouths, so as to open and close the communication with the receiver. The valves P are located in housings or channels Q, which by means of passages R communicate with the receiver. When the piston I moves in the direction of arrow 1, Fig. 1, the right-hand valve P is open, so that the piston I can force air through channel N and pipe M into receiver L, while the left-hand valve P is closed, being held firmly shut by the pressure of air in receiver L, which by means of channel R can press on the back S of valve P. These backs or rear portions S of the valves are enlarged, so that they present sufficient surface for the compressed air to efficiently act on in forcing the valves shut. A spring can be employed to aid in closing each of the valves. The air enters cylinder K through the inlets T T, which communicate with the inlet-pipe U. When the piston I travels in

the direction of arrow 1, the air enters the cylinder K through the inlet T at the left, the valve V being in position to close the other inlet T. This valve moves in housings W, communicating by channels X with the interior of cylinder K. When the piston I moves in the direction of arrow 1, the air entering the channel X at the right, as indicated by arrow 3, will hold the valve in the position shown in Fig. 1, while if the piston I moves in the opposite direction the air entering through the other channel X will force the valve V to the right, so as to close the inlet T at the left and open the inlet at the right. The valve V is thus oscillated or actuated at the proper moments by the air-pressure at one end or the other of cylinder K. From the receiver L extends a tube Y into the upper part of chamber F. The valve Z in said upper part of chamber F is held raised by the steam-pressure in said chamber; but when the pressure of air in receiver L becomes excessive said valve Z is forced down by the pressure in tube Y against the pressure of the steam and uncovers the opening or mouth of tube a , leading into the case or housing b of piston c , to which is connected the valve or stopper d by a rod e . The pressure of the air from tube a forces the piston c against the pressure of spring f and draws the stopper d out of the channel g , whose mouths h enter the cylinder K near opposite ends of the latter. When the stopper d is drawn out of channel g , the reciprocations of the piston I will merely cause the air to swing or move back and forth through the unobstructed channel g ; but the pumping operation is stopped, as no more air is now forced past valves P into tube M and receiver L. When the air in tube Y forces the valve Z down, the channel i is also uncovered or opened, so that the compressed air travels along channel i and pipe k and enters between the valves or stoppers $l l$ and forces said stoppers apart, so as to close or partially close the openings G, leading from chamber F to the passage in valve C. The stoppers l are slidably mounted on reciprocating rod m , so that said stoppers will not abruptly close the access of steam to valve C, but the steam is allowed to flow to piston B during only a part of the stroke of the latter, so that the piston B is not subjected

throughout its entire stroke to the full pressure of steam from the boiler, but such steam from the boiler is admitted to the piston during only a part of its stroke, after which the steam is cut off and the expansive force of the steam which has been admitted to the piston causes the piston to complete its stroke. A lug *n* prevents the stoppers from coming together, thus leaving space between the stoppers, into which space the air from tube *k* can enter to spread or separate the stoppers. The rod *m* can be provided with lugs to prevent the stoppers from spreading too far. The rod *m*, as also the rod *p*, which oscillates the valve C, are actuated by suitable arms or levers *q*, linked to eccentrics *r* on shaft *s*, which is rotated by a crank-pin *t* and pitman *u*, receiving motion from piston-rod H.

The tube Y is shown provided with a valve *v*, pressed to its seat by a spring *w*, and when the pressure of air in the receiver L and tube Y becomes excessive said valve *v* is forced from its seat, and the compressed air can then pass to the valve Z. The spring *w* is secured at its upper end to a stem *x*, and by setting the stem *x* higher or lower by the setting-nut *y* and jam-nut *z* the pressure of the spring on valve *v* is regulated. The valve *v* slides on the stem *x*.

The plate A' is located at the back of valve C, so as to keep the pressure of steam off the back of said valve, thus enabling the valve to work easily on its seat.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a receiver and a cylinder K, having a housing *b*, of a valve-chamber F, a pipe Y, leading from the receiver to the valve-chamber, a pipe *a*, leading from

the valve-chamber to the housing *b*, a valve Z, located in the valve-chamber F and actuated by the pressure in the pipe Y to open the pipe *a*, and a piston located in the housing of said cylinder, said cylinder being provided with a channel having mouths *h*, leading into the cylinder at opposite sides of the piston, and a stopper or valve *d* for said channel, said stopper or valve being actuated by the pressure in the pipe *a*, substantially as described.

2. The combination, with a receiver, of a cylinder made to communicate with said receiver, said cylinder being provided with a piston I and with a channel having mouths *h*, leading into the cylinder at opposite sides of the piston, a stopper or valve *d* for said channel, an actuating-piston B, a cylinder A for said actuating-piston, stoppers or valves *l* for intercepting the steam-supply to said cylinder, a supply-pipe Y, and pipes or channels *a i* for conveying pressure from the receiver to the valves *d l*, respectively, for actuating the latter, said supply-pipe being provided with a valve and a spring or weight for holding said valve closed until a certain pressure is attained and said pipe Y being made to communicate with the pipes or channels *a i*, leading, respectively, to the valves *d l*, and a valve Z, actuated by the pressure in the pipe Y for opening the pipes or channels *a i*, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

T. F. FARRELL.

Witnesses:

WM. C. HAUFF,
E. F. KASTENHUBER.