No. 767,027. PATENTED AUG. 9, 1904.

M. C. WILKINSON.

AIR COMPRESSION AND UTILIZING DEVICE.

APPLICATION FILED DEC. 13, 1900.

NO MODEL.

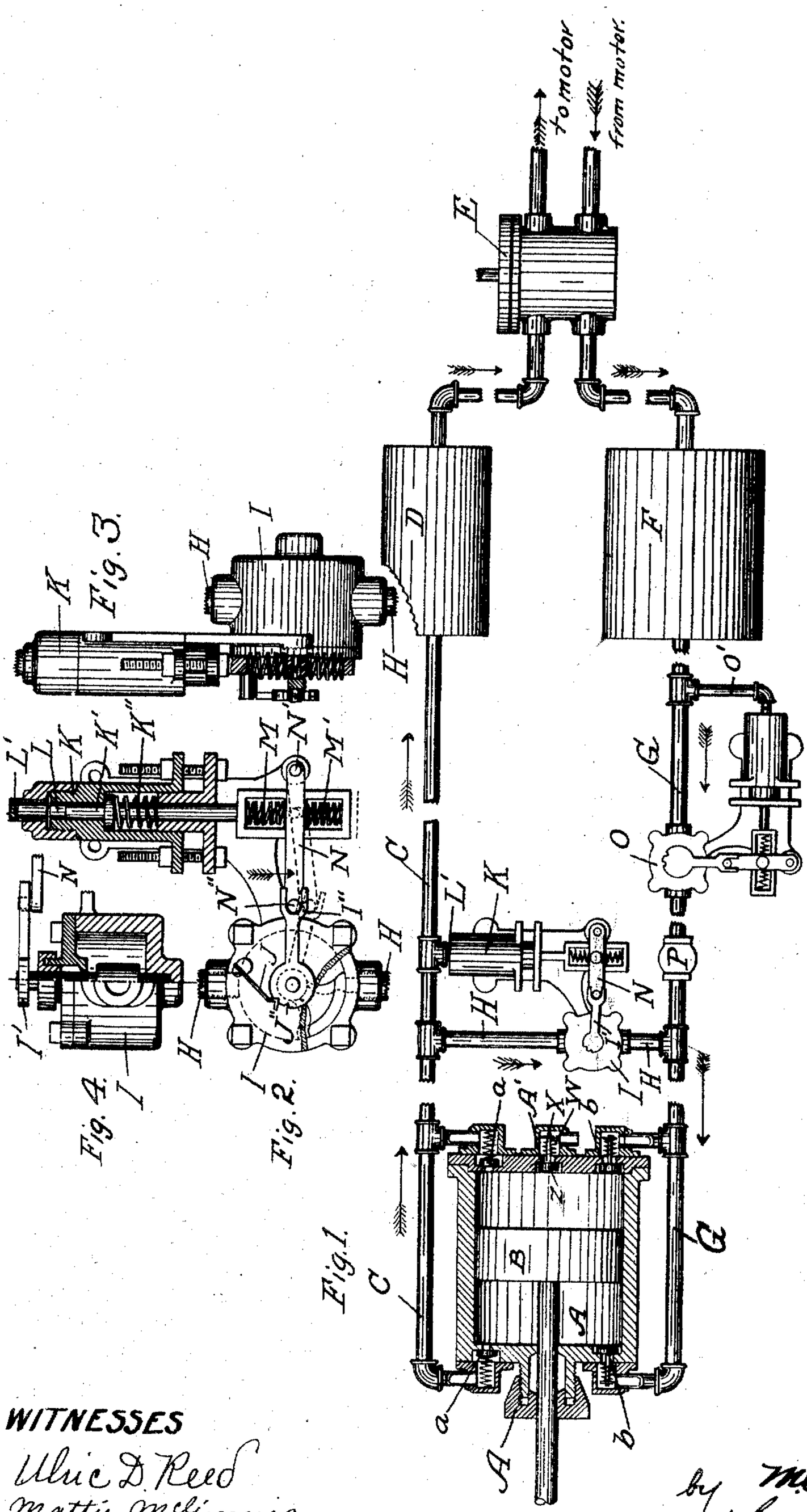

Fig. 3.

Fig. 4.

Fig. 2.

Fig. 1.

WITNESSES

Ulric D. Reed

Mattie McGinnis

INVENTOR

by M. C. Wilkinson

Hazard & Hopkins

ATTORNEYS

No. 767,027. Patented August 9, 1904.

UNITED STATES PATENT OFFICE.

MELVILLE C. WILKINSON, OF LOS ANGELES, CALIFORNIA.

AIR COMPRESSION AND UTILIZING DEVICE.

SPECIFICATION forming part of Letters Patent No. 767,027, dated August 9, 1904.

Application filed December 13, 1900. Serial No. 39,778. (No model.)

To all whom it may concern:

Be it known that I, MELVILLE C. WILKINSON, a citizen of the United States, residing at Los Angeles, county of Los Angeles, State of California, have invented new and useful Improvements in Apparatus for Recompressing, Conveying, and Distributing Compressed Air as a Motive Force, of which the following is a specification.

My invention relates to certain novel modes of controlling the compression, recompression, conveyance, and distribution of air under pressure in that class of machinery in which compressed air is used as a means to transmit motive force to drive machinery more or less distant from the primary source of power in which the exhausted air is recompressed for reuse.

The objects of my invention are to reduce the size and weight of compressed-air machinery, to do away with water-jacketing or other cooling devices, no matter what pressure is used, to enable unevenly-developed power to be utilized at any speed or in any direction, and to generate only the power required to operate the working machinery. I accomplish these objects by means of the mechanism described herein, and illustrated in the accompanying drawings, in which—

Figure 1 is a plan view of my improved apparatus, partly in horizontal section, the connecting-pipes being broken away in places. Fig. 2 is a plan view of the quick-acting valve I and its operating mechanism, the piston-chamber being shown in central longitudinal section. Fig. 3 is a side view of the valve I and connections. Fig. 4 is an edge view of the valve I, one-half being in section.

A is an air-compressing cylinder of ordinary construction without cooling devices and is provided with a third or auxiliary ordinary air-admission port A′ at one end of the cylinder only. Upon the oscillation of the piston B air is forced alternately from the space on the sides of piston B through the emission-valves *a a* into pipe C, and from thence into reservoir D, and thence into controller E, and thence to the working machinery. On the return from the working machinery the air again passes through the controller into reservoir F and thence through pipe G and admission-valves *b b* into the air-compressor. The pipes C and G are connected by a by-pass pipe H, on which is placed a quick-acting valve I and its operating mechanism, (hereinafter more fully explained,) which when the pressure in pipe C reaches a predetermined point—say two hundred pounds—is automatically opened by the mechanism shown in section in Fig. 2 and consists of the chamber K, containing a piston K′, held against the air-pressure in chamber L by spring K″. Chamber L is connected by pipe L′ to pipe C. When the pressure in pipe C reaches one hundred and ninety-five pounds, the piston K begins to compress spring K″ and also spring M. When the tension of spring M has reached, for example, five pounds, this pressure being communicated to lever N, pivoted at N′, and pin N″ within fork of lever I″ of valve I, the expansion of spring M will move lever N in the direction of the arrow, causing the mechanism to assume the position shown in dotted lines in Fig. 2, with the spring J then in notch J″ on the hub of the lever I″. The valve is then open. When the pressure in chamber L again returns to one hundred and ninety-five pounds, spring M′ causes spring J to leave notch J″. The mechanism then assumes its first position, and the valve is closed. As long as no air is being used by the working machinery this by-pass H remains open, the air circulating through pipes C H G and compressor A at the same pressure. When air is used by the working machinery, the pressure in pipe C falls, thus closing valve I, when the air is then pumped from pipe G into pipe C. In pipe G is placed quick-acting valve O, similar in construction to valve I and operated by similar mechanism, only the chamber back of the spring-pressed piston is connected to pipe G instead of pipe C by pipe O′. Between the valve O and the by-pass H on pipe G is placed a check-valve P to permit air to pass from the controller E to the compressor A, but will prevent air from passing in the opposite direction from pipe C through by-pass H and valve O to the controller E when valve I is open. Valve O being at one hundred pounds pressure will give one hundred

pounds pressure on the working machinery and allow the compressed air from the compressor to expand to but two volumes, and thus prevent freezing, and as the compressor will then receive air at one hundred pounds pressure it has to compress it to two hundred pounds or to but one-half its volume. Therefore the compressor requires no cooling devices. Until reservoir F has received air to raise its pressure to one hundred pounds and open valve O air is drawn into the mechanism through valve A′ until both reservoirs D and F have been pumped up to pressure, when valve O opens and the compressor pumps direct from reservoir F, which receives the exhaust of the working machinery. Whenever the pressure drops in pipes C and G, due to loss by leakage, and valves I and O are neither of them open, then the compressor pumps what air remains in the pipes G and H between the valves I and O and suction-ports *b b* into pipe C, and when the air in this section has been exhausted below atmospheric pressure then the outside atmospheric pressure causes air to enter at port A′ and be pumped into pipe C.

The reason why it is desirable to have the valve A′ at one end of the cylinder only is that it requires less power to pump the air from atmospheric pressure to two hundred pounds by using the compressor as a single-acting pump than if it were double-acting, for if it were required to pump as a double-acting compressor from atmospheric to two hundred pounds pressure it would require nearly twice as powerful initial motive force as is required after the pipes are charged to one hundred pounds when the compressor has to compress it to but another one hundred pounds.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an air-compression system, the combination with a compression-cylinder provided with an induction and an eduction port at either end thereof, a high-pressure reservoir connected with the eduction-ports, a low-pressure reservoir connected with the induction-ports, a controller with which the reservoirs are connected, and a pipe extending between the connections of the reservoirs and cylinder, of a pressure-operated valve in the pipe, a check-valve in the connection leading from the low-pressure reservoir to the cylinder and a quick-acting valve located in said connection, pneumatic mechanism for operating the valve, the pneumatic mechanism set to operate only when a predetermined pressure is reached.

2. The combination with a compression-cylinder, high and low pressure reservoirs connected therewith, a pipe extending between the connections, a valve in the pipe and means for controlling the valve, of a rotary valve in the connection between the low-pressure reservoir and the cylinder, a chamber connected with the connection, a piston in the chamber, a valve-fork on the valve, a lever connected therewith, the piston adapted to engage the lever and means for normally retaining the piston at one limit of its movement until overcome by a predetermined pressure.

3. In a system for compressing using and recompressing air under pressure as a motive power, a double-acting air-compressor having induction-ports connecting the said compressor with the low-pressure side of the system and eduction-ports connecting the said compressor with the high-pressure side of the system and an induction-port connecting one end only of the compressor with the external air; an inwardly-opening valve in the induction-port leading to the open air, adapted to open and feed air into one end of the compressor only when the pressure therein falls below the external air-pressure.

4. The combination with a compression-cylinder, high and low pressure reservoirs, and pipes connecting the reservoirs, and cylinder, a by-pass pipe extending between the connecting-pipes, of a valve therein, means connected with the valve and with the high-pressure reservoir to operate the valve, the means comprising a chambered casing in communication with the high-pressure reservoir, a plunger in the casing, a spring for retaining the plunger against the normal pressure of the reservoir, a fork-arm connected with the valve, a lever stationarily pivoted at one end the opposite end connected with the fork-arm and a block yieldingly held by the plunger and connected with the lever.

5. The combination with a compression-cylinder, high and low pressure reservoirs connected therewith and a pipe extending between the high and low pressure connections, of a rotary valve in the pipe, a forked arm connected therewith, a chambered casing connected with the high-pressure reservoir, a plunger in the casing, the plunger provided with an extension protruding outside the casing, a block yieldably supported in the plunger extension means for retaining the plunger in position against the normal high pressure, and a lever connected with the arm and with the yieldingly-supported block.

In witness that I claim the foregoing I have hereunto subscribed my name this 30th day of November, 1900.

MELVILLE C. WILKINSON.

Witnesses:

G. E. HARPHAM,

H. T. HAZARD.