

No. 635,516.

Patented Oct. 24, 1899.

J. P. SIMMONS.  
AIR COMPRESSOR.

(Application filed Feb. 15, 1897.)

(No Model.)

Fig. 1.

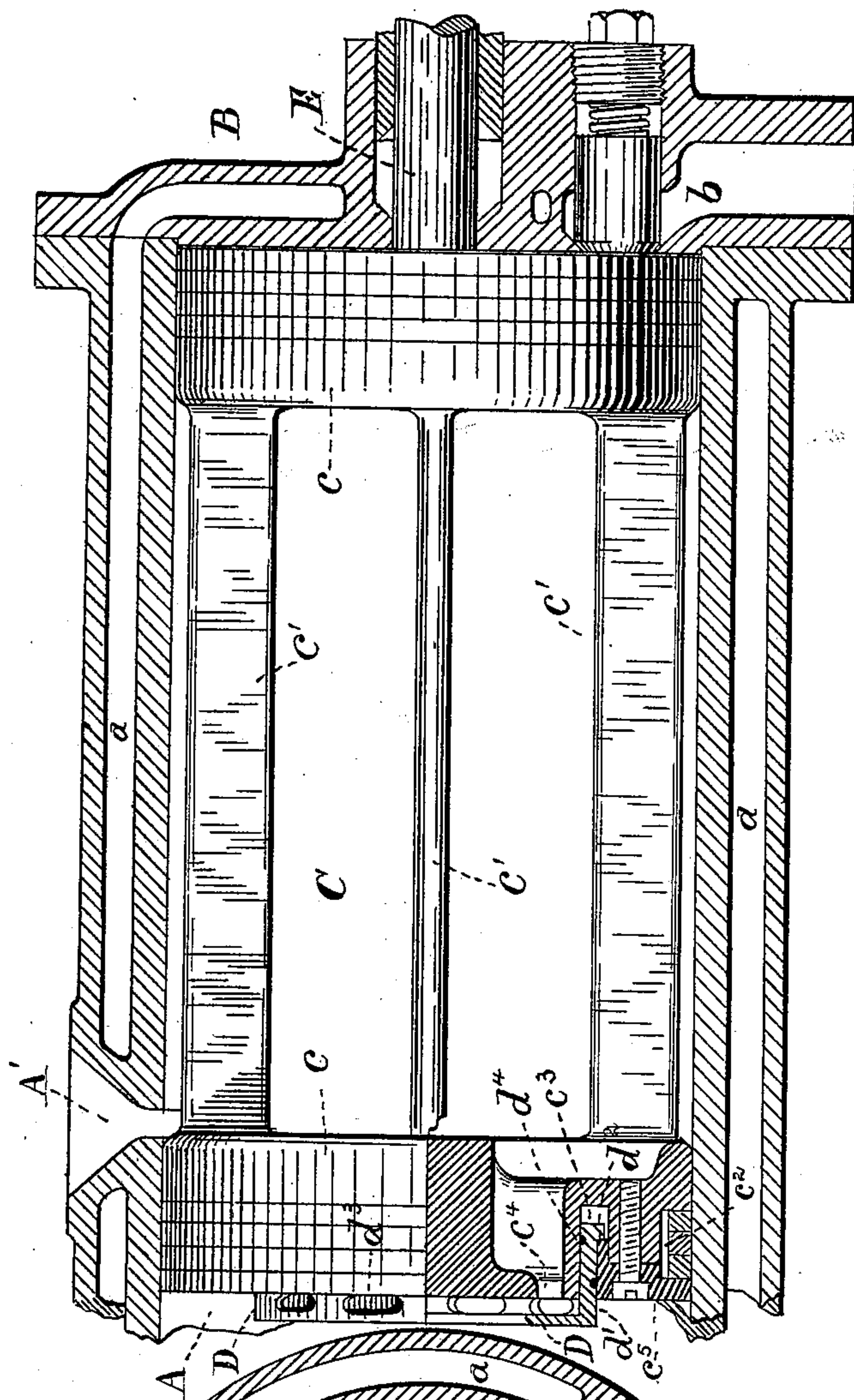
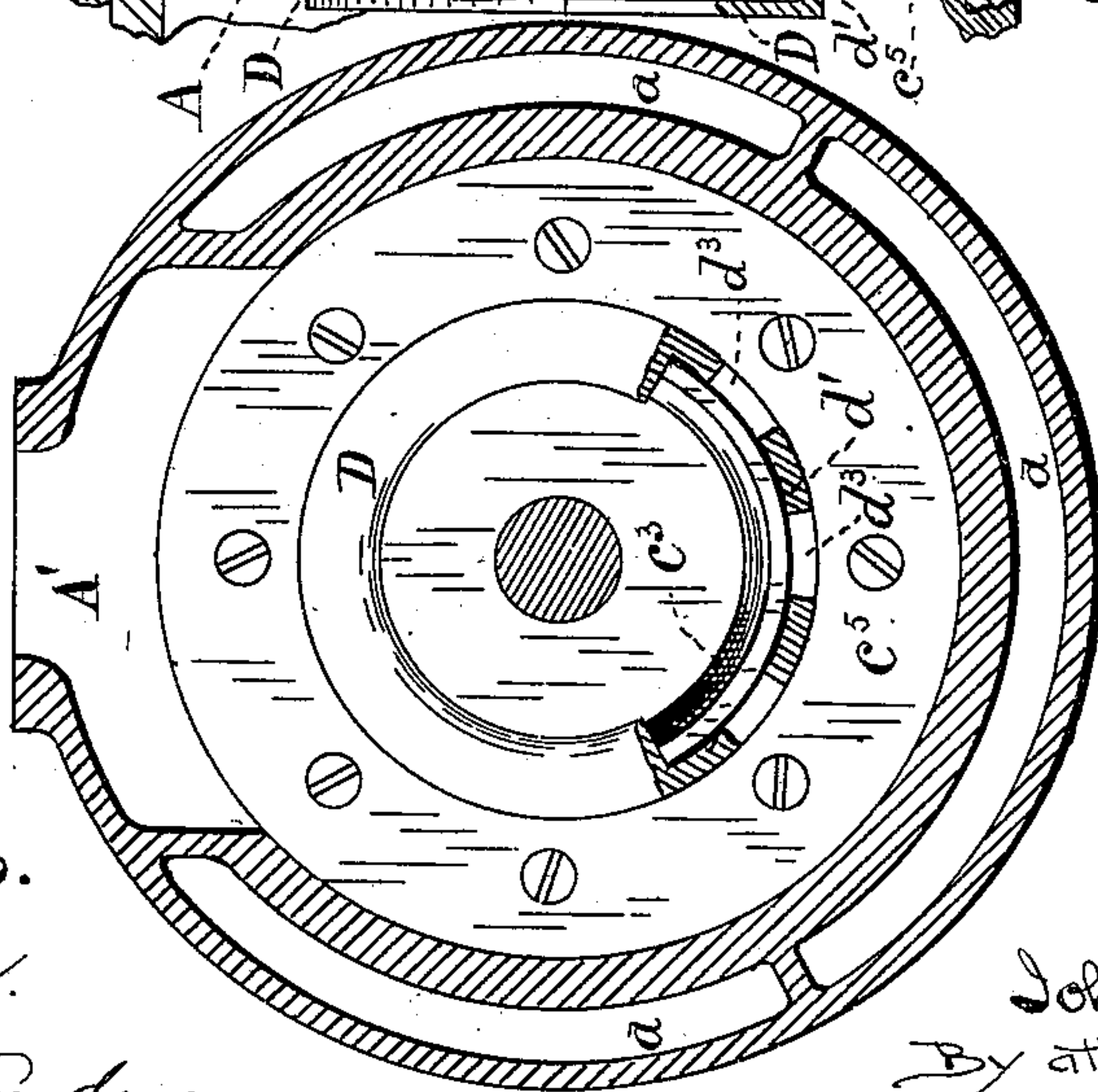


Fig. 2.



Witnesses.

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# UNITED STATES PATENT OFFICE.

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## AIR-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 635,516, dated October 24, 1899.

Application filed February 15, 1897. Serial No. 623,488. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN P. SIMMONS, a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented a new and useful Improvement in Air-Compressors, of which the following is a specification.

My invention relates to the class of devices for compressing air and other gaseous fluids.

It consists in the novel construction, arrangement, and combination of the several parts which I shall hereinafter fully describe and specifically claim.

The object of my invention is to provide a compressor of simple construction which shall be effective in operation. This I accomplish by means of the devices illustrated in the accompanying drawings, in which—

Figure 1 shows a longitudinal section of the compressor-cylinder. Fig. 2 shows a cross-section of cylinder.

Referring to the drawings, A is a double-walled compressor-cylinder, the space between the double walls forming a water space or jacket for the circulation of cooling-water. An inlet-port A' is provided, located approximately midway of the length of the cylinder. For convenience of illustration but one end of the cylinder is shown in Fig. 1, the other end being practically identical in construction.

B is a head suitably secured to the cylinder. It is also double walled to provide for a water-jacket. Free communication is provided between the water-jacket of the head with that of the cylinder for circulating the cooling-water. Suitable valve-controlled outlets, one of which is shown at b, are provided in each head for the exit of the compressed air separated from the water-jacket by suitable partitions.

C is a "cage-piston" formed of two plates c c, separated by a distance approximately equal to the stroke. The plates c c are rigidly connected by any suitable connection. One such is shown in the drawings as cast braces c' c'. Both ends of the cage-piston being alike a description of one will suffice.

When the parts are assembled, c comprises a piston-head provided with a circumferential

groove c<sup>2</sup> for the reception of packing-rings. It also has recessed into its outer face an approximately concentric annular groove c<sup>3</sup>, and it is provided with an annular valve-controlled port or passage c<sup>4</sup>, extending through from side to side of the piston-head c, of smaller diameter and concentric to groove c<sup>3</sup>. An annular ring-valve D of L-section controls the port or passage c<sup>4</sup>. It comprises a flat ring sufficiently wide to cover the port c<sup>4</sup> and extend to the groove c<sup>3</sup>.

The ring-valve D is provided with a short annular stem d', which projects into and is guided by the groove c<sup>3</sup>. The stem d' is provided at its inner end with a radially-projecting shoulder or flange d<sup>2</sup>. Close to the ring D it is provided with perforations d<sup>3</sup> for the free exit of air. It may also have suitable packing, as indicated at d<sup>4</sup>. Forming a part of piston-head c is a detachable ring or annulus c<sup>5</sup>, approximately equal in exterior diameter with the piston-head. A portion of the inner surface of the ring c<sup>5</sup> forms a portion of the circumferential packing-ring groove c<sup>2</sup>, and the inner circular face of the ring forms one side of the annular groove c<sup>3</sup> and, being of somewhat smaller internal diameter than the external diameter of groove proper, c<sup>3</sup>, projects over shoulder d<sup>2</sup>, thus forming a stop to limit the motion of annular valve D.

The operation of the device is as follows: The piston is assumed to be just finishing its stroke to the right, as represented in Fig. 1. Access of air or gas to be compressed is free at all times from the inlet-port A' to the interior of the cylinder A between the heads c c of the cage-piston C. Consequently as the piston moves to the right air will pass freely through the annular port in the left piston-head into the cylinder beyond the piston. Having finished this forward stroke and started back, the rear valve D closes and the forward one opens, admitting air into the forward end of the cylinder and, compressing the air contained in the rear portion of the cylinder, forces it through the valve-controlled outlet b to a receiver or other desired place. This operation is repeated with each stroke of the piston. The reciprocation of the piston is effected by any suitable power device



applied to the piston-rod E, which is securely attached to the cage-piston.

The construction illustrated and herein described accomplishes several very desirable results in a simple and effective manner. It is desirable in this class of devices that the heat generated by compression should be removed as quickly as possible from the walls of the cylinder. In this device cold air has free access to a much larger proportion of the inner surface of the cylinder than in the case of a single-piston compressor.

Another desirable result of the present construction is that the inlet is adapted to the attachment of a pipe whereby compounding is readily accomplished; also, gases or cold air can be led from receptacles or other sources at a distance, results difficult, if not impossible, in compressors in which multiple inlets are placed in the cylinder-heads.

It is extremely desirable that the inlet of air shall be as free and unobstructed as possible. This is obtained in the present device by the inlet A' and the construction of the piston-heads c c and valve D permitting the free and full opening of the annular port c<sup>4</sup>. The opening of valve D is immediate and automatic at the commencement of the return stroke by the expanding of the small body of compressed air forced in behind the valve-stem d' during its previous stroke. The perforations d<sup>3</sup> permit free passage of air with a small lift of the valve.

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

1. A compressor comprising a cylinder having suitable outlets, a cage-piston therein provided with a valve-controlled port in each end thereof communicating with the interior of the cylinder on opposite sides, and an annular recess or pocket exterior to and sepa-

rate from said port, in which the stem of the valve is guided.

2. A compressor comprising a cylinder having suitable outlets and an inlet-port approximately midway of the ends, a piston therein having a valve-controlled port in each of its faces and an annular recess or pocket, exterior to and separate from said port, in which the valve-stem is located and guided.

3. A compressor comprising a cylinder having a valve-controlled outlet at each end and an air-inlet intermediate thereof, a piston therein having a through-passage and a ring-valve on each face, controlling the opposite ends of said passage, the stem of which is guided in an annular recess or pocket exterior to and separate from the passage.

4. The combination with the piston of a compressor having an annular port of a ring-valve controlling the port, said valve having a stem projecting into a recess or pocket in the piston exterior to and separate from the port.

5. The combination with the piston of a compressor having an annular passage, of a ring-valve controlling the passage having an annular stem projecting within the body of the piston and provided with a radial projection, and a ring detachably secured to the piston adapted to engage with the radial projection whereby the movement of the valve is limited.

6. The combination with the piston of a compressor having an annular port of a ring-valve the stem of which forms an annular piston in a recess or pocket whereby air forced into said pocket by previous compression assists the operation of the valve.

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Witnesses:

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