(No Model.) 2 Sheets—Sheet 1.

J. HUMES.

OSCILLATING GAS COMPRESSOR.

No. 540,492. Patented June 4, 1895.

Fig. 2.

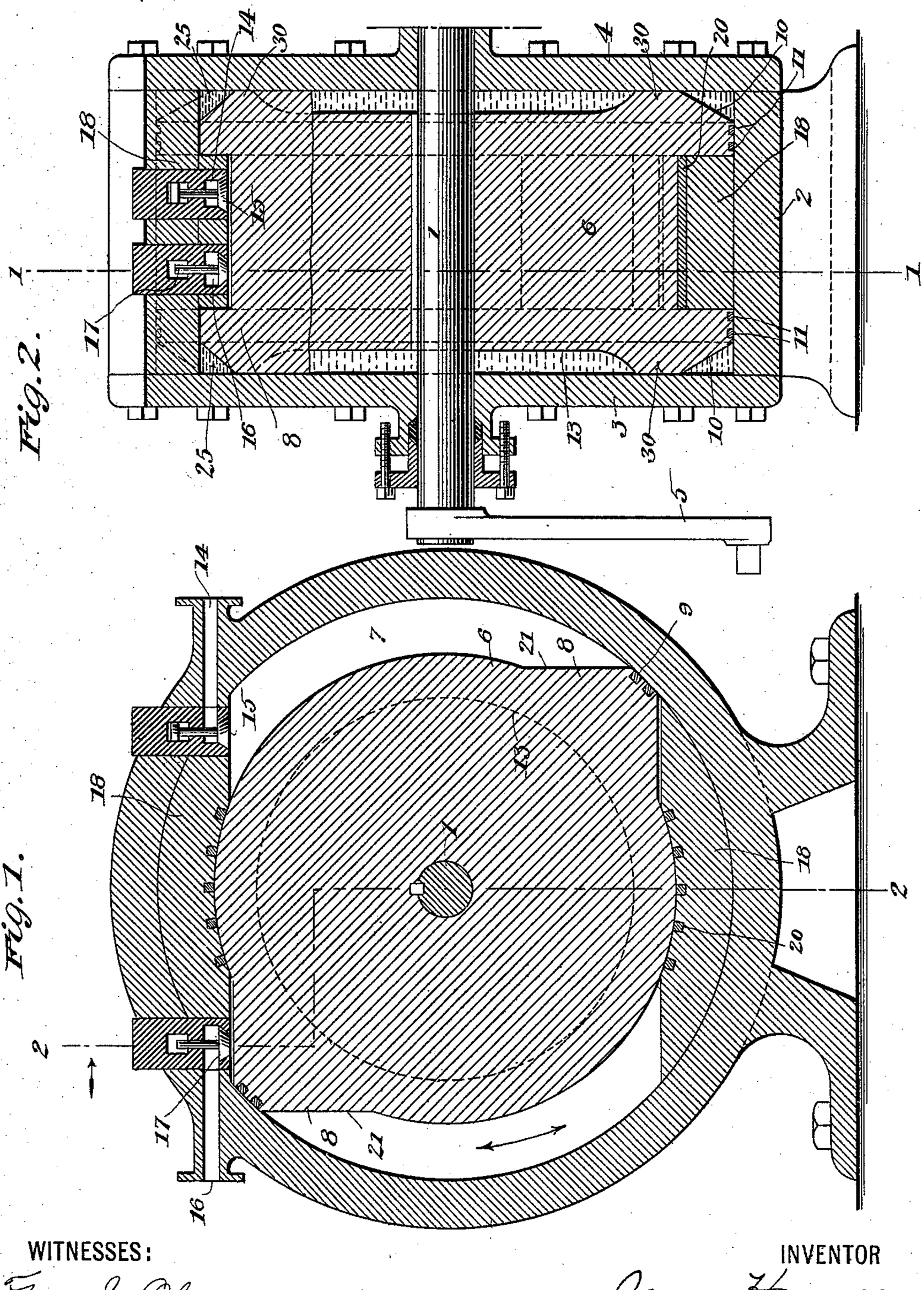

Fig. 1.

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(No Model.) 2 Sheets—Sheet 2.

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OSCILLATING GAS COMPRESSOR.

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Fig. 4.

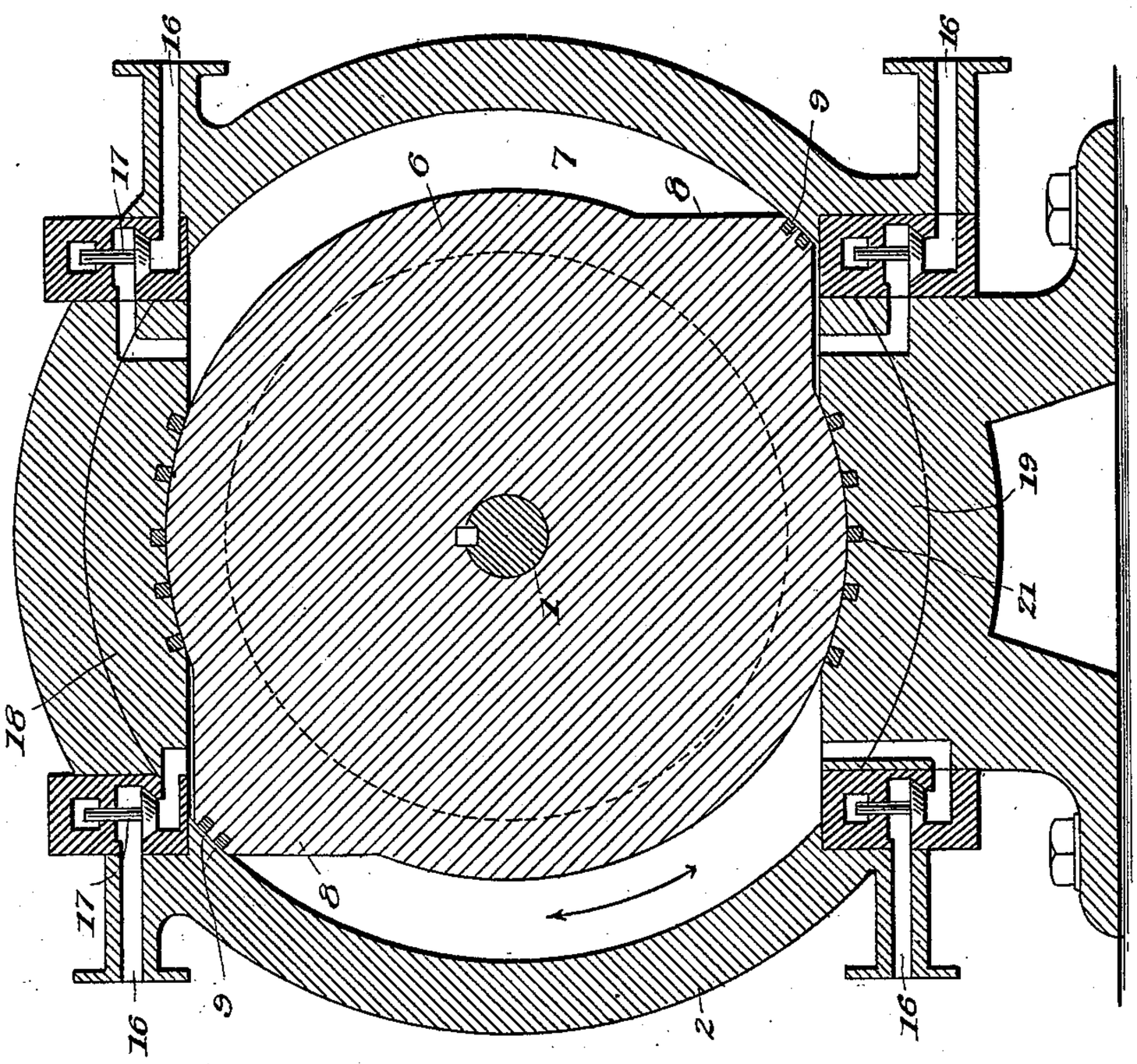
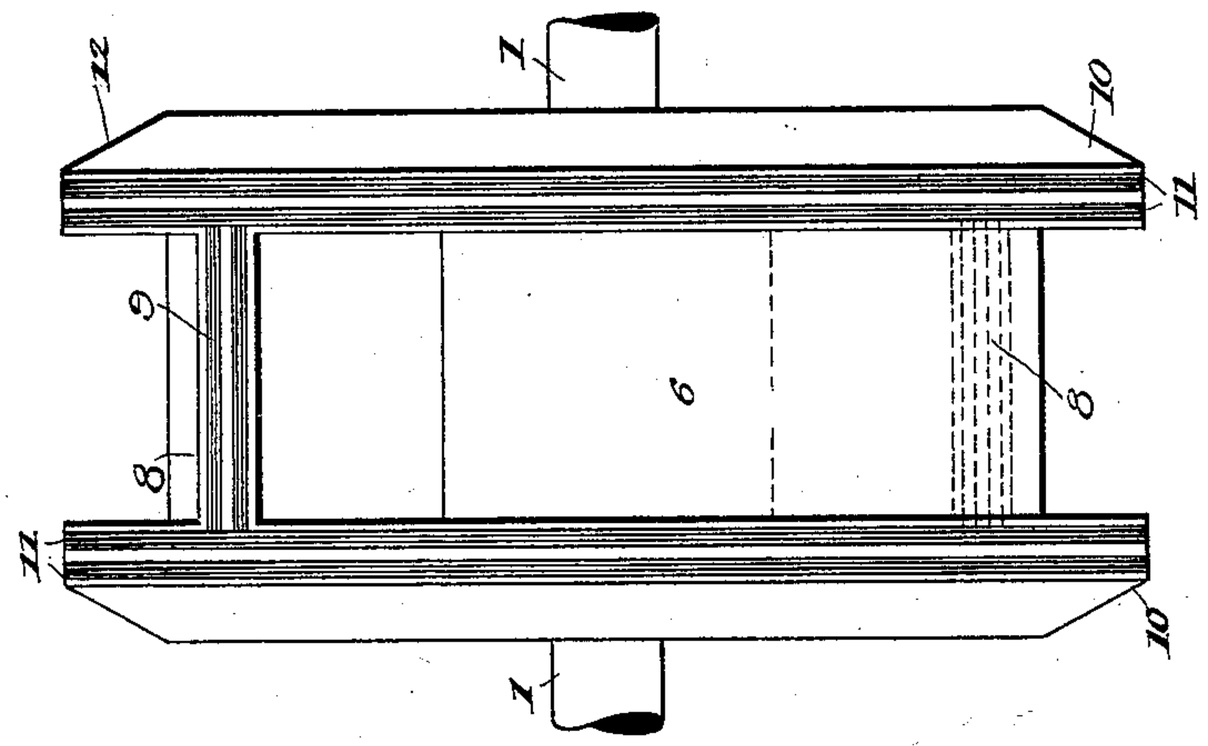


Fig. 3.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JAMES HUMES, OF NEW YORK, N. Y.

OSCILLATING GAS-COMPRESSOR.

SPECIFICATION forming part of Letters Patent No. 540,492, dated June 4, 1895.

Application filed December 5, 1894. Serial No. 530,859. (No model.)

To all whom it may concern:

Be it known that I, JAMES HUMES, a citizen of the United States, residing at New York city, county and State of New York, have invented certain new and useful Improvements in Oscillating Gas-Compressors, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The principal objects of my invention are to provide a simple and efficient form of gas compressor which may be operated either with what I term duplex or quadruplex action and to these ends my invention consists in the certain novel and peculiar arrangements and combinations of the several parts of the apparatus, all as hereinafter fully described and then pointed out in the claims.

I have illustrated types of my invention in the accompanying drawings, wherein—

Figure 1 is a view of a section of one of my improved machines, the plane of the section being indicated by line 1 1, Fig. 2. Fig. 2 is a view in section on planes indicated by lines 2 2, Fig. 1. Fig. 3 is a plan view of the oscillating piston shown as detached. Fig. 4 is a view in section, similar to that shown in Fig. 1, of a quadruplex form of my improved machine.

Referring to the drawings in which like numbers of reference designate like parts throughout, 1 is a shaft which extends centrally through a cylinder 2 which is composed of a cylindrical body portion to which are bolted the heads 3 and 4, respectively. The shaft is mounted in suitable bearings in the end-plates or heads of the cylinder and is rocked or oscillated on its axis by means of of a crank 5, to which suitable motion may be imparted for that purpose.

Upon the shaft 1 is keyed a cylindrically-shaped disk 6 which is considerably smaller in diameter than the interior of the cylinder so as to provide an annular space 7 intermediate the periphery of the disk and the interior of the cylinder and which serves as the compression-chamber into which the gas is admitted and from which it is permitted to escape through means of valved ports hereinafter described. This piston disk 6 is provided with one or more peripheral piston-heads 8 which are designed to fit tightly against the interior wall of the cylinder over which the heads slide as the piston disk is oscillated—each head being provided with suitable packing 9 for preventing the gas from passing from one side of the piston-head to the other since one of the functions of each of the heads is to divide the compression-chamber at such point. In the construction illustrated these heads are shown as being formed in one with the piston disk but I contemplate making them separate pieces and securing them to the periphery of the disk by mortise joint.

As a further precaution against leakage of gas from the compression-chamber I provide the piston disk with a pair of parallel flanges 10, 10, which project from the periphery of the disk and completely encircle it thereby producing in effect a thick disk with a peripheral groove serving as the chamber in which the gas is compressed. The piston-heads 8 each extend between the flanges with which they are shown to be integral, though, of course, they may be made in separate parts and secured together to accomplish the same result. The face of each of the flanges which comes in contact with the interior wall of the cylinder 2 is provided with suitable packing 11 which serves to more completely cut off any passage of the gas across the flanges thereby confining it within the compression-chamber. The outer edges of each of these flanges are beveled off as at 12 in order to provide the annular oil space 25 between the flange and the interior of the cylinder as will be understood from Figs. 2 and 3 and the sides of the disk 6 are provided with annular recesses 13 formed by the annular bearing surfaces 30 for likewise containing lubricating oil—all of these bodies of oil serving alike to both lubricate the adjacent parts and seal them against the leakage of gas.

At suitable points upon the cylinder I pro-

vide a pair or set of ports, each set of which comprises an inlet-port 14 provided with an inwardly-acting valve 15, and an outlet-port 16 provided with an outwardly-acting valve 17—the valves being shown as each mounted in a suitable valve-chest set in the wall of the cylinder.

In the so-called duplex form of compressor shown in Figs. 1 and 2, the two sets of valves are arranged upon the upper part of the cylinder 2 and each set is shut off from communication with the other by means of a partition piece or block 18 upon the one hand and the piston-heads 8 upon the other. Considering now Figs. 1 and 2, it will be seen that as the uppermost piston-head 8 has completed its upstroke, the lowermost piston-head 8 has completed its downstroke. Upon the return stroke of each of these heads the valve 15 controlling the inlet-port of the set of ports at the left-hand of Fig. 1 will open to admit the gas to the upper side of the downwardly-moving piston-head, while the outlet valve 17 of the set of ports at the right-hand will be forced open by the compression of gas effected by the upstroke of the now upwardly moving piston-head 8. After this return stroke is completed and the described operation has taken place, the piston disk is swung back in its oscillation so as to return the piston-heads to the positions shown and during this movement the reverse action of the valves just described takes place. Thus as the oscillating piston disk swings in one direction gas is admitted into one part of the compression-chamber and is expelled in compressed condition from the other part thereof and when it swings back the reverse operation occurs so that the machine has what I term a duplex action.

In the form of machine shown in Figs. 1 and 2—that is, the duplex form—there is practically but one piston-head and, therefore, it may be formed as one head which extends about half way round the periphery of the piston disk instead of being cut away as is shown at the left-hand and bottom of Fig. 1. A block 19 similar to the block or partition-piece 18 is inserted in the lower part of the cylinder 2 and like the part 18 it lies between the two flanges 10 of the piston disk making a snug fit therewith while the face of each block which comes in contact with the periphery of the disk is shaped to conform thereto and is provided with suitable packing strips 20, so that the smallest amount of space or clearance is left between such inclined sides and the blocks 18 and 19 at the completion of the stroke in order that practically all of the gas may be forced out by the piston-head.

In the form shown in Fig. 4, four sets of inlet and outlet ports are used, thus making a quadruplex machine. The additional sets of ports used in this form are located near the base of the cylinder 2 and their action is similar to that described in reference to the other figures, whereby as the piston disk swings in one direction of its oscillation each piston-head serves at the same time to compress the gas in advance of it and draw in a fresh supply to the back of it, and then upon the return stroke as it swings back to reverse such action. In this way the capacity of the machine is greatly increased.

My improvements are especially adapted to the compression of ammonia gas for use in ice-making machinery but it will also be found useful for other like purposes.

Various modifications may be made in the details of invention and I do not, therefore, limit myself to the specific construction of details as herein illustrated.

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

1. In a gas compressor, the combination of a cylinder, an oscillating piston-disk mounted therein and of less diameter than the interior of the cylinder and provided with parallel peripheral flanges fitting tightly within the cylinder and spaced so as to form an annular compression-chamber between them, a dividing piece or partition arranged upon the interior of the cylinder and extending across said annular chamber, one or more piston-heads located upon the periphery of said disk and extending between said flanges so as to divide the compression-chamber at such point or points, said cylinder being provided with one or more sets of ports each set comprising an inlet and outlet port provided with oppositely-working valves, substantially as and for the purpose described.

2. In a gas compressor, the combination of a cylinder, an oscillating piston-disk 6 mounted therein and of less diameter than the interior of said cylinder whereby an intermediate annular compression-chamber 7 is constituted, a dividing piece or partition extending across said chamber, one or more piston-heads 8 located upon the periphery of said disk and fitting tightly against the interior of the cylinder so as to divide the compression-chamber 7 at such point or points, said cylinder being provided with one or more sets of ports, for each of said piston-heads each set comprising an inlet-port 14 and an outlet-port 16 provided with oppositely-working valves 15 and 17, respectively, substantially as and for the purpose set forth.

3. In a gas compressor, the combination of a cylinder, a piston-disk located therein and provided with a shaft mounted in the ends of said cylinder, one or both ends of said piston-disk being formed with an annular bearing-surface closely engaging the said ends of

the cylinder whereby there is constituted an annular oil-chamber around said shaft for lubricating the same and said piston-disk and sealing the ends thereof, substantially as and for the purpose set forth.

4. The combination of a cylinder, and a piston-disk mounted therein and having motion about its axis, the edges of the disk being cut away or beveled so as to constitute an annular oil-chamber between the same and the interior of the cylinder.

In testimony whereof I have hereunto set my hand, this 3d day of December, 1894, in the presence of the two subscribing witnesses.

JAMES HUMES.

Witnesses:
A. M. HAYES,
WILLIS FOWLER.