Jan. 2, 1923.

1,440,891

G. B. PETSCHE.
ROTARY COMPRESSOR.
FILED OCT. 6, 1920.

Fig. 2.

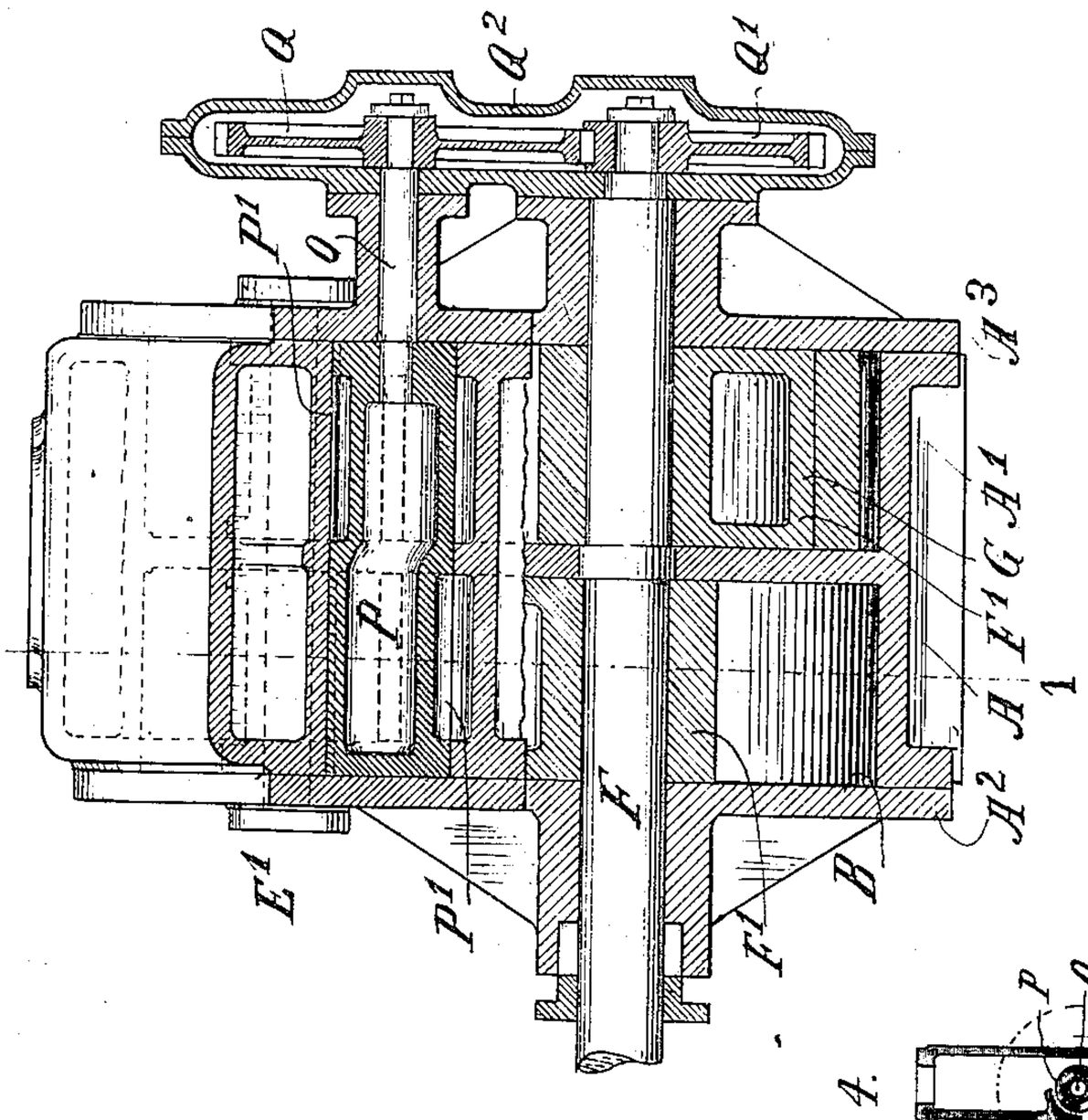


Fig. 1.

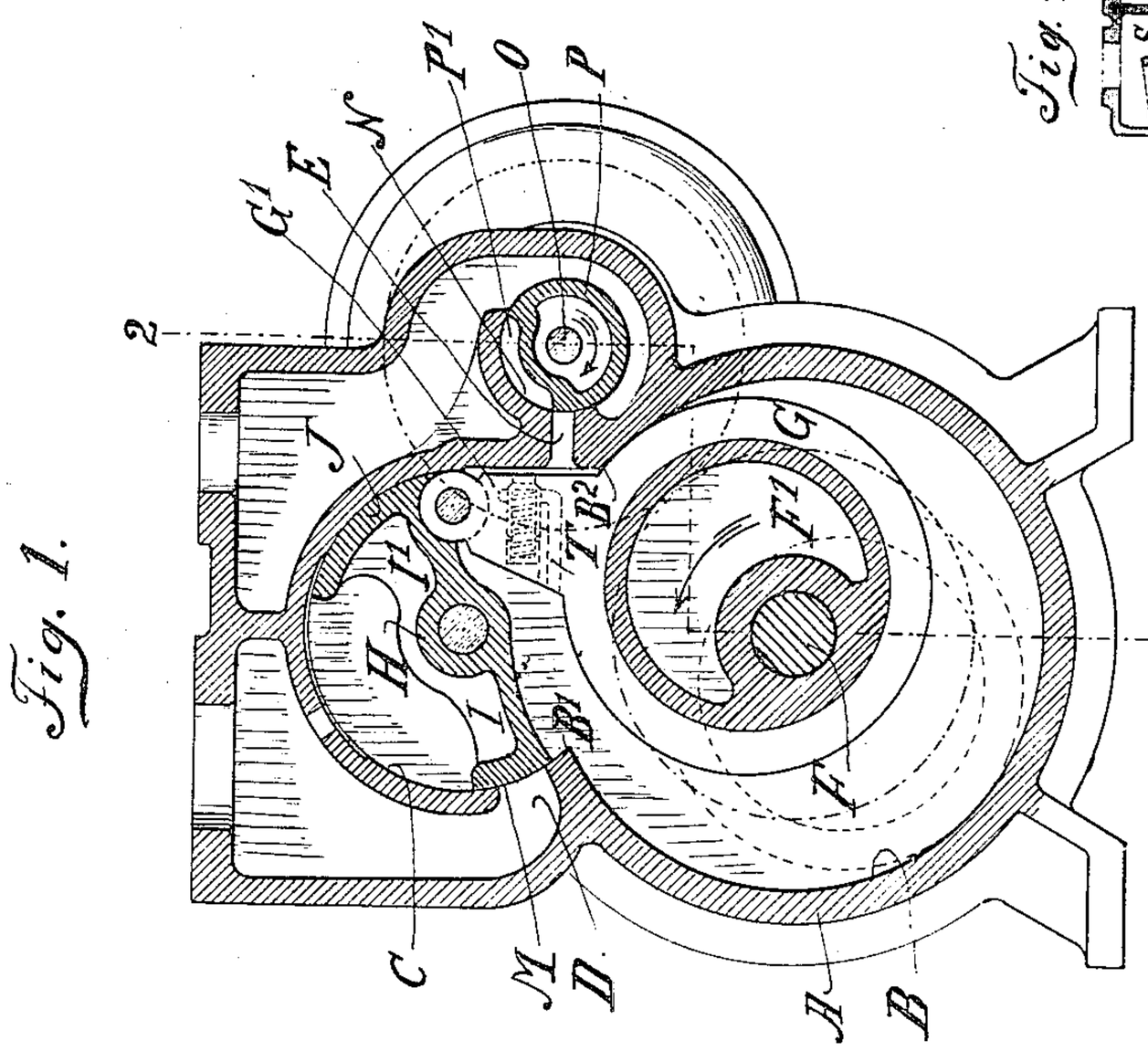


Fig. 4.

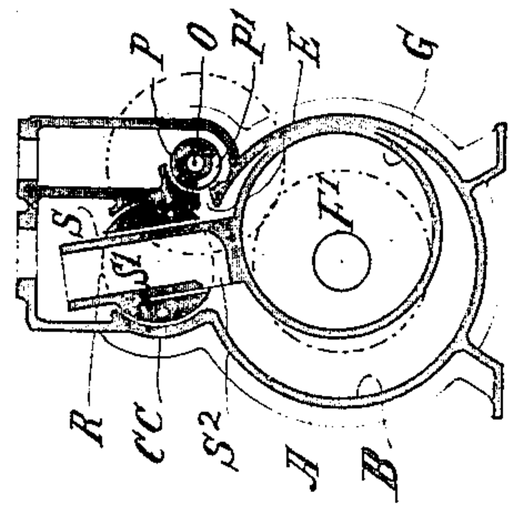
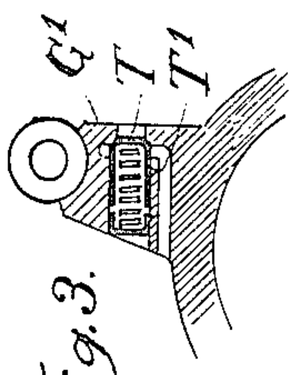


Fig. 3.



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UNITED STATES PATENT OFFICE.

GUSTAV B. PETSCHE, OF YONKERS, NEW YORK.

ROTARY COMPRESSOR.

Application filed October 6, 1920. Serial No. 415,143.

To all whom it may concern:

Be it known that I, GUSTAV B. PETSCHE, a citizen of the United States of America, and resident of Yonkers, county of Westchester, State of New York, have invented a certain new and useful Improvement in Rotary Compressors, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part thereof.

My invention relates to rotary compressors of the type in which the rotary piston consists of an eccentric ring having an extension which forms a partition between the admission and discharge ports of the pump. The object of my invention is to construct pumps of this kind especially suitable to act as compressors at high speed, the terminal pressure of which gases is a large multiple of the initial pressure. In this case the volume discharged is only a small fraction of the initial volume and the period during which the outlet is to be open is only a small part of the compression cycle. These conditions require a discharge valve which opens and closes the port with great rapidity and positively. Further objects of my invention are to provide a positively actuated valve operating in connection with the admission port of the compressor and to close such port during the period when the piston is out of contact with the wall of the cylinder at which time re-expansion of that part of the compressed substance, retained in the clearance space and not discharged, takes place. These residual gases build up a pressure in the cylinder and would escape into the admission port if it is not closed and thus involve a considerable loss in volumetric efficiency, a loss to which other rotary compressors, not having such valves are subject. A still further object is to provide the piston with an automatically operating valve for the release of excess pressure such as is apt to occur in a compressor in which considerable oil is carried with the gas to be compressed and where the discharge valve is opened and closed positively and a further object is to provide for the actuation of the delivery valve from the driving shaft of the pump by means which will not involve the use of stuffing boxes.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and in which

Figure 1 is a side elevation of a pump provided with my improvements taken on the section line 1—1 of Fig. 2.

Figure 2 is a sectional elevation on the line 2—2 of Fig. 1.

Fig. 3 is a sectional detail, and

Figure 4 is a sectional elevation showing the application of my invention to an alternative construction of the pump.

A, A′, indicate the pump cylinders formed in the single casting and provided with face plates A^2 and A^3. B indicates the cylindrical wall of the cylinder cut away at B′ and B^2. C, Figs. 1 and 2, is a cylindrical bearing centered at H. D is the admission port formed, as shown, through the wall of the cylindrical bearing C. E is the delivery port on the opposite side of the compressor. F is the driving shaft of the pump to which is secured the eccentrics indicated at F′, F′, on which are located the eccentric ring pistons G having extending from them the extensions indicated at G′ and extending like the piston from side wall to side wall of the pump chamber. I, I′, is a rock lever pivoted at H and extending from wall to wall of the bearing or valve chamber C. On one side this rock lever carries an admission valve M and on the other side a sliding shoe J, both fitting to the bored face of chamber C. T indicates a port formed through the partition G′ and provided with a valve T′ spring seated and capable of opening under a determined pressure. N indicates a cylindrical seat or bearing for a rotary valve formed on the outer side of the port E and on this bearing works the rotary valve P having a portion of its face depressed as indicated at P′. This valve is rotated by the shaft O on which is secured the gear wheel Q in engagement with a gear wheel Q′ on the shaft F. Q^2 indicates a tight casing enclosing the gearing to prevent escape of gases which casing should be well charged with oil.

Referring to Figure 4, it will be observed that the eccentric ring piston G is here shown as provided with an extension S forming the slide working in the swivel block R, seated in a bearing CC. The admission port to the compressing cylinder is here shown at S′ as formed through the slide S and opening into the compressing cylinder at S^2, the port S^2 bearing such relation to the wall of the swivel block R

that it will be closed during the period when the piston is out of contact with the walls B of the cylinder. In other respects the construction of Fig. 4 is substantially similar to that of Figs. 1 and 2.

In operation the piston rotates in the anti-clockwise direction indicated by the arrow in Fig. 1. The fluid to be compressed is drawn in through the port M and delivered through the port E which, however, remains closed by the rotary valve P until the fluid has been compressed to the desired point at which point the port P′ in the valve P registers with the port E and permits the escape of the compressed fluid into the receiver. Obviously, the amount of compression given to the fluid by the compressor will depend upon the location and length of the port P′. The rotary valve or valves where compressors are used in pairs, as indicated in Fig. 2, is driven from the main shaft F through the gears Q, Q′, and stuffing boxes are avoided by encasing the gears, as shown, and providing oil in the gear case. While for a very high ratio of compression a delivery valve rotating in one direction as shown is practically necessary, an oscillating rotary valve may obviously be used where the ratio of compression is not so large.

It is important that such compressed fluid as may remain in the compression side of the pump at the end of its compression stroke should not be permitted to escape back through the admission port and should be held in the cylinder of the pump in admixture with the fresh charge of fluid to be compressed. The loss of pressure in the way indicated is prevented by providing the admission port with a valve which will close it during the period when the piston leaves contact with the walls of the pump cylinder. In the construction of Fig. 1 this function is performed by the valve M and in the construction of Fig. 4 the admission port S^2 is closed by the bearing face of the swivel block through which the slide moves.

While I have shown the valve P as actuated by gearing which rotates it in one direction only, it will be obvious that any actuating gears or devices which will move it to open and close the port at proper times will be in a broad sense the full equivalent for the illustrated construction.

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

1. In a rotary compressor having a rotary eccentric ring piston provided with an extension forming a division between the admission and discharge sides of the cylinder, a discharge port leading from the cylinder, a port formed through the piston extension and a spring seated valve in said port adapted to open the port under excessive pressure.

2. In a rotary compressor having a rotary eccentric ring piston provided with an extension forming a division between the admission and discharge sides of the cylinder, a bearing in the form of a cylindrical segment, a rock lever pivoted at the center of the bearing, a shoe on one end of the rock lever and a sliding admission valve on the other end, said rock lever being operatively connected to the piston extension, a discharge port leading from the cylinder, a rotary valve for opening and closing the discharge port located at the outer end of said port, means operatively connecting said valve to the driving shaft of the compressor and a tight casing enclosing said means.

GUSTAV B. PETSCHE.