No. 830,636.

PATENTED SEPT. 11, 1906.

B. F. BERGH.

ROTARY CONDENSER OR PUMP.

APPLICATION FILED MAY 18, 1903.

2 SHEETS—SHEET 1.

Fig. 1

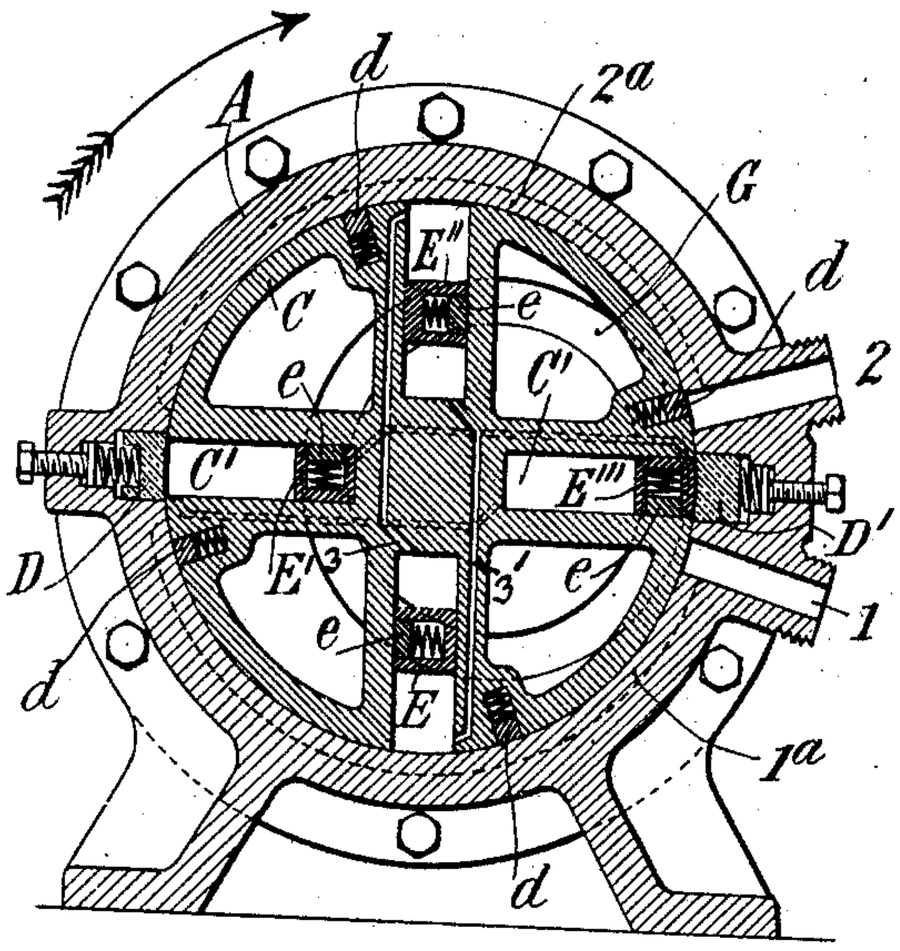


Fig. 3

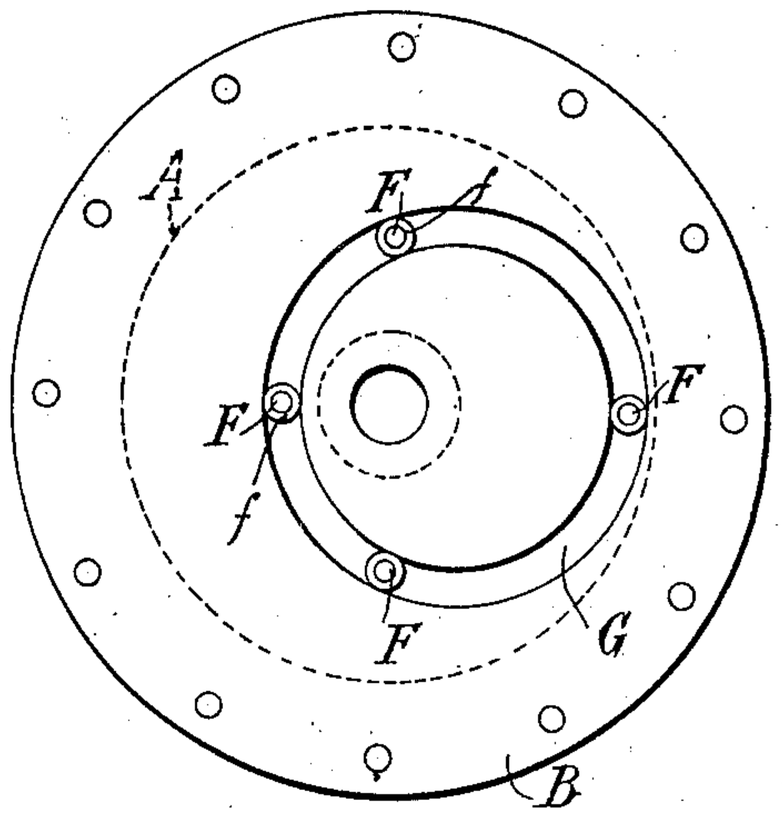
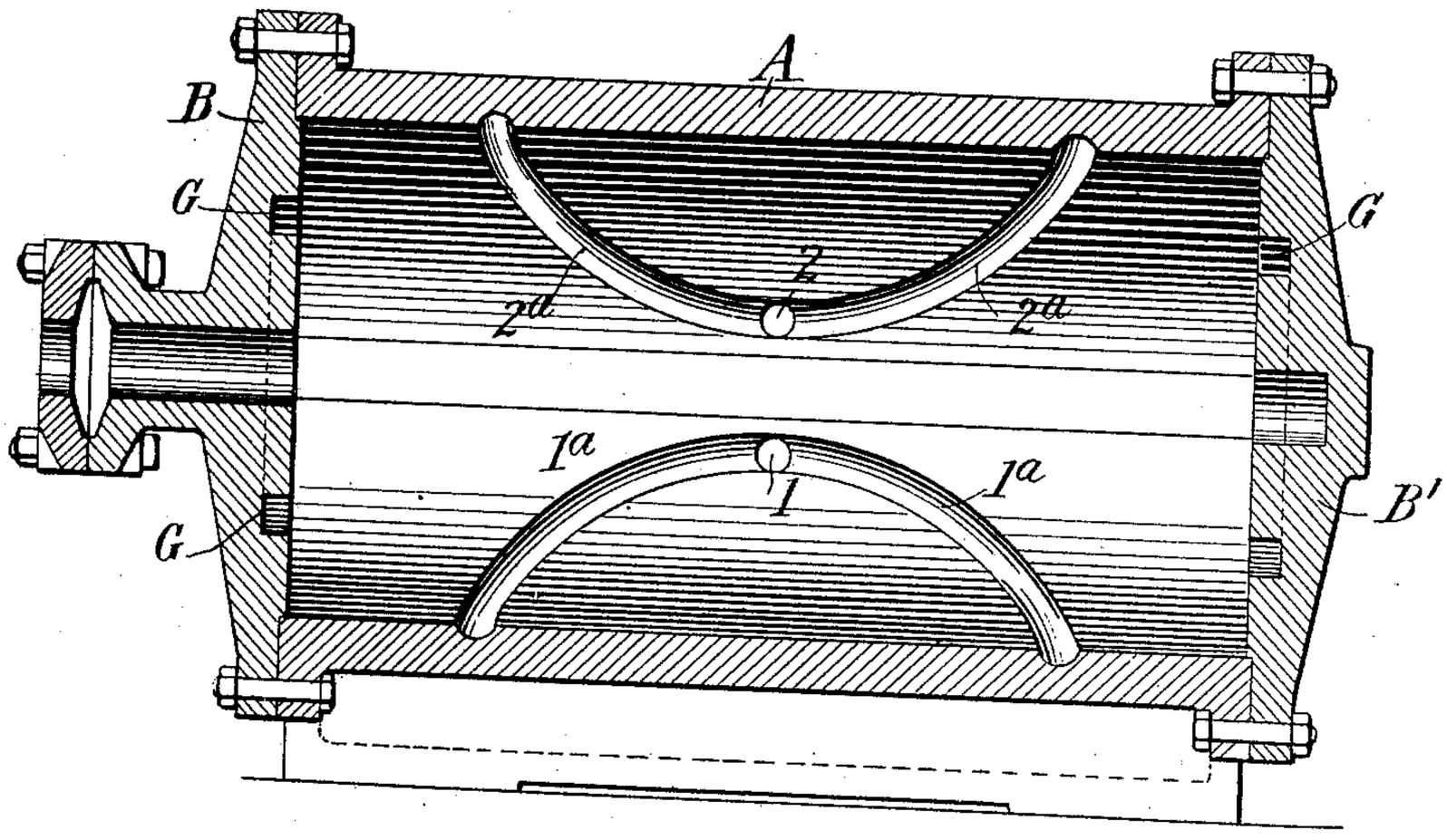


Fig. 2



Witnesses;
Raphael Netter
Gustave R. Thompson.

Inventor
Bror F. Bergh.
by Mauro, Cameron & Lewis.
Att'ys.

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2 SHEETS—SHEET 2.

Fig. 4

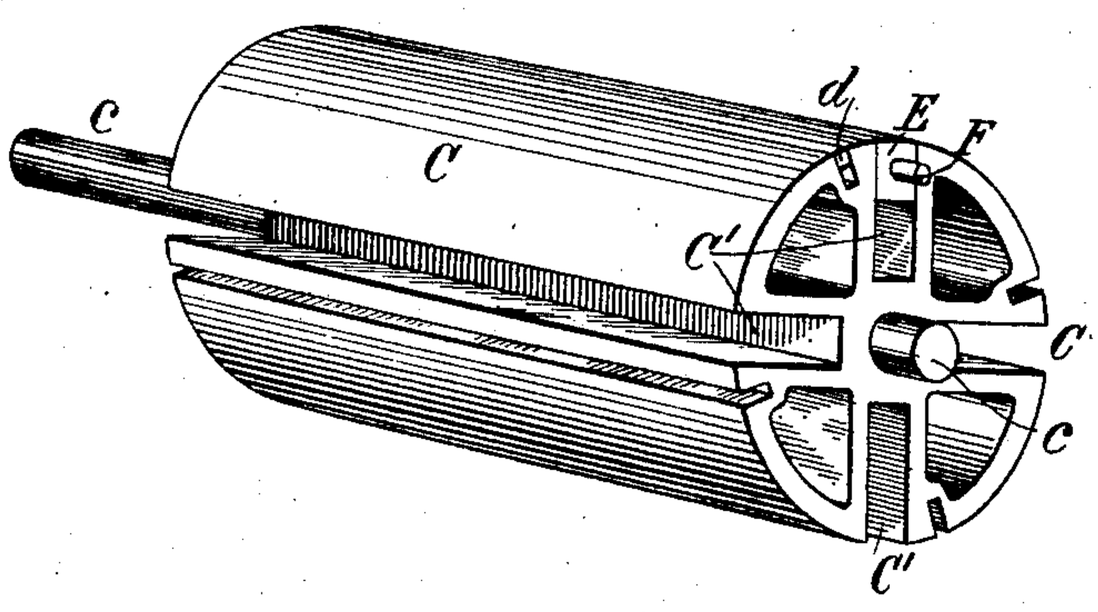


Fig. 4a

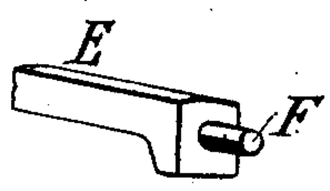


Fig. 5

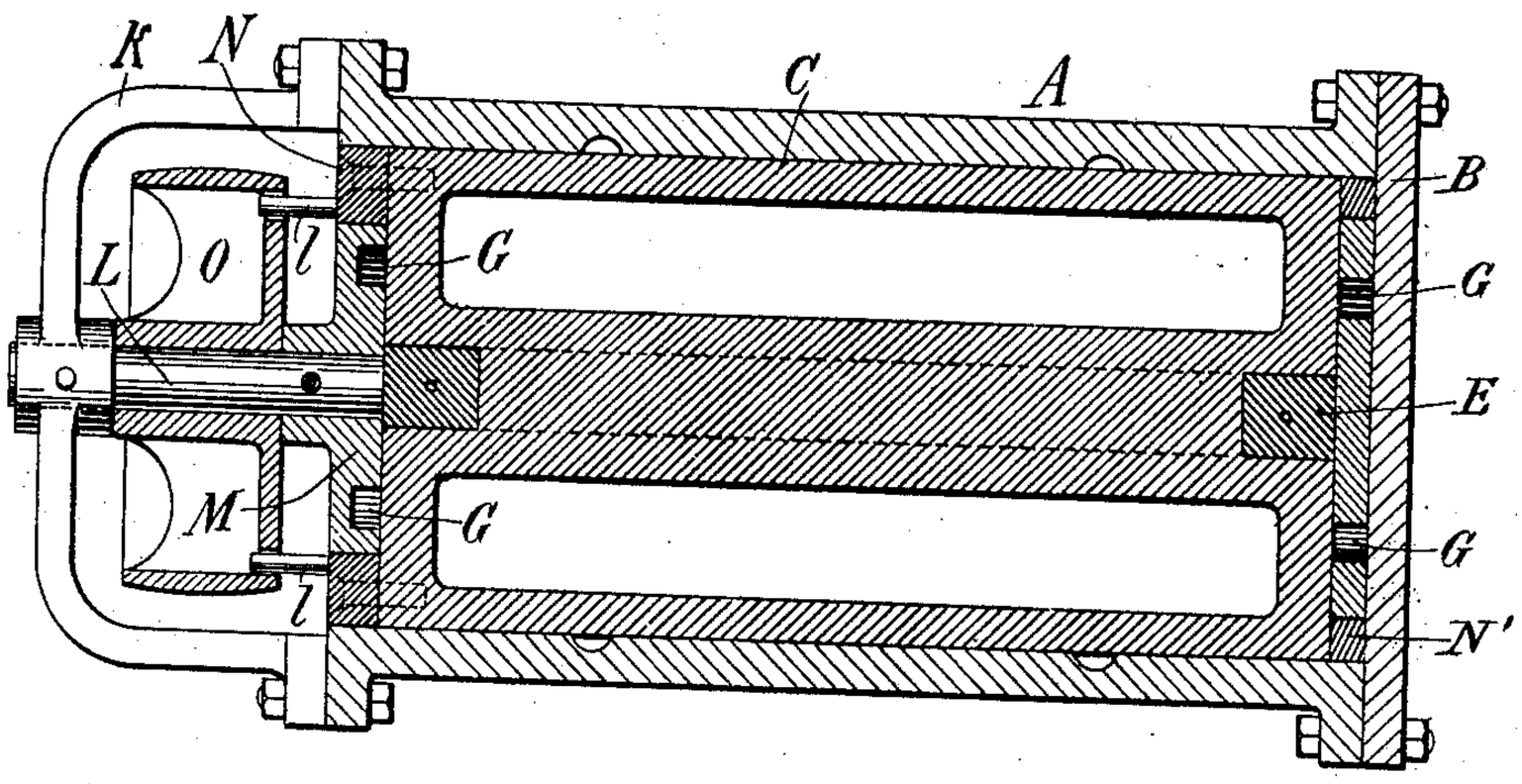
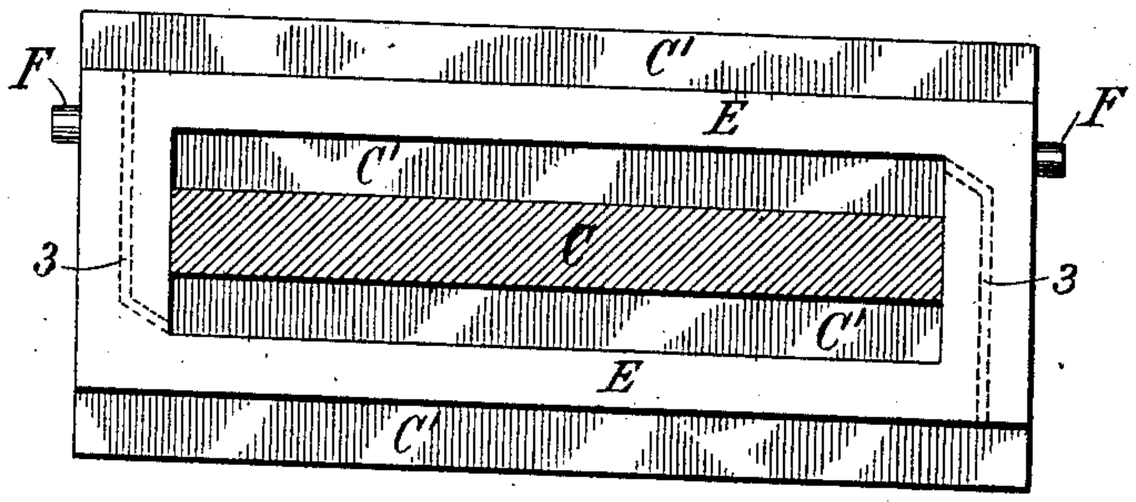
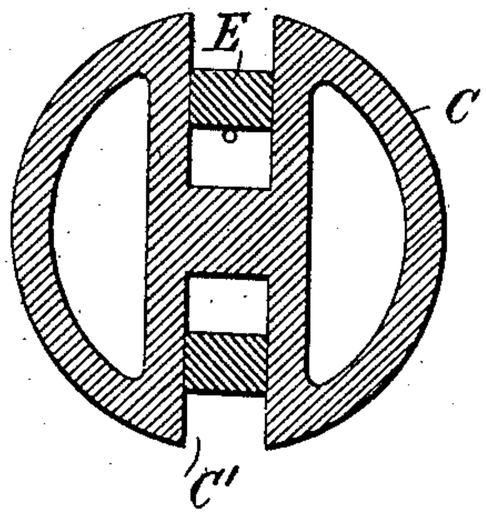


Fig. 6

Fig. 6a





Witnesses:
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Inventor
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Att'ys.

UNITED STATES PATENT OFFICE.

BROR F. BERGH, OF NEW YORK, N. Y., ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO LEBBEUS H. ROGERS, OF NEW YORK, N. Y.

ROTARY CONDENSER OR PUMP.

No. 830,636. Specification of Letters Patent. Patented Sept. 11, 1906.

Application filed May 18, 1903. Serial No. 157,661.

To all whom it may concern:

Be it known that I, BROR F. BERGH, whose post-office address is No. 75 Maiden Lane, New York city, New York, have invented a new and useful Improvement in Rotary Condensers or Pumps, which invention is fully set forth in the following specification.

The invention relates to rotary condensers or pumps, and involves the employment of one or more pistons carried by a rotating drum and caused to reciprocate radially thereof by the revolutions of the drum. Broadly speaking, this has been proposed before; but the constructions suggested have been exceedingly complicated and produce great friction and strain on the parts. I avoid these defects by reason of the means I provide for causing the pistons to slide, and by the simplicity, compactness, and durability of my apparatus. The drum and its surrounding casing are concentric, and the movement of the pistons is not only radial of the drum, but of the casing as well, so that the inward movement of each piston sucks in the air to be compressed, (or the liquid to be pumped,) while the outward movement of the piston itself serves to compress the air within the seat of the piston, (or to eject the liquid.)

Another feature of my invention consists in the manner of producing air-tight closures between moving parts in order to enhance the efficiency of the apparatus.

Still another feature lies in the utilization of both the forward and return strokes (inward and outward movements) of the pistons, and, finally, the invention further consists in certain details of construction, to be more particularly pointed out.

The apparatus is intended, primarily, to compress air or other gases; but it may also be employed for pumping liquids.

My invention will readily be understood by reference to the accompanying drawings, which illustrate preferred embodiments thereof.

In the drawings, Figure 1 is a transverse vertical section through one embodiment of my invention. Fig. 2 is a longitudinal vertical section of the same, viewed from the left of Fig. 1, but the drum being removed. Fig. 3 shows the inner face of one of the bonnets detached. Fig. 4 is a perspective of the drum. Fig. 4^a is a detail. Figs. 5 and 6 are longitudinal sections of a modified construction, Fig. 6 being taken through the drum at right angles to the view in Fig. 5. Fig. 6^a is a transverse section of Fig. 6.

A is a stationary casing having a smoothly-finished cylindrical bore and hermetically closed at each end by suitable bonnet-pieces B and B′.

1 represents the inlet-port, and 2 the outlet-port, either or both of which may be provided with a screw-threaded nipple for pipe connections.

Preferably I provide a shallow groove in the inner face of casing A, leading to each port, and by choice the grooves are branched, as 1^a 1^a and 2^a 2^a.

C is the rotary drum, preferably made in skeleton form for the sake of lightness. It is provided with one or more (preferably four) longitudinal slots C′, constituting seats for pistons E. The drum turns freely within the casing, and in the preferred construction has spindles *c* at each end that turn in journal-bearings in bonnets B and B′. Where these spindles are used, one of them may project through its bonnet and a suitable packing-gland to furnish means for rotating the drum.

D and D′ represent spring-pressed scrapers projecting inwardly from the casing A and abutting aginst the drum. Preferably the two ports 1 and 2 are located near together on the same side of the drum and separated by one of the scrapers, as D. Preferably also the other scraper D is diametrically opposite, and preferably the grooves 1^a 1^a and 2^a 2^a (when present) extend from their respective ports nearly half-way around the bore from one scraper to the other. Whatever the arrangement of the last-named parts, in any event when one or more scrapers are employed the object is to separate the space connecting with port 1 from the space connecting with port 2.

In each slot C′ of drum C is a bar E free to slide radially of the drum, but fitting snugly therein to constitute a piston. At each end of the bar is a stud F entering an eccentric groove or cam-track G in the adjacent face of the bonnets B B′. Preferably some anti-friction device is employed, such as roller *f*, surrounding the spindle F and fitting in the groove.

A passage-way 3 leads from the bottom of each slot C′ to the outer part of the opposite

slot. Preferably there are outwardly-projected spring-pressed scrapers *d* located in longitudinal seats in the drum behind each piston-seat C′ (with reference to the arrow in Fig. 1.) The radial depth of seats C′, the thickness of pistons E, and the location of eccentric G are all properly correlated, so that as the drum revolves the pistons are caused to slide back and forth in their seats, reciprocating radially of the drum, but not passing outside of its periphery. The center of cam-track G is about opposite port 2 and scraper D′.

The drum is rotated in the direction indicated by the arrow in Fig. 1. The cam-track G makes its nearest approach to the cylindrical wall of casing A at that portion of the latter where outlet-port 2 is located, (at the right in Fig. 1,) so that as each piston in turn (being carried around by the revolutions of the drum C) is brought opposite outlet 2 it has moved radially outward from the center of the drum to the extreme of its travel and lies flush, or nearly flush, with the periphery of the drum. The opposite piston E′ at this time has moved radially inward to the extreme of its travel, so that the unoccupied space in each slot C′ lies behind (to the left of) its piston E′ and E‴. The piston E (shown near the bottom of Fig. 1) is moving upwardly and inwardly, and the piston E″ shown in the top of the figure is moving upwardly and outwardly.

The operation of my apparatus when compressing air will now be obvious. Air enters port 1 and lies under normal pressure in space 1^a 1^a and in space C′ behind the piston E. It also passes through passage-way 3′ to enter the space behind the piston E″. At the same time the space in front of piston E (through the passage-way 3) and also the space in front of piston E″ are in free communication (through space 2^a 2^a) with outlet 2. As a result air is drawn or sucked through port 1 and behind piston E and E″, while the air in front of these pistons is compressed and forced out through port 2. The same is true of pistons E′ and E‴, (and of any number of pistons employed.) During about half a revolution of the drum passing from scraper D′ around to D air is drawn in behind each piston and behind its diametrically opposite piston, while during the other half-revolution from D back to D′ air is forced out from in front of each piston and from in front of its diametrically opposite piston. The air is driven through proper pipe connections into a suitable receptacle.

In order to produce a high degree of compression, it may be well to provide spring-pressed scrapers *e*, seated in the forward side of each piston and abutting against the adjacent wall of the slot C′ to form an air-tight closure.

In the modification illustrated by Figs. 5 and 6 I have shown only two slots C′ and a rectangular frame fitted therein to provide two pistons E only. The drum C fits very closely in the casing A and journals therein without the use of spindles *c c*. K is a spider secured at one end of the casing and carrying fixed shaft L, upon which is made fast the plate M, that presents one of the cam-tracks G. N is an annulus surrounding plate M and made fast to the drum C, and N′ is a similar annulus made fast to the other end of the drum, the two serving to keep the scrapers D and D′ from entering the grooves C′. A pulley O revolves on shaft L and has lugs *l*, that engage corresponding lugs on annulus N to rotate the drum C. The principle of the operation is the same as in the other form.

The foregoing detailed description is given merely for the purpose of illustration and explanation, and I do not limit my invention to the precise construction and arrangements shown, as changes in construction or arrangement may be made and parts omitted without departing from the spirit of my invention.

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

1. In a compressor or pump, the combination with a casing having an inlet and an outlet, and a rotary drum for carrying the pistons, of a series of bars caused by suitable devices to slide radially within longitudinal grooves in said drum to constitute pistons, and a passage-way leading from the groove behind each piston to the opposite side of the drum and communicating alternately with said inlet and said outlet, whereby radial movement of said piston in either direction (inward or outward) discharges the contents of said groove from in front of said piston (the inner or outer side thereof, as the case may be.)

2. In a compressor or pump, the combination with a casing having suitable inlet and outlet ports, and a revoluble drum or framework therein, of a series of bars sliding radially of said casing within longitudinal grooves in said drum to constitute pistons, a valve or scraper located in the side of each bar to form an air-tight closure, and a passage-way leading from the rear of each groove (behind its piston) to the front of the opposite groove (in front of the piston of the latter,) and the space in one groove outside its piston and the space in the opposite groove inside its piston both being in communication with said inlet-port, while the space in said last-named groove outside its piston and the space inside the opposite piston are both in communication with said outlet-port.

3. In a compressor or pump, comprising a casing provided with inlet and outlet, the combination of a rotating drum having oppositely-located grooves that afford seats for

pistons, a radially-reciprocating piston in each groove, and a passage-way leading from the bottom (inner part) of each groove to the top (outer portion) of the opposite groove.

4. In a compressor or pump, the combination of a casing having an inlet and an outlet, a framework or drum rotated therein and provided with oppositely-disposed longitudinal grooves, radially-reciprocating pistons located in said grooves and having the oppositely-disposed pistons connected together, passages leading from the inner parts of each groove to the outer part of its opposite groove, and means for causing the pistons to reciprocate radially of the casing.

5. In a compressor or pump, a casing having an end plate fast thereto, a compression-cylinder in said casing having an annulus fast to each end of the same, cam-plates one at each end of said casing fixed relative thereto and forming a bearing for each annulus, and means for rotating said drum.

6. In a rotary compressor or pump, the combination of a cylindrical casing, having an inlet and outlet near together, and provided with grooves in its wall that lead respectively to said inlet and outlet, a revoluble drum closely fitting said cylinder the inner walls of said cylinder constituting bearings for said drum, piston-channels in said drum each of said channels simultaneously open to said inlet and outlet, and reciprocating pistons in said channels separating said inlet and outlet.

7. In a compressor or pump, the combination of a casing having inlet and outlet, a revoluble drum therein having a longitudinal groove, a piston reciprocating radially in the same, the spaces on opposite sides of said piston communicating with the inlet and outlet respectively and alternately as the drum revolves, and means causing said piston to reciprocate.

8. In a rotary compressor or pump, the combination of a cylindrical casing having an inlet and outlet and an end closure, a revoluble drum closely fitting said cylinder and provided with radial piston-channels, annular rings fast to said drum one at each end of the same, plates fitting said rings, fast to and supported by the casing, and having cam-grooves, piston-bars movable in said piston-channels the ends of which engage the grooves in said cam-plates, and means engaging one of said rings for rotating said drum.

9. In a rotary compressor or pump, the combination of a cylindrical casing having an inlet and outlet, a drum revolubly mounted in and fitting said casing, a piston-channel in said drum, a reciprocating piston in said channel, the channel-spaces on opposite sides of the piston opening on the periphery of the drum, and means for alternately connecting said spaces with said inlet and outlet.

10. In a rotary compressor or pump, the combination of a casing having a separate inlet and outlet, a revoluble drum therein having a piston-channel simultaneously open to said inlet and outlet, and a reciprocating piston in said channel separating said inlet and outlet.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

BROR F. BERGH.

Witnesses:
R. L. SCOTT,
ELISHA K. CAMP.