H. WILCOX & F. BRABSON.

AIR COMPRESSOR.

APPLICATION FILED APR. 1, 1908.

915,815.

Patented Mar. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

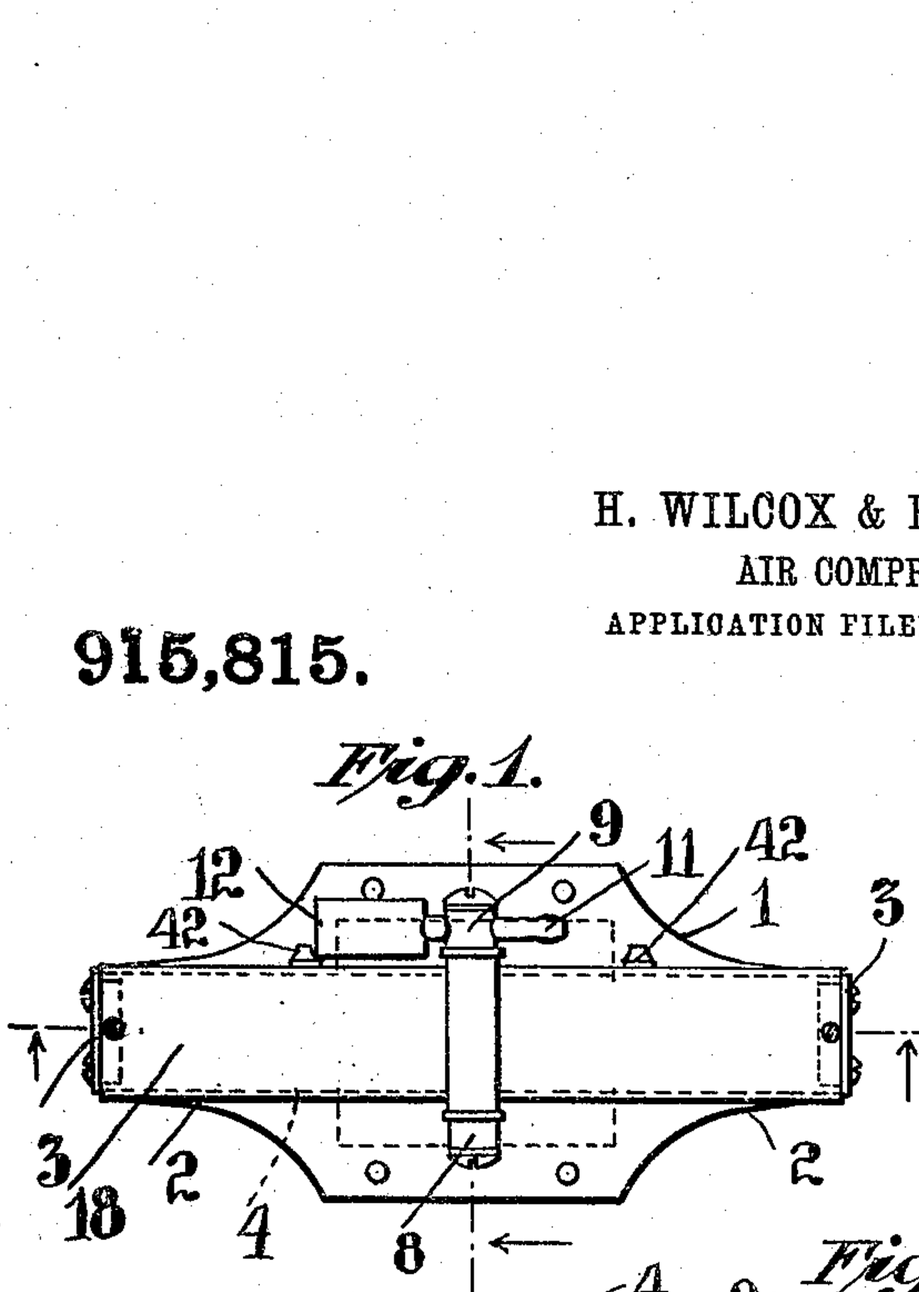


Fig. 2.

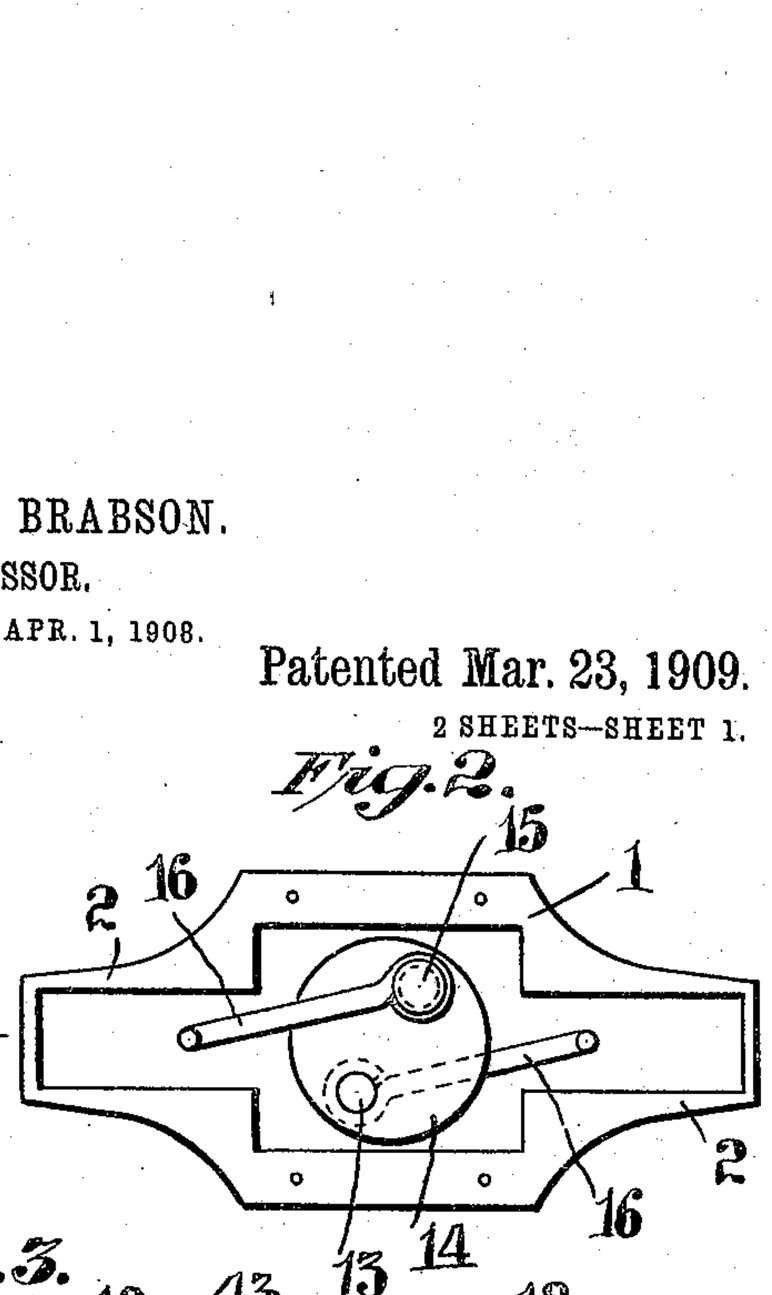


Fig. 3.

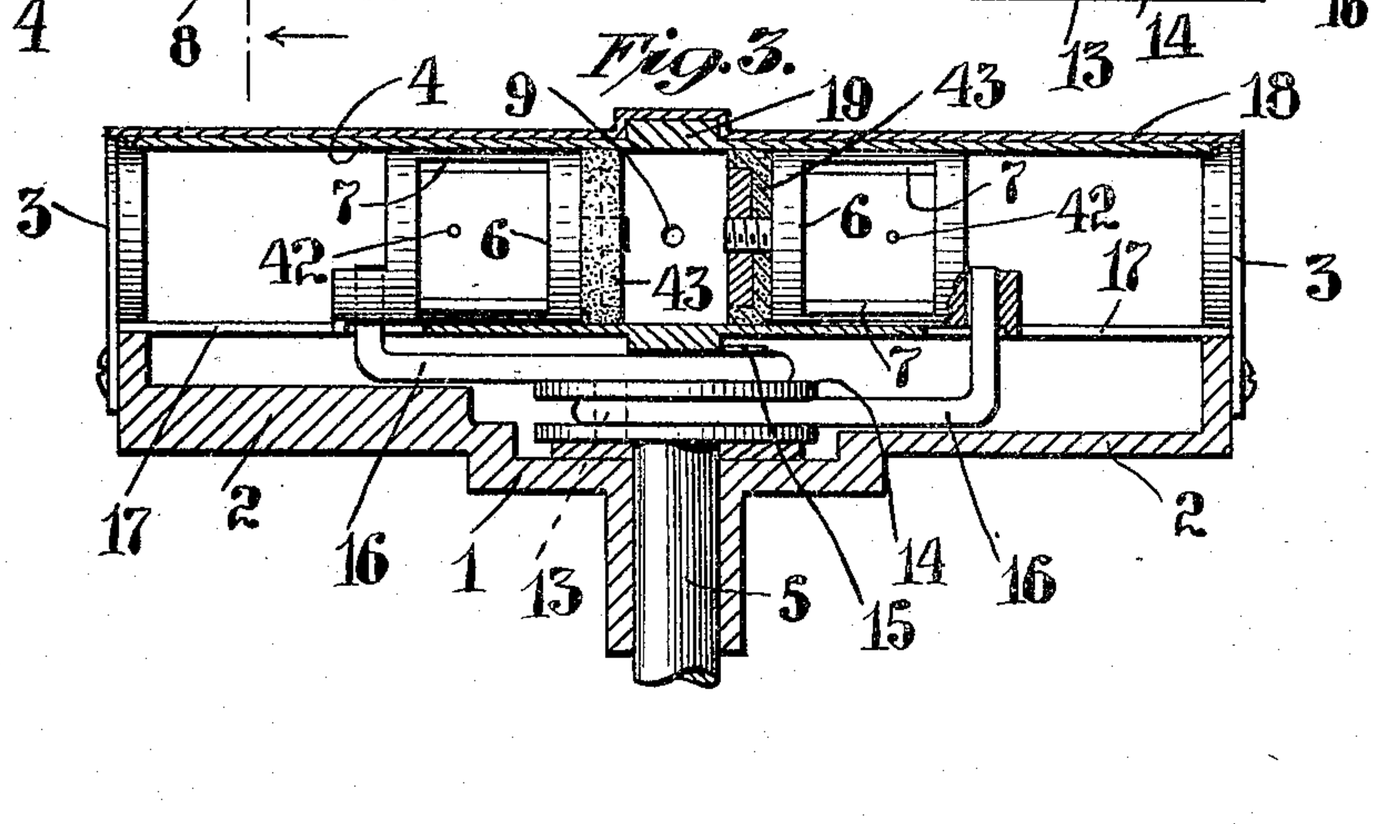


Fig. 4.

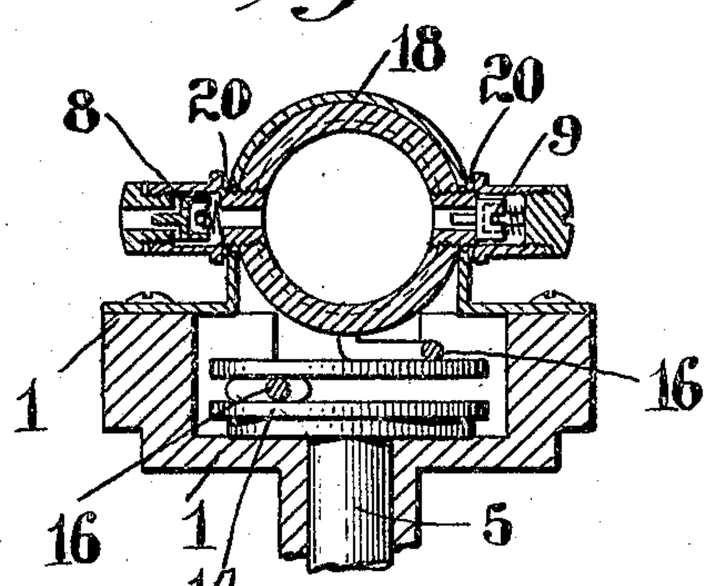
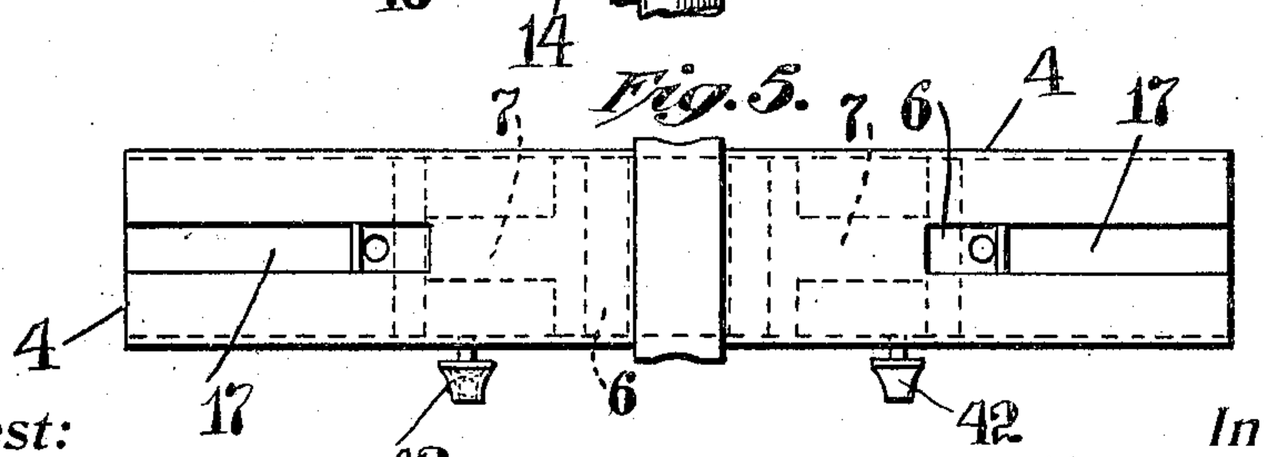


Fig. 5.



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2 SHEETS—SHEET 2.

Fig. 6.

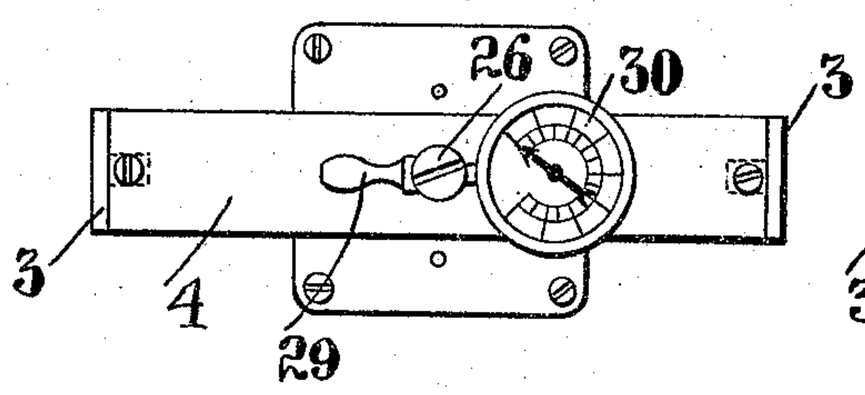


Fig. 7.

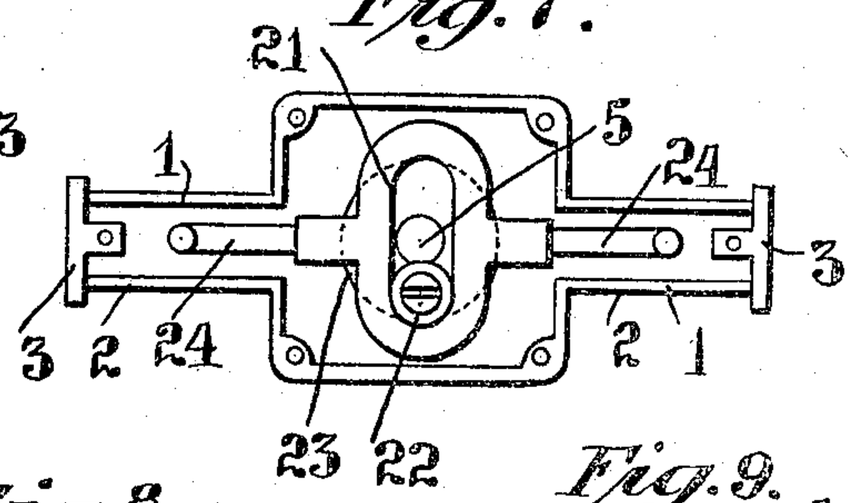


Fig. 8.

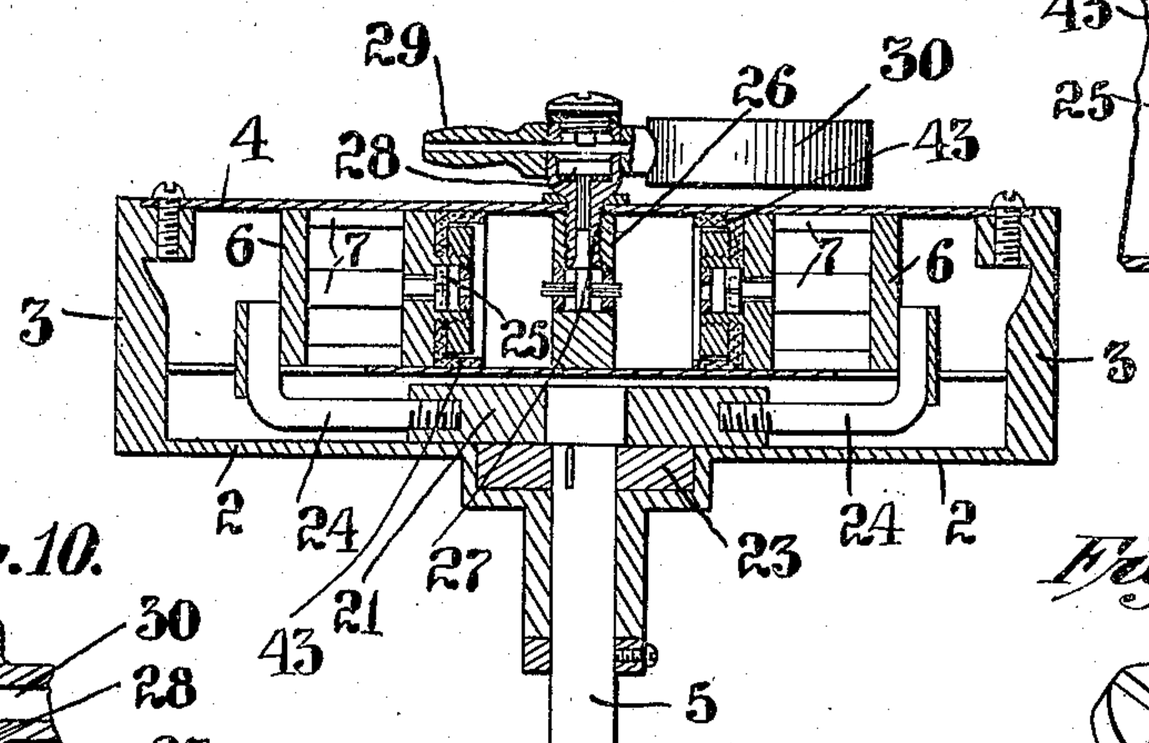


Fig. 9.

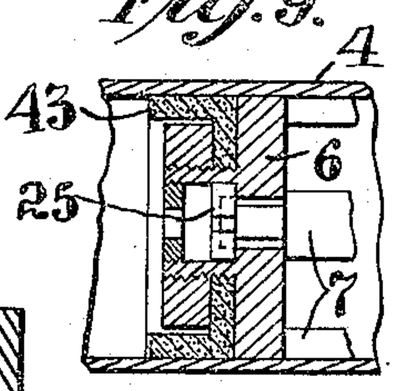


Fig. 10.

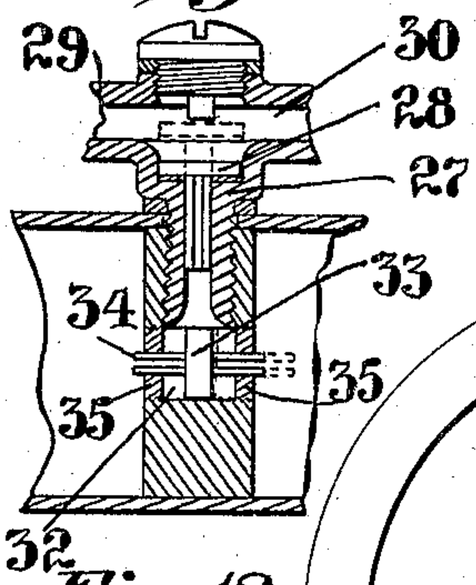


Fig. 11.

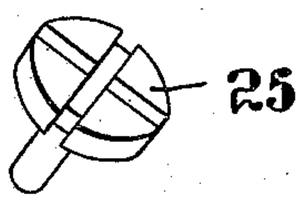


Fig. 12.

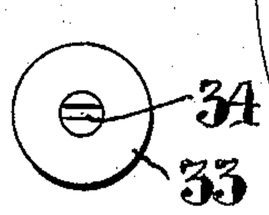
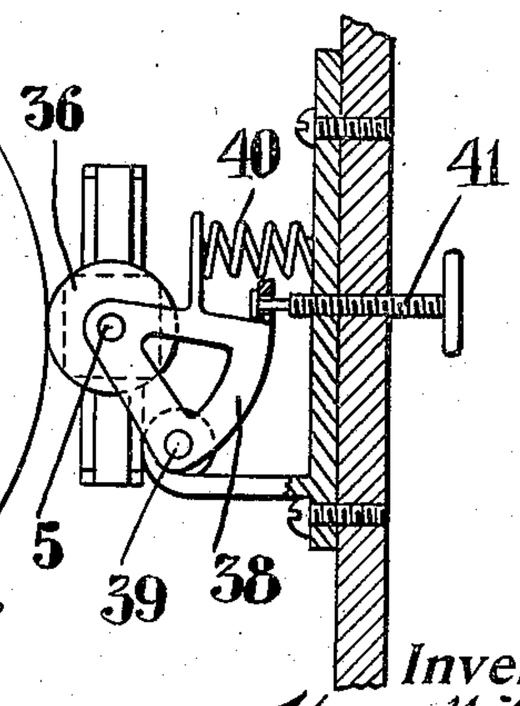


Fig. 13.



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UNITED STATES PATENT OFFICE.

HENRY WILCOX AND FRANK BRABSON, OF NEWARK, NEW JERSEY.

AIR-COMPRESSOR.

No. 915,815. Specification of Letters Patent. Patented March 23, 1909.

Application filed April 1, 1908. Serial No. 424,568.

To all whom it may concern:

Be it known that we, HENRY WILCOX and FRANK BRABSON, citizens of the United States of America, and residents of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Air-Compressors, of which the following is a specification.

Our invention relates to improvements in air compressors, particularly that type thereof especially adapted and intended for the inflation of pneumatic tires, the operation of power whistles on motor boats, and like service where a compressor of moderate capacity working to moderate pressures is desired.

Our invention consists in the novel mechanism of the compressor.

The objects of our invention are, to improve and simplify compressors of the type referred to, and to provide a compressor which is simple, extremely compact, relatively light, capable of operation at high speeds, easy and cheap to manufacture, and free from liability to derangement.

In the accompanying drawings we illustrate certain forms of compressor embodying our invention.

In said drawings: Figure 1 shows a front elevation of one of said compressors; Fig. 2 shows a front view of the frame plate and attached parts, the casing and compression cylinder having been removed; Fig. 3 shows a section through the axes of the cylinder and driving shaft; Fig. 4 shows a transverse section of the pump through the center of the cylinder; Fig. 5 shows an elevation of that side of the cylinder which faces the frame plate; Fig. 6 shows a side elevation of an alternative form of pump; Fig. 7 shows an elevation of the frame plate and attached parts, with the cylinder removed; Fig. 8 shows a section of the pump through the axes of the cylinder and driving shaft; Fig. 9 shows a detail section through one of the pistons; Fig 10 a detail section through the discharge valve; Fig. 11 a perspective view of the admission valve; Fig. 12 a detail elevation of the valve in the partition at the center of the cylinder; and Fig. 13 shows in elevation and partial section, means for mounting the pump to be driven by friction from an engine fly wheel.

Referring first to Figs. 1–5 inclusive, 1 designates a frame plate having lateral extensions 2, 2 provided with brackets 3, 3 forming outer heads for the cylinder 4. This frame plate 1 has also a bearing for the driving shaft 5. Within the cylinder 4 are two pistons 6, 6 comprising front and rear heads connected by ribs 7. These pistons work toward each other so that no cylinder head is required between them; and the cylinder is provided with an inlet valve 8 and an outlet valve 9, the latter provided with a connection 11 for a flexible tube and provided also with a connection for a pressure gage 12. Driving shaft 5 is provided with a crank pin 13 projecting from a disk 13′ rigidly mounted on shaft 5; and to this crank pin is rigidly secured another disk 14 provided with an opposite crank pin 15. Connecting rods 16 are mounted upon these crank pins and are provided with right angled ends fitting into sockets in the rear ends of pistons 6; these right angled portions of the connecting rods working in slots 17 in that side of the cylinder which faces the frame plate 1. It will be obvious that as the crank shaft is rotated, the pistons are alternately separated (air being then drawn in through valve 8) and moved toward each other, so compressing air between them and forcing it out through the discharge valve 9. The two disks 13′ and 14 serve as guides for the connecting rods, permitting the bearing surface of the connecting rods on these crank pins to be much shorter than would otherwise be permissible and so making the crank mechanism very compact. By this construction we obtain all the advantages of two cylinders and two pistons, while needing only a single inlet valve and a single discharge valve. Moreover, the pistons balance each other as to inertia and other reactions, since they reciprocate in opposite directions, and since they reciprocate along the same axial line.

To prevent entrance of dust into the mechanism, we preferably cover the cylinder and the face of the frame plate 1 with a casing 18. The cylinder 4 being made of thin tubing, we provide it near the center with a reinforcing ring 19, in function integral with said cylinder, and in this ring are threaded openings into which screw the bonnets of valves 8 and 9. Packing 20 is customarily provided between the flanges of these bonnets and the casing, to make a tight joint.

It will be apparent that as the shaft 5 is rotated air is alternately drawn into the cylinder and compressed between the pistons and forced out through valve 9. There being only two valves, leakage of air is reduced to a minimum and owing to the perfect balancing of the two pistons the pump may be operated at a high speed.

In the alternative form of pump shown in Figs. 6–12 inclusive, we employ a similar frame plate, cylinder tube, and pistons, but in this case reciprocate the pistons by means of a slotted yoke 21 itself reciprocated by a crank pin 22 mounted on a disk 23 secured to the driving shaft 5; and this yoke is provided with extensions 24 fitting into sockets in the rear ends of the pistons. Since, according to this construction, the pistons move in the same direction, the valve arrangement employed in Figs. 1–5 inclusive is not practicable, and the admission valves 25 are located in the pistons themselves. Also there is a partition 26, functionally forming a part of the cylinder, and located between the pistons; and to this partition is connected a discharge valve 27 provided with a valve plug 28 and with a connection 29 for a flexible tube; also a connection for a pressure gage 30. In the partition 26 is a valve chamber 32 containing a disk valve 33 provided with a central guide stem 34 working through central orifices in disks 35 at the ends of the valve chamber 32. This guide stem is slotted lengthwise, as indicated particularly in Figs. 10 and 12, to permit free passage of air into valve chamber 32 and so past the discharge valve. It will be clear that as the driving shaft rotates the pistons are moved back and forth alternately. As either piston moves toward the central partition, the air compressed before it moves the valve 33 to the opposite side of the partition, so permitting free passage of air from in front of such piston past the discharge valve; and when the other piston moves toward the partition the position of the valve 33 is automatically reversed by the action of the air.

The driving shaft 5 of the pumps illustrated, may be driven in any suitable manner. In Fig. 13 we have indicated means for driving said shaft by friction from the fly wheel of the engine. 36 designates a friction wheel mounted upon shaft 5 and adapted to be moved into and out of driving contact with the fly wheel 37 of an engine. The entire compressor is mounted upon a rocking frame 38 pivoted at 39 and a spring 40 tends to press the pump toward the fly wheel 37 and therefore to press the friction wheel 36 against said fly wheel. When it is not desired to have the pump operating during the rotation of fly wheel 37, retracting means, such as a screw 41, is operated to draw and hold the rocking frame 38 back so that friction wheel 36 is not in contact with said fly wheel.

It is obvious that the pump above described may be used for pumping gases other than air; also that while it is especially suitable for use as a tire inflating pump, it may be used for compressing air into a tank, or for operating a power whistle or other purpose for which small compressors are commonly used. Likewise, it will be obvious that the pump might be used for pumping liquids; suitable modifications being made preferably in the valves and passages, although the valves and passages shown will permit liquid to be used in the pump shown.

In the pumps herein described we will commonly regulate the size of the clearance space or spaces so that the pump is incapable of pumping beyond a safe pressure, thereby need of a relief valve is obviated.

Suitable means may be provided for lubricating the pistons. In the pump shown in Figs. 1–5 inclusive, we have shown for this purpose oil cups 42 so located that the pistons override the ports of the oil cups when they reach the outer ends of their strokes. The pistons are provided with the usual cup packings 43. Since these pistons compress toward the middle of the cylinder, the outer heads of the cylinder need not be tight, there never being any air pressure upon them.

What we claim is:—

1. A pump such as described, comprising in combination a cylinder, opposed pistons therein, a driving shaft located to one side of and at right angles to said cylinder and at a point intermediate the ends thereof, said shaft provided with opposed crank pins, connecting rods mounted on said crank pins and extending in opposite directions from the shaft toward the ends of said cylinder and working through slots in said cylinder, engaging said pistons to reciprocate the same toward and from each other, and admission and discharge valves.

2. A pump such as described comprising in combination a frame plate having lateral extensions, a cylinder secured to said frame plate, a driving shaft mounted in a bearing in said frame plate, crank mechanism operated by said shaft and arranged to reciprocate said pistons and located within a recess of said frame plate and between said plate and cylinder, and comprising connecting rods outside of said cylinder and connected to said pistons near the rear ends thereof, and admission and discharge valves.

3. A pump such as described comprising in combination a cylinder provided with slots on one side, pistons within said cylinder having sockets opposite said slots, a frame secured to said cylinder, a crank shaft having bearing in said frame, means operated by rotation of said shaft for reciprocating said pistons comprising connecting means fitting

within said sockets and working in said cylinder slots, and admission and discharge valves.

4. A pump such as described comprising in combination a frame, a cylinder connected thereto, opposed pistons within said cylinder, a driving shaft having a bearing in said frame, a crank pin carried by said shaft, a disk rigidly secured to said crank pin and carrying an opposite crank pin, connecting rods connected to said crank pins and pistons and adapted to be guided by said disk, and admission and discharge valves.

5. A pump such as described comprising in combination a frame, a cylinder connected thereto, opposed pistons within said cylinder, a driving shaft having a bearing in said frame, a disk on said shaft provided with a crank pin, another disk rigidly secured to said crank pin and carrying an opposite crank pin, connecting rods connected to crank pins and pistons and arranged to be guided by said disks, and admission and discharge valves.

6. A pump such as described comprising in combination a frame, a cylinder connected thereto, opposed pistons within said cylinder, a driving shaft, crank mechanism operated thereby for operating said pistons, located to one side of said cylinder admission and discharge valves, and a casing surrounding said cylinder and connected to the frame so as to form a closed chamber inclosing said cylinder and crank mechanism.

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

HENRY WILCOX.
FRANK BRABSON.

Witnesses:
H. M. MARBLE,
FRANK E. RAFFMAN.