C. N. SCOTT.

BLOWING ENGINE AND THE LIKE.

APPLICATION FILED NOV. 1, 1907.

905,108.

Patented Nov. 24, 1908.

2 SHEETS—SHEET 1.

Fig. 1.

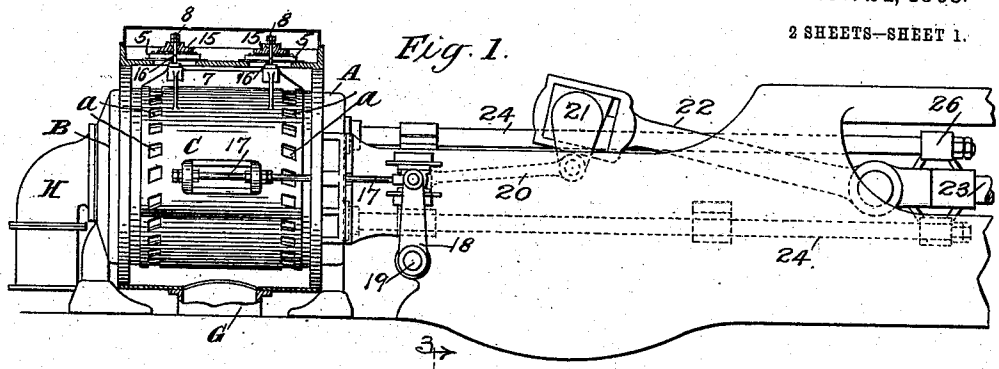
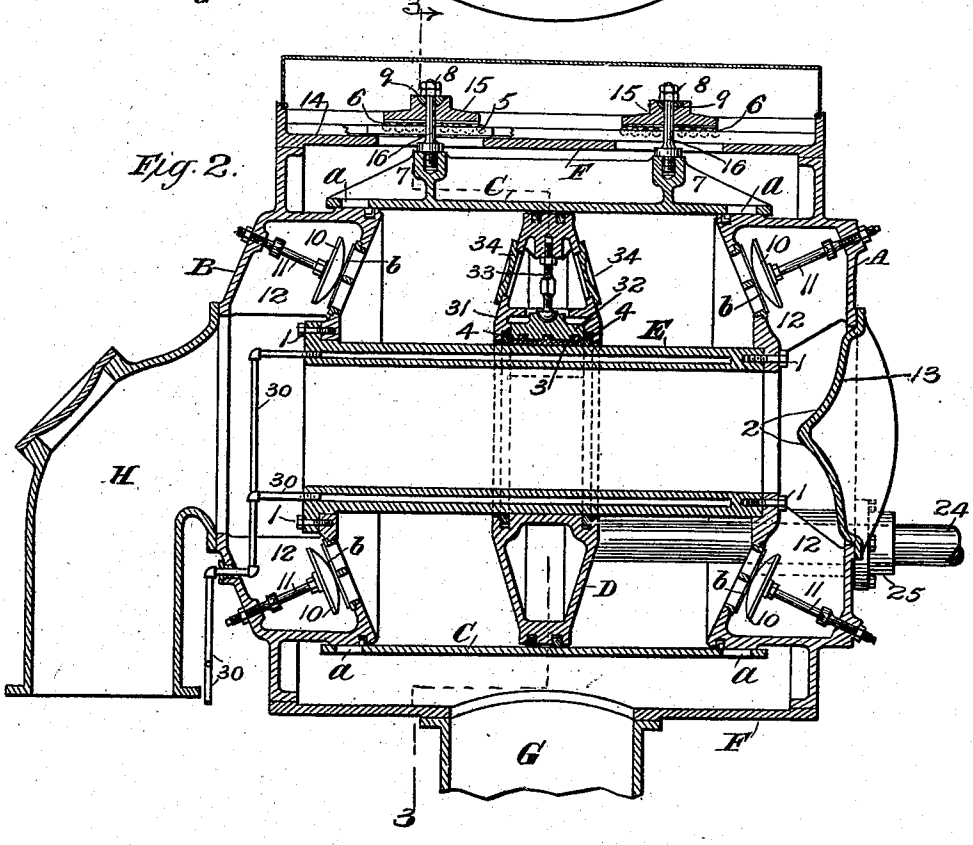


Fig. 2.



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THE NORRIS PETERS CO., WASHINGTON, D. C.

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2 SHEETS—SHEET 2.

Fig. 3.

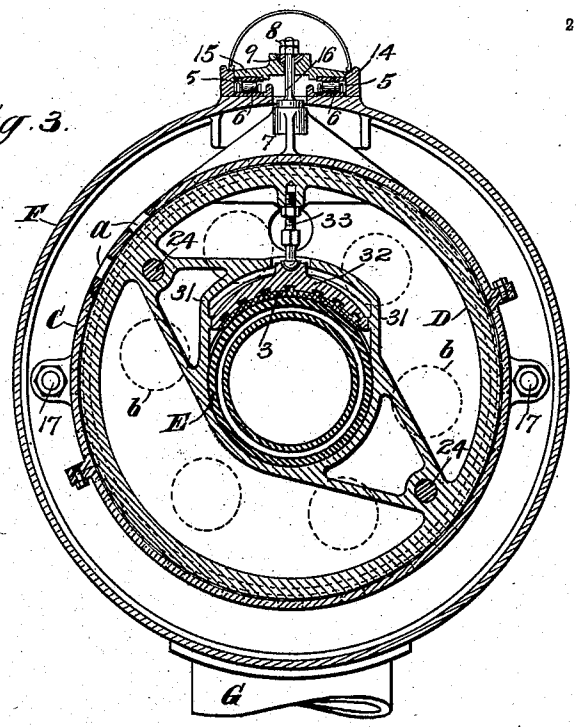
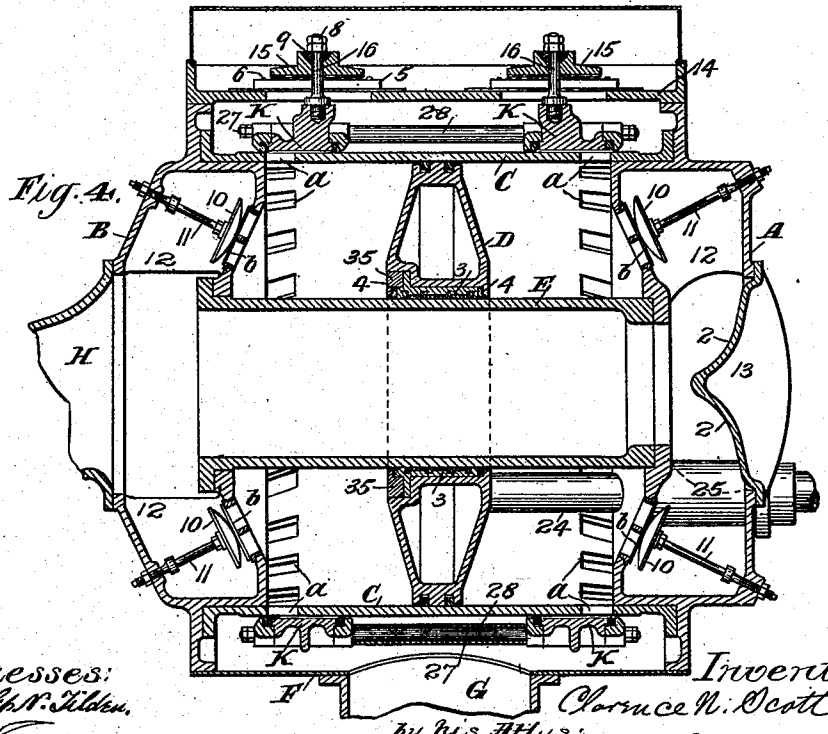


Fig. 4.



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UNITED STATES PATENT OFFICE.

CLARENCE N. SCOTT, OF BUFFALO, NEW YORK, ASSIGNOR TO INTERNATIONAL STEAM PUMP COMPANY, A CORPORATION OF NEW JERSEY.

BLOWING-ENGINE AND THE LIKE.

No. 905,108. Specification of Letters Patent. Patented Nov. 24, 1908.

Application filed November 1, 1907. Serial No. 400,276.

To all whom it may concern:

Be it known that I, CLARENCE N. SCOTT, a subject of the King of England, residing at Buffalo, county of Erie, and State of New York, have invented certain new and useful Improvements in Blowing-Engines and the Like, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The especial object of the present invention is to provide an improved construction of blowing engines of those classes in which the cylinder, or ring valves surrounding the cylinder, are moved longitudinally of the cylinder to open and close the admission ports, and air is discharged through delivery ports at the ends of the cylinders, but the invention may be used in other similar air or gas pumps or compressors in which a large piston and cylinder are required.

The invention includes the novel feature of a central trunk extending through the cylinder, so as to form a rigid tie between the two heads and a support for the piston, and preferably hollow, so as to connect the discharge chambers at opposite ends of the pump, important results in compactness, accessibility, alinement, reduced weight of parts and durability being thus secured.

The invention includes, also, a novel means which is preferably used for supporting the cylinder or ring valves, and certain more specific features of construction and combinations of parts, all as fully described hereafter and particularly pointed out in the claims.

In the accompanying drawings forming a part of this specification, the invention is shown as applied in its preferred form to two types of blowing engines, in which drawings—

Figure 1 is a side elevation of a blowing engine of the type employing a movable cylinder. Fig. 2 is a central longitudinal section of the same. Fig. 3 is a cross section on the line 3 of Fig. 2, and Fig. 4 is a view similar to Fig. 2, showing the invention applied to a blowing engine of the type using ring valves.

Referring now particularly to Figs. 1 to 3, A, B are the inboard and outboard heads of the engine, C is the cylinder moving on the heads for opening and closing the admission ports, D the piston, E the central trunk on which the piston is supported, F the outer casing inclosing the air admission chamber, G the admission pipe, and H the discharge pipe or elbow, which is connected centrally to the outboard head B opposite the trunk E. The cylinder C has the usual air admission ports *a* at opposite ends, and flexible metal discharge valves *b* are shown having spherical or cylindrical backing 10, carried by rods 11 adjustable from outside the cylinder. It will be understood, however, that other forms of discharge valves may be used, either mechanically actuated or automatic. Ribs 12 are preferably used to strengthen the heads and provide separate discharge chambers for the valves *b*. The trunk E is preferably secured to the inboard head, as shown, by bolts 1 connecting the inner end of the trunk with the inner head plate, the trunk being seated in the head plate so as to accurately center the same, and at its outer end the trunk passes through and fits a central opening in the inner plate and is provided with a flange, by which the trunk is secured to the inner plate of the outboard head B by bolts 1. The two heads are thus accurately alined and centered by the trunk. The opening through the outer plate of the outboard head B, with which the discharge elbow connects, is preferably made large enough to permit the flange at the outer end of the trunk E to pass through it, so that the trunk may be withdrawn from the heads by removing the discharge elbow. The inner plate of the inboard head A is provided with a central opening opposite the trunk, having a removable cover 13, and the inner surface of this cover 13 may be curved, as shown at 2, so as to direct the air delivered through the valves *b* to the inboard end of the trunk E, reducing the friction and resistance. As shown in Figs. 1 to 3, the trunk E is jacketed and pipes 30 provided for cooling fluid, but the jacketing may be omitted, as shown in Fig. 4.

The piston D may be of any suitable construction, but that shown in Figs. 1 to 3 is preferred, and forms a specific feature of the invention. In this construction, the piston D has a vertical guideway 31 above the trunk E, in which guideway a bearing piece 32 is vertically adjustable by screw stud 33 bearing on the top of the bearing piece and forming the abutment for the bearing piece.

This bearing piece carries a wear plate 3 which rests on the trunk E, and on opposite sides of the wear plate 3 are packing rings 4. The piston is provided with hand holes for access to the adjusting screw stud 33, so that the wear plate may readily be adjusted to take up wear, the holes being normally closed by covers 34. The head of the screw stud 33 preferably has a rocking bearing on the bearing piece, and for this purpose is shown as hemispherical and seated in a spherical cavity in the bearing piece 32, so as to permit the bearing piece 32 to adjust itself as the piston D moves over the trunk E.

In the construction shown, the cylinder C is suspended from above by roller bearings in such a manner as to move freely, and to permit lubrication without interference with the air admission chamber, and this construction forms a specific feature of the invention. This result is secured by mounting on the top of the casing F a longitudinal tie 14 carrying oil baths 5, in which run rollers 6 on which run carriages 15, from which the cylinder C is supported by studs 16, these studs being connected to ribs 7 on the cylinder formed so as to strengthen the latter and prevent distortion by its weight. The studs 16 are provided with adjusting nuts 8 at their upper ends, which nuts bear upon hemispherical washers 9, so that the cylinder may adjust itself to the pressure of the packing rings or other conditions.

The cylinder C is moved by rods 17 connected to the cylinder at opposite sides, and two levers 18 on rock shaft 19, this rock shaft being shown as actuated by a lever and link 20 from crank 21 on the main crank pin driven by rod 22 from the cross head 23 of the main piston rod. The piston D is driven by rods 24 at opposite sides of the piston passing through sleeves 25 in the inboard head A, and connected to cross head 26 on the main piston rod.

The construction shown in Fig. 4 differs from that shown in Figs. 1 to 3, and above described, in that the cylinder C is stationary, and the admission ports *a* are opened and closed by a valve cylinder, which of course may be a continuous cylinder outside the cylinder C, but as shown the central part of this outside valve cylinder is omitted, and the end rings K, forming the valves, connected by ties 27 in distance sleeves 28 between the rings. The valve cylinder formed by the rings K may be constructed and packed in any suitable manner, and, in accordance with the present invention, is supported from and carried by the carriages 15, in the same manner as the air cylinder C, in the construction shown in Figs. 1 to 3. The piston of Fig. 4, moreover, has not the adjustable bearing piece of Figs. 1 to 3, but the wear plate 3 is a ring extending about the trunk E, this wear plate and the packing rings 4 being held in place by a removable ring 35.

The central trunk of the present invention enables very important results to be secured, among which are the following and others will be apparent to those skilled in the art. The inboard and outboard heads are rigidly connected together, and their proper alinement fixed by the trunk, and the engine is self contained and self alined, as the inboard head may be connected directly to the end of the main frame without tie bars, this also making possible a reduced length of the engine. The interior of the cylinder and all the valves are readily accessible by removal of the trunk, this being permitted in the construction shown by simply removing the discharge pipe elbow. The weight of the piston being carried on the trunk, the usual inboard and outboard guides to support the piston, are not required. The weight of the parts is very materially reduced, as with the trunk no inboard or outboard cross heads are required and other parts may be made lighter. The diameter of the cylinder may be larger, on account of the support of the piston by the trunk, thus providing for larger discharge valves and greater discharge valve area. The air admission is also freer, as it is not interrupted by the usual tie bars or braces extending through the admission chamber between the inboard and outboard heads.

The above applies to the trunk whether closed to the discharge chambers as in the case of a solid trunk or one having closed ends, or open to the discharge chambers, so as to connect them. With the hollow trunk connecting the discharge chambers at opposite ends, there is less friction on the air on account of the direct discharge of the air from the discharge valves to the central trunk. With the hollow trunk, a central opening in the inboard head can be used, so that the removal of one central cover gives access to all the discharge valves, and the long power piston rod can be removed by detaching it from the main cross head and pulling the piston rod through the trunk, which is important where space is not available at the power end of the engine but is at the air end. A stronger construction of the cylinder heads is possible, as it is not necessary to cut away the ribs in the discharge chamber to secure passageway from the valves to the delivery pipe. The weight of the parts is also reduced largely by carrying the weight of the air or valve cylinder on the longitudinal tie resting on the two cylinder heads, as shown, and the bearings for the cylinder support secure a smooth easy movement, enabling light actuating parts to be used. These bearings, also, are entirely removed from the circulation of refrigerated

air, permitting proper lubrication. While this method of carrying the cylinder secures these results, however, and forms a part of the invention, it will be understood that this is not essential to the other features of the invention and the air or valve cylinder may be otherwise guided and supported.

It will be understood that the invention is not limited to the specific construction or arrangement of parts shown, but that these may be varied while retaining the invention defined by the claims.

What is claimed is:—

1. A gaseous fluid pump having a piston and a trunk extending through the piston and connecting the cylinder heads, in combination with a port controlling cylinder outside the piston, and means for moving the cylinder and piston longitudinally of the trunk.

2. In a gaseous fluid pump, the combination with the air cylinder and piston, of a central trunk extending through the piston and connecting the cylinder heads, admission ports extending circumferentially of the cylinder at opposite ends, means actuated by mechanical connections to a moving part of the pump for opening and closing said admission ports, and means for controlling the discharge from opposite ends of the cylinder.

3. In a gaseous fluid pump, the combination with the movable air cylinder and its fixed heads and the piston, of a central trunk extending through the piston and secured to the heads, and means for moving the cylinder and piston longitudinally of the trunk.

4. In a gaseous fluid pump, the combination with the air cylinder and its fixed heads, the piston, and a discharge connection outside one of the heads through which the piston delivers on its stroke in each direction, of a central hollow trunk extending through the piston and secured to the heads and forming a part of the discharge passage.

5. In a gaseous fluid pump, the combination with the air cylinder and its fixed heads, the piston, and a discharge connection outside one of the heads, through which the piston delivers on its stroke in each direction, of a central hollow trunk extending through the piston and secured to the heads and connecting the discharge chambers at opposite ends of the cylinder, and discharge valves in the heads surrounding the trunk.

6. In a gaseous fluid pump, the combination with the longitudinally moving horizontal cylinder and its fixed heads and means for moving the cylinder, of an admission chamber surrounding the cylinder, a central trunk extending through the piston and secured to the heads, and a support for the cylinder outside the admission chamber.

7. The combination with the cylinder and central horizontal trunk, of the piston moving on the trunk and having a vertically adjustable bearing piece above the trunk, and means for moving the piston.

8. The combination with the cylinder and central horizontal trunk, of the piston and means for moving the piston on the trunk, vertical guides 31 in the piston above the trunk, and bearing piece 32 mounted in said guides.

9. The combination with the cylinder and central horizontal trunk, of the piston and means for moving the piston on the trunk, bearing piece 32 in the piston above the trunk, and an abutment having a rocking bearing on the top of the bearing piece.

10. The combination with the central horizontal trunk and the piston and means for moving the piston on the trunk, of a longitudinally moving air or valve cylinder, means for moving the cylinder, a support above the cylinder, and bearings for the cylinder on the support.

11. The combination with the horizontal longitudinally moving air or valve cylinder and the air chamber outside the cylinder, and means for moving the cylinder, of support 14 above the chamber, rollers 6 carried by said support, carriages 15 on said rollers, and means for suspending the cylinder from the carriages.

12. The combination with the horizontal longitudinally moving air or valve cylinder and the air chamber outside the cylinder and means for moving the cylinder, of support 14 above the cylinder, rollers 6 carried by said support and carriages 15 on the rollers, studs 16 connected to the cylinder, and rocking supports for the studs on the carriages.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

CLARENCE N. SCOTT.

Witnesses:
S. B. Daugherty,
J. H. O. Bunge.