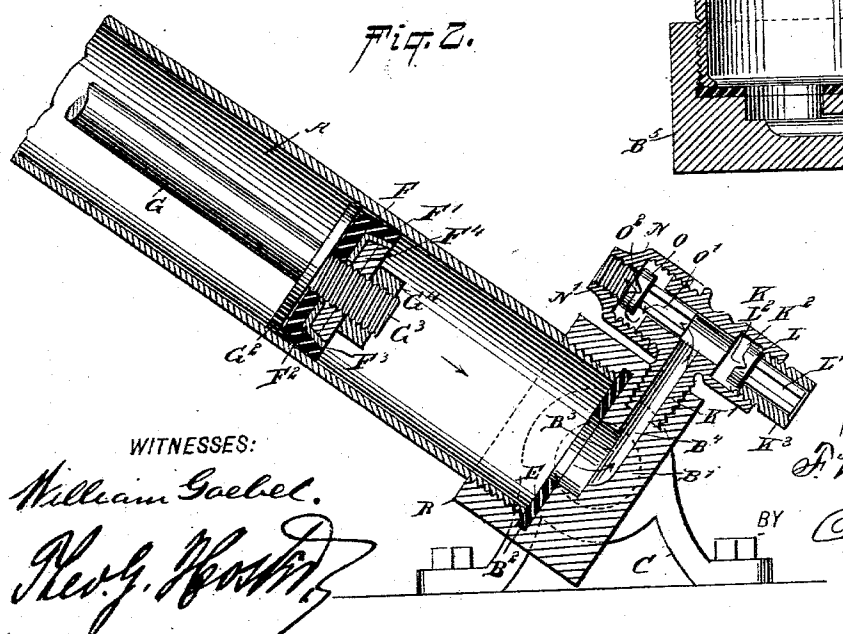
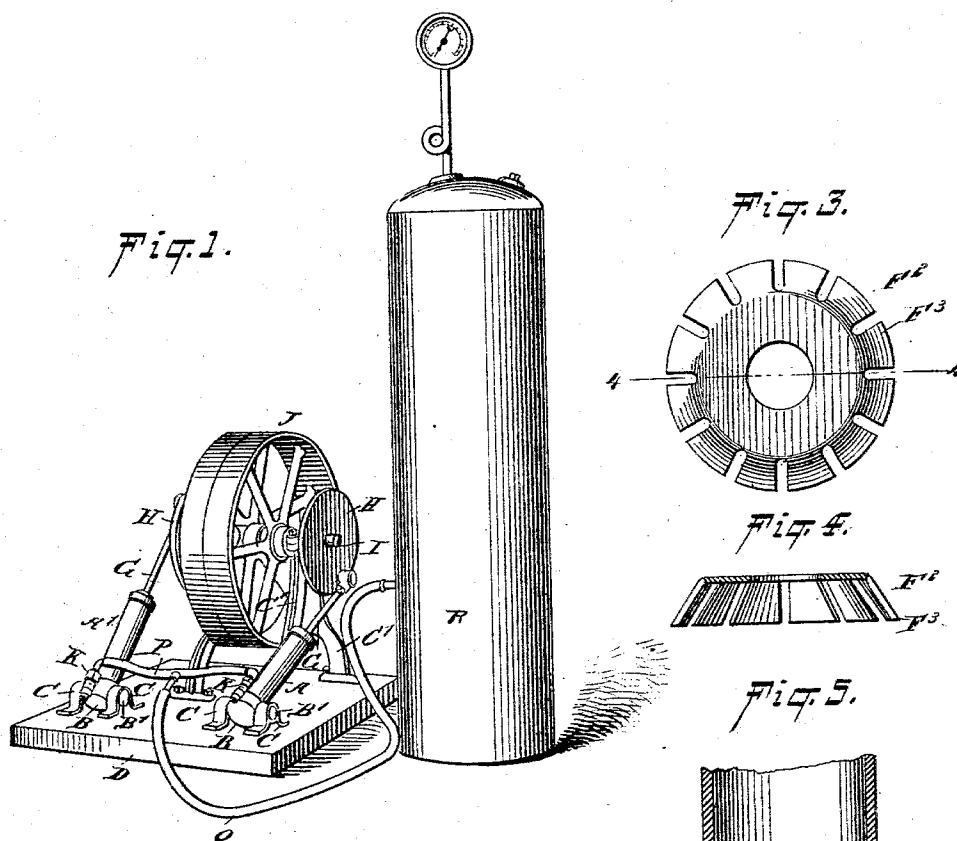


(No Model.)

F. N. STEVENS.  
AIR PUMP.

No. 556,704.

Patented Mar. 17, 1896.



# UNITED STATES PATENT OFFICE.

FRANK N. STEVENS, OF SENECA FALLS, NEW YORK.

## AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 556,704, dated March 17, 1896.

Application filed March 28, 1895. Serial No. 543,502. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK N. STEVENS, of Seneca Falls, in the county of Seneca and State of New York, have invented a new and Improved Air-Pump, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved air-pump which is simple and durable in construction, very effective in operation, not liable to leak, and arranged to permit of conveniently repairing any part of the pump in case of wear or injury.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claim.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the improvement. Fig. 2 is an enlarged sectional side elevation of the cylinder-head and valve-casing. Fig. 3 is an enlarged face view of the expansible packing-disk or spreader. Fig. 4 is a sectional side elevation of the same on the line 4 4 of Fig. 3, and Fig. 5 is a sectional side elevation of a modified form of packing between the cylinder and its head.

The improved air-pump, as illustrated in Fig. 1, is double-acting, and is provided for this purpose with two oscillating cylinders A and A', each arranged to screw at its lower end into a head B provided with trunnions B', mounted to turn in suitable bearings C, secured to a base D of any approved construction.

In the bottom of each head B is arranged a packing ring or washer E, made of rubber, leather, or other suitable material, and fitting at its edge into an annular groove B<sup>2</sup>, somewhat larger than the threaded bore of the head, so that the cylinder, when screwed up into the bore, abuts on the face of the said packing-ring E a distance from the edge thereof, so as to allow the cylinder to strike the ring squarely, thus making a very tight joint to prevent leakage.

In each cylinder is fitted to reciprocate a piston F, provided with a piston-rod G extending through the open end of each cylin-

der A and A' and connecting at its outer end with a crank disk or arm H attached to a driving-shaft I journaled in suitable bearings C' secured on the base D. The two disks or arms H have their wrist-pins set diametrically opposite each other, so that the pistons in the two cylinders A and A' are alternately on the up or down stroke to insure a continuous operation of the pump. On the shaft I are secured the fast and loose pulleys J, connected by belt with other suitable machinery, to impart a rotary motion to the shaft I; but, if desired, the latter may be turned by hand, foot-power, or other means.

Each piston F is formed with a cup F', made of leather, rubber, or other suitable material, and abutting against a disk G<sup>2</sup> integral with the piston-rod G, and into the said cup F' fits an expansible disk or spreader F<sup>2</sup>, preferably made of sheet metal with flaring sides F<sup>3</sup>, formed with slots, as plainly indicated in Figs. 3 and 4, and in this spreader F<sup>2</sup> are placed leather or metallic washers F<sup>4</sup>, against the undermost of which abuts a nut G<sup>4</sup> screwing on the lower threaded end G<sup>3</sup> of the piston-rod G. Now it will be seen that by this arrangement the operator by screwing up the nut G<sup>4</sup> presses the washers F<sup>4</sup> against the sides F<sup>3</sup> of the spreader F<sup>2</sup> to force the sides of the cup F' into firm contact with the inner surface of the cylinder A to prevent leakage.

In the bottom of each head B is formed a recess B<sup>3</sup> sufficiently large to admit the nut G<sup>4</sup> to permit the piston F to pass down in the cylinder to the extreme lower end thereof to expel all the air previously sucked in. The recess B<sup>3</sup> leads to a channel B<sup>4</sup>, connected with a pipe K' screwing in the head B and forming part of the valve-casing K. The latter is preferably made in the shape of a T, as plainly illustrated in Fig. 2, and is formed at one end with a valve-chamber K<sup>2</sup>, in which operates the inlet-valve L, provided with a spider-stem L', fitted to slide in a short nipple K<sup>3</sup> screwing into the outer end of the chamber K<sup>2</sup>. In the top of the valve L is formed a V-shaped groove L<sup>2</sup> for the purpose of permitting the air to freely pass from the valve-chamber to the channel K'.

On the upper end of the valve-casing K is secured a cap N, forming a valve-chamber for

an outlet-valve O, similar in construction to the valve L and having its stem O' fitted to slide in the valve-casing K. A V-shaped groove O<sup>3</sup> is in the top of the said valve to permit the air to readily pass from the chamber formed in the cap N to the outlet end N' of the said cap. This outlet end N' is connected by a rubber tube P with the outlet of the other cap on the cylinder-head for the cylinder A', and the tube P is connected at or near its middle by a tube Q with the air-reservoir R, in which the air is to be stored.

As illustrated in Fig. 5, the packing-disk E' between the cylinder A<sup>2</sup> and the head B<sup>5</sup> is placed in the lower end of the threaded bore of the head without enlarging the bore, as previously described and shown in Fig. 2; but in order to make a firm contact between the lower edge of the cylinder A<sup>2</sup> and the said packing-ring I form the extreme lower end with an inwardly-extending annular flange A<sup>3</sup>, adapted to be seated on the face of the said packing-ring to insure a tight joint.

It will be seen that by the arrangement described the cylinders A and A' oscillate when the shaft I is set in motion, and the pistons F in the two cylinders are moved alternately up and down, so as to continually draw in air and discharge the same into the reservoir R.

It will further be seen that by the construction described the operator can readily unscrew the cylinders with his hands, slide the same up on the piston-rod G and free the pis-

ton F, so as to permit of repacking the latter whenever desired.

As the cup F' is completely filled with the spreader and the washers no air will remain in the lower end of the cylinder A when the piston F moves into a lowermost position, so that all the air is expelled from the cylinder at each downstroke.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

An air-pump, comprising a cylinder formed with each end open, a head having in one side a circular recess internally threaded and having at its inner extremity an annular groove extended peripherally beyond the sides of the recess, a packing-ring seated on the inner sides or bottom of the recess in the head and projected into the groove thereof, the cylinder being screwed into the recess and engaged with the packing-ring, the head further having a counter-recess centrally in the first recess and communicating with a passage extending outside of the head, air inlet and outlet valves commanding said passage, and a piston in the cylinder, said piston being capable of close engagement with the packing-ring of the cylinder-head, substantially as described.

FRANK N. STEVENS.

Witnesses:

THOMAS W. POLLARD,

THOMAS T. GIBSON.