(No Model.) 2 Sheets—Sheet 1.

C. W. NASON.

BELT SHIFTING DEVICE FOR AIR PUMPS.

No. 529,404. Patented Nov. 20, 1894.

Fig. 1.

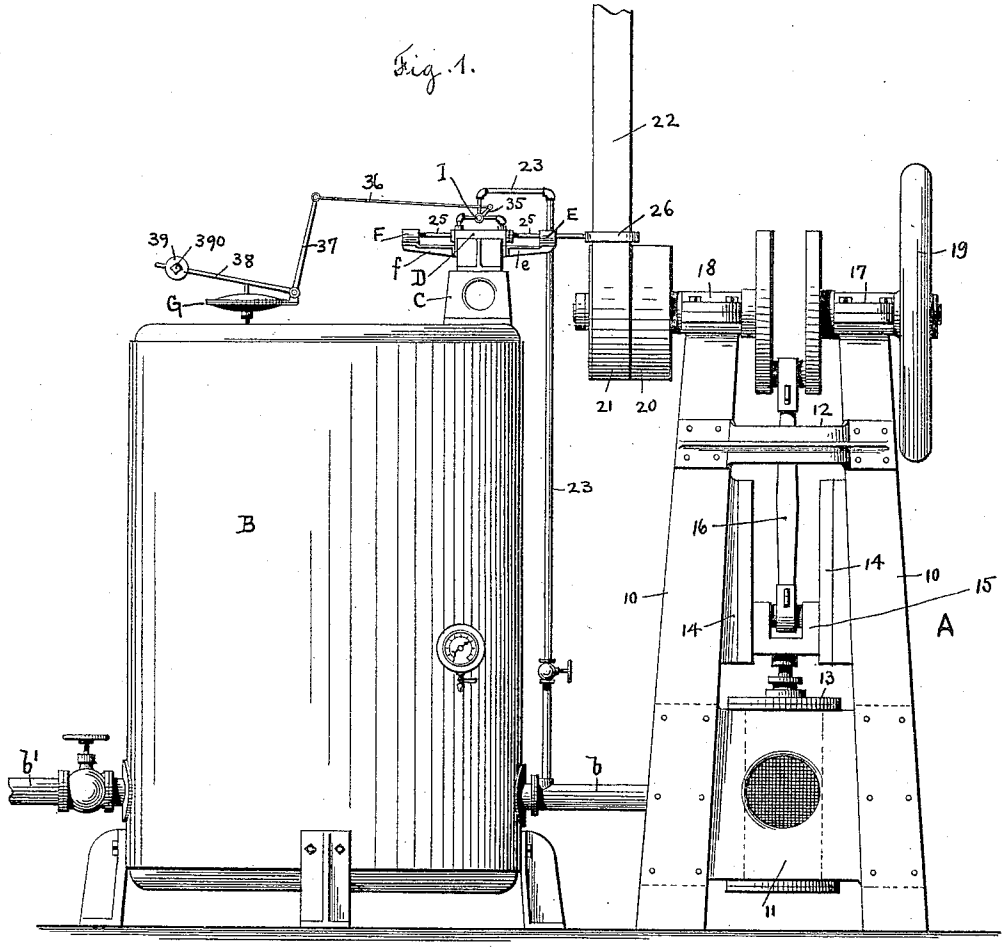
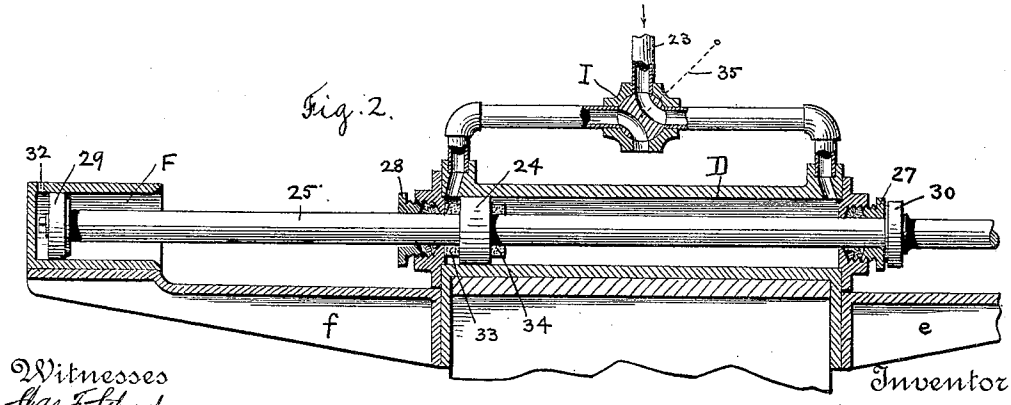


Fig. 2.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

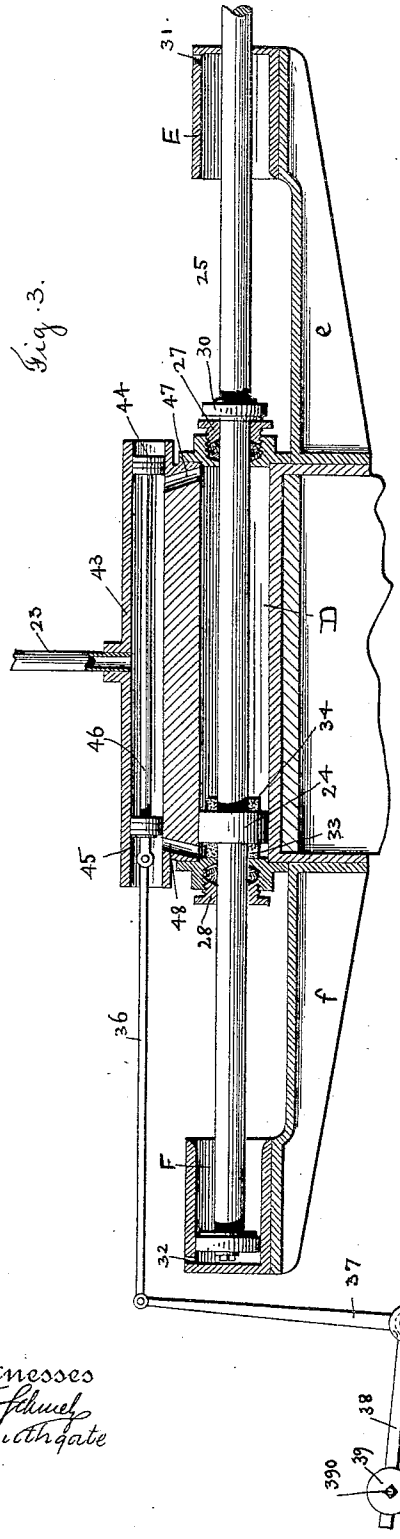
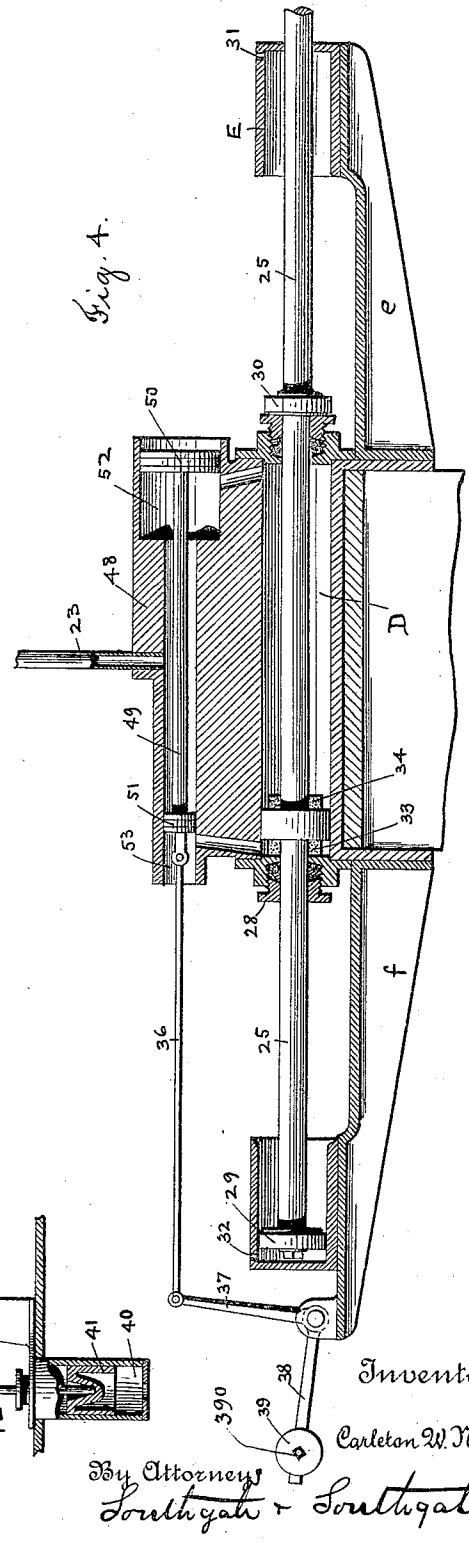


Fig. 4.



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UNITED STATES PATENT OFFICE.

CARLETON W. NASON, OF NEW YORK, N. Y.

BELT-SHIFTING DEVICE FOR AIR-PUMPS.

SPECIFICATION forming part of Letters Patent No. 529,404, dated November 20, 1894.

Application filed February 19, 1894. Serial No. 500,665. (No model.)

To all whom it may concern:

Be it known that I, CARLETON W. NASON, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a new and useful Improvement in Belt-Shifting Devices for Air-Pumps, of which the following is a specification.

The object of my invention is to provide a simple and efficient belt-shifting device for air-pumps, and to this end, my invention consists of the parts and combinations of parts as hereinafter described, and more particularly pointed out in the claims at the end of this specification.

Referring to the accompanying two sheets of drawings, Figure 1 is a side elevation of an air-pump and pressure-tank provided with my improved belt-shifting device. Fig. 2 is a longitudinal sectional view on an enlarged scale of the cylinder for actuating the belt-shifting device, and Figs. 3 and 4 are similar views illustrating modified forms of construction to be hereinafter referred to.

Referring to Figs. 1 and 2, A designates an air-pump, which may be of any ordinary or approved construction.

I have shown in the drawings a vertical air pump, which is constructed with side frames 10, the side-frames being connected by cross-pieces or ties 11 and 12. Mounted in the cross-pieces 11 is the pump cylinder 13, and the piston-rod of the cylinder is connected to a cross-head 15, which is adapted to reciprocate on vertical ways 14 carried by the side-frames 10. The cross-head 15 is connected by a pitman 16 with a crank-pin carried by a horizontal shaft, which is mounted in boxes 17 and 18 supported on the side-frames 10. At one end, the horizontal shaft is provided with a fly-wheel 19, and at the other end is provided with a tight pulley 20 and a loose pulley 21, these pulleys being driven by a belt 22, which may be actuated from any suitable source of power.

B designates a pressure-tank, which is connected with the pump-cylinder by means of the inlet pipe *b*, and is provided with an outlet pipe *b'*.

My improved belt-shifting device, as shown in the drawings, is mounted on top of the pressure tank, although it is evident that it may be located in any convenient position.

D designates the main cylinder of the belt-shifting device, which is carried on a support C, as shown, and air-pressure from the tank B may be admitted to either end of the cylinder D by means of the pipe 23.

Referring to Fig. 2, 24 designates the main piston, which is mounted in the cylinder D, and is carried by the piston-rod 25, which passes through suitable stuffing boxes 27 and 28, and at one end is provided with a belt-shifting device 26, as shown in Fig. 1. Mounted on the piston-rod 25, near its end, I provide a supplemental piston 29, which is adapted to fit into the cylinder F, which is supported by a bracket *f*, and is provided with a minute orifice 32 forming a dash-pot to retard the main piston near the end of its stroke. Mounted on the piston-rod 25 at the other side of the piston 24, I also provide a supplemental piston 30, which is adapted to engage a cylinder E carried by a bracket *e*, and provided with a minute orifice 31, thus forming a dash-pot for retarding the main piston near the other end of its stroke, as most clearly shown in Figs. 3 and 4.

In order to prevent the piston 24 from hammering or being driven against the cylinder-head at either end of its stroke, I also provide rubber washers 33 and 34, which are carried by the piston-rod 25, at each side of the piston 24.

I designates a four-way valve, as most clearly shown in Fig. 2, which is operated from a bell-crank lever by means of the link 36 and the arm 35.

As shown in Fig. 1, the bell-crank lever is pivoted in a bracket carried by a diaphragm case G. An adjustable weight 39, which can be secured in any desired position by means of the set-screw 390 is mounted on the arm 38 of the bell-crank lever. Also acting on the arm 38 of the bell-crank lever, I provide a suitable flexible diaphragm, which is mounted in the shell G, and is controlled by the pressure of air in the pressure-tank B.

The action of my improved belt-shifting device is thought to be obvious, and may be briefly described as follows:—When the pressure rises in the tank B, the flexible dia-

phragm is raised, and the valve I is operated through the bell-crank lever and the link 36 so as to admit pressure in front of the piston 24, and the belt is thus shifted from the tight pulley 20 on to the loose pulley 21, and the air-pump is stopped. If now the pressure should fall, the weight 39 through the bell-crank lever and the link 36, will turn the valve I so as to admit pressure behind the piston 24, and shift the belt on to the tight pulley 20, thus starting the pump. By this means, it will be seen that the air-pump will be accurately regulated, and a constant air-pressure will be maintained. It is also to be noted that the intensity of the air pressure may be regulated by simply adjusting the weight 39.

In some cases, instead of using a four-way valve, I contemplate using a slide-valve, and I have illustrated such constructions in Figs. 3 and 4.

Referring to Fig. 3 it is to be noted that the cylinder D is provided with a supplemental valve-casing 43, which is mounted on the same, and is connected to the main cylinder by means of ports 47 and 48. A balanced cylindrical slide-valve is mounted in the valve casing 43, and is formed by the valve-stem 46 and the pistons 44 and 45. The valve-stem 46 is connected directly to the link 36, and is actuated by the bell-crank lever in the same manner as in the construction shown in Fig. 1, except that instead of a flexible diaphragm for actuating the bell-crank lever, I have illustrated a cylinder and piston. The cylinder 40, for actuating the bell-crank lever may be connected with the pressure-tank in any convenient way, and, as shown in the drawings, it is set directly into the top of the pressure-tank; but it is evident that it may be located in any convenient position, and may be connected by means of pipes to the air-pump or pressure-tank. 41 designates a piston which is mounted in the cylinder 40, and is provided with a central depression in which is mounted a piston-rod 42, which is adapted to engage one arm of the bell-crank lever. The operation of this form of belt-shifting device is substantially the same as that heretofore set forth, and need not be described at length, as it is evident that the supplemental cylinder and piston are the equivalent of the flexible diaphragm, and may be used in place of the same, if desired.

Another form of valve, which I contemplate using for controlling the admission of pressure to the cylinder D consists essentially of a differential slide-valve, and is illustrated in Fig. 4.

Referring to Fig. 4, it will be seen that the cylinder D has mounted upon the same a valve-casing 48. The valve-casing 48 has a cylindrical valve-chamber 53 bored in the same, and a larger valve-chamber 52 arranged concentrically with the valve-chamber 53. The valve-casing 48 is also connected with the cylinder D by means of ports, as in Fig. 3. Mounted in the valve chamber 52 is a piston 50, and in the valve chamber 53 is a smaller piston 51. The pistons 50 and 51 are carried by a valve-spindle 49, which is connected to a bell-crank lever, carrying an adjustable weight by means of the link 36. The pipe 23, which leads into the valve-casing 48 may be connected directly to the air-pump, or to the pressure-tank. Since the area of the piston 50 is greater than the area of the piston 51, the differential slide-valve will tend to move so as to admit pressure in front of the piston 24. As the pressure in the pipe 23 falls, the weight 39 will tend to move the differential slide-valve back again, and it will thus be seen that the operation of this form of belt-shifting device is substantially the same as that heretofore described.

I am aware that many changes may be made in the construction of the device, and I do not wish to be limited to its use in connection with any particular form of air-pump, nor to the peculiar location, in which I have illustrated the same.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of an air pump, a belt-shifting device for starting and stopping the air pump, a main cylinder and piston for operating the belt-shifting device in either direction, and an automatically controlled valve actuated by variations in the air pressure for admitting pressure to either end of the main cylinder, substantially as described.

2. In a belt-shifting device, the combination of a main cylinder and piston for shifting the belt, dash-pots for retarding the motion of the piston near the end of its stroke, and an automatically controlled valve actuated by variations in the air pressure for admitting pressure to either end of the main cylinder, substantially as described.

3. In a belt-shifting device, the combination of a main cylinder, a piston-rod, a main piston, supplemental pistons mounted on the piston-rod fitting into cylinders at each end of the main cylinder, and forming dash-pots for retarding the piston at each end of its stroke, and an automatically controlled valve for admitting pressure to either end of the main cylinder, substantially as described.

4. The combination of an air pump, a belt-shifting device, a main cylinder and piston for actuating said belt-shifting device, a valve for admitting pressure to either end of the main cylinder and adapted to be moved in one direction by the air pressure and in the opposite direction by a weight, substantially as described.

5. The combination in a belt-shifting device of a main cylinder and piston, a controlling valve for admitting pressure to either end of said main cylinder, a bell-crank lever having an adjustable weight mounted on one

arm, and having its other arm connected to the controlling valve, substantially as described.

6. The combination of an air pump, a belt-shifting device, a cylinder and piston actuating said belt-shifting device in either direction, a valve for admitting pressure to either end of said cylinder, a flexible diaphragm actuated by pressure from the air pump, and connected to operate the valve, substantially as described.

7. The combination of an air pump, a main cylinder and piston actuating a belt-shifting device, a valve for admitting pressure to either end of said cylinder, a bell-crank lever having one arm connected to the valve, and having its other arm provided with an adjustable weight and connected to a flexible diaphragm actuated by pressure from the air pump, substantially as described.

8. The combination of an air pump, a belt-shifting device controlling said air pump, a cylinder and piston for actuating said belt-shifting device in either direction, dash-pots for retarding the piston at each end of its stroke, said dash-posts being carried by extended brackets leaving free access to the stuffing boxes of said cylinder, a flexible diaphragm controlled by variations of the air pressure, and adapted to actuate a valve for admitting pressure to either end of said cylinder, substantially as described.

9. The combination of an air pump, a belt-shifting device, a cylinder and piston actuating said belt-shifting device in either direction, dash-pots for retarding the piston, rubber washers for preventing the piston from hammering at the end of its stroke, a valve for admitting pressure to either end of said cylinder, said valve being actuated in one direction by the air pressure, and in the other direction by an adjustable weight, substantially as described.

10. In a belt shifting device, the combination of the main cylinder and piston for actuating the belt, a controlling valve actuated by variations in the air pressure for admitting pressure to the main cylinder, supplemental pistons mounted on the main piston rod and engaging dash-pots carried by extended brackets, leaving free access to the stuffing boxes at each end of the cylinder, and flexible washers mounted on the piston-rod at each side of the main piston, and adapted to alternately engage the opposite ends of the cylinder as the main piston moves back and forth, substantially as described.

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

CARLETON W. NASON.

Witnesses:

JOHN J. MURRAY,

SAMUEL GREASON.