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E. J. ROHRBACHER.

AUTOMATIC AIR PUMP.

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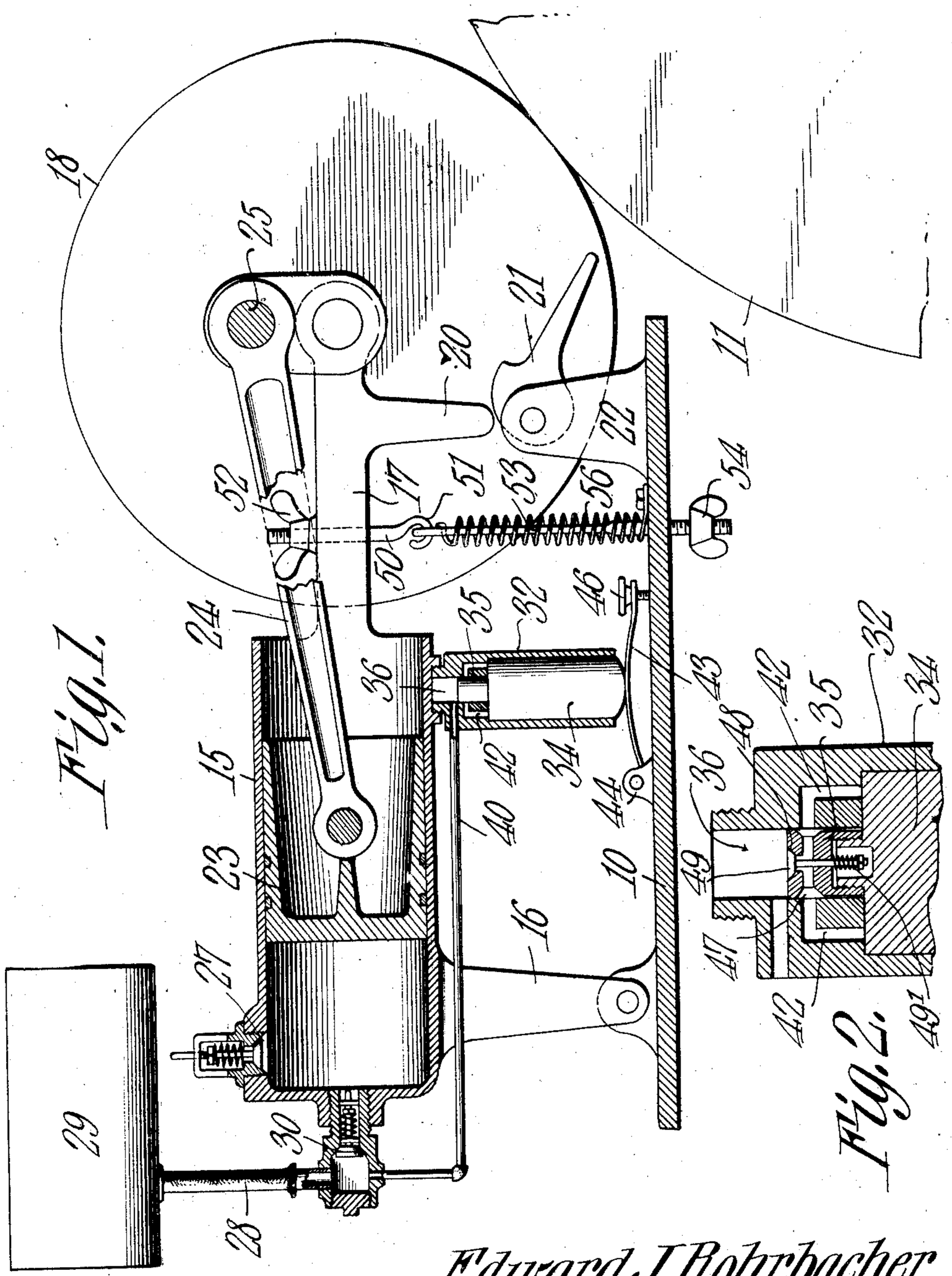

Fig. 1.

Fig. 2.

WITNESSES:

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AUTOMATIC AIR-PUMP.

No. 864,918. Specification of Letters Patent. Patented Sept. 3, 1907.

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To all whom it may concern:

Be it known that I, EDWARD J. ROHRBACHER, a citizen of the United States, residing at Blaine, in the county of Whatcom and State of Washington, have invented a new and useful Automatic Air-Pump, of which the following is a specification.

This invention relates to air pumps, and has for its principal object to provide a pump for use in connection with automobiles, whistle tanks, or for general use where air is to be forced under pressure into a suitable reservoir or tank, or into a tire.

One of the principal objects of the invention is to provide a pump which may be set or adjusted to pump air to any desired pressure, and when that pressure is reached, to automatically stop.

A further object of the invention is to provide an improved form of pump in which a portion of the compressed air is utilized as a means for forcing the pump to inoperative position when the desired pressure has been attained.

A still further object of the invention is to provide an improved means for adjusting the degree of pressure to which the air may be pumped.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction, and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings:—Figure 1 is a sectional elevation of a pump constructed in accordance with the invention. Fig. 2 is a detail sectional view of the upper portion of the cylinder and piston by which the pump is moved to inoperative position.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The working parts of the pump are mounted on a suitable base 10 which may be arranged at any convenient point, and if used in connection with an automobile or the like is disposed adjacent to the fly wheel 11 of the engine. Arranged above the base is a pump cylinder 15 having at one end a downwardly projecting frame 16 that is fulcrumed to a lug 17 projecting from the base, and to the rear end of the cylinder is secured an arm 17 at the outer end of which is formed a bearing for the reception of a friction wheel 18 the latter being moved into and from engagement with the periphery of the fly wheel 11 and constituting the actuating device of the pump. The arm 17 is provided with a downwardly extending lug or arm 20 that is arranged immediately above a cam lever 21 that is carried by a suitable standard 22 arranged on the base, and by turning the cam lever the pump member may be raised in order to disconnect the friction wheel from the fly wheel and stop the operation of the pump.

Fitting within the cylinder is a piston or plunger 23 that is connected by a rod 24 to a wrist pin 25 on the friction wheel 18. The piston is reciprocated within the cylinder, and on one stroke draws air through a suitable inlet 27, and on the stroke in the opposite direction forces such air through a discharge pipe 28 into a reservoir 29, or to an automobile tire or other place where air is to be stored. In the connection 28 is arranged a one way check valve 30 opening outward to permit the passage of the air from the pump cylinder.

Secured to the bottom of the cylinder 15 is a vertically arranged cylinder 32 that is open at its lower end and is counter-bored. The main body of the cylinder receives a plunger or piston 34 having at its upper end a reduced stem 35 that fits within the reduced portion 36 of the bore of the cylinder, and this portion 36 of the cylinder is placed in communication with the reservoir or the pipe 28 by a small connecting pipe 40 so that the pressure in the reduced portion 36 of the cylinder may be at all times the same as that in the reservoir.

In the upper portion of the cylinder 32 are arranged a number of by-pass ports 42 which place the larger and smaller portions of the cylinder in communication with each other, and these ports are under the control of the reduced stem 35 of the piston when the latter is in the position shown in Fig. 1, and it is not until the pressure increases to an extent sufficient to elevate the cylinder 33 that the air may pass through the port 42 and engage with the upper end of the main body of the piston 34. The lower end of the piston 34 rests on a leaf spring 43, said spring being secured at one end to a lug 44 that is carried by the base, and it is provided at its opposite end with a screw 46 which may be adjusted for the purpose of altering the upward stress on the piston or plunger 34, and by suitably adjusting this spring the degree of pressure necessary to raise the cylinders 32 and 15 may be altered as required.

The upper portion 35 of the piston is provided with ports 47 leading from the periphery of the piston, to a central portion 48 that communicates with the upper end of the piston. The top of the port 48 is provided with a seat for a valve 49, the stem of said valve extending through a guiding opening formed in the upper portion of the piston, and the lower end of said stem is engaged by a spring 49′ that tends to hold the valve in closed position.

When the air inlet pressure has forced the mechanism to inoperative position, the air which has passed through the ports 42 to the upper portion of the cylin-

ler 32 is of the same pressure as that in the reservoir 29, and this pressure is acting also on the lower surface of the valve 49 and tending to unseat the same, although the area of the lower portion of the valve is less than the area of its upper face, so that there will be slightly greater pressure tending to force the valve to closed position than that tending to open it, and this closing pressure is assisted by the spring 49'. The ends of the ports 47 are somewhat enlarged so that they may remain in communication with the inner ends of the port 42 in practically all positions of the piston and cylinder.

When the air in the reservoir 29 is consumed, and the pressure reduced, the superior pressure in the upper portion of the cylinder 32 will act on the valve 49 and will move the same to open position, the pressure equalizing back to the reservoir 29, so that the spring 56 may act to draw the pump down until the friction wheel 18 operatively engages the driving wheel 11 and the device is once more set into operation.

Extending through the arm 17 is a bolt 50, the lower end of which is provided with a hook 51, and at the upper end of the bolt is a thumb nut 52 which may be adjusted in order to draw the hook up or down. To this hook is connected the upper end of a rod 53, which passes through an opening in the base and carries an adjusting nut 54, the latter being normally in a position somewhat below the bottom of the base. This mechanism serves to limit the upward movement of the arm 17 and the distance which the friction wheel 18 moves when separating from the fly wheel 11. The hook 51 is connected to the base by a coiled tension spring 56, the stress of which may be adjusted by the nut 52, so that the degree of pressure in the chamber 36 and in the tank 29 may be increased or decreased to any desired extent before the pump can move to inoperative position, these two springs 43 and 56 serving to secure a delicate and reliable adjustment of the air pressure.

In operation the piston 23 is reciprocated by the revoluble friction wheel, and the air drawn in through the inlet 27 is compressed and forced out through pipe 28 to the storage tank, tire or other point. A portion of this air passes through the pipe 40 to the reduced portion 36 of the cylinder 32, and when the pressure accumulates to a sufficient extent, the piston 34 will be forced downward against the resistance offered by the spring 43, this spring yielding under far less pressure than the spring 56. As soon as the reduced stem 35 of the piston 34 clears the ports 42, the compressed air instantly passes from said ports 42 and presses against the top of the piston proper, the larger area of this piston serving to instantly raise the cylinder 15 and arm 17 and thus move the friction wheel 18 to inoperative position. After the air pressure in the cylinder 29 is exhausted or reduced, the valve 49 is opened in the manner previously described in order to allow the pump to resume operative position.

The device is wholly automatic in its nature and will permit the operation of the pump for the purpose of replenishing the supply in the tires of automobiles, or other vehicles, or it may be used for motor purposes or the like. It is obvious that in place of a single cylinder, twin cylinders or more than two cylinders may be used if desired.

I claim:—

1. In combination, an air compressing pump, an actuating means therefor, a compressed air reservoir, a cylinder in communication with the reservoir and through which movement is imparted to the pump to move the same to inoperative position when the pressure reaches a predetermined point, and means for automatically releasing the cylinder pressure to allow the pump to move to operative position when the pressure in the reservoir is lowered to a predetermined point.

2. In combination, an air pump including a cylinder having an inlet and discharge, a piston therein, a friction wheel, a crank pin carried thereby and operatively connected to the piston, a driving wheel with which the friction wheel may engage, a cylinder carried by the pumping cylinder, a piston disposed within said cylinder, means for connecting the cylinder to the discharge of the compressing pump to move said pump to inoperative position, and an adjustable means for preventing movement of the pump until the pressure has reached a predetermined point.

3. In a device of the class specified, a pivotally mounted pump, an arm extending therefrom, a friction wheel journaled in the arm and operatively connected to the pump, a cylinder depending from the pump and provided with bores of two diameters, a piston fitting within the larger bore and having a reduced stem fitting within the smaller bore, there being ports for placing the two bores in communication with each other, and the ports at the smaller bore being under the control of the piston, means for admitting a portion of the compressed fluid to the smaller bore, a spring for resisting downward movement of the plunger, a second spring for resisting upward movement of the pump, and means for adjusting the stress of the springs.

4. In apparatus of the class described, a base, a pivotally mounted pump carried thereby, an arm projecting from the pump, a friction wheel journaled on the arm and operatively connected to the pumping mechanism, a cylinder carried by the pump and provided with bores of two diameters, which are placed in communication with each other by ports, the portion of smaller diameter being in communication with the discharge side of the pump, a piston having portions of two diameters fitting within said cylinders, the portion of small diameter controlling said ports, a leaf spring on which the piston bears, means for adjusting said leaf spring, a hook bolt carried by the arm, a tension spring extending between said hook bolt and the base, means for adjusting said bolt to vary the stress of the tension spring, a limiting bolt also connected to the hook and extending through the base, and an adjustable nut carried by the said limiting bolt, substantially as specified.

5. In combination, a fluid compressing pump, an actuating means therefor, a cylinder, a piston, the cylinder being arranged to receive a portion of the fluid compressed to effect movement of the pump to inoperative position when the pressure reaches a predetermined point, and an automatic valve for permitting the escape of the fluid from the cylinder and the restoration of the pump to operative position.

6. In combination, an air pump including a cylinder having an inlet and discharge, a piston therein, a friction wheel, a crank pin carried thereby, and operatively connected to the piston, a driving wheel with which the friction wheel may engage, a cylinder carried by the pumping cylinder, a piston disposed within said cylinder, ports in said piston, a spring closed pressure actuated valve in said piston, said valve controlling the exhaust of air from the cylinder, means for connecting the cylinder to the discharge of the compressing pump to move said pump to inoperative position, and adjustable means for preventing movement of the pump until the pressure has reached a predetermined point.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDWARD J. ROHRBACHER.

Witnesses:
J. B. HINNIKSON,
DANA BAILEY.