J. CROCKER.

AIR COMPRESSOR.

APPLICATION FILED OCT. 15, 1909.

990,231.

Patented Apr. 25, 1911.

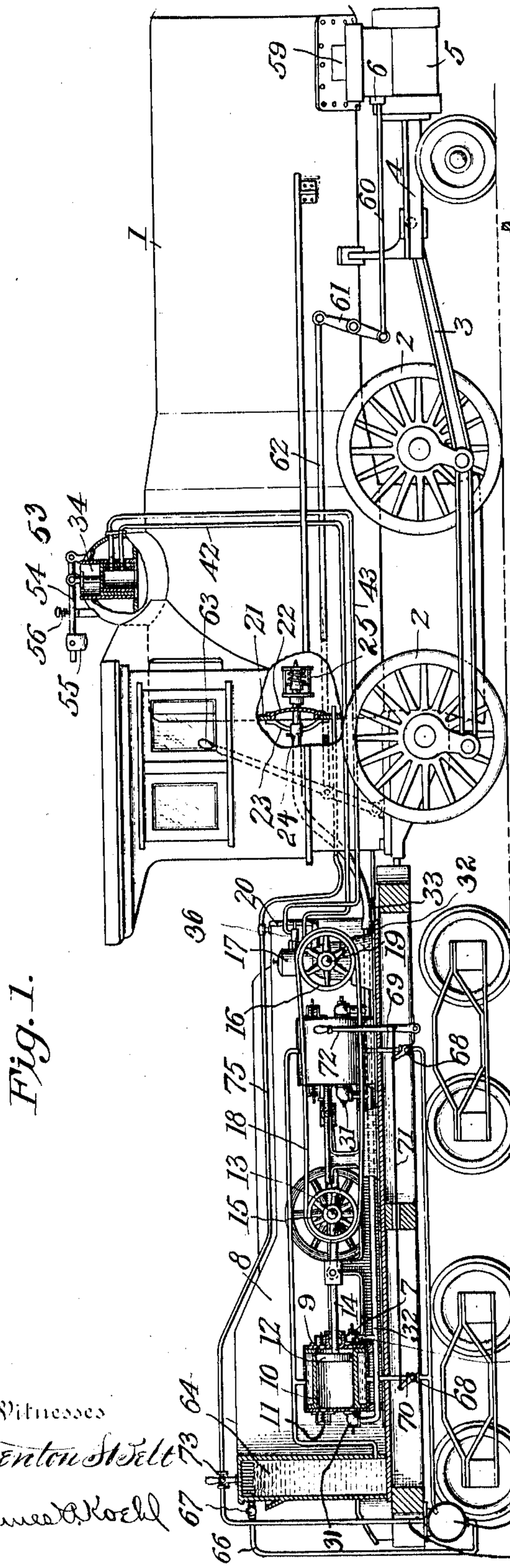

Fig. 1.

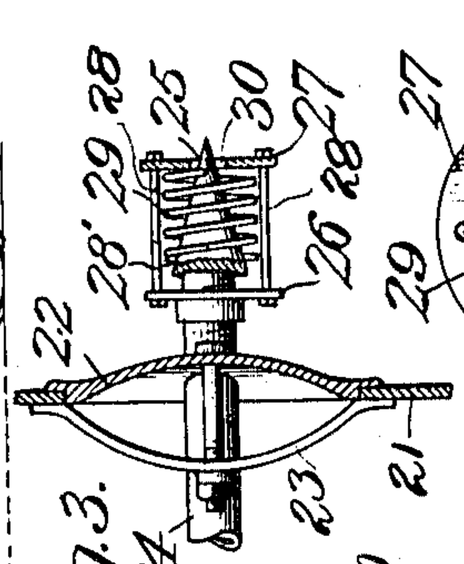

Fig. 3.

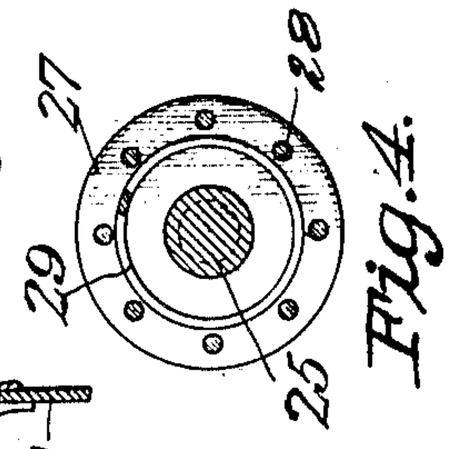

Fig. 4.

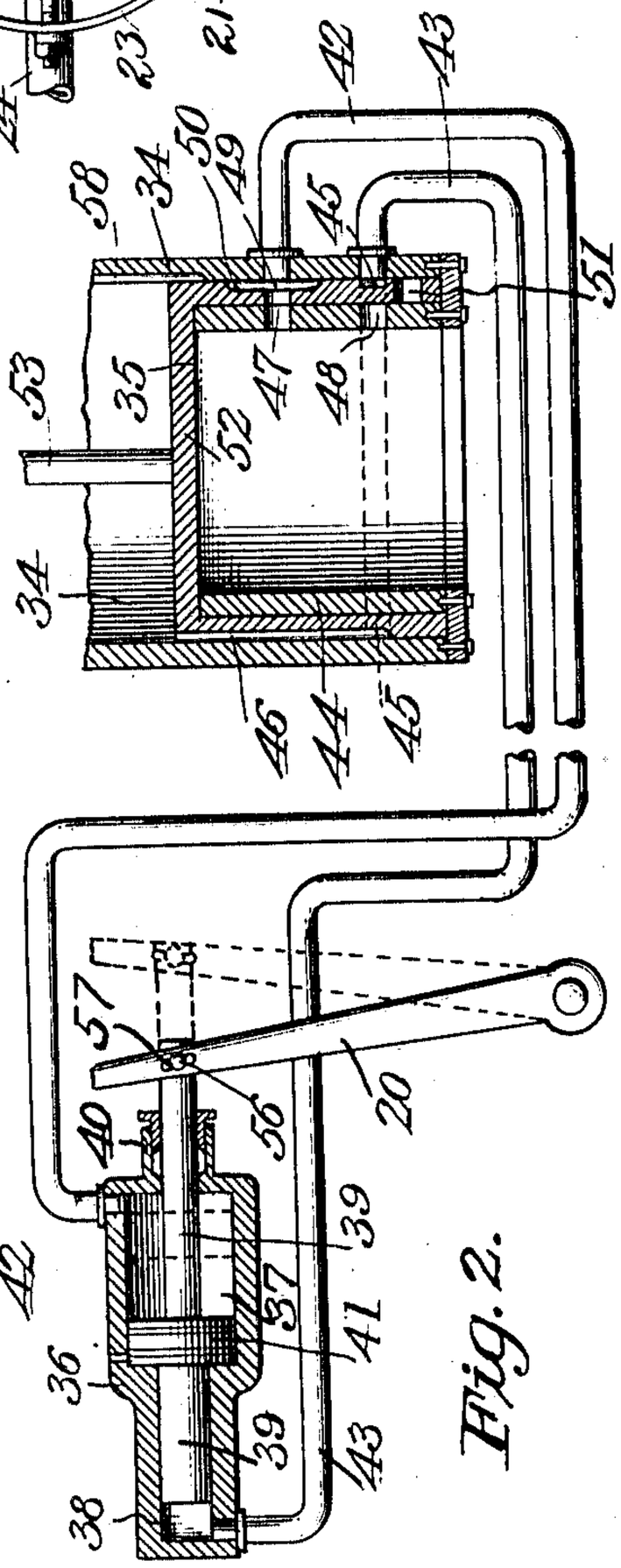

Fig. 2.

Witnesses

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UNITED STATES PATENT OFFICE.

JAMES CROCKER, OF BIRMINGHAM, ALABAMA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF FIVE FORTY-EIGHTHS TO JOSEPH H. STEWART, OF WASHINGTON, DISTRICT OF COLUMBIA, ONE HUNDRED AND NINETY-NINE EIGHT-HUNDREDTHS TO WILLIAM H. PERRYMAN, ONE NINETY-EIGHTH TO J. R. CHAMBERS, AND ONE EIGHT-HUNDREDTH TO WM. McBRIDE, OF ADAMSVILLE, ALABAMA, AND ONE-TWELFTH TO CHARLES BRUCE, ONE ONE-HUNDRED-AND-NINETY-SIXTH TO ROBERT OLIVER, ONE ONE-HUNDRED-AND-NINETY-SIXTH TO I. H. GARTH, AND ONE FORTY-EIGHTH TO MART WILLINGHAM.

AIR-COMPRESSOR.

990,231. Specification of Letters Patent. **Patented Apr. 25, 1911.**

Application filed October 15, 1909. Serial No. 522,855.

To all whom it may concern:

Be it known that I, JAMES CROCKER, a citizen of the United States, residing at Birmingham, in the county of Jefferson and State of Alabama, have invented new and useful Improvements in Air-Compressors, of which the following is a specification.

This invention relates to air compressors, the object being to provide means whereby the compressor may be conveniently and effectively applied to an ordinary steam locomotive and for storing a quantity of compressed air to be utilized in place of steam for reciprocating the pistons in the usual steam cylinders.

Another object of the invention is to provide a novel form of motor for driving the pumps of the compressor, means being provided whereby the motor will be automatically shut off after a predetermined amount of air has been stored in the reservoir, means being also provided whereby the motor will be automatically started after the air pressure has fallen below a predetermined amount.

The motor employed by me is preferably in the form of a gasolene engine whose cylinders are provided with water jackets of any well known form for cooling the cylinders, and a further object of the invention is to provide a storage receptacle for containing a quantity of water which may be fed by air pressure to the cooling jackets.

The above mentioned and other objects are attained by the construction, combination and arrangement of parts, as disclosed on the drawing, set forth in this specification, and particularly pointed out in the appended claims.

In the drawing, forming a portion of this specification and in which like numerals of reference indicate similar parts in the several views:—Figure 1 is a sectional elevation of a locomotive showing my air compressor applied thereto. Fig. 2 is a sectional elevation of the starting and stopping means for the motor. Fig. 3 is a sectional elevation of the inlet valve to the reservoir. Fig. 4 is a detail section taken through the valve.

The locomotive may be of any well known suitable design and does not form essentially any particular part of my invention but it is preferable that the locomotive be provided with such a reservoir as the one shown at 1 in Fig. 1 of the drawing. The reservoir is mounted upon the usual drive wheels 2 which are operatively connected with each other and to a connecting rod 3 which latter is slidable in a cross-head guide 4 in which the piston rod reciprocates. The piston cylinder 5 is provided with a sliding valve 6 which may be of any suitable construction adapted to alternately admit fluid to the opposite ends of the cylinder.

A pair of opposing pumps is mounted upon a base 7 and each extends longitudinally of the bottom of the tender 8 of the locomotive, each pump comprising a horizontal cylinder 9 which is surrounded by a water jacket 10. Each cylinder has its heads provided with inwardly opening check valves 11 and in each cylinder is mounted for reciprocatory movement a piston 12. A crank shaft 13 is mounted upon the base 7 at a point immediately between the pumps, and as illustrated, the said shaft is operatively connected with the rods 14 of the piston heads. The crank shaft has mounted thereon a pulley 15 which is connected with the pulley 16 of a motor 17 by means of a driving belt 18. The motor may be of any well known suitable construction but I preferably employ a gasolene engine which is provided with a shaft 19 upon which is keyed a starting lever 20.

The diaphragm or head 21 of the reservoir has formed therein an opening which is normally closed by a cover, a suitable clamp 23 being employed for holding the cover in its closed position. This cover supports a pipe section 24 upon whose inner end is mounted an inlet valve 25. The valve 25 is of conical form and is disposed horizontally having its apex or reduced end extended toward the front of the reservoir and in a longitudinal plane therewith. The valve is mounted in a suitable cage which comprises a pair of heads 26 and 27 which are con-

nected to each other and spaced apart by an annular series of bolts 28. The valve is provided with a transversely extending pin 28′ against which one end of a helical expansion spring 29 is engaged, the other end of the said spring being engaged with the head 27 of the cage so that the spring will exert its tension to hold the valve seated normally against the inner end of the connection 24. The head 27 is formed with a central passage 30 in which the outer end of the valve is disposed, the said valve being arranged for limited sliding movement in the said passage. The heads of the pump cylinders are provided with outwardly opening check valves 31 which are connected suitably with a main line pipe 32, the outer end of the said pipe being connected with the inner end of a flexible hose 33. The outer end of the said hose is connected and secured in any suitable manner to the connection 24. From the construction just described it will be appreciated that the pumps operate to force air into the reservoir 1.

An engine starting and stopping mechanism is employed for my improved compressor and while serving this purpose it serves the purpose of a safety valve for the reservoir. This starting and stopping mechanism consists of a cylinder 34 which is formed with open end portions, the inner end opening directly into the reservoir. The cylinder is preferably located at a point slightly in advance of the cab of the locomotive but it is obvious that it may be located at the most desirable point. The cylinder is disposed vertically and has mounted therein a sliding valve 35. A cylinder 36 extends horizontally from the motor 17 and as shown, the said cylinder is formed with large and reduced bores 37 and 38, the latter having slidably mounted therein the rear end of a guiding stem 39, the forward end of the said stem being slidably mounted in a gland 40 at the outer end of the cylinder. A piston 41 is secured to the stem 39 and is adapted to reciprocate therein in the bore 37 of the cylinder. At the forward end of the cylinder 36 is connected one end of a fluid conveying pipe 42, the other end of the said pipe being connected with the cylinder 34 and it opens directly onto the valve 35. The rear end of the cylinder has connected thereto one end of a fluid conveying pipe 43, the other end of the said pipe being connected with the cylinder 34 in a manner similar to that described for the pipe 42. The cylinder 34 has mounted therein a short annular wall 44 which is disposed in spaced relation to the walls of the cylinder to form a guideway for the annular wall of the valve 35. The valve 35 has its annular wall formed with an annular port 45 which is adapted to aline with the inner end of the pipe 43. The annular port opens directly into a vertical port 46 whose outer end opens to the atmosphere. The wall 44 of the valve cylinder is formed with upper and lower ports 47 and 48, the former being adapted to normally register with the branch 49 of an elongated port 50 which is also formed in the annular wall of the valve. The port 48 is adapted to register with a port 51 in the valve. The diaphragm 52 of the valve extends in a plane with the opening in the reservoir in which the valve is mounted, and as shown, this diaphragm is provided with a vertical stem 53 whose upper end is pivoted to a lever 54. The lever just described has its forward end pivoted to a bracket on the locomotive. This lever acts as a governor and it has adjustably mounted thereon a weight 55 which is operatively mounted upon the lever to cause the valve to respond to suit the occasion. A suitable spring 56 normally bears against the lever to hold it against vibratory movement. The stem 39 of the piston 41 is provided with a transverse pin 56′ which extends through an elongated slot 57 in the starting and stopping lever 20.

Assuming the weight 55 on the lever 54 to be set to sustain a five hundred pound pressure of fluid it will be seen that if the reservoir contains a quantity of fluid past the mark named the fluid will act against the diaphragm of the valve 35, forcing the valve upwardly causing the port 51 to aline with the port 48 and with the forward open end of the pipe 43 which will open communication between the bore 38 of the cylinder 36 and the reservoir 1, the expansive force of the fluid being sufficient to move the stem 39 into the position shown in dotted lines in Fig. 2. When the stem has been moved into this position the lever 20 will be actuated to shut off the motor and to instantly stop operation of the pumps of the compressor. The position normally of the valve 35 is such that the fluid pressure in the reservoir is conveyed by way of the pipe 42 into the enlarged bore 37 of the cylinder 36 to hold the piston 41 at the rear end of its movement to normally hold the lever 20 in open or starting position. When the valve rises and the port 51 thereof alines with the port 48 communication will be opened with the atmosphere and an amount of the fluid in the cylinder 36 will be free to escape. The port 50 of the valve coöperates with a port 58 in the cylinder 34, this port also opens into the atmosphere, as shown.

Fluid in the cylinder 1 is introduced into the cylinder 5 by way of a connection 59 whose ports coöperate with those of the slide valve to admit the fluid to the opposite ends of the cylinder. The slide valve is provided with a rod 60. The rod 60 is pivoted to the lower end of a pivoted link 61, the upper end of the said link being connected with a controlling rod 62. This controlling rod is

operatively connected with cut-off lever 63 within the cab which is arranged within convenient reach of the operator of the apparatus.

A water receptacle 64 is located at the rear of the tender it being connected with the water jacket whereby cool water can always be supplied thereto. A water receptacle 65 is located adjacent to the receptacle 64 and is connected thereto by a pipe 66 in which a check valve 67 is located, the purpose of the said valve being to allow water from the tank 65 to be forced into the tank 64. The tank 65 is connected with a plurality of valves 68 which are connected with discharge pipes 69 of the water jackets. The levers 70 of the valves are connected to each other by a rod 71 which is operatively secured to an operating lever 72. This operating lever is adapted for operation whereby the valve 68 can be opened to permit the discharge of heated water from the cooling jackets. A suitable valve 73 is connected with the receptacle 64 and with pipes 74 and 75 the former being connected with the reservoir 1 and the latter to the receptacle 65. The valve 73 is of such construction that it may be actuated to cause the fluid in the reservoir 1 to exert its pressure against the water in the receptacle 64 to thoroughly and effectively drain the same. The valve is also adapted for operation whereby fluid may be forced upon the surface of water in the receptacle 65. The receptacle 65 is provided for the purpose of cooling the water after it is discharged from the cooling jackets and after the water has been sufficiently cooled in the receptacle 65 it may be conveyed to the receptacle 64. In this manner I constantly use the same water.

I claim:—

1. A locomotive having a reservoir thereon provided with an inlet valve, fluid operated driving mechanism having communication with the reservoir, a pump connected with the reservoir for supplying the same with fluid, a motor operating the pump, a cut-off lever for the motor, a stem connected with the lever, a cylinder, a piston slidable in the cylinder and secured to the stem of the cut-off lever, a safety valve on the reservoir, a casing for the valve, the said valve having a port-way therein, a fluid conveying connection opening at one end normally into the port-way of the valve and at its opposite end into one end of the said cylinder so that direct communication is established between the cylinder and the reservoir to operate against the piston of the controlling lever's stem to hold the controlling lever in open position, the said valve having a second port-way therein, the valve casing having a port-way therein above the second port-way of the valve, a second connection between the valve casing and the opposite end of the said cylinder and operating to register with the port-way of the cylinder and the second port-way of the valve on a predetermined movement of the valve to establish communication between the opposite end of the piston cylinder and the reservoir so that the pressure in the cylinder will be exerted against the piston stem of the controlling lever to move the lever to cut-off position.

2. A wheeled reservoir, fluid controlled driving connections for the wheels of the reservoir and receiving its fluid from the reservoir, a pump connected with the reservoir, a motor driving the pump, a starting and stopping lever for the motor, in combination with a governor valve connected with the starting and stopping lever of the motor to hold the lever normally in starting position and operating on a predetermined pressure of fluid to move the lever to a stopping position, the said valve having a port-way therein to open to the atmosphere to bleed the reservoir on the stopping position of the lever.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES CROCKER.

Witnesses:
JOHN L. FLETCHER,
JAMES A. KOEHL.