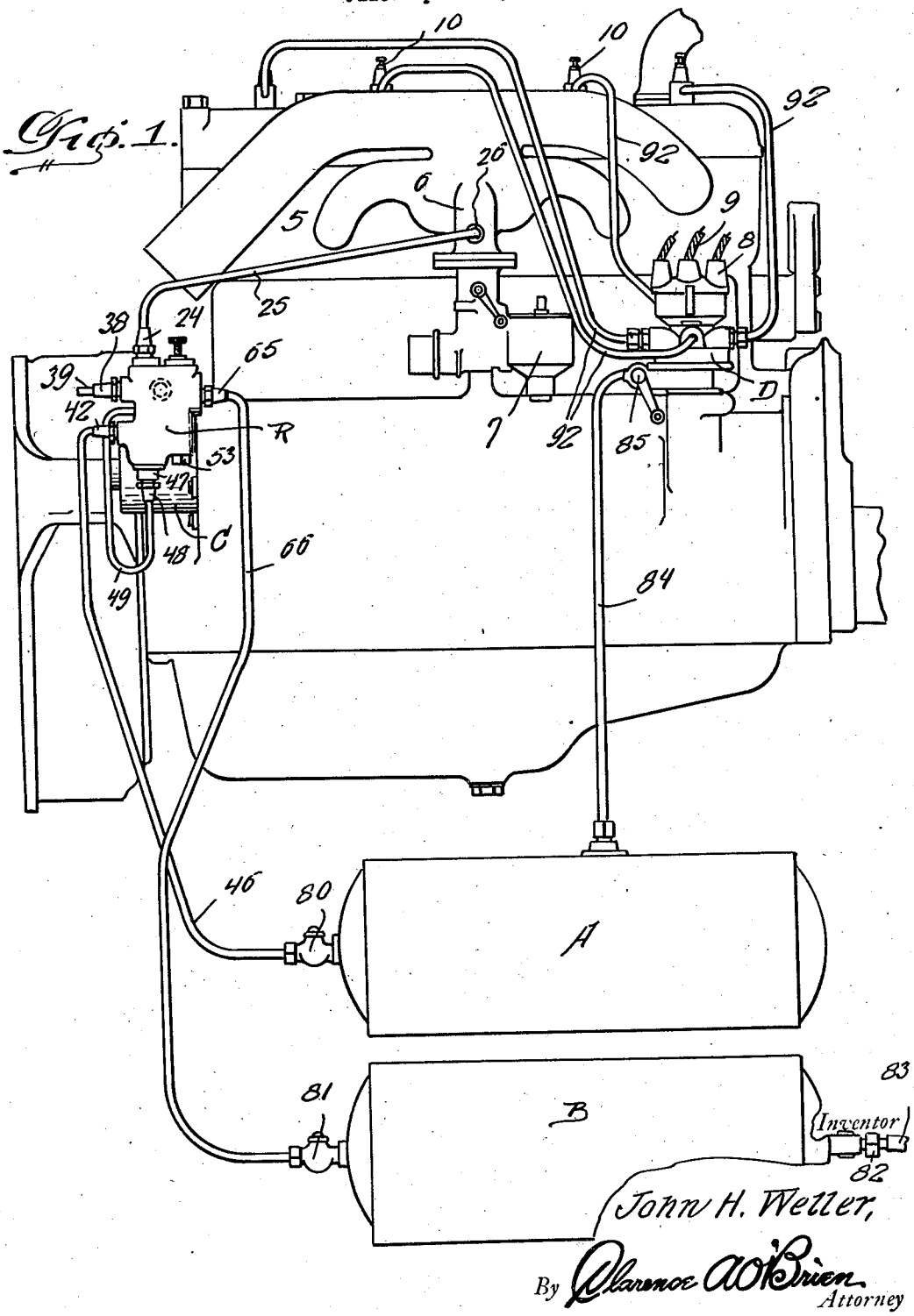
July 10, 1928. 1,676,591

J. H. WELLER

VAPORIZED GAS AND AIR STARTER FOR AUTOMOBILES AND THE LIKE

Filed April 19, 1927 3 Sheets-Sheet 1

Fig. 1.



Inventor
John H. Weller,
By Clarence A. O'Brien
Attorney

July 10, 1928. 1,676,591

J. H. WELLER

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Fig. 2.

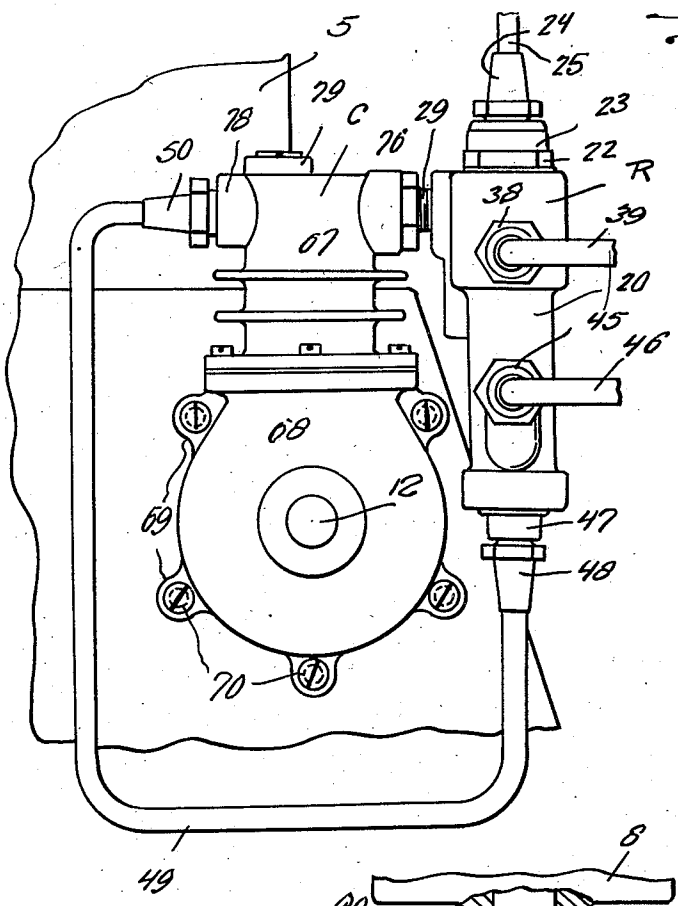
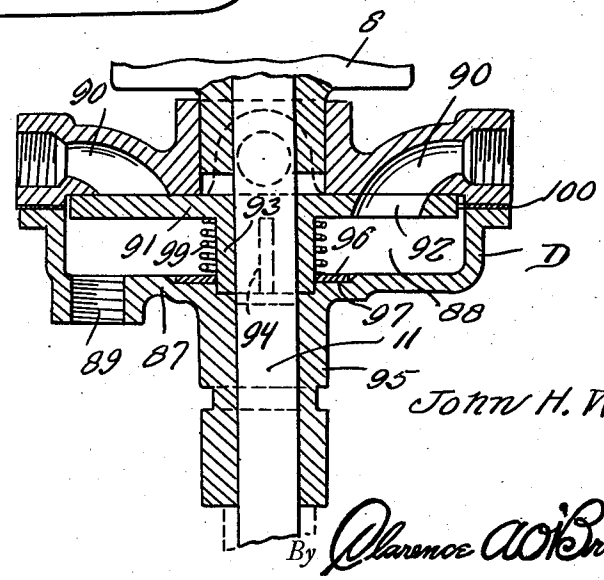


Fig. 5.



Inventor
John H. Weller,

By Clarence A. O'Brien
Attorney

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J. H. WELLER

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Fig. 3.

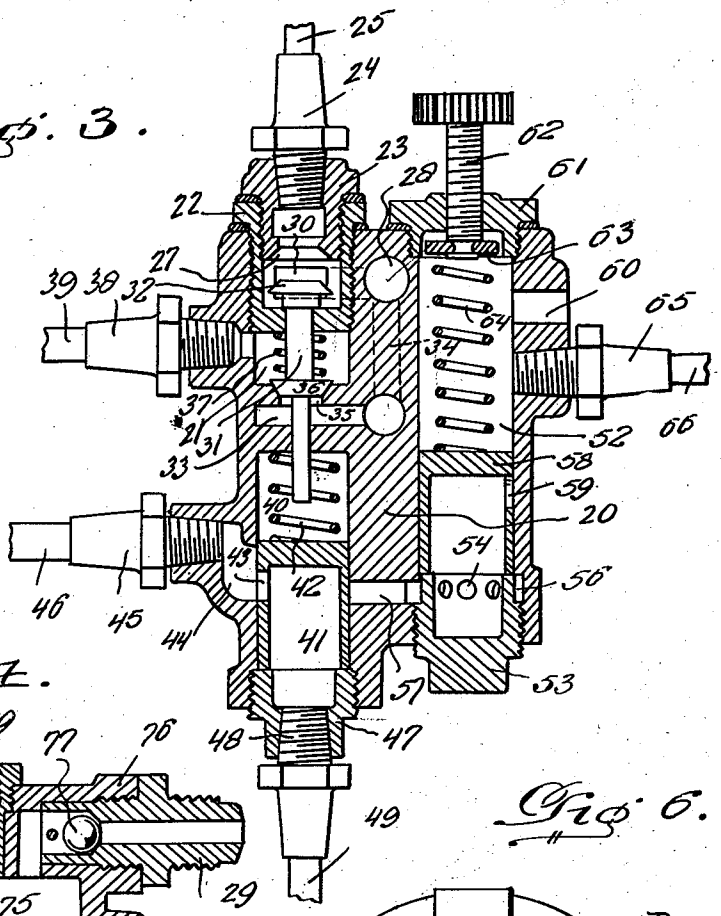


Fig. 4.

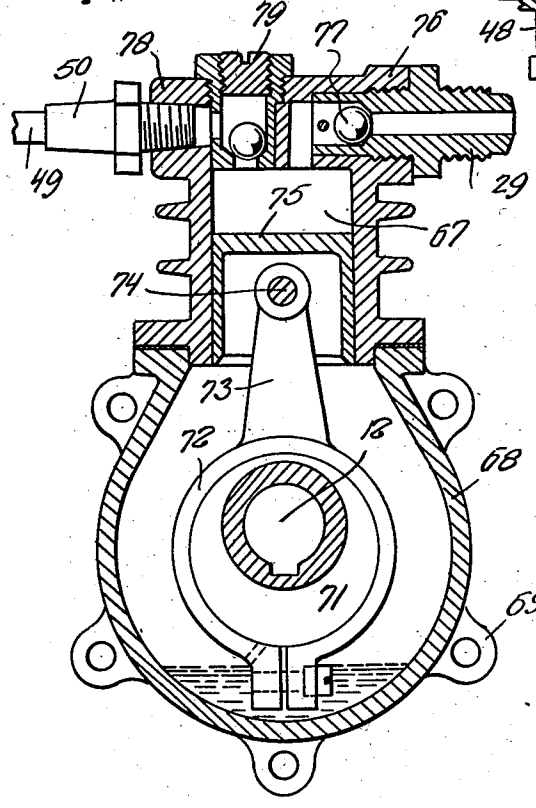
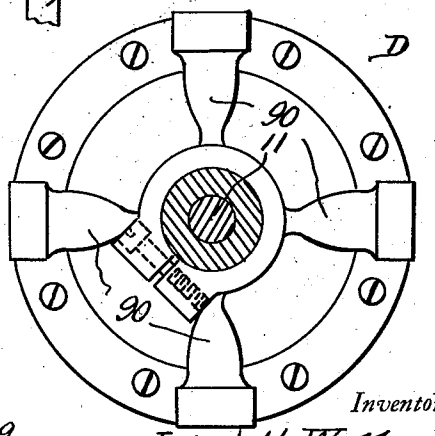


Fig. 6.



Inventor
John H. Weller,

By Clarence A. O'Brien
Attorney

Patented July 10, 1928. 1,676,591

UNITED STATES PATENT OFFICE.

JOHN H. WELLER, OF CADILLAC, MICHIGAN.

VAPORIZED GAS AND AIR STARTER FOR AUTOMOBILES AND THE LIKE.

Application filed April 19, 1927. Serial No. 184,939.

The present invention relates to a vaporized gas and air starter designed particularly for the internal combustion engines on automobiles, trucks and like vehicles.

An important object of the invention resides in the provision of means whereby a supply of vaporized gas may be stored up under pressure, during the operation of the internal combustion engine for the purpose of using this vaporized gas under pressure to start the engine.

Another very important object of the invention lies in the provision of means for properly distributing the vaporized gas under pressure, to the cylinders in proper firing order.

Another important object of the invention lies in the provision of automatic valve means which will cause the device to shut off at a predetermined pressure being attained in the tank for storing the vaporized gas, and will then cause the compressor to deliver air to another tank to be stored under pressure therein, for the purpose of inflating tires, cleaning purposes, and for general use, as may be desired.

A still further very important object of the invention lies in the provision of an apparatus of this nature, which is comparatively simple in its construction, inexpensive to manufacture and install, thoroughly efficient and reliable in operation, compact and convenient, and otherwise well adapted to the purpose for which it is designed.

With the above and numerous other objects in view, as will appear as the description proceeds, the invention resides in certain novel features of construction, and in the combination and arrangement of parts as will be hereinafter more fully described and claimed.

In the drawing:

Figure 1 is a side elevation of an internal combustion engine with my improved apparatus applied thereto.

Figure 2 is a front elevation thereof,

Figure 3 is a vertical section through the regulator.

Figure 4 is a vertical section through the compressor.

Figure 5 is a vertical section through the distributor, and

Figure 6 is a horizontal section therethrough.

Referring to the drawing in detail, it will be seen that the numeral 5 denotes generally an internal combustion engine of any conventional or preferred type, which in the present instance is designed with an intake manifold 6 leading from a carburetor 7. The numeral 8 denotes the electrical or ignition distributor, having the usual wires 9 extending therefrom for the various spark plugs 10 of the engine. This electrical distributor 8 is mounted on the distributor shaft denoted by the numeral 11. The numeral 12 denotes the cam shaft of the engine. The parts thus far described are of conventional or any other preferred construction, and have been illustrated herein merely to demonstrate the operation, utility and advantages of my improved apparatus.

The letter R denotes generally the regulator. The letter A denotes the vaporized gas tank, and the letter B the air tank. The letter D denotes generally the vaporized gas under pressure distributor.

Attention is first directed to the regulator R which is formed with a block body casting, drilled, or otherwise formed to provide a cylinder 21, opening through the top of the body 20 to threadedly receive a valve guide 22, in the upper end of which is threaded a cap 23, in which is threaded a coupling member 24 leading from a pipe 25, which is tapped as at 26, into the intake manifold 6. The bottom of the cap 23 is formed with a valve seat 27. A passage 28 is connected by a coupling 29 with the compressor which is denoted generally by the letter C. The coupling 29 leads from the intake 76 of the compressor C as will be more apparent as the description proceeds. A by-pass 30 leads from the passage 28 into the interior of the valve guide 22. A valve stem 31 is slidable through the valve guide 22 and has a valve 32 at its upper end for closing the seat 27, in a manner to be explained later. Another by-pass 33 leads from the passage 28 through still another by-pass 34. A valve

seat opening 35 connects the by-pass 33 with the bottom of the cylinder 21. A second valve 36 is mounted on the valve stem 31 and is normally held seated on the valve seat opening 35, by a spring 37. A coupling 38 is connected to communicate with the cylinder 21 and is connected with a pipe 39 leading to the atmosphere. A cylinder 40 is formed in the body 20 below the cylinder 21 and in alignment therewith and the valve stem 31 extends down into the cylinder 40 and terminates therein. A hollow piston 41 has its bottom end open and its top end closed and is slidably mounted in the cylinder 40 and is normally held downwardly by a spring 42. An opening 43 is provided in the piston 41 to normally register with a passage 44, formed in one side of the block 20 and into which is threaded a coupling 45, from a pipe 46, leading to the tank A. A cap 47 is threadedly engaged in the bottom of the cylinder 40 and the piston 41 normally rests thereagainst. A coupling 48 is threadedly engaged in the cap to normally communicate with the interior of the piston. This coupling 48 is on a pipe 49 leading to the outlet 78 of the compressor C, by means of a coupling 50, as will be more clearly hereinafter described. A cylinder 52 is formed in the body 20 in parallelism with the cylinders 21 and 40 and alongside of them. A cap 53 is threaded into the lower end of the cylinder 52 and has a plurality of openings 54 at the inner end thereof. A groove 56 is formed in the cylinder about the cap 53 and in registry with the openings 54. A by-pass 57 connects the cylinder 40 with the groove 56 and it is to be noted that this by-pass 57 is normally cut off by the piston 41. A hollow piston 58 is slidable in the cylinder 52 and has its upper end closed and its lower end open and is provided with a side opening 59 adjacent its upper closed end. An opening 60 leads from the upper end of the cylinder 52 to the atmosphere. A cap 61 is threaded in the upper end of the cylinder 52 and has threaded therethrough a screw 62 on the inner end of which is swivelled a plate 63. A spring 64 is disposed in the cylinder 52 and impinges against the plate 63, and the closed ends of the piston 58 to normally hold the piston 58 downwardly in abutment with the cap 53. Obviously, the tension of the spring 64 may be regulated by operation of the screw 62. A coupling 65 is tapped into the body 20 to communicate with the interior of the cylinder 52, and is connected with a pipe 66 leading to the air tank B.

The compressor C includes a cylinder 67, on a crank case 68, having apertured ears 69 in order that it may be bolted, as at 70, to the crank case of the internal combus ion engine 5. The cam shaft 12 extends from the crank case of the engine into the case 68 and has a cam 71 thereon in the case 68, operable in a cam ring 72 on a connecting rod 73 engaged with the wrist pin 74 of a piston 75, mounted for rectilinear movement in the cylinder 67. The numeral 76 denotes the intake and the numeral 78 denotes the outlet. The coupling 29 heretofore referred to, has a check valve 77 mounted therein, to allow air to pass inwardly of the compressor only. An oppositely operating check valve 79 is mounted in the outlet 78.

Referring to the operation of the device, as thus far progressed, it will be seen that when the internal combustion engine is in operation, the piston 75 will reciprocate in the cylinder 67, so as to intake at 76 and exhaust at 78. The low pressure set up in the intake 76 will cause a suction through the coupling 29, passage 28, by-pass 30, coupling 24, and pipe 25, to take vaporized gas from the intake manifold 6. This vaporized gas will fill the cylinder 67 on the down stroke of the piston 75, and on the upper stroke of the piston 75 will said gas be forced through the check valve 79, through the outlet 78, through the coupling 50, pipe 49, coupling 48, into the piston 41, through the opening 43, through the passage 44, through the coupling 45, and through the pipe 46, into the tank A, it being noted that a check valve 80 is provided in the pipe 46, to prevent back pressure. After this operation continues for a while and pressure is built up in the tank A to a predetermined point, it will be seen that the piston 41 will be caused to raise in the cylinder 40, until the closed end thereof engages the lower end of the valve stem 31 and lifts the valve 36 off the valve seat opening 35 and causes the valve 32 to close against the valve seat 27, thereby preventing further suction through the pipe 25, from the intake manifold 6. At the same time, the passage 44 will be closed, since the opening 43 will have moved up into the cylinder 40 out of registry with the passage 44. This will communicate the bottom of the cylinder 40 with the passage 57, and therefore it will be seen that the low pressure created at the intake 76, upon further operation of the compressor C, will cause a suction to be set up through the coupling 29, passage 28, passage 34, passage 33, (at this point it will be noted that passage 30 is cut off because of the closing of valve 32), and set up suction through the bottom of the cylinder 21, through the opening 35, which will in turn set up a suction through the coupling 38, and pipe 39, to suck air from the atmosphere. This air, which will be sucked into the cylinder 67 on the down stroke of the piston 75, will be forced out of said cylinder in the upstroke of the piston, through check valve 79 and outlet 78, through coupling 50, through pipe 49,

through coupling 48 into the bottom of the cylinder 40 and through passage 57, through groove 56 and openings 54 to raise the piston 58 until the opening 59 registers with the coupling 65 so that the air will pass through the pipe 66, check valve 81, and into tank 50, to be stored therein, until a predetermined pressure has been reached, after which the piston 58 will rise to register opening 59 with the escape passage 60, so that the air will escape to the atmosphere.

The air from the tank B may be used through a suitable hose connection 82 and hose 83, or in any other suitable manner.

The vaporized gas in the tank A escapes through pipe 84, having a control valve 85 incorporated therein. This pipe 84 connects with the distributor D. This distributor D comprises a body 87, having a reservoir 88 therein, with a threaded intake opening 89, so that the pipe 84 may be coupled therewith. A plurality of distributor conduits 90 are formed in the top of the body 87 leading from the reservoir 88. This distributor has a disc valve 91 mounted in the reservoir to close off the passages 90, and has a single opening 92 which is successively brought into registry with the passages 90 to successively connect them with the reservoir 80. Pipes, hose, or other conductors 92 lead from the passages 90 to the various cylinders of the internal combustion engine. The disc 91 has a hub 93, keyed as at 94, to the shaft 11. The lower end of this hub is journaled in tube 95 of the body 87, through which the shaft 11 extends. A gasket 96 is seated in a recess 97, in the reservoir 88 about the hub 93 and is held tightly in place by a coil spring 99, which impinges against the gasket and against the disc 91, to hold the same tightly in engagement with the top of the body 87, in which the distributing passages 90 are formed. This top is preferably separable from the remaining portion of the body and a gasket 100 is interposed between the top and the body.

When it is desired to start the engine, it will be seen that the ignition is turned on and the valve 85 is turned on, and the conduit 92 communicating with the cylinder having its piston ready to fire will have its corresponding passage 90 in registry with the opening 92, so that vaporized gas, under pressure, is fed to this cylinder, forcing its piston downwardly and at the same time, the spark plug will ignite this highly compressed gas, and thus the engine will be given its initial momentum. As the engine picks up its speed, after the various cylinders are fired, it will be readily understood that the valve 85 is shut off.

It is thought that the construction, operation, and advantages of this invention will now be quite apparent to those skilled in this art, without a more detailed description thereof.

The present embodiment of the invention has been disclosed in detail, merely by way of example, since in actual practice, it attains the features of advantage enumerated as desirable in the statement of the invention and the above description. It will be apparent that changes in the details of construction, and in the combination and arrangement of parts may be resorted to, without departing from the spirit or scope of the invention as hereinafter claimed or sacrificing any of its advantages.

Having thus described my invention, what I claim as new is:

1. A regulator for the purpose specified, comprising a body having a cylinder formed therein, a valve guide in the cylinder, a valve seat cap in the cylinder, said body formed with a passage adapted to lead from the suction end of a compressor, a valve stem in the guide, a valve on the end of the valve stem cooperable with the valve seat cap, a by-pass leading from the first mentioned passage into the other end of the cylinder, said body having an opening leading from said other end of the cylinder and adapted to be connected with the atmosphere, a valve seat in the by-pass, a second valve on the valve stem, spring means normally holding the second valve closed and the first valve open, said body formed with a second cylinder to which the valve stem extends, means communicating the bottom of the second cylinder with the outlet end of a compressor, a hollow piston slidable in the second cylinder, spring means normally holding the piston downwardly, said piston having an opening, said body formed with a passage leading from the bottom of the second cylinder and adapted to be connected with a storage tank, said body formed with a third cylinder, a passage leading from the bottom of the second cylinder to the bottom of the third cylinder, a piston slidable in the third cylinder and of hollow construction and having its side opening, said body having an opening adjacent its upper end adapted to be communicated with an air tank, and also provided with an escape passage above the last mentioned opening, spring means in the third cylinder normally holding the hollow piston therein downwardly.

2. In an apparatus of the class described, and in combination, a regulator, a compressor, a pair of tanks, conduits between the tanks and the regulator, intake and exhaust conduits leading from the compressor to the regulator, said regulator including conduits leading from different sources of gas to be compressed, means in the regulator for connecting one conduit of the reg-

ulator with the intake conduit, means in the regulator for connecting the conduit of one tank with the exhaust conduit, means in the regulator for connecting the other conduit of the regulator with the intake conduit, means in the regulator for connecting the conduit with the other tank with the exhaust conduit, means normally cutting off the second two mentioned means, pressure responsive means controlled by the pressure in said one tank and operable to oppositely actuate said second two mentioned means and to cut off the first two mentioned means.

In testimony whereof I affix my signature.

JOHN H. WELLER.