

May 14, 1929.

W. L. WILSON

1,713,015

VALVE

Filed Feb. 23, 1927

2 Sheets-Sheet 1

Fig. 1.

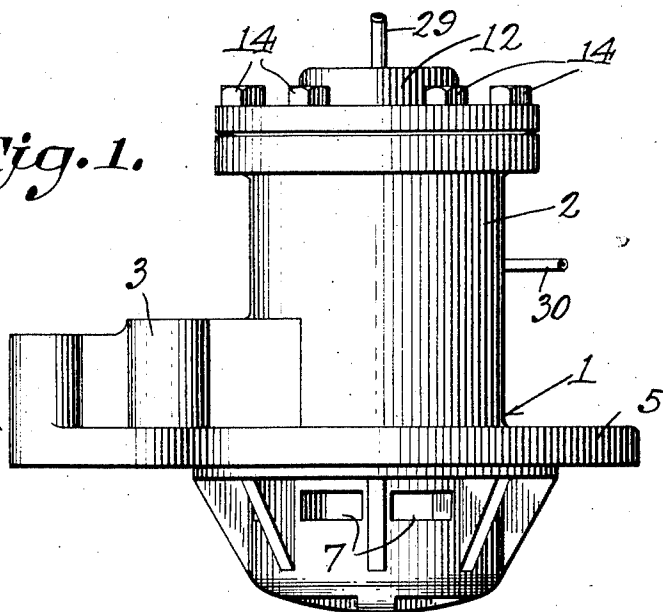


Fig. 2.

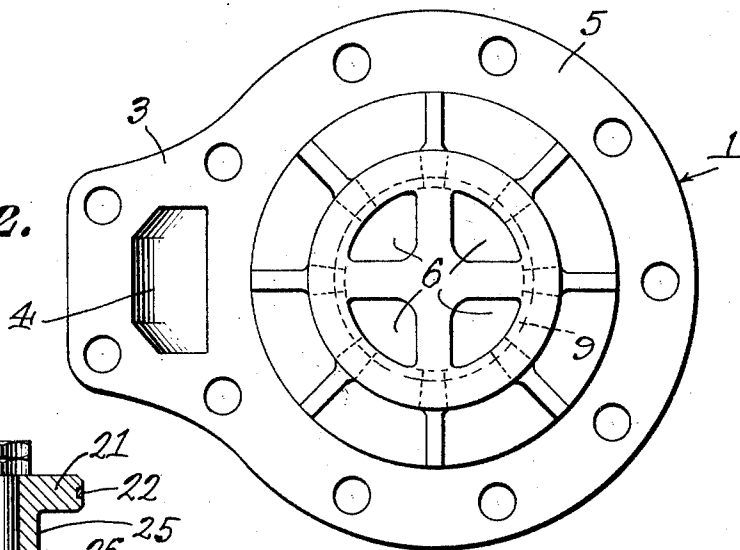
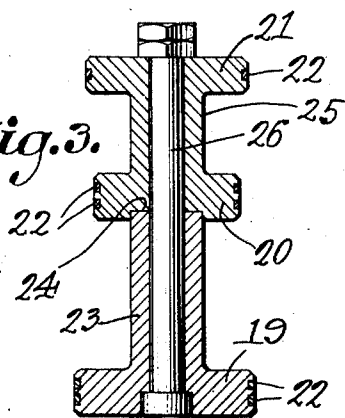


Fig. 3.



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Fig. 4.

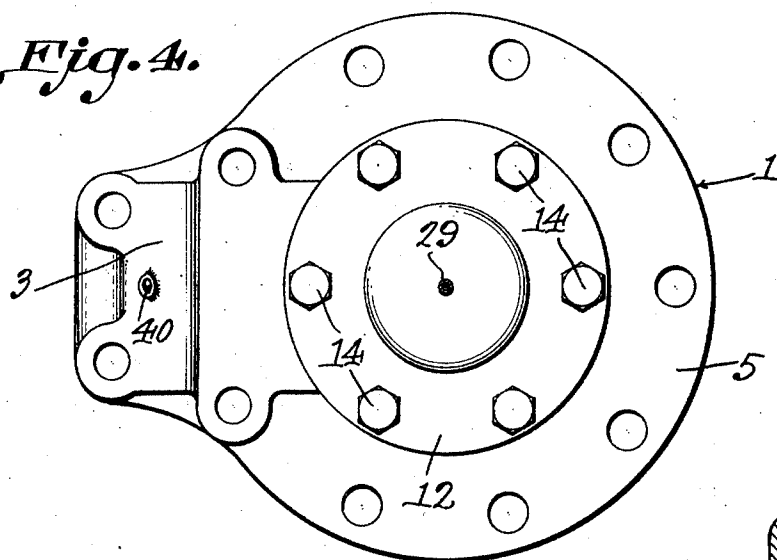
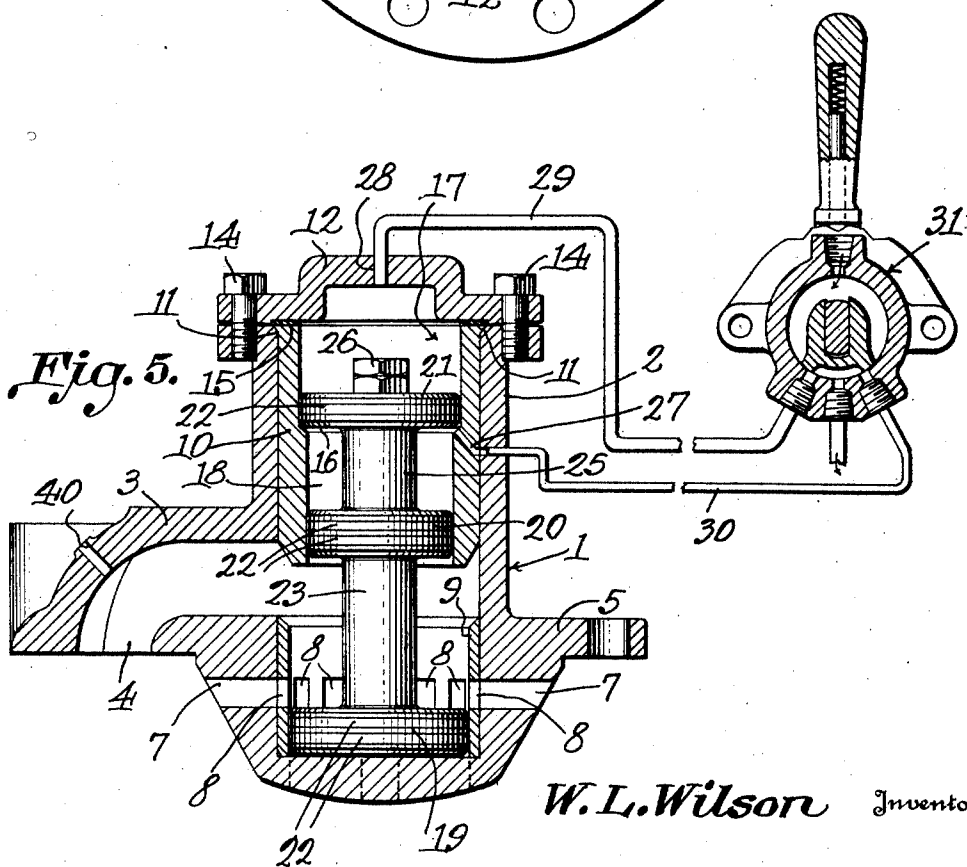


Fig. 5.



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UNITED STATES PATENT OFFICE.

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VALVE.

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In locomotives which resemble the Mallet articulated compound in general construction, there are two sets of driving wheels, each operated by its individual two-cylinder engine, one engine, however, operating at a higher pressure than the other, and steam being conveyed from the high pressure engine to the low pressure engine by way of the receiver pipe. The foregoing explanation is introduced, in order to define what is meant hereinafter when the "high pressure engine", or the "low pressure engine", is referred to.

The device forming the subject matter of this application accomplishes at least three results: First, it maintains normally, and without attention upon the part of an operator, a proper ratio between the receiver pipe pressure and the high steam pressure, thereby causing the low pressure engine to do its proportion of the work constantly; second, it enables the operator to change the aforesaid ratio, toward one limit, at will, thereby to reduce receiver pipe pressure and to check the action of the low pressure engine, if the low pressure engine is operating its driving wheels to the slipping point; third, it enables the operator to change the aforesaid ratio, toward the opposite limit, at will, thereby to increase receiver pipe pressure and thus to enhance the effectiveness of the low pressure engine when increased power is desired. The objects above-mentioned, are accomplished, in the present invention, by a single operative structure which is characterized by marked simplicity.

It is within the province of the disclosure to improve generally, and to enhance the utility of, devices of that type to which the invention appertains.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed, may be made within the scope of what is claimed, without departing from the spirit of the invention.

In the drawings:—

Figure 1 shows in side elevation, a device constructed in accordance with the invention, the valve which is handled by the operator being omitted;

Figure 2 is a bottom plan of the device depicted in Figure 1;

Figure 3 is a sectional view showing the three connected valve and piston members which work in the casing illustrated in Figure 1;

Figure 4 is a top plan of the structure shown in Figure 1;

Figure 5 is a sectional view of the device disclosed in Figure 1, the operator's valve being shown, and parts being broken away.

The specific material embodiment which the invention assumes, will be governed in some measure by the construction of the locomotive engine whereon the invention is used, by the fact that the invention is being applied to an old engine or is being built into a new one, and by other circumstances which need not be alluded to. The device, in the present disclosure, comprises a valve casing which, considered as an entity, is marked by the numeral 1. The valve casing 1 includes a tubular body 2 provided with a lateral extension 3 having a passage 4 which communicates with the interior of the body 2. The opening 40 in the extension 3 is the oil pipe connection from the lubricator (not shown) in the cab of the engine. The valve casing 1 may be supplied with an attaching flange 5, should occasion require.

There are openings 6 in the bottom of the body 2, and in the sides of the body, near to the lower end thereof, there are lateral ports 7, the openings 6 and the ports 7 communicating with the receiver pipe (not shown). The side ports 7 communicate with ports 8 formed in a bushing 9 which is retained in the lower end of the body 2.

In the upper end of the body 2 is located a bushing 10 provided at its upper end with an outstanding flange 11 that overlaps the upper end of the body 2 a little, pressure being exerted on the upper end of the bushing 10, to hold it in place, by a cap 12 which is connected by securing devices 14 with the upper end of the body 2, a packing gasket 15 being interposed between the cap 12 and the upper end of the bushing 10. The bushing 10 has an upper chamber 17 which is slightly larger in diameter than the lower chamber 18, there being a shoulder 16 in the bushing 10 at the inner ends of the chambers 17 and 18.

The device comprises a valve 19 slidable in the bushing 9, a piston 20 slidable in the lower chamber 18 of the bushing 10, and a piston 21 slidable in the upper chamber 17 of the bushing 10. The valve 19 is somewhat

larger in diameter than the piston 20, and the relative diameters of the valve 19 and the piston 20 determine the ratio at which receiver pipe pressure, derived through the openings 6 and the ports 7—8, balances high steam pressure entering through the passage 4 in the extension 3. The piston 21 is a trifle larger in diameter than the piston 20, so that the piston 21 may have the advantage when pressure is admitted (through the registering ports 27, hereinafter described) into the space between the pistons 21 and 20. The members 19, 20 and 21 are provided with packing rings 22, and are connected, for simultaneous movement, in any suitable way. Thus, as shown in Figure 3, the valve 19 has a tubular hub 23, the upper end of which is received in a recess 24 in the piston 20, the piston 20 and the piston 21 being joined by a reduced neck 25, a securing device 26, such as a bolt and superposed nuts, passing through the members 19, 20 and 21, through the hub 23, and through the neck 25. For convenience in claiming the invention, the part 19 may be alluded to as a valve, the part 20 as an inner piston, and the part 21 as an outer piston.

There are registering side ports 27 in the body 2 and in the bushing 10, these ports opening into the space between the piston 21 and the piston 20, and, more specifically, opening through the shoulder 16. The cap 12 is supplied with a port 28 which communicates with the chamber 17. A pipe 29 communicates with the port 28, and the ports 27 communicate with a pipe 30. The pipes 29 and 30 are controlled by a valve mechanism 31, generally located in the cab of the locomotive, and under the control of an operator to admit steam at high pressure, and preferably at boiler pressure, to the pipes 29 and 30, one at a time. The valve mechanism 31 is not described in detail, because I know that no specific kind of an operator's valve can be covered in this application, and because there are many stock valves that can be substituted for the valve mechanism at 31, to function in the way hereinbefore mentioned in connection with the valve mechanism 31.

Suppose that the parts are arranged as shown in Figure 5, the valve mechanism 31 being so set that pressure is cut off from the pipes 29 and 30. High pressure steam enters through the passage 4 and moves by way of the ports 8—7 into the receiver pipe, thereby to secure a proper pressure in the receiver pipe, and to insure that the low pressure engine will do its just share of the work. When the receiver pipe pressure builds up to the predetermined point that is fixed by the relative diameters of the valve 19 and the piston 20, the high pressure steam between the members 19 and 20 operates, through the piston

20, to raise the members 20 and 19, the ports 8—7 being closed by the valve 19 against the flow of high pressure steam from the passage 4 to the ports 8—7. When receiver pipe pressure is reduced, the valve 19 uncovers the ports 8—7 and receiver pipe pressure builds up again. The result is that a proper ratio of pressures between the steam at high pressure, and steam at receiver pipe pressure, is maintained at all times, and the low pressure engine, which depends upon the receiver pipe, and the ports 8—7, for its supply, will bear its proper burden in the propelling of the train which the locomotive is hauling.

If the driving wheels of the low pressure engine begin to slip, due to any cause, the operator can manipulate the valve 31 so as to admit pressure to the pipe 30 and the ports 27, the pressure passing into the chamber 18, between the pistons 21 and 20. The parts 21, 20 and 19 then will move together, because the piston 21 is of greater diameter than the piston 20, and the valve 19 will move to closed position with respect to the ports 8—7, thus cutting off the pressure delivered through the ports 8—7, and enabling the drivers of the low pressure engine to acquire a hold upon the rails.

When additional power is desired, the valve mechanism 31 is so operated as to deliver high pressure steam on top of the piston 21 through the pipe 29 and the port 28. Then, the valve 19 is held in open position with respect to the ports 8—7, as in Figure 5, or is moved to that position, and the low pressure engine gets increased pressure by way of the ports 7—8 and the passage 4.

What is claimed is:—

A device of the class described, comprising a casing, a valve, an outer piston, an inner piston located between the valve and the outer piston, the valve and the pistons being slidable as one piece in the casing, the valve being of larger diameter than the inner piston, means for supplying pressure to the casing between the valve and the inner piston, the casing having a port so located that it will be opened by the valve and placed in communication with said means when the valve moves toward one end of the casing, means under the control of an operator for admitting pressure between the outer piston and the opposite end of the casing, the outer piston being of smaller diameter than the valve, and means under the control of an operator for admitting pressure between the pistons, the inner piston being of smaller diameter than the outer piston.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

WILLIAM L. WILSON.