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PATENTED MAY 8, 1906.

F. O. WHEALON.
LOCOMOTIVE.

APPLICATION FILED OCT. 31, 1904.

4 SHEETS—SHEET 1.

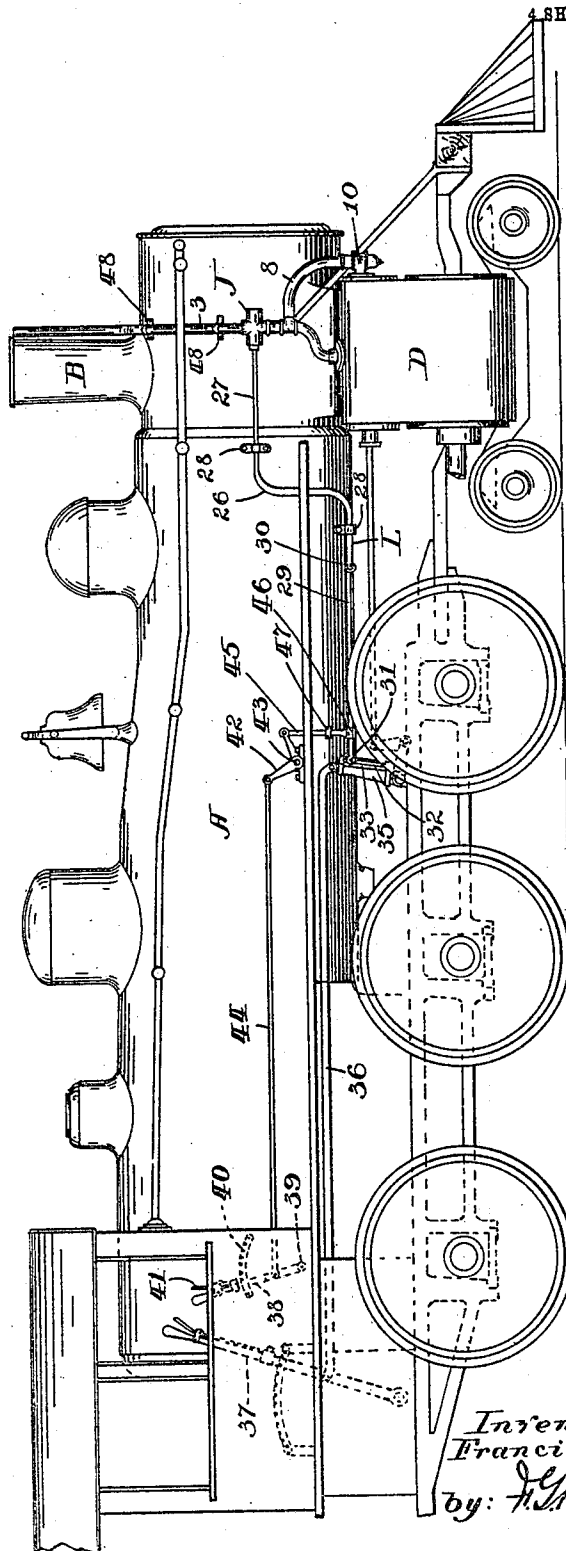


Fig. 1.

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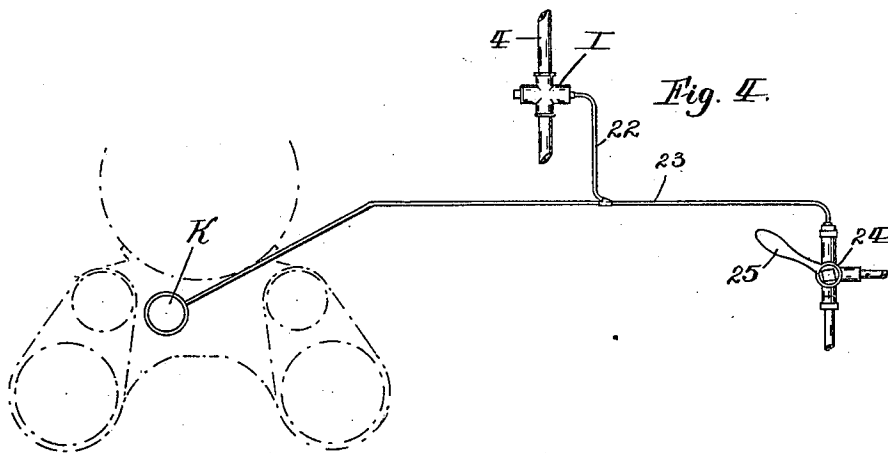
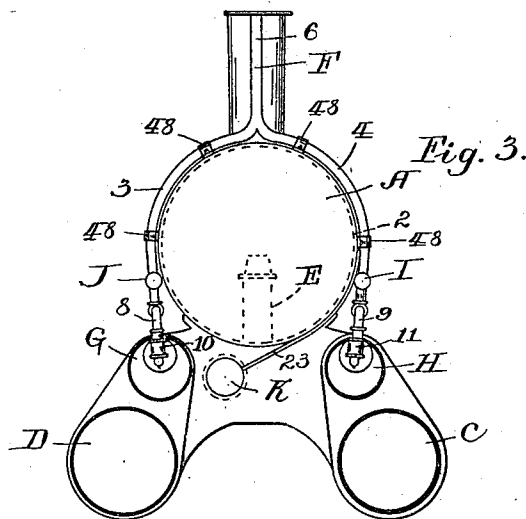
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4 SHEETS—SHEET 3.



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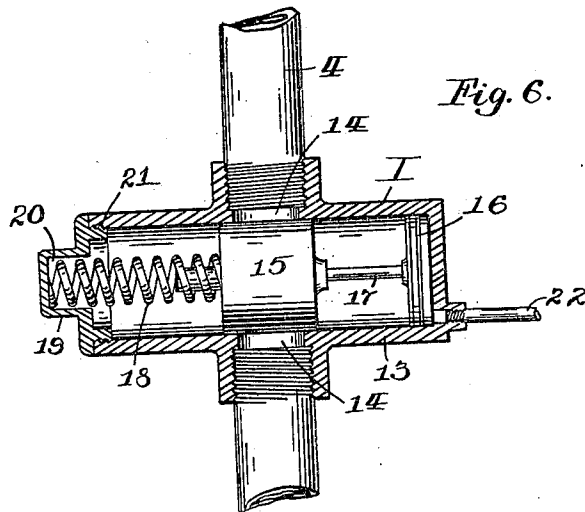
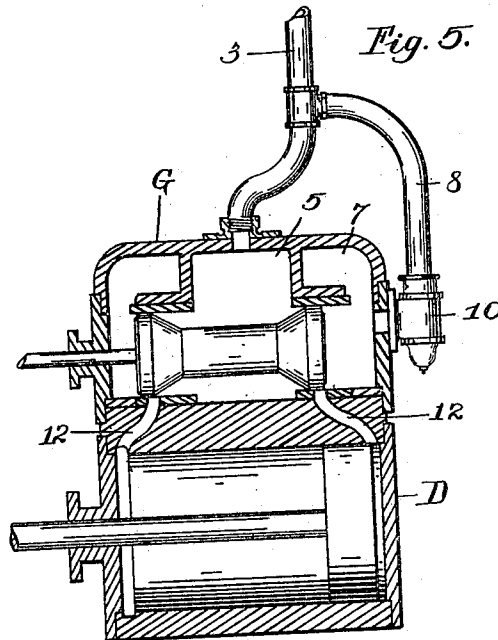
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

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LOCOMOTIVE.

No. 819,828.

Specification of Letters Patent.

Patented May 8, 1906.

Application filed October 31, 1904. Serial No. 230,666.

To all whom it may concern:

Be it known that I, FRANCIS O. WHEALON, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented a new and useful Locomotive, of which the following is a specification.

My invention relates to improvements in locomotives, and has for its object to provide means for regulating the draft in the chimney, preventing the cylinders from cooling when the engine is drifting, and saving lubricating-oil in the cylinders and valves.

This invention is an improvement on the mechanisms described in my Letters Patent No. 741,859, dated October 20, 1903, for locomotive-exhaust mechanism, and No. 789,111, dated May 2, 1905, for locomotives.

The present invention is particularly, though not exclusively, adapted for use with compound locomotives, and among the advantages attained over the prior art are simplicity of construction and effectiveness in use.

In the accompanying drawings, forming part of this specification, Figure 1 is an elevation taken on the low-pressure-cylinder side of the locomotive. Fig. 2 is another elevation taken on the high-pressure-cylinder side of the locomotive. Fig. 3 is a detail end view of Fig. 1. Fig. 4 is a diagrammatic view of part of my invention. Fig. 5 is a longitudinal section of one of the cylinders and its steam-valve, showing my invention connected therewith; and Fig. 6 is a longitudinal section of the valve controlling the auxiliary passage-way leading from the high-pressure cylinder.

In the drawings, A represents a compound locomotive of ordinary construction; B, its smoke-stack or chimney; C, the high-pressure cylinder; D, the low-pressure cylinder, and E the exhaust-nozzle in the smoke-chamber 2, with which the cylinders connect in the ordinary manner. An auxiliary exhaust passage-way F, leading to a point outside of the smoke-chamber, is adapted to conduct the exhaust and all leaky steam, which obstructs the operator's view, to the top of the stack. This auxiliary passage-way has two pipes 3 and 4, which lead from the exhaust-outlet 5, Fig. 5, of each cylinder and merge

into a trunk-pipe 6 beside the stack. Connected with the live-steam passage-ways 7, as shown in Fig. 5, in the cylinder-valves G and H are branch passage-ways 8 and 9, which respectively connect with the pipes 3 and 4. These branches have suction or back-pressure valves 10 and 11, closing the same when live steam enters the cylinder-valves C and D. The cylinder-valves are of cylindrical form, though it is obvious that any other form of valve or steam-chest may be used without departing from the spirit of this invention. The branch passage-ways are connected with the auxiliary passage-ways to conduct all leaky or waste steam away and prevent obstructing the operator's view. In effect, each branch passage-way connects the two ends of each cylinder and the steam-ports 12, for when the engine is drifting and the suction-valves are open the dead steam or hot air in the cylinders passes back and forth through said ports of the cylinders and the branches and lower ends of the auxiliary exhaust-pipes. The valves 10 and 11 may be of any suitable form desired (such as suction or back-pressure) to accomplish the results desired. They may be automatic to prevent compression in the cylinder, and the branch passage-way may effect an outlet through variable exhaust mechanism for steam relieved or escaping from any form of valve without departing from the spirit of this invention. A valve is connected with each of the auxiliary passage-ways 3 and 4. On the high-pressure-cylinder side this valve I is preferably operated by steam, and on the low-pressure side the valve J is mechanically operated. The valve I (shown in Fig. 6) consists of a cylinder 13, with which the pipe 4 is connected through ports 14 in its sides. A piston-valve 15 moves through the cylinder 13 to open and close the ports 14 by means of the piston 16, which is connected with the piston-valve by means of the rod 17. On one end of the valve is an expansion-spring 18, as shown. A cap 19, having a pocket 20 to receive one end of the spring, is threaded at 21 into the end of the cylinder 13. The piston end of the cylinder 13 is preferably connected, by means of the pipe 22, with the live-steam-conducting pipe 23, leading from the boiler, which is part of the sys-

tem of operating mechanism (of ordinary construction) of the locomotive, to admit steam from the boiler into the combined exhaust and intercepting valve K and change the cylinders into simple or compound connection. A hand-valve 24 is connected with the pipe 23 in the cab of the locomotive and operated by turning the handle 25. When the hand-valve is opened, steam enters the valve I and causes it to open the auxiliary passage-way 4. The combined exhaust and intercepting valve simultaneously disconnects the cylinders to operate simple, and the exhaust from the high-pressure cylinder passes through the exhaust-nozzle E and the auxiliary outlet to reduce the draft in the smoke-chamber.

The valve J on the low-pressure side of the engine is of ordinary mechanical construction and operated by the mechanism L, which consists of a sectional rod 26. One of its sections 27 slides through clips 28 on the side of the boiler-frame and connects with said valve J, and the other section 29 is pivoted at 30 to the section 27 and at 31 loosely in the slot 32 in the frame 33. This frame is fastened to the rock-arm 35 of the ordinary cylinder-valve-operating mechanism of the locomotive. The rock-arm is connected by the rod 36 in the ordinary manner to the reverse-lever 37 in the cab. The free end of the section 29 is regulated in the slot 32 by the lever 38, which is pivoted at 39 in the cab and adjusted by the segment 40 and handle 41 to change the position of the valve J and vary the size of the opening and the amount of exhaust-steam passing through the auxiliary passage-way 3. A bell-crank lever 42 is journaled at 43 on the frame of the locomotive and has one arm connected by the rod 44 with the lever 38 and its other arm connected by the link 45 with the free end of the arm 29, which slides freely through the loop 46 on the lower end of said link. The link works through the guide 47 on the frame. It is obvious that this adjusting mechanism for regulating the valve J may be changed and modified when desired. It is further obvious that the auxiliary exhaust passage-ways may be connected to the frame by any suitable means, (such as clips 48.)

In operation when the cylinders are operated in compound the valve 24 is closed. The spring 18 closes the valve 15 in the auxiliary passage-way leading from the high-pressure valve. When the engine is reversed by the lever 37 to move forward or backward, the valve J is opened, the amount of opening being regulated by changing the position of the lever 38. The exhaust-steam is free to pass through the exhaust-nozzle in the smoke-chamber. The amount of the draft in the smoke-chamber, however, is regulated by part of the exhaust-steam passing outside through the auxiliary passage-way. The

drifting-valves when steam is cut off from the cylinders and the engine is running freely operate in the ordinary manner and permit the pistons in the cylinders to run without compression or admitting outside air into the cylinders. When the cylinders are operated in simple connection, the valve 24 is opened and the intercepting-valve closes the connection between the cylinders. Live steam enters and opens the valve I, and part of the exhaust-steam passes outside from the cylinder C through the auxiliary exhaust passage-way, and the remainder of the exhaust passes into the smoke-chamber through the exhaust-nozzle. The mechanism for regulating the exhaust from the cylinder D is operated in the same manner as when the cylinders are connected in compound. When the engine drifts, the drifting-valves open the passage-ways through the branches 8 and 9 and make connection, respectively, between the ends of the cylinder through the cylinder-valve chambers in the auxiliary exhaust mechanism.

It is obvious that two drifting-valves may be used in connection with each cylinder instead of one, as shown, without departing from the principles applied and two branches used instead of one in connection with said drifting-valves to prevent any reluctancy of action when desired.

Having described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In combination with a locomotive, its cylinder, exhaust passage-way from the cylinder to the smoke-chamber and valve controlling its steam inlet and exhaust ports, an auxiliary passage-way leading to a point outside of said smoke-chamber for the exhaust-steam, a steam-operated valve in said auxiliary passage-way, means for controlling said valve, a connection between the valve controlling the inlet and exhaust ports and said auxiliary passage-way, and an automatic-valve in said connection to open the same when the supply of live steam is checked.

2. A device of the class set forth, consisting, in combination with a locomotive having a smoke-chamber, its cylinders and a main exhaust passage-way leading from the cylinders and projecting into said smoke-chamber, of an auxiliary passage-way connected with said main exhaust passage-way having valve mechanism for modifying the size of the same, consisting of a steam-operated valve and means for controlling the operation of said valve.

3. A device of the class set forth, consisting, in combination with a locomotive having a smoke-chamber, its cylinders and a main exhaust passage-way leading from the cylinders and projecting into said smoke-chamber, of an auxiliary passage-way connected with said main exhaust passage-way having valve mechanism for modifying the size of the same,

consisting of a steam-operated valve and means for controlling the operation of the same, a connection between the auxiliary passage-way and the live-steam ports in each of said cylinders, and an automatic valve in said connection.

4. In combination with a locomotive having a main passage-way forming an exhaust-outlet between the cylinders and the smoke-chamber, a branch passage-way from said main passage-way leading to a point outside of said smoke-chamber, automatic mechanism for modifying the size of said branch passage-way, a connection between the steam-inlets of said cylinders and said branch passage-ways, and automatic valve mechanism in said connection.

5. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, an intercepting-valve, and means for opening and closing the branch passage-way to permit said cylinders to be used either in simple or compound connection.

6. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, means for connecting said cylinders to operate either in single or compound, and automatic valve mechanism for closing the branch passage-way leading from the high-pressure cylinder when said cylinders are connected in compound.

7. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, means for connecting said cylinders to operate in compound, and means for closing said branch leading from the high-pressure cylinder when said cylinders are connected in compound.

8. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, means for connecting said cylinders in compound, means for closing the branch leading from the high-pressure cylinder, and valve mechanism for modifying the outlet of said branch passage-way leading from the low-pressure cylinder.

9. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, means for connecting said cylinders in compound or simple, means for automatically opening and closing said branch when the cylinders are

changed from simple or compound connection, and valve mechanism for modifying said branch from the high-pressure cylinder.

10. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, valve mechanism for regulating the size of the outlet of said branch passage-way, and means for connecting said cylinders in simple or compound and closing the branch leading from the high-pressure cylinder.

11. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, valve mechanism for modifying said branch passage-way, and means for connecting said cylinders in compound and automatically closing the branch leading from the low-pressure cylinder.

12. A device of the class set forth, comprising a passage-way between the cylinders and smoke-chamber of a locomotive for the exhaust-steam, a branch from said passage-way to the exterior of said smoke-chamber, means for connecting said cylinders to operate in simple or compound, valve mechanism for modifying said branch, means for adjusting the operation of said modifying means, and means for closing said branch leading from the high-pressure cylinder when the cylinders are connected to operate in compound.

13. A compound locomotive having high and low pressure cylinders and operating-valve mechanism for controlling their inlet and exhaust ports, passage-ways from the exhaust-ports of said cylinders to the smoke-chamber, a branch from each of said passage-ways leading to a point outside said smoke-chamber, an intercepting-valve between said cylinders, a valve in the branch leading from the high-pressure cylinder and connected with a source of steam-supply to open the same, means for closing said valve, a mechanically-operated valve in the branch leading from the low-pressure cylinder, and means for opening and closing said last-mentioned valve.

14. A compound locomotive having high and low pressure cylinders and valve mechanism for controlling their inlet and exhaust ports, passage-ways from the exhaust-ports of said cylinders to the smoke-chamber, a branch from each of said passage-ways leading to a point outside of said smoke-chamber, an intercepting-valve between said cylinders, an operating-valve in the branch leading from the high-pressure cylinder to close the same when the cylinders are connected in compound, another valve in the branch leading from the low-pressure cylinder, and means for operating said last-mentioned

valve to modify the branch with which it is connected.

15. A compound locomotive having high and low pressure cylinders and valve mechanism for controlling their inlet and exhaust ports, passage-ways from the exhaust-ports of said cylinders to the smoke-chamber, a branch from each of said passage-ways leading to a point outside said smoke-chamber, an intercepting-valve between said cylinders, a valve normally closed in the branch leading from the high-pressure cylinder, means for opening said valve, another valve in the branch leading from the low-pressure cylinder, and means for opening and closing said last-mentioned valve.

16. A compound locomotive having high and low pressure cylinders and valve mechanism for controlling their inlet and exhaust

ports, passage-ways from the exhaust-ports of said cylinders to the smoke-chamber, a branch from each of said passage-ways leading to a point outside said smoke-chamber, an intercepting-valve between said cylinders, a valve normally closed in the branch leading from the high-pressure cylinder, means for opening said valve, another valve in the branch leading from the low-pressure cylinder, means for opening and closing said last-mentioned valve, and adjusting mechanism for said last-mentioned valve.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCIS O. WHEALON.

Witnesses:

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F. G. BRADBURY.