

May 20, 1924.

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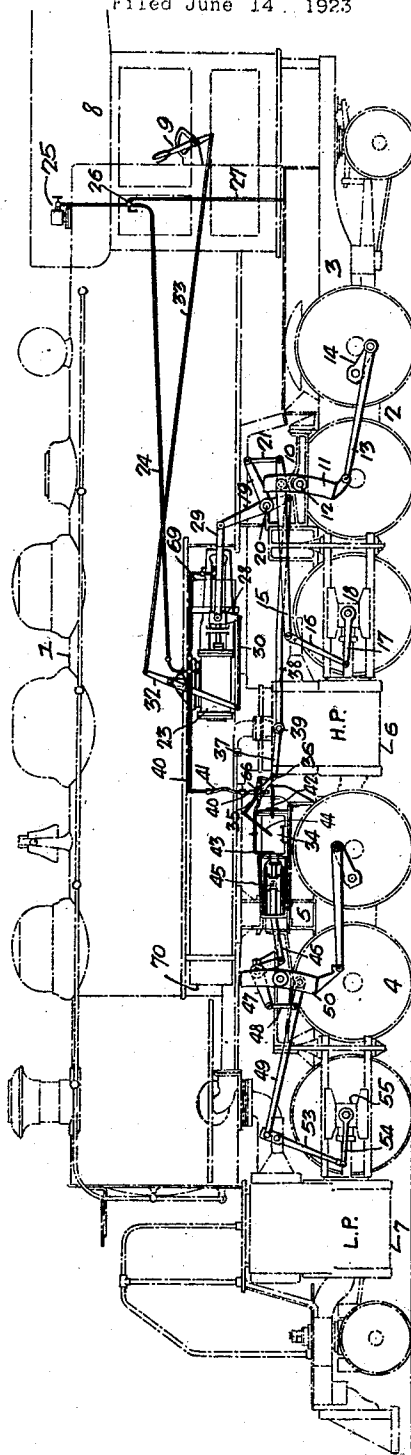
H. V. WILLE

MALLET LOCOMOTIVE

Filed June 14, 1923

3 Sheets-Sheet 1

Fig. 1.



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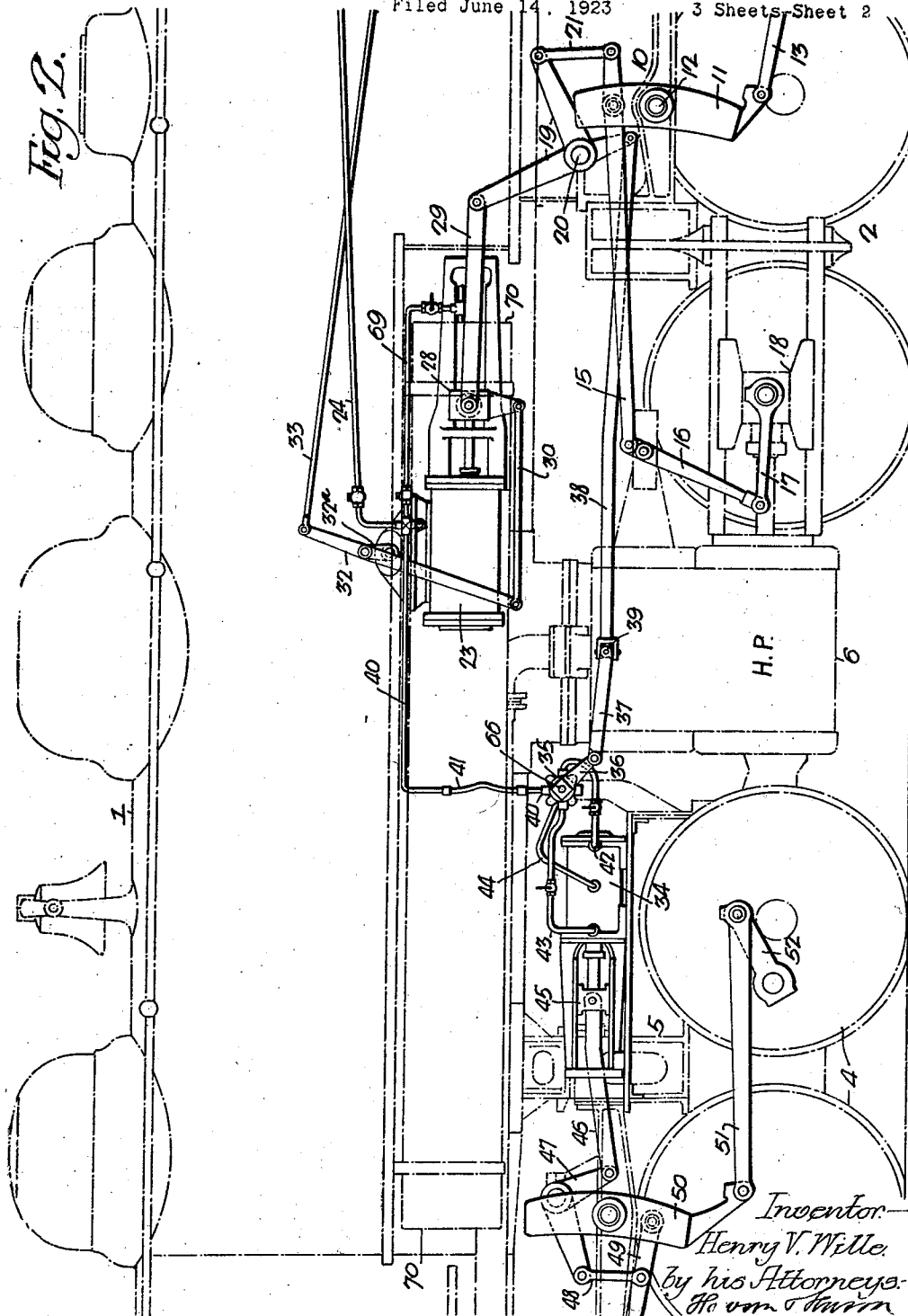
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3 Sheets Sheet 2



May 20, 1924.

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3 Sheets-Sheet 3

Fig. 3.

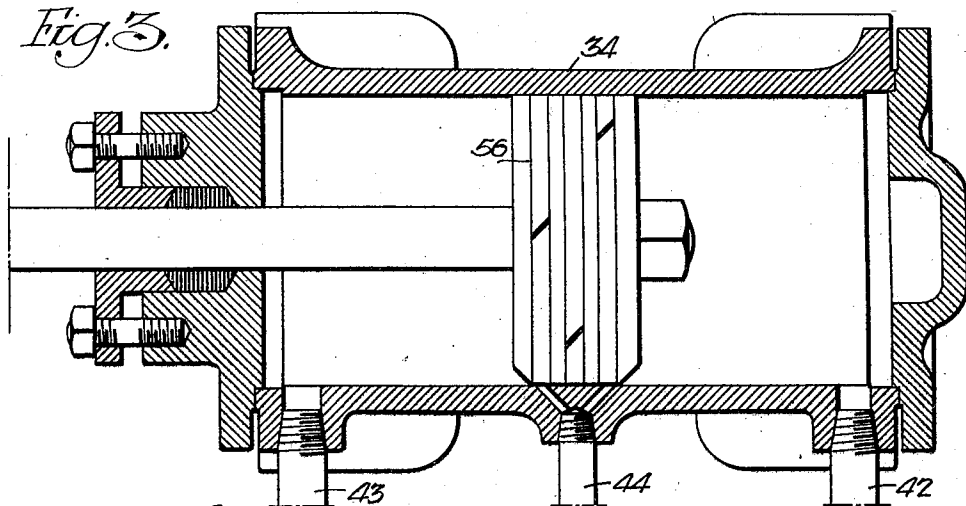


Fig. 4.

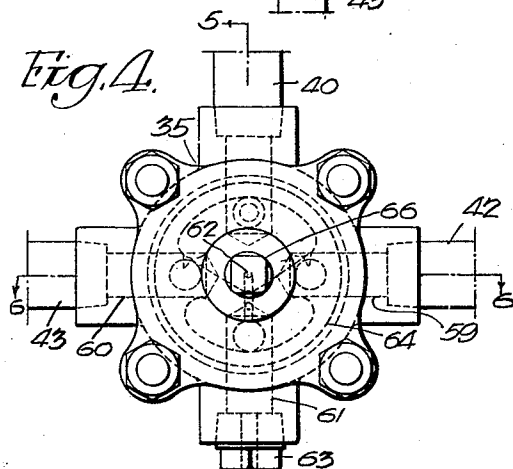


Fig. 5.

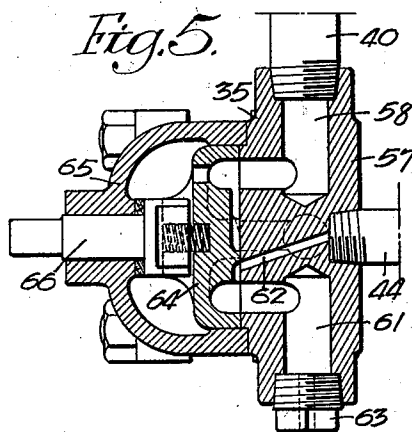
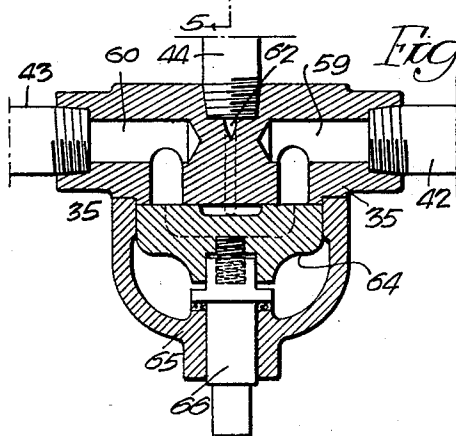


Fig. 6.



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UNITED STATES PATENT OFFICE.

HENRY V. WILLE, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE BALDWIN LOCOMOTIVE WORKS, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

MALLET LOCOMOTIVE.

Application filed June 14, 1923. Serial No. 645,369.

To all whom it may concern:

Be it known that I, HENRY V. WILLE, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Mallet Locomotives, of which the following is a specification.

The object of my invention is to change the present practice of the reverse gear control on Mallet locomotives so that the low pressure gear will not change its relative position of cut-off in conformity with the high pressure gear, but will be held at a constant cut-off in the same direction as the high pressure gear, and will be thrown into "neutral" when the high pressure gear is placed in the neutral position.

The mechanism is intended to operate only on the low pressure valve gear of a Mallet compound locomotive. The high pressure valve gear may be controlled by any approved mechanism that will permit the operation at a number of positions representing different percentages of cut off of the steam in the high pressure cylinders.

In the accompanying drawings:

Fig. 1 is a side view of a Mallet compound locomotive in dotted lines with the valve mechanism in full lines;

Fig. 2 is an enlarged side view of a portion of a Mallet compound locomotive in dotted lines, with the valve mechanism of the high and low pressure cylinders in full lines, and more in detail than illustrated in Fig. 1;

Fig. 3 is a sectional view of the low pressure operating cylinder;

Fig. 4 is a face view of the low pressure operating valve;

Fig. 5 is a sectional view on the line 5—5, Fig. 4; and

Fig. 6 is a sectional view on the line 6—6, Fig. 4.

Referring to the drawings, 1 is the boiler of a locomotive. 2, 2 are the high pressure driving wheels, carrying the frame 3, which is attached to the boiler 1. 4, 4 are the low pressure driving wheels, carrying a frame 5, which is pivotally connected to the frame 3 and extends under the forward end of the boiler. 6 is one of the high pressure cylinders mounted on the frame 3. 7 is one of the low pressure cylinders mounted on the

frame 5. It will be understood that these cylinders are duplicated on the opposite side of the locomotive.

8 is the cab and 9 is the reverse lever in the cab. The construction hereinbefore described is that of the ordinary Mallet compound locomotive.

10 is the ordinary type of valve gear for the high pressure cylinder. 11 is a link pivoted at 12 to the frame and connected by a rod 13 to a crank 14 on one of the driving wheels. 15 is a rod connected to the lever 16, which is connected, in turn, by a rod 17 to the cross head 18 of the high pressure piston located in the cylinder 6. 19 is a lever pivoted to the frame at 20. This lever is connected by a link 21 to the rod 15, which has a pin traveling in the segment 11.

23 designates the power reverse cylinder for the high pressure mechanism. 24 designates a steam pipe leading from the steam valve 25 in the cab to the cylinder 23. In this valve is a three-way emergency cock 26. 27 designates a drain pipe leading from said cock. The cross head 28 of the piston in the cylinder 23 is connected by a rod 29 to the lever 19 and also by a link 30 to a floating lever 32, which, in turn, is connected by a rod 33 to the lever 9 in the cab of the locomotive. The lever 32 is pivoted to an arm 32^a that controls the control of fluid (either air or steam) to the high pressure reverse cylinder 23 of the ordinary construction.

34 designates the low pressure operating cylinder mounted on the frame 5 of the locomotive. 35 designates the low pressure operating valve, also mounted on said frame. This valve is shown in detail in Figs. 4, 5 and 6.

36 designates an arm attached to the valve proper and connected by a link 37 to a rod 38, which is attached to an arm of the lever 19 of the high pressure reverse mechanism. 39 designates a flexible joint between the lever 37 and the rod 38. 40 designates a fluid supply pipe connected to the valve 35 and to the steam pipe 24 and the air pipe 69, leading from the reservoir 70—shown by dotted lines. The pipe 40 has a flexible connection 41 so that it will accommodate itself to the movement of the two frames of the locomotive.

It will be understood that either steam

or air may be used, and, in some instances, either the steam or the air connection may be omitted.

42 designates a pipe leading from the valve 35 to the rear end of the cylinder 34. 43 designates a pipe leading from the valve 35 to the forward end of the said cylinder. 44 designates an exhaust pipe leading from the center of the cylinder to the exhaust passage in the valve 35. 45 designates a cross head connected to the piston 56 located in the low pressure operating cylinder 34.

46 designates a rod connecting the cross head with the lever 47, which, in turn, is connected by a link 48 to the rod 49 having a pin that travels in the link 50. The link is connected by a rod 51 to the crank 52 on one of the driving wheels 4. The rod 49 is connected to a lever 53, which, in turn, is connected by an arm 54 to the cross head 55 of the piston in the low pressure cylinder 7. The low pressure operating valve is illustrated in Figs. 4, 5 and 6.

57 designates the base of the valve having ports 58, 59, 60 and 61, and an exhaust passage 62. The steam pipe 40 communicates with the port 58. The pipe 42 communicates with the port 59. The pipe 43 communicates with the port 60. The exhaust port 61 has a plug 63, which has an exhaust passage therein. This plug can be detached and other plugs, having openings of different sizes, may be substituted for the plug 63.

64 designates the valve proper having ports that are shaped as shown clearly in the drawings to direct the steam from the port 58 to the other ports. The valve 64 is closed by a cap 65, which also supports the valve stem 66 to which the arm 36 is attached.

With the mechanism hereinbefore described, no other manipulation is required by the engineer in the cab of the locomotive than the arrangement commonly used. When starting, the operating lever, or operating screw, in the cab is placed in the extreme front or back position. This automatically places the low pressure valve gear, as well as the high pressure valve gear, in the extreme forward position or the extreme back position. These positions are determined according to the maximum cut-off found to give the best results.

If desired, the high pressure valve gear may now be brought back to any shorter cut-off position without disturbing the low pressure valve gear until the neutral, or central, position is reached. When the high pressure valve gear is reversed, the low pressure valve gear will be moved immediately to the other end of the cylinder, allowing pressure from the opposite end to exhaust through the valve.

When it is desired to place the valve mo-

tion in mid gear position, this may be accomplished by placing the high pressure hand lever, or screw, at the central position. The low pressure gear will then move to a corresponding position with the piston in the center of the operating cylinder. When the high pressure gear reaches the mid position, the operating valve, which is connected to it, is also on center. When the valve is in this position, a small amount of fluid is admitted to both ends of the cylinder and opens the small exhaust port to the middle of the cylinder. As the pressure on one side of the piston is reduced by the middle exhaust port, the pressure on the other side moves the piston until it covers this port, which keeps the piston at the center of the cylinder.

The arrangement, hereinbefore described, has been found to be a decided improvement over that generally used, as it produced greater efficiency of the locomotive without requiring the special attention of the engineer, as its operation is automatic.

It has been determined by actual service that an engine may be operated more efficiently by maintaining the cut-off of the low pressure unit at one position and varying the high pressure unit only to suit the speed and the load.

I claim:

1. The combination in a Mallet compound locomotive, of two flexibly connected frames; a high pressure cylinder on one frame and a low pressure cylinder on the other frame; valve reverse mechanism mounted on the same frame as the high pressure cylinder; valve mechanism for the low pressure cylinder mounted on the same frame as the low pressure cylinder; means for operating the high pressure valve mechanism; a low pressure operating cylinder; a valve for operating the low pressure cylinder; and means connecting the operating valve of the low pressure cylinder with the valve mechanism of the high pressure cylinder.

2. The combination in a Mallet compound locomotive, of a high pressure cylinder; a valve gear therefor; mechanism for operating said gear; a low pressure cylinder; a valve gear therefor; a low pressure operating cylinder; a low pressure operating valve connected to the low pressure operating cylinder; an arm on the valve; and means connecting the arm with the valve mechanism of the high pressure cylinder so that the low pressure valve gear will be moved to its extreme position in the same direction for any movement of the high pressure valve gear and both going to "neutral" position together.

3. The combination of a Mallet compound locomotive, in which there are two frames, the boiler being carried by one frame and overhanging the other frame; high pressure

cylinders on the frame carrying the boiler, and low pressure cylinders on the other frame; a valve gear for controlling the flow of fluid to the high pressure cylinders; a
5 valve gear for controlling the flow of fluid to the low pressure cylinders; a power reverse cylinder connected to the high pressure valve gear; a low pressure operating cylinder on the frame carrying the low pressure valve
10 gear; a low pressure operating valve connected to both ends of the said cylinder and having an exhaust port communicating with the center of the cylinder; a fluid pipe communicating with the high pressure power reverse cylinder and with the low pressure operating valve; a link connecting the valve
15 proper of the low pressure operating valve mechanism with a rod, which, in turn, is connected to the high pressure reverse mechanism; flexible joints in the pipe leading to
20 the valve from the cab; and a flexible joint between the link and the rod connected to the high pressure reverse mechanism.

HENRY V. WILLE.