

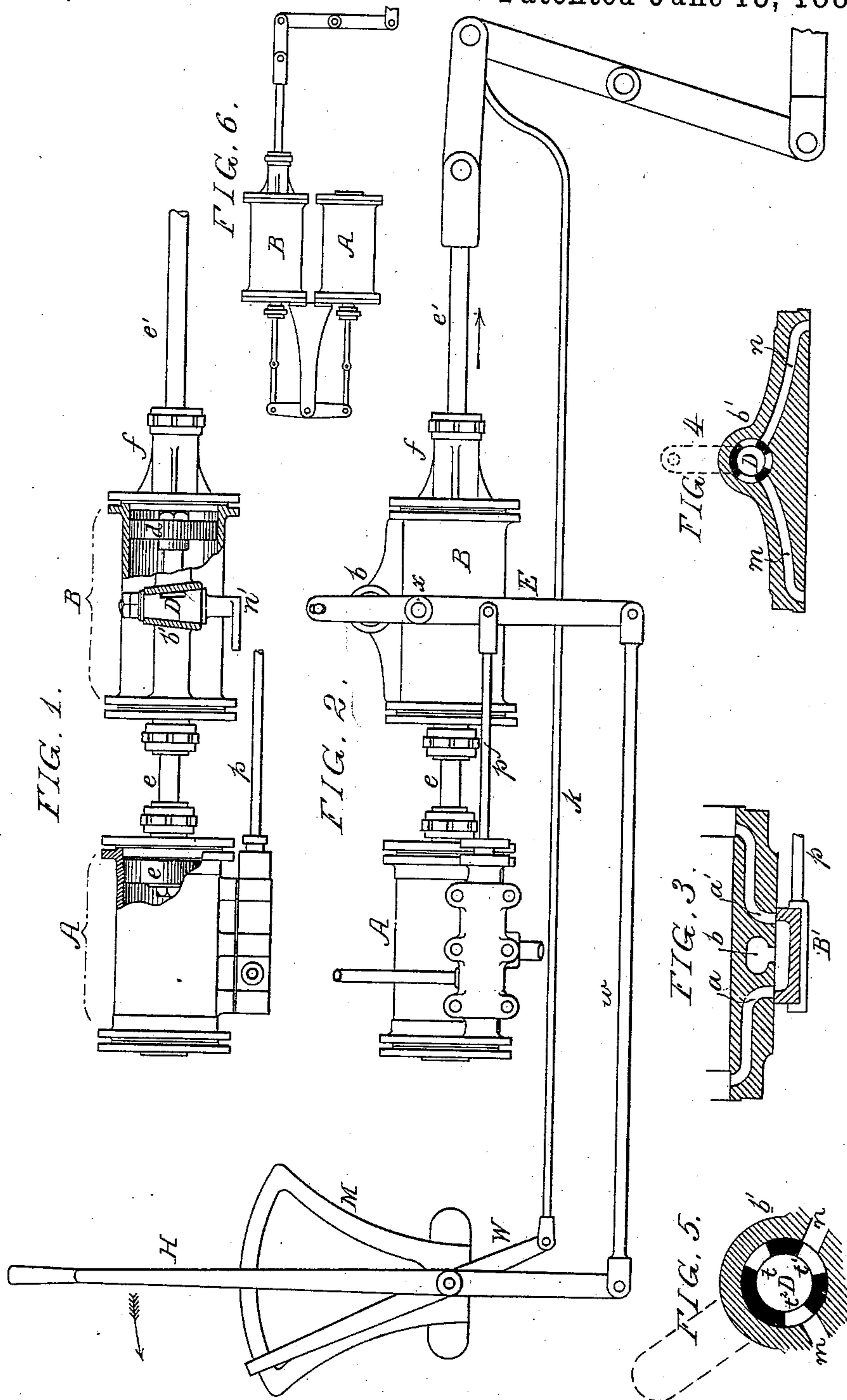
(No Model.)

W. P. HENSZEY.

REVERSING GEAR FOR LOCOMOTIVES.

No. 259,538.

Patented June 13, 1882.



Witnesses:

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UNITED STATES PATENT OFFICE.

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REVERSING-GEAR FOR LOCOMOTIVES.

SPECIFICATION forming part of Letters Patent No. 259,538, dated June 13, 1882.

Application filed November 7, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. HENSZEY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented an Improvement in Reversing-Gear for Locomotives, of which the following is a specification.

My invention relates to certain improvements in that class of mechanism for facilitating the operation of the reversing-shaft of a locomotive-engine, which consists in the combination of a small steam-cylinder with a hydraulic cylinder, the piston-rod common to both being connected to the said reversing-shaft, and appliances for operating certain valves of the said cylinders being under the control of the engineer, the object of my improvements, which are fully described hereinafter, being to give the engineer better control of the valves of the locomotive than he can acquire by ordinary reversing mechanism of the class to which my invention relates, and to afford him facilities for observing the results of the manipulation of the valves of the steam and hydraulic cylinders.

In the accompanying drawings, Figure 1 is a plan view of the steam and hydraulic cylinders, partly in section; Fig. 2, a side view of the said cylinders, with mechanism for operating the valves, and certain indicating devices referred to hereinafter; Fig. 3, a sectional view of the valve and ports of the steam-cylinder; Fig. 4, a sectional view of the valve and ports of the hydraulic cylinder; Fig. 5, an enlarged sectional view of the valve of the hydraulic cylinder, and Fig. 6 a diagram illustrating a modified arrangement of the two cylinders.

Two cylinders, A and B, are required to carry my invention into effect, the former being the steam-cylinder, and the latter I term the "hydraulic cylinder," although oil is the liquid preferred for use in connection with it. The steam-cylinder differs in no respect from that of an ordinary steam-engine, there being the usual steam-ports, *a a'*, exhaust-port *b*, and an ordinary slide-valve, *B'*, for which, however, may be substituted a cylindrical valve, or, indeed, any other valve used in connection with steam-engines. I prefer, however, the common slide-valve shown. The hydraulic cylinder B has a piston, *d*, connected to the piston *c* of the steam-cylinder by the piston-rod *e*, a continuation, *e'*, of the same rod passing

through a stuffing-box, *f*, of the said hydraulic cylinder. Two passages, *m n*, communicate with the interior of the hydraulic cylinder, one at one end and the other at the opposite end of the same, and meet at a chest, *b'*, containing a valve, *D*, by which the said passages can be made to communicate with or be cut off from each other. While different kinds of valves may be used for this purpose, I prefer the hollow tapering plug-valve, as being simple and economical; and as there are no sudden changes of temperature to interfere with the free working of a valve of this class in connection with the hydraulic cylinder, the valve, moreover, is always maintained in a thoroughly lubricated condition by the oil which has to pass through it.

It should be stated here that the rod *e'* is connected to an arm on the reversing-shaft of the locomotive, and that the valves of the two cylinders have to be so operated that the steam admitted to the cylinder A will, in conjunction with the oil which is always in the cylinder B, accomplish precisely the same duties which an engineer has to perform in manipulating the ordinary reversing-lever.

A lever, *E*, is pivoted to the hydraulic cylinder at *x*, or to any other fixed object, the valve-rod *p* of the steam-cylinder being connected to one arm of this lever, and the other arm being properly connected to a lever, *n'*, of the valve *D* of the hydraulic cylinder. This permits me to use a reversing-lever, *H*, in about the same position as the ordinary reversing-lever in the cab of a locomotive, the short arm of the lever *H* being connected in the present instance directly to the long arm of the lever *E* by a rod, *w*. It will be evident, however, that mechanism other than that described may be used for causing the valves of the two cylinders to operate simultaneously and permit them to be actuated by a lever, *H*, the character of the connections in many cases depending upon the location of the two cylinders and their relative arrangements, for it is not even essential that the two cylinders should be arranged in line with each other. They may, for instance, be situated one above the other, the piston-rods being connected to a lever, as shown in Fig. 6, and the piston-rod of the hydraulic cylinder being connected to an arm on the reversing-shaft.

On referring to Fig. 5 it will be seen that

the valve D has three ports, t , t' , and t^2 . When the arm n' has been moved to its full extent to the left, as indicated by dotted lines in that figure, the ports t' and t^2 will afford a communication between the passages m and n of the hydraulic cylinder, the port t being out of service; and when the arm has been moved to its extreme limit to the right the ports t and t^2 will afford a communication between the two passages, the port t' being out of service; and when the arm n' is in a vertical position, and this is its normal condition and that of the valve, the latter will have closed both passages m and n , and the valve can be moved in either direction to a limited extent from its normal position without opening the communication between the two passages.

It should be here remarked that it is not new to use a small steam-cylinder and hydraulic cylinder with connected pistons for operating the valve-gear of steam-engines, and that the valves of the steam-cylinder and hydraulic cylinder have been so connected that they could be operated simultaneously by a hand-lever.

The main feature of my improvement consists in the relation which the valve and ports of one cylinder have to the valve and ports of the other cylinder, this relation being such that results are attained which may be explained as follows: The force exerted to operate the reversing-shaft is due to the pressure of steam on the piston of the steam cylinder, and the movement effected by this pressure of steam is controlled by the hydraulic cylinder. In moving the hand-lever H from its vertical or normal position, Fig. 2, to the left, in the direction of its arrow, the slide-valve will admit steam to the cylinder before the communication between the two passages m and n of the hydraulic cylinder is open, and hence the piston of the said hydraulic cylinder is locked by and between two volumes of oil in the same, and the piston-rod and reversing-shaft are consequently immovable. At this time steam has been exhausted from the cylinder A on one side of the piston and live steam is present on the opposite side, ready to perform its duty before the valve of the hydraulic cylinder permits it to move the piston. But on continuing the movement of the hand-lever in the direction of the arrow the valve D will begin to open the communication between the two passages m and n , and the pressure exerted by the steam will cause the piston of the hydraulic cylinder to force the oil from one end of that cylinder to the other, and permit the steam to move the rod e' in the direction of the arrow with a rapidity commensurate with the extent of opening of the valve D to the passages m and n and the time taken to force the oil through these passages, so that the engineer can effect a comparatively slow or rapid movement of the reversing-shaft, as circumstances may suggest, by manipulating the hand-lever. Precisely the same proceedings take place when the hand-lever is moved from its vertical or normal

position in a direction contrary to that pointed out by the arrow, when the piston and piston-rod have to be moved back for reversing the engine, and causing it to go ahead, the steam in all cases being admitted to the steam-cylinder ready to perform the functions determined by the movement of the valve of the hydraulic cylinder. This result is due to the fact that during the simultaneous movements of the valves of the two cylinders the ports m and n of the hydraulic cylinder remain covered by its valve for a longer period than the steam-ports of the steam-cylinder, so that whatever valves may be used in connection with the steam and hydraulic cylinders they should bear such relation to their ports that when the lever is moved in either direction one of the steam-ports of the steam-cylinder shall be open to admit live steam and the other open to the exhaust before the valve of the hydraulic cylinder permits the fluid to pass from one end of the said cylinder to the other.

The only duty which an engineer has to perform in manipulating the hand-lever H in addition to that required in operating an ordinary lever is that of restoring the lever H to its normal position, after he has moved it in either direction, to bring about the desired result. This is for the purpose of locking the piston of the hydraulic cylinder and arresting the movement of the reversing-shaft at the desired point. For instance, if the engineer finds it necessary, after moving the hand-lever in the direction of the arrow—say half-way to its full extent—to arrest the pistons and reversing-shaft, it becomes necessary to lock the piston of the hydraulic cylinder at the desired point; and in order to do this the engineer must, the instant this point is reached, move the hand-lever to its normal position, thereby operating the valve D and causing it to close the communication between the two passages m and n , when the piston of the hydraulic cylinder will be locked between two volumes of oil, and in thus restoring the hand-lever to its normal position the valve B' must move with it, and the steam contained in the steam-cylinder will be exhausted. Whatever movement of the hand-lever is made for accomplishing any desired extent of movement of the reversing-shaft in either direction, that movement of the hand-lever should be followed the moment the desired effect has been attained by its restoration to its normal position. It must be remembered, however, that there is no direct connection between the piston-rod or mechanism connected therewith and the hand-lever, and that the cylinder must often be situated at a point whence the engineer cannot observe the actual results of the movement of the lever, his only knowledge of these results being acquired by the performance of the engine. Hence it is important that the engineer should know at a glance, without waiting to observe the effect of any movement of the hand-lever on the engine, that the duty he intended to perform by that movement has been actually

accomplished. For this purpose I pivot to the stand M, which is secured within the cab of the locomotive, a lever, W, one arm of which is connected by any suitable devices—a rod, k, for instance—to any part of the mechanism connected to the piston-rod e', the long arm of the lever W terminating in a projection which is close to the segmental upper edge of the stand M, without being in actual contact therewith, this upper edge of the stand being in the arc of a circle of which the pivot-pin of the lever W is the center, and this edge is so graduated to accord with the movement of the pistons that by glancing at the pointer and the graduations the engineer can at once determine whether his movement of the hand-lever has been attended with the desired results. For instance, if the hand-lever in Fig. 2 has been moved from its normal position in the direction of the arrow to its full extent, the long arm of the lever W will make the same movement, and will remain at the point shown to indicate that the result has been attained after the hand-lever has been moved back to its normal position.

I claim as my invention—

1. The combination of the steam-cylinder A

and its piston, a valve for admitting steam to and exhausting it from the said cylinder, the hydraulic cylinder having a piston connected to that of the steam-cylinder, a valve for opening and closing a communication between the opposite ends of the said hydraulic cylinder, and mechanism for operating both valves simultaneously, the two valves and the ports relating thereto being constructed substantially as herein set forth, so that on moving the valves in either direction that of the steam-cylinder will always act in advance of that of the hydraulic cylinder, as described.

2. The two cylinders and their connected pistons, the valves, and the hand-lever H for operating the same, in combination with the stand M, its graduated segment, the pointing-lever W, and mechanism by which the piston-rod of the two cylinders is caused to actuate the said lever, all substantially as specified.

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

WM. P. HENSZEY.

Witnesses:

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HARRY SMITH.