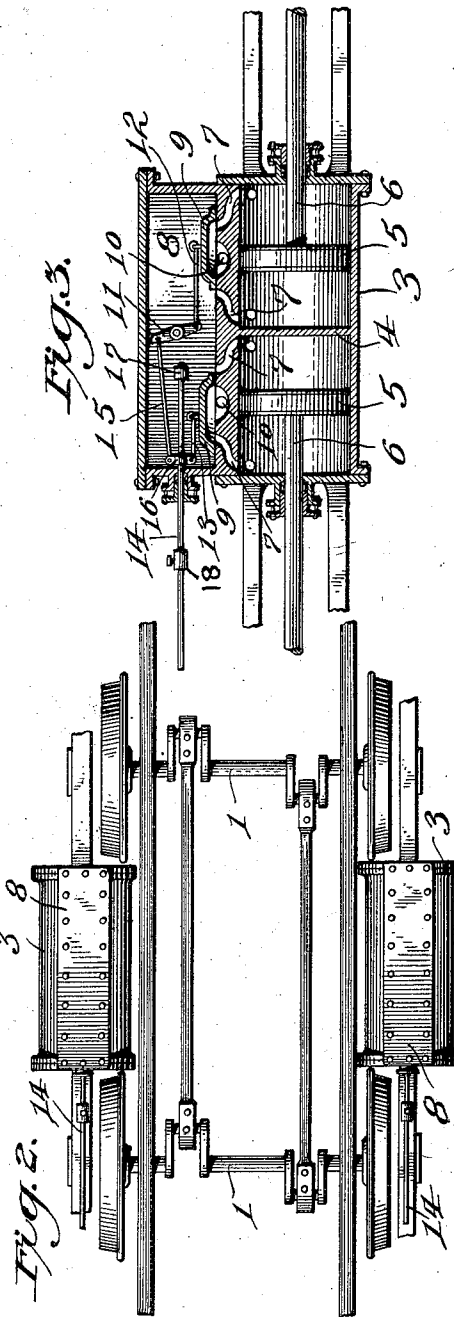
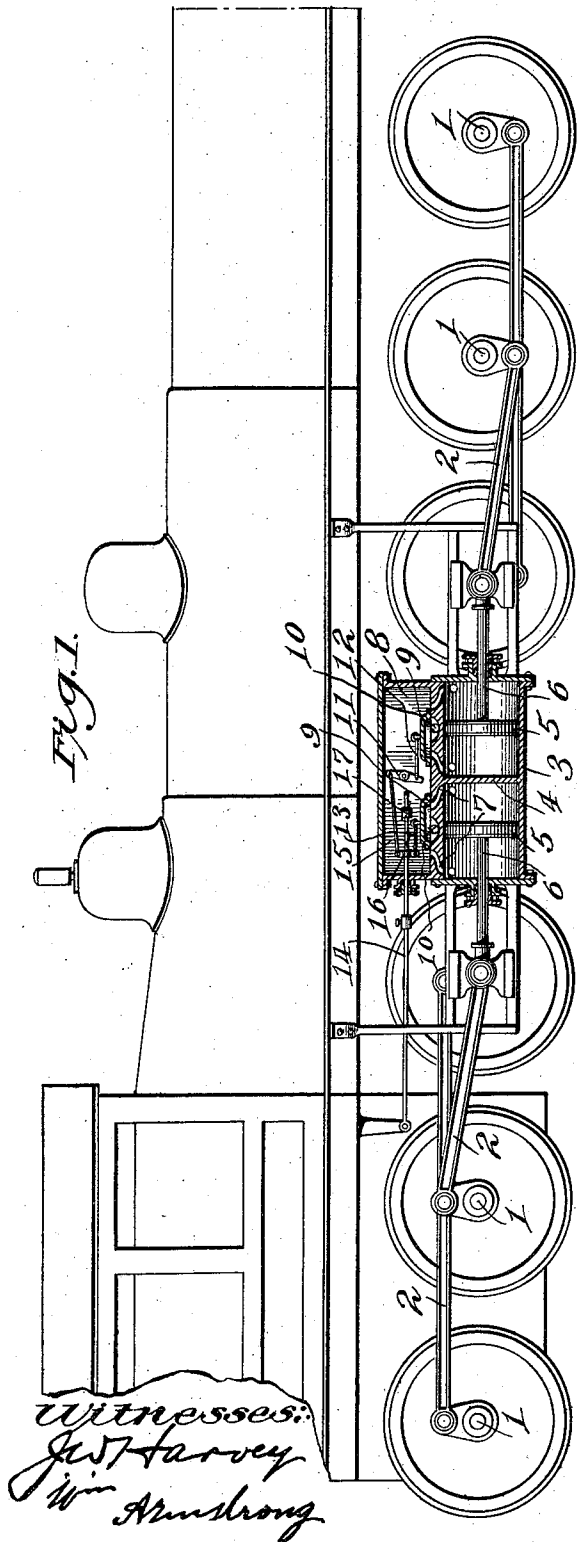


W. R. SANDERS.
STEAM ENGINE.
APPLICATION FILED DEC. 13, 1909.

1,028,840.

Patented June 4, 1912.



Inventor:
William Robert Sanders.

UNITED STATES PATENT OFFICE.

WILLIAM ROBERT SANDERS, OF SUNSET, TEXAS, ASSIGNOR OF ONE-HALF TO JOHN W. HARVEY, OF SUNSET, TEXAS.

STEAM-ENGINE.

1,028,840.

Specification of Letters Patent.

Patented June 4, 1912.

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To all whom it may concern:

Be it known that I, WILLIAM R. SANDERS, a citizen of the United States, residing at Sunset, in the county of Montague and State of Texas, have invented new and useful Improvements in Steam-Engines, of which the following is a specification.

The present invention relates to engines of the reciprocating type and more particularly to such as are designed for locomotive engines, the purpose being to simplify the construction, to overcome the necessity for the use of balance blocks on the drive wheels, to equalize application of the driving force and to devise novel connecting means for operating the valve.

The invention consists of the novel features, details of construction and combination of parts, which hereinafter will be more particularly set forth, illustrated in the accompanying drawing, and pointed out in the appended claim.

Referring to the drawing, forming a part of the application, Figure 1 is a side view of a locomotive engine embodying the invention, the cylinder and valve chest being in section. Fig. 2 is a top plan view of a truck showing the engine cylinders and crank drive axles. Fig. 3 is a longitudinal section of the engine cylinder, chest and valves, the pistons being in full lines.

Corresponding and like parts are referred to in the following description, and indicated in all the views of the drawing, by the same reference characters.

The locomotive is provided upon opposite sides with engines in the usual manner and the drive wheels are secured to crank axles 1, each axle having oppositely disposed crank portions, thereby equalizing the application of the driving force. The crank portions of the crank driving axles are connected by pitmen 2. The engine upon each side of the locomotive comprises in effect two engines having a tandem arrangement and for convenience and economy of construction the two engines comprise a single cylinder 3, which is provided at a central point with a partition 4 constituting a head common to the inner ends of both engine cylinders. It is to be understood that the partition and engine cylinders may be of any construction. A piston 5 is arranged to operate in each cylinder and its piston rod 6 is connected with a cross head in the usual

manner, said cross head in turn being connected by means of a pitman with the rod or pitman connecting the crank portions of the crank driving axles. Each cylinder is provided at opposite ends with ports 7, which communicate with a steam chest 8, the latter being common to both cylinders and connected with the steam boiler in the usual manner. Slide valves 9 are arranged to operate in the steam chest 8 and control the ports 7, said slide valves being of the usual D-form and spanning exhaust ports 10. The slide valves 9 are connected for simultaneous movement in opposite directions so as to uncover the outer ports or the inner ports of both cylinders. The pistons 5 travel in opposite directions, that is they move either inward or outward at the same time and are connected with the respective drive axles to cause movement of the locomotive engine in the desired direction.

A lever 11 is mounted midway of its ends within the steam chest and a pitman 12 connects one end of the lever with one of the slide valves 9. A rod 13 connects the other slide valve with a valve operating rod 14, which is reciprocated in the usual way. A rod 15 connects the valve operating rod 14 with the opposite end of the lever. The rod 14 operates through a stuffing box in one end of the valve chest and is mounted in a guide 17 arranged within the chest. A connection 16 fixed to the inner portion of the rod 14 has the rods 13 and 15 pivotally connected thereto. A coupling 18 connects the parts of the operating rod 14 which is preferably made in sections. In the operation of the engine the rod 14 is reciprocated and by reason of its direct connection with one of the valves 9 imparts a corresponding movement to said valve, whereas the other valve is operated from the rod 14 through the connections 12, 11 and 15, hence both valves are operated synchronously but in opposite directions. When the outer ports 7 are uncovered to admit live steam into the outer ends of the cylinders the inner ports are covered and communication is established between them and the exhaust ports and this operation is alternated so as to cause the pistons to reciprocate in their respective cylinders in opposition to each other.

It is to be understood that the crank portions near one end of the respective crank axles have an opposite arrangement to the

crank portions near the opposite ends of said axles and since the engines have a central arrangement with reference to the sets of drive axles the crank portions of one set of drive axles extend in an opposite direction to the corresponding crank portions of the other set of drive axles. The arrangement of the crank portions of the drive axles and the engines as well as the connecting means results in the utilization of the force developed by the engines for driving the several axles in the same direction, either to move the locomotive forward or to drive the same backward. The opposite arrangement of the crank portions of the drive axles wholly obviates the necessity for providing the drive wheels with balance blocks and also insures an equalization of the propelling force, with the result that the strain is uniformly distributed and the engine caused to run smoothly.

From the foregoing description, taken in connection with the accompanying drawing, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the device which I now consider to be the embodiment thereof, I desire to have it understood that the device shown is merely illustrative, and that such

changes may be made when desired as are within the scope of the claim appended hereto.

Having thus described the invention what is claimed as new, is:—

An engine comprising two cylinders having a tandem arrangement and separated by means of a partition, each of the said cylinders having terminal ports, pistons arranged in the cylinders, a chest common to both cylinders, slide valves for the ports arranged within the chest, a lever, a guide member arranged within the chest adjacent one end thereof, an operating rod extending within the chest and mounted in the said guide member, a rod connecting one of the said valves to one end of the said lever, a second rod disposed below the said operating rod and connecting the other of the said valves to the said guide and operating rod, a pitman arranged above the said operating rod and connecting the opposite end of the lever with the said guide member, and a connecting operating rod substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM ROBERT SANDERS.

Witnesses:

J. W. HARVEY,
D. B. BENSON.