

946,084.

Patented Jan. 11, 1910.

5 SHEETS—SHEET 1.

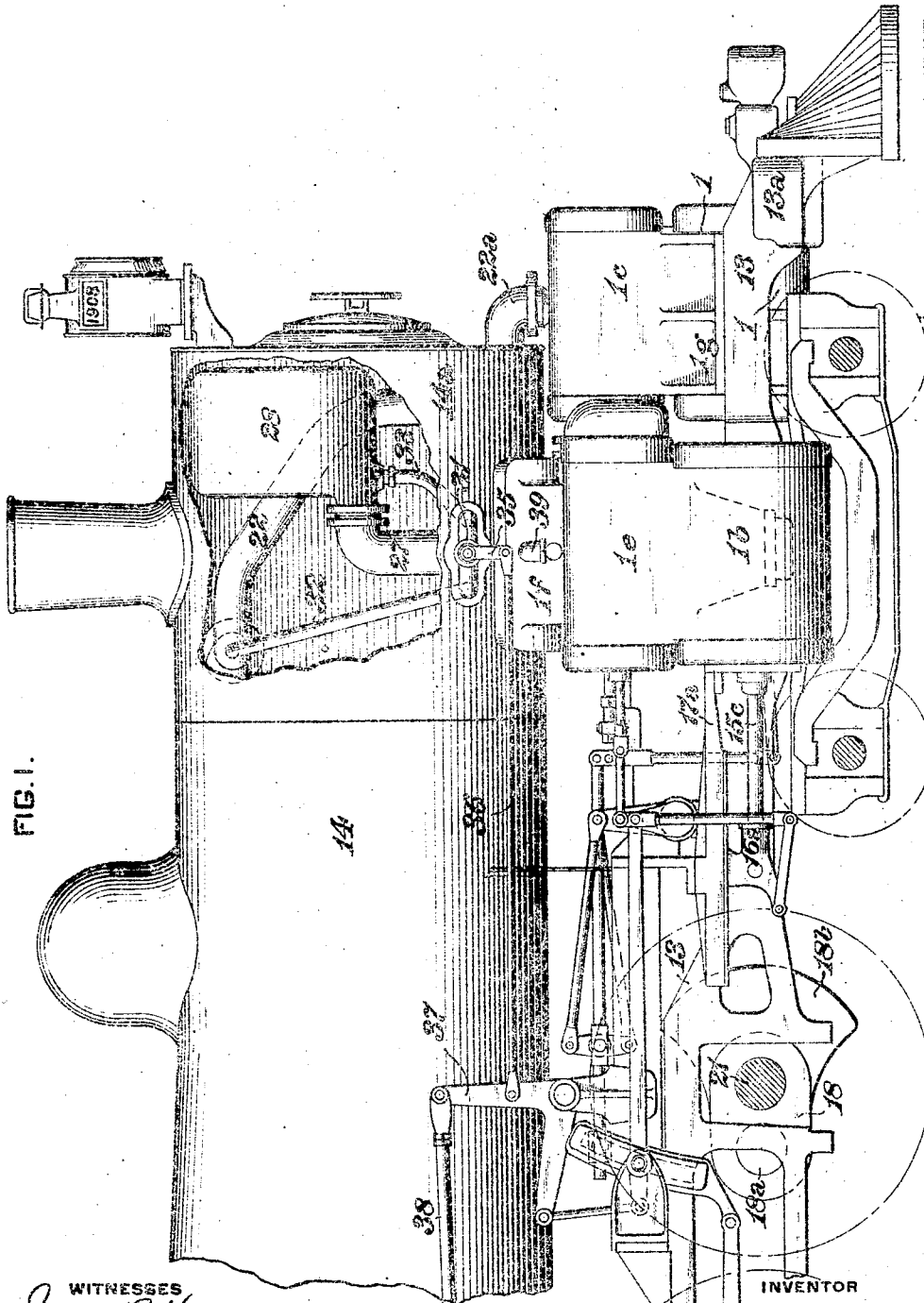


FIG. 1.

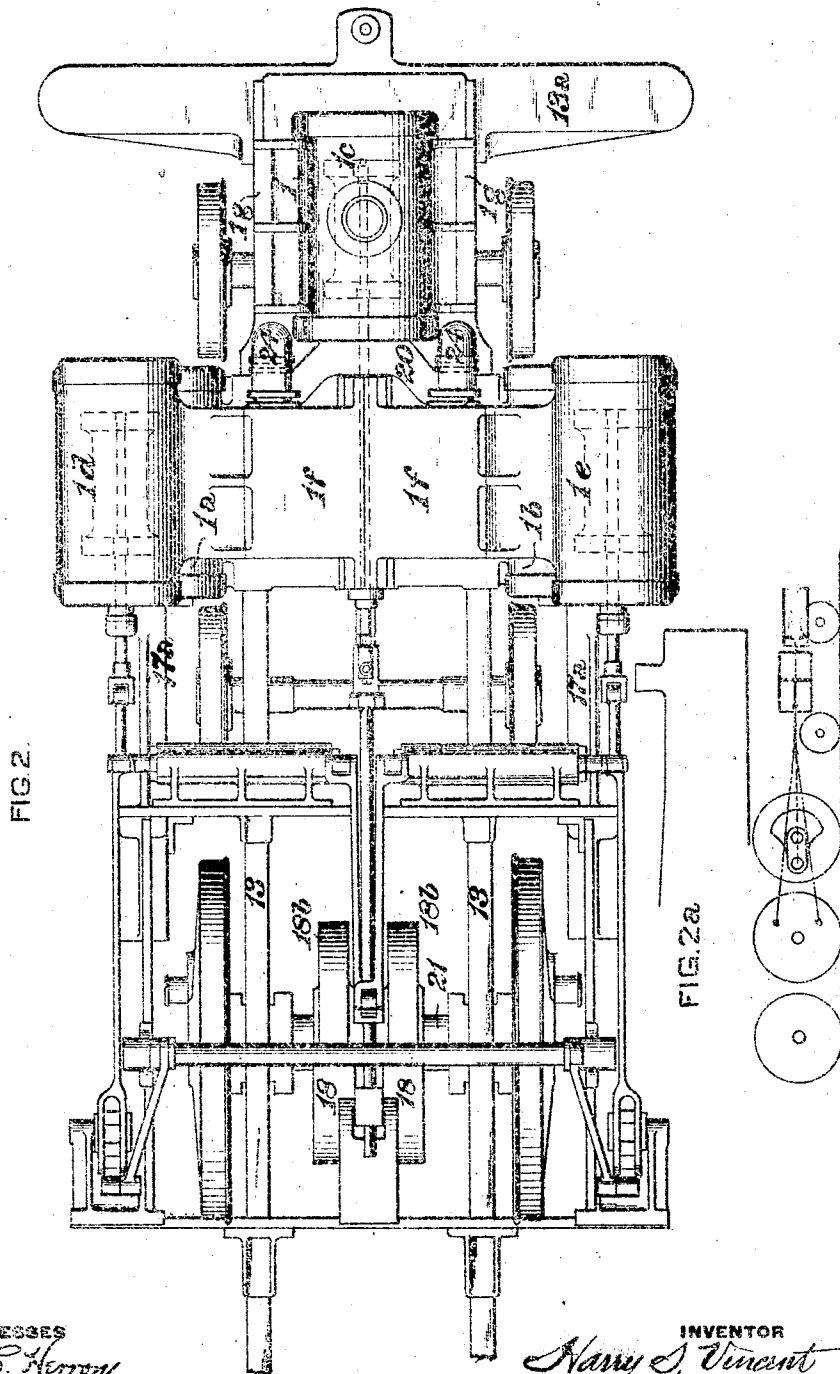
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H. S. VINCENT.  
LOCOMOTIVE ENGINE.  
APPLICATION FILED JULY 27, 1909.

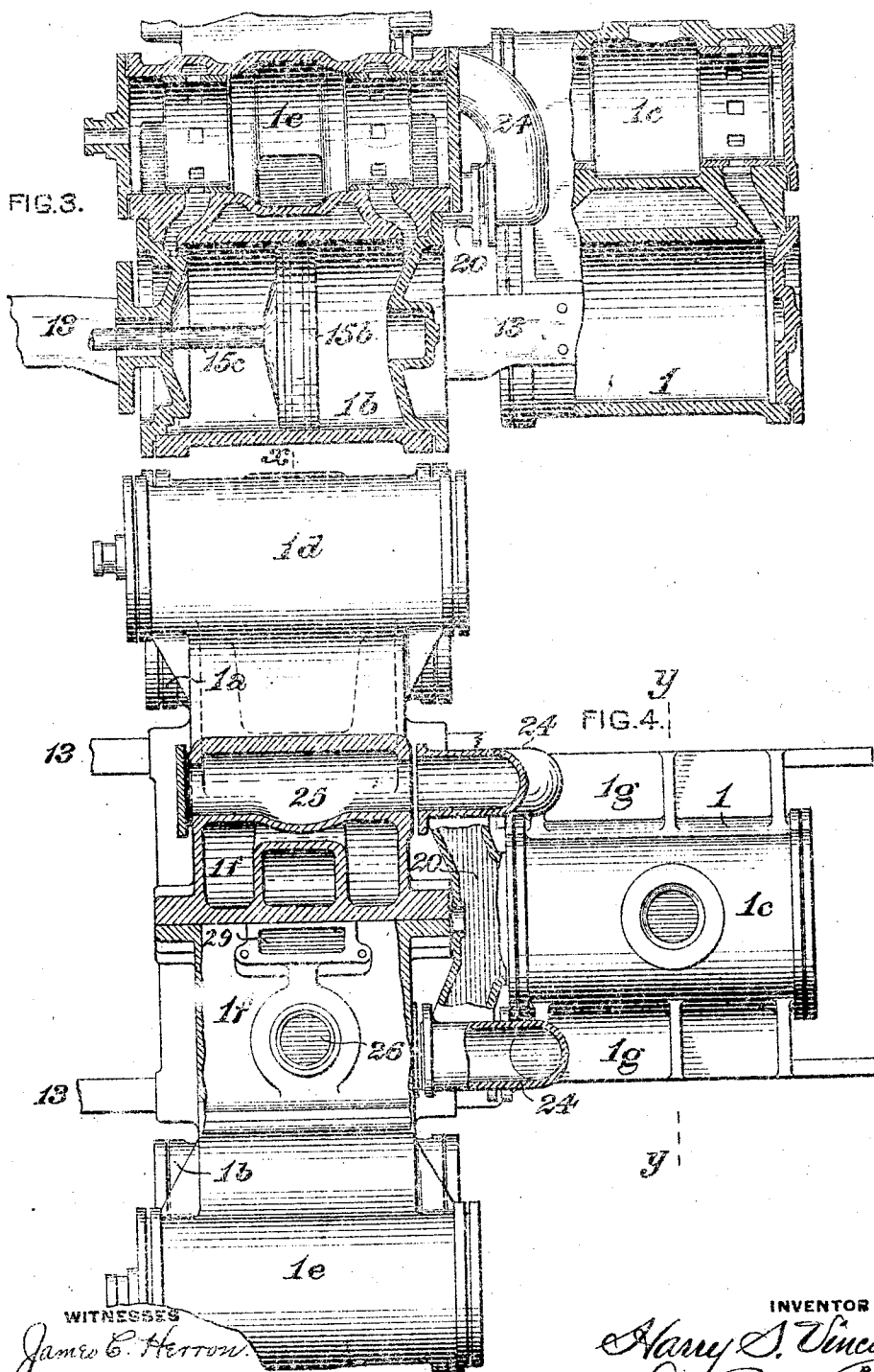
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6 SHEETS—SHEET 3.



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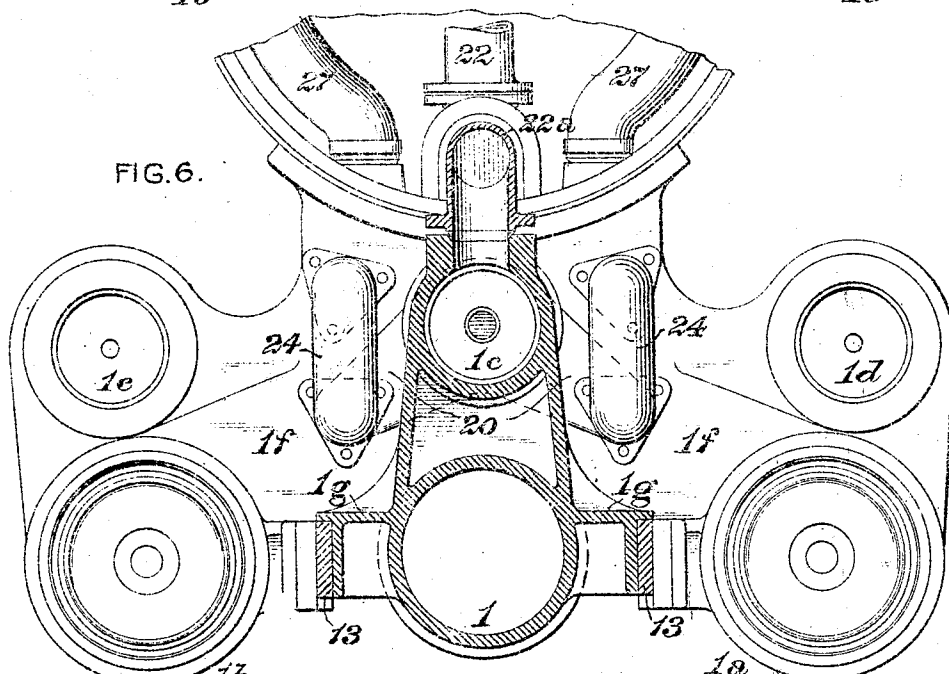
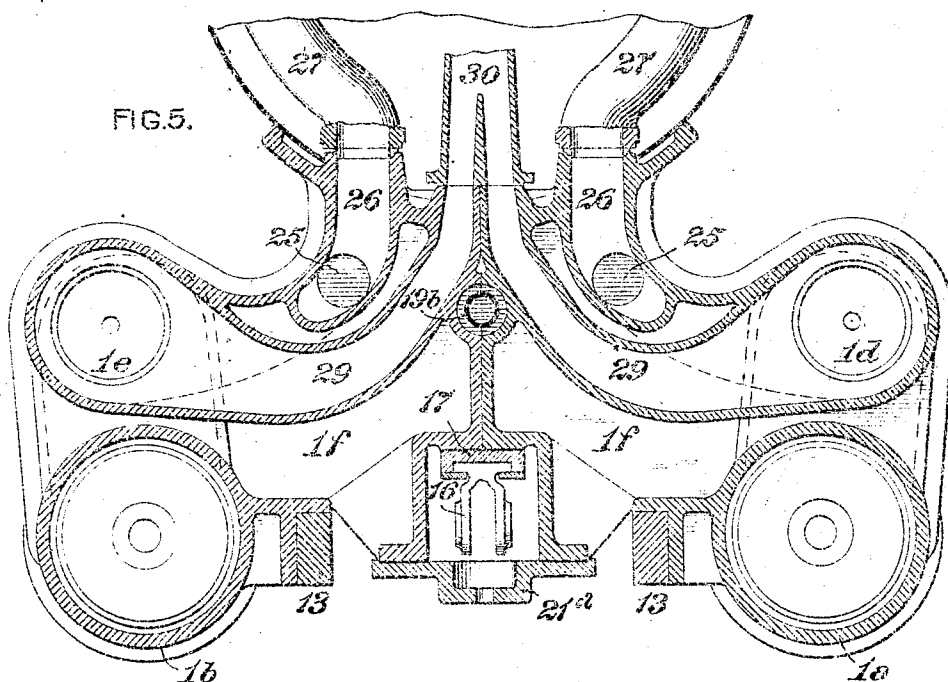
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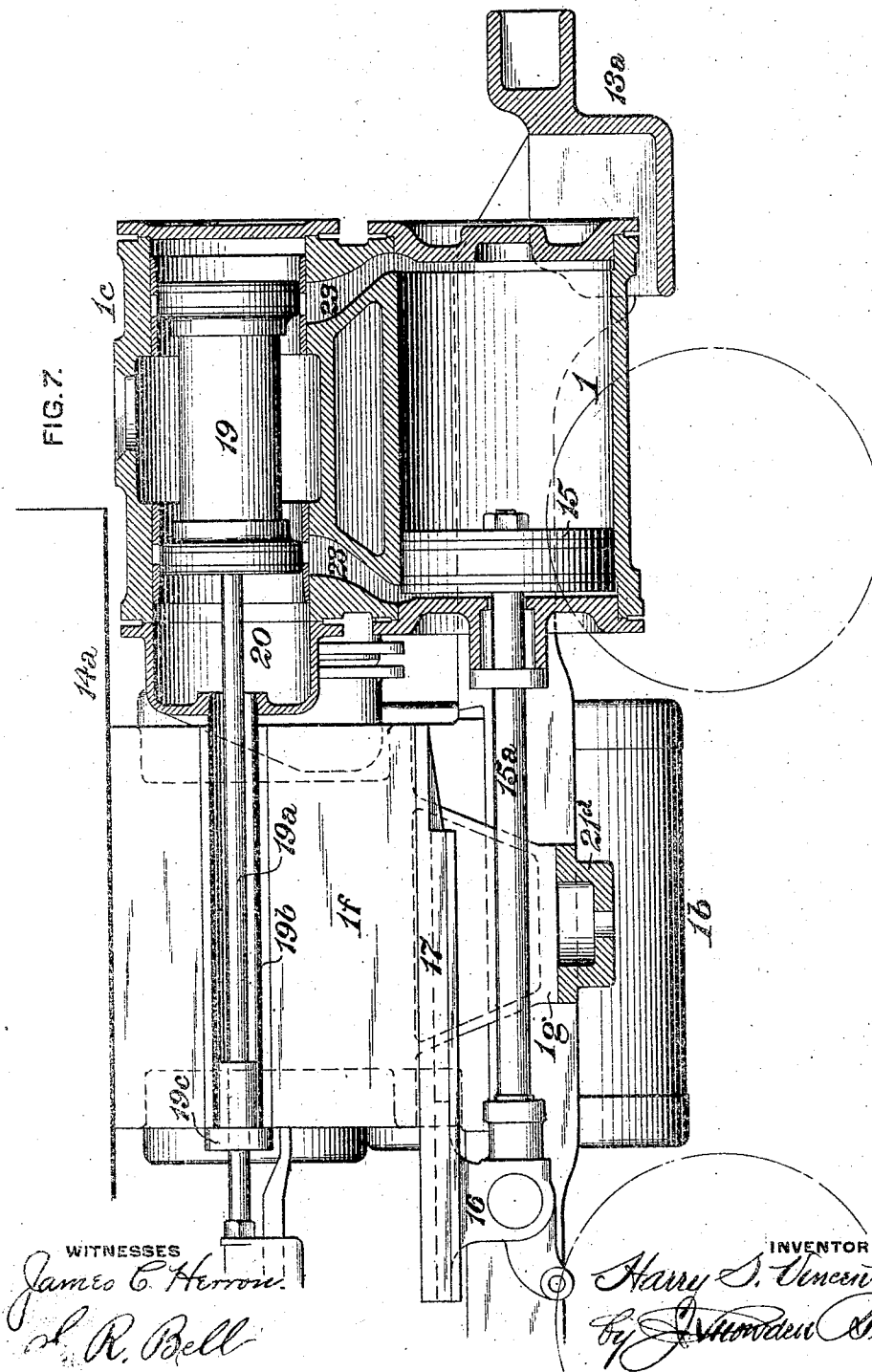
WITNESSES  
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APPLICATION FILED JULY 27, 1909.

Patented Jan. 11, 1910.  
5 SHEETS—SHEET 5.



# UNITED STATES PATENT OFFICE.

HARRY S. VINCENT, OF RIDGEWOOD, NEW JERSEY.

## LOCOMOTIVE-ENGINE.

946,084.

Specification of Letters Patent.

Patented Jan. 11, 1910.

Application filed July 27, 1909. Serial No. 509,850.

To all whom it may concern:

Be it known that I, HARRY S. VINCENT, of Ridgewood, in the county of Bergen and State of New Jersey, have invented a certain new and useful Improvement in Locomotive-Engines, of which improvement the following is a specification.

My invention relates to locomotive engines of the three cylinder type, in which, under normal operation, there is an approximately equal division of power between the three cylinders, and while more particularly designed for application in engines of the compound or stage expansion type, embodies features of advantage which are desirably applicable in simple or single expansion engines.

The object of my invention is to provide a three cylinder locomotive engine in which the high pressure cylinder shall be so disposed that the main rod by which its piston is coupled to the front driving axle shall be of maximum length without unduly lengthening the wheel base of the engine; the crank cheeks shall be so shaped and proportioned as to integrally counterbalance the reciprocating elements of the central cylinder, this avoiding the eccentric strains resultant upon the placing of this balance in the driving wheels; the steam passages to and from the low pressure cylinders shall be so disposed that said cylinders shall be perfectly similar and interchangeable; and a starting mechanism shall be provided which will not require independent manipulation by the engineer, but be so connected to the ordinary reversing gear as to be automatic in its action.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a view, in elevation, of the forward portion of a locomotive engine, illustrating an application of my invention; Fig. 2, a plan or top view of the same, with the boiler removed; Fig. 2<sup>a</sup>, a diagrammatic side view, illustrating the angular disposition of the crank pins; Fig. 3, a vertical central section through the right hand low pressure cylinder and its valve chest, and a partial similar section through the central high pressure cylinder and its valve chest; Fig. 4, a plan view, partly in section, of the cylinders, with the low pressure cylinder bolting flange removed; Fig. 5, a vertical transverse section,

on the line *x x* of Fig. 4; Fig. 6, a view, partly in elevation and partly in vertical transverse section on the line *y y* of Fig. 4; and, Fig. 7, a vertical central section.

My invention is herein exemplified as applied in a three cylinder compound locomotive having two or more driving axles and a four wheel leading truck. The two outside low pressure cylinders, 1<sup>a</sup>, 1<sup>b</sup>, with their valve chests, 1<sup>d</sup>, 1<sup>e</sup>, are cast integral with a pair of cylinder saddles, 1<sup>f</sup>, 1<sup>g</sup>, the bottom portions of which are secured to the side frame members, 13, of the engine, and upon which the smoke box, 14<sup>a</sup>, of the boiler, 14, is supported in the usual manner. The low pressure pistons, 15<sup>b</sup>, are secured upon piston rods, 15<sup>c</sup>, the outer ends of which are fixed to cross heads, 16<sup>a</sup>, sliding on guides, 17<sup>e</sup>. The cross heads are coupled by connecting rods and crank pins (shown only diagrammatically in Fig. 2<sup>a</sup>) to the second pair of driving axles. The construction thus far described is similar to that which, in connection with simple cylinders, is characteristic of the present standard locomotives having four wheeled leading trucks.

In the practice of my invention, I provide a high pressure cylinder, 1, which is cast integral with its valve chest, 1<sup>e</sup>, and is located centrally between the side frame members, 13. In order to admit of the use of a main rod of sufficient length, with a minimum length of wheel base, the high pressure cylinder is located in advance of the cylinder saddles, between the same and the buffer beam, 13<sup>a</sup>, and is secured to forward extensions of the side frame members by bolts passing through lateral flanges, 1<sup>h</sup>, on the cylinder. The piston, 15, of the high pressure cylinder, is secured upon a piston rod, 15<sup>a</sup>, the rear end of which is fixed to a cross head, 16, sliding on guides, 17, secured to the bottoms of the low pressure cylinder saddles, 1<sup>f</sup>. The cross head, 16, is coupled, through a main rod, in the ordinary manner, to a crank pin, 18<sup>a</sup>, secured to crank arms, 18, formed integral with, or fixed upon, the front driving axle, 21. The crank arms, 18, are preferably set at an angle of 120 degrees with each of the crank pins to which the cross heads of the low pressure cylinders are coupled, as illustrated diagrammatically in Fig. 2<sup>a</sup>, and the crank pins being thus relatively disposed, three impulses are imparted to the driving axles in each revolution,

instead of two as in two or four cylinder engines, thereby effecting a substantial uniformity of turning movement.

The valve chests of the several cylinders, which are located above the same and cast integral therewith, are connected with their respective cylinders by the usual induction and eduction ports and passages, and each of them is fitted with a suitable steam distribution valve. The distribution valve, 19, of the high pressure cylinder, is connected with its operating mechanism by a valve stem, 19<sup>a</sup>, passing through a central opening in the cylinder saddles, 1<sup>f</sup>, and in order to afford easy access to the packing of the valve stem, the latter is surrounded by a heavy casing, 19<sup>b</sup>, extending from a crotch pipe, 20, at the rear of the high pressure cylinder, to the rear of the cylinder saddles, 1<sup>f</sup>, at or near which it is fitted with a suitable packing gland, 19<sup>c</sup>.

The engine truck center casting, 21<sup>a</sup>, is secured to forward extensions, 1<sup>g</sup>, of the cylinder saddles, which extensions are suitably spaced to provide clearance for the high pressure cylinder cross head, 16, and guides, 17, as shown in Fig. 5.

For the purpose of balancing the reciprocating members connected with the high pressure cylinder, counterbalances, 18<sup>b</sup>, are formed integral with the crank arms, 18, and extend in line therewith on the opposite side of the axle, 21, the counterbalances being in substantially the same plane as the reciprocating members.

In the operation of the locomotive, live steam from the boiler is supplied to the high pressure valve chest, through the steam pipe, 22, and external elbow, 22<sup>a</sup>, and enters the space between the end pistons of the distribution valve, 19. After having been admitted to the high pressure cylinder and actuating the piston 15, thereof, it passes out through the induction and eduction passages, 23, into the crotch pipe, 20, thence through lateral conduits, 24, which are detachably connected thereto, into the passages, 25, in the low pressure cylinder saddles, and thence through the passages, 26, and pipes, 27, into the receiver, 28. The passages, 25, communicate, at their ends, directly with the low pressure valve chests, permitting steam to pass directly from the high pressure to the low pressure cylinders, or to by-pass to the receiver. The exhaust steam from the low pressure cylinders is discharged to the atmosphere through the exhaust passages, 29, and exhaust pipe, 30. Each of the low pressure cylinders is provided with a safety valve, 39, which communicates with the receiver, 28.

It will be seen that the ports and passages of the two low pressure cylinders, 1<sup>a</sup> and 1<sup>b</sup>,

are similar in both, and therefore that the two cylinders are interchangeable and may be cast from the same pattern. It will also be obvious that the high pressure cylinder can be removed and replaced as desired, without interference with the low pressure cylinders.

I claim as my invention and desire to secure by Letters Patent:

1. In a three cylinder locomotive engine, the combination of side frame members, two outer cylinders having abutting and connected half saddles and secured to the side frame members, a central cylinder secured to the side frame members forward of the outer cylinders, a valve inclosed in a chest above, and effecting the distribution functions of, the central cylinder, a casing extending from the distribution valve chest through the half saddles and inclosing the stem of the distribution valve; and a packing gland closing said casing adjacent to the rear of the half saddles.

2. In a three cylinder locomotive engine, the combination of two outer cylinders, a central cylinder located forward of said outer cylinders, a forward driving axle having a counterbalanced crank, a piston in the central cylinder coupled to the pin of said crank, and pistons in the outer cylinders coupled to crank pins on another driving axle at angles of approximately 120 degrees to the crank pin of the central cylinder.

3. In a three cylinder locomotive engine, the combination of side frame members, two similar and interchangeable outer low pressure cylinders having abutting half saddles and secured to the side frame members, a central high pressure cylinder secured to the side frame members forward of the low pressure cylinders, and detachable connections between the valve chest of the high pressure cylinder and the valve chests of the low pressure cylinders.

4. In a three cylinder locomotive engine, the combination of side frame members, two similar and interchangeable outer low pressure cylinders having abutting half saddles and secured to the side frame members, a central high pressure cylinder secured to the side frame members forward of the low pressure cylinders, a transverse crotch pipe located in front of the half saddles and communicating with the distribution valve chest of the high pressure cylinder, and detachable lateral conduits connecting said crotch pipe with passages in the half saddles leading to the low pressure cylinders.

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