No. 670,745. Patented Mar. 26, 1901.

S. M. VAUCLAIN.

COMPOUND ENGINE.

(Application filed Nov. 2, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

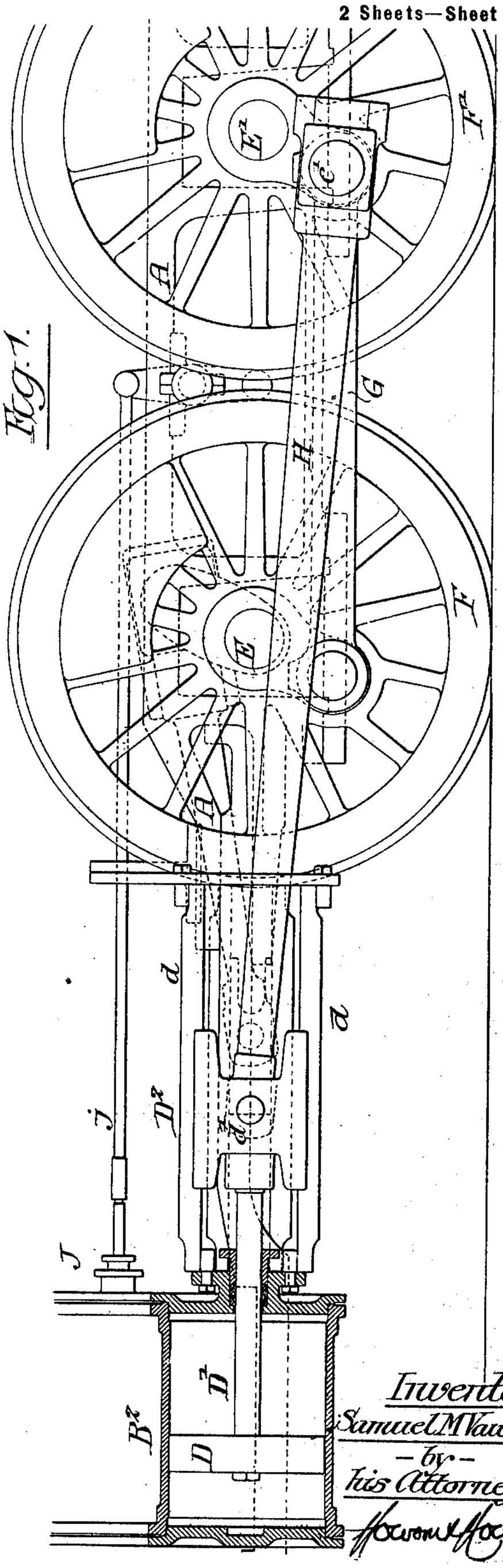

Fig. 2.

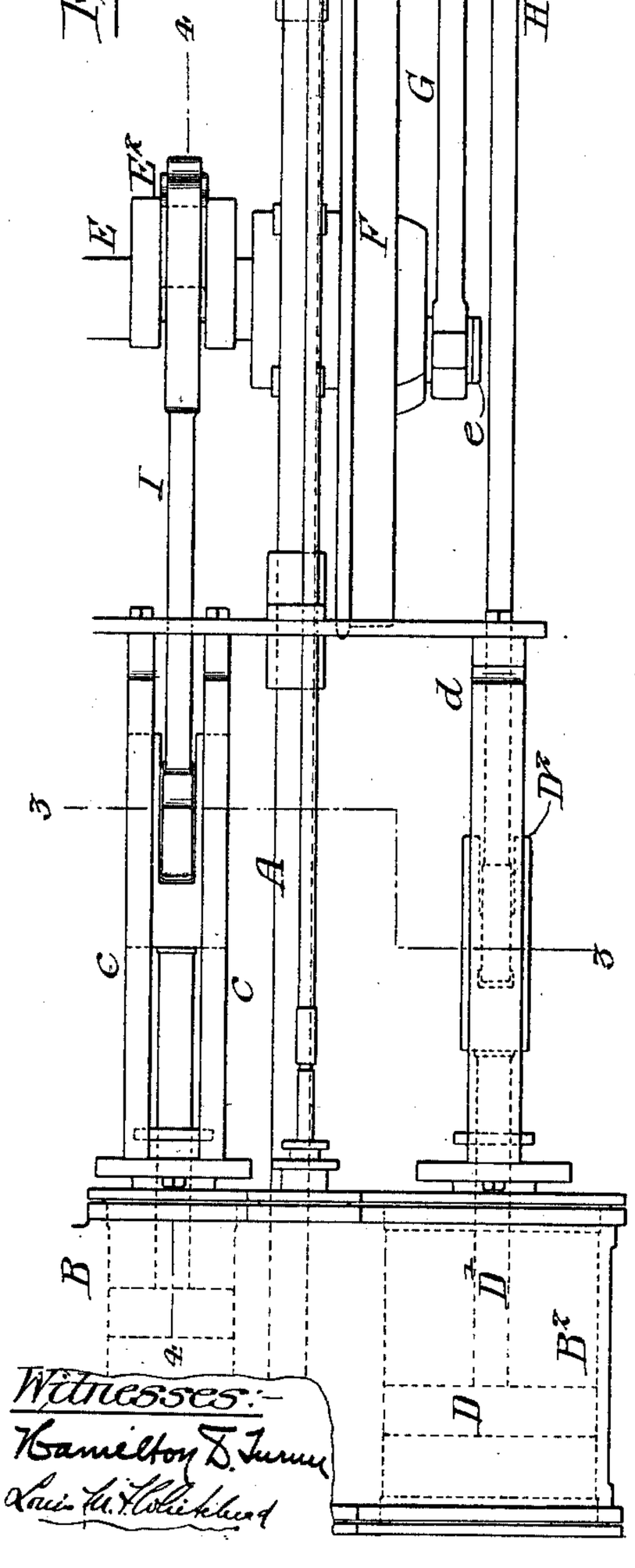

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Fig. 3.

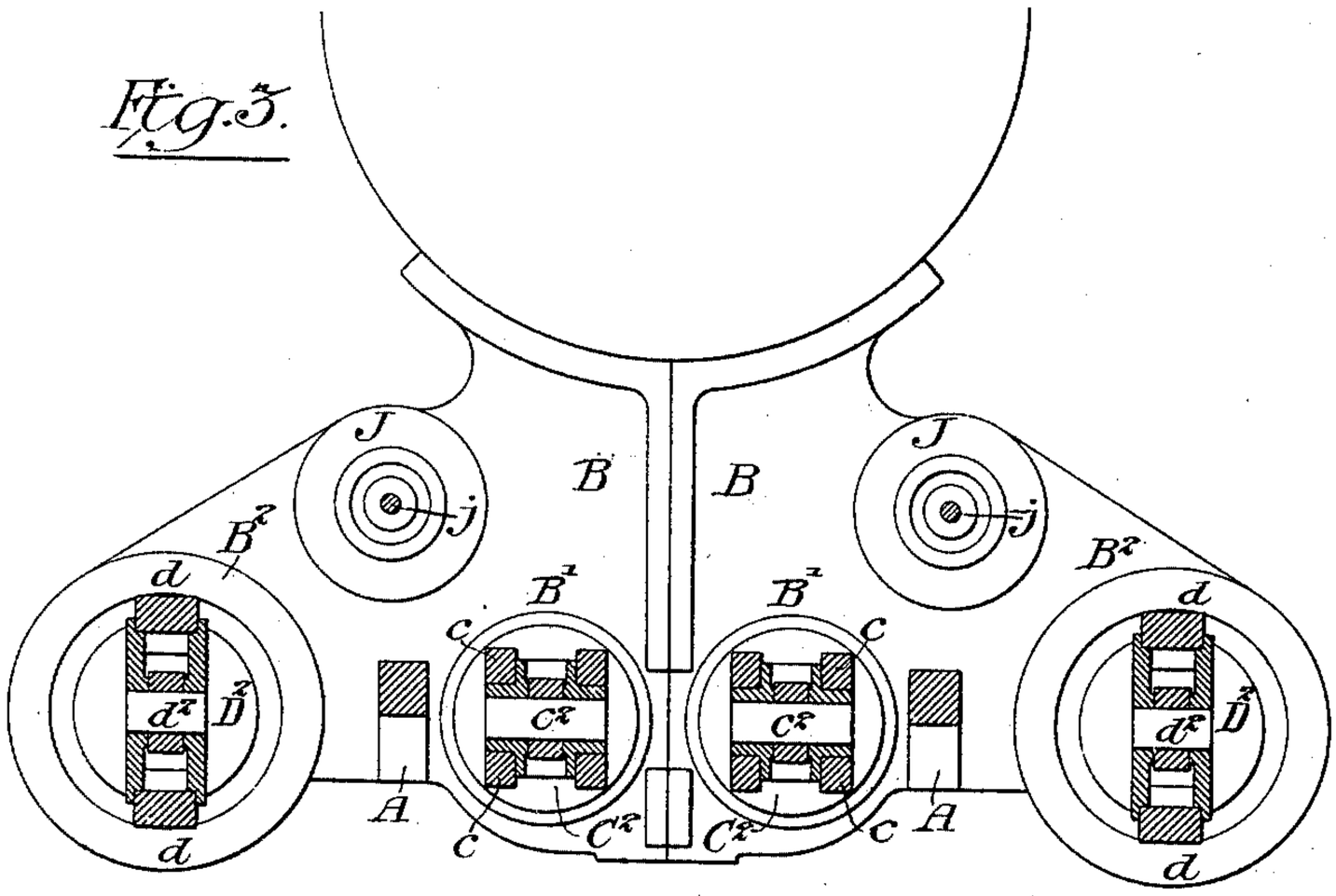


Fig. 4.

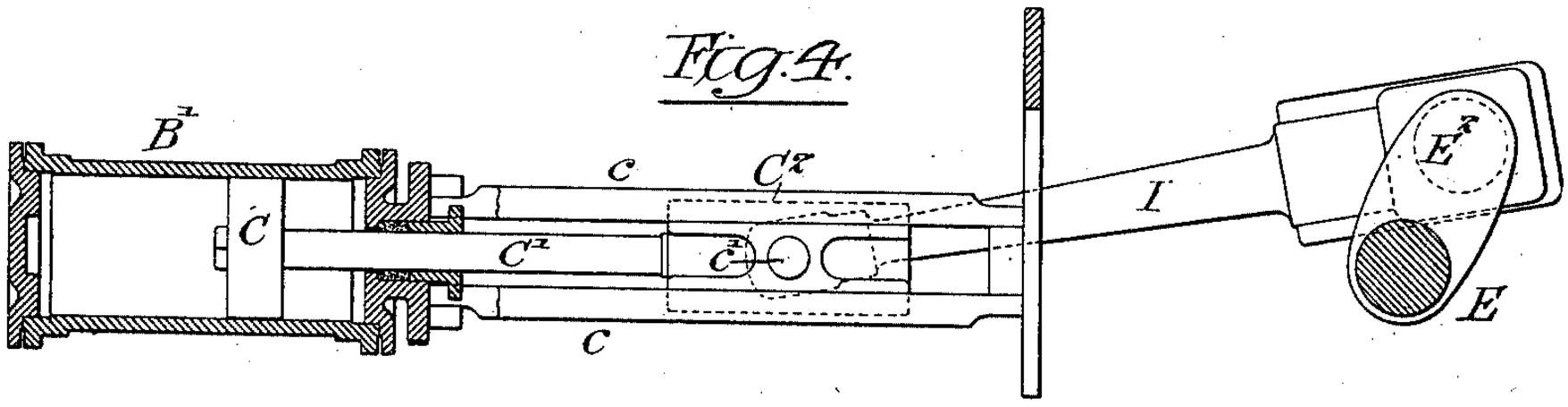
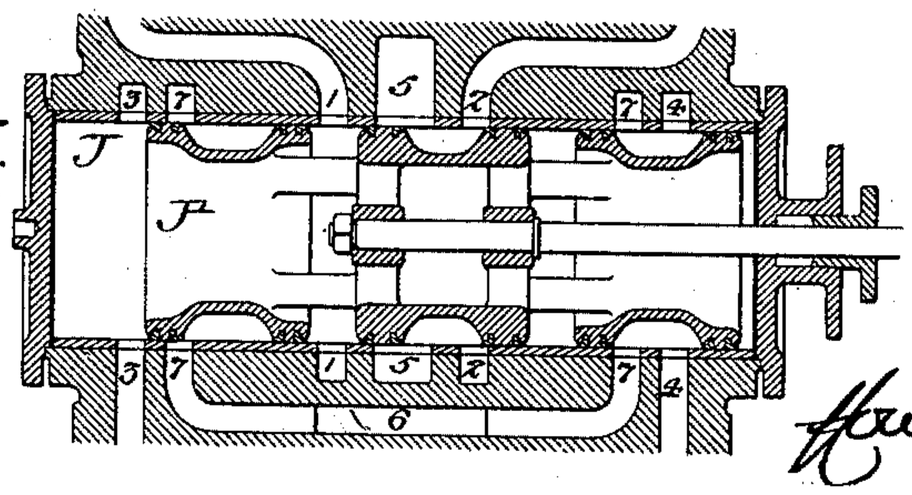


Fig. 5.



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UNITED STATES PATENT OFFICE.

SAMUEL M. VAUCLAIN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO BURNHAM, WILLIAMS & COMPANY, OF SAME PLACE.

COMPOUND ENGINE.

SPECIFICATION forming part of Letters Patent No. 670,745, dated March 26, 1901.

Application filed November 2, 1900. Serial No. 35,229. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL M. VAUCLAIN, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Compound Engines, of which the following is a specification.

My invention relates to certain improvements in compound engines, particularly of the locomotive type, in which two cylinders are arranged at each side of the locomotive.

The object of my invention is to so construct an engine of this type that the piston of one cylinder will move forward while the other is returning, using a single valve to control the passage of steam to both the high and low pressure cylinders.

In the accompanying drawings, Figure 1 is a side view, partly in section, of sufficient of a locomotive-engine to illustrate my invention. Fig. 2 is a plan view showing one-half of the driving-gear of a locomotive. Fig. 3 is a transverse sectional view on the line 3 3, Fig. 2. Fig. 4 is a longitudinal sectional view on the line 4 4, Fig. 2; and Fig. 5 is a sectional view of one form of valve used with my improved engine.

A is the frame of a locomotive.

B B are the two cylinder-castings forming the saddle.

B′ B′ are the high-pressure cylinders, and B^2 B^2 are the low-pressure cylinders. In the present instance each casting B contains a high and a low pressure cylinder.

C is the piston of the high-pressure cylinder, having a rod C′, which passes through a stuffing-box in the head of the cylinder and is secured to a cross-head C^2 at its outer end. This cross-head slides in guides *c c*, Figs. 2 and 4.

D is the piston of the low-pressure cylinder, having a rod D′ extending through a stuffing-box in the head of the cylinder and secured to a cross-head D^2, arranged to slide on guides *d d*, Figs. 1 and 2.

E E′ are the driving-axles, mounted in boxes fitted to the frame A.

F F′ are the driving-wheels, mounted on the axles E E′. On each wheel is a crank-pin *e* *e′*, respectively, and G is a parallel rod mounted on the pins *e* *e′*. The pin *e′* is extended, and a connecting-rod H, pivoted to the cross-head D^2 at *d′*, is coupled to the pin *e′*, as shown.

The driving-axle E has two cranks E^2, one on each side of the center of the locomotive, and each crank is coupled to a cross-head C^2 of one of the high-pressure pistons by a connecting-rod I being pivoted to the cross-head at *c′*.

J is the valve-chest common to both the high and low pressure cylinders. In the chest is a valve J′, having a rod *j* attached to the valve-gear of the engine. The valve-chest and valve illustrated are described and claimed in a companion application filed by me of even date herewith, and therefore need not be described in detail in this application.

The valve-chest J is formed in the cylinder-casting B and in the present instance is above the cylinders, and the ports 1 and 2, leading to the high-pressure cylinder B′, and the ports 3 and 4, leading to the low-pressure cylinder B^2, are direct. A central steam-supply port 5 is provided, as well as a central exhaust-passage 6, communicating with the ports 7 7.

By the above description it will be seen that a single valve controls the passage of steam to both the high and low pressure cylinders on one side of the locomotive, and the valve can be operated by a plain valve-gear. One of the pistons is connected to a crank on one of the axles, and the other piston is connected to one of the driving-wheels, making a very simple construction.

I claim as my invention—

1. The combination of high and low pressure cylinders, a piston and piston-rod for each cylinder, two driving-axles, connections between one of the piston-rods and one of said axles and other connections between the second piston-rod and the other axle, said connections being so arranged that the high-pressure piston travels in a direction opposite to that of the low-pressure piston, and a single valve common to both cylinders, the long axes of said cylinders being in parallel vertical planes, substantially as described.

2. The combination of high and low pressure cylinders, a piston and piston-rod for each cylinder, a cross-head at the outer end of each rod, guides for the said cross-head, a

driving-axle, a driving-wheel thereon, a connection between one of said cross-heads and the driving-shaft, connections between the second cross-head and a crank on the driving-wheel, said connections being made on opposite sides of the wheel, a valve-chest common to both cylinders, and a valve within the said chest, said cylinders being so arranged that their long axes are in the same horizontal plane, substantially as described.

3. The combination of high and low pressure cylinders so arranged that their long axes are in the same horizontal plane, a piston and piston-rod for each cylinder, a single valve for supplying steam to the two cylinders, cross-heads connected to the said rods, guides therefor, a cranked driving-axle having a wheel, a crank-pin on said wheel, a rod connecting the cross-head of one piston to the crank of one shaft, and a rod connecting the cross-head of the other piston to the crank-pin of the wheel, substantially as described.

4. The combination in a compound locomotive, of a saddle consisting of two castings, each casting having a high and low pressure cylinder therein, a single valve-chest common to the cylinders of each casting, a valve therein, opposite side frames for the engine, one cylinder of each pair being on the inner side of its side frame and the other cylinder of the pair on the outer side thereof, a crank-axle, a driving-wheel on the outer side of the frame, the crank of the axle being on the inner side of the same, a rod connecting one piston-rod to the crank-axle, and a rod connecting the other piston-rod to the crank-pin on the wheel, substantially as described.

5. The combination in a locomotive-engine, of the frame of the locomotive, a saddle consisting of two castings each casting having a high and low pressure cylinder and a valve-chest therein, said valve-chest being common to the cylinders of each pair, the high-pressure cylinders being on the inside of the frame and the low-pressure cylinders being on the outside of the frame, a cranked driving-axle, driving-wheels on said axle and on the outer side of the frame, rods connecting the piston-rods of the high-pressure cylinders to the cranks of the crank-axle, and rods connecting the piston-rods of the low-pressure cylinders to the crank-pins of driving-wheels, substantially as described.

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

SAMUEL M. VAUCLAIN.

Witnesses:

WILLIAM DE KRAFFT,

JAS. H. M. HAYES.