

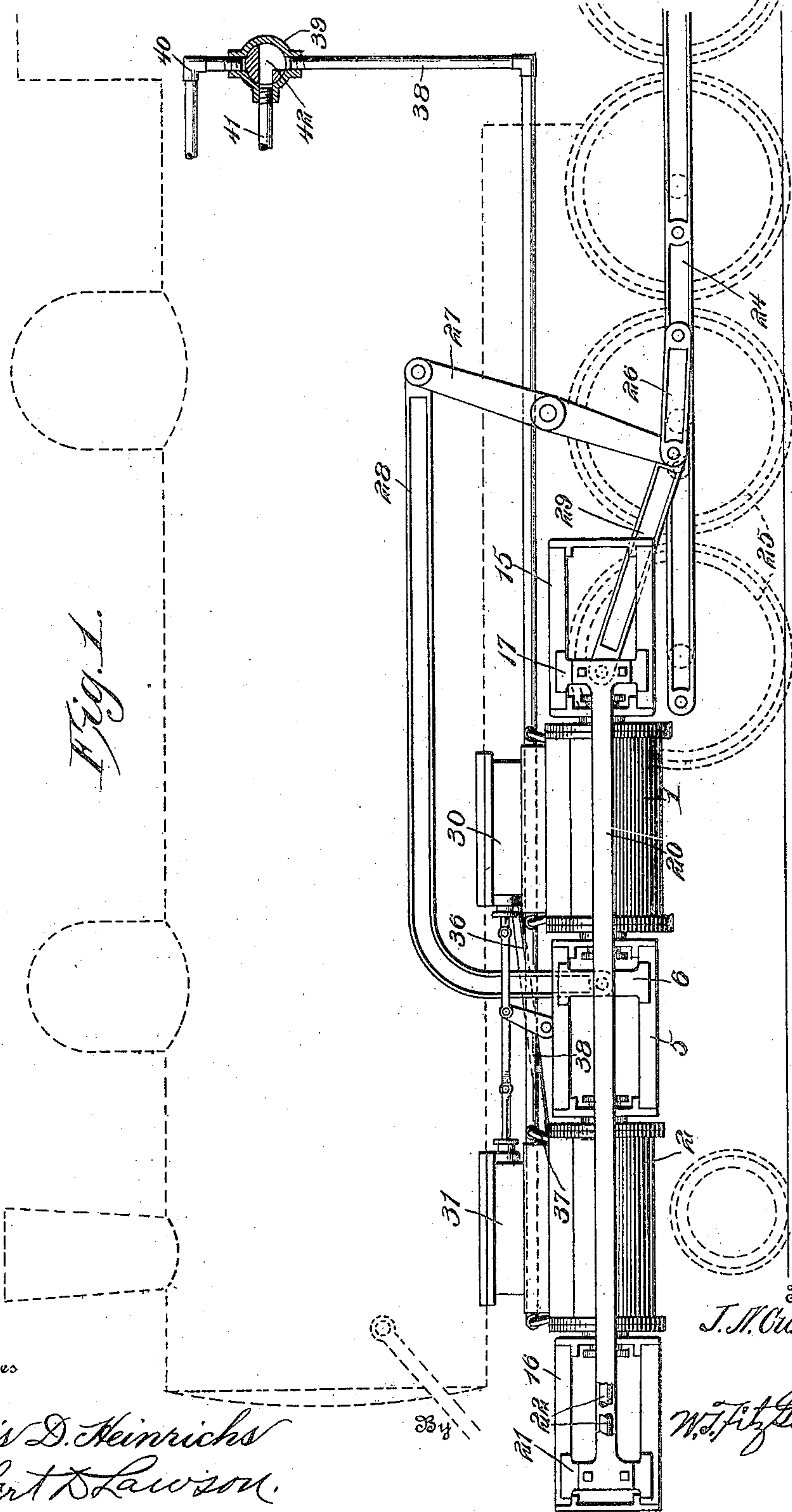
No. 822,586.

PATENTED JUNE 5, 1906.

J. N. CUMMINGS.
ENGINE.

APPLICATION FILED APR. 17, 1905.

2 SHEETS—SHEET 1.



Witnesses

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Herbert Lawson.

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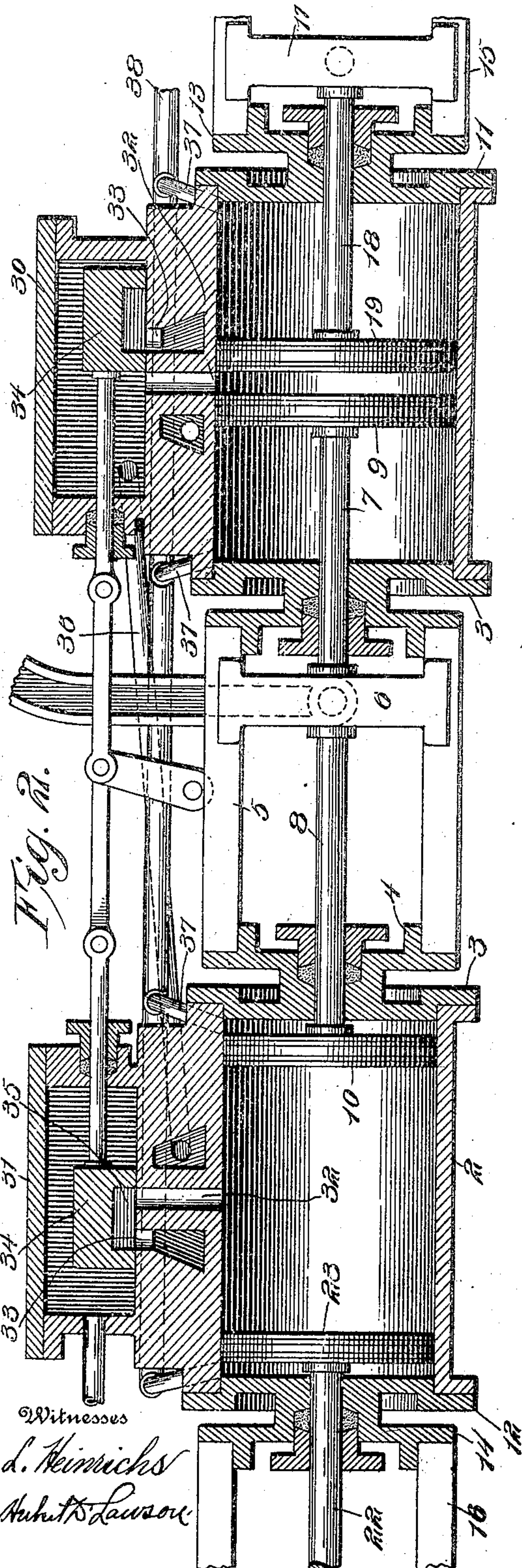
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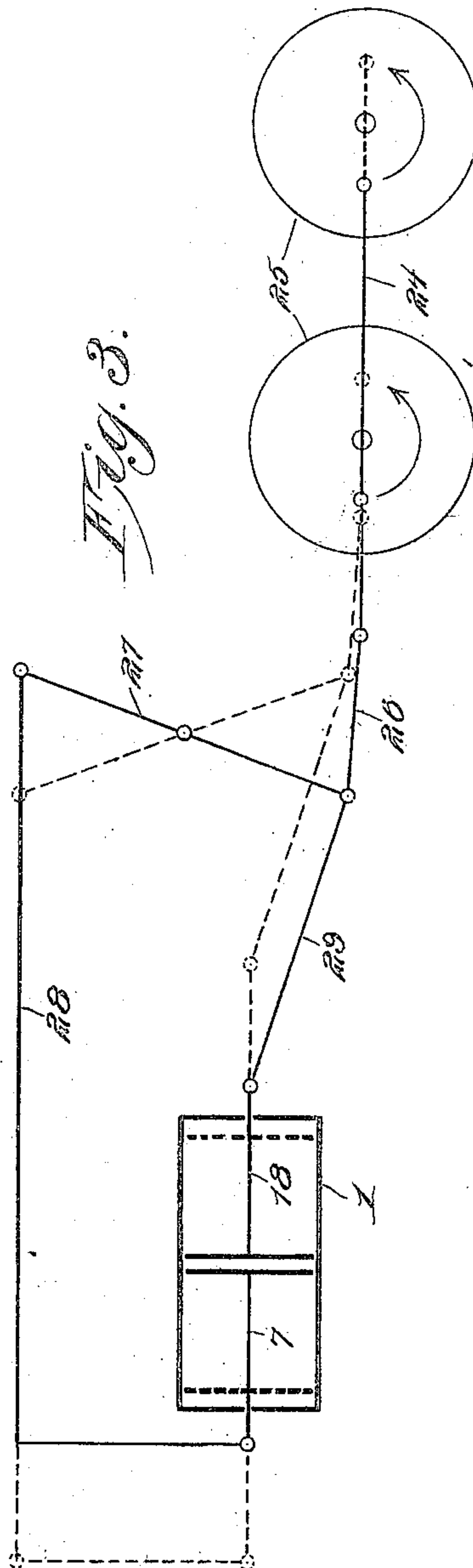
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Witnesses

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UNITED STATES PATENT OFFICE.

JAMES NEWTIN CUMMINGS, OF SUMMERVILLE, GEORGIA, ASSIGNOR OF ONE-SIXTH TO H. N. HORTON AND ONE-SIXTH TO F. M. SCHLAPBACH, OF GEORGIA, AND ONE-SIXTH TO X. N. DAVID, OF CEDARTOWN, GEORGIA.

ENGINE.

No. 822,586.

Specification of Letters Patent.

Patented June 5, 1906.

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To all whom it may concern:

Be it known that I, JAMES NEWTIN CUMMINGS, a citizen of the United States, residing at Summerville, in the county of Chattooga and State of Georgia, have invented certain new and useful Improvements in Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to compound engines; and its object is to provide a plurality of cylinders arranged in pairs, each cylinder containing oppositely-movable pistons, whereby steam admitted between pistons in the two cylinders will alternately force said pistons apart.

Another object is to provide novel means for transmitting motion from the pairs of pistons to the drive-wheel of the engine.

With the above and other objects in view the invention consists of a pair of cylinders each of which contains two pistons adapted to move in opposite directions simultaneously. The pistons of the two cylinders are connected in pairs, so that when moving apart in one cylinder they will be forced together in the other cylinder, and a novel arrangement of power-transmitting devices is employed for causing the rotation of the drive-wheels of the engine when the pistons are actuated.

The invention also consists of valve-gearing for alternately directing steam or other motive fluid into the pistons of the cylinders. An escape device is connected to the heads of the cylinders to prevent the formation of vacuums or cushions, and this escape device is also adapted in cases of emergency to be utilized for directing steam into the cylinders.

The invention also consists of the further novel constructions and combinations of parts hereinafter more fully described, and pointed out in the claims.

In the accompanying drawings I have shown the preferred form of my invention.

In said drawings, Figure 1 is an elevation of my improvement connected to a locomotive, which has been illustrated by dotted lines. Fig. 2 is an enlarged section through the cylinders, and Fig. 3 is a diagrammatical view showing by full and dotted lines the po-

sitions assumed by the power-transmitting devices.

Referring to the figures by numerals of reference, 1 and 2 are low and high pressure cylinders, respectively, which preferably aline and have their adjoining heads 3 formed with integral arms 4, to which are secured parallel guides 5. Slidably mounted on these guides is a cross-head 6, from which piston-rods 7 and 8 extend in opposite directions. The rod 7 is provided with a piston 9, which works within cylinder 1, while rod 8 has a piston 10 within the cylinder 2. The rods 7 and 8 are of such length that when the cross-head 6 reaches the limit of its movement one of the pistons 9 and 10 assumes a position adjacent the center of its cylinder, while the other piston assumes a position close to its cylinder-head 3. The other heads 11 and 12 of cylinders 1 and 2 have arms 13 and 14, to which are connected guides 15 and 16. A cross-head 17 is mounted on the guides 15 and is connected, by means of a rod 18, with a piston 19 in cylinder 1. This rod 18 reciprocates within head 11 and is of such length that the piston 19 assumes a position adjacent the center of cylinder 1 or near the head 11 when the cross-head 17 reaches the limit of its movement. Side strips 20 are connected to cross-head 17 and extend longitudinally along opposite sides of cylinders 1 and 2 and are connected to another cross-head 21, mounted on the guides 16. A rod 22 extends from the cross-head 21 and through head 12 and is secured to a piston 23, disposed in cylinder 2. In view of the fact that the cross-heads 17 and 21 are connected by strips 20 the two pistons 19 and 23 are moved in unison, and these are so disposed in relation to each other that when piston 19 is adjacent the center of cylinder 1 piston 23 is located close to head 12, and vice versa.

The main rod 24, which is connected to the wrist-pins of the drive-wheels 25, is connected by a link 26 with one end of a centrally-fulcrumed lever 27, and the other end of this lever is secured, by means of a bar 28, to the cross-head 6. Another link 29 is connected to lever 27 at the point where link 26 is secured thereto, and this link 29 is pivoted to the cross-head 17. It will therefore be seen that when the lever 27 is swung upon

its fulcrum the cross-head 6 will be moved in a direction opposite to that of cross-heads 17 and 21, and therefore the pistons connected to said cross-heads will be correspondingly moved. Steam-chests 30 and 31 are located on the cylinders 1 and 2, respectively, and each is connected by a port 32 with the center of its cylinder. An exhaust-port 33 is formed in each cylinder and is adapted to be placed in communication with port 32 by means of a slide-valve 34, having a passage 35 therein. This slide-valve always extends over the exhaust-port; but when it is in one of its positions the steam is free to enter from the steam-chest through port 32, and when it is in its other position the steam can exhaust through port 32 into passage 35 and the exhaust-port 33. The valves 34 in the two steam-chests are connected, and any suitable mechanism (not disclosed) may be provided for actuating these valves at the proper times. A pipe 36 extends from the exhaust of cylinder 2 to the steam-chest 30.

Steam upon entering the cylinder 2 through its port 32 will force the pistons 10 and 32 away from each other, and therefore cross-head 6 will be pushed in one direction, while cross-heads 21 and 17 will be moved in the opposite direction because of the connection 20 between them. As cross-head 17 is connected, by link 29, to one end of lever 27 and the other end of said lever is connected, by means of bar 28, with cross-head 6, power will be applied to both ends of said lever and the main rod 24 will be moved longitudinally, so as to cause the rotation of the drive-wheels. As soon as the pistons 10 and 23 reach the limit of their outward movement the valves 34 will be automatically shifted so as to place the ports 32 and 33 of cylinder 2 in communication. Steam will then enter between the pistons 9 and 19 and reverse the operation of the cross-heads and lever, and thereby complete the

rotation of the drive-wheels. During the operation of the pistons air will circulate back and forth between them and the cylinder-heads through vents 37 and pipes 38 and 41. If in the event of an emergency it is desirable to direct steam between the pistons and the cylinder-heads, this can be done by turning valve 42 so as to place pipe 40 into communication with pipe 38.

It will be understood that considerable power may be produced by employing the arrangement of cylinders and pistons herein described, and therefore the apparatus is designed equally as well for use upon freight or passenger engines.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an engine the combination with a cylinder having a centrally-disposed inlet; of oppositely-movable pistons at opposite sides of the inlet, a power-transmitting lever, pivoted connections between the ends of said lever and the respective pistons, connected tubular vents at the ends of the cylinder, and means for directing motive fluid through the inlet and through the vents.

2. In an engine the combination with a cylinder having tubular vents at the ends thereof and an inlet, and a valve controlling said vents; of oppositely-movable pistons within the cylinder at opposite sides of the inlet, means for directing motive fluid through the inlet and for exhausting it therefrom, a centrally-fulcrumed power-transmitting lever, and pivoted connections between the ends of the lever and the respective pistons.

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

JAMES NEWTIN CUMMINGS.

Witnesses:

H. D. MALLICOAT,
O. J. ESPY.