

No. 808,685.

PATENTED JAN. 2, 1906.

J. E. ROBERTS.  
LOCOMOTIVE ENGINE.  
APPLICATION FILED APR. 13, 1905.

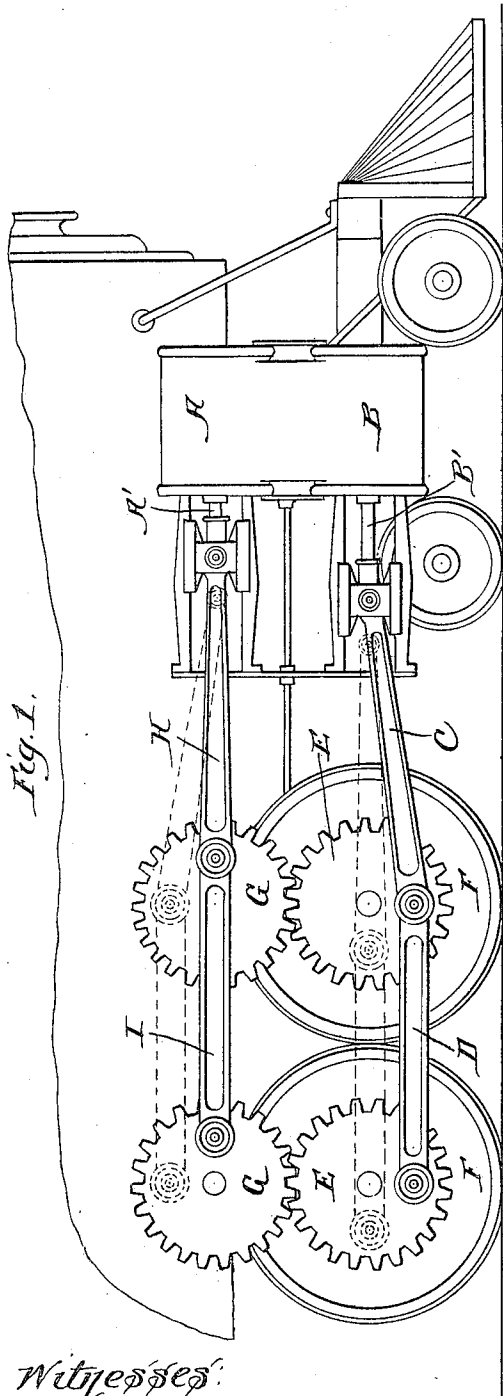


Fig. 1.

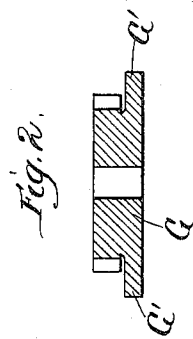


Fig. 2.

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# UNITED STATES PATENT OFFICE.

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## LOCOMOTIVE-ENGINE.

No. 808,685.

Specification of Letters Patent.

Patented Jan. 2, 1906.

Application filed April 13, 1905. Serial No. 255,445.

*To all whom it may concern:*

Be it known that I, JOHN EDWARD ROBERTS, a citizen of the United States, residing at Onedia, county of Clay, and State of Kentucky, have invented a certain new and useful Improvement in Locomotive-Engines, of which the following is a specification.

My invention relates to a new and useful improvement in locomotive-engines, and has for its object to provide a locomotive-engine of double-acting type similar to the device patented by me December 16, 1902, No. 716,107, in which two cylinders are located upon each side of the engine in order to obtain an equalization of the power of the locomotive on each side of the same, and at the same time provide means whereby dead-centers are effectually overcome and the accidental slipping of the driving-wheels on the rails obviated.

This invention also has the advantage of overcoming to a large degree the wear and tear on the road-beds and does away with the side strain upon the rails when the engine is started. Other advantages are gained which are not necessary to enumerate, as they are obvious from the construction.

With these ends in view this invention consists in the details of construction and combination of elements hereinafter set forth and then specifically designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same, the construction and operation will now be described in detail, referring to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side elevation of a portion of a locomotive equipped according to my invention; Fig. 2, a cross-section through an improved form of gear-wheel.

My former invention above referred to provided for two cylinders upon each side of the locomotive, said cylinders being in a line horizontally, while in this invention the cylinders are arranged one above the other, and the particular improvement consists in the manner of transmitting the power to the driving-wheels.

A represents the upper cylinder, and B the lower cylinder, upon each side of the locomotive. These cylinders are designed to be supplied with steam from any ordinary locomotive-boiler, said supply being under control of the engineer, and any kind of valve or reversing mechanism may be utilized. The

valves may be located above the upper cylinder and below the lower one or between the two, as shown in the drawings, and, in fact, could be located at any position found desirable.

A' represents the piston-rod leading from the piston in the cylinder A, and B' represents the piston-rod leading from the piston located in the cylinder B.

C is a pitman connected at one end to the piston-rod B', the other end being pivoted eccentrically to the forward driving-wheel in the usual manner, a connecting-rod D connecting all the driving-wheels together, as is now done upon locomotives.

E represents gear-wheels secured to and adapted to revolve with the driving-wheels of the locomotive, and G represents gear-wheels arranged above the gear-wheels E and in mesh therewith, said gear-wheels being journaled to the framework of the locomotive above the driving-wheels.

H is a pitman connected at its forward end to the piston-rod A' and at its forward end pivoted eccentrically to the forward gear-wheel G, the two gear-wheels G being connected together by the connecting-rod I, the same as the driving-wheels are connected together by the rod D. The crank-pins upon the driving-wheels F and gears G are so disposed with relation to each other that the four pistons will only be half a stroke apart, as illustrated in Fig. 1, the connection upon the opposite side of the engine being shown in dotted lines. While the two pistons on one side are moving in one direction those on the other side will be moving in the opposite direction. It will also be seen that during a portion of the revolution of the driving-wheels the two pistons on one side of the engine will be moving in the same direction, and this movement will continue a distance equal to one-half the stroke of any one piston, while during the next half stroke one of the pistons will be moving in one direction and the other piston on the same side of the engine will be moving in the opposite direction. The arrangement is such that the gear-wheels G revolve in the opposite direction from the way the drive-wheels and gear-wheels E revolve, that during a half of a revolution of same the two pistons on one side will pass each other when the crank-pins of the driving wheels and gears G are

at an angle, or forty-five degrees to each other, and during the other half of the revolution the same movement takes place with respect to the other two pistons on the opposite side of the engine. Thus it will be seen that when two of the cranks on one side are at an angle, or forty-five degrees to each other, and at the same time on the opposite side there will be one crank at ninety degrees on the live point, and by this operation it will be seen that there will always be ninety degrees of crank-power on the driving-wheels, as twice forty-five degrees equals ninety degrees. Thus there will always be four pistons acted upon by the steam, two on each side of the locomotive. This is productive of equal power on each side of the locomotive and gives ninety degrees of power, the whole revolution of the driving-wheels, and avoids the possibility of dead-centers. It also distributes or equalizes the strain produced on the frame and the body of the locomotive on the rails of a road-bed in starting a heavy train of cars, and thus prolongs the life of the road-bed and the life of the locomotive-engine, and is also productive of producing more power and better results with the same amount of steam. Of course, if desired, friction-wheels could be utilized instead of the gears E and G; but gears would probably be more positive in their operation, and in practical use a flange-gear, such as shown in Fig. 2, would probably be used, in which the flange G' would add an element of safety to the device.

Of course I do not wish to be limited to the exact construction here shown, as slight modifications could be made without departing from the spirit of my invention.

Having thus fully described my invention, what I claim as new and useful is—

1. In a locomotive-engine, the combination with the front and rear driving-wheels thereof, of two cylinders arranged upon each side of the locomotive, one above the other, a piston working in each cylinder, pitmen connected at their forward ends, one to each piston-rod, the rearward end of the lower pitmen be-

ing pivoted eccentrically to the forward driving-wheel, a connecting-rod connecting the forward driving-wheel with the rearward driving-wheel, gears secured to and adapted to revolve with the driving-wheels, gears arranged above the first-named gears and meshing with the same and journaled to the framework of the locomotive, the upper pitmen being pivoted eccentrically to the forward upper gears, connecting-rods connecting all of the upper gears together, the wrist-pins of the driving-wheels and the wrist-pins of the upper gears being so disposed relative to one another as to be one-quarter revolution removed relatively, as and for the purpose specified.

2. In a locomotive-engine, the combination with the front and rear driving-wheels thereof, of two cylinders upon each side of the locomotive, said cylinders being arranged one above the other, piston-rods extending from said cylinders, two pitmen upon each side of the locomotive connected one to each piston-rod, the lower pitmen being connected at their rearward ends eccentrically to the forward driving-wheels, wheels arranged above the driving-wheels and adapted to mesh therewith, the upper pitmen connected at their rearward ends to the forward one of these wheels, connecting-rods connecting the driving-wheels together and also the wheels in mesh with the driving-wheel, the wrist-pins upon the driving-wheels being so disposed that the pistons in each pair of cylinders will always be at a distance apart equal to half of a complete stroke in either direction to cause the pistons at one side of the engine to move in the same direction for half of the stroke of any one piston, while during the next half-stroke the piston will move in opposite directions.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

JOHN EDWARD ROBERTS.

Witnesses:

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