

# UNITED STATES PATENT OFFICE.

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## LOCOMOTIVE.

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*To all whom it may concern:*

Be it known that I, RUSH S. BATTLES, a citizen of the United States, residing at Girard, in the county of Erie and State of Pennsylvania, have invented certain new and useful improvements in Locomotives; 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.

This invention relates to locomotives; and it consists in certain improvements in the construction thereof, as will be fully set forth, and pointed out in the claims.

This invention is illustrated in the accompanying drawings, as follows:

Figure 1 is a side elevation view of a locomotive containing my improvements. Fig. 2 is a top or plan view of the running-gear of the locomotive with the boiler, engines, cab, &c., removed. Fig. 3 is a longitudinal section view of the running-gear, taken on the line *x x* in Fig. 2. Fig. 4 is a top or plan view of the driving-gearing, as seen in Fig. 2, but much enlarged. Fig. 5 is an end elevation of the driving-gearing, looking from the line *y y* in Fig. 2, in the direction of the arrow.

Like letters refer to like parts in all the figures, as follows:

A is the boiler; A', the cab; A<sup>2</sup>, the tank and coal-box; A<sup>3</sup>, the main frame-work of the locomotive; B, the wheels; B', the axles; C, the engine-cylinders; C', the cross-heads; C<sup>2</sup>, the connecting-rods; C<sup>3</sup>, the crank-disks; C<sup>4</sup>, the crank-shaft; D, the drive or main shaft; D', the universal couplings in the drive-shaft; F, the gear or pinions on the axles; F', the pinions on the drive-shaft; F<sup>2</sup>, the main driving-gear on the drive-shaft; F<sup>3</sup>, the driving-gear on the counter-shaft; G, the counter-shaft; H and H', the driving-gears on the counter-shaft; E and E<sup>2</sup>, the driving-gears on the crank-shaft, and E a sliding sleeve on the crank-shaft carrying the gears E and E<sup>2</sup>.

*c c* are feathers on the crank-shaft, which fit in grooves in the sleeve E.

J' is a shifter, which moves the sleeve E, and J a sliding block, which carries the shifter J'.

I is a screw-shaft, which moves the block J; I', a worm-wheel on the screw-shaft I, and I<sup>2</sup> a worm-shaft, which extends from the cab to the worm-wheel I'. Geared Steam Locomotive Works

The construction and operation are as follows, so far as relates to my invention: The engines are placed on the sides of the boiler near the front end, and the crank-shaft is placed below the boiler and at right angles thereto near the fire-box. Directly below the crank-shaft is placed a counter-shaft G, which is parallel with the crank-shaft and at right angles to the main shaft D. On the counter-shaft are two driven gears H and H', of which H is of less diameter than H'. On the crank-shaft C<sup>4</sup> is a sliding sleeve E, on which are two gear-wheels E' E<sup>2</sup>, of which E' is of much greater diameter than E<sup>2</sup>. The sleeve E is feathered to the shaft C<sup>4</sup>, and is always moving with it. As shown in the drawings, in Figs. 2, 3, and 4, the sleeve E is in such a position on the shaft C<sup>4</sup> as to bring the small gear E<sup>2</sup> in gear with the large gear H' on the counter-shaft, thus giving the counter-shaft a less rapid motion than the shaft C<sup>4</sup>; but if the sleeve E was shifted so as to bring the large gear E' into gear with the small gear H the counter-shaft G would have a more rapid movement than the crank-shaft. The sleeve E is moved by a shifter J', which is attached to a sliding block J, which is moved by a screw-shaft I, and the screw-shaft I is moved by a worm-shaft I<sup>2</sup>, which extends from the cab and acts upon a worm-wheel I' on the shaft I. The engineer in the cab, by rotating the shaft K<sup>2</sup> one way or the other, moves the sleeve one way or the other and brings the gear E' or E<sup>2</sup> into gear with the gear H or H', as he desires, and thus regulates the speed of the counter-shaft, making it greater or less than the crank-shaft, as he may elect. The main shaft D runs along over the axles B' at right angles thereto and below the counter-shaft G. This main shaft is provided at proper points with universal joints D', as is commonly done in similar constructions, and is supported by cross-boxes B<sup>2</sup> on the axles. On each axle is a driven gear F with skew-cogs, and on the shaft D adjoining each axle is a skew-pinion F'. Thus motion from the shaft D is communicated to each of the axles simultaneously. On the shaft G is a skew-driving-gear F<sup>3</sup>, which engages with a skew-driven gear F<sup>2</sup> on the shaft D. The motion is communicated from the counter-shaft G to the main shaft D. It will therefore be seen