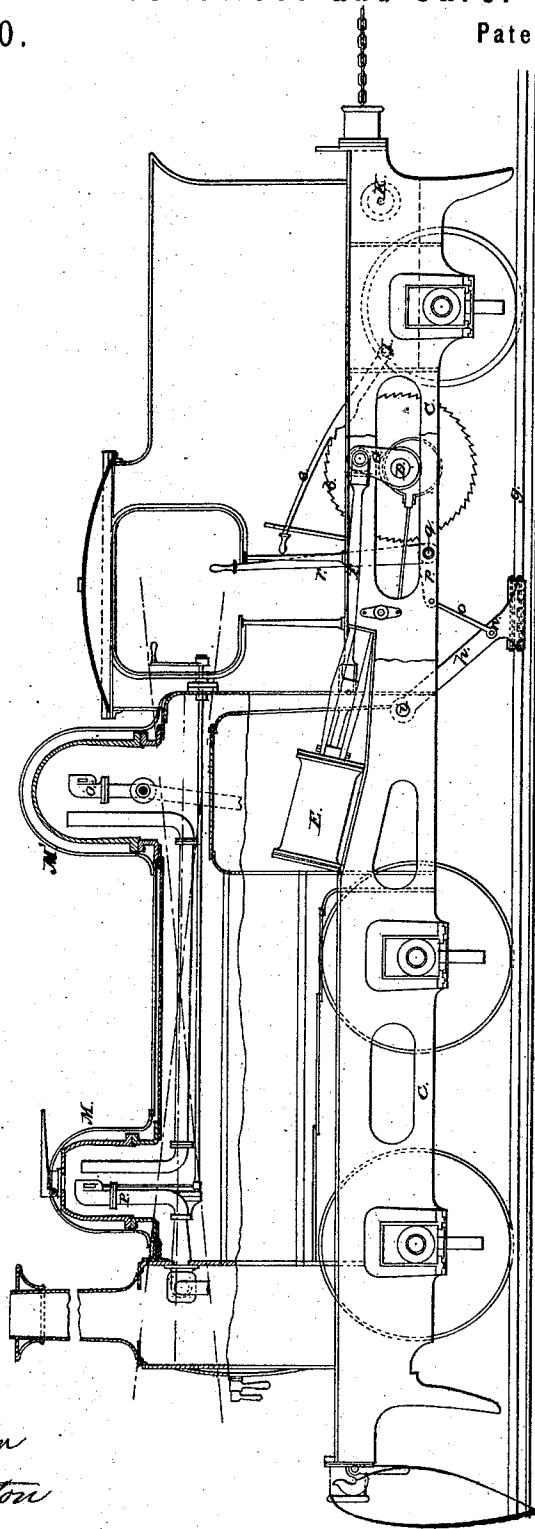


H. HANDYSIDE.
Locomotives and Cars.

No. 158,070.

Patented Dec. 22, 1874.

Fig. 1.



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Fig. 2.

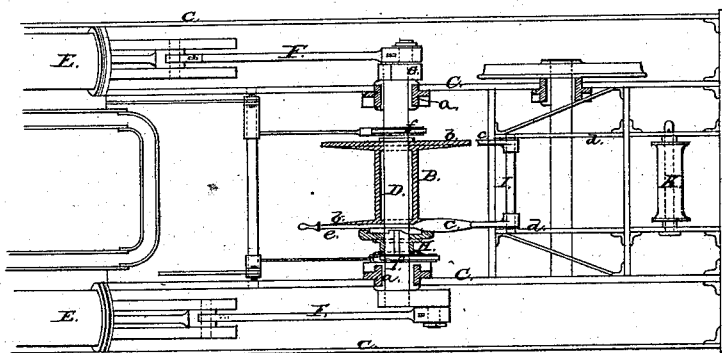
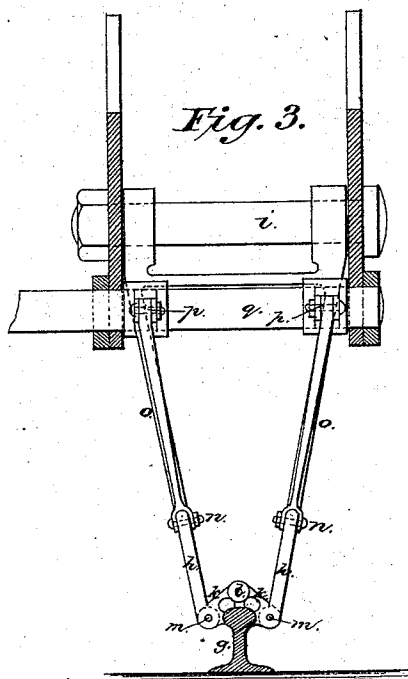


Fig. 3.



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HENRY HANDYSIDE, OF LONDON, ENGLAND.

IMPROVEMENT IN LOCOMOTIVES AND CARS.

Specification forming part of Letters Patent No. **158,070**, dated December 22, 1874; application filed June 22, 1874.

To all whom it may concern:

Be it known that I, HENRY HANDYSIDE, of London, in the county of Middlesex, England, have invented a new and useful Improvement in Locomotive-Engines for Steep Inclines and Sharp Curves; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to certain peculiar construction and arrangements of locomotive-engines and apparatus to be applied thereto, and to the carriages or wagons of a train, whereby the safe and easy ascent of trains up steep inclines is accomplished, and their passage round sharp curves is facilitated.

And in order that my said invention may be fully understood, I shall now proceed more particularly to describe the same, and for that purpose shall refer to the several figures on the accompanying sheets of drawings, the same letters of reference indicating corresponding parts in all the figures.

Figure 1 of my drawings represents a side elevation, partly in longitudinal section, of so much of a locomotive-engine as is requisite to illustrate the application of my invention thereto. Fig. 2 is a sectional plan of a portion of the same, corresponding to Fig. 1. Fig. 3 is an enlarged detail of a self-acting gripping-strut constructed in accordance with my said invention.

According to my invention, I couple the locomotive-engine to the train or other load to be hauled up an incline, by a rope or chain, A, which is wound on a drum, B, mounted in the framing C C of the engine. The axis or shaft D of this drum works horizontally in bearings at *a a* in the main framing, and is driven or rotated direct or by gearing, as found most convenient, from a separate pair of cylinders, E E, distinct from the usual cylinders which drive the locomotive in ordinary cases. These cylinders E E may be secured to any convenient part of the locomotive, and transmit a rotatory motion to the shaft of the hauling-drum by connecting-rods F F, coupled to cranks G G, secured to the ends of the hauling-drum shaft, as clearly shown in Fig. 2, or coupled to the shaft of separate or inter-

mediate gearing. The drum or windlass-barrel is loose upon its shaft, and is coupled therewith, when required for hauling purposes, by means of a sliding clutch, H, provided with projections or teeth, by preference inclined or beveled off at the back, which teeth engage into corresponding holes or recesses in the end of the drum. A clutch-lever (not shown in my drawings, but which should be conveniently placed to the hand of the driver) is provided for throwing the hauling-drum into or out of action, as required. The circumference of one or both flanges or end plates *b b* of the drum have ratchet-teeth formed thereon, and into these teeth engage the detent or detents *c c*, which are mounted on the rocking shaft I, working in suitable bearings in the inner framing *d d* of the engine. These detents, when engaged with the ratchet-teeth, hold the drum stationary during the time the engine is running with the train attached behind it. *e* is a lever-handle, forming part of one of the said detents, for the purpose of enabling the driver to instantly release the drum, when required. *f f* are the eccentrics and eccentric rods for working the valves of the cylinders E E, these eccentrics being mounted on the shaft of the drum, or on the gear-shaft. K is a guide-roller, fitted in the rear end of the inner framing for guiding the hauling rope or chain A onto and off the drum. This guide-roller may be constructed only sufficiently broad to carry the rope or chain, and be provided with a lever or screw purchase to receive a horizontal motion for guiding the rope or chain in the case of going round sharp curves. On each side of the engine-framing, and also on each side of one or more of the carriages or wagons of the train, there is or are suspended one or more self-acting gripping-struts, L, (see Fig. 3,) which, when let down onto the rails *g* by the driver, or other person in charge of the train, will firmly gripe the sides of the rails, and hold the engine or train, or portion of the train, stationary on any part of a steep grade. I prefer to construct these struts each of two steel arms, *h h*, hinged at their upper ends at *i i* to the main framing, and connected together at their lower ends by two jaws, *k k*, Fig. 3, which are hinged together in the center at *l*, and are also hinged at *m m* to the ends of the steel

arms *h*. To the arms *h h* of each strut there are jointed at *n n* the rods *o o*, which are jointed at their upper ends to short lever-arms *p p* on a rock-shaft, *q*. This rock-shaft carries a lever-arm, *r*; convenient to the hand of the driver, for the purpose of enabling him to instantly raise or lower the struts on both sides of the engine simultaneously.

On lowering the free end of the strut, which should project downward at an angle of rather less than forty-five degrees, and in a direction contrary to the direction in which the train is traveling, as shown in Fig. 1, the jaws *k k* of the struts, which should be roughened and hardened on their inner surfaces, immediately gripe the opposite sides of each rail, and effectually prevent any retrograde motion of the engine or carriages when on a steep grade. On arriving at the foot of a steep incline, the engineer will release the hauling-drum on the engine by disengaging the detents *c c*, and will, without stopping the engine, run it up the grade to any desired distance, having previously lowered, by means of the lever-handle *r*, the arresting-struts *L L*. On stopping the engine, the struts immediately come into action, as shown in Figs. 1 and 3, and maintain the engine firmly in its place. The hauling-drum *B* is now started by throwing the clutch *H* into gear therewith, (the rope or chain *A* having been paid out as the engine ascended,) and the entire train, or any part of the train, is hauled up by the sole power of the cylinders *E E*, which work the winding-drum. The struts on the train, similar to those shown at *L*, act, as before described, to prevent any retrograde motion thereof, when required, or in case of an accident to the hauling apparatus they also allow the engine to start again without the train to take another length of the incline, and so on until the complete ascent of the incline has been effected, the train being hauled up by the engine by the aid of the winding drum, as hereinbefore described.

On level sections, or on comparatively light grades, the locomotive acts precisely as an ordinary locomotive-engine.

It is obvious that this arrangement of hauling-drum and separate winding-engine carried on the framing of the locomotive will also be found most serviceable in facilitating the hauling of heavy trains by light locomotive-engines round sharp curves.

In my drawings I have shown the steam-pipe *O*, for supplying the winding-engine, as connected with the dome *M*, while the steam-pipe *P*, for supplying the ordinary driving-cylinders of the engine, is shown as connected with the dome *M'*, each pipe being provided with the usual regulator-valve inside the dome.

I am aware that car-brakes adapted to embrace the rails of the track are not, broadly, new, and that it has been proposed to propel hand-cars by means of a windlass mounted thereon, and having anchor-cords connected to clamps, which are made to clamp the rails.

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

1. Applied to a locomotive-engine, the combination of the rods *o*, arms *h*, jaws *k*, arm *p*, and lever *r*, for the purpose of forming a self-acting griping-strut, which shall gripe the top and sides of the rail, and thus render the engine or carriage stationary and firm upon a steep grade, and prevent retrograde motion, substantially as and for the purpose specified.

2. Applied to a locomotive-engine, the combination of a griping-strut, a steam-cylinder or pair of cylinders, and a winding-drum, having a ratchet-wheel, detent, and clutch, substantially as and for the purpose specified.

The above specification of my invention signed by me this 21st day of April, 1874.

HENRY HANDYSIDE.

Witnesses:

HARRY SWALES,
HENRY W. DEWEY.