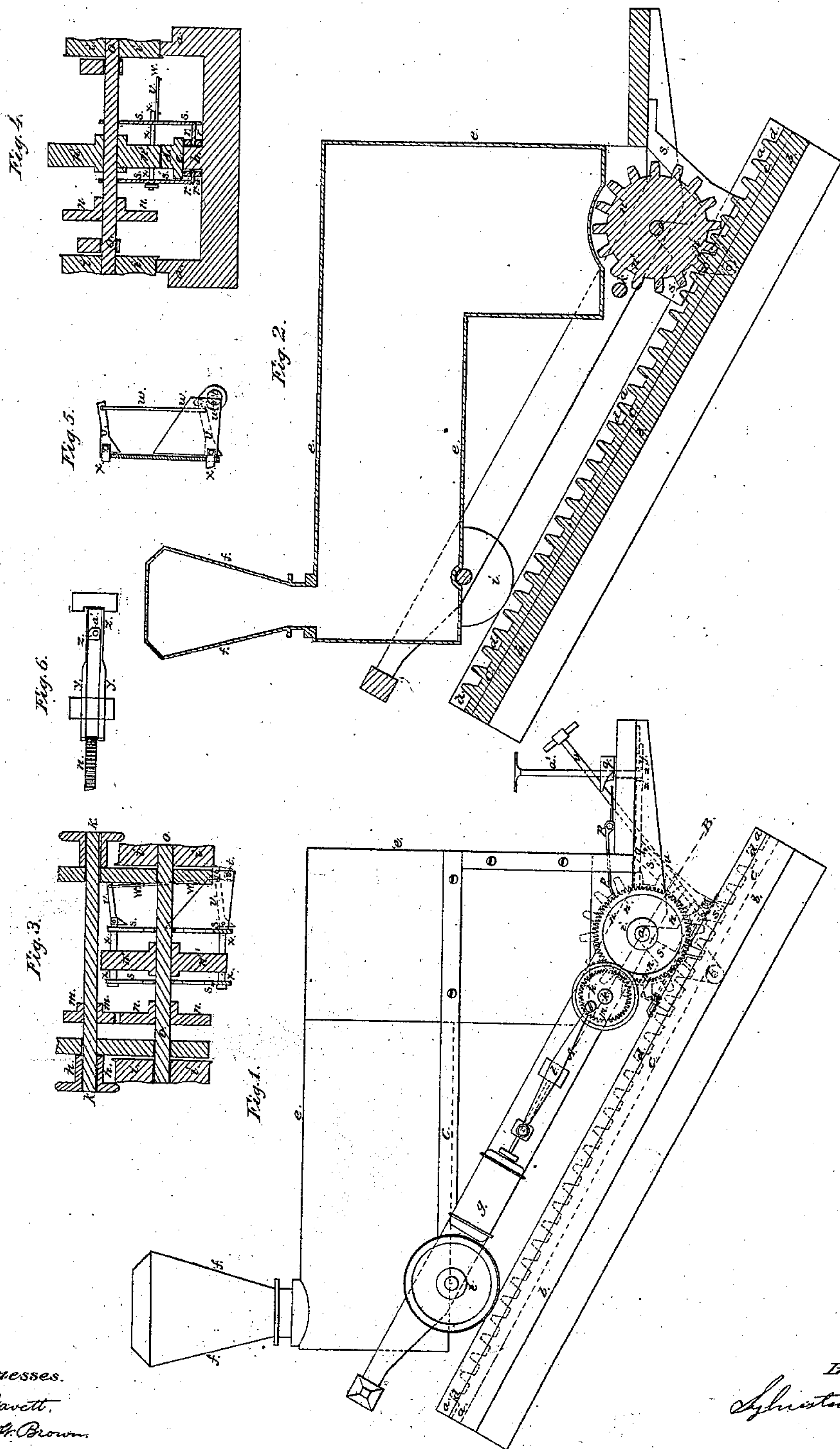


S. Marsh,
Inclined Railroad

N^o 33,255.

Patented Sep. 10, 1861.



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IMPROVEMENT IN LOCOMOTIVE-ENGINES FOR ASCENDING INCLINED PLANES.

Specification forming part of Letters Patent No. 33,255, dated September 10, 1861.

To all whom it may concern:

Be it known that I, SYLVESTER MARSH, of West Roxbury, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Locomotive-Engines for Ascending Inclined Planes; and I do hereby declare that the following description, taken in connection with the accompanying drawings, hereinafter referred to, forms a full and exact specification of the same, wherein I have set forth the nature and principles of my said improvements, by which my invention may be distinguished from all others of a similar class, together with such parts as I claim and desire to have secured to me by Letters Patent.

The figures of the accompanying plate of drawings represent my improvements.

Figure 1 is a side elevation of my improved locomotive-engine. Fig. 2 is a central longitudinal vertical section of the same. Fig. 3 is a section taken in the plane of the line A B, Fig. 1. Figs. 4, 5, and 6 are views in details to be hereinafter referred to.

The present invention relates to that class of locomotives which are used for ascending very steep grades, and has for its objects, first, obtaining sufficient power to ascend a steep inclination with a light locomotive instead of a heavy and cumbersome one, such as have heretofore been necessarily used; second, preventing the possibility of the engine being thrown off or lifted and ungeared from the track by the interposition of any obstruction thereon, and the means employed for checking and stopping the progress of the train.

I will now proceed to describe in detail the construction of my improved locomotive.

a a in the drawings represent the outer rails of a railroad-track on a steep grade.

b b is a central rail constructed with a gear-rack *c c* and projecting flanges *d d*.

e e represent the body of the locomotive. *f* is the smoke-pipe; *g*, the steam-cylinder; *h*, an eccentric worked by the connecting-rod *l*; and *i i i i*, running-wheels that support the locomotive upon the outer rails *a a*.

k is the driving-shaft, driven by the connecting-rod *l*, attached to the eccentric *h*. On the driving-shaft *k* is a pinion *m*, that engages with a large gear-wheel *n*, attached to the

axle *o* of the rear running-wheels *i i*. A gear *n'* on the same axle *o* works into the geared rack *c c* on the central rail *b b*, and thus by the motion received from the pinion *m* drives the locomotive.

It has heretofore been customary in the construction of locomotives for ascending inclined planes to attach the connecting-rod directly to the driving-wheel of the locomotive, which of course necessitated the use of a large engine of great power, whereas by the arrangement above described a light locomotive of small power can be successfully used.

p is a lever-pawl, which is engaged with or disengaged from the gear *n* by means of a cam *q*, and serves to prevent the engine from running backward when engaged with the gear *n* and is disengaged when the train is descending.

The gear *n'* is prevented from being lifted out of the geared rack *c c* of the central rail in case of any obstruction on the track by means of the small friction-wheels *r r*, attached to two spring-plates *s s*, which are made to bind upon and clasp the sides of the central rail at pleasure by means of an eccentric *t*, (worked by a brake-rod *u*,) which moves two short levers *v*, (connected by a rod *w*,) the ends of which abut against one of the spring-plates *s*, and are attached to the bars *x x*, which play through the spring-plates and draw them together when the brake-rod *u* is turned in the proper direction, as will readily be understood by inspection of Figs. 3, 4, and 5. The importance of this arrangement of holding the engine upon the track by the spring-plates and friction-rollers will be manifest, as the disengagement of the gear *n'* from the central rail would be attended with serious consequences. The progress of the train can also be checked or stopped altogether by means of two levers *y y*, the ends of which are made to embrace both faces of the gear *n*, before referred to, by the turning of a cam *z*, actuated by a brake-rod *a'*, as will be readily understood by inspection of Fig. 6.

Having thus described my improvements, what I claim as my invention, and desire to have secured to me by Letters Patent, is—

1. The general arrangement of devices herein described for driving locomotives on inclined planes of a steep grade, the same

consisting of the eccentric *h*, attached to the connecting-rod of the engine, the pinion *m*, and gears *n* and *n'*, in combination with a toothed central rail, as set forth.

2. In combination, with the central rail constructed with flanges, as described, the traveling friction-rollers and the spring-plates

arranged in relation to the devices operating them, in the manner and for the purposes set forth.

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