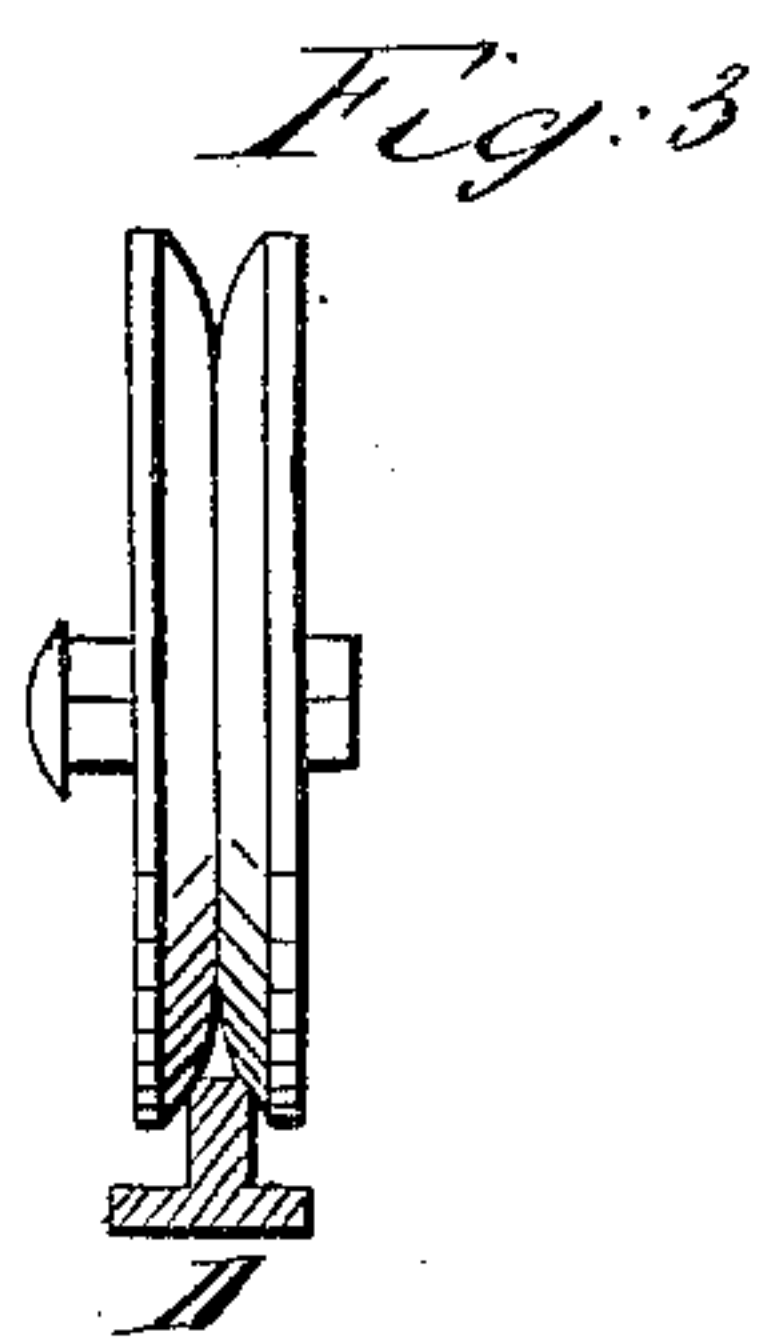
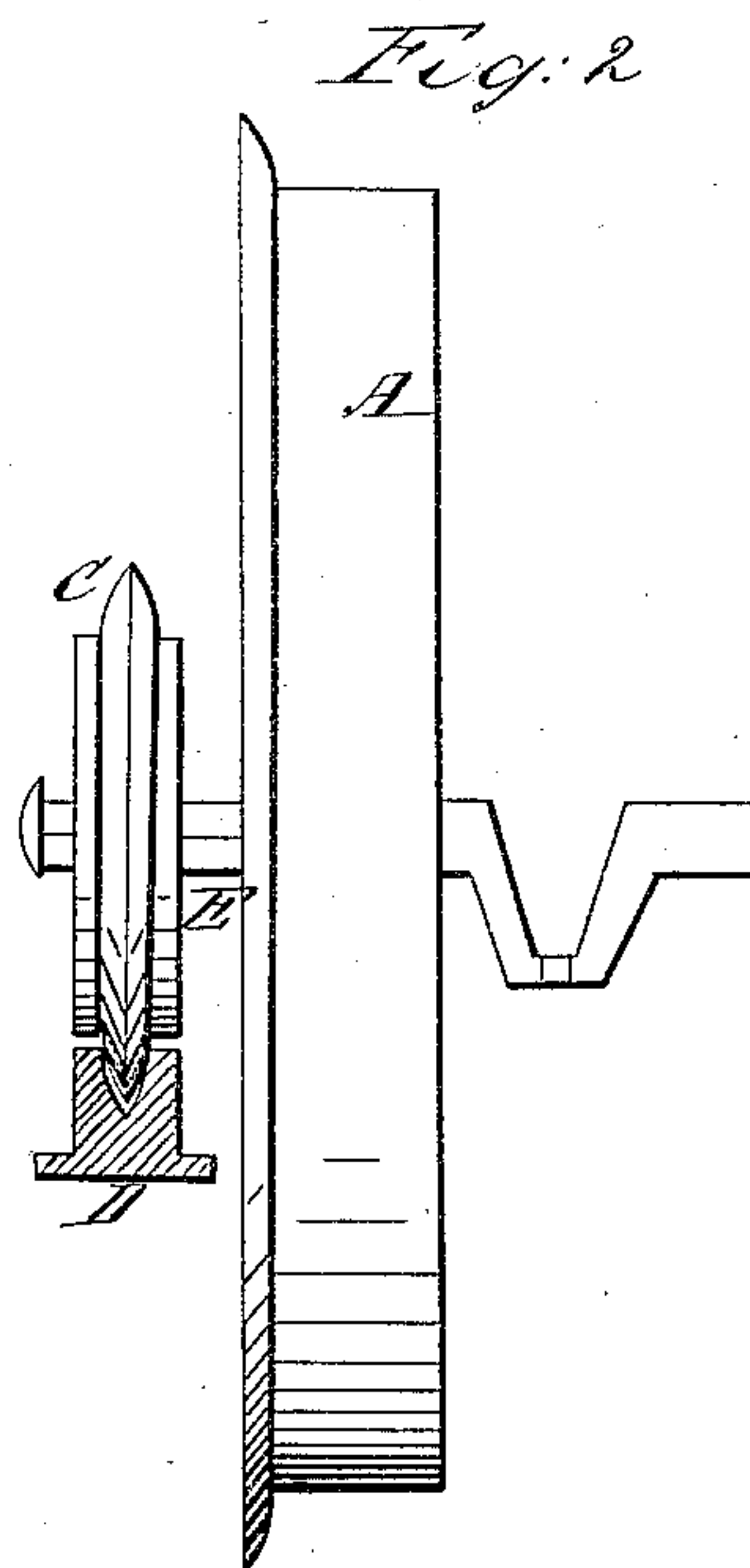
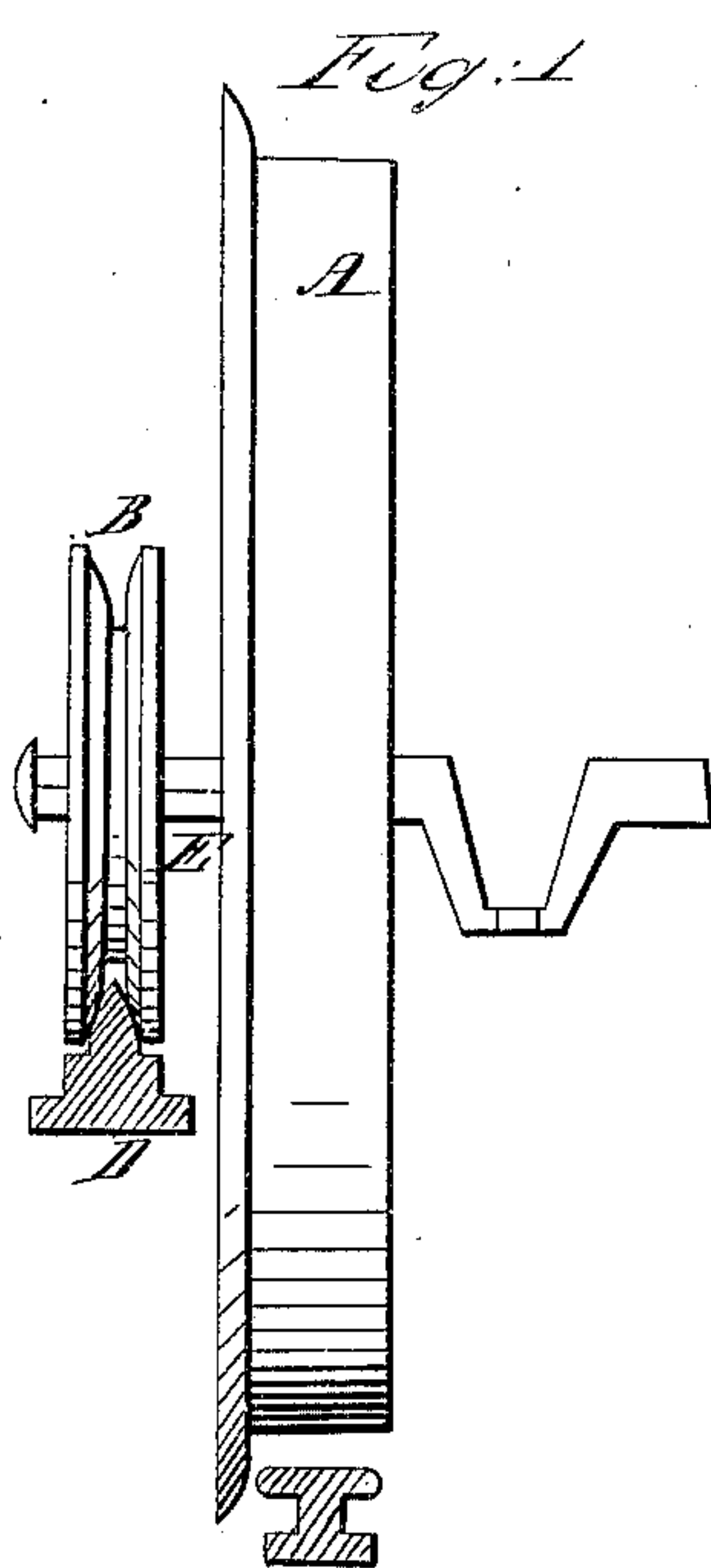


W. F. Ketchum,
Inclined Railroad,
N^o 1,107. *Patented Mar. 20, 1839.*



UNITED STATES PATENT OFFICE.

WM. F. KETCHUM, OF BUFFALO, NEW YORK.

MODE OF ASCENDING AND DESCENDING INCLINED PLANES ON RAILROADS.

Specification of Letters Patent No. 1,107, dated March 20, 1839.

To all whom it may concern:

Be it known that I, WILLIAM F. KETCHUM, of the city of Buffalo, in the county of Erie and State of New York, have invented an improvement in the mode of constructing the wheels of locomotive-engines and of rails adapted to such wheels, by the aid of which locomotives with the trains attached to them may be made to ascend inclined planes, the
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adhesion of the wheels to the rails being increased without the employment of cogs, while said wheels may be reduced in size to any desirable extent, thus increasing the power of ascent in the same ratio; and I do hereby declare that the following is a full and exact description thereof.

The ordinary driving wheels of the locomotive engine, are made in the usual way, but on the same axis on which two ordinary
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wheels are fixed, I place another pair of wheels, on the outside of those ordinary wheels. The additional wheels may be made of such diameter as will adapt them to the grade of the inclined plate up which they
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are to ascend. The peripheries of these wheels are to be grooved, or channeled, in the manner of those pulleys or wheels which are to receive a rope, or chain; the form of the groove, or channel, may vary, but I most
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commonly sink it so as to form a V groove, but this is not a point of importance. The wheels, constructed as above, are to run upon rails adapted to them, placed on a line with, and outside of, the ordinary rails of the
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track, and raised above the ordinary rails to a height sufficient to raise the ordinary wheels above them, so that they may revolve freely without coming into contact with any thing. The rails adapted to the grooved
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wheels, are to be ridge formed, so as to fit into the grooves of the wheels, and so that the sides of the grooves may bind upon them in any desired degree.

It will be readily perceived that the form
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of the groove and of the rail, may be varied in any manner consistent with the main object of the construction, namely, that of causing the one forcibly to embrace the other. It will also be evident that the same
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principle may be varied by forming the groove in the rail, and the ridge upon the wheel; but this arrangement would be objectionable as the grooved rail would re-

tain any substance which might fall, or be placed within it. The extra wheels are to
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have some lateral play to adapt them to the unavoidable irregularities of the rails; and to admit of this I make the portion of the axis upon which they are placed and the holes through the centers of the wheels,
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square or otherwise polygonal; or, if round, I check them from turning and allow as shown at E them to play laterally, by means of a feather.

In the accompanying drawings, A, A, Fig-
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ures 4 and 2, represent the ordinary driving wheels, and B and C, the extra wheels, B being grooved, and C ridged, the rails D, D, upon when they run, being made of a corresponding form. Fig. 3, shows that the
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rail D, though differing greatly from those in Figs. 1 and 2, in its form, may still be forcibly embraced by the groove in the wheel.

By placing these additional wheels on the
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outside of the ordinary driving wheels, I am enabled to vary their size from an equality with that of the driving wheels, to the smallest diameter at which they can be eligibly used on the steepest ascents.
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They can also be readily removed, and those of other sizes substituted for them, should it be desired, or they may be left off when it is desired to allow the driving wheels to run upon the ordinary rails.
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I do not claim to be the inventor of the mode of increasing adhesion of wheels, to the rails by making one of them with a ridge, and the other with a groove, this having been previously done, the extra wheels
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for this purpose having been placed on the insides of the driving wheels; but

What I do claim is—

An improvement in the manner of using such wheels, by placing them outside of the
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driving wheels, by which change they are much better adapted to the intended purpose than when placed on the inside, as their diameters may be varied to any desirable extent; while, also, they may be readily
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removed, or others may be substituted for them, as above specified.

W. F. KETCHUM.

Witnesses:

C. H. MILTBERGER,
LINTON THORN.