(No Model.)

3 Sheets—Sheet 1.

T. MULLREY.

LOCOMOTIVE.

No. 305,101. Patented Sept. 16, 1884.

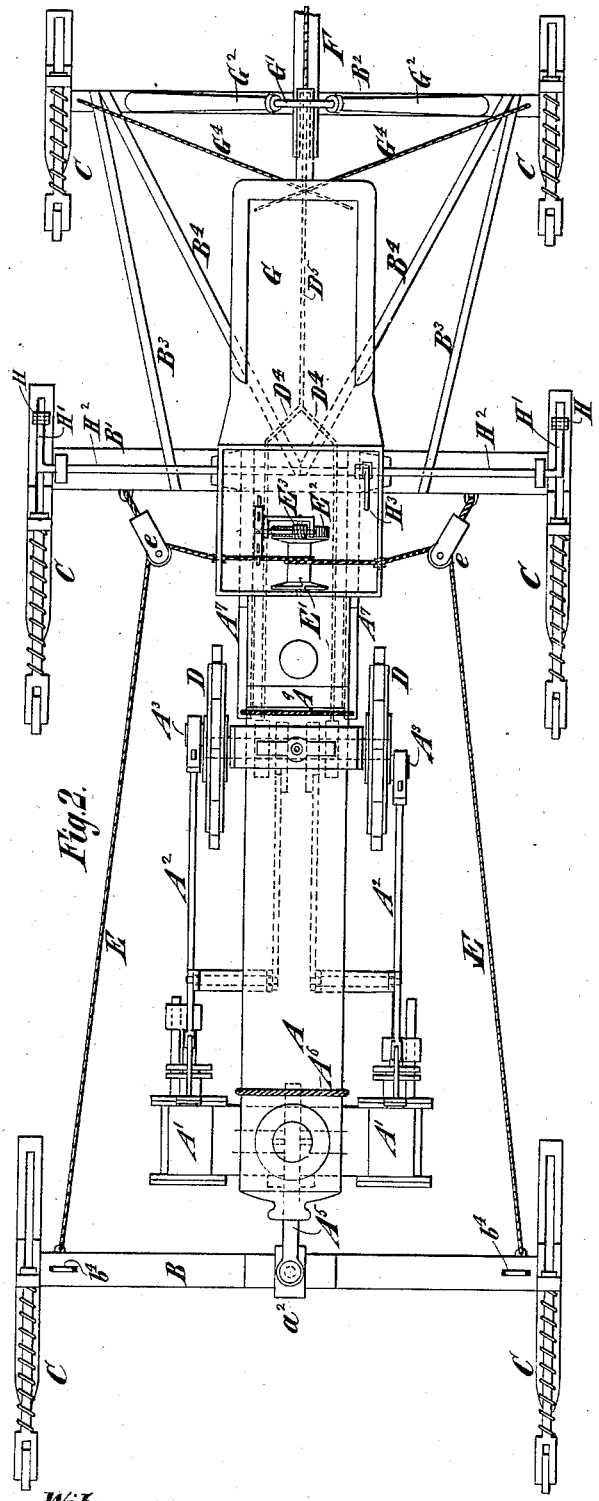

Fig. 2.

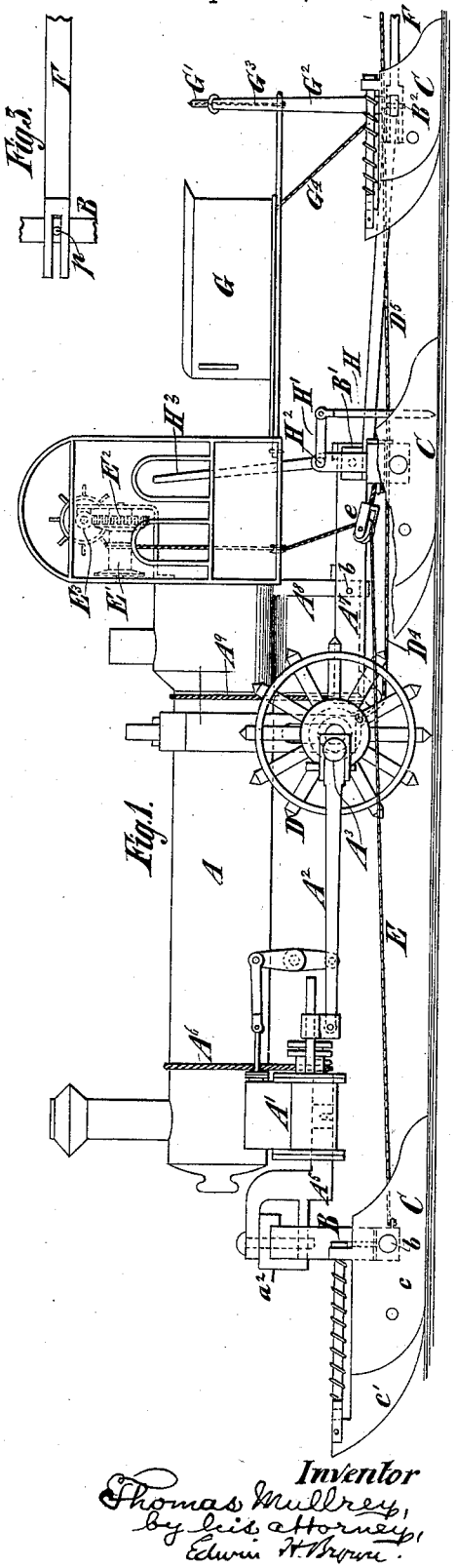

Fig. 3.

Fig. 1.

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3 Sheets—Sheet 2.

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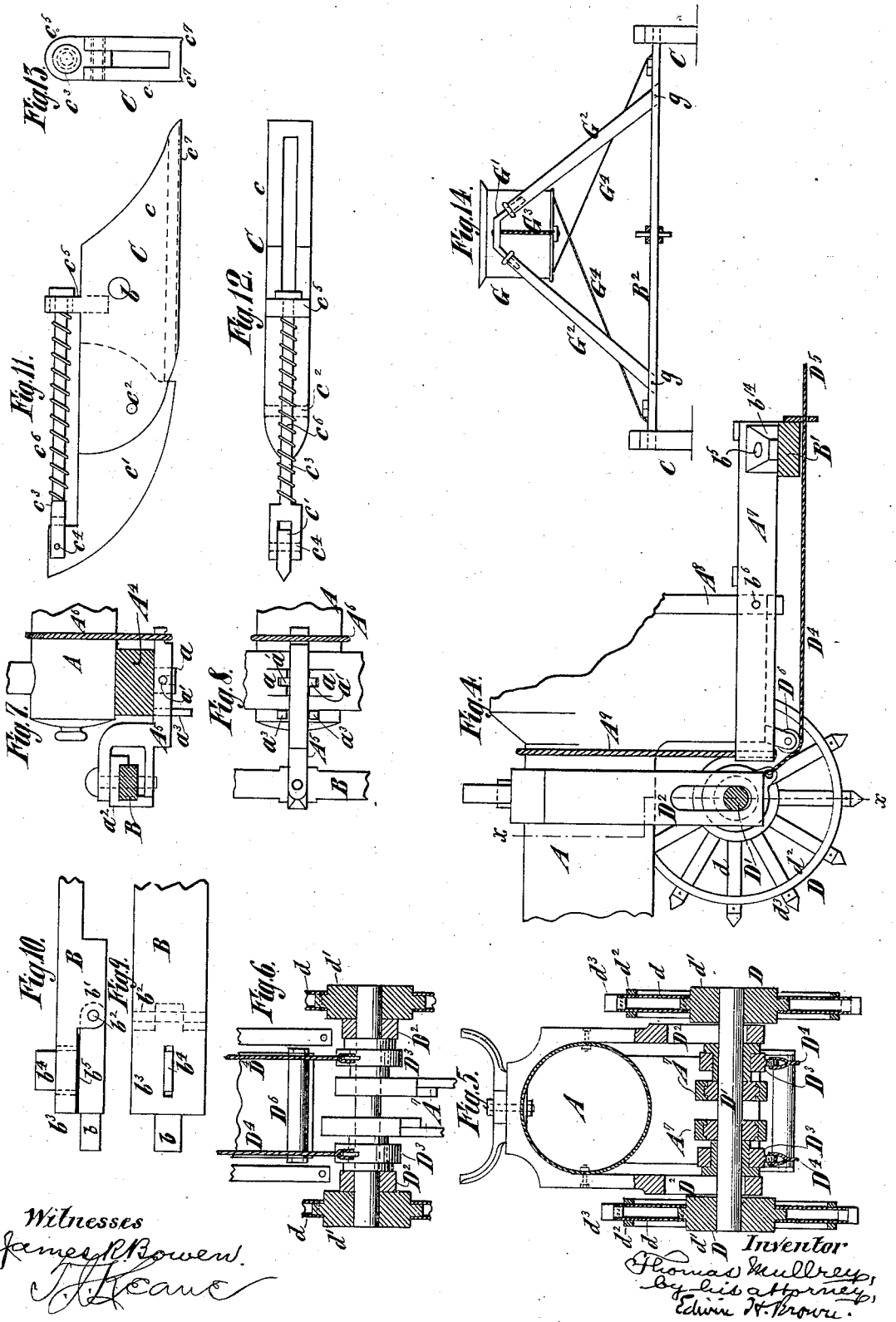
No. 305,101. Patented Sept. 16, 1884.



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(No Model.) 3 Sheets—Sheet 3.

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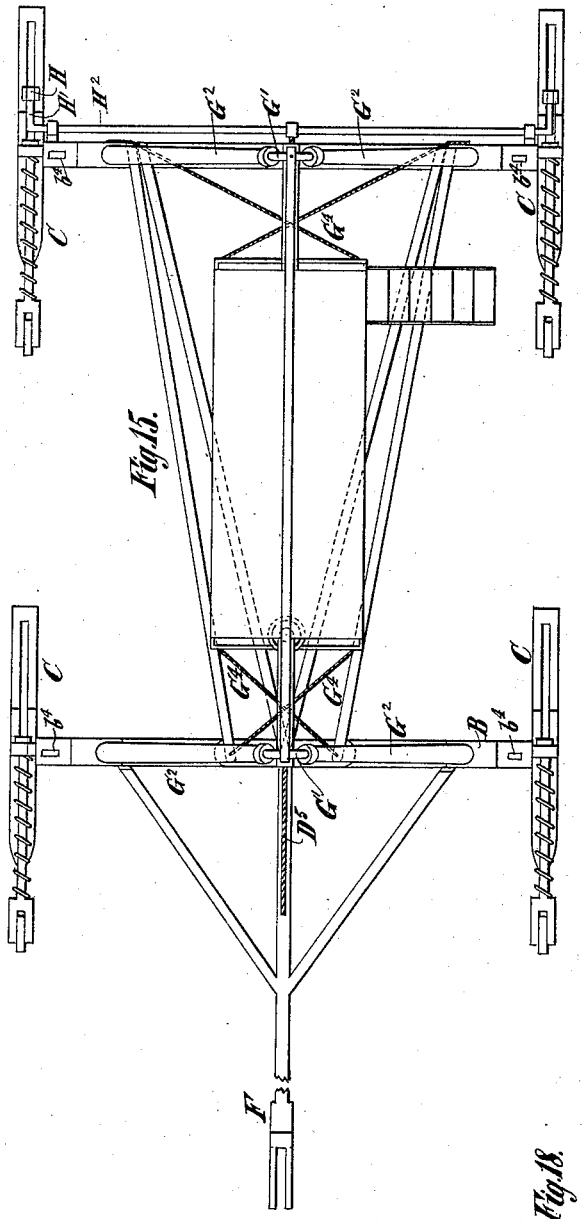

Fig. 15.

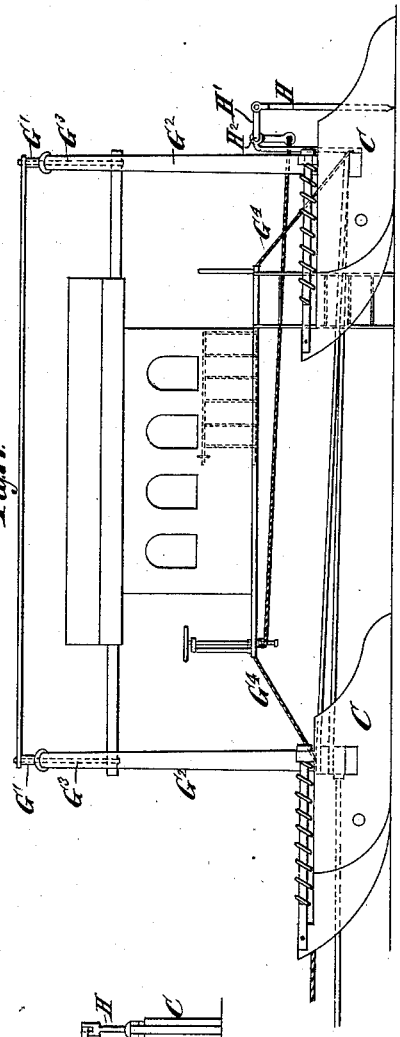

Fig. 17.

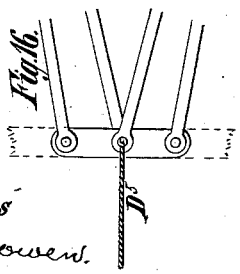

Fig. 16.

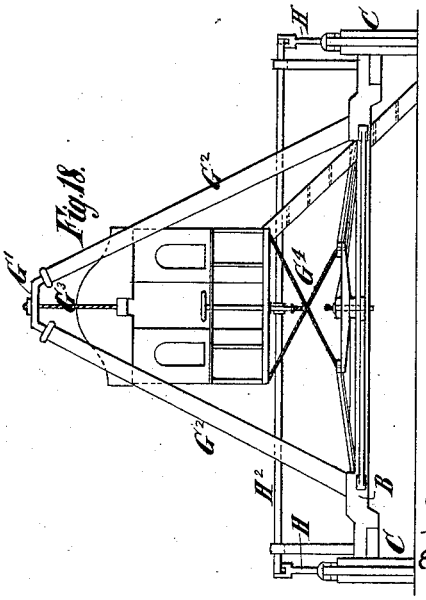

Fig. 18.

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UNITED STATES PATENT OFFICE.

THOMAS MULLREY, OF NEW YORK, N. Y.

LOCOMOTIVE.

SPECIFICATION forming part of Letters Patent No. 305,101, dated September 16, 1884.

Application filed December 7, 1883. (No model.)

To all whom it may concern:

Be it known that I, THOMAS MULLREY, of New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Locomotives and other Cars Adapted for Traveling on Ice, of which the following is a specification.

I will describe my improvement in detail, and then point out its various features in the claims.

In the accompanying drawings, Figure 1 is a side view of a locomotive embodying my improvement. Fig. 2 is a plan of the same. Fig. 3 is a plan of certain parts which are not clearly shown in Fig. 2. Fig. 4 is a sectional side elevation of the rear part of the locomotive. Fig. 5 is a transverse section taken as indicated by the dotted line *x x*, Fig. 4. Fig. 6 is a sectional inverted plan or bottom view of certain of the parts which are shown in Fig. 4. Fig. 7 is a sectional side view of certain parts at the forward end of the locomotive. Fig. 8 is an inverted plan or bottom view of the same. Fig. 9 is a plan of the end portion of one of the axles of the locomotive. Fig. 10 is a side view thereof. Fig. 11 is a side view of one of the runners. Fig. 12 is a plan or top view of the runner. Fig. 13 is a back view of the runner. Fig. 14 is a rear view of the locomotive-tender. Fig. 15 is a plan of a car drawn by the locomotive. Fig. 16 is a plan of certain parts not clearly shown in Fig. 15. Fig. 17 is a side view of this car, and Fig. 18 is a front view of the car.

Similar letters of reference designate corresponding parts in all the figures.

A designates the boiler of the locomotive. It may be made like the boiler of an ordinary locomotive; but preferably it will be made longer and slighter, in order that its weight may be distributed over a larger surface of ice. It is supported by axles or cross-bars B B′ and runners C, and it is propelled by sprocket or toothed wheels D. Engines A′ of ordinary type are secured to and combined with the boiler in any suitable manner, and impart motion through connecting or pitman rods A^2 and crank A^3 to the driving-wheels D.

Having given this preliminary description of the parts, I will proceed to explain their several constructions in detail.

The runners C are severally constructed of a main section, *c*, which is fitted to a journal or circular portion, *b*, at the end of an axle, and a yielding auxiliary section, *c′*. The auxiliary section *c′* is pivoted by a pin, c^2, to the main section *c*, and is held down to its normal position by means of a rod, c^3, that is pivotally connected to it by a pin, c^4, and fits loosely in a bearing, c^5, extending from the main section, and a spring, c^6, surrounding the rod. The advantage of this auxiliary section is that it can yield and adjust itself to varying angles, so as to facilitate the passage of the runner over unusually large obstacles. The runners are preferably made wider than ordinary sleigh-runners, and are provided with ribs c^7 on the under side.

The axles are preferably made of great length, so that the weight sustained by them may be distributed over a very large surface of ice. By thus distributing the weight the locomotive can be used early and late in the winter season, while the ice is comparatively thin. As a broader base is thus formed, irregularities in the surface of the ice will not have so great an effect upon the boiler of the locomotive.

The journals *b* of the axles B B′ are not made integral with the axles, but are hinged to shoulders *b′* on the axles by pins b^2, so that they extend under end portions, b^3. They are provided with tongues b^4, that extend through slots in the end portions, b^3, of the axles, and have springs consisting of pieces of india-rubber b^5, or other suitable material, interposed between them and the end portions, b^3, of the axles. This method of combining the journals with the axles is advantageous, in that it enables the journals to move to a slight extent independently of the axles, and thereby to prevent small irregularities in the surface of the ice from transmitting such shocks through the axles to the boiler, as otherwise they would do.

Under the forward end of the boiler is secured a pillow-block, A^4, by which the engines are in this instance supported. The lower side of this pillow-block is provided with jaws *a*, having bearings, in which fit journals *a′*, extending from a bar, A^5. The forward end of this bar is bifurcated and pivotally connected

to the front axle, B, and the rear end is grooved to receive a rope or cable, A^6, that surrounds and hangs down from the forward portion of the boiler A. The connection between the bar A^5 and the forward axle, B, is made as follows: A saddle or wearing-piece, a^2, fits upon the axle. The forward bifurcated end of the bar A^5 fits over the axle and this saddle or wearing-piece, and a king-bolt passes through the bar, the saddle or wearing-piece, and the axle. The bar A^5 is prevented from lateral movement relatively to the boiler by the jaws a, and also by jaws a^3, extending downwardly from the boiler. The forward axle, B, is, owing to the manner in which it is combined with the bar A^5, capable of turning relatively to the axis of the boiler, in order that the locomotive may be directed around curves.

The rear axle, B′, has pairs of jaws b^{14}, which embrace bars a^7, and are pivotally connected thereto by pins b^5. These bars A^7 are pivotally connected by pins b^6 to bars A^8, extending from the sides of the fire-box of the locomotive or from any other support. The forward ends of these bars A^7 are connected to a rope or cable, A^9, that extends around and hangs from the locomotive-boiler. By this method of connecting the rear axle, B′, to the locomotive-boiler, small irregularities in the surface of the ice traveled will not impart such shocks to the boiler as otherwise they might do. It will be understood that this connection of the rear axle to the boiler does not admit of any adjustment of this axle relatively to the axis of the boiler—as, for instance, while the locomotive is traveling in curves.

I will now explain the means whereby the forward axle, B, may be adjusted for directing the locomotive around curves.

E designates cords or cables fastened to the axle B near its ends, passing around pulleys e, and then around a windlass, E′, in the cab of the locomotive. The windlass E′ is provided with a worm-gear wheel, E^2, that engages with a worm, E^3. By turning this worm the windlass may be rotated so that it will vary the angle of the forward axle relatively to the axis of the boiler.

The driving-wheels D are not intended to contribute to the support of the locomotive-boiler. They severally consist, as here shown, of a number of tubular metal spokes, d, having a recess or opening in their outer ends. They are fitted into a hub, d', and secured in a rim, d^2, and provided with sprockets or teeth d^3. These sprockets or teeth (see particularly Fig. 5) have shanks that fit into the outer ends of the spokes, and are secured there by cross-pins. The sprockets or teeth may therefore be removed and replaced by others when worn out. They are preferably V-shaped at the outer ends.

The driving-wheels D are rigidly affixed to an axle, D′, which fits in housings or vertically-elongated bearings D^2, extending from the boiler; consequently the wheels are free to rise and fall relatively to the boiler. On the axle D′ are loosely mounted collars D^3, which do not rotate with the axle, by reason of having attached to them ropes or cables D^4, that are secured to a common rope or cable, D^5. This rope or cable D^5 extends to the car shown in Figs. 15, 16, 17, and 18, and is fastened to the front axle thereof. The ropes or cables D^4, leaving the collars D^3, pass down under pulleys D^6, secured to the bottom of the fire-box; hence any strain exerted by the car shown in Figs. 15, 16, 17, and 18 upon the ropes or cables D^4 D^5 will cause the wheels D to be drawn down upon the ice, so that they will make a firm engagement therewith. These wheels will therefore always engage with the ice with a force corresponding to the strain exerted by the load which the locomotive draws. The said wheels can of course rise and fall, to adapt themselves to irregularities in ice, without affecting the locomotive-boiler.

The car drawn by the locomotive has a very long tongue, F, in order that the car and locomotive will not be too near together to greatly strain the ice traveled. This tongue is connected to the car, so that it cannot have any independent lateral movement, and it is bifurcated to embrace an axle, B^2, that contributes to support a tender, G. The tongue is also shaped so as to embrace a pin, p, on the axle B^2. The tongue keeps the car a proper distance in rear of the locomotive and enables the locomotive to guide the car.

I have provided a brake whereby the speed of the locomotive may be checked. It consists of bars H, fitted in vertical slideways in the main sections of the runners that are attached to the rear axle, B′. These bars are pivotally connected to arms H′, extending from a rock-shaft, H^2. This rock-shaft has affixed to it a rod, H^3, that extends into the cab of the locomotive, where it can be reached by the engineer. The bars H may thus be caused to indent themselves more or less into the ice to retard the locomotive.

The tender G at the front end is, as here shown, hung upon the floor of the cab, and at the rear end it is hung from a connecting-piece, G′, by which pillars G^2 are united.

The axle B^2 is connected to the axle B′ by rods B^3 B^4. The pillars G^2 fit in sockets in the axle B^2, and are pivotally secured therein by pins g. The connecting-piece G′ has shanks fitting in sockets, with which the pillars at the upper ends are furnished; hence the connecting-piece can rise and fall slightly with relation to the pillars, and the latter can swing somewhat to admit of this. Thus shocks may be more or less neutralized, so as not to affect the tender seriously. A rope or cable, G^3, is fastened to the connecting-piece G′ and to the tender. Ropes or cables G^4 extend from the bottom of the tender to reverse ends of the axle B^2, and thereby keep the tender from tilting.

The tender is of course only a particular kind of car—namely, a car for carrying fuel, water,

&c. Therefore I desire to cover here not only the pillars G^2 and connecting-piece G′, and the steadying ropes or cables G^4 for this particular kind of car, but for any other kind of car—as, for instance, the car shown in Figs. 15, 16, 17, and 18 of my drawings. The runners, axles, and brake I also desire to cover in such a car as that last mentioned.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a locomotive designed for traveling over ice or snow, the combination of runners for supporting it, wheels upon an independent shaft serving to propel it, vertically-elongated bearings therefor, a car, and means for connecting the car to the axle of the propelling-wheels, substantially as and for the purpose specified.

2. The combination of the axle B, saddle or wearing-piece a^2, bar A^5, and king-bolt passing through them, substantially as specified.

3. In a locomotive, the combination of an axle, B, bar A^5, journaled to the boiler or a pillow-block thereon, and the rope or cable A^3, substantially as specified.

4. In a locomotive, the combination of an axle, B′, the bars A^7, pivotally connected to the boiler or the fire-box thereof, and the rope or cable A^9, substantially as specified.

5. The combination, with a locomotive and car designed to travel over ice or snow, of the tongue F and the rope or cable D^5, substantially as specified.

6. The runner consisting of main section *c*, attached to the vehicle for which it is a support, and the auxiliary section *c′*, pivoted to the main section *c*, and otherwise unconnected with the vehicle, substantially as specified.

7. The runner consisting of a main section, *c*, auxiliary section *c′*, rod c^3, and spring c^6, substantially as specified.

8. The combination, with axles B′ B^2, provided with runners, of the rods B^3 B^4, extending between the said axles and secured thereto, substantially as specified.

9. The combination, with a suspended vehicle-body and an axle therefor, of ropes or cables G^4, substantially as specified.

10. The combination, with a vehicle and an axle for the same, of the pillars G^2, connecting-pieces G′, and rope or cable G^3, substantially as specified.

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