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W. S. HUDSON.

Improvement in Locomotives.

No. 129,230. Patented July 16, 1872.

Fig. 2.

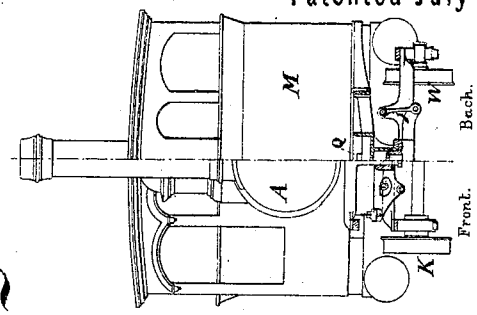

Fig. 1.

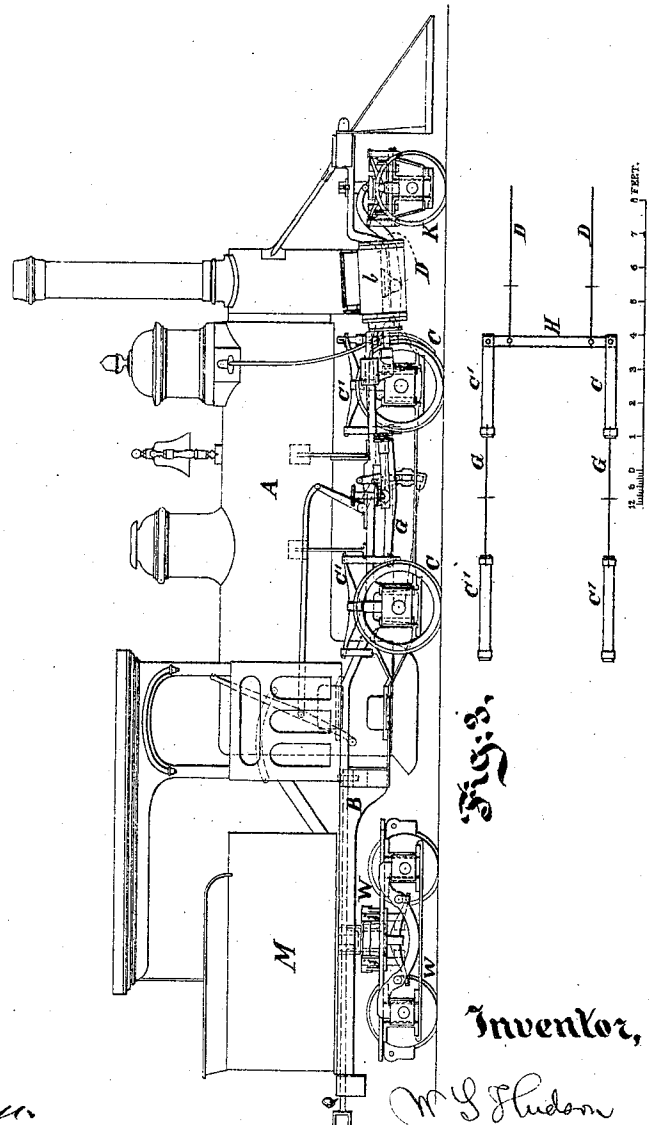

Fig. 3.

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by his attorney

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Fig. 4.

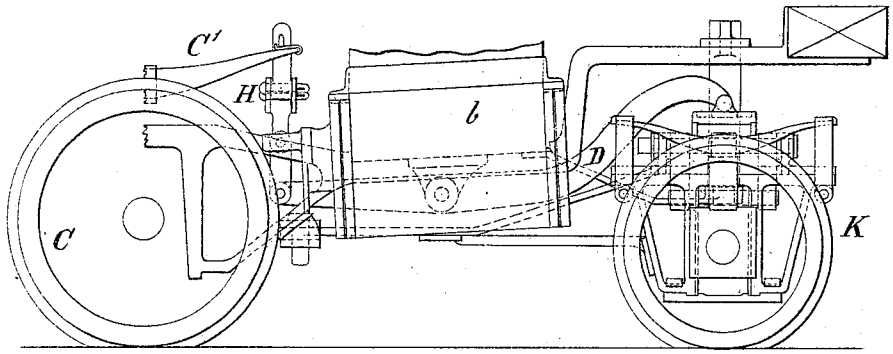


Fig. 5.

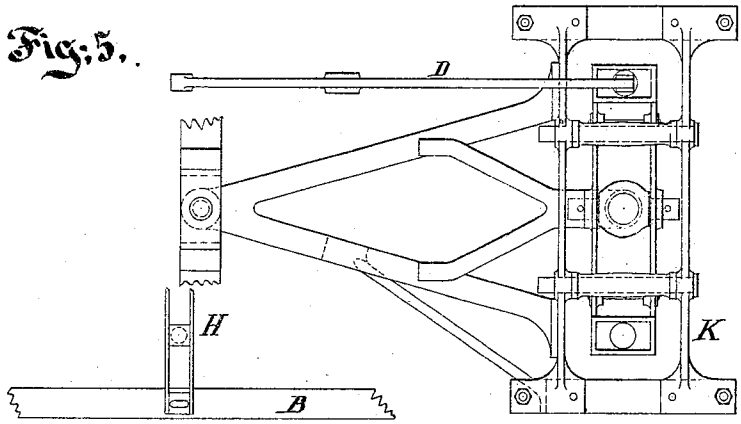


Fig. 6.

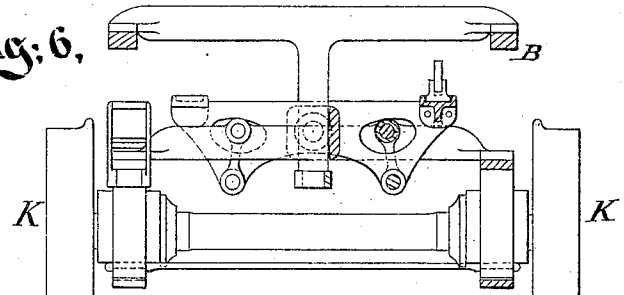
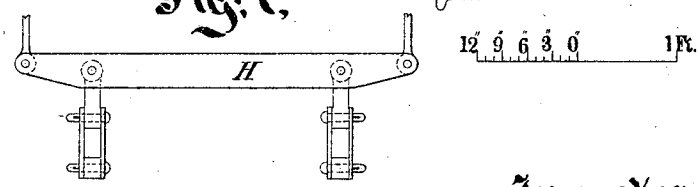


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM S. HUDSON, OF PATERSON, NEW JERSEY.

IMPROVEMENT IN LOCOMOTIVES.

Specification forming part of Letters Patent No. 129,230, dated July 16, 1872.

Specification describing certain Improvements in Locomotives, invented by WILLIAM S. HUDSON, of Paterson, in the county of Passaic and State of New Jersey.

The invention relates to the class of locomotives in which the rigid frame is extended rearward and made to support or form a part of the tender.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawing forms a part of this specification.

Figure 1 is a side elevation of the entire construction. Fig. 2 is an end elevation—half in front and half in rear. The left side of the central line is a front elevation. The right side is a rear elevation. The drawing is equivalent, as will be well understood by draughtsmen, to two complete elevations. Fig. 3 is a plan view or diagram, showing the relation of equalizing-levers, and what I term a partial cross-equalizer. Fig. 4 is a side elevation of some portions at the front of the locomotive on a larger scale. Fig. 5 is a plan view of some of the parts on the same scale as Fig. 4. Fig. 6 is a front elevation and vertical section of some of the front work on the the same scale. Fig. 7 represents a peculiar cross-beam, which I term a partial cross-equalizer, and its connections detached from the other parts.

Similar letters of reference indicate like parts in all the figures.

There is a truck at the rear, which is adapted to both swivel and move from side to side. The fire box of the locomotive is overhung behind the rear drivers, and is thus supported between the drivers and the rear truck. There is a truck or half-truck, composed of one pair of wheels only, in the front of the locomotive. There are equalizing-levers, distributing the shocks between the driving-wheels and the truck at the front, and the equalizing-levers on one side are peculiarly connected with the corresponding equalizing-levers on the other side of the locomotive by the cross-beam or partial cross-equalizer, shown detached in Fig. 6, which performs important functions.

A is the boiler and its attachments. B is the fixed framing, which is secured to the sides of the boiler in the ordinary manner, and extended rearward to form the framing of the tender. This extension may be forged in one with the other part of the framing, or it may be stiffly secured thereto by bolting or otherwise. W is the rear truck, adapted to support the weight of the tender M, and also a portion of the weight of the rear end of the boiler A. Its general construction and functions will be understood from the figures. Sufficient side motion is permitted, as will appear further on, to allow for all the curves in the track. The position of the central line of the structure is determined by the two pairs of driving-wheels C C. M is the part which performs the functions of the tank or body of an ordinary tender. The cylinders *b* stand at a low level, slightly inclined, as represented. The frames B are depressed in passing the cylinders, and take hold very firmly of these important members of the mechanism. At or near the front end of the cylinders the frames B are bent upward, and thus rise abruptly to a height quite above the cylinders. They thence extend forward on a level, and are connected by suitable cross-beams and braces. The front bearing-wheels K, which, with their connections, form what is sometimes known as a single Bissell truck, have ample room to play from side to side and to perform all the vertical and swiveling motions required. It will be understood that this single Bissell truck is connected by a rigid radius-bar to a point a little in front of the forward drivers, being in this respect identical with the ordinary construction of such Bissell trucks. The radius-bar, and many other ordinary and well-understood parts of the locomotive, are omitted in Fig. 1 to avoid confusion. It will be understood that any part not represented or described may be made in the ordinary manner. The equalizing-levers G, mounted below the frames B between the springs C′ C′ over the two pairs of driving-wheels C C, equalize between them. The forward equalizing-levers D D equalize between the front drivers and the single Bissell truck-wheels K. They are crooked so that while their centers are at a low level the forward ends are high, and rest properly on suitable bearings on the truck, and are mounted in positions parallel to each other within the framing B, and nearer together than the other equalizing-levers G. The connections are

formed between these two sets of equalizing-levers G G and D D by means of the partial cross-equalizer H. This latter beam connects across between the springs of the forward drivers. If the connections to the bearing-wheels in front was by a single lever from the middle of this cross-beam H, the latter would tilt freely, and would thus perform the functions of an ordinary cross-equalizer. If, on the other hand, the front levers D were as wide apart as the rear levers G the cross-beam H would perform no function.

My arrangement connecting the front levers D, at points intermediate between the center and the sides, makes the cross-beam H perform with a portion of the effect of a cross-equalizing lever, but still affording side bearings to the front of the entire structure.

It will not be necessary in this specification to analyze mathematically all the strains and motions. The levers D may be placed a little nearer together or a little wider apart than here represented, and in proportion as their distance apart is lessened, the cross-beam H will perform in a greater degree the functions of a cross-equalizing lever. But I esteem it important to mount them in about the positions represented, so that while a portion of the effect of a cross-equalizer is obtained in distributing the shocks, a good part of the effect of side-equalizers is retained to aid in the stability of the locomotive. The rear truck W supports the structure only at the center, and perfect cross-equalization at the front would be incompatible with the proper vertical support of the locomotive. It is important that the forward levers shall support the machine on the two sides independently without perfectly equalizing across. My levers D are sufficiently wide apart for this purpose; but the tilting of the cross-beam H under the several shocks partially conveys across and diffuses the effects of the shocks and concussions among all the springs. The rear truck is free to move laterally and to be guided by the rails. It may be permissible to connect this truck to the locomotive by a radius arm extending forward from the truck-frame and pivoting to a point at a proper distance forward on the main framing B, and having a limited freedom, as described in my patent of April 5, 1864; but it is not necessary, and I esteem it an advantage sometimes to leave it free. It is extremely important, however, that it be capable of lateral motion. The position of the center line of the structure is determined by the driving-wheels C C, and as the structure projects in a rigid form a long way behind the rear drivers, there arises a necessity for allowing a considerable lateral movement of the framing B and the parts supported thereon to one side or the other upon the rear truck. Another way of stating this is to say that a considerable liberty must be allowed for a lateral movement of the truck under the framing. I allow this by the swing links *j*, which suspend the weight to bolsters or rigid cross-pieces on the truck framing. The mechanism is the same as is described for a truck in a different position in a patent to A. F. Smith, dated February 11, 1864. When any inequality or curve in the track causes the truck to move to one side under the framing, or causes the framing B and its supported parts to move to one side upon the truck, the swing-links *j* allow such movements, but compel a lifting of that portion of the framing B, and the inclination of the mechanism is to constantly bring back the truck and framing to their original coinciding positions.

I esteem it an important advantage to connect the draw-bar Q at a point nearer the center of the length of the locomotive than usual. In passing around curves, and at the same time pulling hard on a train, the draw-bar inclines obliquely to one side, as is well understood, and if attached at the extreme rear, exerts a strong lateral force to derange the position of the locomotive.

By extending the draw-bar past the center of the truck, and attaching it nearer the center of the locomotive, its length is so increased that its obliquity is materially lessened under certain conditions, and the effect of the lateral force is always diminished by being received not at the extreme end but nearer the center. This feature is important irrespective of the precise manner in which it is attained, which latter may be modified in various ways. It is especially important in structures having so great length as mine.

I claim, as my improvements in locomotives having a stiff frame-work extended and serving in the place of a tender-frame—

1. The partial cross-equalizing lever H, serving between the side-bearing equalizing-levers D D, mounted within the main framing, and the side springs C′ C′, and levers G, and operating therewith and with the swing-beam of the truck K, substantially as and for the purposes herein specified.

2. The combination of the within-described system of side-bearing supports C′ C′ G H D, at one end, with the center-bearing support at the other end, and a laterally-moving truck at each end, as herein specified.

3. The extension of the draw-bar Q through or past the work of the truck, and without lateral bearing thereon, and the connection thereof to the locomotive at a point nearer the center of its length, so as to lessen the tendency to disturb the position of the locomotive in pulling hard around curves, as described.

In testimony whereof I have hereunto set my name in presence of two subscribing witnesses.

Witnesses: WM. S. HUDSON.

ARNOLD HOERMANN,

C. C. LIVINGS.