J. HARRISON, Jr.

Improvement in Locomotives.

No. 129,133. Patented July 16, 1872.

FIG. 1.

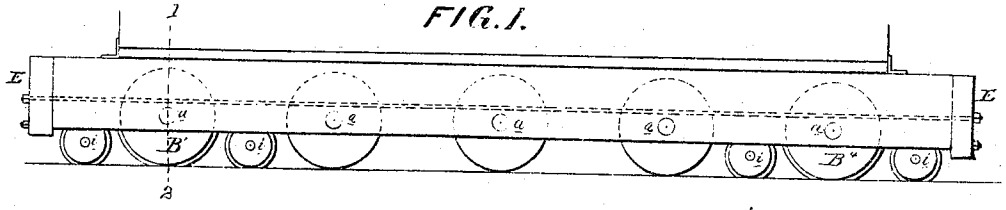
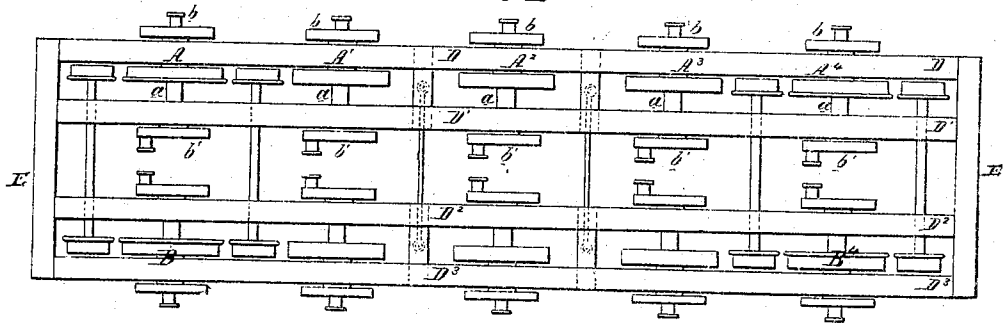


FIG. 2



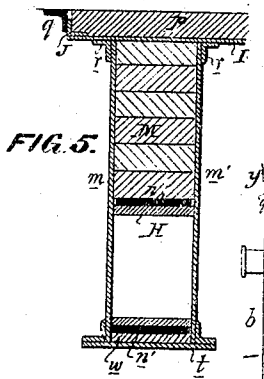


FIG. 5.

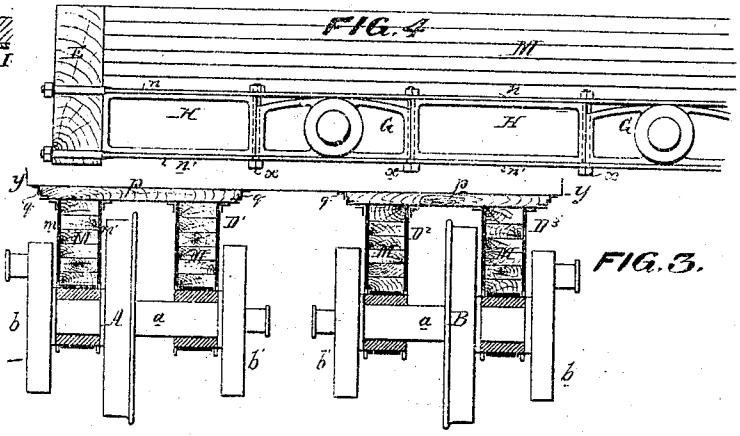


FIG. 4.

FIG. 3.

FIG. 6.

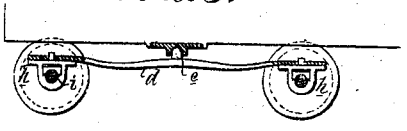
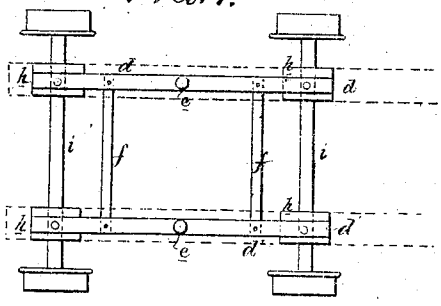


FIG. 7.



Witnesses { Harry Smith
Thomas McElwain

Joseph Harrison Jr.
By his Attys
Howson & Sons

UNITED STATES PATENT OFFICE.

JOSEPH HARRISON, JR., OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN LOCOMOTIVES.

Specification forming part of Letters Patent No. 129,133, dated July 16, 1872.

Specification describing certain Improvements in Locomotives and Cars, invented by JOSEPH HARRISON, Jr., of the city and county of Philadelphia, State of Pennsylvania.

Improvements in Locomotives and Cars.

My invention consists of a peculiar system of running-gear, the construction, operation, and purport of which are too fully explained hereafter to need preliminary description; the said running-gear being applicable to locomotives and cars.

In the accompanying drawing, Figure 1 is a side view of a frame and running-gear for locomotives; Fig. 2, a plan view; Fig. 3, a transverse section on the line 1 2, drawn to an enlarged scale; Fig. 4, a longitudinal section of part of the frame; Fig. 5, a vertical section of one of the beams of the frame; and Figs. 6 and 7, views of one of the trucks.

A prominent feature of my invention, as applied to locomotives, is the peculiar arrangement of the driving-wheels and their shafts, the system of wheels on one side of the engine being entirely disconnected from those on the opposite side, as best observed in Fig. 2, where it will be seen that there are five driving-wheels, A, A′, A″, A‴, and A⁗, on one side of the engine, each secured to a separate shaft, *a*, and each shaft having two cranks, *b b′*, one at each end, the cranks being at right angles to each other. One set of suitable rods, similar to those of ordinary coupled driving-axles, connects the cranks *b* of all five axles together, and another set of similar rods connects the opposite cranks *b′* of all the shafts together.

Another system of coupled drivers, precisely like that described, is arranged at the opposite side of the engine; but, as before remarked, the two sets of driving-wheels are totally independent of each other, the object of this arrangement being to facilitate the turning of curves by permitting one set of drivers to traverse the longer course, presented by the outer rail of the curve, without interfering with or being controlled by the opposite wheels, which traverse the shorter course, presented by the inner rail of the curve—in other words, the two sets of wheels will accommodate themselves to the two rails without interfering with each other.

With the view, however, of inducing the locomotive to easily enter upon and traverse the curved rails, I combine with each pair of end drivers, A and B and A^4 and B^4, a truck, which I prefer to make in the manner illustrated in Figs. 6 and 7, the frame of this truck consisting of two parallel bars, *d* and *d′*, each of which is pivoted to the frame of the locomotive by a central pin, *e*, the two bars being connected together by radius-rods *f f*. The ends of the bars *d d′* carry horizontally-pivoted bearings *h h* for the two axles *i i*, each axle carrying small flanged wheels.

It will be readily understood how the truck at once adjusts itself to any curve it may have to traverse, and how, by giving a lateral bias to the frame of the locomotive, the truck induces the end drivers to follow the curve of the rails. It should be understood, however, that the truck has not to support any material part of the weight of the locomotive; it is so adjusted, in fact, that its wheels will just bite the rails with sufficient weight on each wheel as will surely prevent the flanges from mounting the rails, and thus be able to perform their duty of piloting the end drivers onto and over the curve.

It may be remarked here that I lay no claim to the above-described truck, only so far as it is combined with the pairs of independent end drivers, in the manner described.

The frame which I have adapted to the above-described system of running-gear is of a most simple character; it consists of four longitudinal parallel beams, D, D^1, D^2, and D^3, connected at each end to a transverse bumper-beam, E, and by suitable ties at such intervening points as the wheels, their coupling-rods, and the trucks will permit. In adapting the running-gear to the frame I discard the usual springs, which have been considered indispensable in locomotives, and rely upon the intervention of a cushion between the bearings of the axles and the rigid body of the locomotive, (not a cushion with any material yielding properties, which would render it equivalent to a spring,) but one comparatively rigid, and of material which will suffice to absorb the shocks to which the running-gear may be subjected; wood, for instance, either solid or in layers, will serve the purpose, for the yielding of the wood will be imperceptible,

and yet will suffice to absorb the shocks. In order to carry this feature of my invention properly into effect, however, it is essential that there should be a multiplicity of wheels to support the locomotive, and that the bearings of the axles should be so fixed to the frame that the axles cannot fall on the one hand out of line, and on the other hand are prevented from rising to any perceptible extent by the dense cushion, as more fully explained hereafter. By adopting this plan the wheels will ride over the sudden depressions which frequently occur in rails, especially at the joints, for, owing to the multiplicity of wheels, that which in an ordinary locomotive would be forced into the depression is supported by the adjoining wheels on each side of the said depression, and consequently rides over the same; hence, a heavy locomotive constructed according to my invention has a tendency to maintain the rails in a uniformly level condition, as the wheels, instead of repeatedly hammering an incipient depression into one of formidable character, which is the case with ordinary locomotives, refuse to enter any depression.

I will now proceed to describe the manner in which I prefer to construct the frame and apply the bearings to the same with the view of carrying out this feature of my invention. Each longitudinal beam is composed of two continuous and comparatively deep plates, *m m'*, of sheet-iron, Fig. 5, and two flat bars, *n* and *n'*, of wrought-iron, are situated between the plates, and extend from end to end of the longitudinal beams, the end of each bar being converted into a bolt, which passes through the bumper-beam, and is furnished outside the latter with a nut, as best observed in Fig. 4, so that these long bars, in addition to the duties which they have to perform, as explained hereafter, are actually tie-bolts for securely confining the bumper-beams to the longitudinal beams. It should be understood that these long bars *n* and *n'* are not rigidly connected to the side plates *m* and *m'* of the beam. One set of running-gear on one side of the engine is carried by the two beams D and D^1, and a like set of running-gear on the opposite side of the engine by the beams D^2 and D^3, the axle of each driving-wheel having a bearing in each of the two beams, and the wheel being situated between the latter, as best observed in Fig. 3. Each bearing consists of a simple casting, G, having suitable bearing-boxes adapted to the axle; and this bearing is confined to its place laterally by and between the two plates *m* and *m'* of the beam, vertically by and between the two bars *n* and *n'* and certain cross-pieces described hereafter, and longitudinally by light castings H or other filling-pieces intervening between the bumper-beam and the end of the bearing, as well as between the bearings, as best observed in Fig. 4. Where these filling-pieces H meet the bearings G, a vertical bolt, *x*, passes through the two bars *n* and *n'*, so as to bind the same to the filling-pieces.

The line *y y*, Fig. 3, represents the under side of the engine-boiler and water-tank, for I propose to dispense with the usual tender, and to support both boiler and engine, and supply of water and fuel on the above-described running-gear. Two comparatively thin cushions of wood, *p p*, extend from end to end of this foundation *y y;* and beneath the cushion extends a plate, I, having angle-iron bars J, both plate and bars being confined laterally by angle-iron bars *q*, secured to the under side *y* of the foundation or base of the engine-boiler and tank. It should be understood that the angle-iron ribs *q* only serve as lateral guides for the plate I, and that the engine-boiler and tank bear with their whole weight on the cushions *p*. Each plate I thus cushioned bears on two of the longitudinal beams, as shown in Fig. 2, the plates *m m'* of each beam being confined laterally to the plate by angle-iron bars *r;* and between the said plates *m m'* of each beam are layers of wood packed closely together and extending longitudinally from bumper-beam to bumper-beam, and vertically from the bar *n* to the plate I. Each bearing G is slightly rounded at the top, as shown in Fig. 4, so that any shock to which the wheel appertaining to the said bearing may be subjected is transmitted through the bearing first to the bar *m* at a point directly above the center of the axle, then to the cushion consisting of the layers of wood M, and, finally, to the cushion *p*.

It will thus be seen that each layer of wood *p* serves as a cushion for one set of running-gear, and the other similar layer as a cushion for the other set of running-gear, while each bearing finds a separate cushion in the layer of wood M contained within the side plates *m m* of one of the longitudinal beams.

In order that the bearings shall not be sustained solely by the bar *n'*, I secure a cross-piece, *t*, to the plates *m m'* of each beam wherever a bearing occurs, and between this plate I and the bar *n'*, directly below the bearing, intervenes a packing-piece, *w*, which prevents the wheels from falling into depressions in the rails.

My invention may be applied to freight-cars in a manner which will be readily understood by supposing Fig. 1 to represent a side view and Fig. 2 a plan view of the frame and running-gear of a freight-car, the axles of which, however, may extend across the frame in the usual manner, although I prefer an independent set of running-gear on each side of the car, and the combination of the same with trucks, in the manner described above.

I have not deemed it necessary to illustrate or describe either the engines, boiler, or tank, as the detailed organization of these parts of the locomotive is not dependent on the running-gear, and as separate applications for patents will be made for these features. It may be well to remark, however, that in the loco-

motive which I am now constructing I have separate and independent engines for driving the two sets of running-gear, that I surround a boiler of peculiar construction with the water-tank and fuel-reservoir, that the whole bears on the ten driving-wheels shown in the drawing, and that I connect the pistons of the cylinders to the cranks of the end axles.

It will now be seen without further description that the whole of the bearings for the axles are essentially fixed bearings, for, while the cushions are of a character which enables them to absorb the shocks to which the axles are subjected, they are sufficiently rigid to prevent the axles from rising to any perceptible extent, while their depression is rendered impossible by the cross-plates *t*, attached to the permanent frame.

It may be remarked that, although I have illustrated and described the cushions as made entirely of wood, and that, although I prefer the use of this material for the purpose, other material may be employed, providing it is not of a character to yield to any material extent—leather, for instance, or even strips of vulcanized rubber, may be interposed between the layers of wood or other material.

While I prefer five or even more drivers on each side of the locomotive, four drivers on each side might be employed.

I claim as my invention—

1. A locomotive having two sets or lines of driving-wheels, those on one side of the locomotive being arranged to revolve independently of those on the opposite side, as set forth.

2. A locomotive having two sets of independent drivers, as specified, the wheels of each set being connected together by two sets of cranks and rods, as described.

3. The end drivers, revolving independently of each other, and arranged between the wheels of a piloting-truck, as set forth.

4. A locomotive or car frame composed of two pairs of longitudinal beams connected together, one pair of beams carrying the bearings of one set of drivers, and the other pair carrying the bearings of the opposite and independent set of drivers, as set forth.

5. A locomotive or car in which the bearings of the axles are confined vertically to the frame in one direction rigidly, and in the opposite direction by comparatively unyielding but shock-absorbing material, as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH HARRISON, JR

Witnesses:
WM. A. STEEL,
HARRY W. DOUTY.