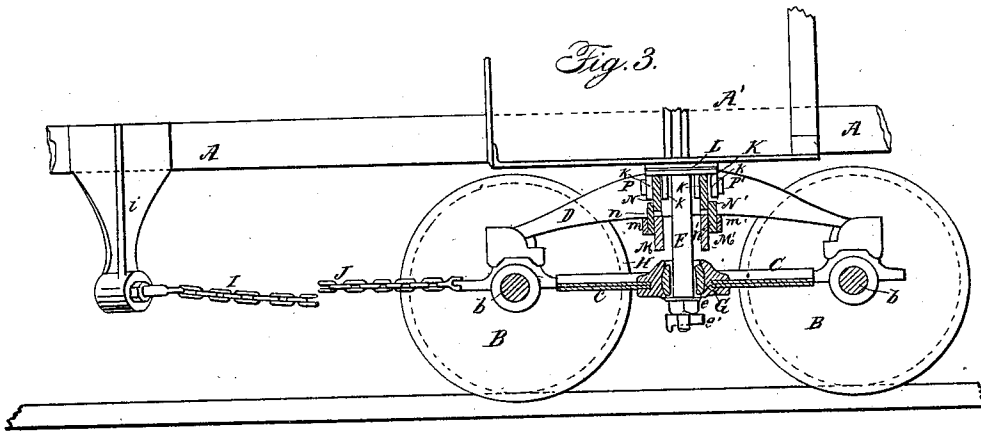
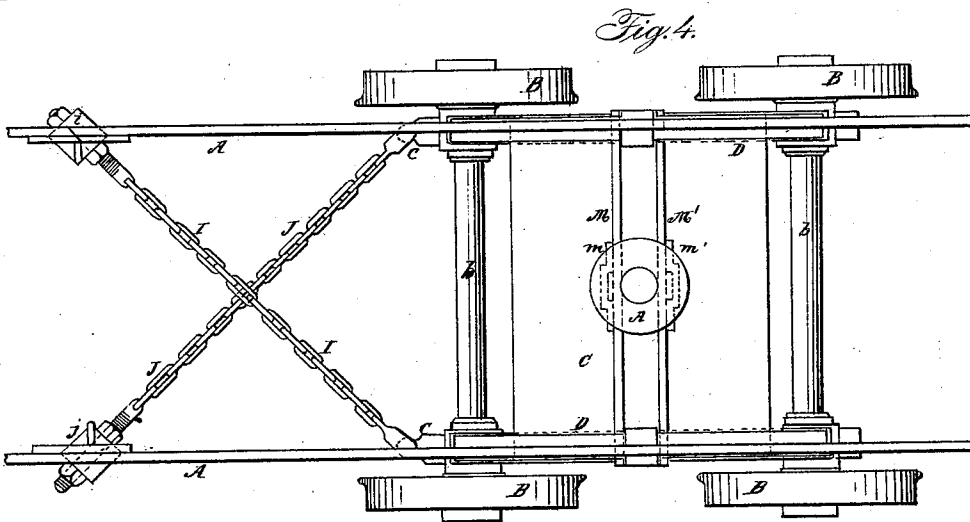
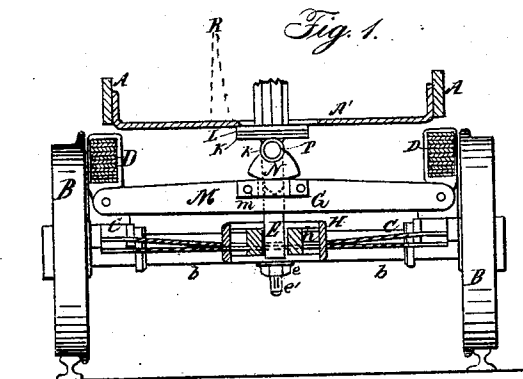
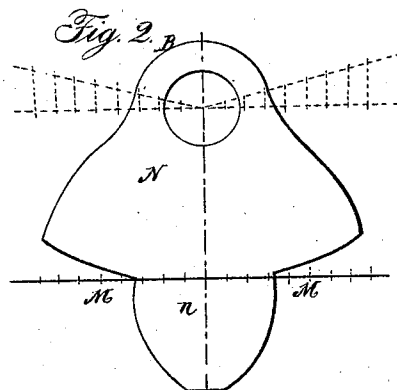


A. S. SWEET, Jr.

Car Truck.

No. 40,290.

Patented Oct. 13, 1863.



Witnesses:

D. W. Litch

Attenduction

Inventor:

A. S. Sweet Jr
per J. D. Litch. Attorney.

UNITED STATES PATENT OFFICE.

ALLEN S. SWEET, JR., OF DETROIT, MICHIGAN.

IMPROVEMENT IN SUPPORTS OF LOCOMOTIVES UPON CAR-TRUCKS.

Specification forming part of Letters Patent No. 40,290, dated October 13, 1863.

To all whom it may concern:

Be it known that I, ALLEN S. SWEET, Jr., of Detroit, in the county of Wayne, in the State of Michigan, have invented a certain new and useful Improvement in Locomotives; and I do hereby declare that the following is a full and exact description thereof.

The first part of my improvement relates to the means whereby center-bearing trucks are connected to the other portions of such structures. In traversing a straight portion of the road the forward portion of the locomotive should lie in the center line of the truck and be held in that position with some force; but it is well known that in traversing curves the driving-wheels at the rear and middle, by each clinging properly upon the rails, compel the structure to assume a position tangential to that part of the road which is embraced between the two pairs of drivers, and consequently carry its forward end outside of the center of the road. Various methods have been adopted to prevent or to allow and control this movement of the weight upon the truck and to steady the entire machine and properly guide and control the truck under all conditions. The means which I have invented are cheap and durable, and serve the purposes desired more perfectly than any before known to me.

A second part of my improvement relates to the guiding or swiveling of the truck. The cones and flanges of the wheels of the truck usually suffice to guide it, but the proper keeping the rails is a matter of immense importance; and my invention aids in holding the truck in the right position while allowing the variations which are required. The same devices aid to hold the truck correctly when as a last contingency the locomotive has actually left the rails. My device for this purpose is light and cheaper than any before known to me, and may be attached to locomotives of any ordinary construction.

The accompanying drawings form a part of this specification.

Figure 1 is a vertical central cross-section through the truck and the parts immediately supported thereby. Fig. 2^b is a view of a portion on a larger scale. Fig. 3 is a central vertical longitudinal section through the truck and the parts connected thereto. Fig. 4 is a plan view of the same.

Similar letters of reference indicate like parts in all the figures. The tints are used merely to distinguish parts.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation by the aid of the drawings and of the letters of reference marked thereon.

A is a portion of the frame of a locomotive. It is rigidly attached to the boiler and may be of any construction. It represents the weight which is to be supported upon the truck.

B B are the wheels, *b b* the axles, C the frame, and D the springs, of a truck. All these parts, as also the pintle or king-bolt E, may be of any approved construction with the exceptions to be noted below.

A slot, *h*, is provided in a housing, H, in the frame C, to allow the king-bolt E, and consequently the entire supported mass, to move laterally upon the truck. This slot is adapted to receive and properly inclose the cylindrical box G, through which latter the king-bolt E plays in its vertical movements by the action of the springs D. A split key, *e'*, prevents the king-bolt E from becoming disconnected from the truck under any circumstances. The slot *h* is just sufficiently long to allow a side movement of the cylindrical box G and its connections equal to all the divergence or side movement of the locomotive upon the truck which is required, and is of a cylindrical form to allow the truck to pitch and oscillate by the free turning of the cylindrical box G within it.

M M' are two stout cross-beams adapted to support the entire weight transmitted through A and transfer it to the springs D D, as represented. Pieces *m m'*, formed as represented, are bolted upon their outer faces at the points indicated, leaving a rectangular pocket between each beam and its side piece. N N' are stout pendulous cams vibrating upon stout bolts or axes P P', and traversing each upon the top of a cross-beam, M. Each of these cams is guided by a spur, *n* or *n'*, which prevents the displacement of the bearing-surfaces by being restrained in the rectangular pocket above referred to.

The weight of the entire forward end of the locomotive is carried upon these cams N N', and by their aid is allowed to traverse side-wise when required. I attach great importance to invention because of its allowing the

extreme refinement in the form of the cams which I have adopted, and the consequent delicacy in the action, united with great strength and durability. If these cams are segments of a circle and are hung at their centers, the front end of the locomotive will move sidewise upon the truck without proper resistance. I avoid this evil and secure the desired conditions under all circumstances by the following plan:

I make my cams $N N'$ of suitable length to meet the space between truck and smoke box, which varies according to the construction of the engine. I draw a perpendicular line through the center of cam and a right-angle line across it corresponding with the lower or extreme outer bearing-surface of cam. Coincident with this line I make a perfect plane in the center of the bearing-surface on which the weight of the front end of the engine rests, when upon a straight part of the road, with sufficient firmness to maintain its stability when running over imperfect road on straight lines, thereby avoiding a tendency to sinuous motion from the above cause. Then by intersection of lines, as shown on Fig. 2^b, I lay out the balance of the tread or bearing surface of cams on either side of the plane surface, so as to enable the gravity of the front end of the engine to counteract or counterbalance the centrifugal force, and the tendency of the front end of the engine to remain outside of the center line of road after it has turned a curve. The peculiar shape of the cams makes my invention a perfectly compensating arrangement. These cams can be used either side up to meet peculiarities in construction of engines.

I make the surface of the top of the cross-beams $M M'$ perfectly plane, and it may be observed that the cams $N N'$ and the working-surfaces of $M M'$ may be made of any desired material.

It will be seen by reference to the drawings that the plate K , which receives the cams $N N'$, is made with a hole in the center to slip over the center-pin E . On either side of the center of the plate (which should be made of wrought-iron) are two ears $k k$, to receive the cams $N N'$ and bolts $P P'$. The top surface of this plate K is faced off, as also the center plate, which is made of cast-iron and bolts on to the smoke-stack, with a boss running upward through the same to receive and sustain the center-pin E . Between these two surfaces is to be inserted a steel or composition plate, L , to enable the plate K and its connections to revolve or swivel sufficiently to accommodate the position of the truck when curving either to the right or left, thereby presenting the bearing-surfaces of the cams $N N'$ always fairly and properly upon the cross-beams $M M'$. These two plates $K L$ should slip freely, so as to fit easily around the center-pin E . The cams $N N'$ can be removed by simply raising the engine three or four inches and removing the bolts $P P'$; or

the whole can be slipped off the center-pin E by raising the latter out of the truck.

I will now describe my means of guiding or aiding to guide the truck.

I is a chain extending from the right-hand rear corner of the truck-frame C to a rigid arm, i , extending down from the left side of the locomotive-frame A at any convenient point considerably in the rear of the truck, as represented.

J is a similar chain extending crosswise of the chain I , and connecting the left-hand rear corner of the truck-frame C to a rigid arm, j , extending downward from the right side of the locomotive-frame A at a point opposite to i . Each chain is provided with a screw-bolt and with nut and jam-nut for adjusting its length, and both are so adjusted that they are a little slack while the locomotive is running properly on a straight portion of the road, and exerts under such conditions no influence whatever, except in cases of obstructions on or defects in the rails over which the truck-wheels pass. In the latter case this arrangement of chains almost entirely precludes the possibility of the swiveling of the truck, and the wheels maintain exactly or very nearly their natural position, and so soon as the faulty point is passed they assume their positions as if nothing had happened. Even if the locomotive is thrown off the rails from any cause, the chains I and J become of service to hold the truck in very nearly the right position, and by so doing they diminish the damage resulting from such an accident. They also, by reason of their peculiar arrangement, perform a novel function and contribute to avoid the liability of getting off the rails upon a curve. So soon as the locomotive commences to traverse a curve the movement of the forward end of the frame A outwardly upon the truck in the manner described in the early portion of this paper moves the arms i and j somewhat in the same direction, and thus pulls one chain and slackens the other, so as to incline the truck in the right direction to correspond with the curvature of the road, and thus tends to compel the truck to run properly in addition to the guidance due to the flanges of the wheels. Suppose, for example, the road curves to the right. The truck commences to follow it in obedience to the ordinary guidance, and the forward end of the locomotive traversing upon the supports $N N'$ assumes a position so far to the left or outside of the center line of the truck as corresponds with the extent of the curvature of the road according to the well-known law referred to above, and thus moves the hangers i and j also to the left, but to a less extent. This movement is just sufficient to tighten the chain I and slacken the chain J , and the tension on I , by pulling back the inner side of the truck, keeps it favorably to its work.

A similar or nearly similar result may be produced by leading the chains I and J from the rear corners of the truck forward, instead

of backward; also by leading them from the rear corners of the truck-frame to a single point under the center line of the locomotive; also by leading them from the center of the rear of the truck-frame to the side hangers *i* and *j*, it being necessary simply that the chains lead from the rear of the truck-frame, so as to cause the swiveling in the right direction, that they lead a considerable distance forward or backward, and be nearly horizontal, so that they shall not prevent the plunging or vertical oscillations of the truck, and that they stand greatly inclined on the horizontal plan, so as to act at a proper advantage. These chains, thus arranged, contribute to guide the truck around the curves and diminish or do away altogether with the grinding of the flanges of the wheels of the entire locomotive against the inside of the outer rail.

It will be observed that an adjustment of the chains *I* and *J* may be performed by the engineer with any degree of nicety to suit any road, and that this may be done with very ordinary skill. Springs may be inserted at the junctions of these chains with the frame either of the locomotive or of the truck, or of both, if desired, in order the better to adapt the machine to all the conditions which obtain for brief periods, as, for example, the momentary increased tension on a chain in leaving a quick curve and commencing to run on a straight line; but I believe the natural elasticity of the parts sufficient for all cases met with in ordinary practice.

My entire invention, as represented and described, is applicable to all kinds of trucks in use, at slight cost, and involves a necessity for no radical changes in the construction in order to apply the improvement, and is less expensive to build new than any other possessing kindred properties. It adds but little or no weight to the lightest truck, and in many instances saves hundreds of pounds of weight. And lastly, it is believed to be a more safe arrangement than any other now in use.

The drawings only show my improvement upon what is called the "dead-truck," because that truck is chiefly used; but it is quite as easy to put it on any other of the improved

constructions of truck. To put it on what is called the "spring" or "Roger's" truck, no cross-beam is necessary, but simply a change in center-plate is all that is required to fit the truck to receive the improvement, making it much more simple than the one shown in the drawings.

I am aware that Messrs. Davenport & Bridges and many others have employed partial rollers to support a portion of the weight of a car or locomotive upon trucks; but in such the surfaces were concentric to the bolt which formed their axes and the partial rollers were used to allow the swiveling of the truck, merely, and were neither used, like my cams, for the purpose of enabling the front end of the engine to move sidewise upon the truck, nor so constructed and arranged, like my cams, as to induce by its gravity an active tendency to return to its usual central position.

I do not confine myself to the precise number of the cams *N N'* represented, as one such cam may suffice, or four or more may be used if preferred; but,

Having now fully described my invention and explained in what manner I propose to carry it into effect, what I claim as new and as my invention, and desire to secure by Letters Patent, is as follows:

1. Mounting a locomotive upon its truck through the aid of one or more cams, *N N'*, arranged to roll transversely to the motion of the trucks, substantially as represented, and having their bearing-surfaces formed substantially as described, and for the purpose herein set forth.

2. The within-described arrangement of chains *I* and *J*, connecting the rear end of the truck-frame *C* to the locomotive-frame *A*, substantially in the manner and for the purpose herein set forth.

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

ALLEN S. SWEET, JR.

Witnesses:

JOHN FULLER,

JOHN B. SUTHERLAND.