2 Sheets--Sheet 1.

W. S. HUDSON.

Improvement in Locomotives.

No. 129,234.

Patented July 16, 1872.

Fig. 3.

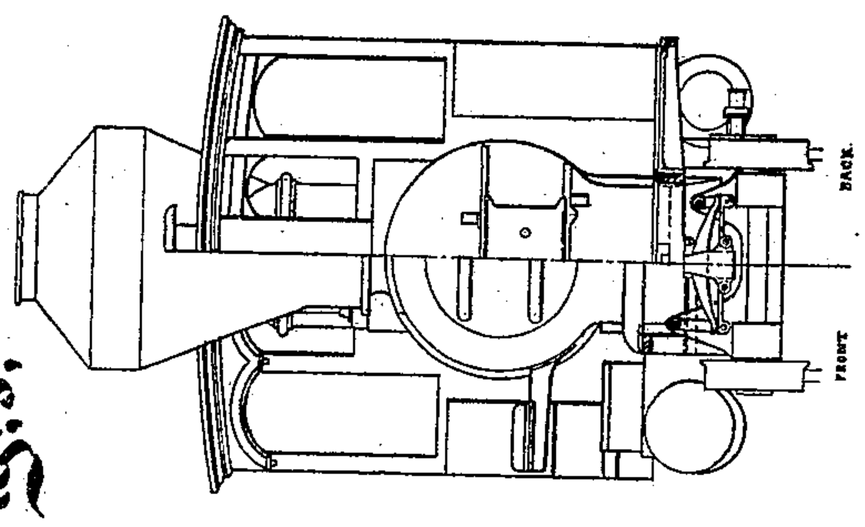


Fig. 1.

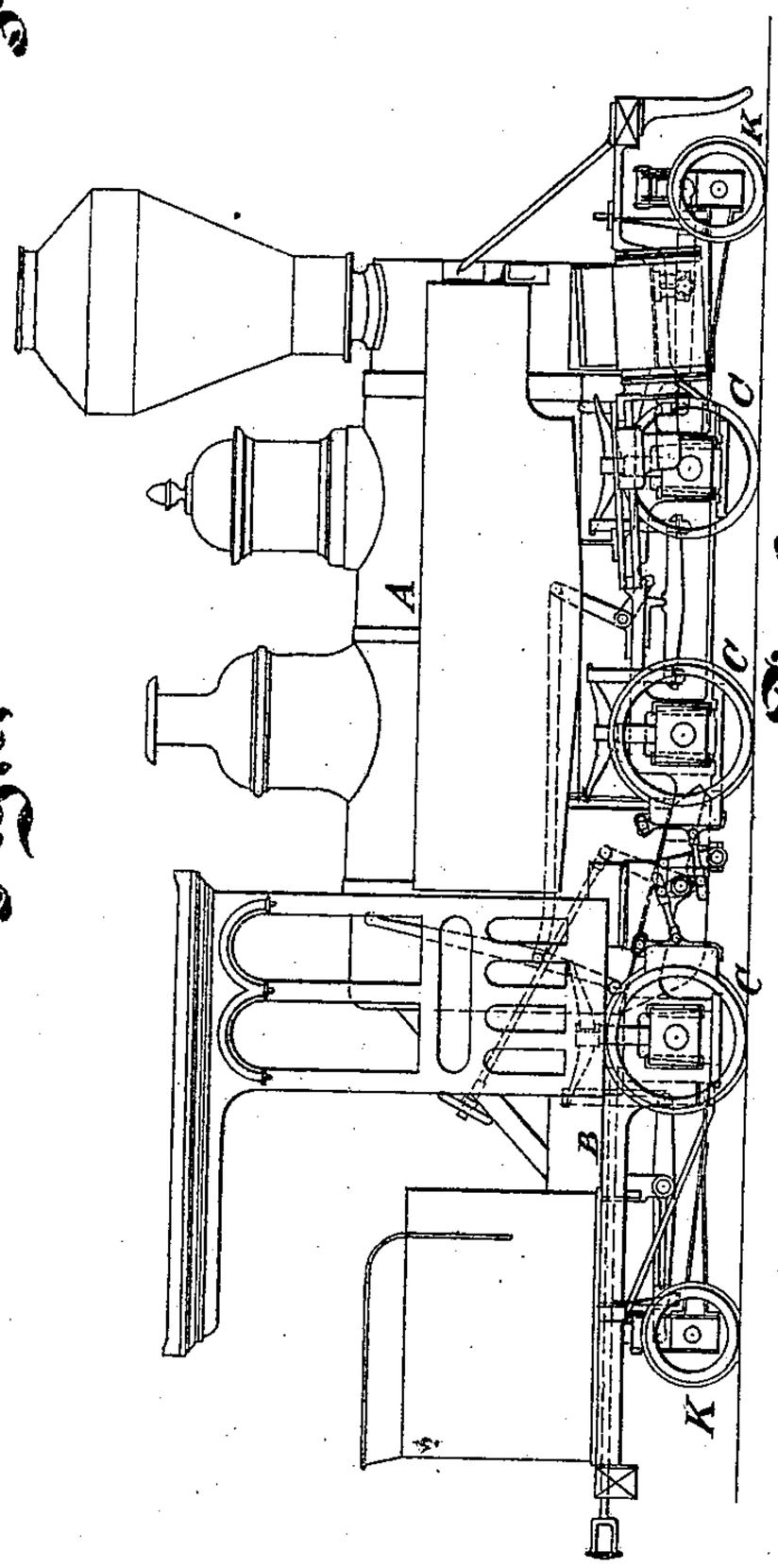
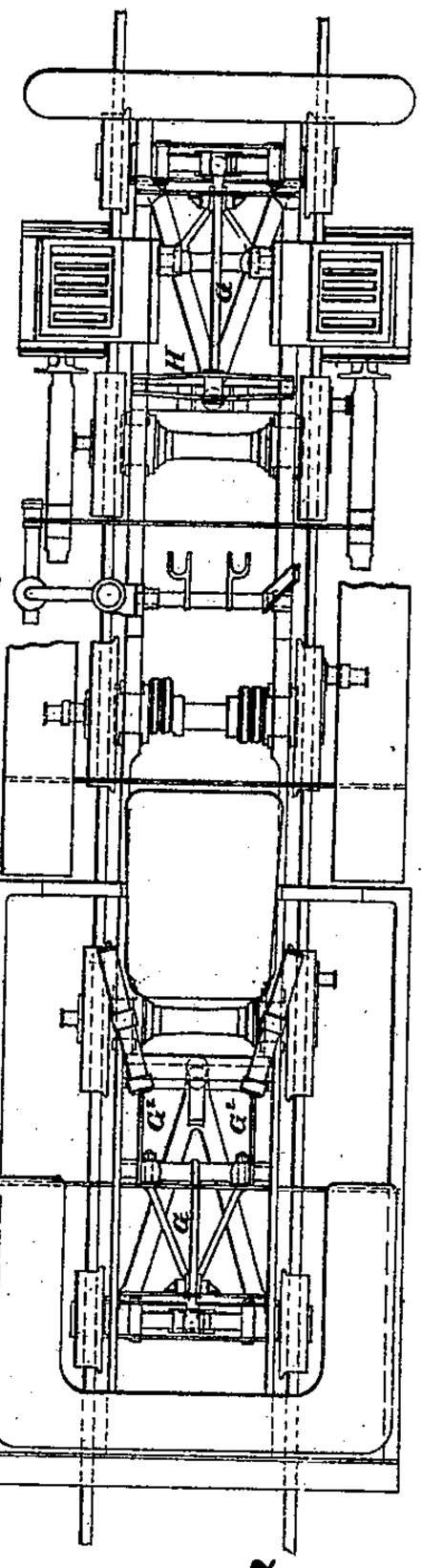


Fig. 2.



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H. M. McMillan,

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W. S. HUDSON.
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Fig:4.

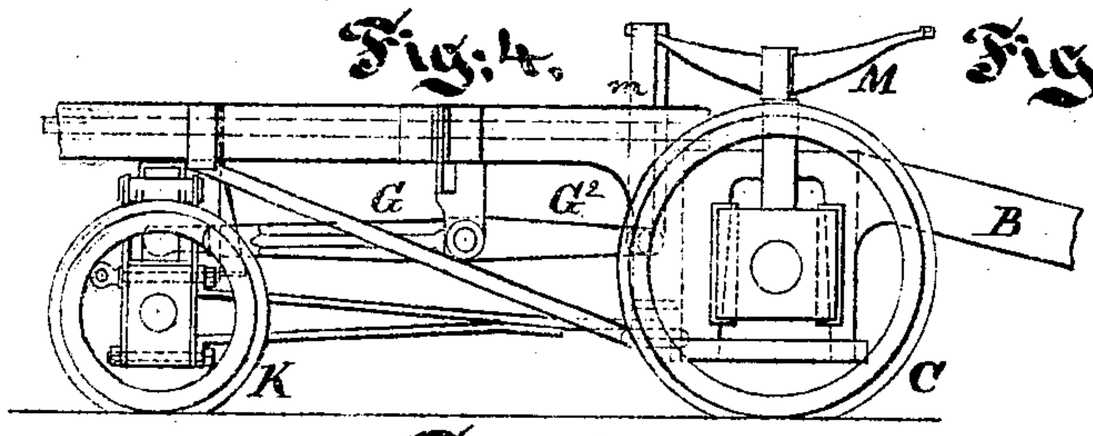


Fig:6.

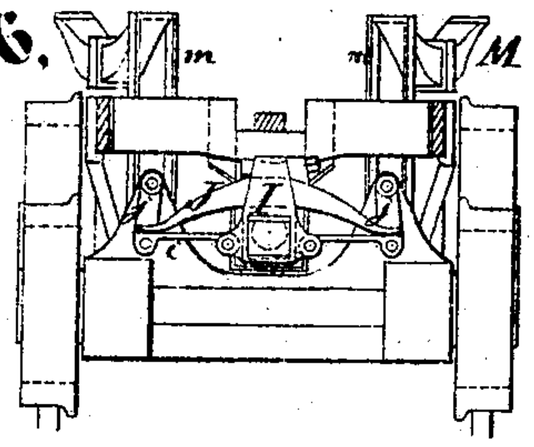


Fig:5.

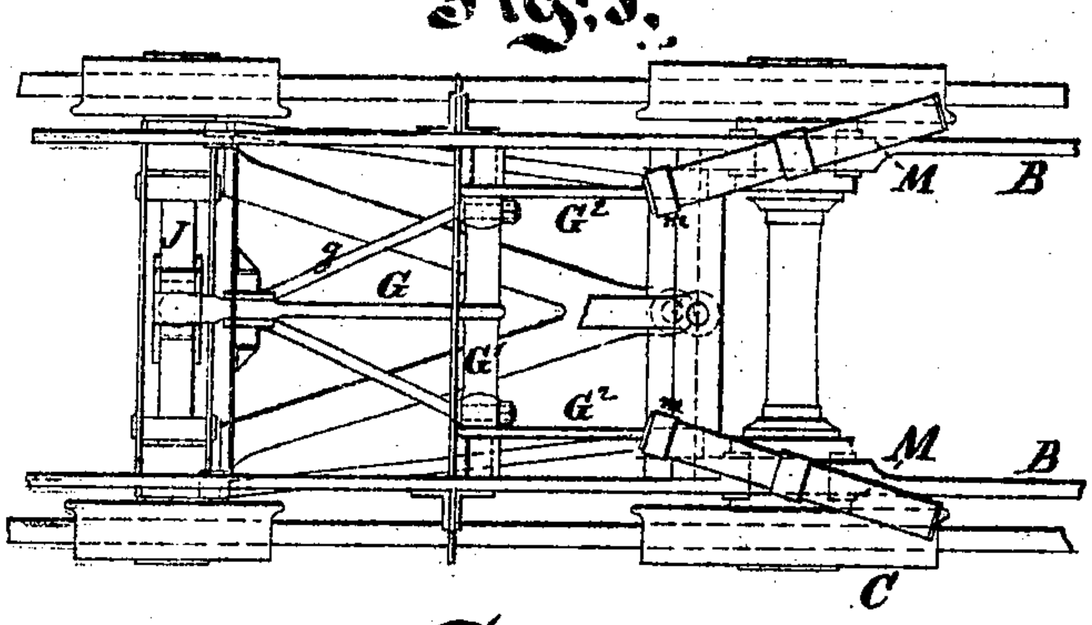


Fig:10.

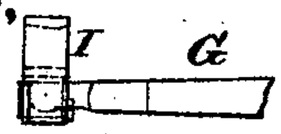
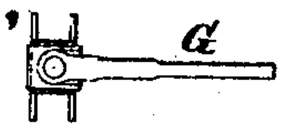


Fig:11.



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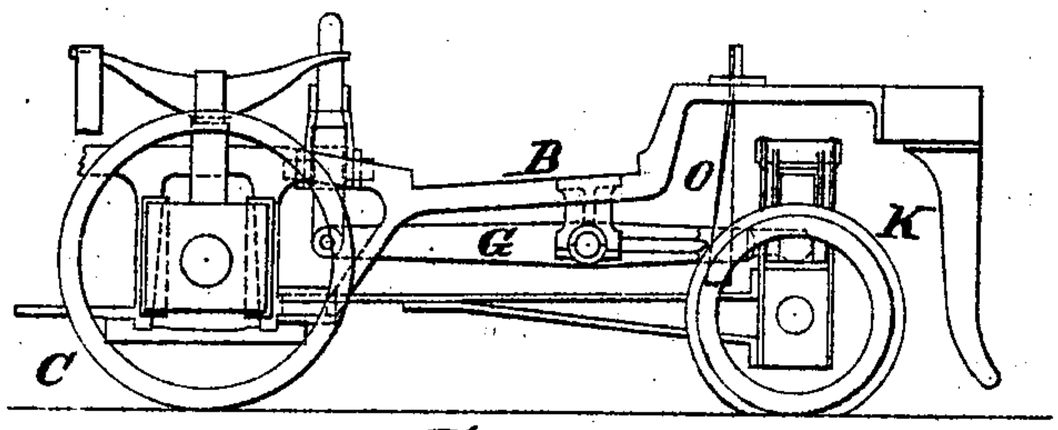


Fig:9.

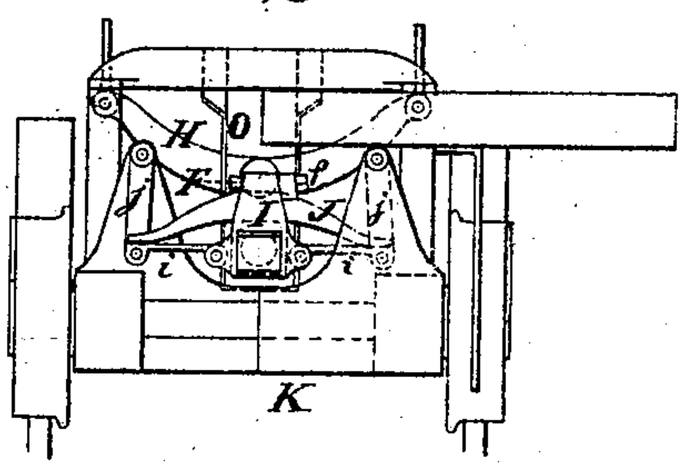


Fig:8.

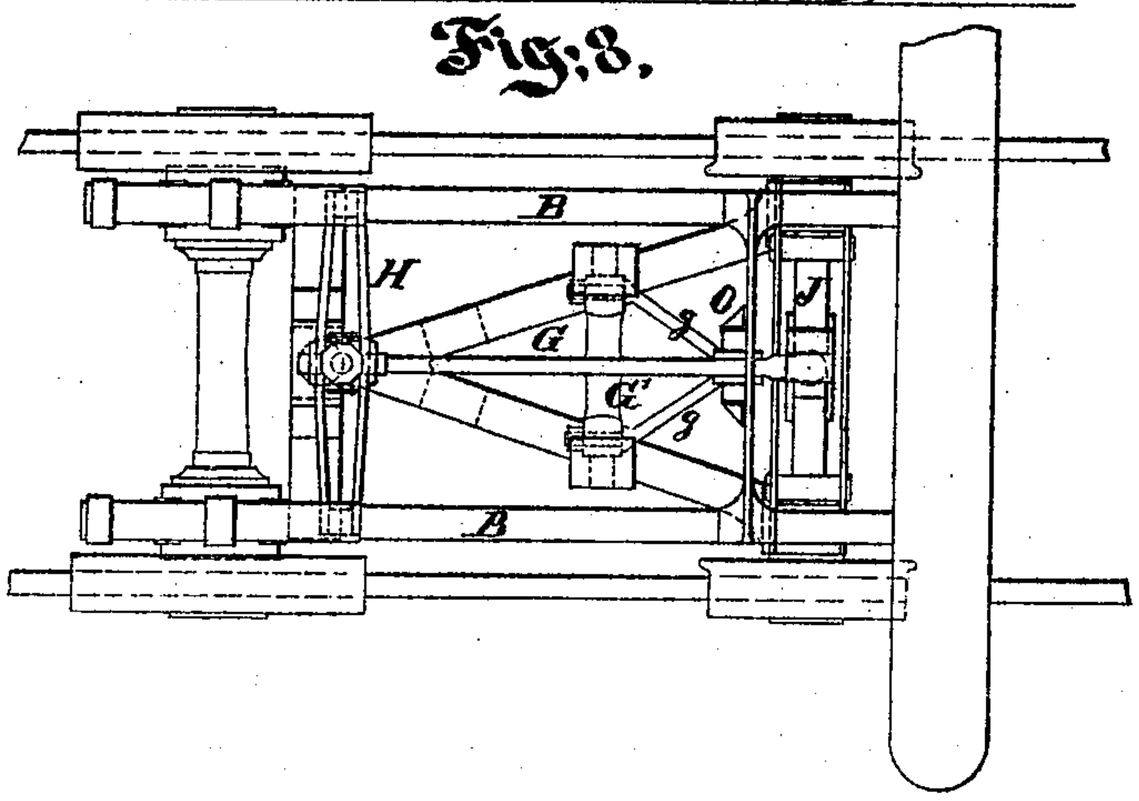


Fig:12.

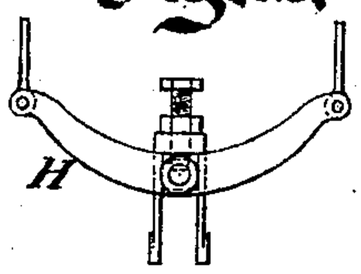
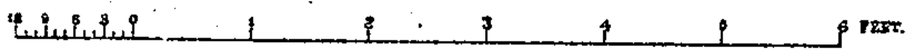


Fig:13.



Witnesses:

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Inventor:

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New York

129,234

UNITED STATES PATENT OFFICE.

WILLIAM S. HUDSON, OF PATERSON, NEW JERSEY.

IMPROVEMENT IN LOCOMOTIVES.

Specification forming part of Letters Patent No. 129,234, dated July 16, 1872.

Specification describing a certain Improvement in Locomotives, invented by WILLIAM S. HUDSON, Superintendent of the Rogers Locomotive Works at Paterson, Passaic county, State of New Jersey.

The improvement relates to details of the construction, which, among other advantages, facilitate the manufacture and repairs, and promote the stiffness, strength, and durability of the structure. The general structure is analogous to what has been before successfully tried. The rigid frame of the locomotive is extended rearward to form a support for a rear tank and for the necessary fuel. There is a Bissell half truck at each end.

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 structure. Fig. 2 is a plan view, showing the running-gear with the cab and boiler removed. Parts of the side tanks are shown, which extend along the side of the boiler and smoke-box. Fig. 3 is an end view serving as a double drawing. The left-hand side is an elevation of half the front end. The right-hand side is an elevation of half the back end.

The remaining figures represent certain details on a larger scale.

Fig. 4 is a side elevation, showing the rear driving-wheels and the rear truck with the connecting work. Fig. 5 is a plan view of the same. Fig. 6 is a rear view of the same. Fig. 7 is a side elevation of the forward driving-wheels and the forward truck with the connecting and adjacent parts. Fig. 8 is a plan view of the same. Fig. 9 is a front view of the same. Figs. 10, 11, 12, and 13 represent certain parts detached. Fig. 10 represents the bearing of the equalizing-lever over the center of the rear truck. Fig. 11 is a plan view of the same. Fig. 12 is a front view of the cross-equalizer and its connections. Fig. 13 is a side view of a part of the same.

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

A is the boiler; B, the rigid frame; C C, &c., the three pairs of driving-wheels; and K K, the truck-wheels. There are three pairs of driving-wheels with a system of equalizing-levers, equalizing the shocks between the center and front pair and the forward truck. This system equalizes across and gives the effect of a center bearing by allowing the structure to tilt or incline laterally with perfect freedom, according as it is required by the rear system of bearings and equalizing-levers. The rear system of equalizing-levers equalizes between the pair of rear driving-wheels and the rear truck. It gives the effect of side bearings and supports the locomotive laterally.

The construction and arrangement of the equalizing levers and springs at each end of the structure are peculiar.

Referring first to the forward end of the structure, and inviting attention particularly to the plan view, Fig. 2, H is a cross-equalizing lever, which equalizes between the springs and equalizing-levers at the two sides. G is a central fore-and-aft equalizer, which extends forward from the center of the cross-equalizer H to a bearing over the truck-axle, and is supported by a stout rock-shaft, G′, which is capable of rocking slightly in bearings fixed on the frame-work B. As the forward truck rises and sinks in passing over irregularities in the road, the lever G oscillates the shaft G′, turning slightly in its bearings to allow of this motion.

While it is a chief peculiarity of the Bissell half truck that it is capable of moving from side to side under certain restrictions, as is well understood, it is important that the lever G and its connections be held against any lateral motion, and be capable simply of oscillating up and down.

It is usual to provide elaborate constructions over the truck-center to guide the work in this respect, so that while the truck shall move laterally, the swing-beam and the connected work above shall be stiffly held in a fixed relation to the center line of the structure. I accomplish these ends by means of the lever G, and its connections properly braced. The forward end of the lever G is turned to the form of a sphere, with the top flattened or removed. The lower half of the sphere rests in a corresponding hollow bearing in a block suspended under a transverse spring, J, shown in Figs. 2, 3, 8, and 9. I brace the forward end of the lever G by means of diagonal braces *g g*, connecting between the ends of the rock-shaft G′ and the forward part of the lever G. Any tendency of the spring J and its connec-

tions to move to one side or the other is received by the ball-joint on the forward end of the lever G, and is resisted by the stout rock-shaft G′, to which it is transmitted through the aid of the braces *g g*. Behind the rock-shaft G′ the construction and effect is of the ordinary character. It may be proper to remark here that the forward driving-wheels are made wide in the tread and without flanges. The position of the structure is controlled on curves by the center drivers and the rear drivers, both of which are flanged. The transverse spring J serves in place of what is ordinarily a rigid swing-beam, with the advantage that its elastic action contributes to the softening of any shocks received. As springs are liable to be short-lived from the failure of one or more of the leaves at intervals, and require to be frequently taken out and repaired or exchanged, it becomes important to provide for effecting this with little labor, and with the removal of but a small quantity of carefully executed work. My invention allows the spring to be made in the plainest possible manner. It is formed, as usual, of a series of thin plates, superposed one upon another, and sustained in position by means of teats or small projections in the one fitting in elongated holes or short grooves in its neighbor. The ends are formed plain and simply rest upon bearings provided in the bottom of the swing-links *j j*. The links *j* are longer than usual and are suspended to high points, so as to hold the work at a proper level, and give great freedom for lateral motion. The lower ends of these swing-links *j* are tied to the center-work by means of horizontal links or tie-pieces *i*, which connect to joints on each side of a peculiar central box or deep strap, marked I, the several functions of which will now be explained. The box I first incloses in its lower portion the bearing-box for the hemispherical end-bearing at the forward end of the lever G. Above this it incloses the several leaves of the transverse spring J, and above this it incloses a wedge-piece, F, which is held in position by the aid of a screw, *f*, and binds the leaves of the spring J firmly together. Whenever the spring J needs renewal or repairs, it is not necessary to destroy any of the work. The structure being jacked up so as to relieve the parts I J from strain, the screw *f* is withdrawn, the wedge-piece F removed, and then the spring J may be removed and repaired or exchanged at pleasure, to be returned and secured by the reverse of the above operations. O is a guard-strap, which is bolted upon the cross-piece on the framing B, and incloses the lever G as a safe-guard against great derangements of position. It is of especial importance in the case of derailment. Turning now to the work at the rear end of the structure, the Bissell half truck at the rear is similar in its general features to the corresponding part at the front. The spring J serving as the swing-beam, and the deep strap I which incloses it, are exactly similar to those at the front; so also of the horizontal links or tie-pieces. The suspension-links *j*, which hold up the weight, are analogous to those at the front, but are not as long. The nearness of the rear truck to the flanged drivers which control the position does not require as high a suspending point for these links as at the front. The swing-beam and its connections are held laterally in a manner corresponding to that elaborately described at the front—that is to say, there is a stout rock-shaft, G^1, longer than at the front, in suitable bearings and supporting an equalizing-lever or a corresponding series of levers which receive the load. This rear rock-shaft is marked G^1, like the corresponding part at the front. An arm of the equalizing-lever extends rearward therefrom, marked G, and it is braced laterally by diagonal braces *g g*. Thus far the arrangements correspond with that at the front, but the lever G is not extended directly across the rock-shaft G^1 to connect to a cross-equalizer, as at the front. The construction is modified in a very important respect. Two arms, G^2 G^2, rigidly connected to the rock-shaft G^1, extend forward just inside of the framing B, and taken together they form in effect an extension of the central equalizing-lever G, but with this difference, that they are wide apart and rigid in their position relatively to the rock-shaft, and there is no cross-equalizing action. M M are two springs, mounted obliquely as represented, so that the rear end of each is over one of the arms G^2. The forward end of each spring M is tied down by a suitable link, not shown, to the framing B. The rear end of each is tied down by a suitable link, *m*, to the forward end of the corresponding arm G^2. The center of each spring M bears on the box which incloses a bearing of the rear driving-axle. The peculiar arrangement of the equalizing system at the rear will now be understood. Any concussion received by one of the rear driving-wheels bends the adjacent spring M and transmits the strain with a slight motion to the corresponding arm G^2, and slightly rocks the rocking-lever G^1, and bends the spring J which forms the swing-beam of the rear truck. But none of this strain is felt on the opposite spring M. The effect is rather to relieve that spring on the opposite side of the locomotive, but the relief is not such as to induce any disturbance in the action. In case there is a concussion on both the rear driving-wheels at the same time, both these springs M M bend simultaneously and transmit a corresponding strain to the center of the rear truck.

I claim as my invention—

1. The rock-shaft G^1, equalizing-lever G, and braces *g*, arranged as represented at one or both ends of the locomotive and serving not only to transmit the load to the truck, but also to receive all the lateral strain at the center, and to hold the swing-beam firmly in position while allowing it to move freely up and down, as specified.

2. The ball-and-socket joint on the end of

the beam G, serving to transmit the strain and brace the swing-beam laterally while allowing it and the entire truck to tilt freely, as specified.

3. The obliquely-mounted springs M M, the framing B, rock-shaft G^1, with its arms G G^2 and the spring J over the truck, combined and arranged as and for the purposes specified.

4. The spring swing-beam J inclosed within the strap I, the provisions F *f* for confining and releasing the spring, and the socket for the ball-joint, at the end of the equalizing-lever G, all combined and arranged to operate as herein specified.

5. The tie-pieces *i* connecting the central part I with the pendent links *j*, and serving relatively to those parts, the spring J, and the truck and superposed structure, as herein specified.

In testimony whereof I have hereunto set my hand this 21st day of February, 1872, in the presence of two subscribing witnesses.

WM. S. HUDSON.

Witnesses:
ARNOLD HORMANN,
WM. C. DEY.