(No Model.)

W. H. FITCH.

RAIL JOINT.

No. 596,934. Patented Jan. 4, 1898.

Fig. 1.

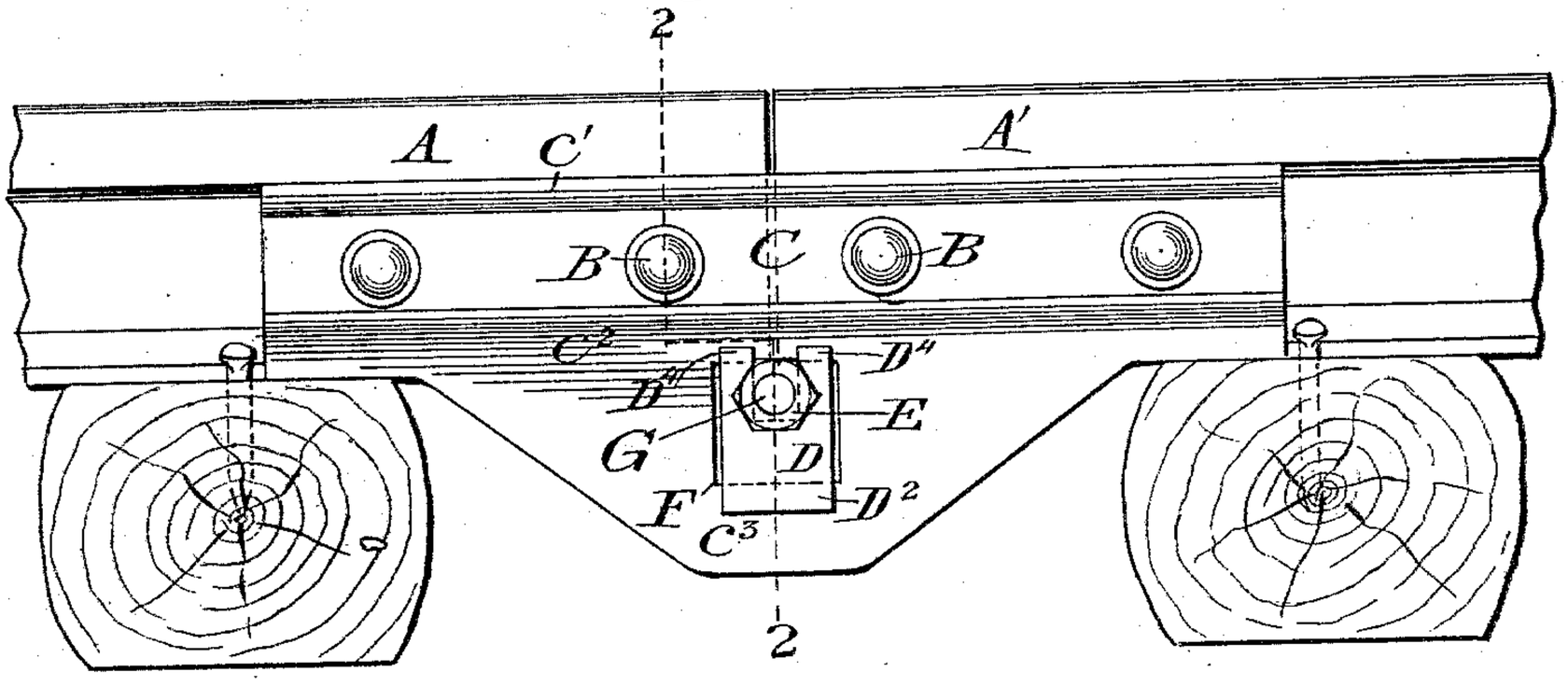


Fig. 2

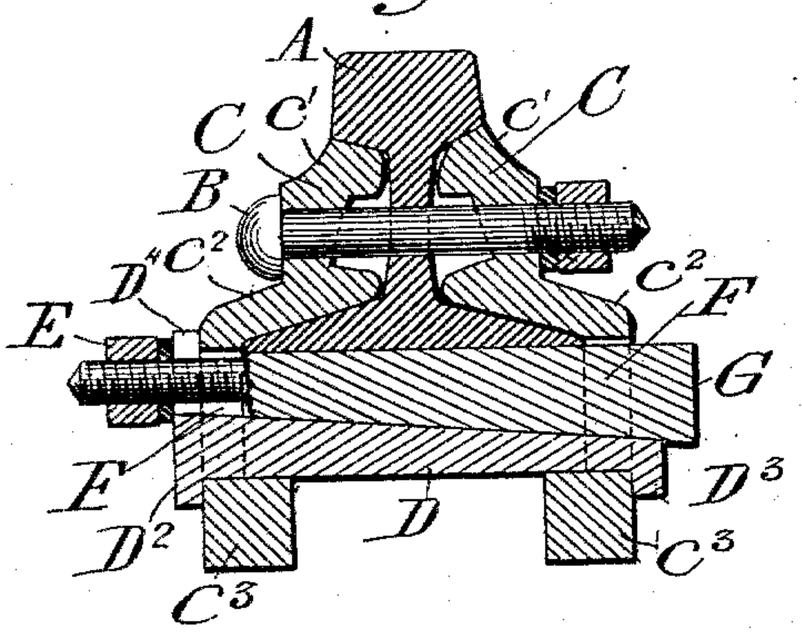
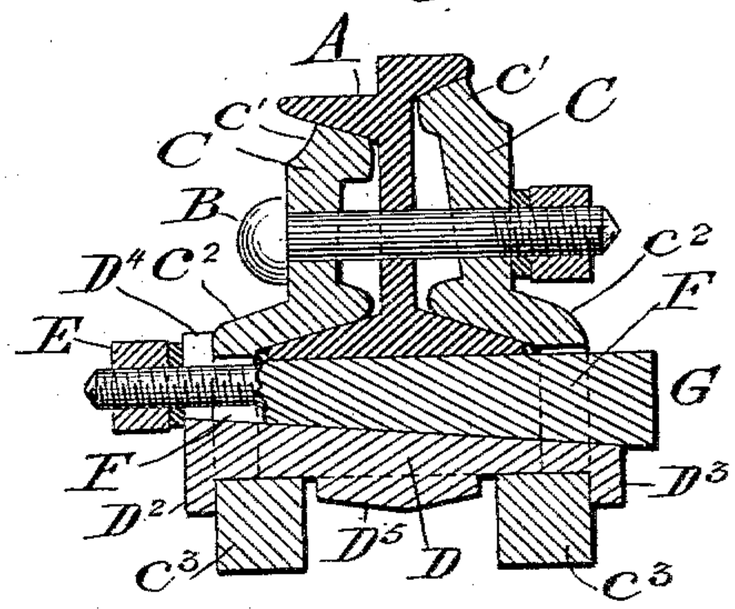


Fig. 3.



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RAIL-JOINT.

SPECIFICATION forming part of Letters Patent No. 596,934, dated January 4, 1898.

Application filed February 6, 1897. Serial No. 622,343. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. FITCH, a citizen of the United States, residing at Indianapolis, in the State of Indiana, have invented certain new and useful Improvements in Rail-Joints; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The objects of this invention are to provide a rail-joint for steam and street railway rails in that class of joints known as "suspended" joints that is simple in its parts, easily and cheaply constructed, possessing an elasticity and strength about equal to the solid unbroken rail, so that a moving load passing over the same will produce the same wave of deflection at the joint as it does elsewhere on the solid rail, and to reduce to the minimum the alternating vertical motion of the ends of the rails in a joint under the action of a moving load, and a means of adjustment by which any looseness in the fitting of the various parts of the joint whether from defective manufacture or from wear can be fully taken up and all parts be brought into their full bearing and proper action.

The peculiar form of the splice-bars and the supporting and adjusting keys and the manner of application and operation will be more fully hereinafter described.

Figure 1 represents a side view or elevation of a portion of two ordinary T-rails joined by my device. Fig. 2 is a cross-sectional view of the T-rail and splice-bars and the supporting and adjusting keys on the line 2 2, Fig. 1. Fig. 3 is a cross-sectional view of an ordinary street-railway rail and my device with a modified form of the lower supporting and adjusting key, taken upon a line similar to 2 2, Fig. 1.

It is a matter of common knowledge among those skilled in railway construction that the splice-bars in general use are not equal to the task of preserving a perfect alinement of the rails and that they are deficient in strength to resist a transverse strain as compared with the solid rail and that they frequently fracture at a point about opposite the line of junction of the rails. At each joint a space is left between the ends of the rails to accommodate expansion longitudinally. As the car-wheel passes along the rail and approaches the end of the rail in the joint it is depressed and is thus forced out of alinement with the adjoining rail, which the wheel strikes with a pounding sound, flattening and greatly damaging the same. When the entire joint also settles down under the load through weakness of the joint-fastenings, the hammer-blow and its destructiveness are also increased.

As the car-wheel approaches the point of junction of two rails joined with the common angle-bars the head of the loaded rail bears upon the upper edge of the angle-bar, which transfers the strain obliquely downward and forward to the foot or flange of the adjoining rail, being most severe as the wheel reaches the extreme end of the rail. The instant the wheel passes to the adjoining rail the strain on the joint, while most severe, is instantly shifted. The wear and hammering of the surfaces in contact cause great wear upon the under side of the head of the rails, extending three or four inches from their ends, and a like wear on the corresponding portions of the angle-bars until a V-shaped opening develops, with its widest part at the extreme ends of the rails. When in this condition, an increased alternate vertical motion of the rails occurs and accelerates its destruction. No amount of tightening up of the securing-bolts which pass through the stem of the rail can compensate for the material that has worn away. This action of the load and strains is equally true of all forms of joints which support the rail alone by a section of material interposed between the head and flange of the rail, regardless of the ultimate strength of the joint itself.

Joints which support the base of the rails and transfer the joint-load upon the adjoining cross-ties must of necessity acquire whatever rigidity and strength they possess from the condition of the cross-ties and the ballast and have been found defective and unsatisfactory in practice. In joints where part of the joint-load is received from the head of the rail, part from the base of the rail, and part from the adjoining cross-ties it has been

found to be impracticable to keep the several parts in such condition as will cause them to perform their several functions in perfect harmony with each other, resulting in an equally unsatisfactory and deficient service.

In the drawings Figs. 1 and 2, A A′ represent the ends of two ordinary T-rails as now used on steam-roads.

C represents the splice-bar, the upper part of which C′ C^2 resembles somewhat in form the common angle-splice, one of which is used on each side of the rail, which are secured to the rails A and A′ by the usual bolts B, which pass through the usual holes in the stem of the rails A and A′. The splice-bar has a depending vertical or nearly vertical flange C^3 formed integral with the upper portion, which is provided with the opening F to receive the supporting and adjusting keys G and D. The lower key D, when placed in position, rests at or near each end on the flat suface of the opening F and has depending vertical lugs D^2 D^3, which prevent the spreading apart of the flanges C^3 and prevent the key from shifting out of its proper position, and also at one end has two upward vertical lugs D^4, separated, as shown in Fig. 1, to allow the free insertion of the threaded end of the upper key G.

Key D is thickest at the end having the lugs D^4 and slopes uniformly to the thinner end, upon which surface the upper key G fits and moves. The upper key G is then inserted and is, in fact, a wedge having the same pitch as the lower key D, so that when in position the top surface of key G is at all times parallel with the lower surface of key D, where it rests on the flat seat of F in the splice-bars. It is then driven by hammer-blows until a proper tension of all the parts is secured.

The smaller end of the key G is threaded to receive an ordinary track-nut E, which is turned up solid against the lugs D^4 to lock and secure the wedge G in its position.

In adapting my invention to different forms of rails the only modification necessary in the form of the splice-bars is made in the upper portion of the same to correspond with the height and contour of the under side of the head of the rails to which it is to be applied, as shown in Fig. 3.

In Fig. 3 the lower key D is shown in a modified form by increasing the strength of the same by an increase of thickness formed integral, as shown at D^5, so disposed as not to interfere with the closer adjustment of the splice-bars C and is in all other respects the same as key D in Figs. 1 and 2.

In practical use, after applying and adjusting the various parts as heretofore described, when the load comes upon the rail at the joint the entire joint-load is imposed upon the top of key G, which has a full bearing upon key D, which bears at its end upon the flat seats of the holes F in the splice-bars C. Both keys are usually made about two inches wide and their combined thickness so proportioned, usually near two inches, that they have an elastic limit between their points of support about equal to that possessed by the solid rail between supports two feet apart or some similar standard of test to which the joint is to be applied. The load imposed on the seats of F in the flanges C^3 of the splice-bars is a transverse strain, but causes a tensile strain throughout the flanges C^3, which perform the functions of under trusses and transfer their strain to the upper part of the splice-bar, (shown as C′ C^2,) which results in a compressive strain throughout C′ C^2, which equalizes itself and comes to rest, with the final result that the load is uniformly and equally distributed the entire length of the splice-bars.

The seat of F, which is subject to wear, is made broad to offer a larger bearing-surface to key D. The portion of C^3 below the seat of F and throughout the flange C^3 is proportioned to carry as a truss the load imposed by the keys G D. The upper part of C (shown as C′ C^2) is especially designed and disposed to withstand a compressive strain and a tendency to spring away from the rail at its ends caused by the load imposed by the trusses C^3.

To illustrate the great advantage of the peculiar shape of the splice-bar, as shown in the drawings, it has been found that in joints like these below the base-line of the rail, but like the common angle-bar above that line, when tested to destruction by transverse strain the splice-bars would spring away from the rail at their ends and in some cases to rupture the end-securing bolts and also to have compressed longitudinally near the center of the splice-bars and on or near a vertical line from the base-line of the rail to its point of contact with the head of the rail, the compression being least at the base-line of the rail and greatest at its point of contact with the head of the rail.

It is well known that the common angle-bar cannot be widened at its extreme top line without forming an obstruction to the flanges of car-wheels. I therefore have widened out my splice-bar at C′, Figs. 1 and 2, at the highest point not to interfere with the flanges of car-wheels and have thereby increased the area of metal at the most essential point to withstand compressive strain, and I have also moved the vertical portion, through which the securing-bolts B pass, farther from the stem of the rail and more in direct line with the strain received from the under truss C^3, and thereby reducing the tendency in the splice-bar to spring away from the rail and also to form a section of metal, as shown at C′ C^2, with projections extending toward the stem of the rail which extend the entire length of the splice-bar and which act as ribs so disposed as best to withstand any tendency of the splice-bar to spring away from the rail. Ample provision is made for longitudinal expansion and contraction of the rails in the usual manner by having the holes in the

splice-bars made oblong, and the holes through the stem of the rail are made ample to provide some space on either side of the securing-bolts. The key G is so constructed that it can be reversed and used either side up with equal efficiency to the joint and thereby serving the purpose of a new key should the key G ever become so worn or indented by contact with the base of the rails as to require a new key. The holes F in C^3 are identical in size and form in both splice-bars and the keys may be inserted as desired from either side. The lower key D is so formed and situated that when once placed in position does not require to be held there and cannot shift out of its proper position while the key G is placed and adjusted. The splice-bar C, while not designed or intended to receive any loads from the head of the rail, is so formed, however, that it will render ample service during a temporary absence of the keys G and D, which might occur at such times as the tracks were undergoing repairs.

Having fully described my invention, what I claim as new and useful, and desire to secure by Letters Patent, is—

1. The combination with adjoining rail ends A A′ in a rail-joint having counterpart splice-bars C each having an integral flange C^3 extending downward vertically below the base-line of the rail, having at C′ a projecting portion which extends the entire length of the splice-bar engaging the under side of the head of the rail; and at C^2 having a lower projecting portion which extends the entire length of the splice-bar engaging the top side of the flange of the rail, and having the usual holes in the vertical part at C′ C^2 registering with holes in the stem of the rail through which the bolts B are inserted; and having the opening F at about midway of the length of C^3 in the flange to receive the adjusting and supporting keys G and D, the top of the opening F being above the base-line of rail when the splice-bars are applied and adjusted; and having the widened portion C^3 at the base of F to provide a large wearing and bearing surface to key D; and the supporting and adjusting keys G and D; D having a bearing near its ends on the base of the opening F, and G having depending vertical lugs D^2 D^3 and two upright vertical lugs D^4 between which the threaded end of key G is free to pass and having a wedge shape with a pitch to correspond with key G; and key G which corresponds in pitch with key D, so that the top surface of key G is at all times parallel with the lower surface of key D where it rests on the base of the opening F, the small end of key G being threaded and provided with a nut to screw up against the lugs D^4 to lock and secure key G in its position; and key G being movable upon key D in the direction of their length for the purpose of adjusting the tension and bearings of the various parts of the rail-joint; and having the upper surface of key G engaging the base of the rail and its lower surface engaging the upper surface of key D, whose lower surface near its ends rests upon and engages the base of the openings F in C^3—acting together to transfer the entire joint-load or so much as is imposed by the rails upon key G to the base of the opening F and flange C^3; which flange C^3 acts as an under truss in transferring the strain to the portion C′ C^2; and C^2 having an equal bearing upon the top side of the flange of the rail the entire length of the splice-bar substantially as and for the purpose described.

2. In a rail-joint the combination with the counterpart splice-bars C of the supporting and adjusting keys G and D; D having a bearing near its ends on the base of F and having vertical depending lugs D^2 D^3 and two upright vertical lugs D^4 between which the threaded end of key G is free to pass and against which the nut E running on the threaded end of key G bears; and key D having an inclined surface or pitch from the end where the lugs D^2 D^4 are located to the end having lug D^3; and having key G with an incline surface to correspond with key D and having a portion of its smaller end threaded to receive nut E which when turned up engages the lugs D^4 and the key G engaging the top surface of key D and the base of the rails to support the joint-load and adjust the bearing between the base of the rails and the seat of F in C^3 substantially as and for the purpose described.

3. In a rail-joint the combination with counterpart splice-bars C and the supporting and adjusting keys G and D; D having the upright vertical lugs D^4 and key G having its smaller end threaded and extending between the lugs D^4 and having a lock-nut E to run on the same, to turn up and engage the lugs D^4 to lock and prevent key G from leaving its position substantially as and for the purpose described.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

WALTER H. FITCH.

Witnesses:
JAMES C. FITCH,
M. H. S. FITCH.