

(No Model.)

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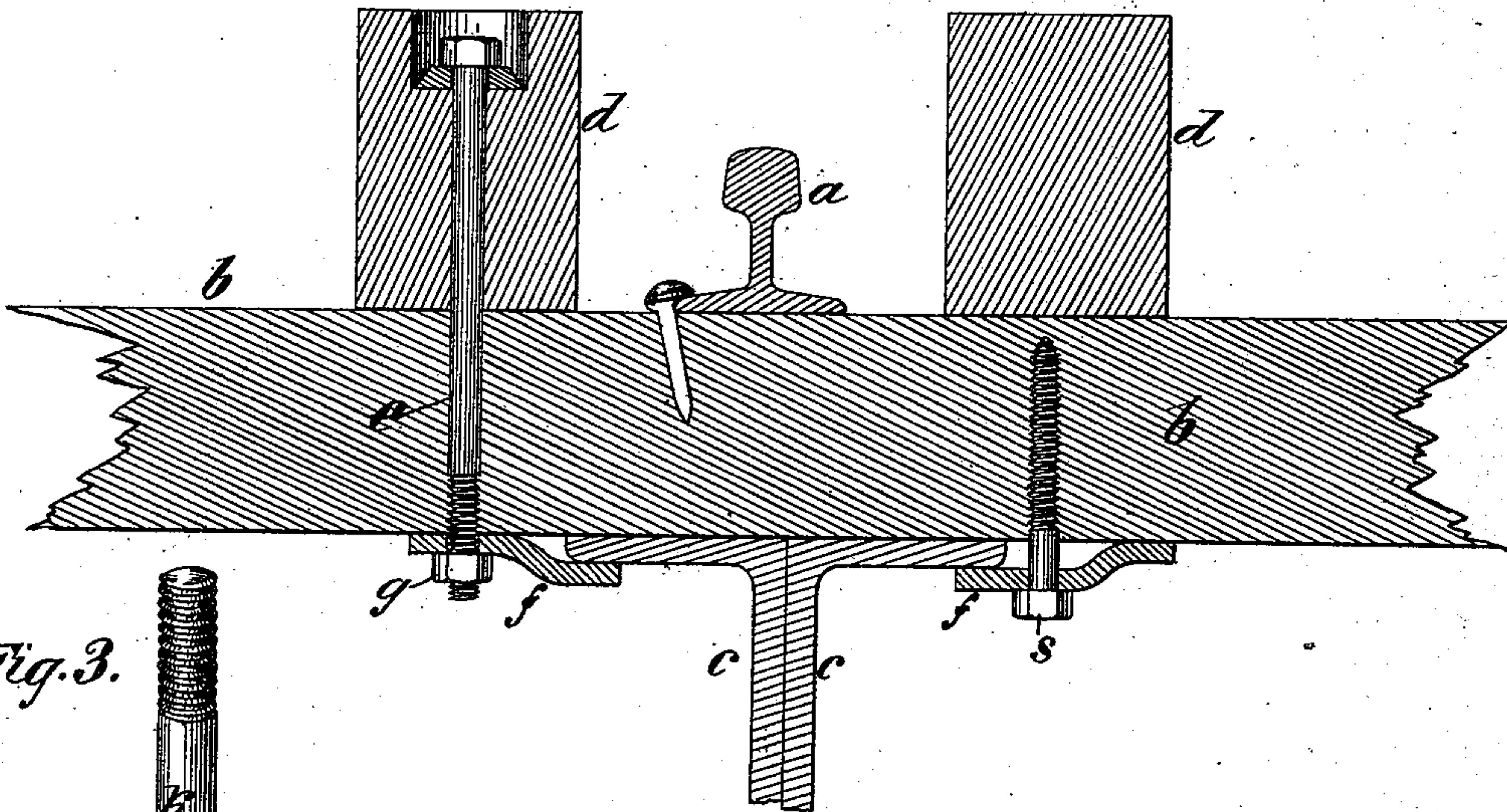
F. K. HAIN.  
RAILWAY STRUCTURE.

No. 376,951.

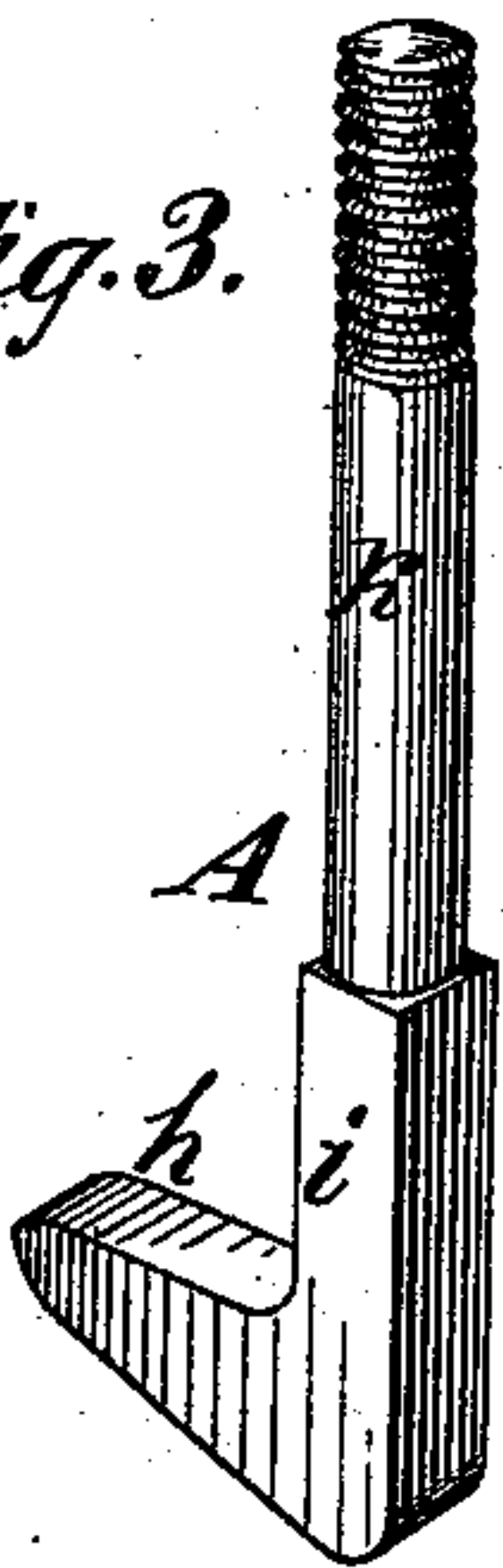
Patented Jan. 24, 1888.

*Fig. 1.*

*Old System.*

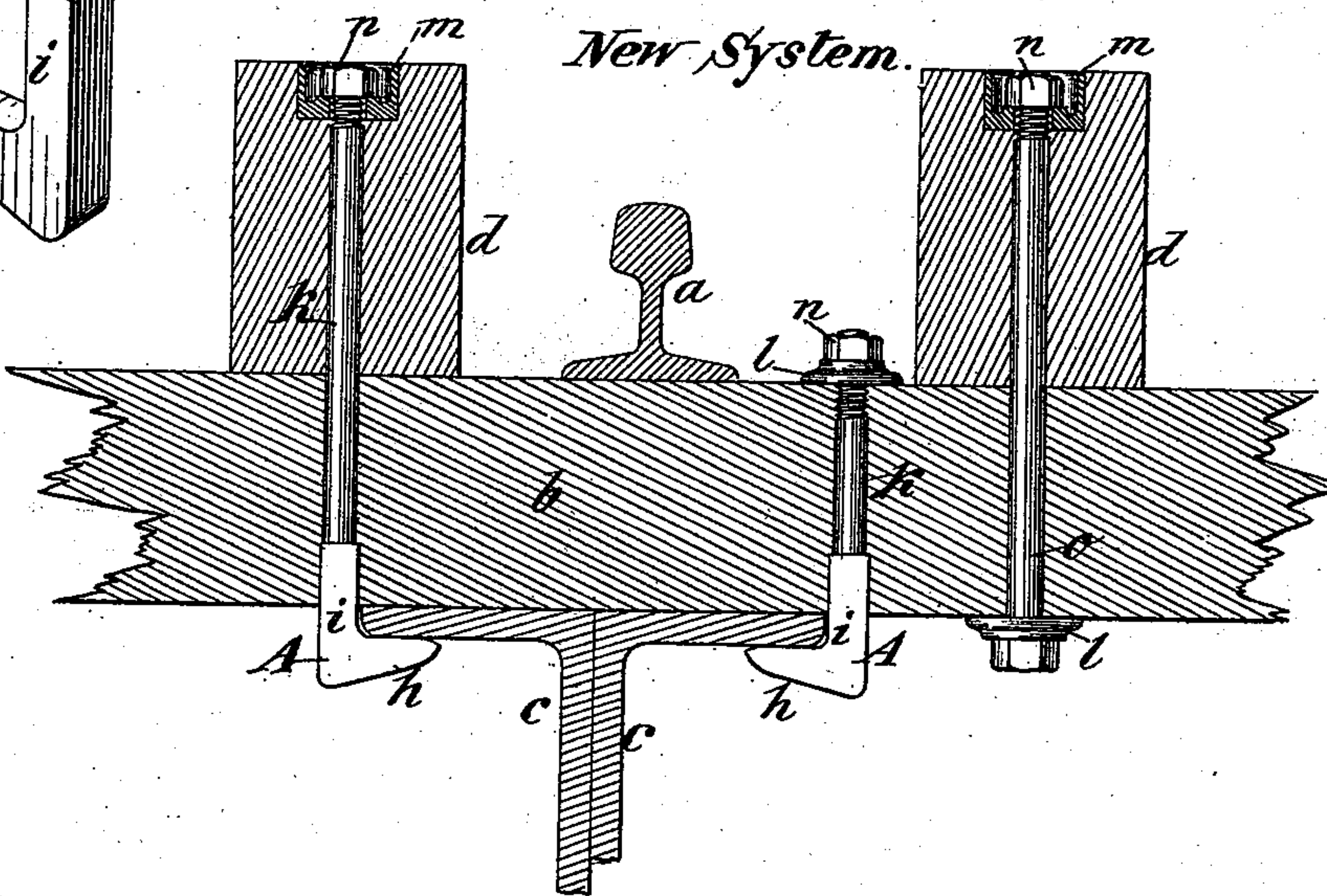


*Fig. 3.*



*Fig. 2.*

*New System.*



WITNESSES

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*Geo. C. Hain*

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2 Sheets—Sheet 2.

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Fig. 4.

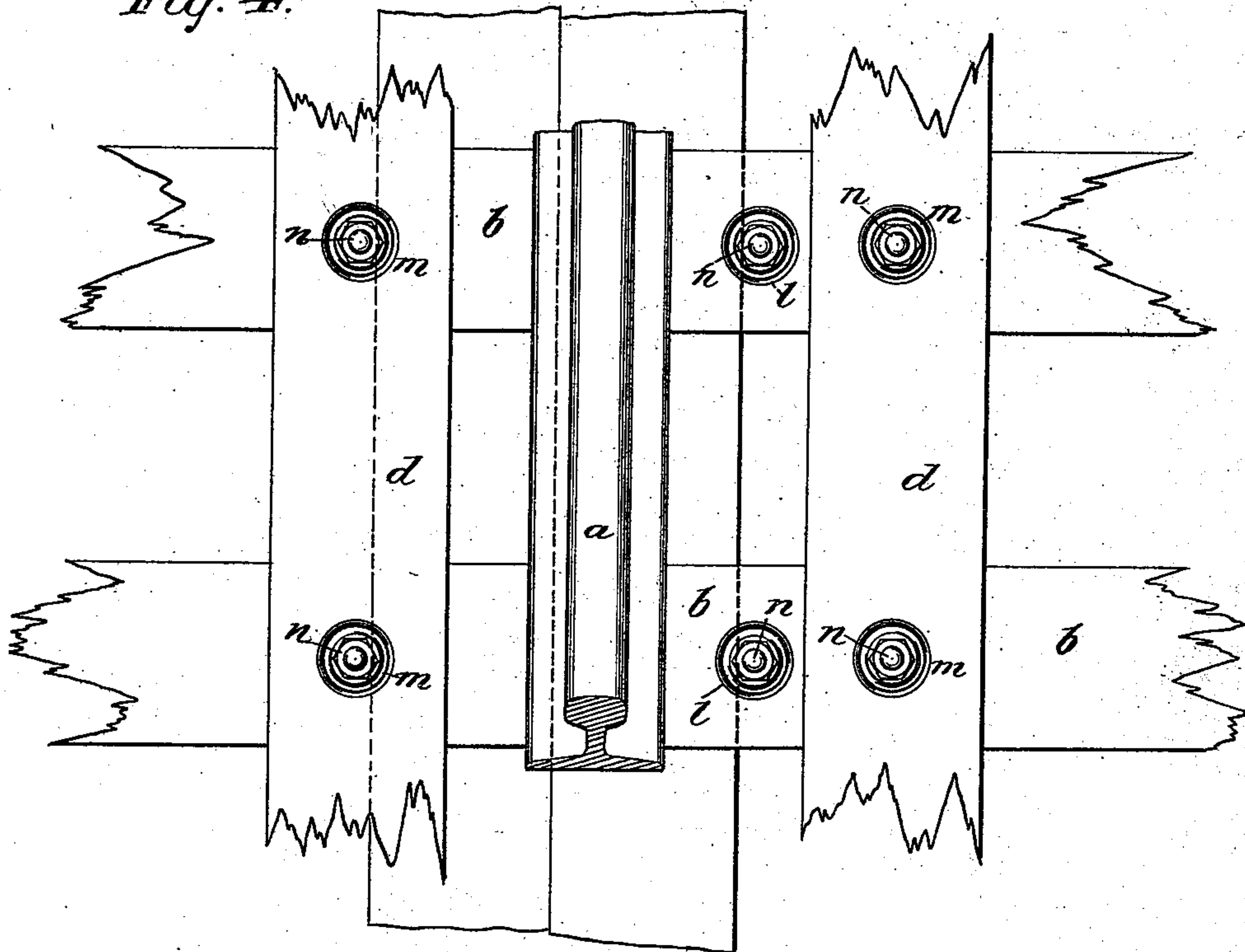


Fig. 5.



Fig. 6.

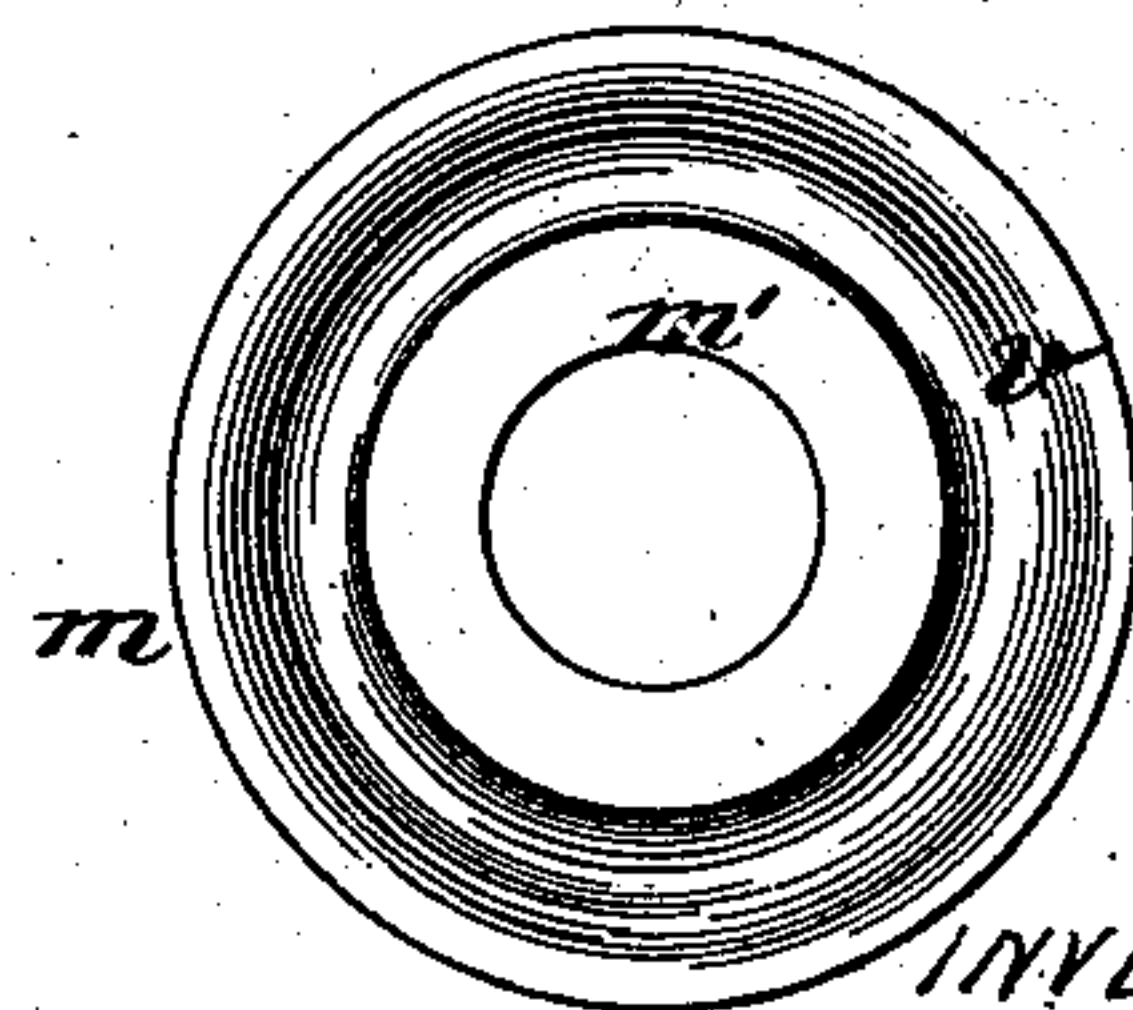
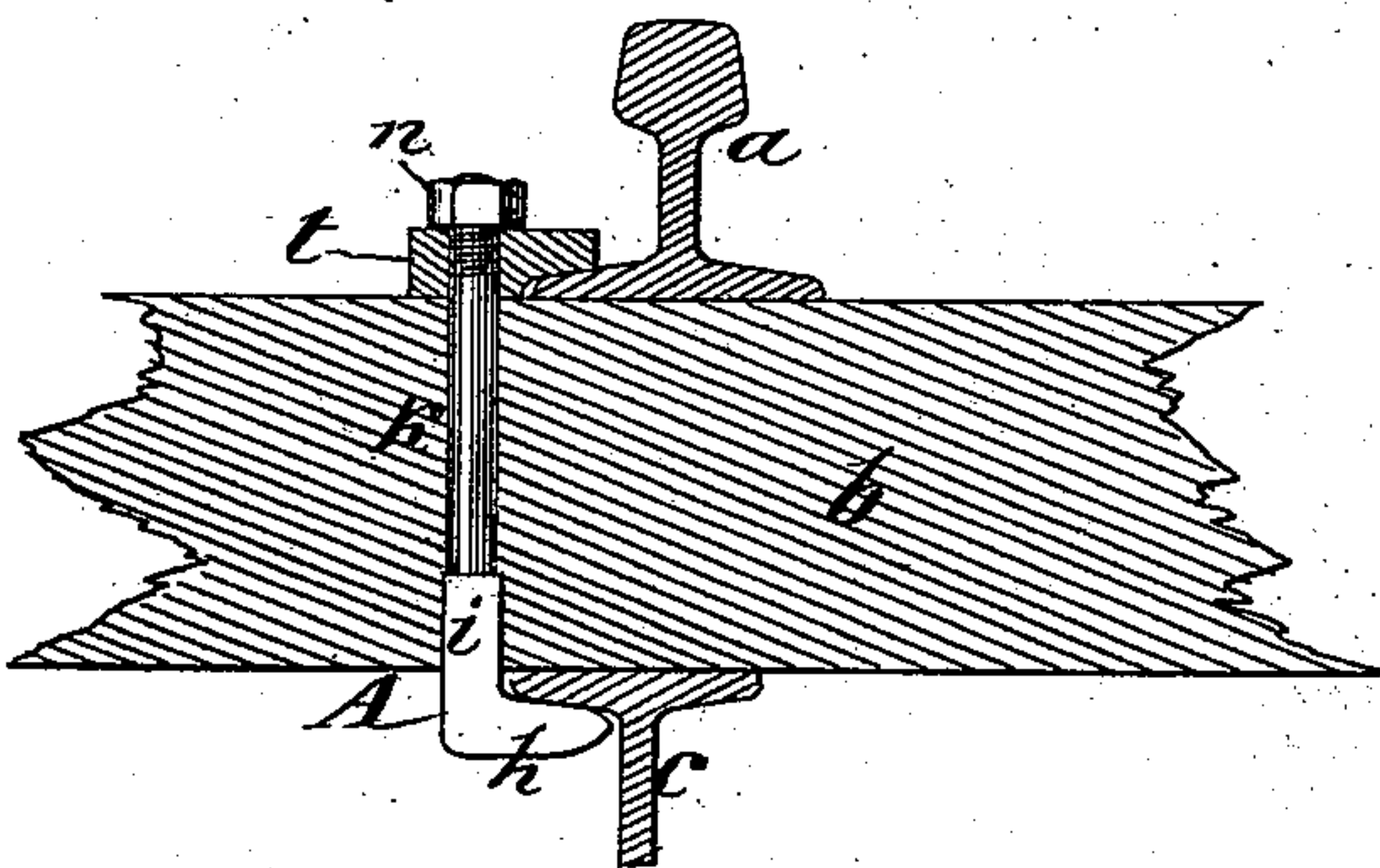


Fig. 7.



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# UNITED STATES PATENT OFFICE.

FRANK K. HAIN, OF NEW YORK, N. Y.

## RAILWAY STRUCTURE.

SPECIFICATION forming part of Letters Patent No. 376,951, dated January 24, 1888.

Application filed October 7, 1887. Serial No. 251,728. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK K. HAIN, of New York city, county and State of New York, have invented certain new and useful Improvements in Railway Structures, of which the following is a specification.

My invention applies more especially to elevated railways, trestles, or bridges, and relates to the manner of securing the cross-ties and guard rails or timbers to the main girders of the structure, the object of my improvement being to secure the ties and the guard-rails to the girders in a manner which will prevent play or looseness at the connections, reduce noise, and bind the parts together in a more strong, safe, and durable manner. To this end I employ hook-headed bolts, the hooked ends of which directly engage the flange of the girders, while the stems pass clear up through the ties or guard-rails, or both, and are fastened by a nut and washer on the top of said timbers. The bolts passing up through the guard-rails are provided with cup-shaped washers recessed into the top of the timbers flush with the top face thereof, and are furnished with nuts which are inclosed within the cup-washers. The stem of the bolts near the hooked head is square, while the upper part is round, and this square end, being driven forcibly into a snug round hole bored in the timber to receive the bolt, is locked in place, and is thus prevented from turning its hooked head out of its engaging position.

My invention therefore consists, mainly, in the features above outlined, whereby important advantages are secured, as hereinafter fully set forth.

In the drawings annexed, Figure 1 presents a cross-sectional detail of an elevated railway-track, showing the main girder, cross-ties, rail, and guard-timbers fastened together according to the old or existing system. Fig. 2 gives a similar view of the same parts fastened according to my improved system. Fig. 3 is a perspective view of the hook-headed bolt used in my system. Fig. 4 is a plan of the part shown in Fig. 2. Fig. 5 shows an enlarged section, and Fig. 6 a plan view, of the novel form of cupped washers used in the new system. Fig. 7 shows that the hooked bolt may also be used for holding the main rails to the ties and girders.

Referring to Figs. 1 and 2, *a* indicates the rails; *b*, the cross-ties; *c*, the main girders, and *d* the guard rails or timbers on each side of the main rails. Now, in the old system shown in Fig. 1 it will be seen that the ties and the guard-rails are fastened to the main girders by the clips *f*, which bear at one end upon the edge of the girder-flange and at the other against the tie, and are secured to the tie by the lag-screw *s* and bolt *e*. The head of the lag-screw *s* on the right bears on the middle of the clip between its bearing ends, and thence screws directly into the wood of the tie, as shown. The bolt *e* on the left, however, passes down clear through the guard-rail and the cross-tie, and its threaded end passes through the outer abutting end of the clip and receives the nut *g*, which is screwed up against the clip to hold the several parts in connection with each other and the girder, as shown. The headed end of the bolt is recessed into the top of the guard-timber, and of course bears upon a washer at the bottom of the recess, as illustrated.

It will now be seen that in the old system the nuts of the bolts and the heads of the lag-screws are all on the under side of the structure, where they are very difficult or inconvenient to inspect by the track-inspector, and difficult to reach and tighten if found loose, and, as it is well known that the bolts and nuts upon a railroad structure require continued inspection and attention to insure safety, this difficulty of access is therefore a great objection and is an element of danger. Furthermore, it will be seen that the several joints or points of contact between the screw or bolts and the clips, ties, and girders, with the spring or leverage of the clips, tends to allow a play or looseness at the connections, which is aggravated by the constant vibrations and stresses due to the passage of trains, which therefore cause more or less constant rattling between the clips and girders, which is both noisy and unsafe. Besides this the constant jar and strains on the lag-screws, together with the rapid oxidizing action of wood on iron, causes the threads to wear off by the effects of both the rusting and jar to such an extent as to allow the bolts to occasionally fall entirely loose out of the tie, thus endangering those who pass below and leaving the structure weakened.



It may be seen, however, on reference to Fig. 2, that in my improved system I dispense entirely with the clips and lag-screws and I bring all the nuts or tightening ends of the fasten-  
 5 ing-bolts on the top of the track, where they may be in constant sight and easy reach for inspection and adjustment.

It will be noted that in dispensing with the clips and lag-screws I substitute a peculiar  
 10 form of bolt, A, (shown best in Fig. 3,) having a laterally-hooked engaging-head, *h*, a square neck, *i*, above the head, and a round stem, *k*, threaded in the usual way at the end. The rail *a*, as seen in Fig. 2, lies on the ties *b*, cen-  
 15 trally or nearly centrally over the main girder *c*, as usual, while the flange of the girder on each side is firmly and directly engaged by the hooked heads of the bolts, the stems of which pass clear up through the tie and receive a nut  
 20 and washer on the top, thereby securing the tie most firmly to the girder, as will be understood.

It will be seen that two lengths of the hooked bolts are used, the shorter one of which passes  
 25 up through the tie only and receives the nut and washer on the top of the tie between the main rail and the guard-rail, while the longer bolt passes up through both the tie and the other guard-rail and receives a deep-cupped  
 30 washer, *m*, at the top, which is recessed into the top of the guard-rail flush with its surface. The nut *n*, screwed on the end of the bolt, is inclosed within the cup-washer and bears upon the base thereof, and neither the nut nor the  
 35 end of the bolt projects above the cupped rim of the washer, so that therefore there is no protuberance on the top surface of the guard-rails to come in contact with any part of the moving trains.

An enlarged view of the washer is shown in Figs. 5 and 6, and on reference to these views  
 40 and to Figs. 2 and 3 it will be seen that the nuts *n* are sufficiently smaller than the cavity of the washer to admit a vertical socket wrench or "key" into the washer, whereby  
 45 the nuts may be screwed up tightly when the bolts are first put in place, or at any subsequent time, if they should require retightening. Besides the long hooked bolts passing  
 50 through guard rail and tie and engaging the girder, as described, long plain bolts *o* of the ordinary kind will also be used at intervals to hold the guard-rails and ties together, as seen on the right of Fig. 2; but the nutted ends of  
 55 these bolts will be on the top side of the guard-rails, and will be fitted with the recessed cupped washers *m* and nuts *n* in the same manner as the hooked bolts, as seen in Fig. 2.

On reference to Figs. 2 and 3 it will be un-  
 60 derstood that round holes are bored through the ties and guard-rails to admit the stems of the hooked bolts, such holes being an easy or snug fit for the stems of the bolts, but of less diameter than the diagonal measure of the square necks  
 65 *i*. Consequently when the bolt is driven into the hole the corners of the square necks become firmly embedded in the wood of the ties

at the base of the round holes, thus securely preventing the bolt from turning out of place, and serving to hold the hooked head fixed  
 75 firmly in its engagement with the flange of the girders, as shown in Fig. 2.

The cup-washers *m* are driven into the recesses in the rails *d* with a red-lead coating, and the nuts *n* are also screwed on with red  
 75 lead, and a film of red lead is also smeared between the face of the nut and washer, thus insuring water-tight joints, excluding rain, and preventing rain or wet from trickling down around the bolt, as will be readily compre-  
 80 hended from Fig. 2. The common washers and nuts, *l n*, (shown on the short hooked bolts on the right of Fig. 2,) will be put on with red lead in the same way.

In Fig. 7 I show the hooked bolt used for  
 85 clamping the rail, tie, and girder together. In this case the hooked head of the bolt engages the flange of the girder *c*, as usual, while the threaded end passes through a clip,  
 90 *t*, which engages the tread of the rail, and a nut, *u*, screwed on the end of the bolt and bearing on the clips, binds the parts firmly in position, as illustrated.

It may now be seen by comparing the old and new systems shown in Figs. 1 and 2  
 95 that I materially reduce the number of parts used in the fastening or clamping devices, and thus render the fastening much simpler, more direct, and very much stronger, and this with-  
 100 out increasing the cost, and at the same time bringing all the nuts or tightening parts on the freely exposed and accessible top of the structure, which are most important advan-  
 105 tages in railways and other similar structures.

The cup-washers with the nuts inclosed  
 105 therein are not of course confined to the hooked bolts, but may be used with the common bolts in many situations, as will be readily appreciated. Again, a recessed cup-washer may be  
 110 used at the head end of the bolt *o* in Fig. 2, as well as at the nut end, or, in other words, the cup-washer may be used at either the head or nut end of the bolt, or both, as will be readily understood.

On reference to Figs. 5 and 6 it will be seen  
 115 that the cup-washer is formed with a raised base or boss, *m'*, against which the nut will abut, while an annular channel, *v*, surrounds the boss in the bottom of the cup. This in-  
 120 sures a better bearing for the nut and permits of the bearing-face being turned off smoothly, if desired, without turning off the entire bot-  
 125 tom of the cup-washer, and besides this the annular groove *v* affords a good lodgment for the red lead applied to seal the joint between nut and washer.

What I claim is—

1. In a railway or similar structure, the combination, with the girder *c* and ties *b*, of the hook-headed bolts A, having hooked ends en-  
 130 gaging the girder and their stems passing up through the ties, with nuts screwed thereon at the top of the ties, substantially as shown and described.



2. In a railway or similar structure, the combination, with the girders *c*, ties *b*, and guard-rails *d*, of the bolts *A*, passing through ties and guard-rail, with hooked head *h* engaging the flange beneath the tie, and a nut  
5 screwed on its threaded end at the top of the guard-rail, substantially as and for the purpose set forth.

3. In a railway or similar structure, the combination, with the girder *c*, ties *b*, and rail *d*,  
10 of the bolt *A*, passing through rail and tie, with hooked head *h* at the base engaging girder, cup-washer *m* on top of bolt at top of rail, and

nut *n*, screwing on bolt within the washer, substantially as shown and described.

4. In a railway structure, the combination, with guard-timbers *d*, of the cup-washers *m*,  
15 recessed into the top of the timbers flush, or nearly so, with the face thereof, and fastening-bolts passing through the washers into the  
20 timbers, substantially as and for the purpose set forth.

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Witnesses:

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G. M. BAILEY.