

No. 859,319.

PATENTED JULY 9, 1907.

J. E. MUHLFELD.  
CROSS TIE FOR RAILWAY TRACKS.

APPLICATION FILED JAN. 28, 1907.

2 SHEETS—SHEET 1.

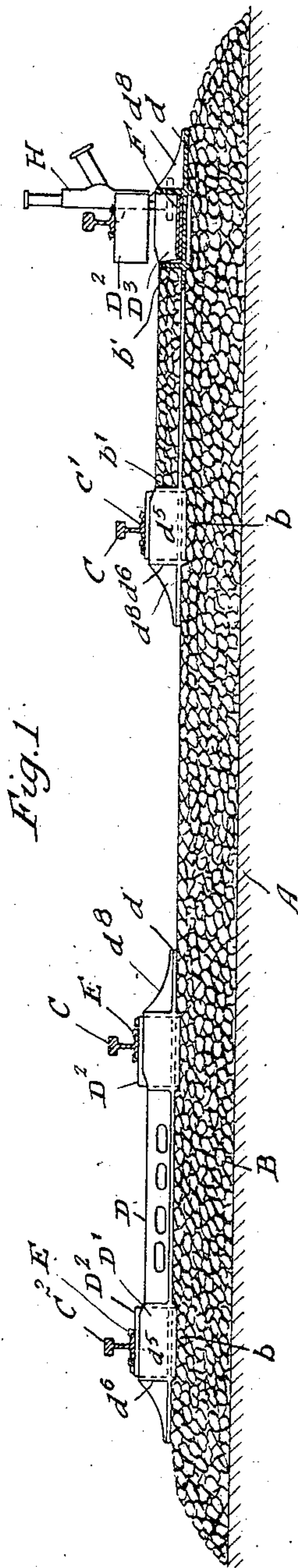


Fig. 1.

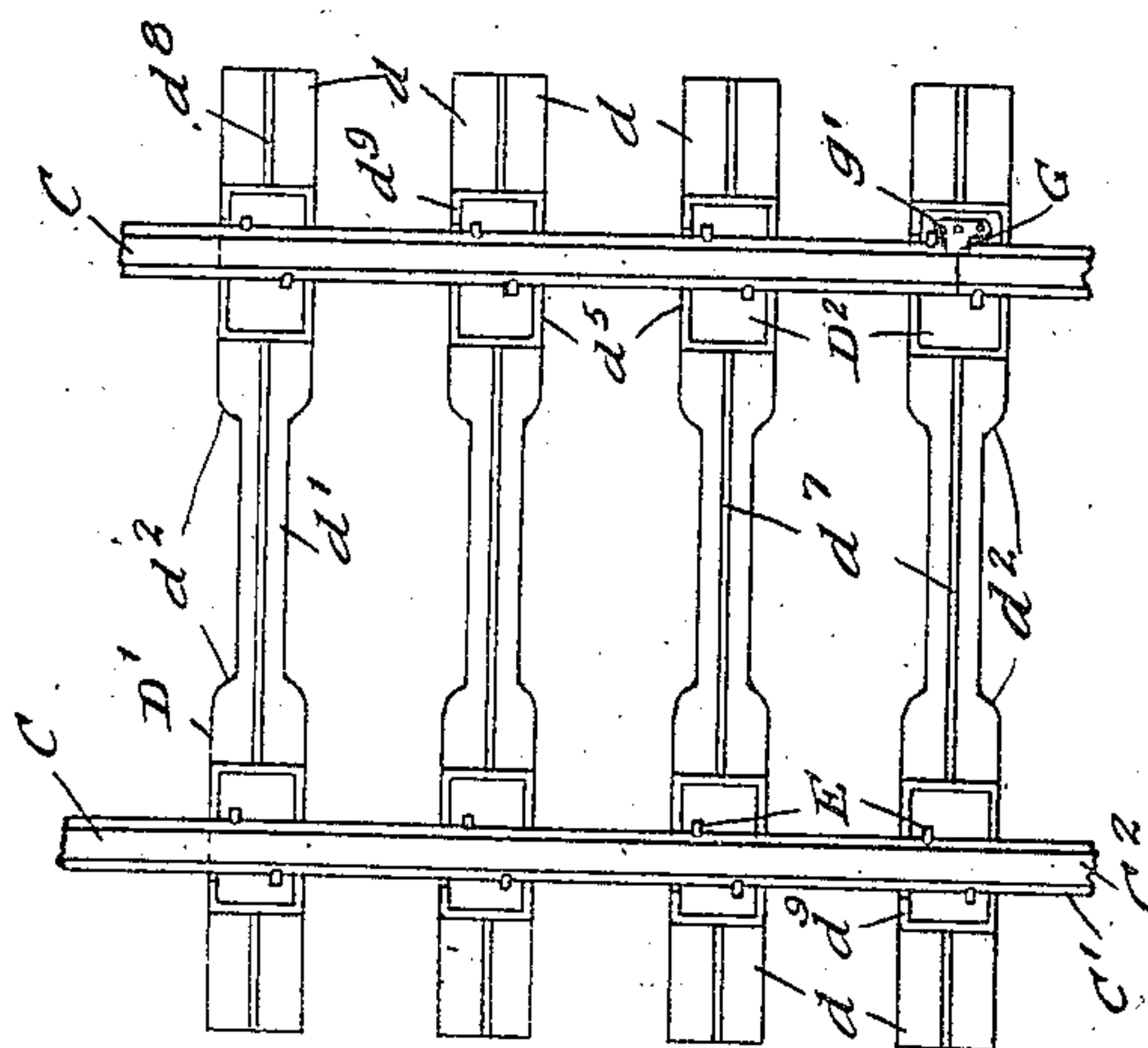
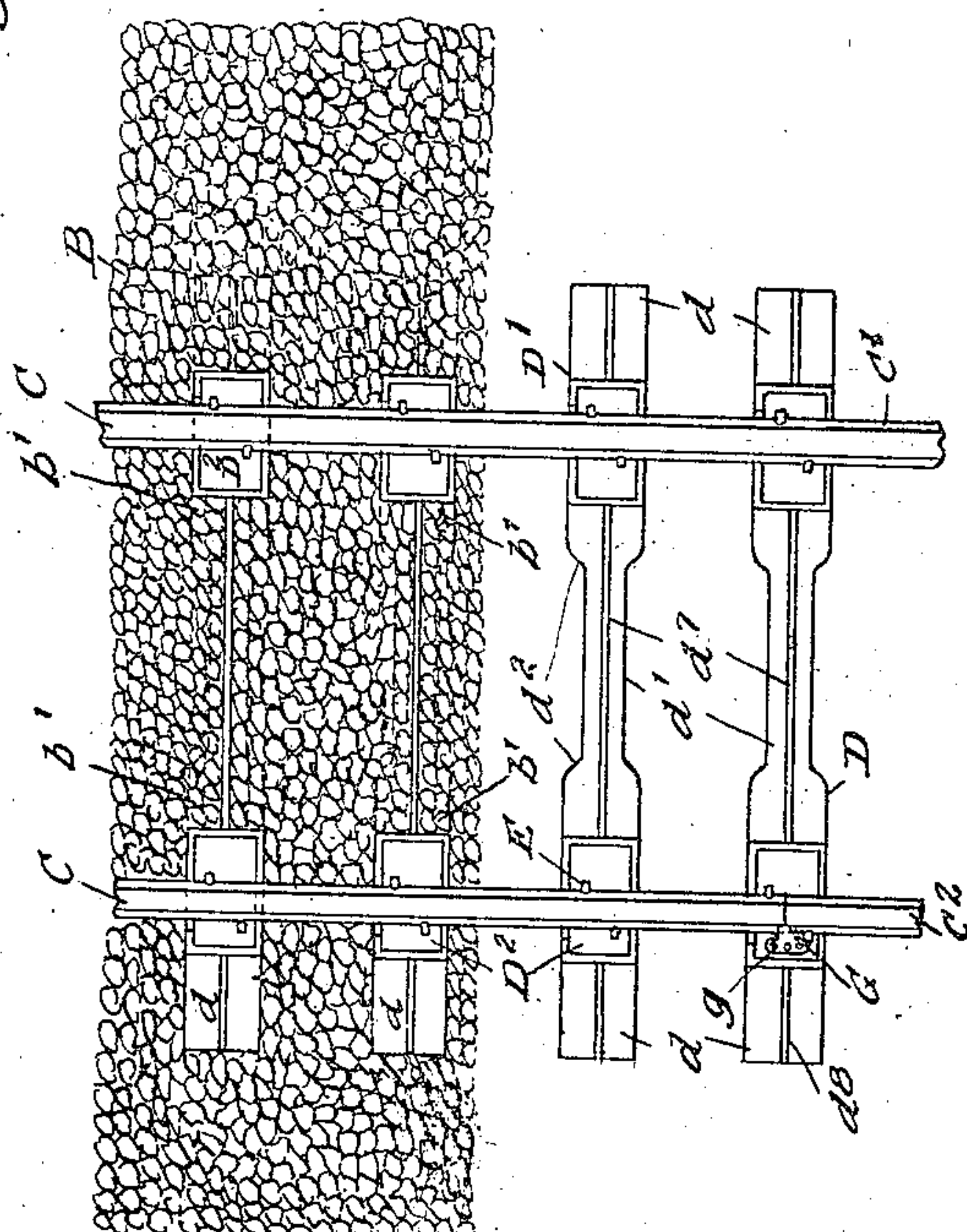


Fig. 2.



Witnesses:  
Wm. Geiger  
H. W. Munday

Inventor:  
John E. Muhlfeld  
H. W. Munday, Wm. Geiger, Adolph H. Clark.

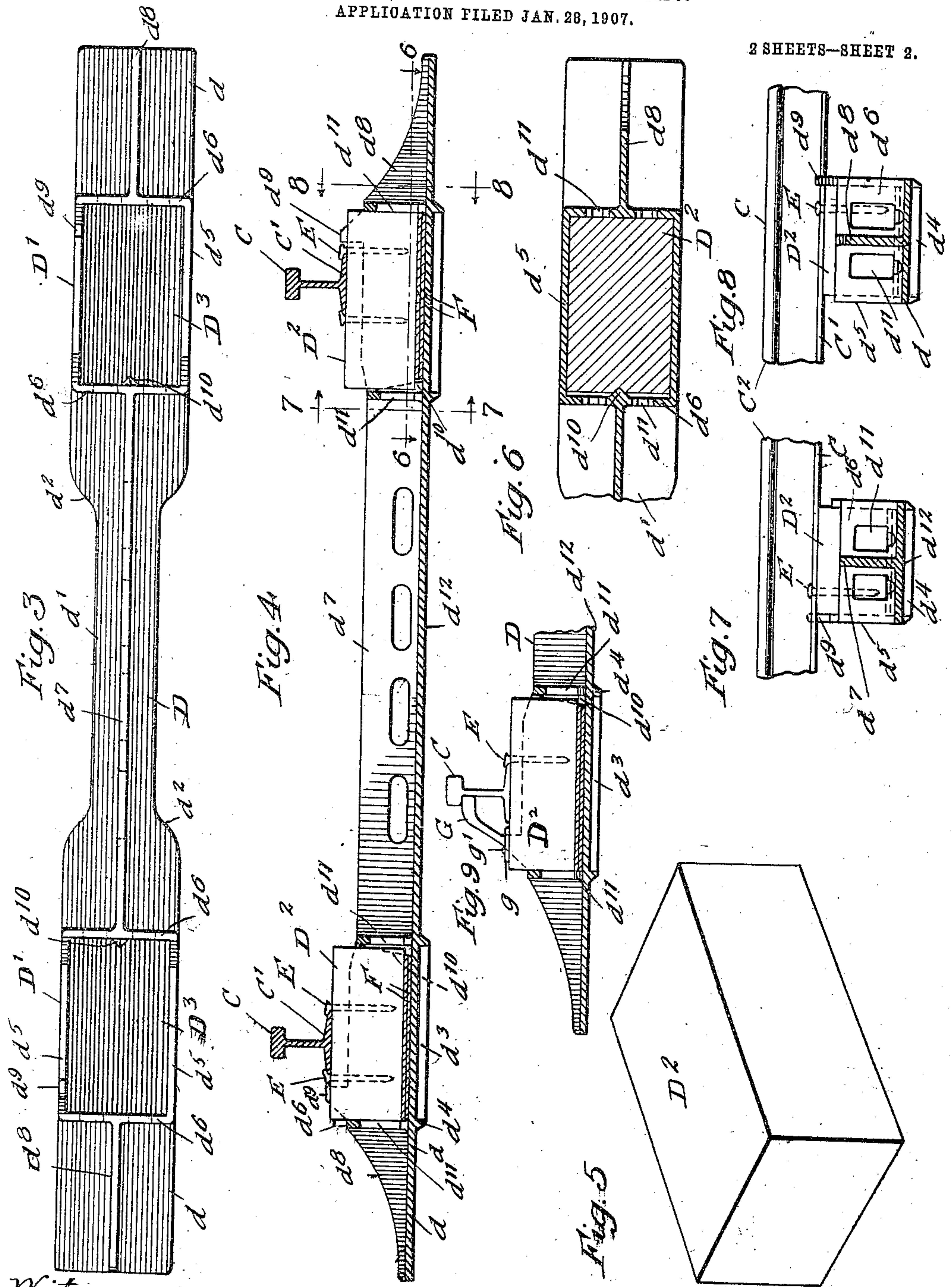
Attorneys

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H. M. Munday

Inventor.  
John E. Muhlfeld  
By Munday, Evans, Adcock & Clarke  
Attorneys



# UNITED STATES PATENT OFFICE.

JOHN E. MUHLFELD, OF BALTIMORE, MARYLAND.

## CROSS-TIE FOR RAILWAY-TRACKS.

No. 859,319.

Specification of Letters Patent.

Patented July 9, 1907.

Application filed January 28, 1907. Serial No. 354,376.

*To all whom it may concern:*

Be it known that I, JOHN E. MUHLFELD, a citizen of the United States, residing in Baltimore, in the State of Maryland, have invented a new and useful Improvement in Cross-Ties for Railway-Tracks, of which the following is a specification.

My invention relates to cross ties for railway tracks.

Heretofore with the wooden, metal, or other cross ties commonly in use in railway tracks, it becomes necessary to disturb practically the entire road bed of the railway each year for the purpose of making renewals and to put the rails in proper "gage," "surface," "elevation," "alignment" and "curvature;" and such track maintenance work ordinarily requires, with the ties heretofore in use, the removal of the rails from the ties and withdrawal of the spikes or other fastening or connecting devices between the rails and ties, and the removal of the ties from the ballast or foundation material of the road bed and the relaying or rebedding of the ties therein. And with the construction heretofore in use the ties are constantly tending to become "center bound" or "center supported," that is to say supported by the ballast or foundation material of the road bed more substantially at the middle portion of the ties than at the end portions thereof under the track rails, owing to the pressure or hammering action of the heavy traffic on the track rails working or forcing out the ballast or foundation bed material from underneath the portions of the cross ties under and immediately adjacent to the track rails, thus necessitating frequent re-tamping of the ballast back under the ties or rebedding the same at great labor and expense. Such track maintenance work and disturbing the ballast or foundation material of the road bed or rebedding of the ties therein for the purpose of maintaining the track and restoring the track rails to proper "surface" "elevation," etc., not only involves great labor and expense but serious interruption of traffic or passage of trains, and materially reduces the carrying capacity and earning power of the railroad, and also from time to time destroys that solidity and compactness of the road bed which is and can only be produced by lapse of time and the compacting action thereon of passing trains. And if the ties are of wood, or of metal or concrete with wood or other elastic or resilient supporting blocks under the rails to cushion the same as is necessary or desirable to diminish jar, vibration and noise and to produce a really efficient track, the frequent removal of the rails from the ties and withdrawal and re-driving of the spikes or other fastening means to regage the track rails on account of rail wear and in the necessary track maintenance work, soon destroys the wood ties or wooden rail supporting blocks and materially diminishes the practical or effective life of the tie. And with the construction of ties heretofore generally in use the base of the rails rests on the upper face of the ties, so

that the body of the tie cannot be and is not materially below the base of the track rails or the practical height-limit of the ballast or foundation material of the road bed, and causes the traffic pressure on the rails, in actual practice, to readily work the ballast or foundation material out from under the ties, an injury or defect that would not materially or greatly take place if the main body of the tie were bedded in one plane in the ballast or foundation material well below the base of the track rails, so that the surrounding ballast or foundation material of the road bed around and above the main body of the tie would tend to support and retain in place the ballast or foundation material directly under the ties. And with the construction heretofore generally in use the endwise or lengthwise abutment or engagement between the tie and the ballast or foundation material of the road bed which tends to prevent longitudinal movement of the tie in the direction of its length or lateral movement of the ties and track under the side thrust of the car wheels on the rails, especially at curves or tangents, is chiefly the outer end surface of the ties; and to give the end surface of the tie any adequate or effective end abutment against the ballast or foundation material of the road bed, it is necessary to materially extend the ballast or foundation material out beyond the outer ends of the ties, thus greatly widening the necessary road bed and materially adding to its cost. And with the construction heretofore generally in use, if of wood or of concrete with wood supporting blocks for the rails, in case of derailment of a train, the ties are liable to be destroyed by being cut or broken in two by the flanges of the car wheels; and if of wood or of rolled or plate steel forms with wood blocks to cushion the rails, they are expensive and of little durability by reason of the speedy rusting to which rolled or wrought iron or steel forms are peculiarly subject when exposed to wet and atmosphere, and by reason of the speedy rotting, under like conditions, if the ties are of wood.

The object of my invention is to provide a railway tie and track construction in which the rails will have the requisite resilient elastic or cushioning support from the ties to produce easy riding or movement of the cars and prevent unnecessary jar, vibration and noise, and in which at the same time the ties will be of a strong, simple, efficient and durable construction, capable of being manufactured and maintained at small cost, not liable to destruction or material injury by rusting or rotting from exposure to moisture or weather, not liable to be cut or broken in two by the flanges of the car wheel in case of train derailment; by which the tendency of the ties to become "center-bound" or "center supported" will be effectually overcome; by which the main body of the tie and its bed in the ballast or foundation material of the road bed will be a considerable dis-



tance below the base of the rails so that the surrounding and superincumbent ballast or foundation material will effectually support and maintain in position the tie bed or portion thereof directly under the tie and prevent the tendency of the same to work out under the pressure or hammering action of the traffic of passing trains; by which adequate and effective abutment or engagement between the ties and ballast or foundation material of the road bed to resist lateral movement of the track or longitudinal movement of the ties in the direction of their length owing to side thrust of the car wheels on the track rails will be afforded by the portion of the ties between the rails and by the ballast or foundation material between the rails, thus materially lessening the required width of the road bed and saving the cost of materially extending the ballast or foundation material beyond the outer ends of the ties; by which the "surfacing," "elevating" or raising or lowering the relative portions of the track rails with each other or with the cross ties or road bed, may be effected quickly and conveniently and without material interruption of train movement, and without disturbing the ballast or foundation material of the road bed or the bedding of the ties therein, or the withdrawal of spikes, screws, bolts or other fastenings employed for securing the rails in place; which will enable the track rails to be jacked up or raised when this is required for any purpose without removing the spikes or other fastenings which secure the rails to their immediate supporting blocks; which will prevent the rails from spreading sufficiently to cause derailment, even if the spikes or means for securing the rails to their immediate supporting blocks should give way; which will readily accommodate and admit the application of "guard rails," "rail braces," "frogs," "switches," "derails" and other similar track appliances on either side of the track rails proper, and this without interfering with the proper insulation of the track rail when it is used as a part of an electric circuit for signaling, block system, or other purposes; in which the immediate track rail supporting blocks of wood or other cushioning material may be reversed or turned upside down or end for end to increase their life or usefulness and also renewed from time to time without material cost; and which, in short, the track construction and track maintenance work may be practically accomplished with a maximum of efficiency and durability, and with a minimum of cost and labor and of interference with train movement.

My invention consists in the means I employ as herein shown and described for practically accomplishing this object or result.

In the accompanying drawing, forming a part of this specification, Figure 1 is a vertical cross section of a railway track embodying my invention, the track illustrated being a double one, and the rail of one track being shown as jacked up to better illustrate how this can be done without disturbing the ties or the bedding of the same in the ballast or foundation material of the road bed. Fig. 2 is a plan view illustrating a short portion of the track, the ballast or foundation material of the road bed at a portion of the track, being in part removed to better show the cross ties. Fig. 3 is an enlarged plan view of one of

the ties. Fig. 4 is a longitudinal sectional view thereof. Fig. 5 is a detail perspective view of one of the track rail supporting blocks. Fig. 6 is a detail section on line 6--6 of Fig. 4, and Figs. 7 and 8 are detail sections on lines 7--7 and 8--8, respectively, of Fig. 4. And Fig. 9 is a detail vertical section similar to Fig. 4, showing a rail brace applied.

In the drawing A represents the road bed; B the ballast or foundation material of the road bed in and upon which the cross ties are bedded, the same being of any suitable material such as crushed rock, cinders, sand, clay, earth, or other material; C the track rails; D the cross ties, each having or comprising a main body portion D<sup>1</sup> of cast or flowed metal, preferably of cast steel, and removable track rail supporting blocks D<sup>2</sup> of wood or other resilient, elastic or cushioning material, and into which the spikes or other rail fastening devices may be driven or applied in different places, said blocks fitting in upwardly open sockets D<sup>3</sup> with which the cast metal main body portion D<sup>1</sup> is furnished near its ends to receive, confine and hold in place said immediate track rail supporting blocks D<sup>2</sup>; E E are the fastening means or devices, preferably ordinary spikes, by which the track rails C are secured to the supporting blocks D<sup>2</sup> and through them to the ties; F are liners or fillers which may be placed in or removed from the sockets D<sup>3</sup> in "surfacing" or elevating or lowering the rails; and G supplemental track rail appliances such as rail braces for example.

The cast or flowed metal body portion D<sup>1</sup> of the tie is furnished with wide and long bases d at each end under and adjacent to the track rails where the pressure and hammering action of the traffic or rolling or other equipment upon the rails comes most severely to give the ties at such portions thereof an extended bearing upon the ballast or foundation material of the road bed; and said main body portion of the tie is also provided with a narrow or contracted intermediate portion d<sup>1</sup> between the track rails so that this intermediate portion of the tie may have a less extended bearing upon the ballast or foundation material of the road bed than the base portion d d and thus prevent the ties from becoming "center bound" or "center supported." The wide bases d d in connection with the intermediate narrow portion d<sup>1</sup> of the tie, also affords each tie with bearing shoulders or faces d<sup>2</sup> which by engagement with the ballast or foundation material of the road bed between the ties, tends to prevent slipping of the tie in the direction of its length under the side thrust of the train or wheel flanges against the rail.

To aid the cooperative action of the wide or extended bases or bearing portions d d in connection with the narrow or contracted intermediate portion d<sup>1</sup> of the tie in preventing the tie from becoming "center bound," and to additionally prevent the ballast or foundation material of the road bed from working out from underneath the ties at the portions thereof directly beneath and adjacent to the rail, I provide the bases d of the ties on the under side thereof with shallow ballast retaining pockets d<sup>3</sup> formed by downwardly projecting marginal ribs or shoulders or flanges d<sup>4</sup>. The marginal ribs or shoulders d<sup>4</sup> also aid in preventing slipping of the tie in the directions of its length.

The main cast or flowed metal body portion D<sup>1</sup> of



each cross tie D is provided on its upper side or face with upwardly projecting longitudinal flanges or ribs  $d^5$  and transverse flanges or ribs  $d^6$ , near each end of the tie to form the walls of the socket  $D^3$  to receive 5 and hold in place the removable rail supporting blocks  $D^2$  upon which the rails directly rest and to which the rails are directly secured by the fastening devices or spikes E.

The immediate rail supporting blocks  $D^2$  of the tie 10 may be made of any desired dimensions, but I prefer to make them about six inches in thickness by eight inches in width and fourteen inches in length in the direction of the tie; and, if of wood as I prefer to make them, the grain of the wood should run in the direction of the tie. The surrounding side walls  $d^5$  and 15 transverse walls  $d^6$  of the sockets  $D^3$  serve to confine and support the wood blocks  $D^2$  on all sides and effectually prevent any tendency of the spikes or other rail fastening devices to split the wood block or cause the 20 same to give way in any direction. The surrounding walls  $d^5$   $d^6$  of the sockets  $D^3$  are preferably an inch or such matter less in height than the thickness of the supporting block  $D^2$ , so that the track rail C cannot come in contact with the cast or flowed metal portion 25  $D^1$  of the tie, and so that the wood block  $D^2$  may also serve as an effective insulation for the rail in cases where the rail is used as an electric power transmission rail, or as part of an electric circuit in block or other signaling systems.

30 While the thickness of the wood or other rail supporting block  $D^2$  may be materially varied without departing from my invention, these immediate rail supporting blocks  $D^2$  which rest on top of and project upwardly from the main cast or flowed metal body 35 portion  $D^1$  of the tie, should always be of such substantial thickness as to cause the base flanges  $C^1$  of the rails C which rest upon the blocks  $D^2$ , to be a considerable distance above the main cast or flowed metal body portion  $D^1$  of the tie, and the immediate bed  $b$  40 thereof in and on the ballast or foundation material B of the road bed, so that the bases of the rails will be well above the main body portion  $D^1$  of the tie, and so that the bed or ballast material  $b$  directly under the tie may be supported and maintained in position by 45 the surrounding ballast adjacent to and above the main body portion  $D^1$  of the tie. This materially aids in securing and maintaining a firm, solid and permanent foundation or bed for the tie in the ballast or foundation material of the road bed.

50 The inner or opposing transverse walls or flanges  $d^6$   $d^5$  of the opposite sockets  $D^3$   $D^3$  on each tie, also serve as abutment surfaces, devices or shoulders for the ties against the portion  $b^1$  of the ballast B between the rails and directly above the tie to aid in preventing the 55 slipping of the tie in the direction of its length under the lateral thrust of the train or car wheel flanges; and the same in connection with the other devices with which the tie is provided to guard against such slipping, renders it unnecessary in my improved construction of tie to materially extend the ballast or 60 foundation material of the road bed beyond the outer ends of the ties as has heretofore been necessary in order to secure a strong and effective end abutment on the road bed for the outer ends of the ties to bear 65 against. This enables me to materially lessen the

width of the ballast or foundation material of the road bed, and the cost thereof both as to first construction and maintenance.

The intermediate portion  $d^1$  of the tie between the sockets  $D^3$   $D^3$  is preferably furnished with an upright 70 longitudinal strengthening rib or flange  $d^7$ . And beyond the sockets  $D^3$   $D^3$  corresponding strengthening ribs  $d^8$ , preferably extend to the extreme ends of the tie.

To prevent the rails C C from spreading apart sufficiently to cause derailment of the train, in case the 75 spikes or other fastening devices E which secure the rails to the immediate rail supporting blocks  $D^2$   $D^2$  should give way, I preferably provide one of the side walls or flanges  $d^5$  of each of the sockets  $D^2$  with an upwardly projecting stop, lip or shoulder  $d^9$ , which by 80 engagement with the base flange of the rail will limit the outward or spreading movement of the rail independent of the supporting block  $D^2$  and the fastening or anchoring devices which secure the rail thereto.

To secure a snug fit of the wood supporting blocks 85  $D^2$  in the sockets  $D^3$ , and especially against the outer ends of such sockets and thus always maintain the rails at the proper gage, the inner transverse walls  $d^6$  of the sockets are preferably provided with one or more upright inclined or wedging securing ribs  $d^{10}$ . 90 And to permit the escape of moisture the sockets are also preferably provided with one or more drain openings  $d^{11}$ .

The removable liners F, one or more of which are placed in or removed from the supporting block sock- 95 ets  $D^3$  beneath the supporting blocks in surfacing or raising and lowering the track rails, may be of any suitable material, but I prefer to make them of wood.

The longitudinal track rail appliances G may be of any suitable kind or construction, such as third or cur- 100 rent transmission rails guard rails, rail braces, crossings frogs, switches, derails, or other track appliances, and the same may fit on either side of the track rail, according to the kind nature or purpose thereof. In the instance illustrated in the drawing the track rail 105 appliance G is of an ordinary form of rail brace, and is represented as being applied at the junction of two rails. Its base  $g$  is preferably secured to the rail insulating and supporting block  $D^2$  by screws or other devices  $g^1$ . It aids in preventing canting or tilting of 110 the rail.

The supporting block sockets  $D^3$  in the main or cast or flowed metal body portion  $D^1$  of the tie, are preferably rectangular in horizontal section as well as in both cross and longitudinal vertical sections, 115 and are also preferably so located in respect to the gage of the railway track or distance between the rails that the rails do not extend across the wood blocks  $D^2$  at the middle thereof, but on the contrary somewhat nearer one end than the other; so that the rail 120 supporting blocks  $D^2$  may be reversed in their sockets not only by turning them upside down but also by turning them end for end while keeping the same face uppermost, and in each instance bring a fresh surface of the block as a seat for the rail base and as a receive- 125 ing space for the spikes or other fastening means by which the rails are secured to the wood supporting blocks. This is not only a convenience in assembling the parts, but adds materially to the life and usable efficiency of the rail supporting blocks and of 130



the tie as a whole. The wood blocks correspond in horizontal section and in cross and longitudinal vertical sections with the sockets in which they fit.

As in my invention the main body portion  $D^1$  of the tie is of cast or flowed metal, preferably cast steel, it is not liable to speedy rusting or corrosion as is the case with rolled or forged iron or steel forms, and this main portion of my tie is exceedingly durable and long lived; and as the supporting blocks are of simple form and of comparatively small length, they are inexpensive and can be readily renewed from time to time at small cost. And, as in my invention, the main cast or flowed metal body portion  $D^1$  of the tie is of a form giving the wide or adequate bases or bearings under and adjacent to the rails and the required strength and rigidity to the tie structure as a whole, with a substantially minimum weight of metal, and is of a form capable of being easily and conveniently cast, my improved tie possesses the important advantage or characteristic of being comparatively inexpensive and cheap to manufacture, especially when its great durability and efficiency, and other advantages in slight cost of subsequent track maintenance and slight interference with train movement are taken into consideration.

As in my invention the cross ties have wide extended bases under and adjacent to the track rails, and the immediate track rail supporting blocks  $D^2$  afford a wide or extended bearing contact with the bases  $C^1$  of the rails, the fraying or wearing action of the rail bases on the wood blocks is rendered comparatively slight, which adds materially to the life and durability of the wood blocks; while at the same time this enables the ties to be spaced a farther distance apart or placed at greater centers, and thus materially reduces the number of ties required per mile of track, which results in a material saving.

While the wood block  $D^2$  is comparatively short in respect to the metal portion  $D^1$  of the tie, it is nevertheless, (though removable therefrom and not bolted or fastened thereto,) long enough to prevent its tilting or turning upward at its inner end under side thrust of the train or car wheels. In other words the immediate track rail bearing blocks  $D^2$  to which the track rails are firmly, rigidly and permanently secured by the spikes or other fastening devices  $E$ , perform the ordinary function of a tie in preventing the rails spiked thereto from canting, turning or tilting, while the metal portion  $D^1$  of the tie in the sockets of which the wood blocks  $D^2$  fit, afford support for the wood blocks and holds them in place, and through them holds the rails in place and affords the requisite bearing and contact with the ballast or foundation material of the road bed.

As in my invention the immediate track rail supporting blocks  $D^2$  are the parts to which the rails are directly spiked or fastened by the spikes or other fastening devices employed, and as these supporting blocks fit in upwardly opening sockets in the main or body portion of the ties, and are removable therefrom, to resurface the track, or restore the track rails to proper elevation in respect to each other or in respect to the ties or road bed, all that is required is simply to jack up the rails and with them the supporting blocks  $D^2$  which are fastened thereto, and remove or add liners  $F$  which

are interposed between the bottom faces of the wood blocks and the bottoms of the sockets  $D^3$  in which the removable wood blocks fit, as may be necessary to produce the proper leveling. In cases where necessary the wood blocks may be shaved or cut away on their under face to reduce their thickness or to renew a smooth face for the rail bearing surface. In my invention it is thus neither necessary to remove or disturb the tie or its bed in the ballast or foundation material of the road bed, or to remove the spikes or other fastenings which secure the rail to the wood blocks, or to disconnect or remove the rails from each other or from the ties. And in the midst of such track maintenance work or when it is partially done, the track rails and their adhering supporting blocks may be very quickly and conveniently again lowered in position by the lifting jacks, (one of which is represented in the drawing at  $H$ ,) to permit the passage of a train; as whatever the stage of the work the moment the rails are again lowered all the parts of the track, rails, ties, supporting blocks and rail-fastenings, are again completely intact and ready for train movement, the same as before the work begun, or after being completed.

Where retamping however of the ballast back under the main body portion  $D^1$  of the tie becomes necessary, the construction of the tie is such as to give open space and ready access for tamping of the ballast or foundation material of the road bed between the ties and around and back under all portions of the tie, the bottom bed face  $d^2$  of which is in one horizontal plane and entirely free from any extended downward projections, flanges or members such as would interfere with tamping or proper bedding of the tie or render impossible the making of a uniformly solid bed therefor in the ballast or foundation material. It is for this reason that the ballast retaining socket  $\bar{d}^3$  and its surrounding rib or shoulder  $\bar{d}^4$  on the lower face of the tie bases  $d d$  is made very shallow, preferably about one-half inch in depth, so that the ribs  $\bar{d}^4$  surrounding this ballast retaining socket will not interfere with the proper tamping or solidification of the ballast under the bases  $d d$  of the tie; and, for the same reason, the bed face of the tie is made in one substantially horizontal plane.

As in my invention the main body portion of the tie is of cast or flowed metal, this body or main portion may have added thereto in one integral mass such lugs, brackets, recesses, projections, or devices as to enable the convenient application thereto of the customary cranks, levers, rods, and other devices or mechanisms required in connection with the operation of interlocking signaling, derailing, and other similar appliances used in connection with the track rails, frogs, switches, crossings, crossovers, derails, signal and other similar appliances used for railway track and train operation, or which may be necessary for the application and operation of third or fourth rails, or metal conductors or cables for the transmission of electric current or other power used in connection with the movement of trains or cars.

As in my invention the main cast metal or flowed body portion has, at the long wide bases  $d d$  thereof, shallow pockets surrounded by or made up of projecting ribs or shoulders which can embed themselves into wooden or other resilient stringers or timbers which go to make up the cross tie foundation on trestles, bridges



and similar structures, such projecting lugs, ribs or shoulders embedded in the stringers or timbers will prevent lateral or longitudinal movement of the cross tie on such trestle, bridge or other structure.

5 As in my invention the main cast or flowed metal body portion of the tie is provided with the safety projecting lugs *d*<sup>9</sup> to prevent rail spreading on one side or edge only thereof, and as such lugs are arranged always on the same side of the ties at each end thereof, these  
10 projecting lugs, which prevent spreading of the rails, do not interfere at all with the operation of angle, chair, or other forms of splices or fastenings used to connect abutting and adjoining rails, and, for the same reason, such safety lugs do not interfere with the insulation of  
15 the rail effected by the interposed rail supporting blocks.

I claim:

1. In a railway track, the combination with the track rails and road-bed, of cross ties therefor, each comprising  
20 a cast or flowed metal main body portion having its lower or bed face in substantially one horizontal plane with shallow ballast retaining pockets at the portions thereof under the track rails, and provided with wide or extended base portions under the track rails and a narrow intermediate portion between the track rails, and furnished on  
25 its upper side with upwardly open track-rail-supporting-block sockets, removable resilient track rail supporting blocks fitting in said sockets and interposed between the track rails and said main metal body portion of the tie, and fastenings securing the rails to said supporting blocks,  
30 said main cast or flowed metal body portion of the tie having also abutment faces or shoulders engaging the ballast or foundation material of the road bed, and said main cast or flowed metal body portion of the tie being  
35 also provided outside of the rails with stops or shoulders to prevent spreading of the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails, substantially as specified.

40 2. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are  
45 secured, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

3. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having  
50 upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, said cast or flowed metal main body portion of the tie having wide or extended bases under and adjacent to the  
55 rails and a narrow or contracted intermediate portion between the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

60 4. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured,  
65 said supporting blocks, interposed between the cast or flowed metal body portion of the tie and the rail bases, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

70 5. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured,  
75 said main metal body portion of the tie having its lower or bed face in substantially one and the same horizontal

plane, said supporting blocks being laterally and longitudinally confined by said sockets, but free to be upwardly lifted therefrom with the rails substantially as specified.

6. The combination with the rails, of cross ties therefor, 80 each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, said main metal body portion of the tie having its lower 85 or bed face in substantially one and the same horizontal plane, and having shallow ballast retaining pockets at the portions thereof under and adjacent to the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom 90 with the rails substantially as specified.

7. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks 95 fitting in said sockets and to which the rails are secured, said cast or flowed metal main body portion of the tie having wide or extended bases under and adjacent to the rails and a narrow or contracted intermediate portion between the rails, said wide or extended bases having 100 shallow or ballast retaining sockets on their under or bed faces, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

8. The combination with the rails, of cross ties therefor, 105 each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, said supporting blocks being laterally and longitudinally 110 confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

9. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail 115 supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, said cast metal main body portion of the tie having wide or extended bases under and adjacent to the rails and a narrow or contracted intermediate portion between the 120 rails, the shoulders between said narrow or contracted intermediate portion and said wide or extended bases serving as abutment faces against the ballast or foundation material of the road bed between the rails to prevent slipping of the ties under side thrust of the train or car 125 wheel flanges, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

10. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, said main cast or flowed metal body portion of 135 the tie having, outside the rail, stops or shoulders to engage the rail bases and prevent spreading of the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified. 140

11. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, removable rail supporting blocks fitting in said sockets and to which the rails are secured, 145 and supplemental track rail appliances as shown and described between the rail and tie said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified. 150

12. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, removable rail-supporting blocks fitting in said sockets and to which the rails are secured, 155 and a supplemental rail brace secured to the rail support-



ing block and engaging the rail, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

5 13. A cross tie comprising a main metallic body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and resilient rail-supporting blocks fitting in said sockets and interposed between said main body portion of the tie and the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

10 14. A cross tie comprising a main metallic body portion having upwardly open sockets on its upper side to receive rail supporting blocks, resilient rail-supporting blocks fitting in said sockets and interposed between said main body portion of the tie and the rails, and fastening devices securing said rails to said removable supporting blocks, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

15 15. A cross tie comprising a main metallic body portion having wide or extended bases at its ends, and a narrow intermediate portion, and provided with upwardly open sockets on its upper side to receive rail supporting blocks and removable wooden rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and said rails, and fastenings for securing the rails to said supporting blocks, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

20 16. A cross tie comprising a main metallic body portion having wide or extended bases at its ends, and a narrow intermediate portion, and provided with upwardly open sockets on its upper side to receive rail supporting blocks and removable wooden rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and said rails, fastenings for securing the rails to said supporting blocks, and said main metallic body portion of the tie having its under or bed face substantially in one horizontal plane, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

25 17. A cross tie comprising a main metallic body portion having wide or extended bases at its ends, and a narrow intermediate portion, and provided with upwardly open sockets on its upper side to receive rail supporting blocks and removable wooden rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and said rails, fastenings for securing the rails to said supporting blocks, said main metallic body portion of the tie having its under or bed face substantially in one horizontal plane, and provided with shallow ballast retaining pockets at the portions thereof under and adjacent to the track rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

30 18. In a railway track, the combination with the rails, of resilient track rail supporting blocks secured to said track rails, and a cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or its bedding in the road bed, or the spikes or other fastening devices securing the rails in place, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

35 19. In a railway track, the combination with the track rails, of wood supporting blocks therefor, spikes securing the rails to said blocks, and a metallic cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or the ballast or foundation material of the road bed or the spikes or other devices which secure the rail in place, said supporting blocks being laterally

and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

20. In a railway track, the combination with the track rails, of wood supporting blocks therefor, spikes securing the rails to said blocks, and a suitable cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or the ballast or foundation material of the road bed or the spikes or other devices which secure the rail in place, said supporting blocks insulating the rails from the metallic tie, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

21. In a railway track, the combination with the track rails, of wood supporting blocks therefor, spikes securing the rails to said blocks, and a metallic cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or the ballast or foundation material of the road bed or the spikes or other devices which secure the rail in place, said supporting blocks insulating the rails from the metallic tie, and a supplemental track rail appliance as shown and described secured to the supporting block, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

22. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable rail supporting blocks fitting in said sockets and to which the rails are secured, and a removable liner in the socket below the supporting block, substantially as specified.

23. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, removable rail supporting blocks fitting in said sockets and to which the rails are secured, said cast or flowed metal main body portion of the tie having wide or extended bases under and adjacent to the rails and a narrow or contracted intermediate portion between the rails, and a removable liner, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

24. The combination with the rails, of cross ties therefor, each comprising a cast or flowed metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, removable rail supporting blocks fitting in said sockets and to which the rails are secured, said main metal body portion of the tie having its lower or bed face in substantially one and the same horizontal plane, and a removable liner, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

25. A cross tie comprising a main metallic body portion having upwardly open sockets on its upper side to receive rail supporting blocks, resilient rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and the rails, and a removable liner, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

26. A cross tie comprising a main metallic body portion having upwardly open sockets on its upper side to receive rail supporting blocks, resilient rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and the rails, fastening devices securing said rails to said removable supporting blocks, and removable liners in said sockets below said rail supporting blocks, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

27. A cross tie comprising a main metallic body portion



having wide or extended bases at its ends, and a narrow intermediate portion, and provided with upwardly open sockets on its upper side to receive rail supporting blocks and removable wooden rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and said rails, fastenings for securing the rails to said supporting blocks, and removable liners in said sockets below said rail supporting blocks, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

28. In a railway track, the combination with the rails, of resilient track rail supporting blocks secured to said track rails, a cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or its bedding in the road bed, or the spikes or other fastening devices securing the rails in place, and removable liners, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

29. In a railway track, the combination with the track rails, of wood supporting blocks therefor, spikes securing the rails to said blocks, and a metallic cross tie having on its upper side sockets to removably receive and hold in place said track rail supporting blocks and permit the same to be jacked up with the rails without disturbing or removing the tie or the ballast or foundation material of the road bed or the spikes or other devices which secure the rail in place, said supporting blocks insulating the rails from the metallic tie, and removable liners, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

30. A cross tie having on its upper side upwardly projecting integral socket walls, removable rail supporting blocks fitting therein and track rail supporting devices or braces extending between the tie and rail to prevent canting or turning over of the rail, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

31. A cross tie having on its upper side upwardly projecting integral socket walls, removable rail supporting blocks fitting therein and track rail supporting devices or braces extending between the tie and rail to prevent cant-

ing or turning over of the rail, said rail brace or device having a base fitting upon and secured to the track rail supporting block, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

32. A cross tie comprising a main metallic body portion having integral upwardly projecting socket walls on its upper side to receive track rail supporting blocks, supporting blocks fitting therein, said main metallic body portion of the tie being extended at the ends beyond the track rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

33. The combination with the rails, of cross ties therefor, each comprising a cast metal body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable and reversible rail supporting blocks fitting in said sockets and to which the rails are secured, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

34. A cross tie comprising a main metallic body portion having upwardly open sockets on its upper side to receive rail supporting blocks, and removable and reversible resilient rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and the rails, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

35. A cross tie comprising a main metallic body portion having wide or extended bases at its ends, and a narrow intermediate portion, and provided with upwardly open sockets on its upper side to receive rail supporting blocks, and removable and reversible wooden rail supporting blocks fitting in said sockets and interposed between said main body portion of the tie and said rails, and fastenings for securing the rails to said supporting blocks, said supporting blocks being laterally and longitudinally confined by said sockets but free to be upwardly lifted therefrom with the rails substantially as specified.

JOHN E. MUHLFELD.

Witnessed:  
E. W. BAKER,  
T. E. HARVEY.