(No Model.)

W. F. GOULD.

ANGLE BAR, RAIL CHAIR, RAIL JOINT, &c.

No. 548,705. Patented Oct. 29, 1895.

Fig. 1.

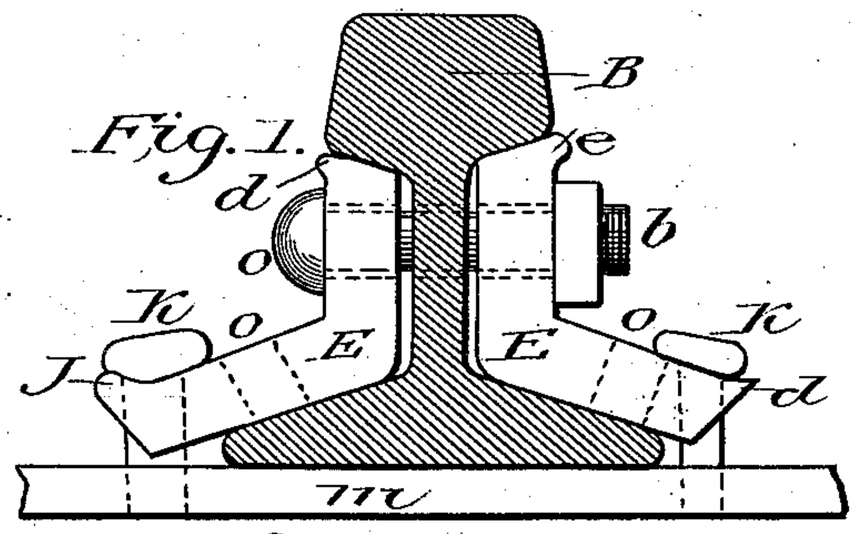


Fig. 2.

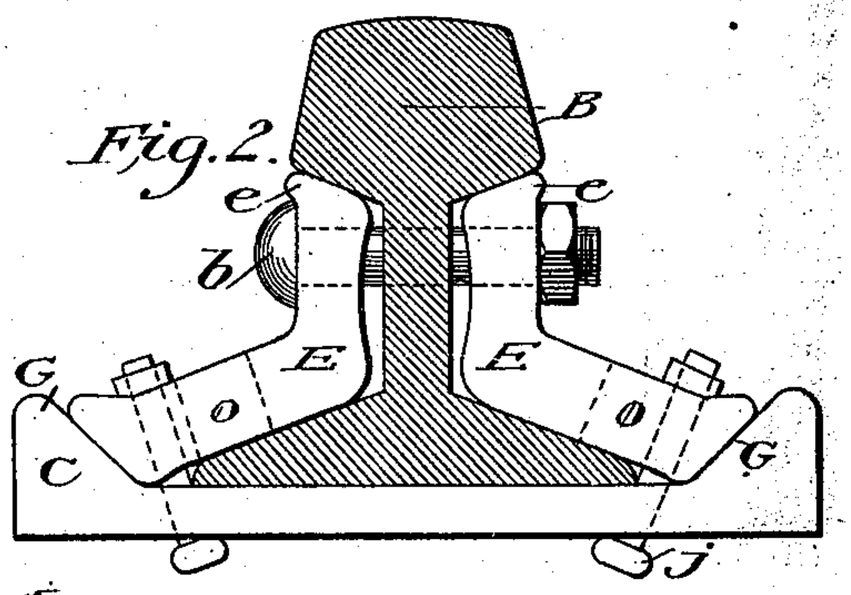
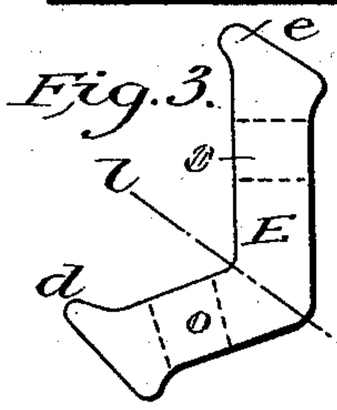


Fig. 3.



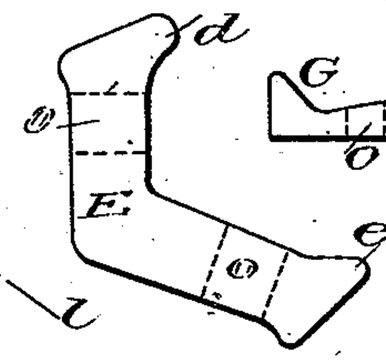


Fig. 4.

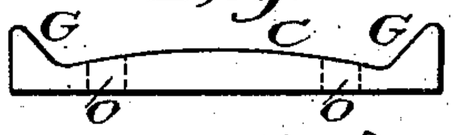


Fig. 5.

Fig. 6.

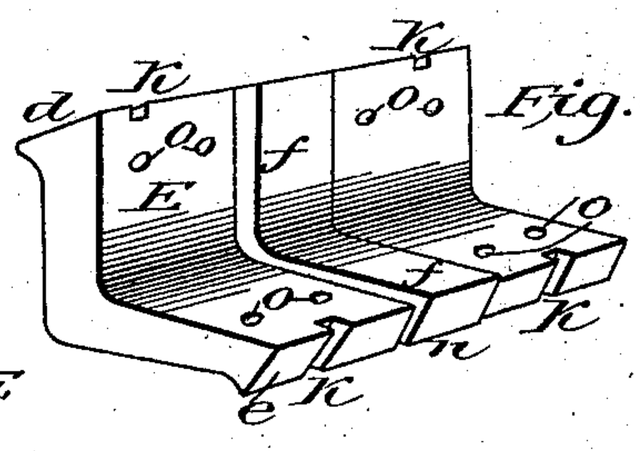


Fig. 7.

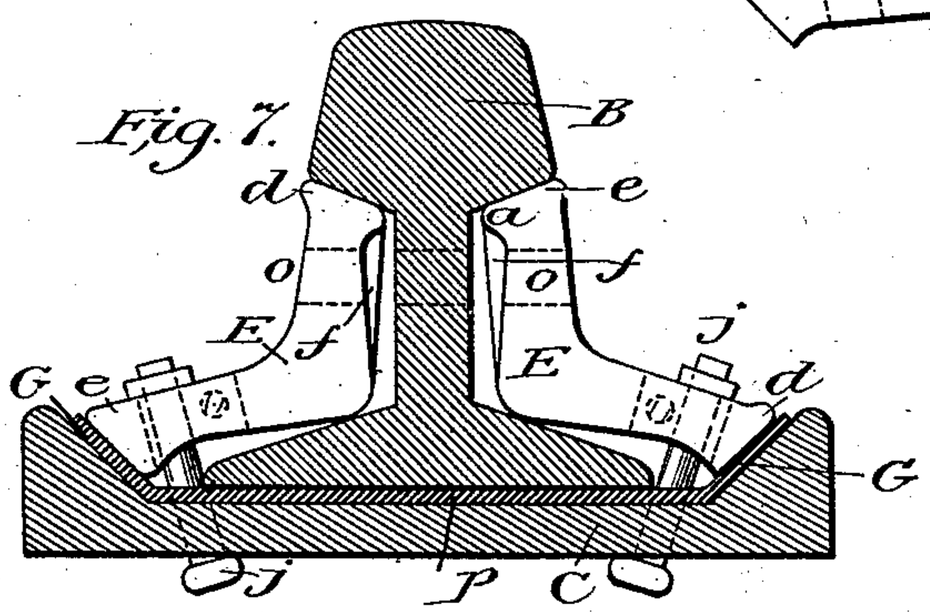


Fig. 8.

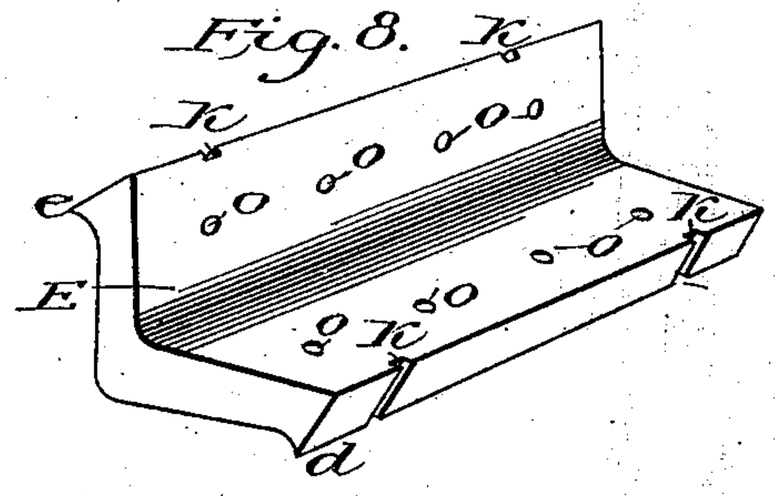
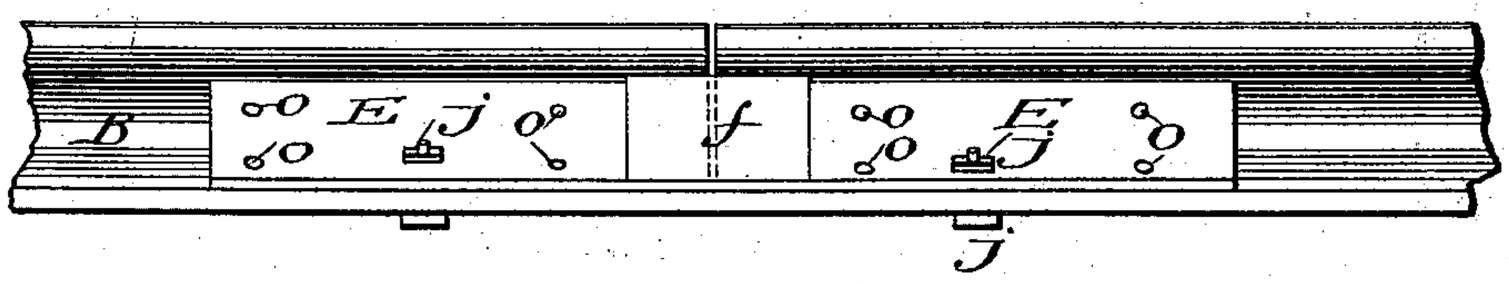


Fig. 9.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM F. GOULD, OF DES MOINES, IOWA.

ANGLE-BAR, RAIL-CHAIR, RAIL-JOINT, &c.

SPECIFICATION forming part of Letters Patent No. 548,705, dated October 29, 1895.

Application filed March 9, 1886. Serial No. 194,661. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. GOULD, a citizen of the United States, residing at Des Moines, in the county of Polk and State of Iowa, have invented certain new and useful Improvements in Angle-Bars, Railway-Rail Chairs, and Rail-Joints, of which the following is a specification.

My invention relates to railway-rail joints and to an improvement in their construction, and also to an improvement in angle-bars used for the purpose of splicing railway-rail ends, and also in railway-rail chairs used in supporting railway-rail ends and their supports, the object of the invention being, first, to make a stronger rail-joint with angle-bars than those now in use, support the rails better, and last longer; second, to form the angle-bar so that it can be used twice on the same section of rail, which is accomplished by making it (the bar) so that it is adapted in size and form to be reversed or inverted, and it therefore has four (4) bearing-surfaces, two of which engage the rail at the same time, and when so inverted or reversed the other two bearing-surfaces on the same bar or splice will then engage the ball and flange of the rail, respectively, in the same manner, showing how it can be used either edge upward, so that when one edge becomes worn it can be turned and the unworn surfaces of the bar be placed in contact with the rail, thereby using the same angle-bar or splice twice; third, to so form the angle-bar that it will fit different sections of rails, so that one leg or angle of the bar will fit a different section of rail than the other angle or leg of the same bar, so that one set of rolls in a rolling-mill can make a rail-splice that will fit two sections of rails; fourth, to so form the angle-bar with one set of rolls in a rolling-mill, or one pattern to be used in the sand at a foundry, that it will form an interchangeable angle-bar with one leg or angle of the bar thicker than the other leg of the same bar, so that when two bars are combined with two rails at the same joint their vertical and horizontal portions can be placed in inverted position relative to each other on opposite sides of the rails, thereby forming the strongest rail-joint possible to make with angle-bars, and in order to save metal it may be advisable to make this bar thinner at its ends than at its center or with a swell or reinforcement at its central portion; fifth, I so form the angle-bars that they will be adjustable relative to the vertical wear which takes place at the rail-joint between the angle-bar or rail-splice and the rails, and the bars so used produce a result or method which is new for said purpose; sixth, to so form the angle-bar or rail-splice with swells or reinforcements that its utility will be more complete, and the results obtained by forming the bar or splice as implied are new and very advantageous, and it can be made, also, with one set of rolls or cast in a mold and should be made of metal, (I would prefer steel;) seventh, to so form a railway-rail chair that it will be adapted to be used in combination with the angle-bars, rails, and ties, and also be interchangeable and both of its outside edges adapted to fit against either edge of the reversible angle-bar and also to slide laterally under the rail from either side or end of the rail and yet allow the angle-bar to be adjusted relative to vertical wear of the same while in such position. I attain these objects by the mechanism as illustrated in the accompanying drawings, in which—

Figure 1 is a view of a vertical section of one end of a railway-rail and two of my reversible angle-bars. Fig. 2 is a view of a vertical section of the end of a rail, two of my reversible angle-bars, and an end view of my chair. Fig. 3 is a vertical sectional view of two of my reversible angle-bars, showing the bars with different lengths of leg, angle, or vertical section in each bar, reference being had to the dotted lines *l l*. Fig. 4 is an end view of my railway-rail chair having inclines on its outside edges inclining inwardly, and also having a convex base. Fig. 5 is an end view of my reversible and interchangeable angle-bar, showing outside swells and reinforcements upon its outside surface, and also one of its legs or angles thicker than the other leg or angle of the same bar, also showing that this angle-bar or rail-splice can be used in an inverted position on either side of the rails at the same joint, also showing that it has four separate and distinct bearing-surfaces, two of which are adapted, respectively, to engage the under side of the ball of the rail and two of which are adapted to engage a

portion of the top of the flange of the rail. Fig. 6 is a view in perspective of my reversible and interchangeable angle-bar, showing the swell or reinforcement thicker on one leg or angle of the bar than on the other leg or angle of the same bar, and showing the swells or reinforcements to be so made upon the outside surface of the bar or splice. Fig. 7 shows a vertical sectional view of a railway-rail joint, and two of my reversible angle-bars with reinforcements on their inside portions, showing the bars as they are in position on the rails, and also the relative position of the splice to the rail in combination with the chair C and packing *p*. Fig. 8 is a perspective view of my angle-bar adapted to be used in an inverted position or as a reversible angle-bar, also showing the bar without reinforcements on its outside surface. Fig. 9 is a perspective view of my combination of the chair, angle-bars, rails, and ties.

These figures being jointly and severally considered illustrate the novelty and utility of my complete invention.

Similar letters refer to similar parts throughout the several views.

E is my improved angle-bar, adapted to be placed on each side of the ends of two rails at the joint. It is provided with perforations or holes *o* and K. *o* is to receive the bolt *b* while K is to receive the spike, as shown in Figs. 1 and 2. In Fig. 1 is shown the angle-bars E E without the chair C, which is shown in Figs. 2, 7, and 9, to show that it is not absolutely necessary to use the chair in order to form a rail-joint with my reversible angle-bars.

Fig. 1 clearly shows how a railway-rail joint can be made and maintained by using my reversible and interchangeable angle-bars E E. It is also shown in this figure how different sections of railway-rails may each use one and the same reversible, adjustable, and interchangeable angle-bar E, so that in case a railway corporation has different sections of rails on its lines of road it can use my angle-bar E on at least two different sections of rails, and the same bar can be made to fit two different sections of rails, be reversible, adjustable, and interchangeable, and yet be made by one set of rolls in a rolling-mill or cast from one pattern in the sand at a foundry.

What I mean by the word "section" of a railway-rail is the distance between its ball and flange, as clearly shown in Fig. 1.

What I mean by the word "interchangeable" in this specification is that the angle-bar E or a rail-splice is adapted to be interchanged from one side of the rail to be inverted or reversed on the other side of the same rail, having also a variation in its section either in thickness of vertical or longitudinal section or in each leg, as shown in Figs. 1, 5, 6, and 8, which clearly show how this angle-bar E will fit the rail either edge upward when it is interchanged.

Another advantage gained by using the angle-bar E, as above described, is that it can be made with one leg or angle so much heavier, thicker, and stronger than the other leg or angle of the same bar, and as one edge of the bar will fit the rail as well as the other it makes the joint so much stronger to put the thickest, heaviest, and strongest leg of the bar in a vertical position on the outside of the rails at the joint and horizontally on the inside of the rails at the same joint, thereby forming a new combination, whereby the strength of the joint is increased far beyond what it ever was before by a pair of angle-bars or rail-splices made by one set of rolls or dies, for the reason that thicker pieces of metal can be used in the angle-bars when they are combined, as described, for the purpose of supporting the ends of railway-rails.

In order to prevent confusion as to what is meant by the words "leg of the bar" in this specification, by referring to Fig. 3 the dotted lines *l l* are drawn through the section of the angle-bar E, and the so-called "legs of the bar" are those portions of the bar above and below the dotted line *l l*. For instance, one leg or angle of the bar is from the dotted line *l l* to *e*, while the other leg or angle of the same bar is from the dotted line *l l* to *d*, and the four bearing-surfaces on the bar are one at *e*, one at *d*, one on the inside line of the bar or splice E between *e* and the dotted line *l l*, and the other is on the inside line of the bar between the dotted line *l l* and *d*, clearly showing four (4) bearing-surfaces upon one angle-bar or rail-splice, which is new and very advantageous.

In Fig. 3 is shown the angle-bar E with different lengths of leg or section, which is explained as follows: By measuring from *e* to the dotted line *l l* is found to be longer than from *d* to the same line. The right-hand figure shows the splice the same as though the bar was reversed or inverted.

In Fig. 4 is shown a modification of my chair C, and shows the chair with its base rounded where it receives the base of the rail. It is formed so that when sand or other substance gets into it after the rails are put in position it will allow the sand to work out from under the bearing-surface of the rail and into the edges of the chair, and so prevent the chair and rails from wearing too fast.

In Figs. 5 and 6 are shown the swells *f f* upon the outside surface of the bar E, and its form is changed on its outside portions, while the portions which are to come in contact with the rails are the same, showing that while the outward form of the bar E is adapted to be changed the bar will still perform the function of a reversible and interchangeable rail-splice; also, that the swells *f f* or the swell on the horizontal portion of the bar at or near the letters *d* and K at its lower edge may be increased above or beyond that of any other

splice or angle bar known, and yet the bar can be used twice for the same purpose at a rail-joint.

I am aware that swells and reinforcements have been placed upon the outside surfaces of a railway-rail splice for the purpose of increasing the strength of such splices for years past. I am aware, also, that putting one piece of metal onto another piece at a particular point to strengthen the same is not new; but when such rail-splices were made they were limited not only to a certain thickness, but also in form and to the position they had to be placed in, or else they were not made in one set of rolls in a rolling-mill.

I am aware that rail-splices have been formed with the outside portions of the splice-bars thicker or heavier than the inside splice-bar; but such bars or splices could not be interchanged, reversed, or inverted; but with my reversible and interchangeable angle-bar or rail-splice E, I make the swell or reinforcement as heavy as necessary on the thin leg of the bar, and by putting the thin leg of the bar in a vertical position on the inside of the rail at the joint I then make the horizontal portion of the same bar very much heavier, and as it is in such position it prevents the bar from bending when the weight comes on it, and it also prevents the T-headed bolts from turning when the nuts are operated. The bar on the outside of the same rail-joint can be placed with the thick or heavy portion of the bar in a vertical position, and as the thinner leg of that bar is in a horizontal position on the outside of the rail at the same joint it will not interfere with the operation of the nuts on the bolts *b*, and when it becomes necessary to renew the joint it can be done by removing the bolts *b*, then reversing or inverting and interchanging the bars E E, so that the unworn surfaces on the bars come in contact with the rails, and the joint will be as good as new and its strength will be the same as before the change was made. Therefore it will be seen that by these means I have produced an angle-bar or rail-splice that is susceptible of more changes, combinations, heavier reinforcements, or swells, thereby making and maintaining a better and stronger rail-joint and also providing for vertical wear of the same after it takes place in a better and more complete manner than any other angle-bar known.

In order to form a rail-joint as above described, a pair of my angle-bars E are used by placing one on each side of two abutting railway-rails at the joint. The bolts *b* are then put through the holes *o* in the vertical lugs of the bars E, and through corresponding holes in each rail. Nuts are then placed upon the screw-threaded ends of the bolts *b*, and as the nuts are operated the angle-bars are drawn toward each other until the angle-bars come in contact with the balls and flanges of the rails, and the joint is thus secured. Spikes are then driven through the notches K in the angle-bars into the ties *m* to prevent in a measure longitudinal movement of the joint, and it is thus made secure, as clearly shown in Fig. 1.

The angle-bar E is preferably formed with two sets of holes *o* to adapt it to be easily and readily inverted, reversed, or interchanged when it becomes necessary to do so in order to properly adjust the bar after it has been used and vertical wear has taken place upon the bars or rails, or both.

When my improved chair C is used in combination with my angle-bars E E, the chair is laid under the abutting ends of two rails and on top of one or more cross-ties. Then the angle-bars E E are on, as hereinbefore described, and in addition to the bolts *b* two or more bolts *j j* are passed through the chair C and through corresponding holes in the angle-bars E E on each side of the chair, as clearly shown in Figs. 2, 7, and 9.

When it becomes necessary to use the packing *p*, as shown in Fig. 7, some kind of paper or other fibrous substance can be inserted between the edges of the bars E E and the chair C or under the rail and on top of the base of the chair C, as shown in Fig. 7. The packing *p* so put in will deaden the sound or noise and also impart a degree of elasticity to the joint while under the passing wheels.

Fig. 6 shows one swell on one leg of the angle-bar E thicker than on the other leg of the same bar, showing that the swell also may be continuous from one edge or bearing-surface of the angle-bar to the other, and also the bar E is shown thicker through one leg of the same bar than the other leg, a feature that is also shown or suggested in Fig 5.

I am aware that prior to my invention swells have been placed underneath and upon the central portions of the horizontal portions of rail-chairs, and a series of ribs running in various directions and connected with each other have also been placed upon the outside portions of such chairs, but not on angle-bars, and that the chairs so made could not be used upon one tie only, and that the chairs so made were not adjustable or interchangeable, as contemplated by me; neither did they provide in any way for taking up the vertical wear of the joint by being reversed or interchanged; neither did the swells on such chairs prevent the T-headed bolts *b* from turning when the nuts upon the opposite ends of said bolts were operated; neither were the swells or ribs on such chairs made heavier on their upper horizontal portions than on their vertical portions and also adapted to fit the rails on each side of them (the rails) at the joint and have also a variable thickness in their vertical section. The ribs, swells, or reinforcements were always alike on each side of the rails at the joint, and when in position were not adapted to be interchanged or perform the same function at a rail-joint as the angle-bar herein described by me.

To avoid confusion as to what is meant in

this specification by the words "inside of the rail," it means that portion of the rails which comes nearest the flanges of the wheels of cars or engines while they are passing over them.

In Fig. 6 is shown how my reversible and interchangeable angle-bar E is formed as to be used either edge upward, thereby making it possible to use thicker bars or a heavier reinforcement upon a rail-splice than has been heretofore used. If a slight reinforcement upon the outside surface of a rail-splice improves the joint, then a heavier reinforcement or swell upon a rail-splice must be another improvement upon the former device, and therefore I not only increase the size of the swell or reinforcement, but also form a new and useful combination of splices and their reinforcements with the rails at a rail-joint, which was before unknown. "Swells" or "reinforcements," as they are called, are placed upon mechanical devices usually to save metal when that device could be of the same thickness its entire length, and when such reinforcements or swells were so used on rail-joints or fish-plates or railway-rail chairs they were alike on each side of the rail and adapted only to be placed in a vertical position on each side of the rail, and were not made any thicker in their vertical portions than would clear the flanges of the wheels in passing over them on either splice; but by placing my angle-bars E E in inverted positions relative to each other on opposite sides of the rails at the joint it admits while in such position of a very much heavier swell or reinforcement *f* being used, and thereby increasing the strength of the joint far beyond the one now used with angle-bars, my object being to make an angle-bar or splice as strong as possible near the extreme end of the rail and yet allow the variable or different-sized reinforcement or swell on the same bar to be placed in a vertical or horizontal position, as the occasion may require.

As shown in Fig. 5, the swell *f* is shown by the dotted lines, showing the swell to be heavier from *d* to the center of the bar E than it is from *e* to the same center on the outside of the same angle-bar E, showing its position vertically and horizontally as the inside splice.

Fig. 6 shows the angle-bar E with one leg or angle thicker than the other, and therefore with more strength through the reinforcement or swell *f*, and the thickest and heaviest portion of the bar E shows as it would vertically on the outside of the rail at the joint or as the outside splice.

The swell on the vertical portion of the inside splice should be as heavy as possible and yet clear the flanges of the wheels while passing over them, while the swell on the horizontal portion of the same splice or bar may be much heavier or thicker, so that if placed in a vertical position on the inside of the rail then it would not clear the flanges of the wheels of the engines or cars and would be therefore inoperative; but this is arranged by putting the heavy angle or leg of the bar E in a vertical position on the outside and horizontally on the inside of the rails at the same joint, and by so doing I am enabled to make and use angle-bars reinforced far beyond any one heretofore made, and the bars herein so described and shown can be made by one set of rolls in a rolling-mill, for the angle-bars or rail-splices so made and adapted to be placed on each side of the rails at the joint are duplicates of each other, and therefore can be put on in inverted positions relative to each other on opposite sides of the rails at the same joint, thereby forming a combination which is new and very advantageous, as clearly shown in Figs. 5 and 6 of my accompanying drawings.

In Fig. 7 is shown two of my angle-bars E when used in combination with a chair C and packing *p*, and the lines on the inside of the angle-bars E E show the swells or reinforcements *f f* on the inside of the bars E, clearly showing the angle-bar or rail-splice reinforced on the inside of the bar or splice. In Fig. 7 it is intended to show an angle-bar or rail-splice that is stronger at its center than its ends and yet allow its outside surface to have an even or plain bearing surface for the heads of the bolts *b* and also the nuts to come in contact with or to rest upon, and so that the bolts *b* will all be of the same length when they are placed in the holes *o*, as clearly shown in this figure also.

I do not wish to confine myself to any particular form of swell or reinforcement either upon the inside or outside of the angle-bar E, but to so form the bar or rail-splice that it will give the greatest amount of support to the extreme end of the rails and yet be adapted to be adjusted relative to the vertical wear of the joint.

What is meant in this specification by the word "adjustable" is that the angle-bar or rail-splice can be adjusted relative to the position of the splice and rail to each other or to the position the splice is in, whether it relates to vertical wear of the splice and rails or whether it relates to curvature of track or elasticity of the joint, and unless the splice is so formed as to be adapted to conform to these conditions it will fail as an angle-bar or a rail-splice, and to do this properly it must be in constant contact with the ball and flange only of the rail at the joint, and when it becomes necessary to adjust the angle-bar E relative to the vertical wear of the same or the rails it can be done by operating the nuts on the screw-threaded ends of the bolts *b*, which will draw the angle-bars E toward each other and upward on the wedge-shaped flanges of the rails B at the joint, thereby forcing the vertical leg of the bar into contact with the under side of the ball of the rail B, and by so doing reduce or take up all of the vertical wear which takes place between the rails and their splices, clearly showing, also, that this operation above described would be impossi-

ble if the angle-bar or rail-splice E came in contact with the web of the rail; but I clearly show in Figs. 1, 2, and 7 a space between the web of the rail B and the inside vertical portions of the angle-bar E. The space herein shown extends upward from the flange of the rail B, showing that the splices or angle-bars can be adjusted by being drawn toward each other after they are in position and become worn, thereby clearly illustrating the operation of an adjustable rail-splice.

I am aware that prior to my invention rail-splices have been formed with enlargements adapted to fit only between the ends of the rails at the joints, thereby forming two openings or rail-joints where there should be but one, and the rail-splices so formed could not be rolled and were therefore expensive in their manufacture; neither could they be adjusted relative to vertical wear upon the splices and rails and the splices so made were limited to a prescribed form or section of rail and could not be adapted to sharp curves in a railway-track without bending the splice or forming tangents in the track when a long splice was used; but with my adjustable angle-bar formed with a swell or reinforcement *f* upon the inside of the bar or splice, and, as shown in Fig. 7, the splice is adjustable relative to vertical wear and also to curvature of track, and it can be very easily rolled in its manufacture, which gives it a commercial value. When my angle-bar E is used, it does not increase the number of joints in a railway-track; neither do the inside swells or reinforcements *f* upon the bars or splices come in contact with each other or the rails; but they (the splices) are so formed that they have a smooth outside surface for the nuts and bolt-heads to rest upon, and while the splices so formed hold the ends of the rails comparatively rigid, yet the intermediate portions of the rails can be moved sidewise to form curvature of track without bending the splice or forming tangents in the track, even when a splice is used long enough to cover three ties properly spaced, which shows that the device above described is new and very advantageous.

The angle-bar E, as shown in Fig. 8, is intended to show an outside view of the bar E, as shown in Fig. 7, with a plain outside surface, the swells or reinforcements *f f*, as shown in Fig. 7, being on the inside of the splice; yet they do not interfere with or are they an impediment to using this same bar or splice in an inverted position, provided the reinforcement or swell *f* is put on, as shown in Fig. 7, for they begin at *a* and extend vertically downward to where the splice engages the flange of the rails. The reinforcements or swells *f f* may extend longitudinally also on the inside of the angle bar or splice E each way from the center of the bar E, as shown in Fig. 7 in the supplemental view of the same. In forming the angle-bars E, I make them as thick as possible on their top edges, and yet not so thick as to touch the web of the rail when the bars are in their respective position on each side of the rails. What is meant by the words "top edges" is that part of the angle-bar E which comes in contact with the under side of the balls of the rails when in position.

I am aware that prior to my invention rail-splices have been formed claiming to be elastic and made in the form of straps or fish-plates (but not as angle-bars) formed concave upon their inside portions, and as the concavity on such splices was deeper at their ends than at their central portions ribs were thus formed running longitudinally along their two extremities or portions which came in contact with the upper and lower portions of the web of the rails at the joint when these were in position. One of the objects was, as stated, to keep the exterior nuts tight after being put on; but when the so-called "ribs" upon the inside of these splices came in contact with the upper and lower portions of the web of the rails at the joint (as it is clearly seen they do when in position) they are inoperative as a rail-splice, for the reason that it is impossible to reduce the opening made by vertical wear or to take up the wear at a rail-joint when any splice is used which comes in contact with the web of the rail, because the splices cannot be drawn toward each other when the nuts are operated or screwed up. The elasticity of a rail-joint does not depend so much upon the splice as it does upon the relative positions that the rail and splice occupy toward each other, for the reason that the rail is as rigid two inches from its end as it is ten feet from the same end. The flange is more elastic, of course, than the ball or head of the rail. Therefore the elasticity of a rail-joint depends in a great measure upon the position the splice occupies upon the flange of the rail, and if the splices are so put on that their inside vertical portions touch the upper and lower portions of the web of the rail, while their bearing-surfaces come in contact with the ball and flange, then their elasticity is destroyed, for the reason that the splice is as rigid as the rail. Therefore short curves cannot be laid with such devices without forming tangents or bending the splice, (when such splices are used,) which is detrimental to the track; but when my angle-bar E is used (shown in Fig. 7) the end of the bar rests upon the more elastic part of the flange of the rail, which yields slightly when sharp curves are laid, thereby allowing side movement of the rail without bending the splice. It is the interior and not the exterior bolts which loosen first at a rail-joint, because of the wedge-shaped bearing-surfaces on the rail which come in contact with the splices, and they are forced apart at the extreme ends of the rails by blows from passing wheels striking the ends of the rails while moving over them, which operation stretches the bolts *b*, thereby caus-

ing friction and wear upon the splices at this particular point, and unless means are provided to properly adjust the splices or angle-bars to their proper places as bearing-surfaces on the rails, and also to keep them adjusted after they become worn in the manner described, they will soon become worn out and dangerous or entirely useless.

I am aware it is not new to form a strap or fish-plate thicker in the middle than it is at its ends, as that has been done by reinforcing its outside portions or by hollowing out its inside portions near its ends; but all such devices are inoperative as contemplated by me, for the reason that no provision was made by them for vertical adjustment of the splice relative to the vertical wear of the same or to the adjustment of the splice and rail relative to curvature of track; but when my adjustable angle-bar or rail-splice is used reinforced or with swells upon its inside portions it can be very easily adjusted relative to vertical wear either on the splice or on the rails by merely operating or tightening up the nuts on the bolts *b*, which will draw the splices toward each other, as shown in Figs. 1, 2, and 7. Furthermore, when my adjustable angle-bar E or rail-splice is used reinforced on its inner walls, as shown in Fig. 7, the lower bearing-surface of the extreme end of the angle-bar or rail-splice rests upon the flange of the rail nearer the center of the flange of the rail than its web or at a distance from the web, and as the flange of the rail is more elastic at that point than nearer its web, and the splice, also, is more pliable, the rail and splice will readily adjust themselves to curvature of track, which can thus be made uniform when the splices so made are combined with the rails in a railway-track, and a degree of elasticity is also thus obtained from the flange of the rail as well as from the splice. The form of the reinforcement or swell *f* can be such as to suit the length of the splice, and also to show that I do not wish to confine or restrict myself to any particular form of reinforcement or swell upon the splice, but that a reinforcement or swell *f* upon the inner walls of an adjustable angle-bar or rail-splice is new and very advantageous.

I am aware that prior to my invention springs, keys, and chairs have been used at rail-joints in combination with each other only, and such springs and keys could not be used unless in combination with the chairs made expressly for them, and such combinations could not be used on rails of different section, and when such springs, keys, or wedges were turned or inverted they did not bring their unworn surfaces in contact with the rails, and therefore were not adapted to be used as or to perform the same function at a rail-joint as the reversible rail-splice herein described and shown by me.

The lower edge of the angle-bar may be made the same thickness as its upper edge, so that when reversed its unworn surfaces will be the same, and therefore afford the same bearing to the rails as before the change was made.

In Fig. 9 is shown the combination of the chair C and angle-bars E. The chair is adapted to fit any section of rail and can be used on one or more ties. It is firmly fixed to the ties when the joint is made by means of the spikes *k*, which pass through it and in a measure prevent longitudinal movement of the chair. One of my reversible angle-bars E is placed on each side of the rails after the rails have been placed in the chair. Bolts *b* are then put through the holes *o* in the bars, and, also, the bolts J are put through the chair and bars on each side of the rails. Nuts are then screwed upon the screw-threaded ends of the bolts, and as all the nuts can be operated the joint so made can be firmly fixed, for the reason that the bolts J hold the bars E to the chair C, which is firmly spiked to the ties, while the inclines G G engage the lower edges of the bars E E.

N is a swell or slight reinforcement upon the top edge of the angle-bar E, as shown in Fig. 6, to assist in providing for vertical wear on the under side of the ball of the rail. It can be used before as well as after the bar is worn, and is intended to assist the bar in overcoming vertical strains caused by uneven track or ties of different bearing-surfaces at the joint.

My improved angle-bar E should be formed of metal—steel is preferred—and so made that its upper and lower edges will each fit the rail as well one way as the other. It may be provided with two sets of bolt-holes *o* and notches K, one set in each leg of the bar, so that there will be no delay in putting the bar on or in inverting or reversing it after it becomes worn, which can be done by taking out the bolts *b*, inverting or reversing the bar E, and putting the bolts *b* in again, thereby bringing the unworn surfaces of the bars in contact with the rails, thereby renewing the joint without the expense of a new splice-bar. Turning the common fish-plate may not be new, but nothing is gained by so doing, for the reason that their worn surfaces come in contact with the rail again, while with my reversible rail-splice unworn surfaces come in contact with the rail, and a new result is thus obtained when it is reversed. An angle-bar with one leg thicker than the other may not be new; but when combined as herein described it produces a result that is new, because the combination is new and very advantageous. An angle-bar with one leg or section longer than the other is not new; but such splices are not adapted to be reversed or interchanged and therefore are not adapted to perform the same function at a rail-joint as the angle bar or splice herein described by me. Springs, keys, or wedges are not adapted to be used in the herein-described invention.

What is meant in this specification by the "inside of the splice or angle bar" is that por-

tion of the splice or angle bar nearest the web of the rail when the bars or splices are in position.

The reversible angle-bar E, as shown in the accompanying drawings, is adapted with either edge *d* or *e* upward engaging the under side of the ball of a rail at the joint, and while in either position it performs the function of a rail-splice. It has, therefore, four (4) separate and distinct bearing-surfaces, two of which are adapted to engage the top of the flange of a rail also, and are described as follows, reference being had to Fig. 3: The dotted lines *l l* are the dividing-lines of the bearing-surfaces of the bar E, adapted to engage the top of the flange of the rail at the joint. One of these bearing-surfaces is on the lower line of the base of the bar E, extending from the lower intersection of the dotted lines *l l* toward *d*, while the other bearing-surface, adapted to engage the top of the flange of the rail, extends from the dotted lines *l l* toward *e* on the same bar, while *d* and *e* of the above-described bar E represent those bearing-surfaces which are adapted to engage the under side of the ball of the rail, clearly showing four (4) separate and distinct bearing-surfaces, each adapted to its respective position, on a single rail-splice, which is new and very advantageous.

Having thus described my invention, therefore, what I claim as my invention, and desire to secure by Letters Patent, is—

1. In a rail joint a reversible angle bar, having upper and lower edges each adapted to fit either side of the ball of a rail, and the intermediate portions of the bar so formed that when reversed its unworn surface will come in contact with the rail, substantially as set forth.

2. In a rail joint an adjustable angle bar or rail splice having a swell upon the top of the outside surface of its horizontal portion substantially as set forth.

3. In a rail joint an adjustable and interchangeable angle bar or rail splice having a varying thickness in its vertical and horizontal portions or legs substantially in the manner and for the purpose set forth.

4. In a rail joint the combination of rails and rail splices, the latter being of different thicknesses in their vertical and horizontal portions or legs, and adapted to be placed in reversed positions relative to each other on opposite sides of the rails at the same joint substantially in the manner and for the purpose set forth.

5. In a rail joint an adjustable and interchangeable angle bar or rail splice with one of its legs or sections thicker than the other, substantially as set forth.

6. An angle bar or rail splice having legs or sections of a different length, of section or leg, and adapted to fit different sections of railway rails substantially as set forth.

7. In a rail joint a rail chair adapted in form to slide laterally under the rails from either side, with a base so made as to receive the base of a rail, and having also inwardly sloping inclines, G, on its outside edges in combination with two of my reversible angle bars, two abutting railway rails, and one or more cross ties, substantially as set forth.

8. In a rail joint the combination of the chair, C, packing, *p*, two angle bars or rail splices, two abutting rails and one or more cross ties substantially as and for the purpose stated.

9. In a rail joint an adjustable angle bar or rail splice having a reinforcement or swell upon its inside portion between its upper and lower bearing surfaces substantially in the manner and for the purpose set forth.

10. An adjustable angle bar or rail splice having a reinforcement upon the intermediate portion of the inside of its vertical section substantially in the manner and for the purposes set forth.

11. In a rail joint a reversible rail splice having upper and lower edges each adapted to the under side of the ball of a rail and so formed that when reversed or inverted its unworn surfaces will come in contact with the rail, substantially as set forth.

12. An adjustable angle bar or rail splice with a reinforcement or swell at its central portion extending from the top to the bottom bearing surface thereof, substantially in the manner and for the purposes set forth.

13. In a rail joint an adjustable angle bar or rail splice having a swell or reinforcement on top of the lower edge of its horizontal portion substantially as set forth.

14. In a rail joint, an adjustable angle bar, or rail splice, capable of being rolled in its manufacture with a reinforcement on top of its horizontal portion extending from its vertical leg outward substantially as set forth.

15. An adjustable angle bar or rail splice constructed as set forth with a boss upon the top and at the center of its horizontal leg and also capable of being rolled in its manufacture as set forth.

16. A new article of manufacture, an angle bar or rail splice capable of being rolled in its manufacture in one piece, and having four distinct bearing surfaces each respective bearing surface adapted to come in contact with the rails at a rail joint as set forth.

WILLIAM F. GOULD.

Witnesses:
C. A. McCRAE,
JAS. THOMPSON.