Oct. 7, 1930. E. C. NEAL 1,777,574

RAIL JOINT

Filed March 3, 1930 2 Sheets-Sheet 1

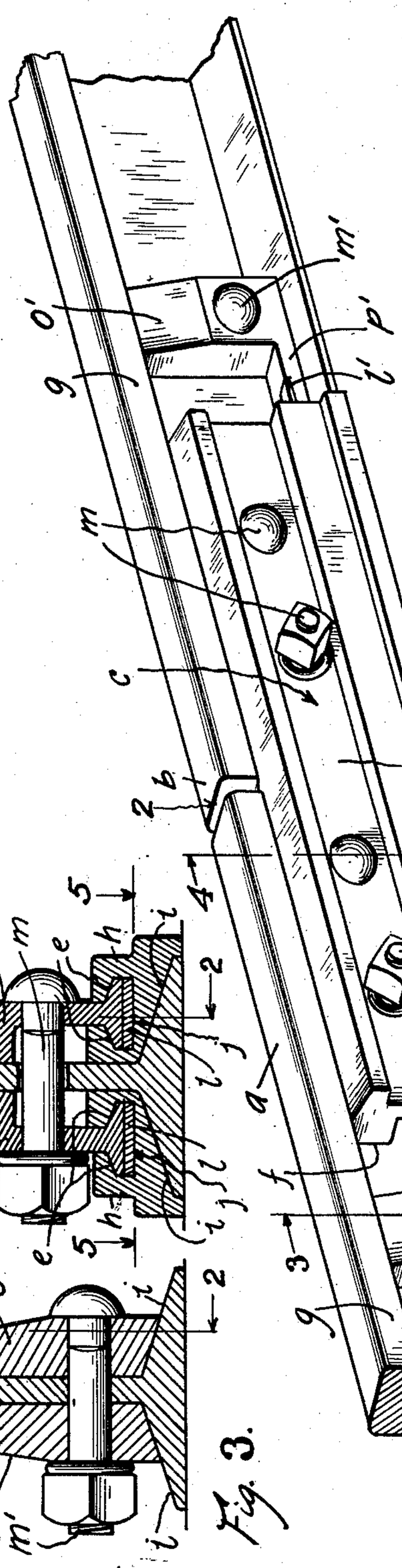

Fig. 1

Fig. 4.

Fig. 3.

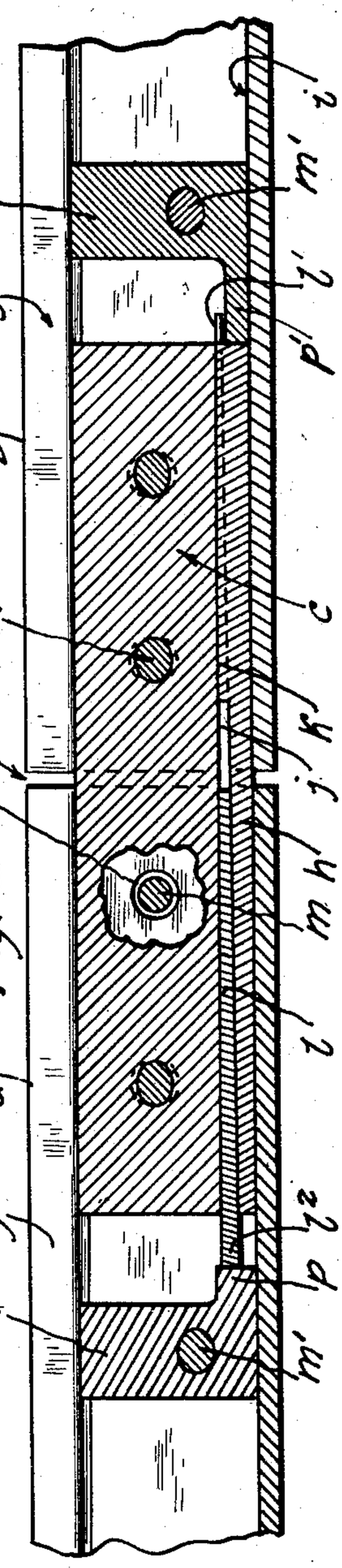

Fig. 2.

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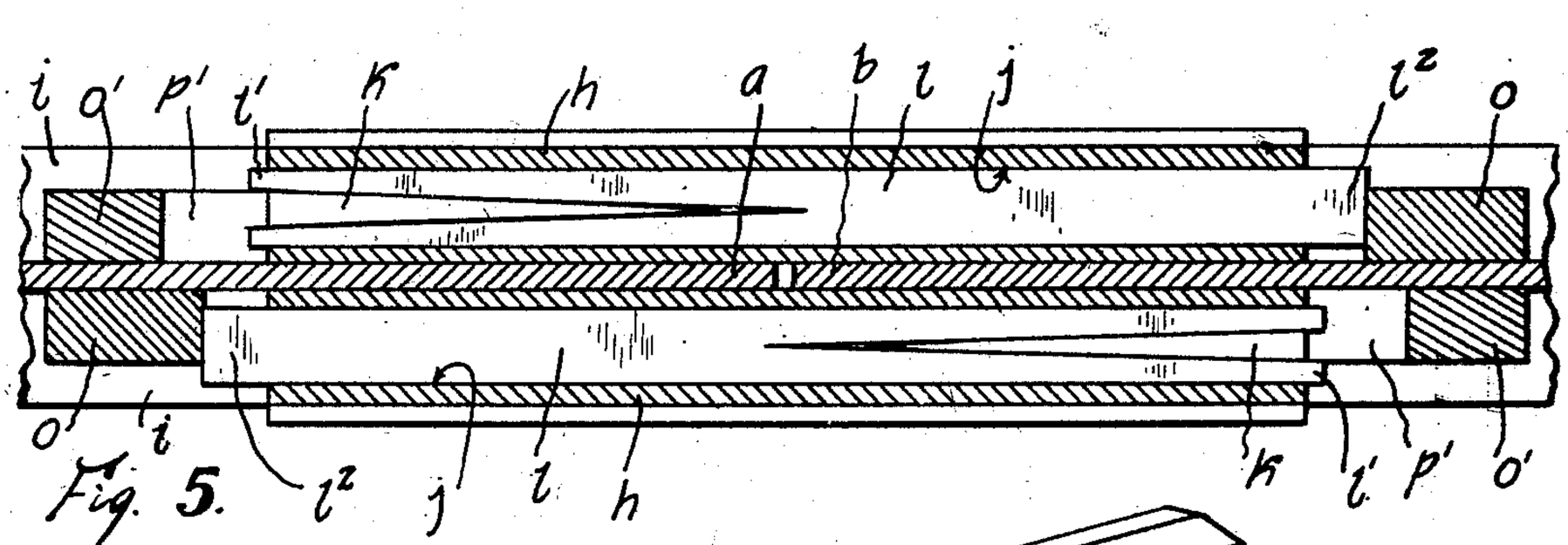

Fig. 5.

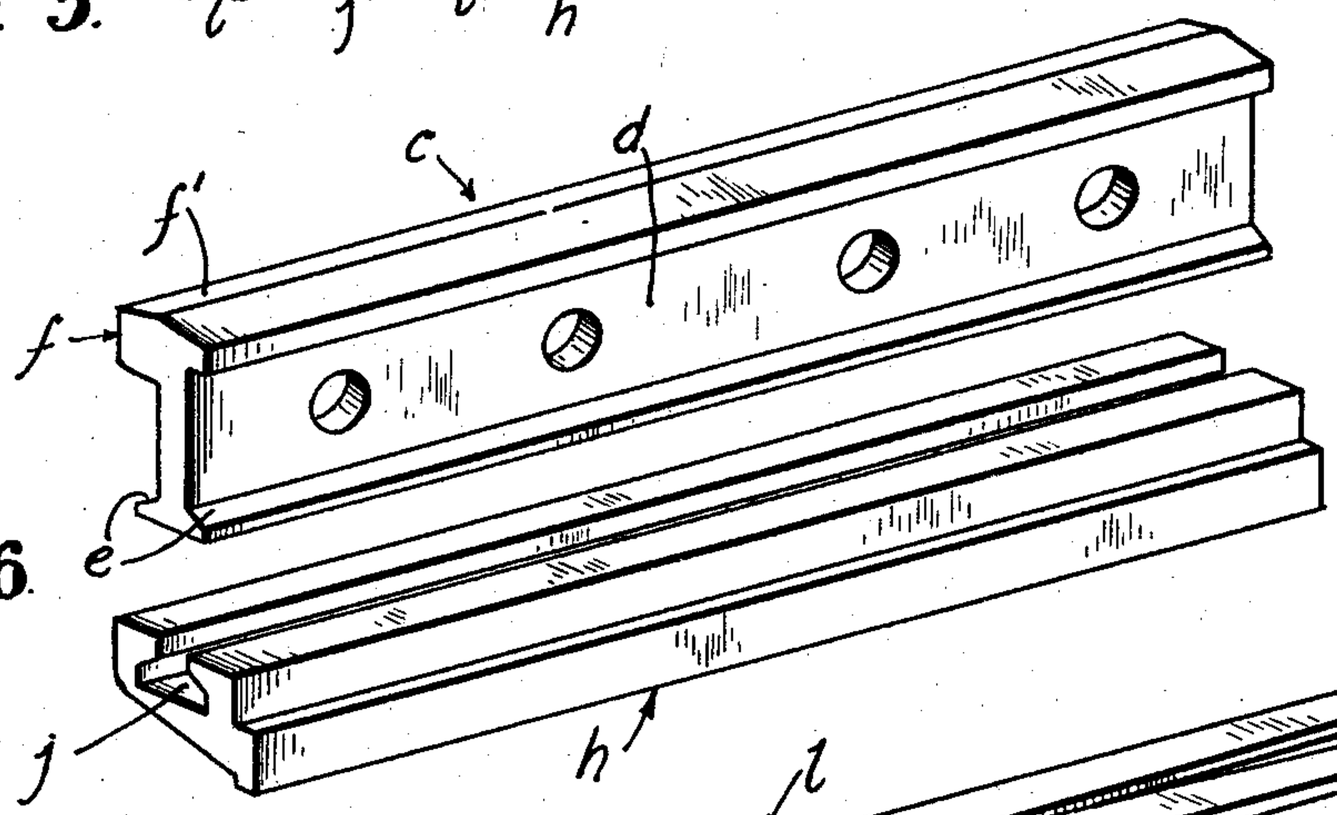

Fig. 6.

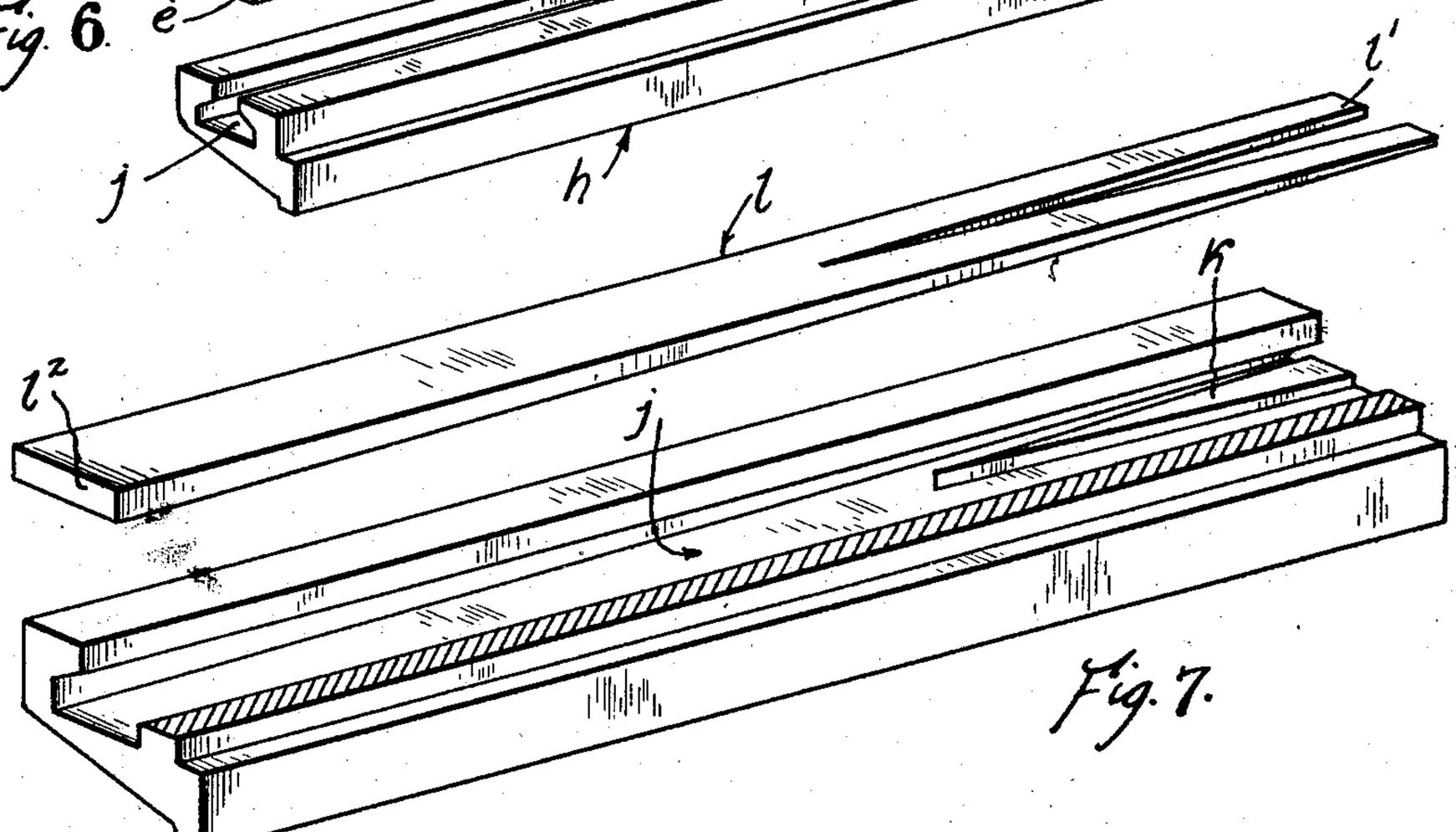

Fig. 7.

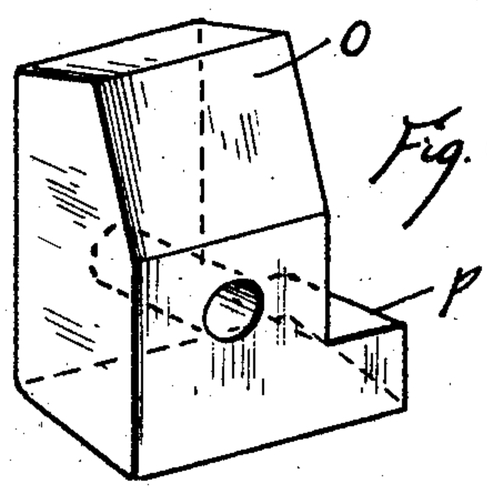

Fig. 8.

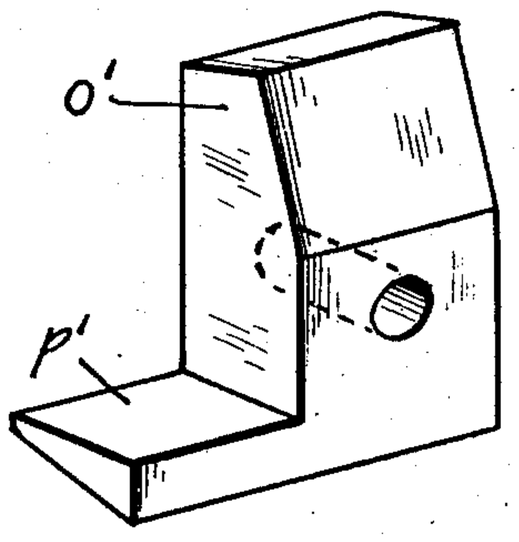

Fig. 9.

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UNITED STATES PATENT OFFICE

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RAIL JOINT

Application filed March 3, 1930. Serial No. 432,808.

My invention relates to splice bars for railroad joints.

In the present forms of railroad construction, the rail at its ends, or in other words, the joints between adjacent rails, are supported only by a single splice bar or fish plate bolted thereto at each side.

The splice bar is adaped, when new, to fit closely between the ball and base flange of the rail and maintain, for a while, a rigid joint, but the constant pounding of the trains passing thereover in time wears the splice bar at the portions bearing on the ball and flange of the rail, respectively, and permits individual, vertical movements of the rail ends so that the trains passing over the joint wear the rail surface to below the surface line of the track.

This is known as "rough rail surface" and causes the train to sway and lurch, and in time the rough rail surface, if not corrected by constant services of the maintenance crews, may get so bad as to cause derailment of the train.

To prevent such wear, it is the common practice for the maintenance crews to periodically tighten the splice bar bolts to make the joint rigid again and to place shims between the splice bar and the ball of the rail, but these only afford temporary elimination of the vertical play. As a result, probably seventy-five percent of the "track troubles" are due to defective splice bars.

The object of my invention is to provide simple, but effective splice bars for rail joints, adapted to rigidly support the joint under all conditions of service, and thus prevent individual, vertical movement relative to each, and the wear of the rail ends, and consequent uneven and rough surfaced track.

Furthermore, railroad rails are subjected to a daily longitudinal expansion and contraction due to the normal range in temperature between night and day, which at midsummer heat is approximately 1/8 inch in a standard 33 foot rail. To meet such conditions, the rails are laid with approximately 1/4 inch space between them, for in theory such expansion and contraction would be from the center of the rail equally towards the ends.

However, such expansion actually follows the line of least resistance, as for example, when the rail is laid on a grade, the total expansion will tend to be in one direction only, down hill. This is called "creeping" and will eventually, after a period of time, close up the gaps between a number of the rails, since at some point further on, as at the bottom of the grade, the resistance to expansion is sure to be in the opposite direction, with the result that further expansion of this group of rails will cause them to buckle and throw the track out of alinement, commonly known as "sun kinks".

Devices for anchoring the rails to the ties have been provided to prevent such creeping, but they have failed because their function has been to prevent the expansion of the rail, with the result that the force of expansion is so great as to press the anchors into the wooden ties, and they become loosened when the strain is relieved by the subsequent contraction of the rail; the rail is then no longer firmly held to the tie, and the tendency to creep is no longer resisted.

Therefore, a further object of my invention is to provide splice bars for rail joints adapted to permit the independent contraction and expansion of the rails, but to resist the expansion of the rails in the lines of least resistance, whereby each rail will expand and contract equally from its center towards its ends and not move as a unit relatively to the adjoining rails; hence the creeping of the rails, with the before mentioned undesirable results, will be prevented.

A further object of my invention is to provide splice bars adapted to hold the rail ends together at the joint, and the rails in

alinement, even though the splice bars are broken.

I attain my objects in a vertically expansible splice bar element including a bifurcate wedge element whose thicker end projects beyond the splice bar, means to effect the spread of the bifurcated end of the wedge element thereby to prevent the retractive movement of the wedge from the position to which advanced, abutments on the joined rails respectively, one of said abutments located adjacent the projecting end of said wedge, the other at the opposite end of the splice bar, whereby upon the longitudinal movement of the rails, the wedge element of the splice bar is further driven in and the splice bar is expanded thereby to support and resist the meeting of the joined rail ends.

These and other incidental features of my invention, the details of construction, and mode of operation are hereinafter fully described with reference to the accompanying drawings.

In the drawings:

Fig. 1 shows a perspective, fragmentary view of two adjoining rails and illustrates my splice in position thereon;

Fig. 2 shows a section taken on the lines 2—2 of Figs. 3 and 4 and illustrates the relative arrangement of the parts of my splice;

Fig. 3 shows a section taken on the line 3—3 of Fig. 1;

Fig. 4 shows a section taken on the line 4—4 of Fig. 1;

Fig. 5 shows a section taken on the line 5—5 of Fig. 4;

Fig. 6 shows a perspective view of the splice bar and boot separated one from the other;

Fig. 7 shows enlarged, perspective views of the wedge and the boot, the latter partly in section; and

Figs. 8 and 9 show respectively, perspective views of the abutments carried by the adjoining rail ends.

Referring now to the drawings:

Fig. 1 shows a rail joint comprising adjoining rail ends *a*, *b*, and my rail joint splices bolted thereto on each side. Each splice comprises a splice bar *c* formed with a vertical web *d*, lateral base flanges *e*, and a lateral flange or ball *f* at the top on the side adjacent the rail, formed, as at *f'*, to fit closely against the underside of the ball *g* of the rail.

A boot *h* is provided adapted to fit on the base flange *i* of the rail which has a longitudinal, undercut groove *j* in its upper surface, adapted to receive the base flanges *e* of the splice bar *c*, Figs. 4 and 6, but said undercut groove is optional; instead, said groove may be made with straight sides.

The bottom of the groove *j* is tapered upwardly from one end, see Fig. 2, and has an inwardly extending wedge-like enlargement *k* provided at the other end, see Fig. 5. A wedge *l*, having a bifurcated end *l'* is inserted in the groove *j* between the bottom of the latter and the splice bar *c*, so that the enlargement *k* lies between the bifurcated ends *l'* of the wedge *l*.

My splice, when thus assembled, is bolted to the rail ends on each side by track bolts *m*, in the usual manner, as illustrated in Figs. 1, 3, and 4, so that the ball *f* of the splice bar *c* fits closely under the ball *g* of the rail. The wedge *l* is then driven into the groove *j* so that the splice bar *c* is firmly seated between the base flange *i* of the rail and the ball *g*, and thus provides a rigid support.

Abutments *o*, *o'* are bolted to the rail ends *a*, *b*, respectively, by bolts *m'*, which are provided with inwardly projecting extensions *p*, *p'*; the extension *p* being adapted to bear against the thick end l^2 of wedge *l* and the extension *p'* arranged to bear against the adjacent end of the boot, but it is of less thickness so that the protruding, bifurcated ends *l'* of the wedge will overlie the said extension, and the bolt holes *r* in the rail ends through which the track bolts *m* are inserted are made oversize to permit a limited relative movement of the rail ends to the splice bar *c*.

By this construction and arrangement, the expansion of the rails will tend to force the wedge *l* further into the boot and move and hold the splice bar *c* rigidly between the ball of the rail and base flange and support the rail ends as a rigid unit, thus to prevent their individual, vertical movement and the consequent pounding and wear as a train passes thereover.

The wedge-like enlargement *k* in the groove *j* tends to hold the wedge *l* in place by expanding its bifurcated end laterally in the groove so that it can not loosen during a subsequent contraction of the rails when the abutment *o* will be drawn away from the end of the wedge *l*.

Also, since the thick end l^2 of the wedge *l* bears against the abutment *o*, the expansion of each rail will be yieldingly resisted and the tendency of the rail to expand in one direction only, the line of least resistance, will be prevented so that each rail will expand and contract as a unit from its centers to the ends.

However, a plain wedge, without a bifurcated end and boot without an inwardly extending enlargement *k* at its shallow end, may be used, since the daily expansion of the rail will tend to drive the wedge back into the boot, should any retractive movement of the wedge tend to take place.

Further, it is evident that my splice may also be used without the abutments *o*, *o'*, and with either a plain wedge or one with bifur-

cated ends, in which case the wedge may be maintained in the boot by the periodic services of the maintenance crew, who may tap the wedge into place by means of a track maul or the like to remedy any retractive movement.

Further, the maximum possible inward movement of the wedge *l* is adjusted so as to be less than the space 2 provided between the rails ends, whereby the ends of the rails will not be permitted to come tightly together at any time, and thus prevent the rails from expanding and pushing the adjacent rails in the line of least resistance, creating the so-called rail creeping with its undesirable results. So for example, if the space between the rail ends is normally 3/8 inch, the greatest possible inward movement of the wedge is 1/4 inch and the maximum expansion of a 33 foot rail 1/8 inch, the gap of 3/8 inch between the rail ends will never be closed and bring the rails into abutment.

The boots *h*, also serve as retainers for the splice bars *c*, so that should one or both splice bars become broken they will still be held in place by the boot and thus the rails will be maintained in alinement.

I claim:

1. In a splice for rail joints, a vertically expansible splice bar element including a wedge element whose thicker end projects beyond the splice bar, means to prevent the retractive movement of the wedge from the position to which advanced, an abutment on one of the joined rails adjacent said projecting wedge end, whereby upon the longitudinal movement of the rails, the wedge element of the splice bar is further driven in and the splice bar is expanded thereby to support and resist the meeting of the joined rail ends.

2. In a splice for rail joints, a vertically expansible splice bar element including a bifurcate wedge element whose thicker end projects beyond the splice bar, means to effect the spread of the bifurcated end of the wedge element thereby to prevent the retractive movement of the wedge from the position to which advanced, an abutment on one of the joined rails adjacent said projecting wedge end, whereby upon the longitudinal movement of the rails, the wedge element of the splice bar is further driven in and the splice bar is expanded thereby to support and resist the meeting of the joined rail ends.

3. In a splice for rail joints, a vertically expansible splice bar element including a wedge element whose thicker end projects beyond the splice bar, abutments on the joined rails respectively, one of said abutments located adjacent the projecting end of said wedge, the other at the opposite end of the splice bar, whereby upon the longitudinal movement of the rails, the wedge element of the splice bar is further driven in and the splice bar is expanded thereby to support and resist the meeting of the joined rail ends.

4. The combination with a rail joint, of means preventing the creeping of the joined rails comprising, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on the said base flanges, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge, whereby upon the longitudinal movement of the rail, said wedge will be further driven in thereby to expand the splice bar and interpose resistance to the meeting of the joined rail ends.

5. The combination with a rail joint, of means preventing the creeping of the joined rails comprising, a boot mounted on the base flanges at each of the sides of the rails across the joint, said boot comprising a base adapted to be seated on said base flanges, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, abutments on the webs of the joined rails, respectively, one of said abutments located adjacent the projecting end of said wedge, the other at the opposite end of the boot, whereby upon the longitudinal movement of the rail, said wedge will be further driven in thereby to expand the splice bar and interpose resistance to the meeting of the joined rail ends.

6. The combination with a rail joint, of means preventing the creeping of the joined rails comprising, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, means to prevent the retractive move-

ment of the wedge from the position to which advanced, an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge, whereby upon the longitudinal movement of the rail, said wedge will be further driven in thereby to expand the splice bar and interpose resistance to the meeting of the joined rail ends.

7. In a splice for rail joints, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the laterial projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction and an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge.

8. In a splice for rail joints, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar provided with a transversely enlarged foot and top, and bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction and an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge.

9. In a splice for rail joints, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar provided with a transversely enlarged foot and top, and bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, means to prevent the retractive movement of the wedge from the position to which advanced, and an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge.

10. In a splice for rail joints, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a bifurcate splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, means on the boot to effect the spread of the bifurcated end of the wedge element thereby to prevent the retractive movement of the wedge from the position to which advanced and an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge.

11. In a splice for rail joints, a boot mounted on the base flange at the side of the rail across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which projects beyond the boot, a bifurcate splice bar provided with a transversely enlarged foot and top, and bearing in said groove of the boot on said wedge, the top of the splice bar bearing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, means on the boot to effect the spread of the bifurcated end of the wedge element thereby to prevent the retractive movement of the wedge from the position to which advanced and an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge.

12. In a splice for rail joints, a boot mounted on the base flanges at the sides of the rails across the joint, said boot comprising a base adapted to be seated on said base flange, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, an abutment secured to the web of one of the joined rails adjacent the projecting end of said wedge, whereby upon the longitudinal movement of the rail, said wedge will be further driven in, thereby to expand the splice bar and interpose resistance to the meeting of the joined rail ends.

13. In a splice for rail joints, a boot mounted on the base flanges at each of the sides of the rails across the joint, said boots each comprising a base adapted to be seated on said base flanges, the upper face of the boot provided with a longitudinal groove, a wedge in said groove, the thicker end of which wedge projects beyond the boot, a splice bar bearing in said groove of the boot on said wedge, the top of the splice bar bear-

ing against the lateral projections of the rail heads, said splice bar secured to the web of the rails by bolts permitting the rails limited longitudinal expansion and contraction, means to prevent the retractive movement of the wedge from the position to which advanced and abutments on the webs of the joined rails, respectively, one of said abutments located adjacent the projecting end of said wedge, the other at the opposite end of the boot.

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