(No Model.)

D. BLAKE.

RAILROAD RAIL.

No. 567,532. Patented Sept. 8, 1896.

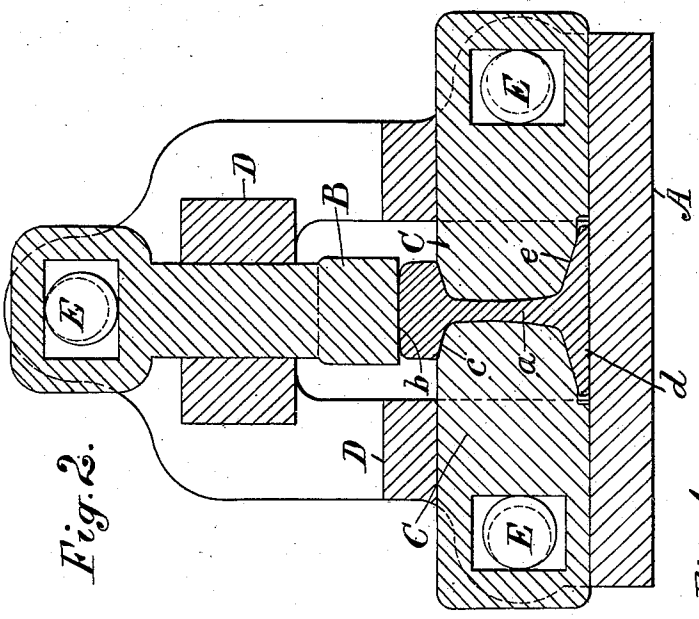

Fig. 2.

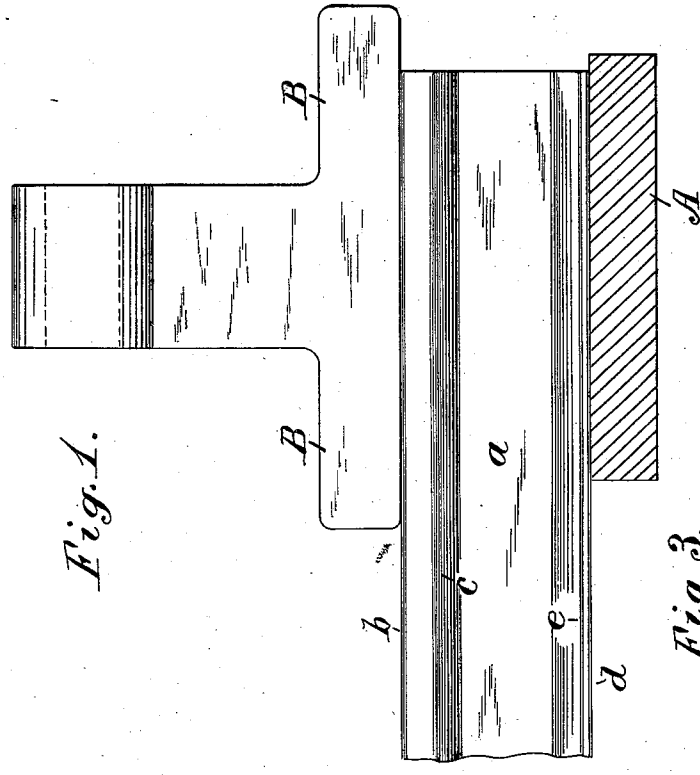

Fig. 1.

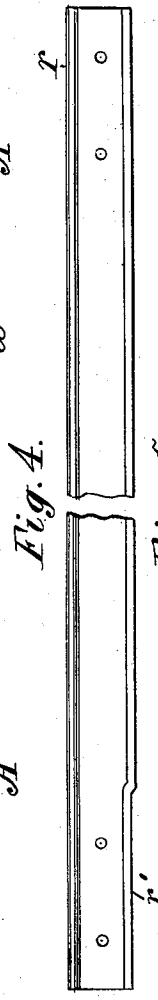

Fig. 4.

Fig. 5.

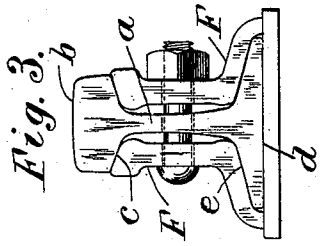

Fig. 3.

Attest:
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UNITED STATES PATENT OFFICE.

DAVID BLAKE, OF NEWARK, NEW JERSEY, ASSIGNOR TO C. NILES BLAKE, OF SAME PLACE.

RAILROAD-RAIL.

SPECIFICATION forming part of Letters Patent No. 567,532, dated September 8, 1896.

Application filed November 11, 1895. Serial No. 568,566. (No model.)

To all whom it may concern:

Be it known that I, DAVID BLAKE, a citizen of the United States, residing at Newark, Essex county, State of New Jersey, have invented certain new and useful Improvements in Railroad-Rails, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

The object of this invention is to produce railroad-rails having uniform dimensions in certain respects at the ends, so that when clamped together in the railway-track the upper surfaces of the rails at the joints may present a perfectly even or flush surface for the passage of the car-wheels, and also a uniform surface to fit the bars or angle-pieces used to form the joints.

The invention involves a supplemental pressure applied to the ends of the rail, such treatment producing a railroad-rail having the ends compressed to uniform height, and in some cases the head or ball compressed to uniform width, and the surface of the rail where the joint-bars are applied compressed to uniform dimensions. By such treatment those portions of the rail which form the joints are adapted to present a perfectly flush surface for the passage of the car-wheels and for the application of the joint-bars, and the necessity is avoided of making the rails of greater accuracy throughout their entire length. At the present time steel rails are in general use, and are made from Bessemer ingots which, in the process of manufacture, are larger at one end than the other to facilitate their removal from the mold, and the metal is of greater density at one end of the ingot, owing to the vertical position of the mold when the ingots are cast therein. Such ingots are formed into blooms, and when drawn down in a train of rolls the bloom from the larger end of an ingot is perhaps worked more than the bloom from the smaller end, and the density of the metal is thus often increased in portions of the bars produced from such bloom. The bars possessing these variations of density are run through rolls to produce railroad-rails, and the resistance of the metal in such bars varies sufficiently to spring the rolls more in some cases than in others, so that the resulting rails vary slightly in height and shape. In former times the managers of railroads have accepted steel of lower carbon than at present, and have also in some cases permitted a variation of one thirty-second of an inch above and one sixty-fourth below the standard height, or three sixty-fourths in all; but owing to the increased weight of the trains which are now used on railroads, and the effort to secure increased speed for such heavy trains, it is found necessary to make the union of the rails at the joint as perfect as possible, so as to avoid the projection of any rail-heads and consequent concussion of the wheels therewith and the resulting injury to the rails and joints and also to the rolling-stock. The rails are therefore gaged with much greater accuracy than heretofore, and some railroads require an hourly inspection of the product during the manufacture of rails, to prevent any variation in the height of the rails exceeding one sixty-fourth of an inch. The exactness now demanded in the rolling of rails requires constant repairs to the rolls and excessively fine adjustment in working, and thus involves great care and expense, which is also increased by the use of steel having a higher percentage of carbon than heretofore.

The present invention avoids so great an amount of care in the rolling of the rails, while securing a greater degree of uniformity in their height and shape at the ends where the rail-joints are formed. It is almost impossible to secure any greater uniformity in the size and shape of the rails in the process of rolling, or by any means hitherto reached, as the limit of perfection in rolling has been practically attained. It is also impracticable, when joining the rails, to entirely overcome the unevenness in their height by "shimming" with thin pieces of sheet metal, as the rail ends vary frequently but a few thousandths of an inch in height, and it is impossible to provide slips of sheet metal in all the varieties of thickness that would be required in practice.

My improved rail may be produced by any suitable means, as a portion of the rail at the ends may be compressed in the direction of its height by a plunger, ram, or die actuated by

suitable mechanism, the movement of which would be checked at a uniform point to gage the height of the rail end, and the ball of the rail and parts where the joint-bars are applied may be also compressed to uniform dimensions by dies pressed in a proper direction upon such parts. The method by which the rail is compressed is wholly immaterial to the invention, but I have illustrated suitable mechanism in a diagrammatic form in the annexed drawings, in which—

Figure 1 is a side view of a bed and plunger applied to the rail end in readiness to compress the same. Fig. 2 shows in cross-section a bed provided with guides, having a plunger for pressing the top of the rail and shaping-dies for pressing the sides of the same. Fig. 3 is a cross-section of a rail-joint, showing the angle-bars fitted to the sides of the rail. Fig. 4 is a side view of a rail requiring compression at one end only, and Fig. 5 is a side view of a rail compressed at both ends.

a designates the web of the rail; *b*, the top of the head; *c*, the under side of the same; *d*, the flange at the foot of the rail, and *e* the upper sloping sides of the same.

A designates a bed to support the rail end during the compressing operation; B, the plunger for pressing the top of the rail end, and C the dies fitted to the head and flange at the points *c* and *e*. The plunger and dies are shown fitted in suitable guides D, and eccentrics E are shown for reciprocating the same. The movement of the plunger and dies would in practice be gaged with great exactness to compress the rail vertically and laterally in the desired degree, and the rail ends would thus be reduced to the most perfect uniformity. As the flanges of the car-wheels contact with the balls of the rails, it is also important that the balls adjacent to the joints should be compressed to uniform width, so that one rail end may not project beyond the other either laterally or vertically; but the ends of the rails may be in perfect alinement. The compression of the rail-head at the edges may be effected by extending the dies C upwardly to operate upon the ball, or by forming the plunger B with downwardly-projecting lugs at a suitable distance apart to compress and gage the width of the rail end.

The angle-plates F, which are shown in Fig. 3, should be made with great care to secure uniformity in their shape and dimensions, and it is obvious that the surface *c* upon the rail-head and *e* upon the rail-flange must correspond perfectly with the same, to produce a perfect rail-joint and to make the surface of the rail-heads flush when the angle-plates are secured in place.

By treating the rail in the manner described the desired uniformity may be produced in the height of the rail, the width of the ball, and in the shape where the joint-bars are applied, as the tools are made of suitable rigidity to shape the rail in the required manner. Rails are not in practice made of uniform dimensions throughout their length or at their opposite ends, and I have therefore illustrated in Fig. 4 a rail having the right-hand end rolled to the proper height and the left-hand end rolled to greater height and compressed in the manner described, to possess the proper dimensions.

In Fig. 5 I have represented a rail which has been rolled, of greater height than the standard throughout, and both ends compressed to the proper height.

The compressed portions of the surface, especially upon the head of the rail, are in practice shaped to produce a smooth juncture with the remainder of the rail; but to illustrate the compression to the eye I have represented the reduction in the height of the rail in an exaggerated manner in Figs. 4 and 5.

It is readily understood that my treatment of the rails reduces the cost of manufacture in rolling, as it avoids the excessive care now required; and it also avoids the filing of the bur caused in sawing the rails to length, as the dies C may operate to reshape the rail at all points where the joint-bars come in contact with their ends. At the present time the bur, if not wholly removed, interferes seriously with the proper fitting of the joint-bars, and the filing off of the bur is thus an expense which is saved by my process.

The change which I make in the rail ends is one of vital importance, as the rails are of uniform height and shape where the joint-bars are fitted thereto, and are thus adapted to secure joints of practically perfect character, which permit an increase of speed in the railroad-cars with safety and comfort and effect a great saving of wear and tear to the rolling-stock. The importance of this improvement will be understood from the following considerations: The varying height and shape of ordinary rails invariably produces a looseness at the fastenings by causing a permanent "set" in the same or by cutting them in some degree, often by both. This looseness increases rapidly if the track is neglected and the nuts on the bolts are not frequently screwed up. The creeping and also the expansion and contraction of the rails due to heat and cold brings a severe tension on the bolts at the holes, and the constant working up and down of the rail ends, if loose, gradually weakens them at this weakest point until they are not able to resist a blow when it occurs or any unusual conditions. Any extra strain breaks the bolts, and hundreds will often break on a single road in a month in winter-time. Roads have been compelled to put in heavier rails on this account, which would not have been necessary otherwise. Rails of my construction can be securely fastened with the solidity demanded by the increased loads now carried, and all

the evils above described can be in great measure prevented, as the concussions are avoided which loosen the joint-bars, and the latter are much better fitted to permanently sustain their legitimate burdens.

It will be readily understood that the supplemental pressure may be applied to the rail ends when cold and the same results produced, provided the mechanism is made of suitable strength to operate upon the material in that condition.

I have described the invention as preferably practiced upon the heated rails because it may thus be introduced as a step in the present process of manufacture in rolling-mills already constructed for rolling rails; but by subjecting the rail ends to supplemental pressure when cold the process may be practiced at any other time or place, and the expense of modifying the mill machinery may be avoided. It is well known that cold-rolled shafting is greatly improved in strength and finish by the cold-rolling process, and it will therefore be readily understood that the rail ends are improved in quality by compression when cold as well as when heated. It is therefore immaterial when the supplemental pressure is supplied to the rails, as the essential feature of the invention consists in gaging the ends to uniform height or dimensions by a pressure applied especially to such parts of the rail.

Having thus set forth the nature of the invention, what I claim herein is—

1. As a new article of manufacture, a railroad-rail having the ends compressed to uniform height.

2. As a new article of manufacture, a railroad-rail having the ends compressed to uniform height, and the head or ball compressed to uniform width.

3. As a new article of manufacture, a railroad-rail having the ends compressed to uniform height, and the head or ball compressed to uniform width, and compressed to uniform dimensions where the joint-bars are applied.

4. A railway-rail having a body portion of a varying size, and ends that are reduced to a standard or uniform size.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

DAVID BLAKE.

Witnesses:
THOMAS S. CRANE,
EDWARD F. KINSEY.