No. 835,020. PATENTED NOV. 6, 1906.

W. GOLDIE.

RAILROAD RAIL.

APPLICATION FILED APR. 24, 1905.

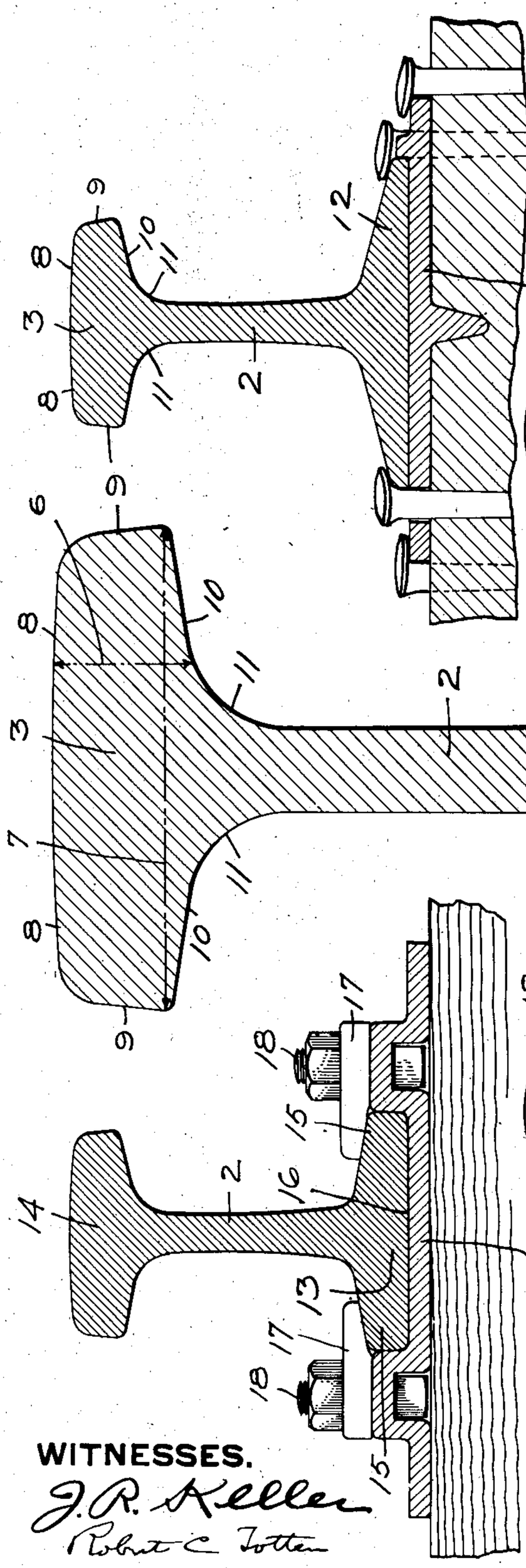

FIG. 2

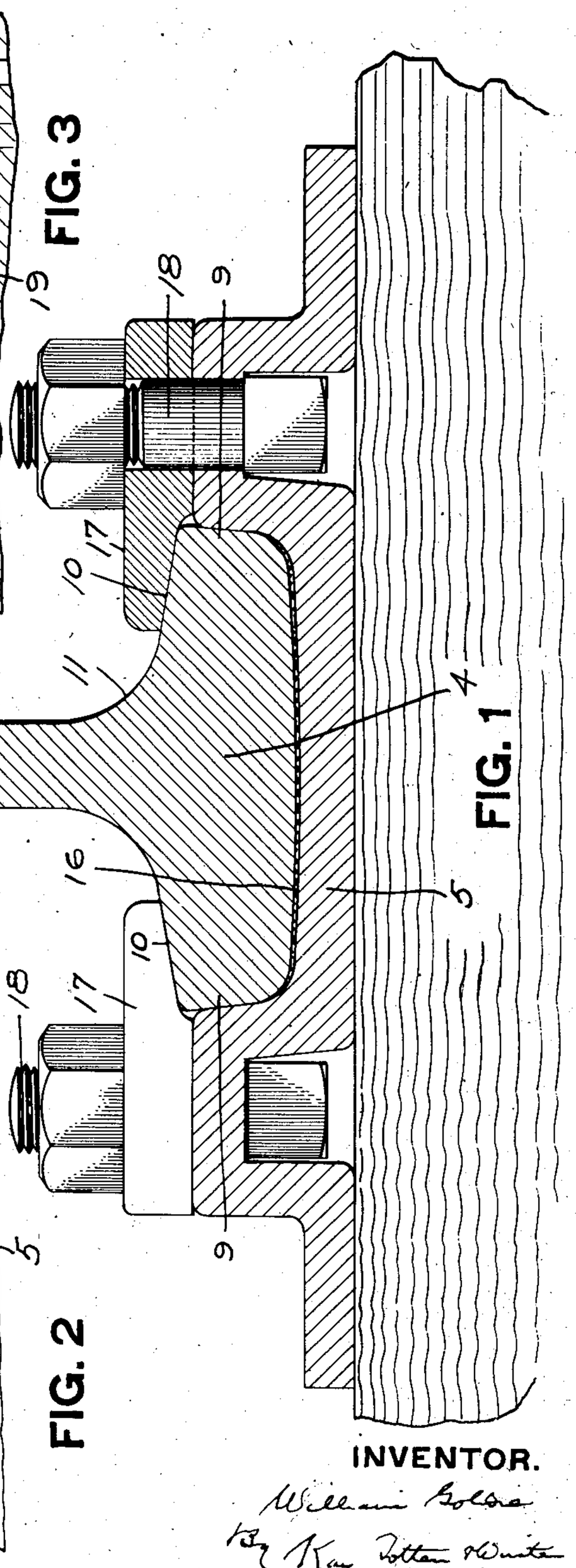

FIG. 1

WITNESSES.

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RAILROAD-RAIL.

No. 835,020. Specification of Letters Patent. Patented Nov. 6, 1906.

Application filed April 24, 1905. Serial No. 257,135.

To all whom it may concern:

Be it known that I, WILLIAM GOLDIE, a resident of Wilkinsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Railroad-Rails; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to railroad-rails, its object being to provide a rail of a high degree of stiffness to sustain the loads to which tracks are now subjected through the increased weight of locomotives, cars, and the loads carried therein and the increased speed of trains. It has for its object to provide a rail in which the rail-head can be so rolled as to be increased in toughness and wearing qualities, though not necessarily increased in weight of head, while on account of the rail-section it may be formed of a harder steel, and therefore be able to resist wear, and one which can be rolled practically free from the internal strains developed in the rail-sections at present in use and also practically free from liability to curve or camber in cooling. The rail also gives a greater resistance to the forcing of the rail-head outwardly under lateral strains, such as on curves or in like positions, and the rail, if desired, being made reversible to provide double wearing-surface, and in this way increase of life.

As the weight and speed of trains have increased in late years, railroads have endeavored to provide rails stiff and strong enough to sustain the same by the employment of heavier rails having wider base-flanges to rest upon the ties; but practical difficulties have been met with on account of the greater bulk of metal in the practically square rail-heads and the development of these wide flanges or bases. In the rolling of this class of rail the reduction of the metal in the head is not so great as to give the proper compacting of the metal, and as the rail-head is of nearly as great depth as width the great bulk of metal in the thick rail-head has a tendency in cooling to anneal such head and leave it soft and in condition for rapid wear. The wide rail-base, rolled thin to obtain the desired width, cools more rapidly than the bulky rail-head, and the whole body of the rail curves or is thrown on a camber in cooling, which develops internal strains, and such rails have to be straightened under powerful presses, which increases the internal strains. On account of the internal strains there is also liability to the development of cracks in the rail-base when in use, which gradually run up into the rail body and head, such cracks being the main source of broken rails and the many accidents caused thereby. Where this rail is of steel of the ordinary carbon, on account of the annealing of the head it is found that the rails wear very rapidly, their life being much shorter than the rails of smaller section, which are, however, too light to carry the heavy loads of the present day. In the endeavor to overcome this rapid wear of the heavy rail, to give greater hardness, the carbon, manganese and other elements have been increased in the steel from which the rails are rolled; but it has been found that this increases the liability to rail breakage and accident, because in such harder rails the cracks developed, as above stated, extend more quickly through the rail-body under the jars and blows of the passing train. One of the most difficult problems presented to the railroads at the present day is to provide a stiff rail sufficient to carry the load and yet of high wearing quality and free from internal strain or liability to cracking and one which can be easily laid and repaired. By my invention it is believed that these requirements are met.

It consists, generally stated, in a railroad-rail having a web portion and a wide and thin bilaterally symmetrical head, the width of the head being approximately three times its depth or thickness, such construction of head providing the necessary body of metal to carry the load and on account of the decreased thickness of the head providing for greater compressing or working of the metal in rolling, so giving a finer texture of metal and greater wearing qualities in the head and also providing for more rapid cooling of the head, which action further increases the wearing qualities, while the rail carries the load in such way as to give a greater angle of lateral resistance on curves and in like positions.

It also consists in forming this rail with a base containing substantially the same bulk of metal as and approximately the shape of the head (the rail being preferably made as a double-headed rail with both heads of the same bulk and shape)—that is, a base with sufficiently-thick edge portions to prevent the development of cracking

therein—while the head and base or the two corresponding heads will permit of the cooling of the rail without the formation of great internal strains, overcoming entirely or to a great extent curving in cooling and the difficulties arising therefrom.

It also consists in certain other improvements, as hereinafter set forth.

In the accompanying drawings, Figure 1 is a vertical cross-section of a rail embodying the invention, together with the supporting-chair or base-bar preferably used therewith. Fig. 2 is a like view, on a smaller scale, showing another form of such rail; and Fig. 3 is a section illustrating another form of rail embodying the invention.

The rail embodying the invention, as illustrated in Fig. 1 of the drawings, is of the double-headed type, having the web portion 2 and two heads 3 4 of identical shape, one head being utilized as the base and resting in the rail-supporting base-bar or chair 5. These rail-heads are bilaterally symmetrical—that is, of the same form on each side of the vertical central line—to adapt them for use in the ordinary steam-railroad track.

As shown in the drawings, the rail-head is made wide and thin, the width of said rail-head being approximately three times its depth or thickness. This is illustrated by dotted lines 6 7. In such construction of rail-head from the central vertical line of the rail-head its top face has a slight downward incline 8 toward the outer edge or face 9 of the head, and under said outer edge or side face the body of the rail-head is carried back on a slight incline, as at 10, toward the web, being connected therewith by the fillet 11. In the rolling of rails of this section it is evident that in developing the wide thin head portion the metal is much more compressed or worked in rolling than in developing a rail-head of practically square section, and such increased work in rolling increases the wearing qualities of the rail-head. Further, because of the decreased thickness of the rail-head it will cool much more rapidly than the ordinary rail-head of the same bulk and of practically square section, and the liability of annealing during cooling found in such square-headed rail is therefore largely done away with, while the surface metal on account of the more rapid cooling is harder and of greater wearing quality. Where a rail-head of such structure is employed with the ordinary wide thin-edged rail-base 12, as in Fig. 3, it is evident that because this rail-head approaches in section more closely to its rail-base and because of the thinning of such rail-head and the more rapid cooling thereof the rail will be free to some extent from the internal strains present on account of the difference in section between the rail-head and its base and the relative difference in cooling thereof. I prefer, however, as above stated, to employ a double-headed rail, as illustrated in Fig. 1, and in that case, as both head and base or both heads are of the same section and both of these sections provide for rapid cooling, it is evident that the rail will be practically free from internal strain and that liability to curve or camber in cooling will be largely, if not entirely, overcome, while the thick edge portions of the heads will not be liable to develop cracking in use, and liability to rail breakage from such causes will therefore be reduced to a minimum. Where a flat-faced rail-base is to be employed, I prefer to employ the section of Fig. 2. This section can be made with the rail-base 13, containing practically the same amount or bulk of metal as the head portion 14, and the edge portions 15 can be made so thick that there is little liability of cracking, first, because of the thickness of the metal at the edges, while the rail head and base approach each other so nearly in section that they will cool with little or no camber or strain. Such rail-section forms the subject of another application of even date herewith, Serial No. 257,136.

In securing the rails to the ties any suitable form of rail-supporting chair, plate, or base-bar may be used. I have illustrated in Figs. 1 and 2 a section of a continuous r il-supporting base-bar 5, which is the subject of another application of even date herewith, Serial No. 257,138. In such base-bar the seat 16 corresponds to the outer portion and sides of the head of the double rail or the base and sides of the other forms of rail and provides means for fastening the rail to the bar, such means being illustrated in the form of clips 17, extending over the top of the rail-base and held by bolts 18. Such sections may be employed as rail-chairs if it is not desired to employ the continuous-running rail-supporting bar.

In Fig. 3 I have illustrated the rail as supported upon the form of continuous base-bar 19 set forth in Letters Patent No. 758,523, granted to me April 26, 1904, the rail being secured thereto by spiking.

The rail above illustrated has many advantages over the ordinary rail-section now in practically universal use in America. In addition to the fact of the increased working and the more rapid cooling of the rail-head it becomes practicable to employ in a rail of this section an increased percentage of carbon and other hardening elements, thus increasing the hardness and wearing qualities of the rail and largely increasing its life while largely overcoming liability to rail breakage, as above stated. The rails illustrated in Figs. 1 and 2 are also of such section that even if rail breakage should occur, if seated in and held by the rail-supporting base-bar 5, the rail would be so held to place that liability of injury from such broken rail would be re-

duced to a minimum. Where, however, the sections, as illustrated in Figs. 1 and 2, are employed on account of the freedom of the rail-body from such internal strains present in the ordinary rail-sections, it is evident that a harder steel may be employed without liability to such breakage. It is also evident that the double-headed rail of Fig. 1 will provide for great wear on account of the possibility of its reversal.

The rail also has the special advantage that because the head is relatively wider than the ordinary rail-section the load is carried closer to the inner edge of the rail-base, being carried about centrally of the rail-head, so that the weight of the train has a greater tendency to hold down the inner portion of the rail-base, and so hold the rail in position on the tie, or the rail-supporting chairs or base-bar, and less tendency to force the rail-head outwardly under the lateral strain in passing around curves or in like positions. For this reason it is possible to employ the rail-section illustrated in Fig 2 with an ordinary tie or tie-plate, while with the rail-section illustrated in Fig. 1, where the double-headed rail is properly supported in chairs or base-bars, a much greater angle of resistance to spreading of the rail is provided through the combined rail and chair.

What I claim is—

1. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head having a continuously-curved convex upper wearing-face.

2. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head, the width of the head being approximately three times its depth or thickness.

3. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head, and a base containing substantially the same bulk of metal as the head, the width of the head being approximately three times its depth or thickness.

4. A double-headed railroad-rail having a web portion, the heads being wide and thin and bilaterally-symmetrical and having continuously-curved convex upper wearing-faces.

5. A double-headed railroad-rail having a web portion, the heads being wide and thin and bilaterally symmetrical, the width of each head being approximately three times its depth or thickness.

6. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head having a continuously-curved convex upper wearing-face, and a base having thick edge portions corresponding substantially to the edge portions of the rail-head.

7. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head, and a base having thick edge portions corresponding substantially to the edge portions of the rail-head, in combination with a rail-support having a seat corresponding in shape to the outer face and sides of the base portion and adapted to receive the same.

8. A railroad-rail having a web portion and a wide and thin bilaterally-symmetrical head, and a base having thick edge portions corresponding substantially to the edge portions of the rail-head, in combination with a rail-support having a seat corresponding in shape to the outer face and sides of the base portion and adapted to receive the same, and fastening devices extending over the upper face of such base portion.

In testimony whereof I, the said WILLIAM GOLDIE, have hereunto set my hand.

WILLIAM GOLDIE.

Witnesses:
JAMES I. KAY,
ROBERT C. TOTTEN.