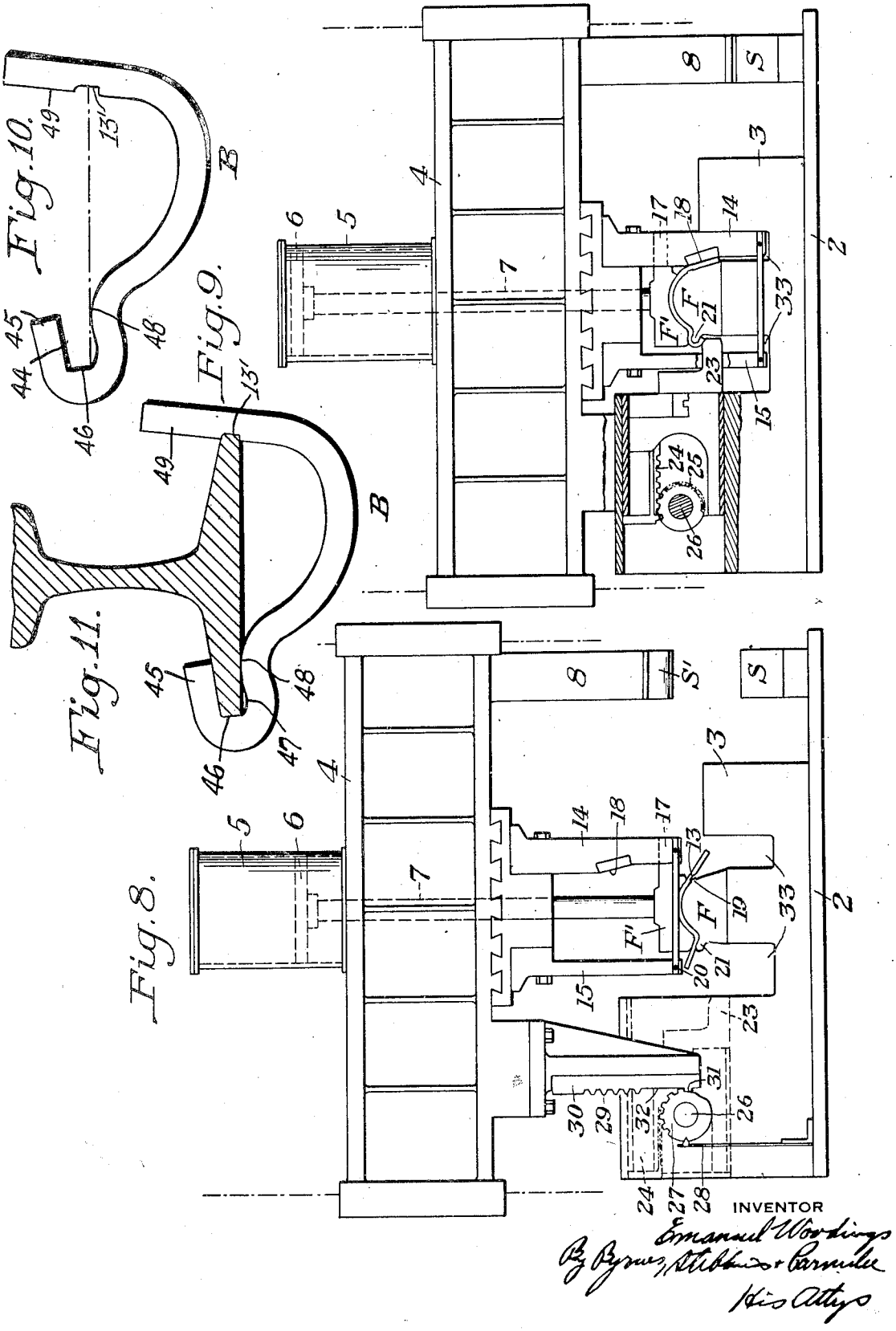
March 19, 1929. E. WOODINGS 1,706,273

METHOD OF FORMING CREEP CHECKS

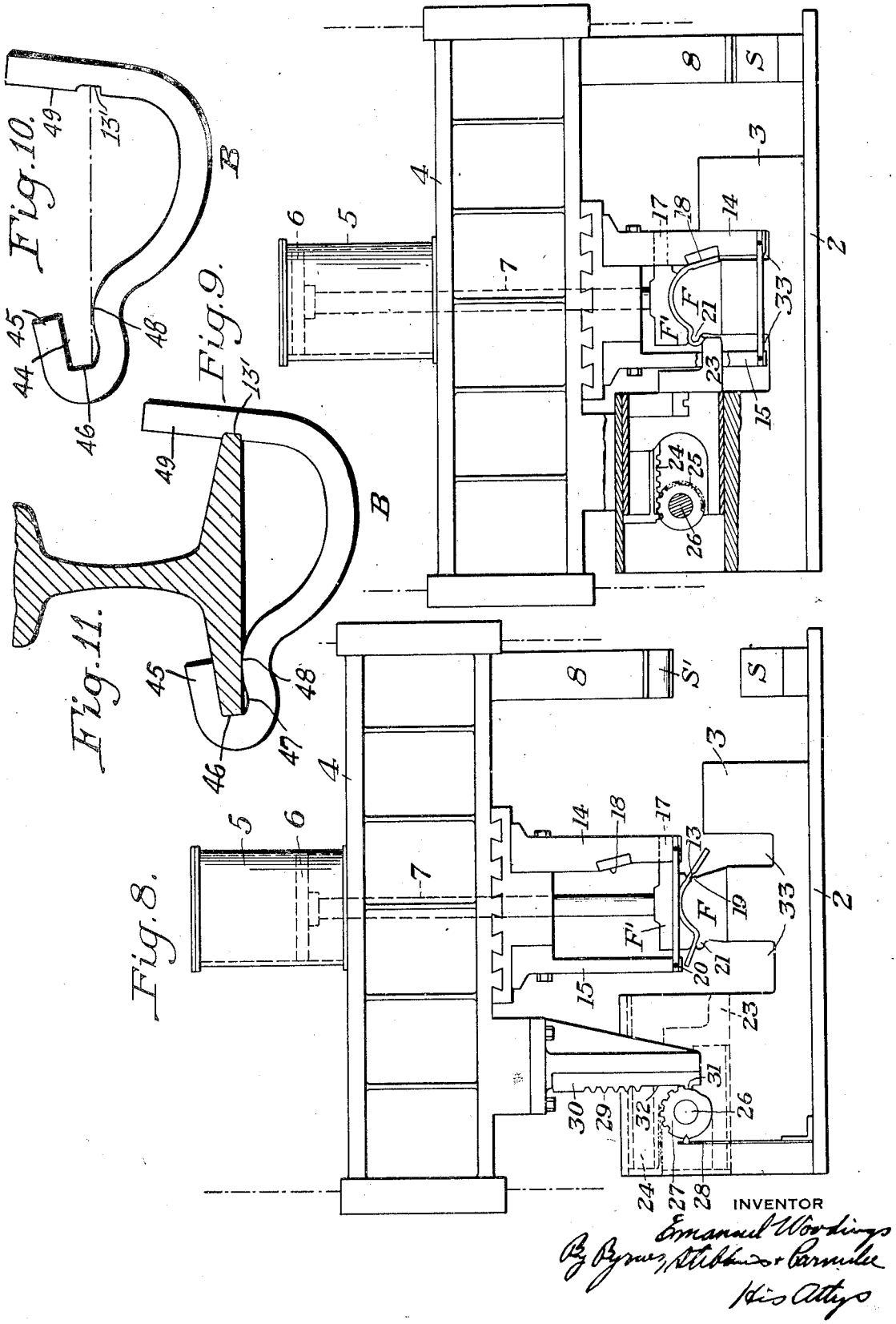
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METHOD OF FORMING CREEP CHECKS

Filed March 17, 1925 2 Sheets-Sheet 2



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1,706,273

UNITED STATES PATENT OFFICE.

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METHOD OF FORMING CREEP CHECKS.

Application filed March 17, 1925. Serial No. 16,130.

The present invention relates broadly to metal working, and to metal working machines, and more particularly to a method and apparatus for the accurate forging of creep checks adapted to be applied to railway rails for the purpose of resisting longitudinal creeping movement thereof.

At the present time it is customary in the general art to which the present invention relates to construct one-piece creep checks. Such checks are highly desirable, not only from the standpoint of simplicity as to construction, and relatively light weight, but also from the standpoint of actual shipment and application.

Under these conditions there is an increasing demand for one-piece creep checks. The present invention relates specifically to an article of this nature which, when accurately formed by machining for test purposes, has proven extremely efficient. It will be understood that while one-piece structures are desirable for the various reasons pointed out, they must be capable of construction in such manner that they may be sold at a price capable of effectively competing with anchors of the type heretofore manufactured.

One-piece anchors while possessing the desirable features referred to, must necessarily be accurately and uniformly shaped in order to meet the exacting demands to which they are subjected in use. If non-uniformly shaped or dimensioned, it is obvious that different anchors will engage either different portions of the same rail, or portions of different rails with varying degrees of effectiveness. Such conditions are objectionable in that the different anchors do not carry their full share of the load, and frequently the anchors will successively slip until ultimately substantially all the load is being taken by one or two of the anchors. As each anchor is calculated with a certain limited maximum holding power, this condition is not only unsatisfactory, but is actually unsafe.

The present invention has for certain of its objects the manufacture of such anchors by forging in such manner that each blank is accurately shaped, and formed to extremely close tolerances insuring maximum and uniform efficiency of the anchors in use.

Heretofore efforts have been made to produce articles of this general character by forging, but it has been found extremely difficult to shape the relatively heavy gauge material, which is necessarily hard and of spring-like nature, in such manner as to obtain a permanent uniform manufacturing set in successive articles, together with sharp angles where required and uniformity of measurement.

In accordance with the present invention these difficulties and objections are overcome, and I am enabled to obtain the desirable results before referred to.

In the accompanying drawings there are shown for purposes of illustration only, certain preferred embodiments of the present invention, it being understood that the drawings do not define the limits of my invention, as changes in the construction and operation disclosed therein may be made without departing either from the spirit of the invention or the scope of my broader claims.

In the drawings:

Figure 1 is an end elevational view, partly broken away and partly in section, illustrating one form of apparatus constructed in accordance with the present invention;

Figure 2 is a diagrammatic view, on an enlarged scale, illustrating the construction of one pair of preliminary shaping dies;

Figure 3 is a view similar to Figure 2, illustrating the dies in closed position at the conclusion of their shaping operation;

Figure 4 is a detail view, partly in section and partly broken away, illustrating a portion of the forming dies and the forming mechanism;

Figure 5 is a view similar to Figure 4 illustrating the parts in one of their successive positions;

Figure 6 is a view similar to Figure 5 illustrating the parts in still another position;

Figure 7 is a front view of a portion of the forming machine illustrating the operation of the stripper;

Figure 8 is a front elevational view of the mechanism illustrated in Figure 1;

Figure 9 is a view similar to Figure 8, but partly broken away and partly in section, and illustrating the parts in the position they occupy at the conclusion of the forming operation;

Figure 10 is a side view of a completed creep check; and

Figure 11 is a detail sectional view through a portion of a standard railway rail showing my improved creep check in position thereon.

Having reference more particularly to Figures 1 to 9, both inclusive, of the drawings, a forging machine constructed in accordance with the present invention may comprise a stationary bed plate 2 having a supporting block 3 thereon for the reception of the lower forming die F, and carrying at one side thereof the lower shaping die S for preliminarily shaping the successive blanks.

Cooperating with the stationary bed plate, is a movable cross head 4 adapted to be operated in any desired manner as well understood in the art, and having mounted thereon a fluid pressure cylinder 5. Positioned within the cylinder is a piston rod 6 having a piston rod 7 projecting downwardly through the cross head and carrying at its lower end the upper forming die F'. At its underside, adjacent one end thereof the cross head 4 is formed with a downwardly projecting block 8 shaped at its lower end to detachably receive the upper preliminary shaping die S'.

In the operation of the apparatus, a blank B as illustrated more particularly in Figure 2, is placed in position between the preliminary shaping dies S and S', and the cross head is thereupon lowered to cause these dies to engage and preliminarily shape the blank. These dies are effective for shaping the blanks as illustrated more particularly in Figures 1 to 3 of the drawings. It is essential that successive blanks be uniformly shaped, and in order to facilitate this operation, the lower shaping die S is provided with one or more stop pins 9 tending to facilitate the proper positioning of the blank B thereon. The accurate positioning of successive blanks, facilitates the accurate formation thereof under the action of the shaping dies. It will be understood that the metal being worked upon is necessarily extremely hard in order to stand up under the loads imposed thereon, and that in order to provide the necessary resiliency to permit application of the creep check it must be more or less spring-like in nature. Such material is extremely hard to shape accurately, and this is particularly true where it is desired to produce abrupt changes of section requiring the formation of more or less sharp corners, or where it is desired to abruptly change the direction of extension of the body of the blank. Having this in mind, I preferably provide the lower preliminary shaping die S with a hardened insert 10 adjacent the point where it is desired to form a comparatively sharp interior angle, and also provide the upper shaping die S' with a similar insert 11 having a projection 12 thereon. During the closing movement of the shaping dies, the projection 12 will be forced into the blank causing an actual flowing of the metal thereof, and thereby form a locking notch or groove 13 therein having sharp corners and of clearly defined outline.

After the completion of each cycle of operation of the cross head 4, the blank which has been preliminarily shaped by the shaping dies is removed therefrom and placed in inverted position on the lower forming die F. After the removal of the preliminarily shaped blank and placing it in position on the forming die F, the operative places a new blank in position on the shaping dies, whereupon the next cycle of operation of the cross head will be effective not only for shaping preliminarily a new blank, but also for completing the formation of the previously shaped blank placed in position on the forming dies.

This forming operation is accomplished by initially bringing the upper forming die F' into engagement with the preliminarily shaped blank for tightly clamping the same on the lower forming die to prevent any movement thereof during subsequent operations thereon. During the continued descent of the cross head, the piston 6 slides in the cylinder 5 in which may be maintained sufficient pressure on the piston as to ensure a firm clamping of the blank by the dies F and F' conditions. Projecting downwardly from the cross head on opposite sides of the piston rod 7 are forming arms 14 and 15 respectively. The forming arm 14 has a vertically extending guiding slot for the reception of the guide lug 17 projecting laterally from the forming die F'. On its inner surface the arm 14 is formed with an inclined forming face 18 adapted to engage the right hand end of the blank as viewed in Figures 4 to 6 and 8 and 9. This forming face is preferably produced by a hardened insert of the general nature before referred to. Upon continued descent of the cross head it will be obvious that the face 18 tends to force the blank inwardly against the die F and around the sharp shoulder 19 formed thereon, whereby the shaping of the locking groove or notch 13 is completed.

The forming arm 15 is of the same general construction as that of the arm 14, it being provided adjacent its lower end with a transversely extending hardened pin 20. This pin is adapted to engage the opposite end of the blank and bend it downwardly around the horn 21 into the position illustrated in Figure 5. Above the pin the arm 15 is provided with an opening 22 adapted for the reception of a laterally movable former 23. This former normally occupies the position shown in Figure 8, it being carried by one end of a rack bar 24. The rack bar is at all times in mesh with a pinion 25 secured to a shaft 26 journaled in the block 3. At its outer end this shaft is provided with a second pinion 27 adapted to be frictionally held in the position shown in Figure 8 by a spring detent 28. Both the

pinion 25 and the pinion 27 are of a special construction, preferably having teeth around only a portion of their respective peripheries. The teeth of the pinion 27 are adapted to mesh at predetermined periods in each cycle of operation with the teeth 29 on the rack bar 30 carried by and projecting downwardly from the cross head. The rack bar 30 has an end tooth 31 and a toothless space 32 separating the end tooth from the teeth 29. It will be apparent that with this construction the end tooth 31 will be effective at the conclusion of each upward movement of the cross head for engaging one of the teeth on the pinion 27 for rotating it to such a position that it will be held by the detent. On the downward stroke there will initially be no movement of the pinion 27, and consequently no movement of the rack bar 24. After the forming pin 20 has bent the blank into the form shown in Figure 5, and has dropped to such a position that it will not interfere with the advance of the former 23, the teeth 29 will engage the teeth of the pinion 27, and thereby rotate the shaft 26 to advance the rack bar 24 and the former 23. This former will engage the lower end of the blank, and bend the same in and around the horn 21, and thus complete the forming of the block. The block 3 is provided with clearance recesses 33 permitting downward movement of the arms 14 and 15 to the extent required for these operations. Upon upward movement of the cross head, the parts will be restored to their original position as shown in Figure 8.

After the formation of each of the blanks is completed, it becomes necessary to effect the stripping thereof from the lower forming die F. This may be accomplished by a mechanical stripper comprising side arms 34 adapted to be horizontally reciprocated on opposite sides of the forming die F. Inasmuch as the maximum binding between a formed blank and a forming die occurs around the shoulder 19 and around the horn 21, the stripper arms 34 will preferably be so positioned that they will engage the blank adjacent these points as clearly indicated in Figure 7. While the stripper may be operated in any desired manner, I find that it may be expeditiously operated by means of a fluid pressure cylinder 35 located at the rear of the machine and having its piston rod 36 connected to the stripper arms in any desired manner. The cylinder 35 is provided with a controlling valve 37 adapted to be operated by a pivotally mounted lever 38 carried by an arm 39 rigidly secured to the block 3 on the bed plate 2 of the forging machine. The forward end of the lever 38 projects into such a position that it is adapted to be engaged upon successive movements of the cross head by a trip lever 40. This lever has a pivotal mounting 41, and is normally urged in a predetermined direction by a compression spring 42. Upon descent of the cross head, the lower end of the trip lever will engage the forward end of the lever 38 and move the controlling valve in such manner that retraction of the stripper is insured. Upon the upward movement of the cross head, after the completion of a forming operation, the trip lever 40 will move the lever 38 in the opposite direction, thereby turning fluid pressure into the opposite end of the cylinder 35 for advancing the stripper arms 34 to thereby strip a formed blank from the lower forming die.

In Figures 9 and 10 there is illustrated a completed creep check constructed in accordance with the present invention.

This creep check is illustrated as having a rail edge receiving jaw 44, with an overhanging clamping arm 45. The bottom face of the clamping arm 45 is disposed at such an angle to the face 46 of the jaw, as to substantially accurately engage the upper surface of the rail base, the face 46 conforming to the contour of the edge of the rail base. The overall width of the face 46 is preferably slightly greater than the thickness of the rail base at its edge, and the jaw is preferably curved downwardly away from the face to form a clearance space 47. This shaping of the face 46 together with the provision of a clearance space enables the check to be initially easily applied to one edge of the rail base. Thereafter it is rotated around this edge as a pivot until the fulcrum point 48 of the check engages the lower surface of the rail base and preferably at a point substantially opposite the point of termination of the clamping arm. Thereafter, the check may be forced upwardly to cause the cam face 49 thereof to slide over the opposite edge of the rail base to an extent sufficient to bring the groove 13′ opposite the rail base edge. At this time the check will forcibly spring into position to tightly grip the rail base as shown in Figure 11.

Actual tests have shown the desirability of having the groove 13′ accurately shaped so as to substantially conform to the contour of the edge of a rail base as shown, not only to prevent nicking of the edge in such manner as to result in the ultimate fracture of the rail, but also for the purpose of more effectively gripping the rail base. It is also desirable that the groove be comparatively shallow, as in this manner weakening of the check is obviated, and subsequent removal for repair of the track, or for re-use of the check is facilitated, without in any way lessening the effective gripping power of the check.

By the present method of forming creep checks, the clamping of the main body thereof, and the subsequent formation of the ends, and the accurate shaping of the groove 13′ insures the desired uniformity in this respect.

The advantages of the present invention

arise not only from the method herein disclosed for effectively forming creep checks by means of forging dies, but also from the apparatus utilized for performing said forging operation.

While a mechanism suitable for the practice of the method described herein has been shown and described with considerable particularity, no claim is made herein to such mechanism as the same forms the subject matter of an application filed May 8, 1926, Serial No. 107,631.

I claim:

1. The method of manufacturing rail anchors each embodying a jaw adapted to grip the flange on one side of the rail, a lock adapted to engage the opposite flange of the rail and a bowed intermediate portion which comprises bowing an intermediate portion of a blank, forming a gripping jaw and lock respectively on opposite ends of the intermediate portion, and then bringing the jaw and lock into predetermined spaced relationship, substantially as described.

2. The method of manufacturing rail anchors each embodying a jaw adapted to grip the flange on one side of the rail, a lock adapted to engage the opposite flange of the rail and a bowed intermediate portion, which comprises bowing an intermediate portion of a blank, forming a gripping jaw and lock respectively on opposite ends of the intermediate portion, and then bringing the jaw and lock into predetermined spaced relationship while holding at least a substantial part of the intermediate portion against distortion, substantially as described.

3. The method of forming creep checks, comprising subjecting a substantial portion of a blank to a bending operation to form a resilient intermediate portion and holding at least a substantial part of said intermediate portion against distortion and completing the formation of a lock on one end of the blank and a jaw on the opposite end of the blank while modifying an unheld part of the intermediate portion to bring the jaw and lock into predetermined accurate spaced relationship.

4. The method of forming creep checks, comprising subjecting a substantial portion of a blank to a bending operation to form a resilient intermediate portion, and to partially form a jaw and lock, and holding at least a substantial part of said intermediate portion against distortion and completing the formation of a lock on one end of the blank and a jaw on the opposite end of the blank while modifying an unheld part of the intermediate portion to bring the jaw and lock into predetermined accurate spaced relationship, said shaping and forming operation being effected on a uniformly heated blank, substantially as described.

5. The method herein described of manufacturing rail anchors embodying a bowed intermediate portion, a lever portion at one end of the intermediate portion, rail engaging jaws at one end of the intermediate portion and a rail engaging groove or notch in the lever portion which consists in bowing or curving a portion of the blank intermediate its ends, forming a notch or groove in a portion of the blank at one end of the bowed or curved portion, bending the portion of the blank at the opposite end of the bowed portion to form gripping jaws and finally forcing the notched or grooved portion of the blank into proper spaced relationship with the gripping jaws.

6. The method herein described of manufacturing rail anchors embodying a bowed intermediate portion, a lever portion at one end of the intermediate portion, rail engaging jaws at one end of the intermediate portion and a rail engaging groove or notch in the lever portion which consists in bowing or curving a portion of the blank intermediate its ends, forming a notch or groove in a portion of the blank at one end of the bowed or curved portion, bending the portion of the blank at the opposite end of the bowed portion to form gripping jaws and finally forcing the notched or grooved portion of the blank into proper spaced relationship with the gripping jaws.

In testimony whereof I have hereunto set my hand.

EMANUEL WOODINGS.