

March 19, 1929.

E. WOODINGS

1,706,370

APPARATUS FOR FORMING CREEP CHECKS

Filed May 8, 1926

3 Sheets-Sheet 1

FIG. 1.

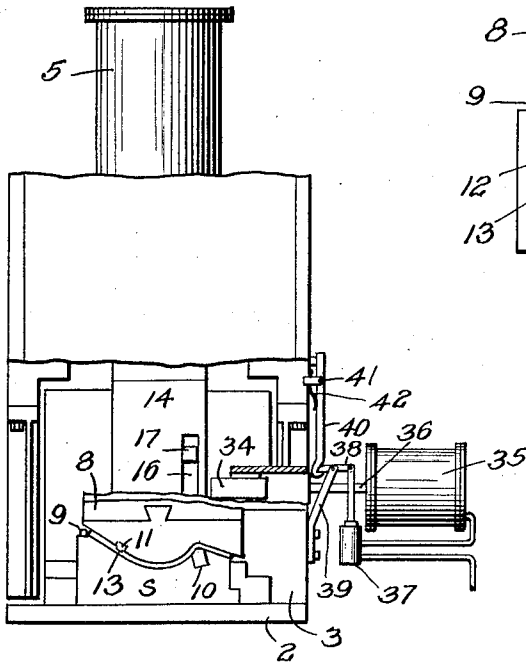


FIG. 2.

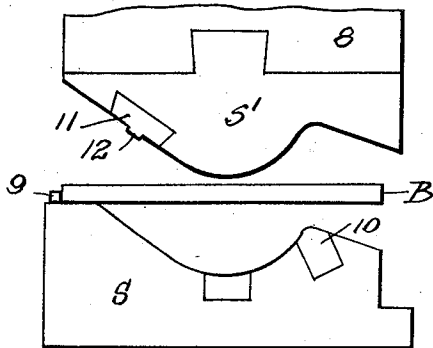


FIG. 3.

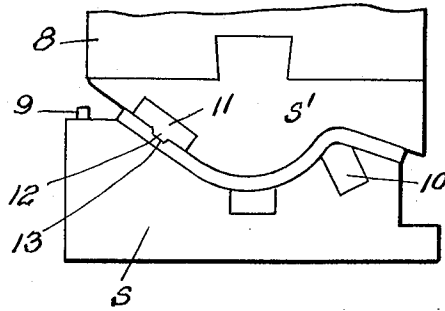


FIG. 4.

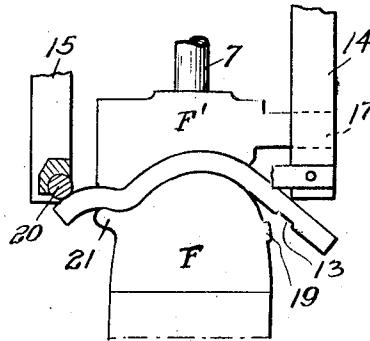
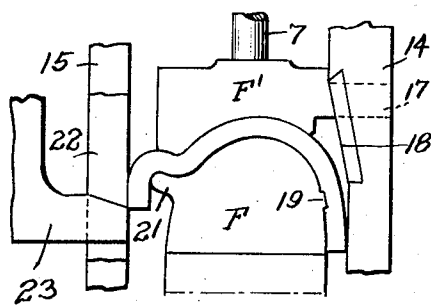


FIG. 5.



WITNESSES

J. Robert Bradley

INVENTOR

Emanuel Woodings
by Darius S. Wolcott
att'y

March 19, 1929.

E. WOODINGS

1,706,370

APPARATUS FOR FORMING CREEP CHECKS

Filed May 8, 1926

3 Sheets-Sheet 2

FIG. 6.

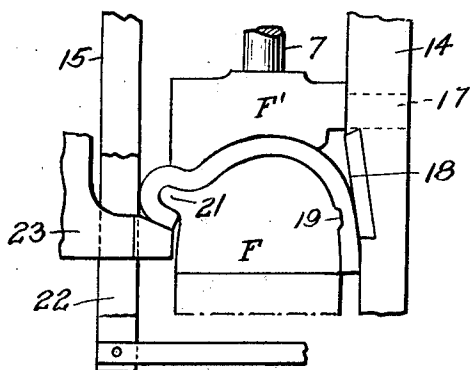


FIG. 7.

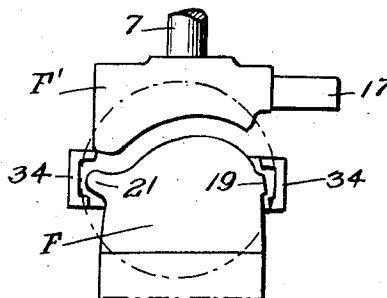
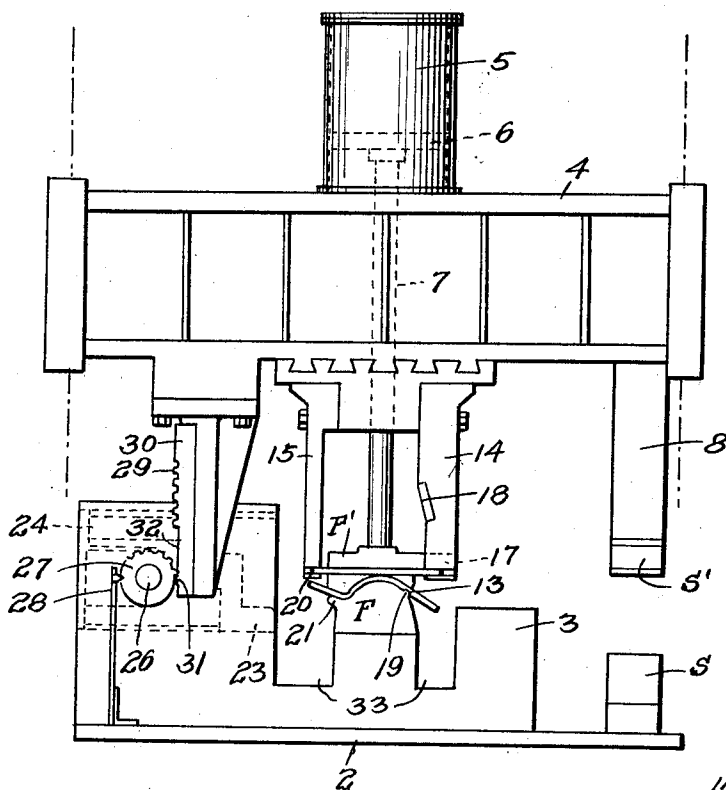


FIG. 8.



WITNESSES

J. Robert Bradley

INVENTOR

Emanuel Woodings
by Darius S. Wolcott
att'y

March 19, 1929.

E. WOODINGS

1,706,370

APPARATUS FOR FORMING CREEP CHECKS

Filed May 8, 1926

3 Sheets-Sheet 3

FIG. 9.

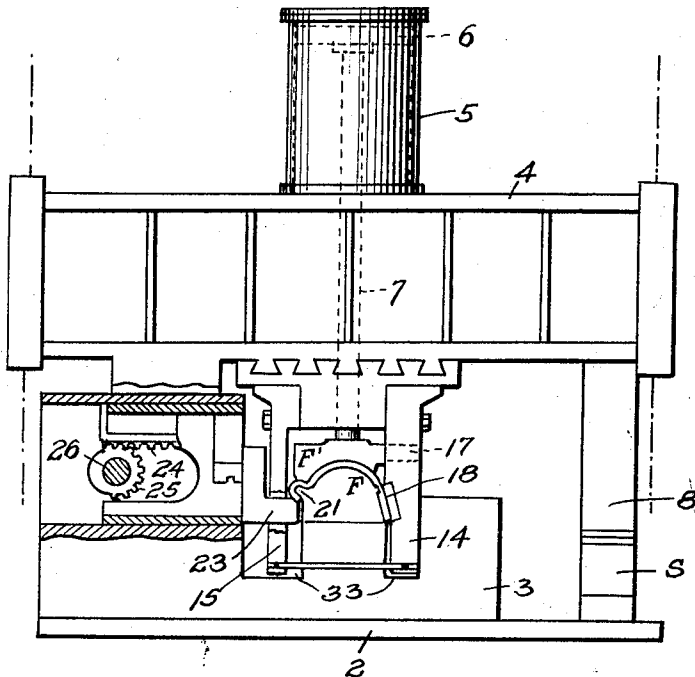


FIG. 11.

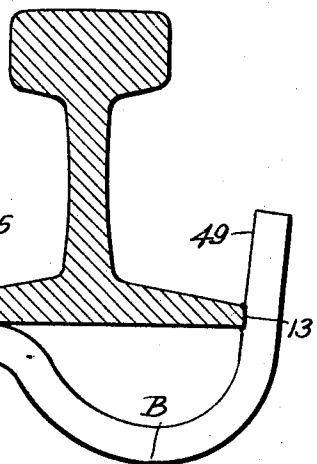
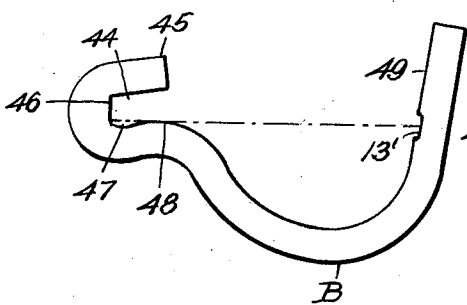


FIG. 10.



WITNESSES

J. Herbert Bradley.

INVENTOR

Emmanuel Woodruff
by Danm. S. Wolcott
Atty

Patented Mar. 19, 1929.

1,706,370

UNITED STATES PATENT OFFICE.

EMANUEL WOODINGS, OF OAKMONT, PENNSYLVANIA, ASSIGNOR TO WOODINGS FORGE & TOOL COMPANY, OF VERONA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

APPARATUS FOR FORMING CREEP CHECKS.

Application filed May 3, 1926. Serial No. 107,631.

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.

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 tolerance 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 strippers; 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
5 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
10 thereon a fluid pressure cylinder 5. Positioned within the cylinder is a piston 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
15 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
25 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
30 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 suc-
35 cessive 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
40 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 naturally, and this is particularly true where it is
45 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
50 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
55 die S' with a similar insert 11 having a projection shoulder 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 and
60 thereby form a locking groove or notch 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
70 shaped blank, and placing it in position on the forming die F, the operator 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
75 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' 80 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
85 of the cross head, the piston 6 slides in the cylinder 5 in which may be maintained only sufficient pressure on the piston as to ensure a firm clamping of the blank by the dies F, F'. Projecting downwardly from the
90 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
95 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
100 and 8 and 9. This forming face is preferably formed 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
105 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
110 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 illus-
115 trated 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
120 carried by one end of a slide 24. The slide is provided with teeth intermeshing with a pinion 25 secured to shafts 26, 26^a journaled in the blocks 3. At their outer ends these
125 shafts are provided with pinions 27 and 27^a 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
130 are of a special construction, preferably having teeth around only a portion of their re-

spective 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 a 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 above 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 blank. 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 positions 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.

With a forging machine of the character described, it will be apparent that each reciprocation of the cross-head is effective for preliminarily shaping one blank and for completing the formation of a blank which has previously been preliminarily shaped. Each finished blank is in turn stripped automatically from the forming die whereby it may be expeditiously removed from the machine. To those skilled in the art, it will be obvious that the forging machine may be operated at a comparatively high rate of speed for rapidly forming completed creep checks. The machine as described, however, requires two pairs of dies, thereby distributing the shaping between two different operations. It will be understood, however, that if desired, forging machines may be constructed in such manner that the complete formation may be effected at a single operation of the machine and in a single pair of dies, as set forth in an application Serial No. 73,109, filed December 4, 1924.

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 14.

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 is 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.

I claim herein as my invention:

1. A creep check forging apparatus comprising a fixed die having on one side a horn adapted to shape a hook on one end of the creep check and on its opposite side a groove-forming shoulder, a reciprocating cross-head, a second and movable die yieldingly carried by the cross-head, said dies having their co-operating opposed faces corresponding in contour to that of the intermediate portion of the creep check to be formed, a lateral slidable member mounted to reciprocate toward and from the fixed die and adapted to force an end of the creep check blank said horn to form the said hook therein, a rack member carried by the cross-head, and a gear positioned to be engaged and driven by said rack, said gear being

positively connected to said lateral member whereby movement of the rack in engagement with the gear drives the lateral member against the end of the said blank beneath the said horn.

2. The combination of claim 1 with the addition of a vertical member carried by the cross-head and adapted to engage the other end of the creep check blank and to force it downward and against the side of the lower die opposite said horn.

3. A creep check forging apparatus comprising a fixed die having on one side a horn adapted to shape a hook on one end of the creep check and on its opposite side a groove-forming shoulder, a reciprocating cross-head, a cooperating die yieldingly mounted on the cross-head, said dies having their co-operating opposed faces corresponding in contour to that of the intermediate portion of the creep check to be forged, a plunger mounted to move across the line of travel of the cross-head, means reciprocating with and carried by the cross-head adapted to force said plunger toward the fixed die beneath the said horn thereon during the lower range of travel of the cross-head whereby to bend one end of the creep check blank around said horn and into hook-shape, and means movable with the cross-head to force the other end of the creep check downward and against the side of the fixed die opposite said horn.

In testimony whereof, I have hereunto set my hand.

EMANUEL WOODINGS.