Dec. 22, 1936. E. J. STRONG 2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Filed Feb. 28, 1931 5 Sheets-Sheet 1

FIG. 1.

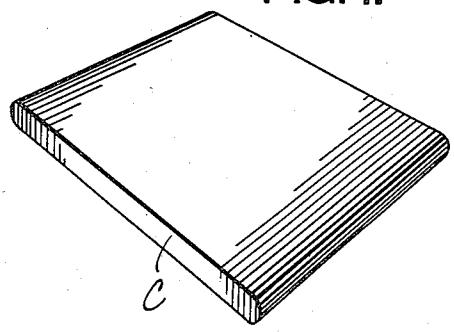


FIG. 2.

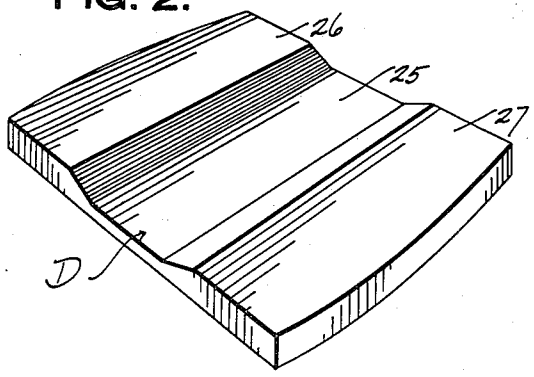


FIG. 3.

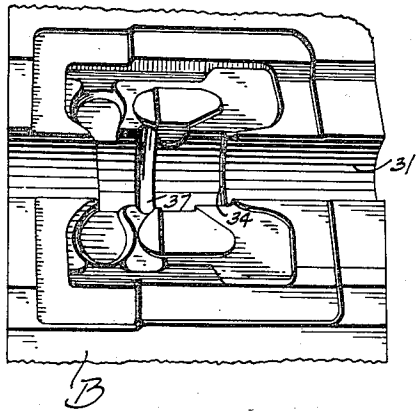


FIG. 4.

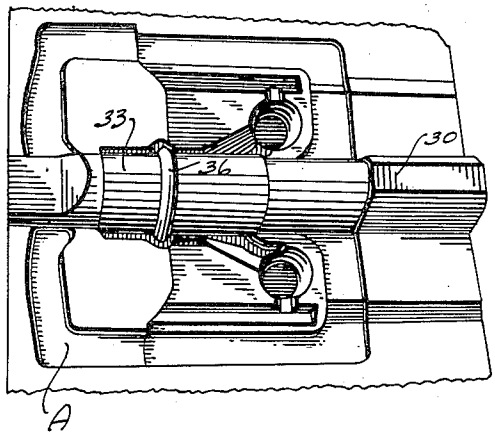
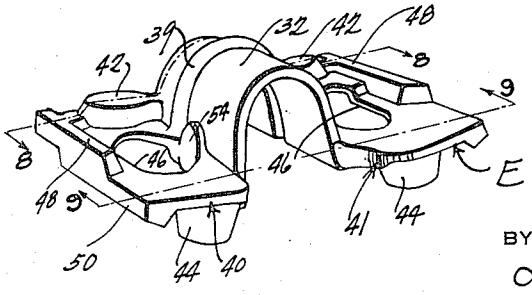


FIG. 5.



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Dec. 22, 1936. E. J. STRONG 2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Filed Feb. 28, 1931 5 Sheets-Sheet 2

FIG. 7.

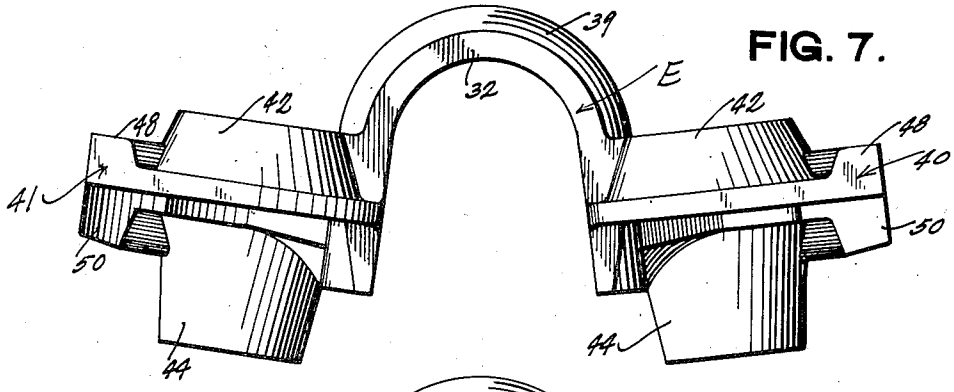


FIG. 8.

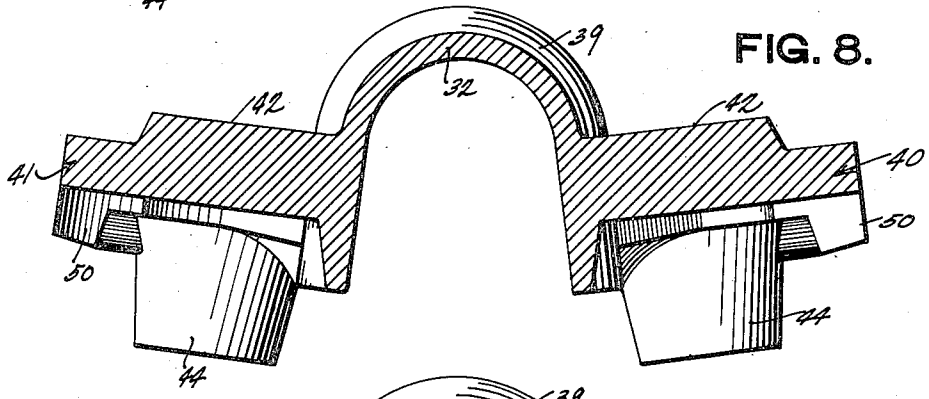
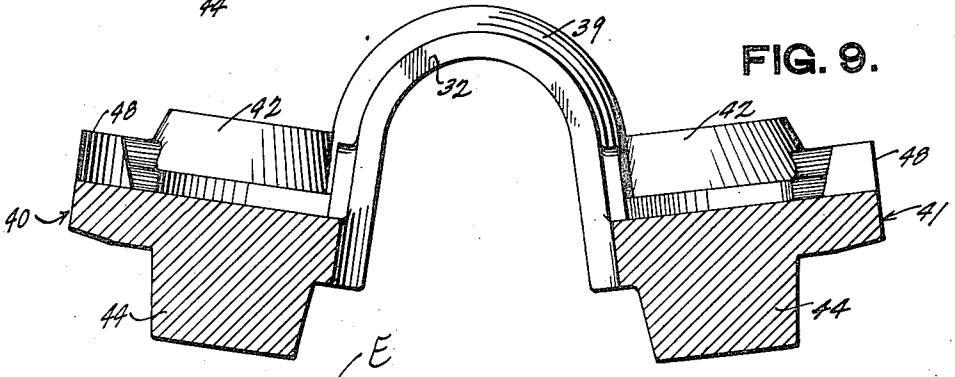


FIG. 9.



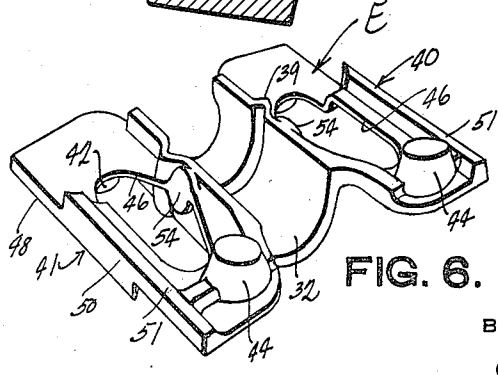


FIG. 6.

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Dec. 22, 1936. E. J. STRONG 2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Filed Feb. 28, 1931 5 Sheets-Sheet 3

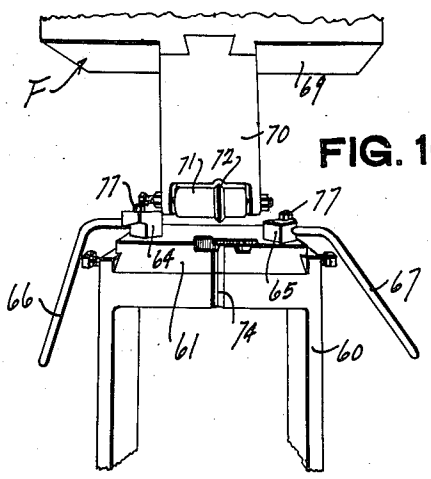


FIG. 10.

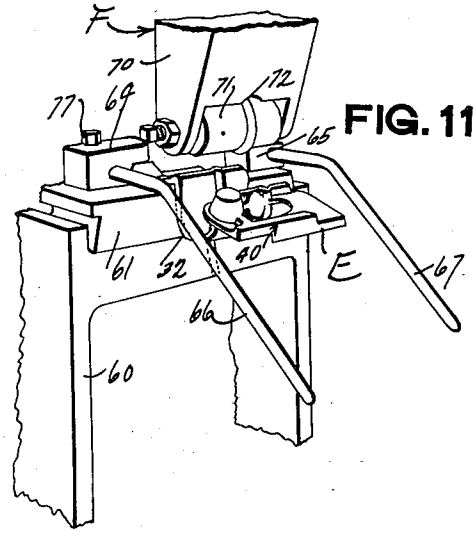


FIG. 11.

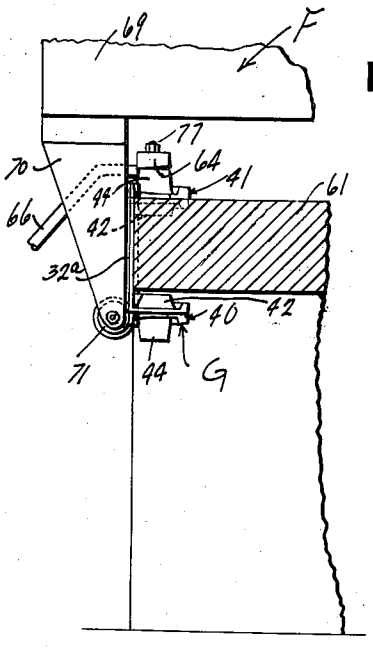
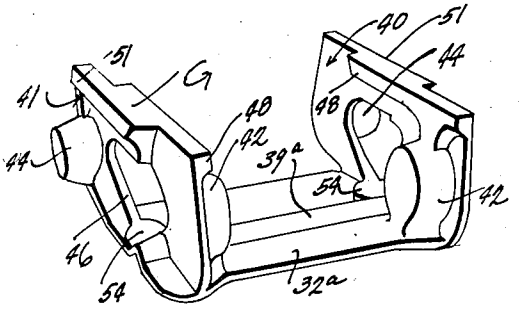


FIG. 12.

FIG. 13.



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Dec. 22, 1936. E. J. STRONG 2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Filed Feb. 28, 1931 5 Sheets-Sheet 4

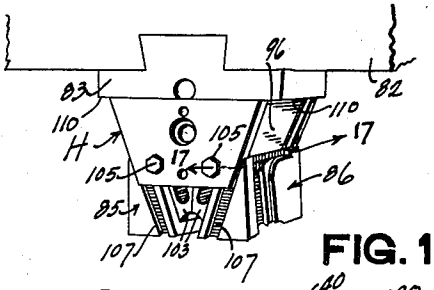
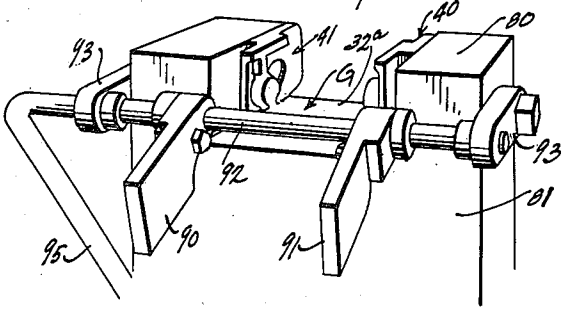


FIG. 14.



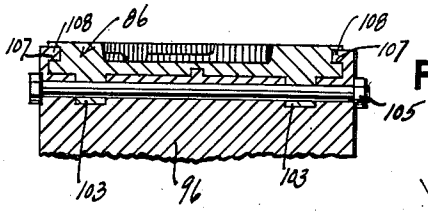


FIG. 17.

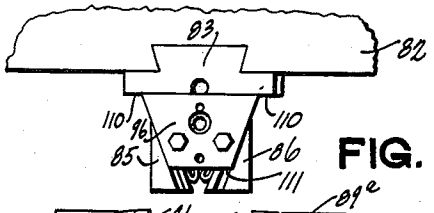
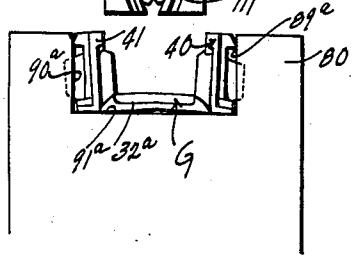


FIG. 15.



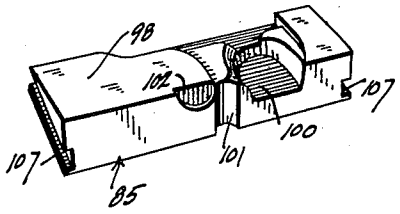
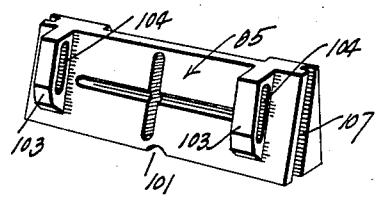


FIG. 19.



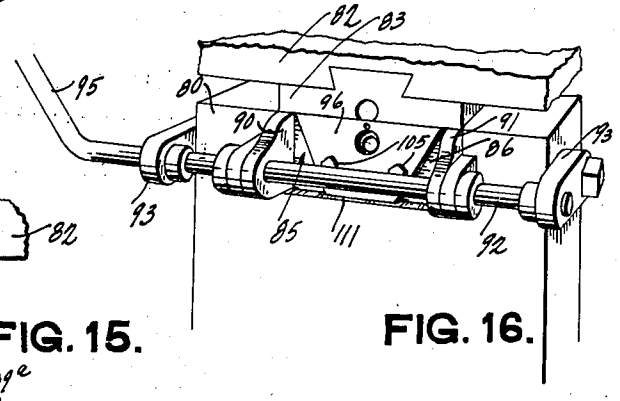


FIG. 16.

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Dec. 22, 1936. E. J. STRONG 2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Filed Feb. 28, 1931 5 Sheets-Sheet 5

FIG. 20.

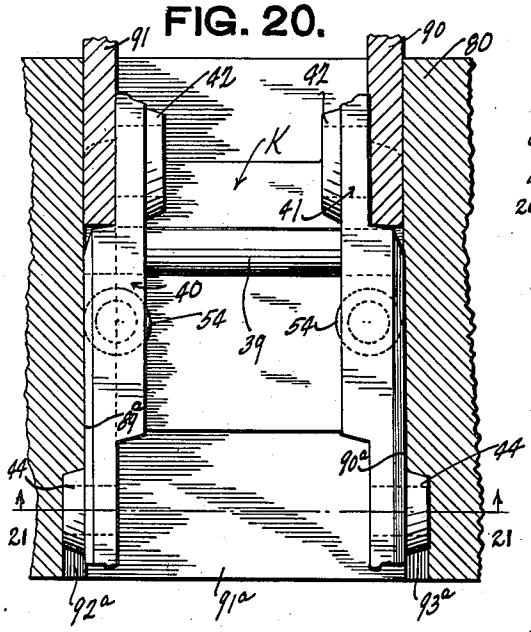


FIG. 21.

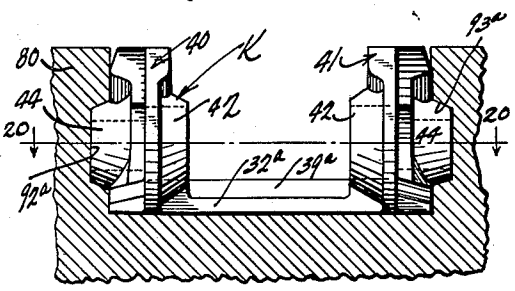


FIG. 22.

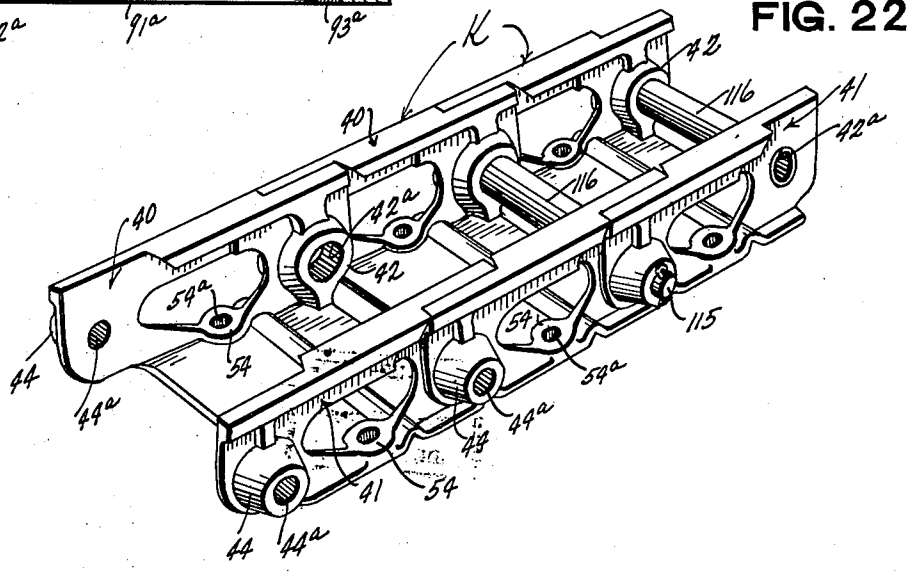
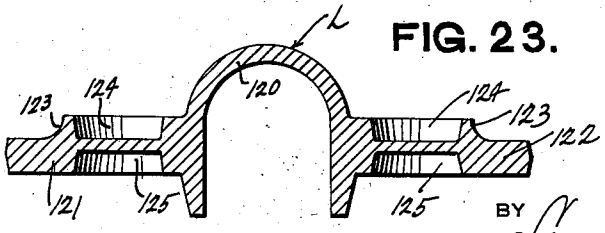


FIG. 23.



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Patented Dec. 22, 1936

2,064,956

UNITED STATES PATENT OFFICE

2,064,956

APPARATUS FOR PRODUCING AN IMPROVED FORGED STEEL TRACTOR SHOE

Eldred J. Strong, Harrisburg, Pa., assignor to Harrisburg Steel Corporation, a corporation of Pennsylvania

Application February 28, 1931, Serial No. 519,122

10 Claims. (Cl. 153—13)

This invention relates to improvements in means for the forging of an improved shoe or link for endless traction belts.

The primary object of this invention is the provision of improved apparatus for the efficient and economical forging of one piece track belt links or shoes.

A further and important object of this invention is the provision of improved dies and means for the drop forging of traction shoes or the like.

It is present practice in the manufacture of endless traction belts for tractors and other vehicles to make the links or shoe portions either out of cast steel, sheet metal bent to shape, or to independently forge and subsequently bolt together the tread and rail portions of the shoe. I have conceived of and developed an improved one-piece forged shoe consisting of a tread portion and side rails which are drop forged after an improved method, with the utilization of improved dies and tools, so as to provide a shoe wherein the connections of the side rails with the tread of the shoe are not weakened by means of irregularity in internal stresses, and wherein the rails and tread portions are accurately shaped and related without the irregularities and inequalities which sometimes occur when the parts of the shoe are independently forged and subsequently connected.

Other objects and advantages of this invention will be apparent during the course of the following detailed description.

In the accompanying drawings, forming a part of this specification, and wherein similar reference characters designate corresponding parts throughout the several views,

Figure 1 is a perspective view of a plate or slug of metal from which the forging is made.

Figure 2 is a perspective view of a plate of metal which may be shaped to permit of the more efficient forging of the shoe.

Figure 3 is a perspective view of the female portion of the die wherein the heated plate or slug is first placed, for the initial forging operation.

Figure 4 is a perspective view of the male portion of the die which cooperates with the die of Figure 3.

Figure 5 is a perspective view showing the forging after removal from between the die parts of Figures 3 and 4, and showing more particularly the shape of the forging, in that the side rails or portions are connected in right angular relation with the adjacent parts of the body or intermediate portion of the forging; the latter being of a U-shape.

Figure 6 is a perspective view of the opposite side of the forging shown in Figure 5.

Figure 7 is an end view of the forging after removal from the die stamping operation.

Figures 8 and 9 are transverse sectional views taken through the forging of Figure 5 substantially on their respective lines 8—8 and 9—9 of Figure 5.

Figure 10 is a perspective end view of a press whereon the operation of bending the intermediate or body portion of the forging of Figures 5 and 6 is accomplished in a succeeding step in the method.

Figure 11 is a perspective view of the machine or press of Figure 10, showing the forging of Figures 5 and 6 clamped in place on the bed of the machine in position to be operated upon by a descending part or platen of the machine for bending the intermediate U-shaped portion of the forging substantially flat.

Figure 12 is a fragmentary view of the machine of Figures 10 and 11 showing the parts after they have bent the intermediate portion or body of the forging into substantially flattened relation; the forging being shown in the machine in this view.

Figure 13 is a perspective view of the forging after removal from the machine of Figures 10, 11 and 12.

Figure 14 is a perspective view of a press or machine wherein the forging of Figure 13 is placed for the straightening, leveling, and further forging and pressing of the parts; the forging being shown in place in the bed or stationary die block of the machine.

Figure 15 is an end view showing the forging in place in the bed or stationary block of the machine of Figure 14 in relation to a descending wedge die upon the movable platen of the press.

Figure 16 is a perspective view showing the parts of the machine in the relation which they bear to each other during the straightening and leveling off of the forging at the time of the sizing operation.

Figure 17 is a fragmentary sectional view showing the means of mounting of a movable die plate or block upon the movable platen of the press, the view being taken substantially on the line 17—17 of Figure 14.

Figures 18 and 19 are perspective views of the opposite sides of one of the movable die complements carried by the upper press platen.

Figure 20 is a horizontal sectional view taken

through the stationary die block of the press shown in Figures 14, 15 and 16, showing in full lines, and not in section, the forging as positioned after the straightening operation; it being noted that the wings or filler plates of the machine are in place, the view being taken substantially along the line 20—20 of Figure 21.

Figure 21 is a transverse sectional view of the stationary die block of Figure 20, the view being taken substantially on the line 21—21 of Figure 20, but showing the forging in full line end elevation.

Figure 22 is a perspective view showing the relation in assemblage of a plurality of the completely forged shoes or links after removal from the final press forging operation.

Figure 23 is a transverse sectional view taken through a modified shoe forging after removal from the initial die stamping, and more particularly showing a structure which is different from that of the U-structure shown in Figures 5 to 9 inclusive.

In the drawings, wherein for the purpose of illustration are shown preferred and modified forms of the inventions, the letters A and B may generally designate the male and female portions of a die utilized for receiving slugs or plates of metal C or D, in order to forge the article E shown in Figures 5 to 9 inclusive. F may generally designate a press whereon the article E after the initial die stamping operation is placed, for a bending operation, in order to provide the article G shown in Figure 13 of the drawings. The letter H may generally designate the press wherein the forged article G is placed and wherein it is further forged, leveled and straightened in a sizing operation to provide the completed track link or shoe K shown in Figures 20, 21 and 22 of the drawings. The letter L may designate the modified forging of Figure 23.

The steel plate or slug C is the rough stock which is used. It contains merely the amount of metal necessary to complete the forging E. It is preferably placed in an edgewise relation in a hammer press and broken down to provide the article D, or the latter may be shaped in any approved manner to provide an intermediate reduced portion 25 and the relatively thicker side or edge portions 26 and 27 which go to make up the rails of the forging. The most economical method of forming the plate is to stand it on edge of the stationary die and permit the top die to strike it edgewise to thicken the edges of the blank. The piece is then lifted up and struck between the flat surfaces of the die whereon the latter has its centers raised to reduce the thickness of the metal at 25.

The complemental die portions A and B are respectively provided with a longitudinal rib and groove 30 and 31, which interfit and are suitably shaped to form the central body 32 of the forging E as shown in Figure 5 of the drawings. This rib 30 has a raised portion 33 which cooperates within an enlarged pocketed portion 34 in the groove 31 to form the U-shaped body 32 on the forging E during the die stamping operation; complementary V-shaped rib and groove segments 36 and 37 being provided on the die portions A and B respectively to stamp the segmental raised portion 39 in the convex side of the U-portion 32 of the forging E, which has a V-shaped cross section; the groove in the raised portion 39 facing inwardly of the channel defined by the body 32 of the forging, and which receives the grouter as will be apparent to those skilled in this art. The complemental dies A and B are suitably shaped at opposite sides of the rib 30 and groove 31 so that the forging E comes from the die with side rails or wings 40 and 41, which are identically shaped, the general plane of each being at exactly a 90° connection with the adjacent portion of the U-shaped body 32 of the forging, as can be seen from Figures 7, 8 and 9 of the drawings. The rails 40 and 41 are so shaped as to provide on one face thereof and at one end thereof a boss 42. These bosses 42 are on the faces of the rails 40 and 41 from which the intermediate portion 32 of the forging extends, and the bosses of course increase the thickness of the rails at these locations and are adapted to be suitably bored or drilled for receiving the shoe connecting pins of the traction belt. On the opposite faces of the rails 40 and 41, and at opposite ends thereof with respect to the bosses 42, said rails are each provided with a transversely extending boss 44, which are likewise in a position to be bored and provide openings for receiving the connecting bolts of the shoes. The central portions of the rail wings 40 and 41 are apertured at 46 for removing excess metal and reducing weight without sacrificing strength. On the faces of the rail wings 40 and 41 from which the bosses 42 extend there are provided laterally extending flanges 48, which have their surfaces flush with the outer edges of the rail wings, as designated at 50, which after the sizing operation defines the track surface on which the supporting rollers of the traction mechanism are received, as will be well understood by those skilled in this art. On the opposite faces of the rail wings, as shown in Figure 6 of the drawings, there are track flange extensions 51 with surfaces likewise terminating flush with the edges of the respective rail wings to make up track surfaces along which the rollers ride. These flanges 48 and 51 are placed at opposite ends of the rail wings and terminate short of the other ends; there being an overlap along the central portion of each of the rail wings as shown. This disposal of the flanges at the ends of the rail wings permits of the rail wings to be interfitted, as is shown in Figure 22 of the drawings, in order to make up a track surface of a uniform width whereon the supporting rollers may bear. It is to be particularly noted that the intermediate portion of each of the rail wings 40 and 41 is so shaped and offset that the face of each rail wing at one end thereof lies in the same plane as the opposite face of the said rail wing at the opposite end thereof, this plane defining the center line of the track surface where the ends of the flanges 48 and 51 overlap. Bosses 54 are forged at opposite sides of the U-shaped body 32, facing the openings 46; the outer surfaces of said bosses 54 being flat and arranged in planes at right angles to the plane of the adjacent rail wing 40 or 41, as the case may be. The centers of these bosses 54, through which openings are drilled for receiving grouter attaching bolts, are disposed in intersecting relation with the center line of the track surface of the rail wing, see Figure 20. This permits of the bosses having a flat surface which will enable the head of the grouter bolt to lie flush in contact therewith entirely around the shank of the bolt. The forging cannot be successfully made to accomplish this result by locating the grouter bolt bosses in any other relation.

As shown in Figures 7, 8 and 9, the rail wings are so disposed on the forging that they are

not in the same plane, although the rail wings are respectively connected in exact right angled relation with the adjacent side portions of the U-shaped body portion of the forging. If desired, the rail wings may be forged in the same plane.

Referring to the press or machine F, the same comprises a stationary frame 60, having a stationary bed 61 affixed thereon which may be suitably recessed in its upper surface at one end thereof to permit of the clamping of one of the wings 40 or 41 of the forging E thereon with the remainder of the forging extending beyond the end of the frame 60 and the bed 61, and the channel of the U-shaped central portion 32 facing upwardly. The machine bed 61 is provided with suitable pivoted clamping blocks 64 and 65 at opposite sides thereof, which may be conveniently manipulated at their movable ends by handles 66 and 67, which are themselves pivoted on fixed axes in the respective clamping blocks 64 and 65. These blocks 64 and 65 are swingable on pivots 77 so that the free moving ends thereof clamp over the end portions of the rail wing of the forging E which is disposed on the bed 61, in the position shown in Figure 11, for fixedly clamping the forging E in the relation mentioned upon the stationary bed and frame.

The platen of the press or machine F, above the stationary part of the frame, designated at 69, is movable in a line normal to the bed block 61, and it is provided with a suitable detachable shank 70 which is relatively long, and which at its free end is bifurcated for rotatably supporting a roller 71. This roller 71 has an annular rib thereabout of V-shape cross section, as is designated at 72. The roller 71 is of a width about equal to the length of the body 32 of the forging E, measured axially, and the clamping blocks 64 and 65 hold the forging E in such position that the rib 72 will enter the groove of the portion 39 forged on the body 32 of the forging E. Upon descent of the platen 69 the shank 70 is moved downwardly at one end of the bed block 61, and with the forging E heated with its original heat the roller 71 bends the U-shaped body 32 into substantially a flattened condition, as can be understood from Figure 12 of the drawings. Due to the shape of the bed and bed block of the machine, the rail wing of the forging E which is free of direct attachment to the stationary bed block of the machine, moves beneath the bed of the machine as shown in Figure 12, and this places the rail wings 40 and 41 in substantial parallelism, although not truly so at this stage of the forging operation. The bed of the machine and the bed block may be suitably recessed at 74 in order to receive the grouter attaching rib 39^a of the forging which is now in the shape of the article G shown in Figure 13. It is noted that the stationary bed and bed block of the machine may be suitably shaped to receive the body portion of the forging thereagainst so that it may be bent into substantially a flattened condition as an incident of the roller passing thereover. Referring to the forging which is now in the shape of the article G shown in Figure 13, the U-shaped body portion 32 has now been flattened to provide the tread or body portion 32^a of the shoe, and the grouter receiving rib 39^a extends transversely on the inner surface of the tread 32^a between the rail wings 40 and 41. Otherwise the parts of the forging G are the same as above described for the forging E.

In order to remove the forging G from the machine, it is merely necessary to swing the clamp blocks 64 and 65 laterally out of engagement with the wings of the forging G, and the latter, from its position shown in Figure 12 on the machine, may be readily removed by tongs. It is still heated with the original heat of forging, and may be moved to the press H whereon the straightening and evening operation takes place.

Referring to the press H, the same may be conveniently located with respect to the machine F, and indeed may be part of said machine if desired, so that the operator may take the forged article G from the machine F and place it into position in the stationary die block 80 on the bed 81 of the machine H. The general arrangement of the machine H is that of suitably recessing the stationary die block 80 to receive the channel shaped forged article G with its channel uppermost and the rails thereof in contact with side walls of the die block 80. The movable platen 82 of the press H is provided with a removable block 83 which supports complemental die pieces 85 and 86 at opposite sides thereof arranged to be wedged downwardly between the rail portions of the forging G for straightening the rails, properly gauging them, and leveling up the tread 32^a and the roller surfaces of the rails.

Referring to a description of the manner in which the forging G is placed in the stationary die block 80, the latter as shown in Figures 20 and 21 of the drawings, is formed with a channel-shaped depression defining oppositely disposed parallel side walls 89^a and 90^a and a horizontal bottom surface 91^a disposed in a plane normal to the walls 89^a and 90^a. The die block at one end is provided with grooves 92^a and 93^a cut inwardly of the walls 89^a and 90^a of the die block, and opening at one end of the die block, as shown in Figure 20; these grooves or slots 92^a and 93^a being of a V-shaped cross section and adapted to permit the rather snug sliding of the external bosses 44 of the rails 40 and 41 therein, as shown in Figure 21. The bosses 44 contacting at the ends of the slots 92^a and 93^a limit the degree to which the forging G may be slid into the die block. It will be noted from Figure 15 of the drawings that the forging G as positioned in the die block 80 does not have the side rails 40 and 41 and the tread 32^a thereof in a finished and evened condition. The straightening thereof is accomplished by bringing the complementary die pieces 85 and 86 into proper pressing relation with the heated article G, as will be apparent. As will be noted from Figure 14 of the drawings the forged article G is slipped into the die block 80 with the rail portions in close proximity to the side walls of the channel of the die block. At the male end of the forged article G, which is adapted to fit into the spaces between the side rails of an adjacent shoe, it will be noted that the outer surfaces of the rails lie spaced from the facing surfaces of the die block 80, as shown in Figure 14. These spaces must be suitably filled so that the rails will have something to abut against and prevent distortion of the shoe rails when being straightened and sized. To this end a pair of filler wings 90 and 91 are keyed upon a shaft 92, in radial relation therewith. The shaft 92 is rotatably supported in suitable bearings 93 which may be attached to the bed of the machine H, or to the stationary die block 80. The shaft 92 has a handle 95 which may be employed for the purpose of

oscillating the shaft in order to throw the wings 90 and 91 into the channel space of the die block 80, and more particularly into the spaces between the facing side walls of the channel of the die block and the male end portions of the shoe rails 40 and 41. In these positions the outer surfaces of the wings 90 and 91 contact against the side walls of the die block 80, and are in position to permit the male ends of the shoe rails to be properly straightened without lateral distortion. Figure 14 shows the filler wings prior to movement into the die block, and Figure 16 shows the filler wings in position in the die during a sizing operation.

The movable platen 82 of the press H detachably supports a wedging block 96 which is provided with opposite sides convergently tapering downwardly. These side surfaces of the wedging block 96 are adapted to receive thereagainst the complemental wedge die pieces 85 and 86, which are movable upwardly and downwardly along these convergent sides. As is shown in the drawings each of these die pieces 85 and 86 is of a substantially rectangular shape, the outer surface 98 of the same being suitably shaped and recessed to receive the irregularities at the inner face of one of the shoe rails 40 or 41, as the case may be, so that when the die pieces 85 and 86 are wedged apart the bosses, irregularities and the like which have been previously formed on the inner faces of the rails 40 and 41 will not be mis-shaped and distorted. It is of particular importance to note that the die pieces 85 and 86 are provided with slots 100 which are disposed vertically in the die faces thereof, opening at the lower edges thereof and adapted to receive the bosses 42 of the forging G. Furthermore, the lower edge of the die piece is grooved at 101 to receive the grouter rib of the shoe, and a semi-circular depression 102 is also disposed in the lower face of each of the complemental die parts 85 and 86 for the purpose of accommodating the adjacent grouter bolt boss 54 of the forging. The general plane of the face of the die parts 85 and 86 which engage the forging rail are parallel to the line of movement of the press platen 82. The opposite face of each die part slopes at an acute angle to the vertical and is provided with a pair of guide lugs 103 which have slots 104, receiving therein attaching bolts 105 which are supported upon the wedge block 96. The slots 104 are arranged in a plane at an acute angle to the line of travel of the press platen on which the complemental die pieces 85 and 86 are mounted, for the purpose of permitting the said complemental die parts to move apart in wedging relation as the press platen 82 is lowered to engage the said die parts with the forging G. The bolts 105 are of course disposed horizontally for attaching the die parts 85 and 86 in place. The ends of each die part 85 and 86 are grooved at 107 in a plane parallel with the inner faces of the respective die parts, and receive guide flanges 108 (see Figure 17) mounted upon the ends of the wedge block 96 for guiding the die parts 85 and 86 in a wedging action.

After placement of the forging G in the channel groove of the stationary die block 80, the filler wings 90 and 91 are swung into place. The press platen 82 is then lowered and the lower surfaces of the complemental die parts 85 and 86 first come into contact with the inner surface of the tread body 32^a of the forging G. As the press platen 82 lowers the wedge block 96 will of course force the die parts 85 and 86 apart, and at their appropriately recessed outer faces they will come into contact with the inner faces of the rails 40 and 41, as is quite apparent. Upon continued downward movement of the press platen 82 the die parts 85 and 86 will obviously be wedged against the side rails of the forging G. Remembering that the latter is still under the original forging heat, it will be apparent that the side rails of the forging G will be pressed between the complemental die parts 85 and 86 and the adjacent side walls of the stationary die block 80. This pressing action straightens the side rails of the forging G into parallelism, and into accurately spaced relation according to the predetermined gauge desired. It is to be noted that the lower faces of the die parts 85 and 86 will cooperate to flatten the tread body 32^a of the forging into a body whose plane is at exact right angles with respect to the now parallel side rails 40 and 41. It should be remembered that the distance between the outer side of the tread body of the forging and the roller engaging surfaces and edges of the rails 40 and 41 should be a predetermined distance which may not vary greatly. To this end, as the press platen 82 lowers to its final position the horizontal shoulders 110 at opposite sides of the wedge block, and which lie normal to the line of movement of the press platen 82, will move into engagement with the top edges, which are the roller engaging surfaces, of the side rail portions 40 and 41 of the forging, and thereafter the lower edge 111 at one or both ends of the wedge block 96 will engage the bottom surface of the stationary die block 80, at points beyond the forging G. The position is shown in Figure 16 of the drawings, and the association of the die blocks of the upper and lower press platens insure that the forging in this position has been accurately sized. In the sizing step the rails are pushed apart into parallelism; the roller track surface of the side rails is leveled off relative to the body or tread surface of the forging; the track or tread surface of the forging is flattened, leveled off and properly straightened; and the distance between the grouter bolt receiving bosses 54 of the forging is properly arranged.

The forging after removal from the stationary bed block 80 is in the shape shown in Figures 20 to 22 inclusive. Openings are then drilled or otherwise placed centrally through the various bosses and lugs 42, 44 and 54, and the track links or shoes K are then assembled. In assemblage the reduced male ends of the rails of the links K are slipped into place between the wider ends of the side rails of an adjacent shoe, until the openings 44^a of the lugs 44 align with the openings 42^a of the lugs or bosses 42 of the adjacent shoe, and the ends of pivot pins 115 are then properly secured upon the shoes K; spacing and sprocket wheel engaging sleeves 116 preferably being disposed over the pivot pins between the rails of the shoes to receive wear incident to sprocket wheel engagement, and for additional reinforcement purposes. It should be noted that the openings 42^a are bored slightly larger in diameter than the openings 44^a to receive the ends of the sleeves 116, as shown in Figure 22.

Referring to the modified form of invention shown in Figure 23, the forging L is die stamped initially to provide a central U-shaped tread portion 120, with laterally extending flanges 121 and 122 which are forged in the same plane.

The bosses 123 on these rails, as well as the rails themselves are punched out during the die stamping operation, to provide opposed depressions 124 and 125 separated by a thin body of metal which is of such nature that it may be readily punched, drilled, or removed to provide the pivot pin receiving openings of the finished shoe. Of course the forging L is treated in subsequent steps the same as the forging E above described, to complete the traction shoe or link. It should be noted that in providing the forging L the rails are forged in the same plane and the dies suitably shaped to substantially complete the pivot pin receiving openings through the rails.

In the practice of the method of forming the improved tractor shoe K the rough stock slug is of course heated to a proper forging temperature and under this original heat the breaking down step to provide the forging blank D; the forging of the article E; the bending to provide the roughly shaped shoe forging G, and the subsequent sizing operation in the press H to provide the shoe link K are all effected under the original forging heat. Of course trimming of the "flash" may be effected after the die stamping operation to provide the forged article E.

While it is to be noted that the body portion 32 of the forging E need not necessarily be of the U-shape shown, since it may be V-shaped or even forged flat with the side rails, yet the U-shaped forging of this body portion will produce the most effective article. In case the body or tread of the forging were initially forged flat with the side rails, the subsequent bending of the latter into right angled relation with the body portion would tend to weaken and place the juncture of the rails with the tread body under internal strains, which would result in easier fracture at these locations. It will be apparent from Figure 6 of the drawings that due to removing of excess metal from the rails by stamping out the openings 46 it would be practically impossible to bend the rails into right angled relation with the tread body using any other shape of forging than that shown in Figure 7. It would be possible, however, to forge the body 32 in a V-shape.

If desired, the grouter receiving bead 39 and the groove on the tread body of the forging may be omitted, and correspondingly the V-shaped bead on the roller of the bending press F may be omitted. Indeed it is possible to omit the roller 71 entirely; it being entirely possible that the body 32 of the forging E and the rail flanges 40 and 41 can be operated upon by a toggle mechanism which will force the rails 40 and 41 into substantial parallelism to produce the rough shoe forging G.

In Figure 20 is shown the centralized relation of the grouter bolt openings and bosses with respect to the center line of the track surface of the shoe whereon the supporting rollers of the traction mechanism ride. This relation of details is important for reasons above mentioned.

So far as permitted by the scope of the claims it is entirely within my contemplation to initially forge the shoe flat and subsequently bend the rail portions normal to the tread portion and straighten and size the parts in one operation.

In connection with forging the U-shaped body 32 so far as concerns the dies A and B, the U-shape has been found to be relatively easy on dies and it is easier to break or wash away the sinking as well as and in addition to the above advantages. The advantages in reducing the blank from the slug C to the thin middle section type of blank D include those of lessening the number of blows necessary in starting the forging between the dies A and B, thus saving dies; the metal is saved by reducing the section which would have to be trimmed if the forging were not made in the manner described; and the metal of the slug is at the place required, since the thickness of the metal through the shoe rails is greater than the thickness of the metal in the tread body. In the placement of the blank D between the dies A and B, the plane side of the blank D faces the female die C, to prevent cold shuts arising.

Various changes in the shape of the improved shoe, and in the size and arrangement of tools and dies may be made to the forms of invention herein shown and described, without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a machine for substantially the purpose described the combination of a bed having relatively spaced facing side walls adapted to receive thereagainst an article to be sized, a movable platen above the bed having a depending wedge block, complemental die parts movably carried by the wedge block in a position to be lowered between the spaced walls of the bed, means to limit the lowered movement of the complemental die parts as they are lowered upon the bed to permit their lateral wedging movement toward the side walls of the bed upon further lowering of the wedging block, and filler pieces movably carried by the bed in cooperative filler association with the article to be straightened between the walls of the stationary bed and said complemental die pieces.

2. In a machine for forming a forging having a base and two side walls, a table upon which the forging is to be supported, a bolster movable toward and away from said table, a pair of dies carried by said bolster adapted to take position within the side walls of the forging, the adjacent faces of said dies being inclined upwardly and outwardly, a wedge carried by said bolster adapted to engage the inclined faces of said inner dies, means for producing relative vertical movement between said wedge and said dies, whereby the movement of the bolster toward the table forces the dies outwardly after they engage the base of the forging, and abutments for the outer sides of the forging against which the forging side walls are pressed by the horizontally moving dies.

3. In a machine for forming a forging having relatively spaced side walls and a connecting portion, a bed adapted to receive the connecting portion mounted thereon with the spaced side walls thereof outstanding therefrom, a movable platen movable towards and away from the bed having a wedge block thereon, and a pair of complementary die parts adapted to be positioned in the space between said side walls of the forging and being spaced for receiving the wedge block therein whereby upon movement of the platen towards the bed the wedge block will move said complementary die parts away from each other into forming engagement with the inner faces of the side walls of said forging.

4. In a machine for forming a forging having

relatively spaced side walls and a connecting portion, a bed adapted to receive the connecting portion mounted thereon with the spaced side walls thereof outstanding therefrom, a movable platen movable towards and away from the bed having a wedge block thereon, a pair of complementary die parts adapted to be positioned in the space between said side walls of the forging and being spaced for receiving the wedge block therein whereby upon movement of the platen towards the bed the wedge block will move said complementary die parts away from each other into forming engagement with the inner faces of the side walls of said forging, and outer die parts at the outer sides of the rails of the forging for forming engagement with the said outer sides of said side walls as the first mentioned complementary die parts are moved into forming engagement against the inner sides of said side walls.

5. In a machine for forming a forging which consists of a base and spaced side walls, said side walls having irregularly formed protuberances and depressions on the inner and outer surfaces thereof, the combination of a bed upon which the base of the forging is mounted with the side walls outstanding from the base, a pair of complementary die parts adapted to be positioned in the space between said side walls of the forging, a platen, and means carried by the platen to move said die parts into forming engagement with the inner surfaces of said side walls.

6. In a machine for forming a forging which consists of a base and spaced side walls, said side walls having irregularly formed protuberances and depressions on the inner and outer surfaces thereof, the combination of a bed upon which the base of the forging is mounted with the side walls outstanding from the base, a pair of complementary die parts adapted to be positioned in the space between said side walls of the forging, a platen, means carried by the platen to move said die parts into forming engagement with the inner surfaces of said side walls, and outer die parts at the outer sides of the side walls adapted for forming engagement with the said outer sides of the side walls as the first mentioned complementary die parts are moved into forming engagement with the inner surfaces of said side walls.

7. In a machine for forming a forged track shoe having a base and two side rails wherein the side rails are provided on their inner and outer surfaces with protuberances and depressions, side die walls adapted to fit against the outer sides of the rail portions of the track shoe including movable portions, said die walls being shaped to fit the protuberances and depressions of the outer sides of said rails, inner die members shaped to form fit with the protuberances and depressions at the inner sides of said rails, and means for moving said inner die members into form fitting sizing engaging relation with the inner sides of said rails and forcing the rails against the first mentioned die walls.

8. In apparatus for forging track shoes which have base portions and transversely extending relative spaced rails, the latter being provided with flanges, protuberances and depressions on both the inner and outer sides thereof, the combination of relatively spaced shaping dies formed on the facing surfaces to receive the outer sides of the rail portions of the track shoe in a form fitting engagement therewith, filler pieces complementary to said dies movable into and out of forming engagement with the outer surfaces of said rails, and relatively expansible and contractible inner dies shaped in conforming relation to the contour of the inner sides of said rails, and means for expanding and contracting said inner dies into and out of engaging relation with the inner sides of said rails.

9. Apparatus for the forging of channel-shaped track shoes and the like which include relatively spaced rails, the combination of a supporting wedge block having opposed relatively convergent walls, movable die parts for said relatively convergent walls having means directly mounting them upon said walls and movable therealong into relative expanding and contracting relation, said die parts on the forging surfaces thereof being recessed in a form-fitting sizing and forging relation in accordance with the shape of the surfaces of the track shoe rail to be forged and sized thereby.

10. In a machine for forming a forging which consists of a base and spaced side rails, said side rails having irregularly formed protuberances and depressions on the inner and outer surfaces thereof, the combination of a pair of complementary die parts adapted to be positioned at the outer sides of said spaced side rails of the forging and being shaped to form fit the outer surfaces of said side rails, a pair of complementary die parts adapted to be positioned in the space between the side rails and likewise shaped to form fit the inner surfaces of said side rails, and means for expanding and contracting the said last mentioned die parts into a sizing and gauging relation with respect to said side rails and first mentioned die parts.

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