March 23, 1948. C. E. SWENSON 2,438,424

METHOD OF FABRICATING TRACK LAYING VEHICLE SHOES

Filed May 18, 1944

Fig. 1

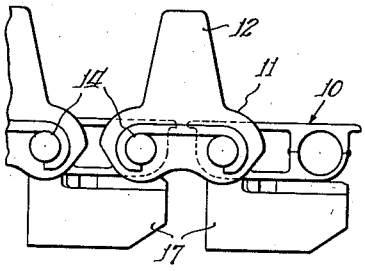


Fig. 2

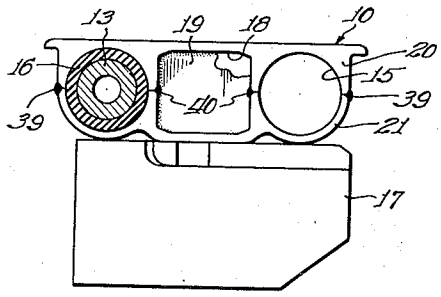


Fig. 3

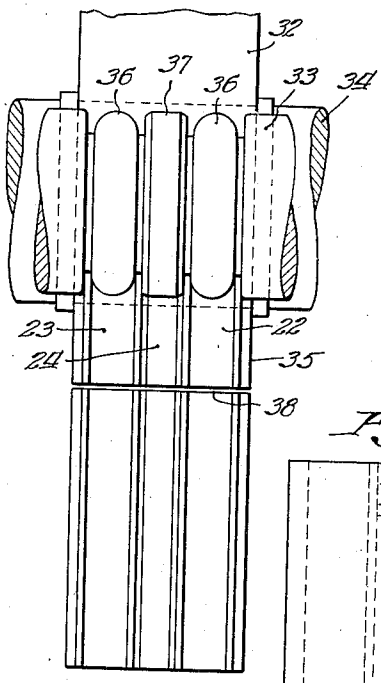


Fig. 4

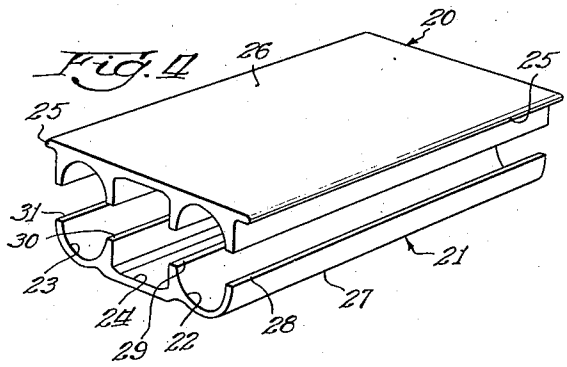


Fig. 6

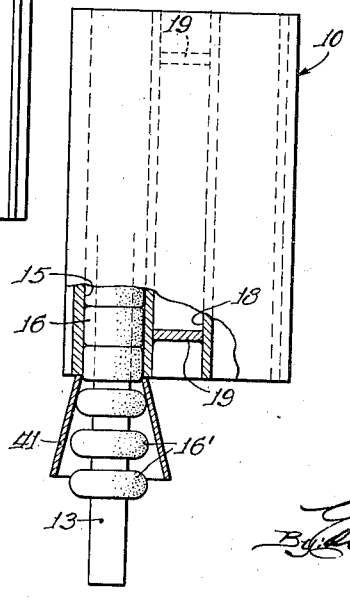
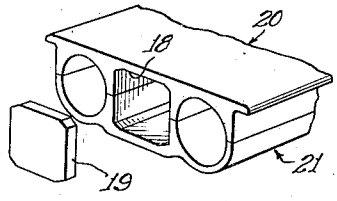


Fig. 5



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METHOD OF FABRICATING TRACK LAYING VEHICLE SHOES

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3 Claims. (Cl. 29—148.3)

1

My invention relates to track shoes for track laying vehicles, such as military tanks and crawler-type tractors, and my invention relates also to a method for making such track shoes.

It is an object of my invention to provide an improved track shoe and an improved method of making the same which are such that a minimum amount of metal and a minimum time are required for making the shoe whereby the shoe may be economically manufactured. It is another object of the invention to provide an improved shoe construction which is light but yet is strong.

The invention consists of the novel constructions, arrangements and devices and of the novel methods and processes to be hereinafter described and claimed for carrying out the above stated objects and such other objects as will appear from the following description of a certain preferrd embodiment of track shoe and a certain preferred method for making such embodiment which are described with reference to the accompanying drawing, wherein:

Fig. 1 is a side elevation of a portion of a tank track embodying the principles of the invention;

Fig. 2 is a side elevation on an enlarged scale, partially in section, of a tank track shoe constituting a part of the track illustrated in Fig. 1 and embodying the principles of the invention;

Fig. 3 is a plan view of rolling mechanism for rolling out strips of metal used in making parts of the track shoe, as will be hereinafter described;

Fig. 4 is an exploded perspective view of the two halves of the track shoe;

Fig. 5 is an exploded perspective view of the shoe in an intermediate stage of manufacture; and

Fig. 6 is a plan view illustrating a method of assembling a trunnion pin in the shoe.

Like characters of reference designate like parts in the several views.

As an example of one form which my invention may take, there is illustrated in the drawing and particularly in Fig. 1 thereof, a track for military tanks or crawler-type tractors comprising a plurality of track shoes 10 which are pivotally connected together by means of connector links 11. The track is adapted to travel around sprockets and guide pulleys (not shown) of a tank or tractor, in accordance with the well

2

known use of such track, and each of the connector links 11 is provided with a guide portion 12 for holding the track against lateral displacement with respect to the sprockets and guide pulleys. Each shoe has a pair of trunnion or pintle pins 13 extending transversely therethrough, one at either end of the shoe, and these pins project beyond both sides of the shoe to form trunnions 14 which are secured in the respective ends of the connector links 11. The pins 13 are mounted in cylindrical bores 15 (see Fig. 2) in the shoes 10 through the medium of sleeves 16 of soft rubber under compression, and the sleeves 16 permit the pins 13 a limited amount of movement within the bores in order to better allow the track to wind around the sprockets and guide pulleys (not shown) with which it cooperates. Each of the shoes 10 is provided with a cleat or grouser 17 which is welded to the shoe, and the grousers 17 on the track shoes function, as is apparent, to provide greater traction between the tracks and the ground or greater traction of the tracks with respect to the water if the tracks are used on an amphibian vehicle such as is, for example, shown in the co-pending application of Benjamin A. Swennes, Serial No. 508,304, filed October 30, 1943. Each shoe 10 is preferably provided with a central shoe lightening bore 18 therethrough, and a cap 19 is fixed in each end of the bore for sealing it.

At present it is the practice to construct a shoe of this general type in the form of an integral forging. Because of the great width of the shoe, it has not been possible to form the bores 15 in the forging operation, even in rough form. The practice, therefore, is to form the bores by drilling entirely through the shoe from one side to the other. In doing so, about forty per cent of the metal content of each shoe is removed, and this boring operation has proved to be very difficult, laborious and time consuming. Because of the great length of the bores, the likelihood of error in the drilling operation becomes progressively greater the deeper the bore becomes. The forged metal used in the shoe is very tough in order to resist wear in operation, and this increases the difficulty of the boring operation. However, the most undesirable characteristic of this method of forming the shoes is the time consumed in the machining operation. In view

of the military use to which these shoes may be put and the demand for speed in producing the track, it is extremely important that the amount of time consumed in machining the shoes be reduced if possible.

The present invention effects a very substantial saving in the processing time, which may amount to more than fifty per cent of the time required in the finishing of the forged shoes, and also effects a very substantial saving in material, which may run as high as forty per cent. In its latter aspect, the invention proposes to form the trunnion bores in such a manner that finishing of the trunnion bores is not necessary, so that the weight of the shoe in finished form is substantially the same as the weight of the shoe before finishing, whereas under the present method, the rough blanks in the average shoe weigh about thirty-eight pounds as against twenty-four pounds in the finished shoe.

In accordance with the invention, the shoe is built up from two different pieces of material, namely, an upper half 20 and a lower half 21 each of which extends transversely of the track shoe and is uniform in cross-section throughout its length. Each of the sections 20 and 21 is formed with a pair of spaced parallel semi-circular channels 22 and 23 and with a generally rectangular channel 24 between the channels 22 and 23. The shoe halves 20 and 21 are identical with the exception that the half 20 is preferably provided with ribs 25 on the front and rear ends of the shoe and the half 20 has a substantially flat outer face 26 while the outer face 27 of the half 21 need not be absolutely flat. The channels 22, 23 and 24 in each of the shoe sections are defined by wall portions 28, 29, 30 and 31, and the wall portions of the two shoe sections are in abutting relationship in the completed shoe so that the channels 22 and 23 form the trunnion bores 15 and the channels 24 form the central bore 18 in the shoe.

Each of the halves 20 and 21 may be formed by a rolling operation in a steel mill. The rolling operation is illustrated in Fig. 3, the billet of steel, indicated at 32, being passed between a pair of rollers 33 and 34 to produce a rolled metal strip 35. The roll 33 is provided with appropriately shaped ridges 36 and 37 thereon for forming the channels 22, 23 and 24 in the rolled strip 35. It will be apparent that the strip 35, which is uniform in cross-section after the rolling operation, may also, if desired, be formed by extruding the metal through appropriately shaped dies (not shown).

After the rolling operation has been completed, the rolled strip 35 is severed as at 36 into the individual shoe halves 20 or 21, as the case may be. This is done by a sawing operation which may take place either while the rolled strip is still in a hot and relatively soft stage or after it has cooled. Prior to the asembly of the shoe halves together, their walled portions 28, 29, 30 and 31 may be machined on their edges, if necessary, so that there may be a close abutting fit of the wall portions of the two halves together. The two halves are put in assembled relationship as shown in Fig. 5, and the halves are welded together at their edges, as at 39, to form a unitary piece. It is obvious, of course, that the strips 20 and 21 could be welded together prior to the severing operation, but it is preferred to perform the welding operation after severing the strips into shoe lengths. The plugs 19 are then inserted into the central bores 18, and the plugs are welded about their edges to the surrounding parts of the shoe halves. The grouser 17 may then be welded in

place. The two shoe halves are also preferably welded together within the central bore 18 between the plugs 19 and the sides of the shoe, as at 40.

In the completed shoe, the welding 39 functions to hold the shoe halves together at the front and rear ends of the shoe, and the plugs 19 and the welding 40 function to hold the shoe halves together in the central region of the shoe. The plugs 19 have the added function of excluding water or dirt from the interior of the central bore 18.

It is impracticable to form a forged shoe having an opening corresponding to the opening 18 therein, with the thickness of the bridging walls 29 and 30 separating such space from the bores 15 being reduced to a minimum throughout the length thereof. In the present invention wherein this space is formed by providing corresponding channels in the separate halves of the shoe, the bridging walls may be made of uniformly minimum thickness, and thereby the weight of the shoe may be brought to a minimum in proportion to its strength.

The trunnion pins 13 together with the sleeves 16 of rubber may be positioned in the bores 15 with use of a funnel-like member 41. A trunnion pin 13 with rings 16' of soft rubber bonded thereto in spaced relation are forced through the funnel-like member 41 into the respective trunnion bores 15. The funnel-like member 41 functions to compress the rings 16' into a functionally continuous sleeve 16 of soft rubber under high compression which yieldingly mounts the trunnion pins within the bores 15 while completely filling the space within the bores so as to exclude destructive grit and eliminate wear in the moving parts.

I wish it to be understood that my invention is not to be limited to the specific constructions and arrangemens or to the specific methods of making such constructions and arrangements which are shown and described, except only insofar as the claims may be so limited, as it will be apparent to those skilled in the art that changes may be made without departing from the principles of the invention.

I claim:

1. The method of fabricating a track laying vehicle shoe having a pair of spaced parallel transversely extending pintle bores therein, comprising the method steps of rolling masses of metal to form elongated strips each of which in cross-section is uniform and corresponds to the side elevation of a half of the shoe divided on a plane bisecting the pintle bores and each of which has a pair of spaced longitudinally extending channels each corresponding to half the pintle bore, severing the rolled strips transversely to form complementary halves of the shoe, machining the matching edges of each shoe to form a close fitting edge, and securing the shoe halves together on those edges to form a finished shoe with the channels in the shoe halves extending transversely of the shoe and cooperating to form the bores of the shoe.

2. The method of fabricating a track laying vehicle shoe having a pair of spaced parallel substantially cylindrical pintle bores extending transversely therethrough comprising the method steps of forming metal strips which are uniform in cross-section throughout their lengths and have longitudinally extending channels therein by passing the metal between opposite metal working surfaces which have appropriate shapes

to form channels, smoothing the channel edges to form close abutting fit with a matching strip, securing the matching strips together on those edges, and severing said assembled strips transversely to form the shoes.

3. The method of fabricating a track laying vehicle shoe having a pair of spaced parallel pintle bores therein, comprising the method steps of forming metal strips which in cross-section are uniform throughout their lengths and correspond to side elevations of halves of the shoe divided along a plane bisecting the pintle bores, severing the strips transversely to form the shoe halves, smoothing the matching surfaces of each half to form close abutting surfaces, and welding the halves together on those matching surfaces to form the track shoe.

CARL E. SWENSON.

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