May 22, 1934. H. J. STEIN 1,959,744

METHOD OF MAKING TRACK LINKS

Filed Nov. 23, 1931 4 Sheets-Sheet 1

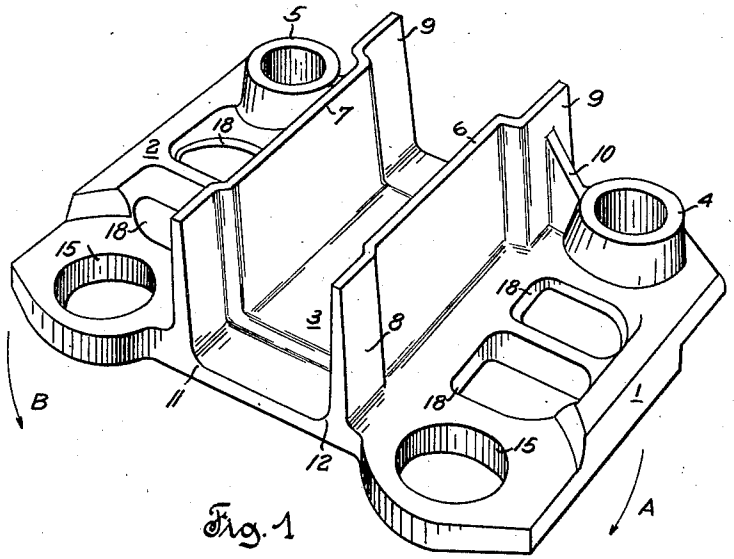


Fig. 1

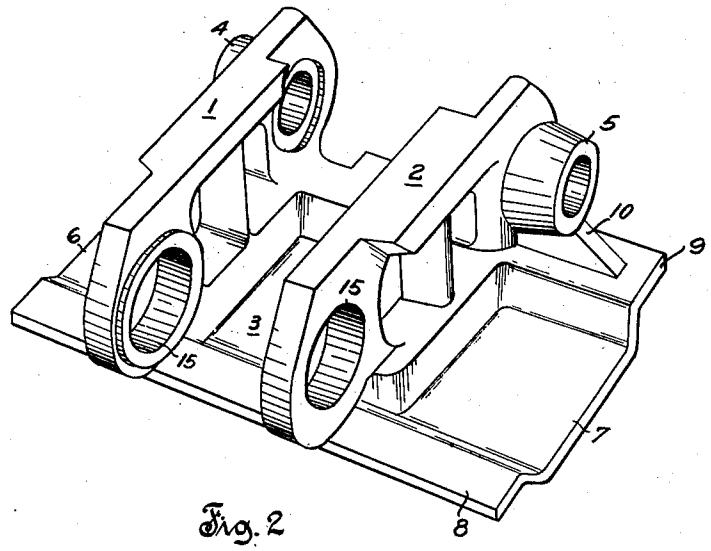


Fig. 2

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May 22, 1934. H. J. STEIN 1,959,744

METHOD OF MAKING TRACK LINKS

Filed Nov. 23, 1931 4 Sheets-Sheet 2

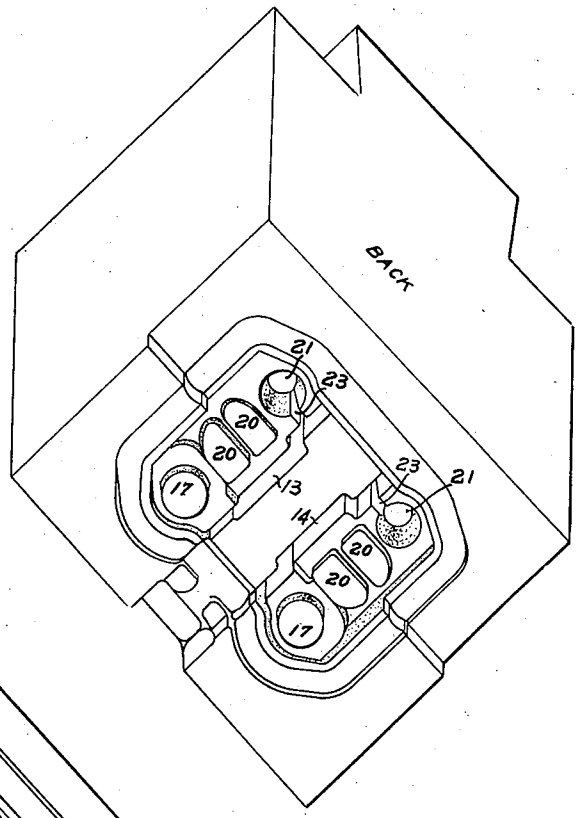


Fig. 4

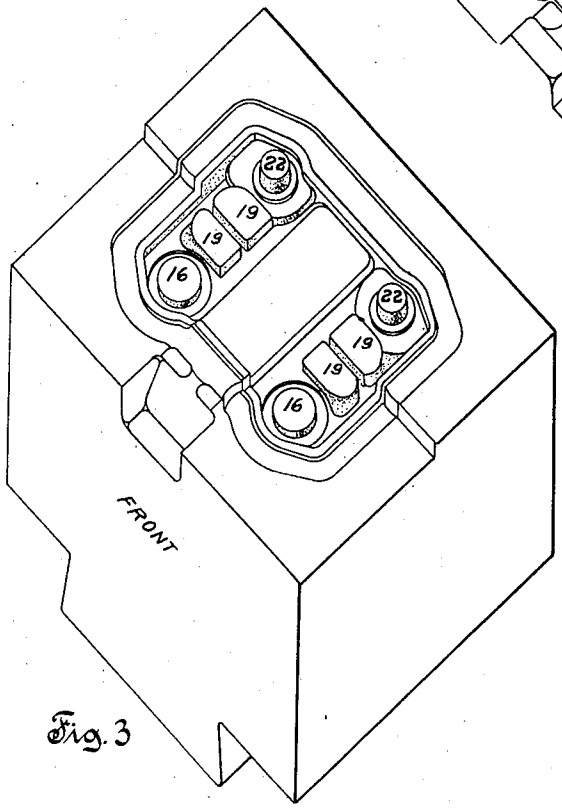


Fig. 3

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May 22, 1934. H. J. STEIN 1,959,744

METHOD OF MAKING TRACK LINKS

Filed Nov. 23, 1931 4 Sheets-Sheet 3

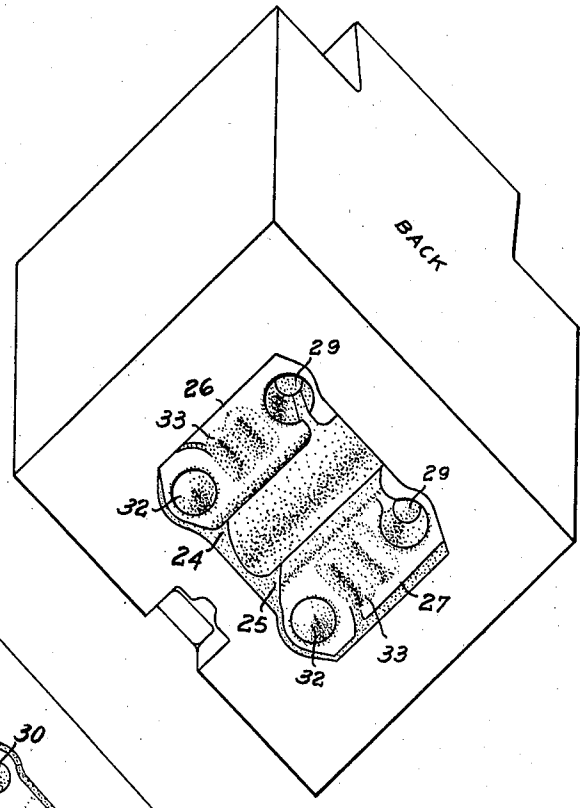


Fig. 6

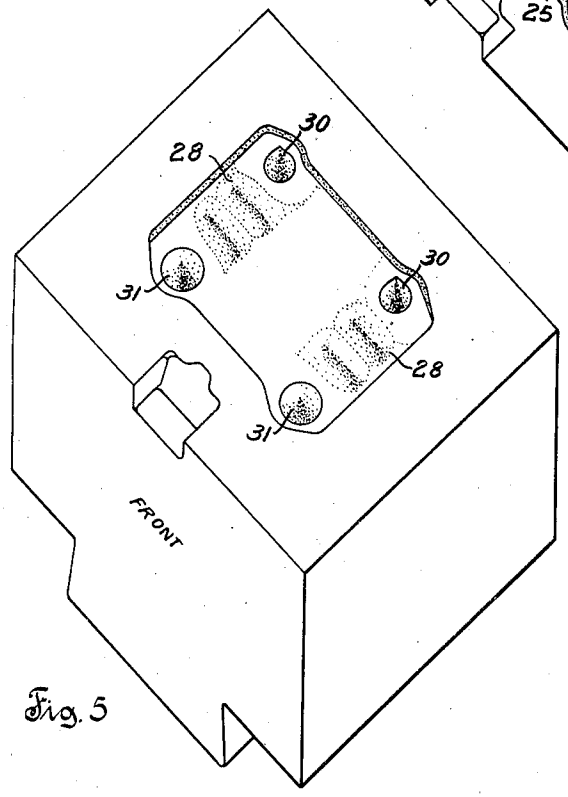


Fig. 5

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May 22, 1934. H. J. STEIN 1,959,744

METHOD OF MAKING TRACK LINKS

Filed Nov. 23, 1931 4 Sheets-Sheet 4

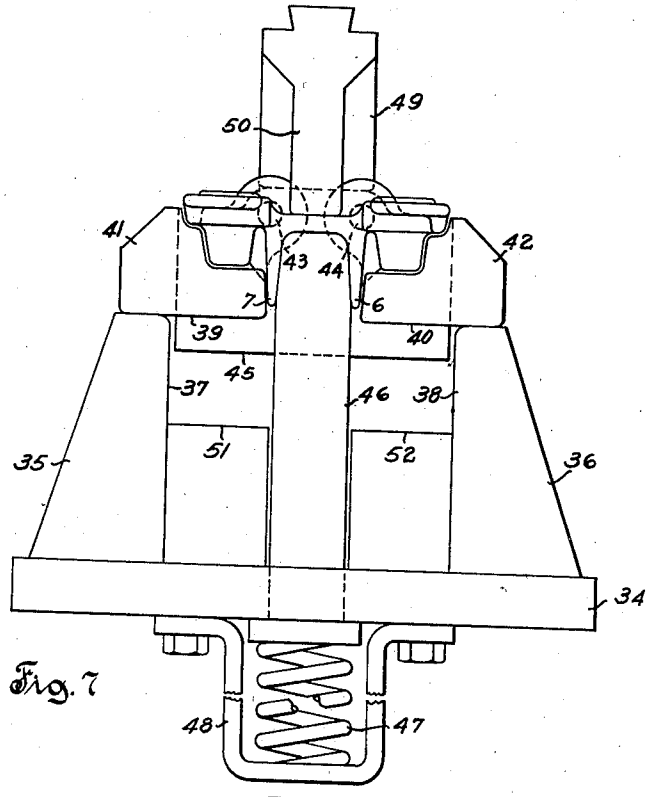


Fig. 7

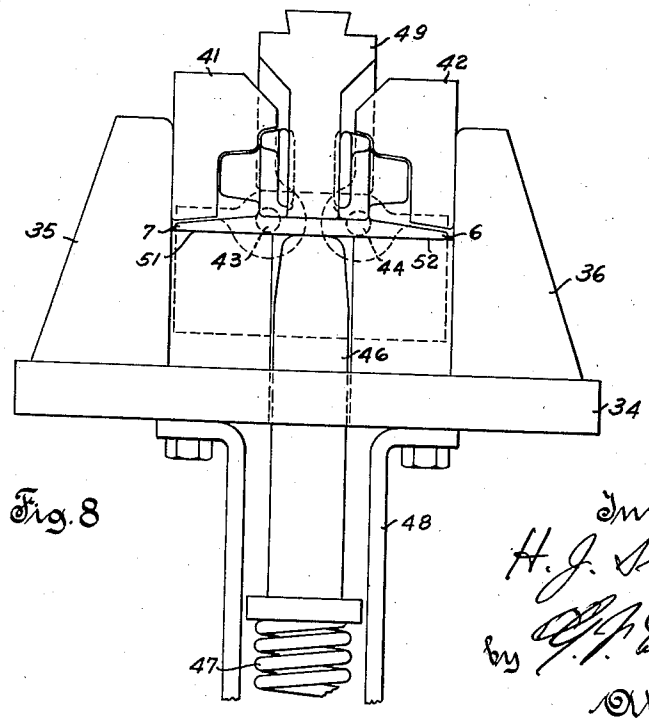


Fig. 8

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UNITED STATES PATENT OFFICE

1,959,744

METHOD OF MAKING TRACK LINKS

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Application November 23, 1931, Serial No. 576,684

3 Claims. (Cl. 29—148)

This invention relates to a method of making track links which are especially applicable to track type tractors.

It is an object of the invention to afford a new method of making track links having rail members of open grid-like construction, integrally formed with a tread portion.

Another object of the invention is to afford a method of making track links which is relatively inexpensive and is well adapted to mass production.

Another object of the invention is to afford a method of making track links which eliminates fitting and bolting of the rail members to the tread member, and which thereby reduces the time and expense of assembling the track belt.

A still further object of the invention is to afford a method of making track links which insures accuracy and strength of the finished track link.

The invention possesses other advantageous features, some of which, with the foregoing, will be set forth at length in the following description where that form of the method according to the invention will be outlined in full, which has been selected for illustration in the drawings accompanying and forming part of the present specification. In said drawings, one form of the method of providing track links embodying the invention has been shown, but it should be understood that it is not desired to limit the invention to such form since it may be embodied in a plurality of forms, as set forth in the claims.

In the drawings:

Figure 1 is a perspective view of a semi-finished track link comprising forged out rail portions and a forged out tread portion;

Figure 2 is a perspective view of a finished track link produced from the semi-finished track link shown in Fig. 1;

Figures 3 and 4 are perspective views of a set of finishing dies, Figure 3 being a view looking down upon the lower die and showing the front thereof, as indicated; and Figure 4 being a view looking up towards the upper die and showing the back thereof as indicated;

Figures 5 and 6 are perspective views similar to Figures 3 and 4, but showing a set of roughing dies;

Figure 7 is a schematic view of an apparatus for bending the semi-finished track link shown in Figure 1;

Figure 8 is a schematic view similar to Figure 7, but showing the bending apparatus in a different operating position.

The method according to the invention preferably comprises providing a pre-shaped blank having roughly developed rail portions and a roughly developed tread portion, forging out said roughly developed rail portions and tread portion into a single piece semi-finished track link having a central tread portion and rail portions extending therefrom in recumbent position, and bending said rail portions about spaced axes parallel to their outer edges so as to bring said rail portions from their recumbent position into an upstanding position relative to said central tread portion.

In the finished track link shown in Fig. 2, the rail portions are indicated generally by the numerals 1 and 2, and the tread member is indicated, generally, by the numeral 3. The rail portions are of open gridlike construction and have attenuated hinge portions at both ends, the hinge portions at one end of the links being provided with pin bosses 4 and 5, respectively. The tread member 3 has lateral wing portions 6 and 7 and has upturned end portions 8 and 9 adapted to form overlapping joints in the assembled track belt. Webs 10 are preferably provided to connect the upturned end portion 9 of the tread member with the pin bosses 4 and 5, respectively.

In producing the track link of the type described, a semi-finished track link as shown in Fig. 1 is formed, according to the invention. This semi-finished track link, as will be noted, comprises the essential elements of the finished track link, that is, it comprises the rail portions 1 and 2 of open, gridlike construction, and the tread member 3 consisting of a central portion and of wing portions 6 and 7. However, the rail portions 1 and 2 occupy a recumbent position and the wing portions 6 and 7 of the tread member 3 do not extend in a substantially common plane with the central portion of the tread member as shown in Figure 2, but they extend upwardly from the central portion of the tread member, forming a substantially square U. In order to produce the finished track link shown in Figure 2, from the semi-finished track link shown in Figure 1, the rail portions 1 and 2 are brought from their recumbent positions to the upstanding positions shown in Figure 2 by bending each of the rail portions about an axis coinciding approximately with the line of intersection between the plane of the adjacent upstanding wing portion 6 or 7, respectively, and the plane of the central, horizontal portion of the tread member. In other words, the rail portions 1 and 2 shown in Figure 1 will be subjected to bending forces acting in the directions of the arrows A and B, re-

spectively, and it will be seen that in carrying out this bending operation the wing portions 6 and 7 will partake in the movement of the rail portions and assume a substantially straightened out position. Additional bending forces may be applied to the wing portions in order to bring them in perfect alignment with the central portion of the tread member 3. The exact location of the axis about which the rail portions and the wing portions will have to be bent may be determined by trial, so as to bring these parts in a relative position such as shown in Figure 2. Likewise the amount of material and the radius of the curvature 11 and 12, respectively, at the base of the upstanding wing portions shown in Figure 1, may suitably be chosen in such a manner that, after the bending operation, the ground tread side of the tread member is substantially straight in transverse direction.

The recumbent position of the rail portions and the upstanding position of the wing portions shown in Figure 1 permit the use of forging dies in producing the semi-finished track link. The dies shown in Figures 3 to 5 are adapted for this purpose. Figures 3 and 4 show a set of finishing dies, and it will be seen that the upstanding wing portions are formed in deep pockets 13 and 14 of the upper die, shaped in accordance with the desired form of the wing portions. The rail portions and the central portion of the tread member are formed in correspondingly shaped portions of the upper and lower dies. The large circular holes 15 at one end of each rail portion are formed by bosses 16 of the lower die and by corresponding bosses 17 of the upper die, and the oblong apertures 18 are formed by corresponding prominent pads 19 and 20 of the lower and upper dies, respectively. Circular pits 21 in the upper die and projections 22 on the lower die cooperate to form the pin bosses 4 and 5 with holes therein. The circular pits 21 are connected with the pockets 13 and 14, respectively, by grooves 23 which serve to form the webs 10 of the semi-finished track link shown in Figure 1.

The finishing dies shown in Figures 3 and 4 are preferably used to forge out a pre-shaped blank having roughly developed rail portions and roughly developed upstanding wing portions. Such a pre-shaped blank may be produced in different ways. For instance, rolled stock of a suitable cross section may be cut into pieces of suitable length, or, if it is not desired to go into expenses for a special set of rollers for a rolling mill, a suitably pre-shaped blank may be produced from commercial stock by using a set of roughing dies, such as shown in Figures 5 and 6. The upper die shown in Figure 6 has pockets 24 and 25 for pre-shaping the upstanding wing portions 6 and 7 of the semi-finished track link, and adjacent to the pockets 24 and 25 depressions 26 and 27 are formed in the upper die for roughly developing the rail portions 1 and 2 of the semi-finished track link. The bottom side of the blank, which is shaped in the lower die shown in Figure 5, is substantially flat at its center and slightly depressed at the sides by protuberances 28 in order to facilitate forming of the apertures 18 of the rail portions. Similar protuberances 33 are formed on the upper die. The pin bosses 4 and 5 with the holes therein are also roughly developed by circular pits 29 in the upper roughing die and by co-operating conical projections 30 on the lower roughing die. Conical projections 31 on the lower roughing die cooperate with conical projections 32 of the upper roughing die to pre-shape the holes 15 of the rail members.

When the track link is being forged out in the finishing dies flash will be formed at the outer edges of the forging as well as in the apertures and circular holes of the rail members. Removal of such flash may be effected, as is customary in the art, by means of a set of trimming dies, whose construction and operation will be understood by those skilled in the art without further description. Restriking of the forging after removal of the flash will usually be required, which operation will be performed in the finishing dies, as usual.

The apparatus shown in Figures 7 and 8 is particularly adapted for carrying out the bending operation which is required for producing the finished track link shown in Figure 2 from the semi-finished track link shown in Figure 1. A stationary base plate 34, adapted to rest on the stationary part of a hydraulic press or the like, carries a pair of transversely spaced guide blocks 35 and 36 having inner guide surfaces 37 and 38, respectively. Projecting inwardly from the guide surfaces are stops 51 and 52 with horizontal top surfaces whose purpose will be explained later. The edges at the upper ends of the guide surfaces are well rounded and cooperate with straight surfaces 39 and 40 of bending pads 41 and 42, respectively. The bending pads are pivoted at 43 and 44 to end pieces 45, and, in the position shown in Figure 7, they provide a bed into which the semi-finished track link shown in Figure 1 may be placed with the upstanding wing portions pointing downwardly, as shown in Figure 7. A plunger 46 extending through the base plate 34 and upwardly between the guide blocks 35 and 36 is yieldingly supported by a spring 47 which in turn is mounted in a downwardly extending spring bracket 48 bolted to the base plate 34. The plunger 46 has an upper end portion adapted to enter the space between the wing portions 6 and 7 of the semi-finished track link, as shown in Figure 7, and it will be seen that the plunger counteracts to a certain extent the downward movement of a ram 49 engaging the opposite side of the semi-finished track link. The ram has a recessed portion 50 corresponding in width substantially to the width of the space between the upstanding rail portions 1 and 2 shown in Figure 2, while end portions of the ram, having the full width thereof, are adapted to make contact with upper portions of the end pieces 45.

In operation, pressure is applied to the ram 49, and in consequence thereof a bending moment will become effective on the bending pads 41 and 42, the lever arm of the bending moment being substantially equal to the horizontal distance from the axes of the pivots 43 and 44 to the vertical planes of the guide surfaces 37 and 38, respectively. While the ram 49 moves downwardly from its position shown in Figure 7, the bending pads 41 and 42 will swing about the axes of their pivots 43 and 44, respectively, until the surfaces 39 and 40 occupy a vertical position, and the rail portions have been brought from their recumbent position into an upstanding position relative to the central portion of the tread member. The bending movement imparted to the rail portions will also cause the wing portions 6 and 7 to move away from the upper part of the plunger 46 but, after the bending pads 41 and 42 have been turned through an angle of about 90°, the wing portions 6 and 7 may still be somewhat inclined relative to each other and not extend

in a perfectly straight direction from the central portion of the tread member which position they are supposed to occupy in the finished track link as shown in Figure 2. In order to bring the wing portions of the tread member in alinement with the central portion thereof, the ram 49 is moved downwardly until the wing portions are seated on the horizontal surfaces of the stops 51 and 52, as shown in Figure 8. During the downward movement of the ram 49, the surfaces 39 and 40 of the bending pads will slide along the guide surfaces 37 and 38, respectively, and the plunger 46 will be forced into a retreated position against the pressure of the spring 47.

It is claimed and desired to secure by Letters Patent:

1. The method of making track links which includes the following steps: providing a pre-shaped blank having roughly developed rail portions and a roughly developed tread portion, forging out said roughly developed rail portions and tread portion into a single piece semi-finished track link having a distorted tread plate portion forming a substantially square U, and rail portions extending in opposite directions from the bottom of the U at substantially right angles to the upstanding legs thereof, bending said rail portions into parallel planes at right angles to the bottom of the U, and alining the legs of the U with said bottom thereof.

2. The method of making track links which includes the following steps: providing a pre-shaped blank having roughly developed rail portions and a roughly developed tread portion, forging out said roughly developed rail portions and tread portion into a single piece semi-finished track link having a central tread plate portion, marginal rail portions and upstanding wings corresponding in shape to marginal tread portions of the finished track link, and bending said upstanding wings and marginal rail portions about spaced axes parallel to the outer edges of said rail portions so as to bring said upstanding wings into the plane of said central tread plate portion, and said rail portions into parallel planes at right angles to the plane of said central tread portion.

3. The method of making a one-piece forged track link having transversely spaced rail portions, an intervening tread portion connecting said rail portions, and marginal tread portions of substantial widths laterally of said rail portions, which method comprises forging a blank having transversely spaced side portions with upper and lower surfaces corresponding to the side surfaces of said rail portions, a central portion connecting said side portions and having upper and lower surface portions corresponding to upper and lower surface portions of said intervening tread portion, and wing portions rising from said side portions at the junctures of the latter with said central portion, said wing portions corresponding to said marginal tread portions, and subsequently causing said side portions, central portion and wing portions to assume their ultimate relationship in which said central portion and said wing portions extend in a substantially common plane and said side portions extend upwardly from said plane.

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