(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 040 533**
A2

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **81302188.8**

(22) Date of filing: **18.05.81**

(51) Int. Cl.³: **E 01 B 7/00**
E 01 B 7/20

(30) Priority: **19.05.80 ZA 802969**
19.05.80 ZA 802971

(43) Date of publication of application:
25.11.81 Bulletin 81/47

(84) Designated Contracting States:
AT BE CH DE FR GB IT LI NL

(71) Applicant: **Csontos, Imre**
432, Essenwood Road
Durban 4001 Natal(ZA)

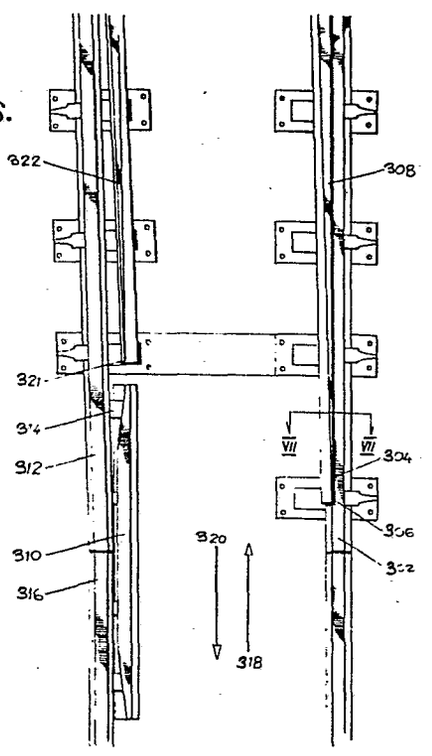
(72) Inventor: **Csontos, Imre**
432, Essenwood Road
Durban 4001 Natal(ZA)

(74) Representative: **Walter, Douglas Ernest et al,**
HASELTINE LAKE & CO. Hazlitt House 28 Southampton Buildings Chancery Lane
London WC2A 1AT(GB)

(54) **Railway turnouts.**

(57) The invention provides a railway turnout including, singly or in combination, a crossing with wing rail inserts to raise the running surfaces of the wing rails in the region of the nose in the crossing, and a guard rail adjacent a shortened standard switch blade, the point of the curved switch blade being positioned opposite the guard rail so that the wheel flanges of car wheels traversing the turnout, are drawn away from the point by the guard rail.

Fig. 6.



EP 0 040 533 A2

0040533

RAILWAY TURNOUTS

This invention relates to railway turnouts.

In prior art turnouts the point of the semi-curved switch blade is merely switched to a position closely adjacent the stock rail when in the turnout position. The point is machined down to a narrow taper to allow the flange of the wheel to enter the turnout. It will be appreciated that the point cannot be machined down completely as a certain amount of metal has to remain to provide the strength required to absorb the lateral thrust applied to the point. The remaining metal results in a ridge standing proud of the stock rail when the switch blade is in the turnout position, and it will be evident that this ridge will wear down quite rapidly.

Furthermore, in railway turnouts the wing rails are normally laid with a constant elevation while the point rail nose is provided with a reverse slope from a point lower than the plane of the wing rail. The car wheels are coned and in running across the crossing, encounter a position on the wing rail where the wing rail deviates from the direction of travel of the wheel or gauge line at the throat of the flangeway of the crossing rail.

The wheel drops as the point of contact between the rail and

the wheel moves outwardly on the conical wheel tread in dropping it encounters the nose, rides up the reverse slope and proceeds at the proper elevation, hammering the nose in the process.

It is an object of this invention to provide a solution to this problem by providing a raised wing rail.

It is a further object of the invention to provide a turnout which overcomes the first mentioned problem by providing a guard rail arrangement.

In this specification the term"first stock rail"will be used to denote the stock rail directly adjacent the curved switch blade, i.e. the main line rail while the term "second stock rail" will denote the stock rail directly adjacent the standard straight blade, i.e. the siding rail.

According to the invention a railway turnout includes a guard rail located adjacent the second stock rail in such a manner that the wheel flanges of wheels moving between the second stock rail and the guard rail are drawn towards the second stock rail thereby drawing the wheel flanges of the wheels moving over the first stock rail away from the stock rail, the guard rail being located opposite the point of the curved switch blade.

The curved switch blade is preferably longer than the standard switch blade.

In a developed form of the invention the first stock rail is formed with a recess adapted to receive the point of the curved switch blade at least partially. The guard rail may be used with or without the recessed first stock rail. The invention includes a method of making a turnout which comprises the steps of forming a recess adapted to receive the curved switch blade in the first stock rail and arranging the point of the curved switch blade to be received in the recess when the latter is in the turnout position.

The method may include the additional steps of forming a recess by cutting the flanges and the head of the stock rail in a single plane cutting operation, the base and head being cut simultaneously, and the mating face of the switch blade being plane cut to fit complementally against the stock rail.

Rail road frogs using raised wing rails have been proposed by Keough in US patent no. 1,389,144 and Carruthers, US patent no. 2,012,807. Keough suggest that the wing rail be raised or that the point be lowered to prevent the wheel striking the point and breaking it down. The raised wing rail is sketchilly

described, but it appears merely to provide a ramp to lift the car wheels over the point of the nose, the frog depending more on a narrow flangeway to force the wheel tread on to the nose tread surface. Keough also proposes a deep wide throat which will tend to offset the advantage gained by the raised wing rail.

Carruthers uses a frog in which the point is inclined above the plane of the stock rail tread surfaces, as are the wing rails. The height above the plane of the stock rails being determined by the expected ultimate displacement of surface metal as a result of cold flow thereof in an endeavour to obtain, once the metal has stabilised the proper elevation on the point rail in particular. The tread surface of the wing rails are horizontal with the result that a car wheel, in transferring from the wing rail to the nose, will place a substantially point load on the inner edge of the wing rail, notwithstanding that the wing rail is raised.

The invention therefor provides a railway turnout comprising two wing rails and a point which includes a nose, the running surface of which is substantially co-planar with the running surfaces of the rail of the turnout, the wing of the rails being provided with tread surfaces inclined upwardly above the plane of the running surfaces, the incline of the wing rails extending longitudinally along the wing rails towards the heels thereof and commencing

at a point corresponding to the point of deviation from the gauge line, of the wing rail, the tread surface adjacent the gauge line, at an angle corresponding to the shape of the average worn car wheel, the angles of the incline and the slope being dependent on the taper on the wheels and on the angle of deflection of the turnout.

According to a further aspect of the invention, the wing rail inclination is provided by a tread surface insert which, in cross section, is provided with the slope described above and which is inclined from the toe to the heel of the crossing.

The cross-sectional shape of the wing rail may be altered by means of additive welding. Only the edge of the wing rail facing the point need be altered.

The insert is preferably of steel hardened to tool steel hardness.

According to yet a further aspect of the invention, the point, in cross section, may be rectangular. It will be appreciated that the rectangular point may be used in conjunction with the rectangular wing rails.

The nose is preferably carried on a frog comprising a main filler adapted to be bolted or otherwise secured between the vertical

webs and base flanges of the wing rails, and a point filler comprising the point and a base, the main filler being formed with a recess adapted to receive the base of the point filler and the point being shaped to abut the severed point rails in use.

In the drawings:

Figure 1 is a diagramatic plan view of a prior art turnout showing the various parts thereof as they relate to the crossing;

Figure 2 is a plan view of the crossing of the turnout of the invention;

Figure 3 is a section on line III-III in Figure 2; and

Figure 4 is a section on line IV-IV in Figure 1.

The invention is further described with reference to the drawings related to the guard rail and switch blades in which:

Figure 5 is a plan view of a prior art right hand turnout showing the component parts thereof as they relate to the switch blades:

Figure 6 is an enlarged plan view of a left hand turnout according to the invention; and

Figure 7 is a section taken at line VII-VII on Figure 2.

The prior art turnout 10 shown in Figure 1 comprises a crossing 24 consisting of a left hand wing rail 12, a right hand wing rail 14, a point or long point rail 16, a splice rail or short point rail 18 and two guard rails 20, 22. The wing rails 12, 14 define a throat 26 for two flangeways 28, 30. The short point rail 18 is slanted and abuts the long point rail 16 which is provided with the point 32. The toes 34, 36 of the wing rails 12, 14 abut the siding rail 38 and the main line rail 40 while the heels 42 are at the runout ends of the wing rail.

The crossing of the invention (denoted generally by the numerical 124) is shown in more detail in Figure 2. The one gauge line 126, shown in chain line, is an imaginary line indicating the path followed by the wheel flange of a car wheel traversing the crossing 124 from left to right. The problem associated with the prior art is well illustrated by following the gauge line 126 from the bottom of the drawing to the top. As the wheel negotiates the gap (B-C), the entrance tc the flangeway 128, the wing rail 112, and therefore the support beneath the wheel, is deviating from the gauge line 126 at a given angle (depending on the angle of deflection of the turnout) and, due to the coning of the wheels, the wheel comes down in elevation. At this point the wheel meets the nose 132, changes direction, on the reverse slope of the prior art point, and continues on its way. The point 133, which is, by nature

of its function, a narrowed tapered piece of metal, is rapidly worn away by the repeated hammer blows.

It is proposed to arrange the wing rails 112, 114, so that they are inclined upwardly from their point of departure from the gauge line 126. This is done by the provision of wing rail inserts 144, 146 which are inclined from the toe to the heel of the wing rails 112, 114 as can be seen from the elevation in Figure 3. In this manner the drop in elevation of the wheel is countered by a corresponding raising of the wheel by the wing rail inserts 142, 136, so that the tyre of the wheel is on a plane with the tread surface of the point 133 at the point of contact. It is anticipated that the lessening of the impact achieved by the raising of the wing rails will prolong the life of the point 133 and nose 132 substantially.

The raising of the wing rail can be clearly seen in Figure 3 where the tread surface of the wing rail 112 is shown to depart from the plane of the other rails in the turnout by an angle ϕ, which will, of course, vary for every turnout angle as well as the angle of taper of the wheel, but is merely a matter of calculation.

The rounded edges of the rail heads reduce the horizontal tread surface of the rail in the crossing 124, the effective point of

first contact between the tread surface of the rail head and the tyre being inwardly of the rail edge and conversely, of the gauge line 126. This means that the contact point between the wing rail 112 and the wheel starts moving away from the flange before the point B and in fact the contact points start deviating at a point A as the wheels traverse the crossing 124. By providing the tread surfaces of the inserts 144, 146, with a rectangular profile or a sharp inner edge, as shown in Figure 4. The distance A-B is added to the running surface of the rail. In a 1 : 9 turnout the added support length is approximately 100mm. The same distance, by the same token is added at the run-off edge of the insert (distance X-Z).

The point 133 is also rectangularly profiled in this manner. The nose 132, is standard, the tapered sides being necessary to prevent a derailment. However, once a point is reached where the wheel is in flangeway, the sides of the nose are angled towards the vertical crowned rectangular profile as shown in Figure 4, thereby adding running surface to the rail in the same manner as is achieved by the profiling of the wing rails 112, 114.

The inserts 144, 146 are keyed and material is removed from the wing reail heads to accept the inserts, the recesses so formed being provided with grooves 148 to accept the keys 150 on the inserts whereby the latter are located on the wing rails and secured by means of bolts.

The inserts 144, 146, instead of having horizontal tread surfaces are sloped upwardly from the inner edges of the wing rails 112 and 114 so that, instead of a point contact between the coned wheel and rail, a line of contact is established. The wheel rim is therefore supported on the whole of the rim surface remaing above the wing rail instead of merely the edge of the wing rail. The slope of the insert is, of course, commensurate with the profile of an average worn wheel.

The point 133 is carried on a frog 152 which may be cast or machined from a block. The frog 152 comprises a base which is carried on the base flanges of the wing rails and abuts the vertical webs. The frog is transversely bolted through the webs of the wing rails and formed with a recess into which the point insert 133, which is provided with a base 154, is adapted to fit. The point insert base is secured into the recess by means of Allen screws.

The heel of the frog 152 and the point insert 133 is slanted and abuts the ends of the long and short point rails 116 and 118 which are slanted to accept the frog and point insert. Once inserted and bolted the frog 152 is therefore securely located in between the wing rails.

Replacement of the wing rail and point inserts is merely a matter of the removal and replacement of a set of bolts and screws, the slanted

ends and keys of the wing rail inserts and the definitive shape of the point insert recess in the frog 152 as well as the slanted heel of the point insert, ensuring the accurate location of the various elements.

In Figure 5 a railway turnout 210 is shown to comprise a first stock rail 212, a second stock rail 214, a curved switch blade 218 and a standard switch blade 216. The operation of the turnout 210 is well known, the movement of the curved switch blade 218 away from the stock rail 212 causing a train to proceed along the main line rail 213, 213a and the removal of the standard switch blade 216 from the second stock rail 214 along with the positioning of the curved switch blade 218 adjacent the first stock rail 212, causing the train to turn out onto the siding rails 215, 215a. The point of the curved switch blade 218, denoted by the number 220, bears the burden of iniating the deflection of the wheels, and understandably, is worn away very rapidly.

In Figure 6 the turnout 310 of the invention is shown, comprising a first stock rail 302 which is formed with a recess 304 therein to receive the point 306 of the curved switch blade 308. A guard rail 310 is provided next to the second stock rail 312. The guard rail 310 is attached to the sleepers in the normal manner and spaced from the stock rail 312 by means of standard cast iron spacer blocks 314. Greasing of the fish plates may present a problem due to the provision of the guard rail 310, but this can be overcome by HUCK

(Trade Mark) bolting of the fish plates in the joint.

When the turnout 300 is in the turnout position, the point 306 of the curved switch blade 308 nestles within the recess 304 where it is out of the way of wheel flanges moving through the turnout 300 from either the trailing - (arrow 318) or facing direction. (arrow 320) The guard rail 310 serves as an additional means of protecting the point 306 by drawing the flanges of the wheels away from the point 306.

It will be appreciated that a recessed stock rail 302 as used here, necessitates the use of the guard rail 310 with the turnout 310 in the open position, that is when a train passing through the turnout 310 goes straight. A train moving out of the turnout 310 in the trailing direction 318 stands the chance of following the recessed gauge line, (the inside line of the track) and hitting the end of the recess 306 with its wheel flanges with derailment as the possible result. The guard rail 310 will prevent the wheels from tracking along the recessed gauge line.

It is self evident that the proposed curved switch blade 306 need not be cut down to as narrow a point as the prior art switch blades with the result that the point is stronger as it has a greater mass of material.

The point of the shortened standard switch blade 312 need not be received in a corresponding recess in the second stock rail 312. When the point of the standard switch blade 312 is laid against the stock rail 312 the car wheels tend to continue in a straight line upon entering the turnout 310. However, the point 321 lies behind the gauge line, the second stock rail 312 being bent away from the straight line path that the wheels tend to follow. The point 321 lies behind the point 321 when they pass it.

The manufacture of the proposed turnout requires less milling operations than the prior art turnouts where up to four different operations or settings on the cutting or milling machine were required. In the section in Figure 7 it can be seen that the material of the stock rail 302 is taken off by plane milling or cutting to provide the recess 304 while the mating face 305 of the switch blade 306 is also plane cut to fit complementally against the switch blade 306 and the remainder provides, in conjunction with the stock rail 302, a running surface equal in width to the rest of the rail 302. The plane cutting operations are obviously less expensive than the intricate milling operations required before.

The guard rail and the switch blades of unequal lengths, in fact, provide the protection for the point of the curved switch blade

and the recess for the point of the curved switch blade is not an absolute necessity.

CLAIMS

1.

A railway turnout including a guard rail adapted for location adjacent a siding rail in the turnout characterised in that the guard rail is located in such a manner that the wheel flanges of car wheels moving moving the siding rail to the extent that the wheel flanges of the car wheels moving over the main line rail are drawn away from the gauge line of the main line rail, the turnout including a curved switch blade and the guard rail being located opposite the point of the curved switch blade.

2.

A turnout according to claim 1 which includes, in addition, a standard switch blade, characterised in that the curved switch blade is longer than the standard switch blade, the guard rail being located adjacent the moveable end of the standard switch blade.

3.

A method of manufacturing a turnout according to claim 1 characterised in that the method comprises the steps of

forming a recess adapted to receive the point of a curved switch blade in a main line rail of the turnout and arranged the point of a curved switch blade to be received in the recess when the curved switch blade is in the turnout position.

4.

A method according to claim 3 characterised by the additional step of forming the recess by cutting the base flanges and head of the main line rail in a single plane cutting operation, the base flanges and head being cut simultaneously, and plane cutting the mating face of the switch blade to fit complementally in the recess in the main line rail.

5.

A railway turnout comprising two wing rails and a point which, includes a nose, the running surface of the point being substantially co-planar with the running surfaces of the rails in the rest of the turnout, characterised in that the wing rails are provided with tread surfaces inclined upwardly above the plane of the running surfaces,

the incline of the wing rails extending longitudinally along the wing rails toward the heels thereof and commencing at a point corresponding to the point of deviation from the gauge line of the wing rail, the tread surface of the wing rails being sloped, in cross section, from the edge adjacent the gauge line, at an angle corresponding to the shape of the average worn car wheel, the angles of the incline and the slope being dependent on the taper on the wheels and on the angle deflection of the turnout.

6.

A turnout according to claim 5 characterised in that the inclination on the wing rails is obtained by the provision of a tread surface insert which, in cross section, is provided with a slope arranged, in use, to extend upwardly from the edge adjacent the gauge line to the outer edge of the insert at an angle corresponding to the shape of the average worn car wheel, the insert being adapted for location in a recess formed in the head of the wing rail.

7.

A turnout according to any one of claims 5 or 6 characterised in that the insert is manufactured from steel hardened to tool steel hardness.

8.

A turnout according to any one of claims 5, 6 or 7 which includes a frog comprising a main filler block which is adapted to be bolted between the vertical webs and base flanges of the wing rails and a point filler block adapted for location on the frog characterised in that the point is included in a point filler block comprising the point and a base, the main filler block being formed with a recess adapted to receive the base of the point filler block and the point being shaped to abut the severed point rails, in use.

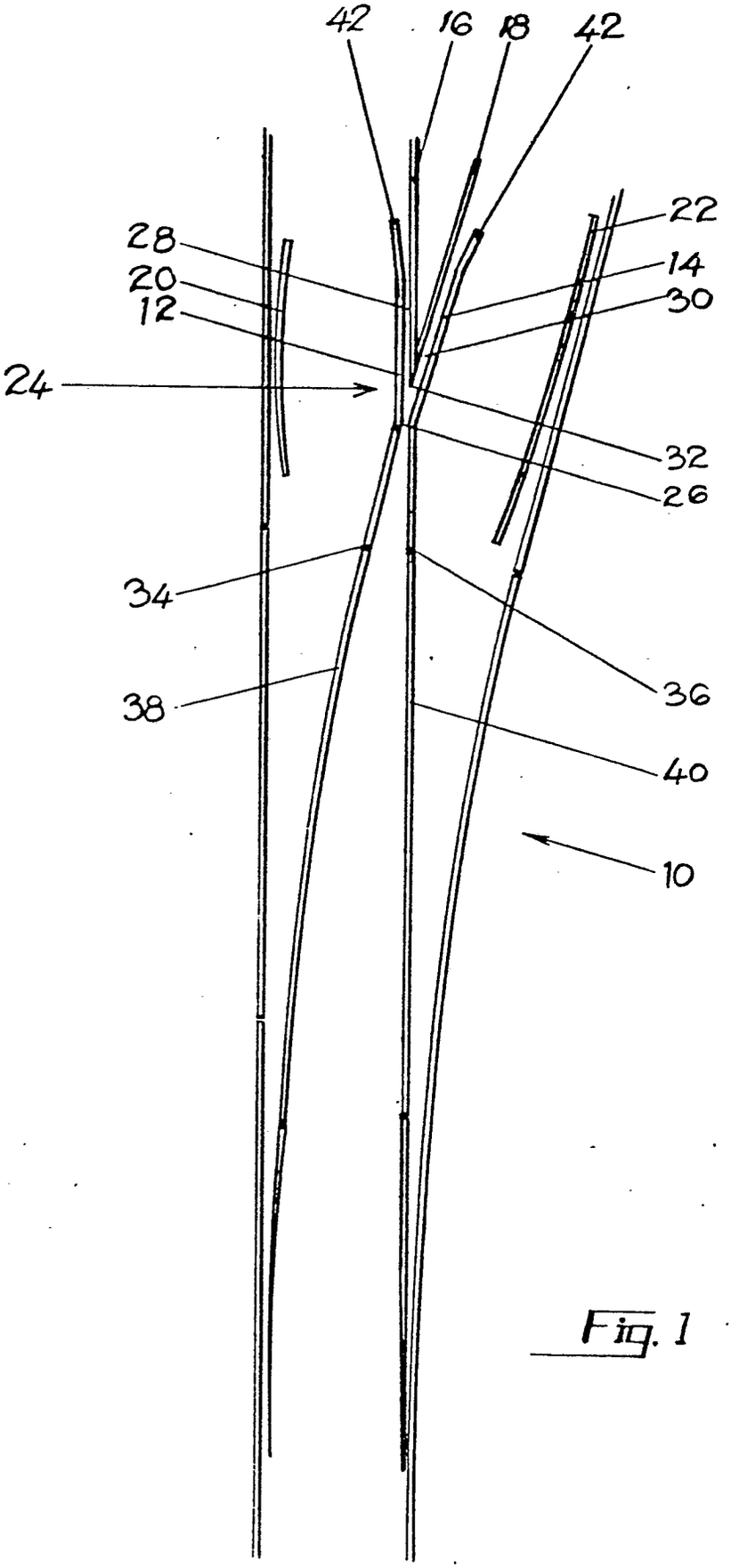


Fig. 1

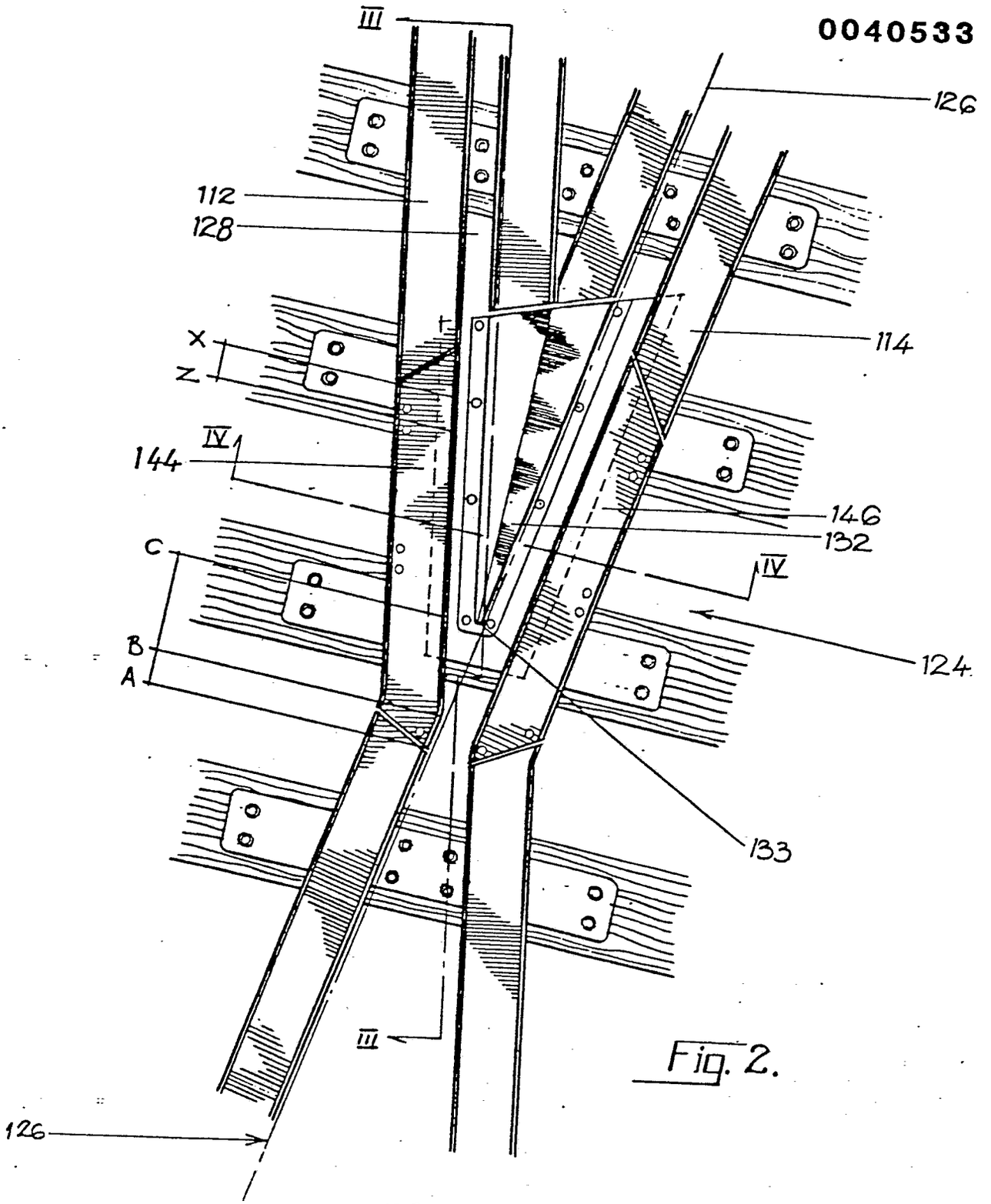

III
126
112
128
X
Z
114
IV
144
146
132
C
IV
B
A
124
133
III
126

Fig. 2.

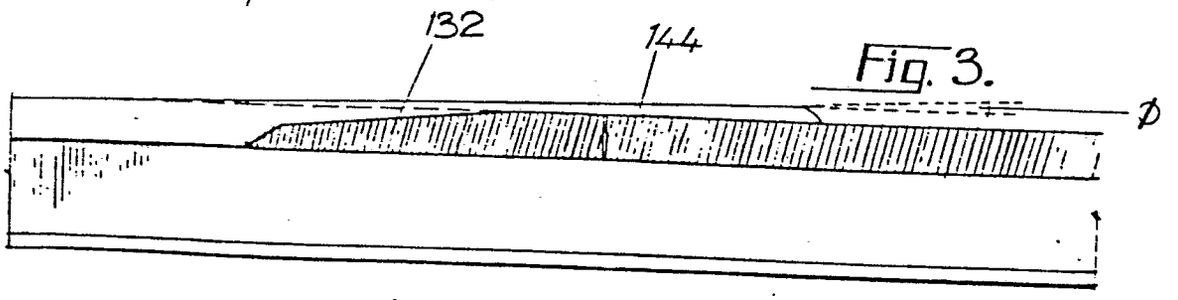

132
144
Ø

Fig. 3.

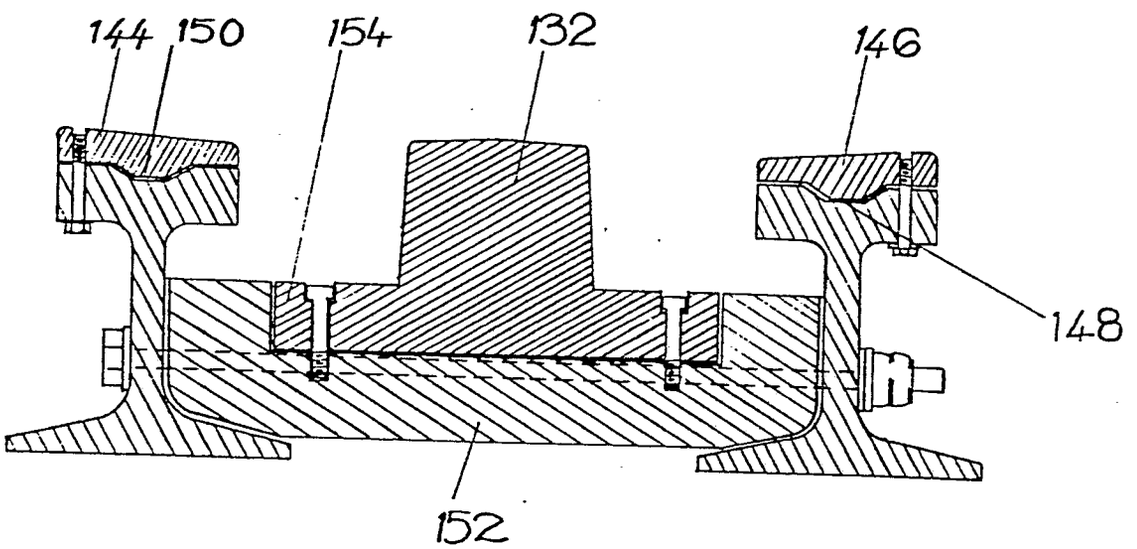


Fig. 4.

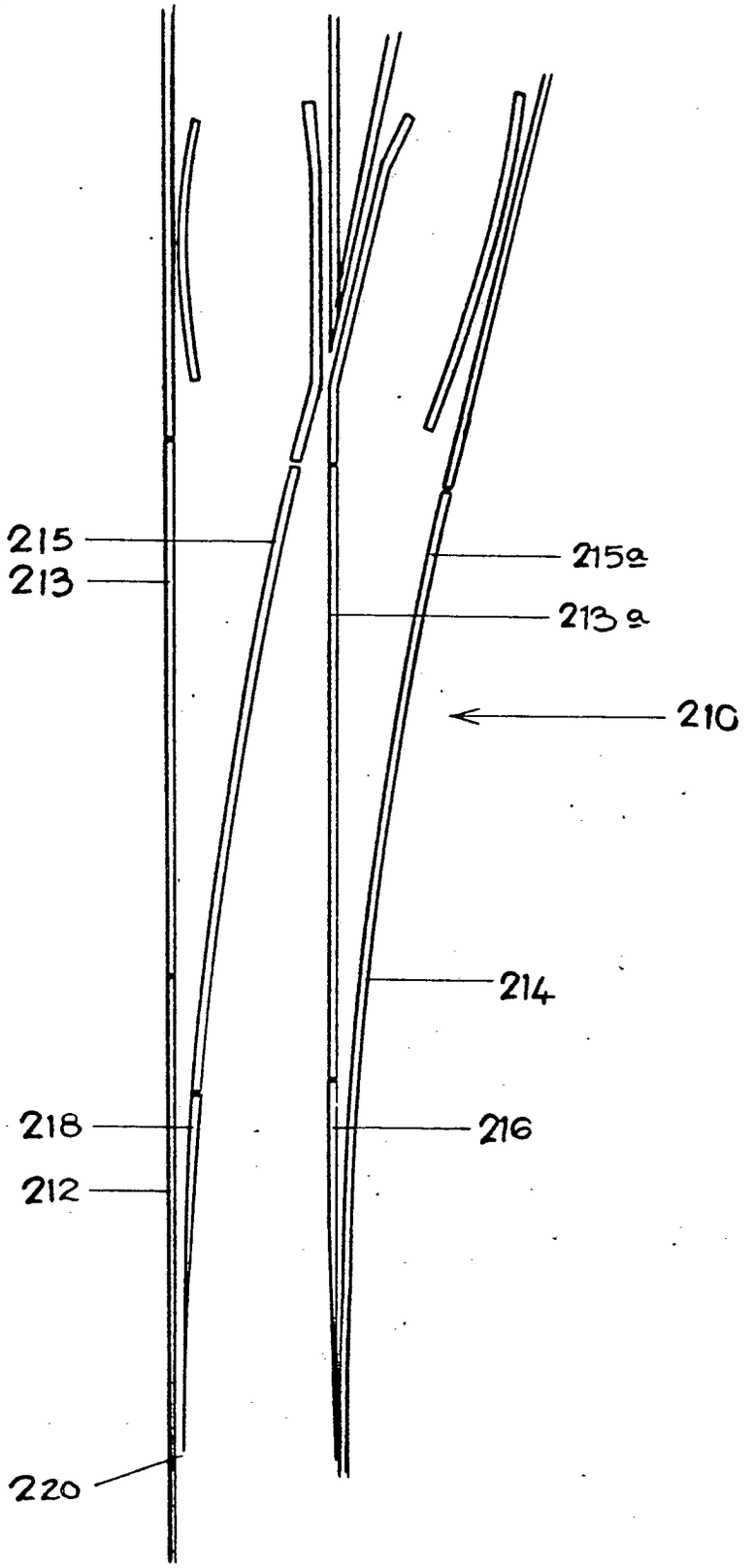
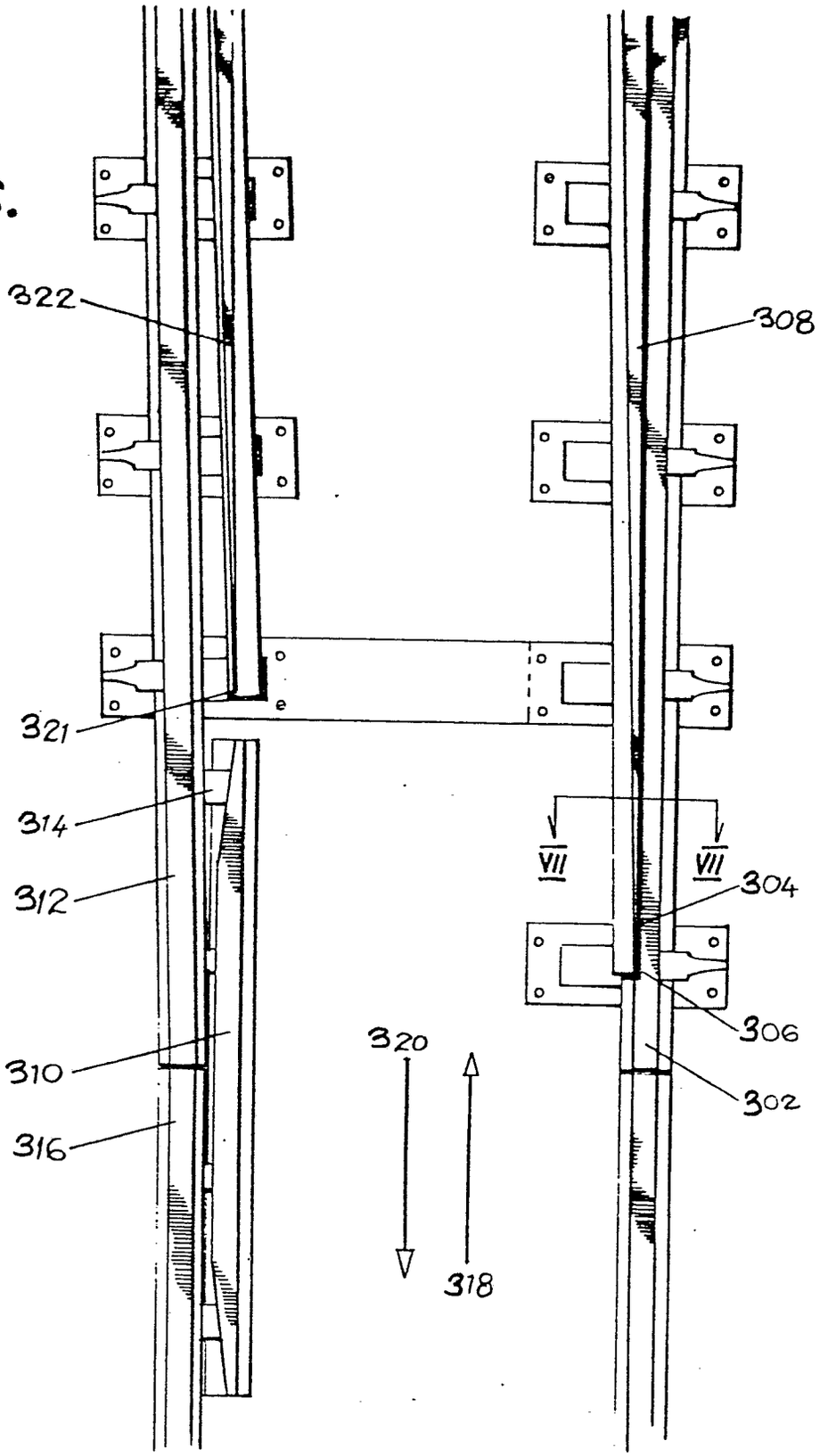


Fig. 5.

Fig. 6.



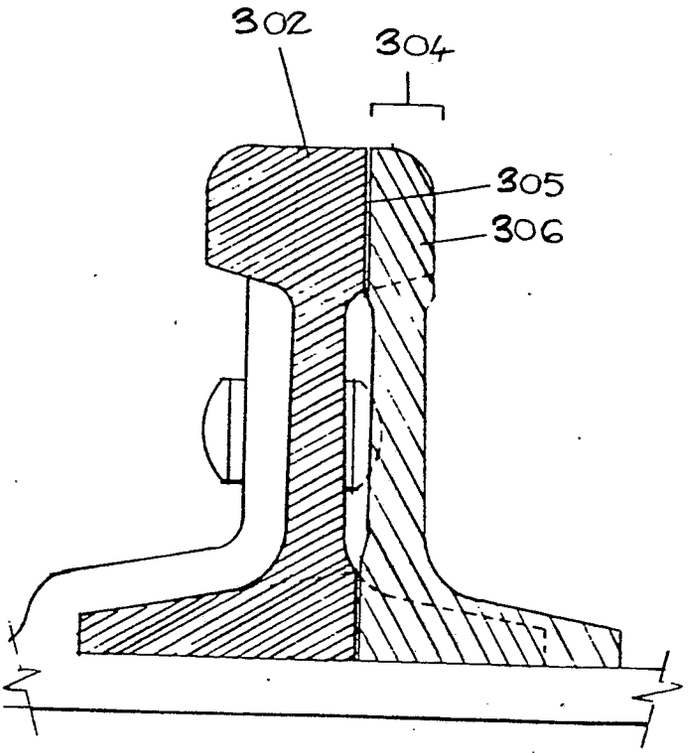


Fig. 7