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(54) **Rail joint**

(57) An electrically insulating end post (10, 30, 50) comprises first and second portions (14, 16, 34, 36, 54, 56). The first portion (14, 34, 54) is provided with at least one connecting element (18a, 18b, 42, 44, 58) extending therefrom. At least one passage (20a, 20b, 46, 48,

62) is enclosed by the second portion (16, 36, 56) and is open at at least one end thereof to receive a respective connecting element (18a, 18b, 42, 44, 58) of the first portion (14, 34, 54), whereby the first and second portions can engage each other to constitute the end part.

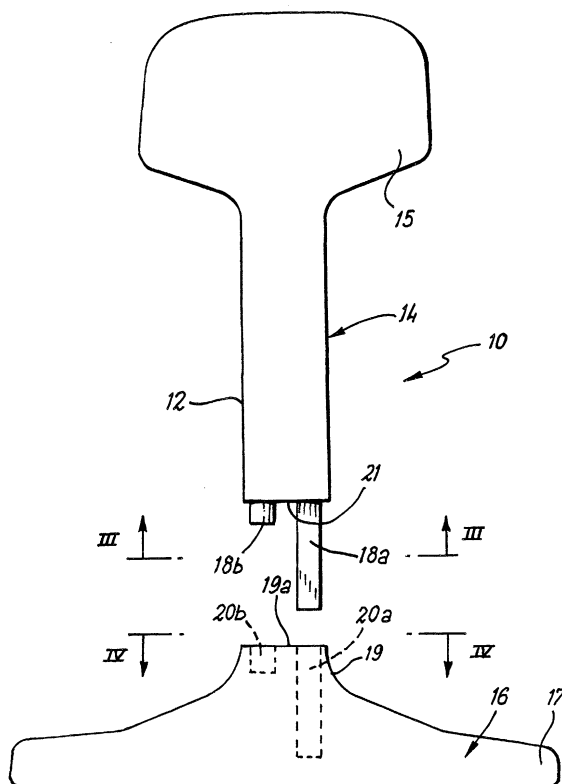


Fig. 2

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Description

[0001] The present invention relates to end posts which may be for use between rails, and particularly, but not exclusively, to use between rails on railway systems. More particularly, but not exclusively, the invention relates to electrically insulating end posts.

[0002] Electrically insulating end posts are in use extensively throughout the rail network and electrically separate one section of track from another.

[0003] Each railway line is part of an electrical circuit for signalling purposes, the circuit being completed by the wheels of either a train or carriage. The completion of this circuit gives notification to a signal box that a train is in the sector. It is imperative that end posts are in place to prevent any misinformation being given to the signalling section.

[0004] Each end post is placed between two rail ends and is in the shape of the rail, there being many different shapes of rail. A train cannot be allowed to pass over two unconnected pieces of rail, as it would almost certainly derail. Therefore, the two rail ends are connected by a "Fish Plate", which is held in place by bolts for strength. Once connected, the end post, rails and fish plate form an insulated block joint (IBJ).

[0005] Even with the "Fish Plate" in situ there can still be a lot of movement in the joint, in a vertical direction, when either a train or a carriage passes over it. The joint is also subject to expansion and contraction as the rail either cools down or warms up possibly creating room for lateral movement of the end post within the IBJ as rail traffic passes over.

[0006] As the trains pass over the IBJ the rail deforms on the top over a period of time to create a "lip of metal" on both sides of the gap. When the two lips meet the IBJ has been compromised. It is the end post's job to slow this process down. It therefore is subject to wear itself.

[0007] If the condition of the track foundation is poor the movement in the end post of the IBJ is amplified or if the bolts should loosen the deterioration of the IBJ is more rapid and therefore the need for replacement of the end post is more frequent to prevent the rails being electrically connected resulting in a degradation of the signalling system.

[0008] At present, replacing the end post by undoing the "Fish Plate", is very time consuming, taking approximately two hours. This cannot be done whilst the trains are running, due to the train delays it would cause. Contract companies are all heavily financially penalised for any delays so this is not a viable option for them. The repairs can only take place by obtaining a formal full track possession. This normally means working very late into the night on most tracks, and on some lines even this can be very difficult due to the volume of rail traffic.

[0009] According to one aspect of the present invention there is provided an electrically insulating end post

comprising first and second portions, the first portion being provided with at least one connecting element extending therefrom, at least one passage is enclosed within the second portion and at least one end of the passage is open to receive a respective connecting element of the first portion, whereby the first and second portions can engage to constitute the end post. The end post is advantageously an electrically insulating end post.

[0010] Preferably securing means are provided to enable the or each connecting element to be secured in the respective passage.

[0011] Preferably the first and second portions comprise two discrete parts of the end post.

[0012] The first and second portions preferably define respectively outwardly flared end regions of the end post. A waist region may be provided between the outwardly flared end regions and may comprise part of the first portion.

[0013] Desirably the or each connecting element is configured to be received in the respective passage.

[0014] Preferably the or each passage extends at least part way through the second portion. Desirably the or each connecting element extends at least part way through the first portion so that the or each connecting element is internal to the first portion. The, or each, passage may be in the form of a bore in the second portion. The, or each, passage may have a longitudinal dimension extending into the second portion. At least said longitudinal extent of the passage is preferably wholly enclosed by the second portion.

[0015] A plurality of connecting elements and respective passages may be provided.

[0016] Preferably two connecting elements are provided. One connecting element is desirably in the form of a stabilising element and the other may be in the form of a securing element.

[0017] Desirably the stabilising element is received in a respective passage extending part way through the second end portion and being open at one end. The securing element may be received in a respective passage extending substantially wholly through the second portion and being open at both ends.

[0018] Alternatively, or in addition, three connecting elements are provided. One connecting element may be a securing element and the other connecting elements may be in the form of stabilising elements.

[0019] Preferably when the stabilising elements are fully received in the respective passages for the stabilising elements the securing element is located through the respective passage for the securing element in the second portion so that a part of the securing element protrudes from said passage.

[0020] Preferably the securing means enable the, or each, connecting element to be secured in position so that the end post is stabilised.

[0021] The securing means preferably comprise an adhesive material.

[0022] According to another aspect of the present invention, there is provided an end post comprising first and second portions, and an adhesive material to secure the first and second portions together. The end post may further include the features of the end post described in the ninth to the twentieth paragraph above.

[0023] The adhesive material is preferably provided in the respective passage for the stabilising elements and may comprise an acrylate adhesive such as cyanoacrylate.

[0024] The securing means may also comprise thread formations provided on the securing element. Desirably the thread formations protrude from the respective passage for the securing element when the securing element extends therethrough.

[0025] Desirably a locking member comprising internal threads complementary to the thread formations is provided so that the securing element can be secured in position on engagement of the locking member with the thread formations. The locking member may be a threaded nut.

[0026] Thread locking adhesive may be provided on the threads of one or both of the locking member and thread formations such that the threaded nut can be locked in position.

[0027] Alternatively, the securing means may comprise a clip engageable with the protruding part of the securing element to retain the securing element in position. The securing means may alternatively be any other suitable securing means.

[0028] Preferably the protruding part of the securing element is coloured, and may be brightly coloured, to enable it to be readily visible to a user.

[0029] Preferably the connecting elements are substantially circular in cross section. Desirably the respective passages for the connecting elements are substantially circular in cross section. Preferably the diameter of the securing element is greater than the respective diameter of the, or each, stabilising element.

[0030] The end post is desirably constructed from a non-conductive material which may be plastic or nylon based.

[0031] According to another aspect of the present invention there is provided a method of installing an end post as described above between adjacent rail ends, the method comprising the steps of inserting the first portion between the rails; inserting the second portion between the rails from below the rails; and moving the second portion relative to the first portion so that the connecting elements of the first portion are received in the respective passages of the second portion.

[0032] Preferably the second portion is moved relative to the first portion until the thread formations of the securing element protrude through the respective passage of the second portion.

[0033] Preferably the threaded nut is tightened around the threaded formations of the connecting element.

[0034] Preferably adhesive is applied to the respective passage receiving the, or each, connecting element before inserting the second portion between the rails. Preferably thread locking adhesive is applied to the thread formations of the connecting element before tightening the nut therearound.

[0035] Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings, in which:-

Fig. 1 is a front view of an end post according to one embodiment of the present invention;

Fig. 2 is a front view illustrating the first and second end portions of the end post of Fig. 1 in a separated condition;

Fig. 3a to 3c are alternative views along the lines III - III in Fig. 2, showing different configurations of connecting elements;

Fig. 4a to 4c are alternative views along the lines IV - IV showing different configurations of passages;

Fig. 5 is a front view of an end post according to another embodiment of the present invention;

Fig. 6 is a front view of the end post of Fig. 5 in a separated condition;

Fig. 7 shows an end post according to another embodiment of the present invention; and

Fig. 8 shows the end post of a Fig. 7 in a separated condition.

[0036] Referring to the drawings there is provided electrically insulating end posts 10, 30, 50 for use in electrically separating one section of rail track from another. Each end post has respective first and second portions 14, 16, 34, 36, 54, 56. Each respective first portion 14, 34, 54 is provided with one or more respective connecting elements 18a, 18b, 42, 44, 58 extending therefrom to be receivable within a respective passage or bore 20a, 20b, 46, 48, 62 enclosed by the second portion 16, 36, 56 and open at at least one end thereof to receive the respective connecting element 18a, 18b, 42, 44, 58 such that the first and second portions 14, 16, 34, 36, 54, 56 engage to constitute the end post 10, 30, 50.

[0037] In more detail, and referring firstly to Figs. 1 and 2 of the accompanying drawings, there is provided a first end post 10. As can be seen, the end post 10 is in two parts comprising first and second portions 14, 16. The first portion 14 includes a first outwardly flared end region 15 and a waist region 12. The second portion 16 includes a second outwardly flared region 17, and a securing region 19.

[0038] The first portion 14 is provided with two connecting elements 18a, 18b extending from a lower end 21 of the waist region 12. The connecting elements 18a, 18b are receivable within respective passages or bores 20a, 20b defined by and enclosed within the second portion 16. Each passage 20a, 20b extends inwardly of the second portion 16 from an upper end 19a of the securing region 19. Each passage 20a, 20b is open at the upper end 19a. The connecting elements 18a, 18b have a width of diameter less than the width of the first end portion 14 such that when received within the passages 20a, 20b, the connecting elements 18a, 18b are contained within the second portion 16.

[0039] When it is required to insert the end post 10 between rails of a railway system, the first portion 14 is placed between the rails before locating the second end portion 16 between the rails from below the rails. The user can then move the second end portion 16 relative to the first end portion 14 such that the connecting elements 18a, 18b are received within the passages 20a, 20b thereby forming the end post 10. Adhesive such as cyanoacrylate adhesive can be placed within the passages 20a, 20b before moving the second end portion 16 towards the first end portion 14.

[0040] The end post 10 thus formed is very stable due to the connecting element being enclosed by the first and second end portions 14, 16. The use of the chemical adhesive provides a bond with sufficient strength to both form the end post 10 and prevent it from being vibrated apart when in use in the rail system. Thereby the need for repairs to be carried out in the field is reduced.

[0041] Figs. 3a to 3c illustrate different arrangements of the connecting elements 18a, 18b, and these are labelled 22, 24, 28 in Figs. 3a to 3c. The connecting elements 22, 24, 28 extend outwardly from the end 21 of the first portion 14 of the end post 10. The connecting elements 22, 24, 28 are examples of the connecting elements 18a, and 18b described above. The connecting elements 22, 24, 28 have substantially square or circular cross sections and accordingly the passages in the ends of the respective second portions 16 (see Figs. 4a to 4c), in which the respective connecting elements are received, have correspondingly shaped cross sections. It should be noted that, in all of these arrangements the width or diameter X of the connecting elements 22, 24, 26, 28 is less than the corresponding dimension or width Y of the end 21 of the first portion 14. As mentioned above, this enables the connecting elements when received within the respective passages provided in the second end portion, to be enclosed by the second portions 16 thereby increasing the stability of the end post 10 thus formed.

[0042] Referring to Figs. 4a to 4c there are shown passages or bores 23, 25, 27, defined in the second portion 16 of the end post 10 and which are examples of the passages 20a, 20b, and which correspond to the connecting elements 22, 24, 28 shown in Figs. 3a to 3c. The passages are intended to receive the connecting

elements 22 shown in Fig. 3a, the passages 25 are intended to receive the connecting elements 24 shown in Fig. 3b, and the passages 27 are intended to receive the connecting elements 28 shown in Fig. 3c.

[0043] The passages 23, 25, 27 have a diameter or width Z which is less than the width Y of the end 19a of the second portion 16 but slightly greater than the width or diameter X of the connecting elements 22, 24, 28 to enable the connecting elements 22, 24, 28 to be received in the respective passages 23, 25, 27.

[0044] In order to increase the stability of the end post 10, the connecting elements 18a, 18b may extend into at least part of the first portion 14.

[0045] Referring now to Figs. 5 and 6, there is shown a further end post 30. In Fig. 5 and 6 the use of the same reference numerals as in Figs. 1 and 2 are intended to refer to the same feature.

[0046] In this example, the end post 30 has a first portion 34, which is similar to the first portion 14, and a second portion 36, which is similar to the second portion 16. The first portion 34 is provided with three connecting elements 42, 44 extending therefrom. The connecting elements are in the form of a securing element 42 and two stabilising elements 44 provided either side of the securing element 42 as clearly illustrated in Fig. 6. The securing element 42 is provided with a threaded portion 38 at its end.

[0047] The securing element 42 is significantly longer than the stabilising elements 44 because the securing element 42 is configured to extend through a passage 46 defined by the second portion 36. The passage 46 is open at its opposite ends 47A, 47B. Indeed, the connecting elements 42, 44 are so arranged on the first portion 34 that the securing element 42 extends through the passage 46 of the second portion 36 only when the two stabilising elements 44 are fully received within their respective passages 48 which are enclosed by the second portion 36 and only open at one end.

[0048] Once the stabilising elements 44 are secured in position, the threaded portion 38 of the securing element 42 protrudes from below the second end portion 36. As can be seen in Fig. 5, a threaded nut 40 can then be screwed onto the threaded portion 38 thereby retaining the securing element 42 in position and hence forming the end post 30. As with the end posts described with reference to Figs. 1 and 2, the passages 46, 48 can be provided with adhesive such as a cyanoacrylate to provide a chemical bond for additional strength to the end post 30. In addition, a suitable adhesive, for example an adhesive described above or a thread locking adhesive, can also be provided on the threads of the threaded portion 38 and/or the nut 40 so that the nut 40 once tightened on the threaded portion 38 is locked in position.

[0049] The end post 30 is installed between rails in rail systems in a similar fashion to the end post 10 described above. However, with the end post 30 the user moves the second end portion 36 towards the first end

portion 34 so that the stabilising elements 44 are received in the passages 48 and the securing element 42 is received in the passage 46. Once the threaded portion 48 of the securing element 42 protrudes from below the second end portion 36 then the user can tighten a nut 40 onto the threaded portion 38. When the stabilising elements 44 are received and the nut 42 is in place, the whole assembly has a stabilised robust construction. To aid the user in realising when the threaded portion 38 of the securing element 42 protrudes from below the second end portion 36, the threaded portion 38 is lightly coloured to be visible beneath the rail thereby easing its assembly.

[0050] A further end post 50 comprising a first portion 54 and a second portion 56 is illustrated in Figs. 7 and 8. Again, the case of the same reference numerals as in Figs. 1 and 2 is intended to refer to the same features. In this end post 50 a single connecting element 58 extends from the first end portion 54 and is received within a passage 62 enclosed by the second end portion 56 and open at both ends. The connecting element 58 is configured to protrude through the bottom of the second end portion and is provided with a hole therethrough such that a clip 60 can be inserted to secure the connecting element 58 in position as illustrated in Fig. 6.

[0051] This end post 50 can be installed between rails in a similar fashion to the other end posts 10 and 30 described above.

[0052] Each of the end posts 10, 30, 50 are made from electrically insulating material to enable them to be safe to use with rail systems that carry any electrical current for signalling purposes, or any other reason, such as railway systems.

[0053] There are thus described a number of end posts for use as part of rail systems and particularly insulating block joints of railway systems. The two part nature of the end posts and the relationship between the connecting elements and the passages provided in the respective end portions enables a user to install the end posts without the need to remove the "fish plates" of the insulating block joint. This therefore reduces the time taken to replace end posts and is therefore clearly advantageous.

[0054] In addition, the two end portions of the end posts are connected through mechanical and chemical fixings. Such fixings lead to the resultant end posts being very stable against vibration in use between rails of a railway system. Therefore, the need to replace the end posts is reduced significantly. The configuration of the connecting elements is such that when the two end portions are connected together, the connecting elements are contained within the second end portion which provides for additional stability and prevents the two end portions from being shaken apart once the rails have contracted and the end post is no longer a snug fit between the rails.

[0055] Various modifications may be made to the present invention without departing from the scope

thereof. For example, the end post provided with the two connecting elements can be provided with a threaded portion on one of the connecting elements to engage with internal threads provided in the respective passage. Alternatively, the element having the threaded portion could extend through the second outwardly flared end portion and be secured in position as easily as with the end posts comprising the three connecting elements. Furthermore, the connection between the first and second end portions of the end post maybe further up the waist region.

[0056] Whilst endeavouring in the foregoing specification to draw attention to those features of the invention believed to be of particular importance it should be understood that the Applicant claims protection in respect of any patentable feature or combination of features hereinbefore referred to and/or shown in the drawings whether or not particular emphasis has been placed thereon.

Claims

1. An end post comprising first and second portions, the first portion being provided with at least one connecting element extending therefrom, at least one passage is enclosed within the second portion and at least one end of the passage is open to receive a respective connecting element of the first portion, whereby the first and second portions can engage each other to constitute the end post.
2. An end post according to Claim 1 wherein the or each connecting element is configured to be received in the respective passage.
3. An end post according to Claim 2 wherein the or each passage extends at least part way through the second portion, and the or each connecting element extends at least part way through the second portion so that all or a major proportion of the length of the, or each, connecting element is internal to the second portion when the first and second portions are connected together.
4. An end post according to any preceding Claim wherein a plurality of connecting elements and respective passages are provided.
5. An end post according to Claim 4 wherein two connecting elements are provided, one connecting element being in the form of a stabilising element and the other being in the form of a securing element.
6. An end post according to Claim 5 wherein the stabilising element is received in a passage extending part way through the second portion and is open at one end, and the securing element is received in a

further passage extending substantially wholly through the second portion and is open at both ends.

7. An end post according to any of Claims 5 or 6 wherein three connecting elements are provided, one of said connecting elements being a securing element and the other connecting elements being in the form of stabilising elements. 5
8. An end post according to Claim 5, 6 or 7 wherein when the stabilising elements, are fully received in the respective passages for the stabilising elements the securing element is located through the respective passage for the securing element in the second portion so that a part of the securing element protrudes from said passage. 10
9. An end post according to Claims 4 to 8 wherein securing means are provided to enable the or each connecting element to be secured in the respective passage. 15
10. An end post according to Claim 9 wherein the securing means enables the, or each, connecting element to be secured in position so that the end post is established. 20
11. An end post according to Claim 10 wherein the securing means comprises an adhesive material. 25
12. An end post according to any of Claims 8 to 11 wherein the securing means comprises thread formations provided on the securing elements, the thread formations protruding from the respective passage for the securing element when the securing element extends therethrough. 30
13. An end post according to Claim 12 wherein a locking member comprising internal threads complementary to the thread formations is provided so that the securing element can be secured in position on engagement of the locking member with the thread formations. 35
14. An end post according to any of Claims 8 to 11 wherein alternatively, the securing means comprises a clip engageable with the protruding part of the securing element to retain the securing element in position. 40
15. An end post according to any of Claims 8 to 11 wherein preferably the protruding part of the securing element is coloured to enable it to be readily visible to a user. 45
16. A method of installing an end post as claimed in any preceding claim between adjacent end rails, the 50

method comprising the steps of inserting the first portion between the rails; inserting the second portion between the rails from below the rails; and moving the second portion relative to the first portion so that the connecting elements of the first portion are received in the respective passages of the second portion.

17. A method according to Claim 16 wherein the second portion is moved relative to the first portion until the thread formations of the connecting element protrude through the respective passage of the second portion. 55
18. A method according to Claim 17 wherein a locking member comprising internal threads is tightened around the threaded formations of the connecting element.
19. A method according to Claim 18 wherein adhesive is applied to the respective passage receiving the, or each, connecting element before inserting the second portion between the rails.

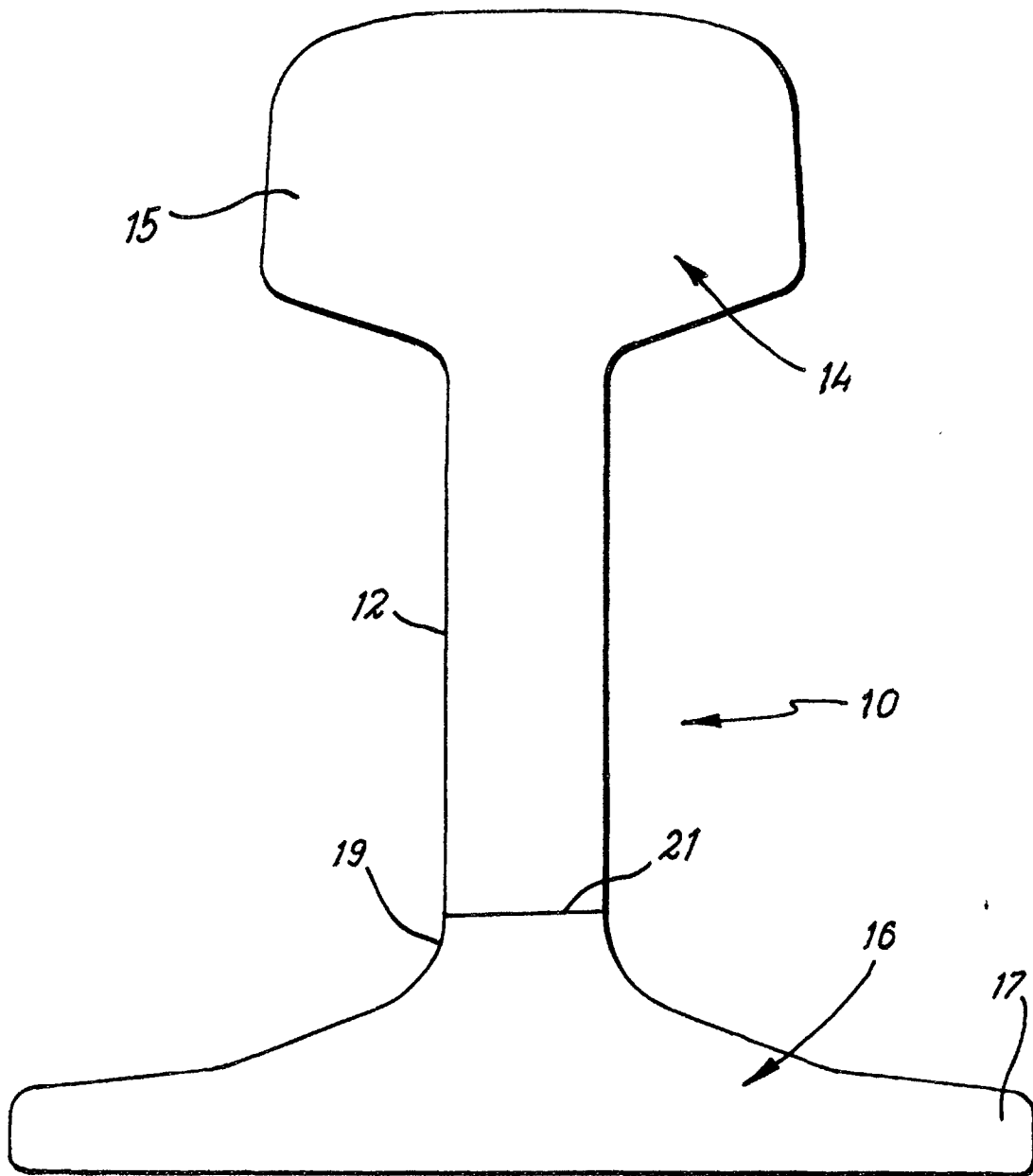
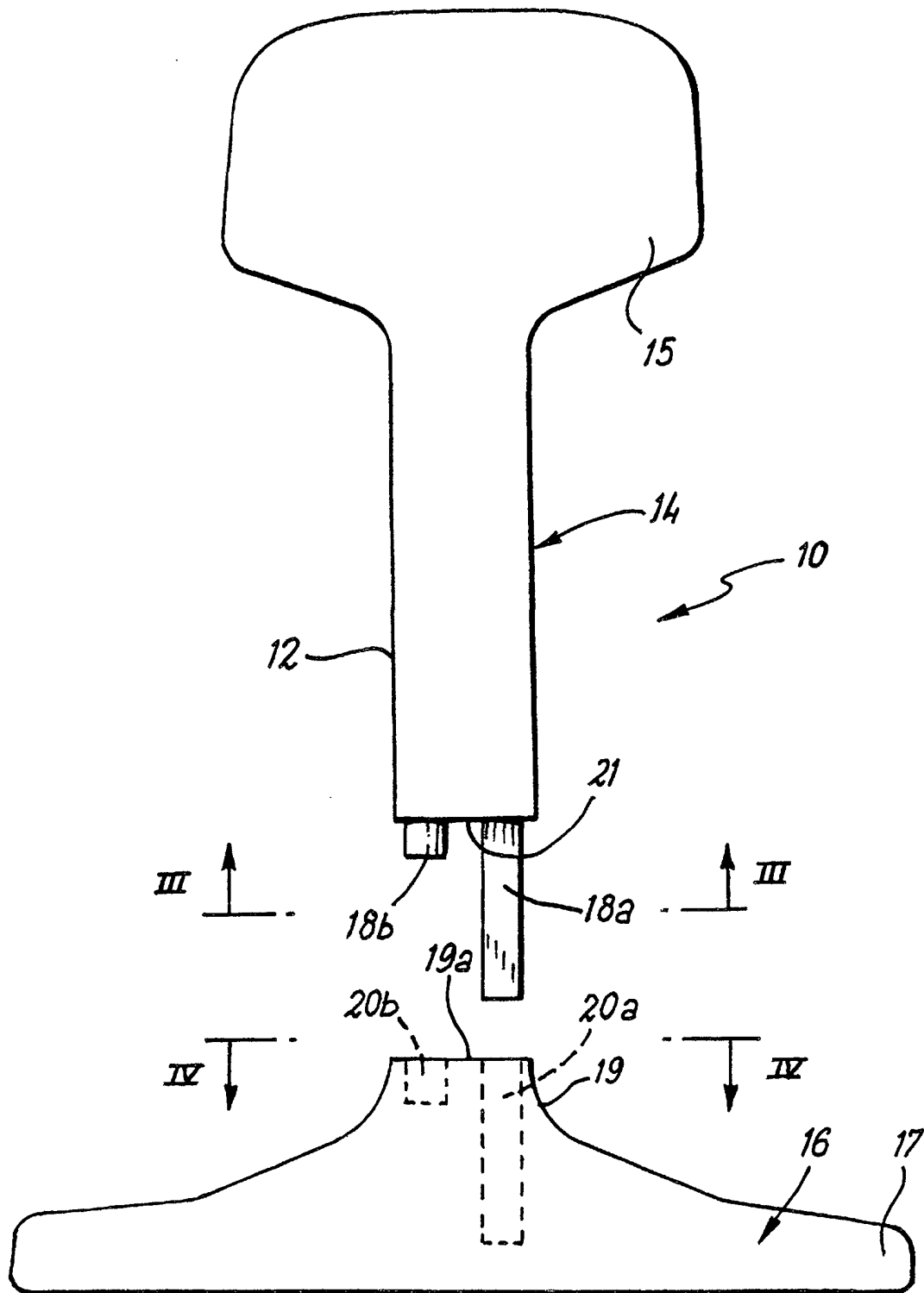
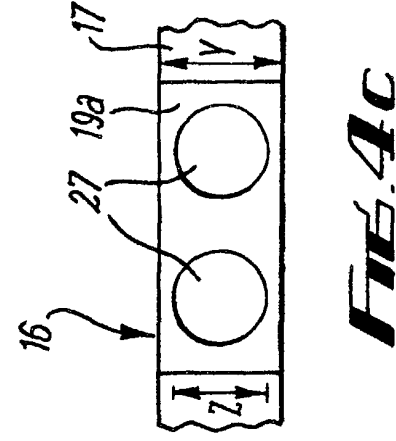
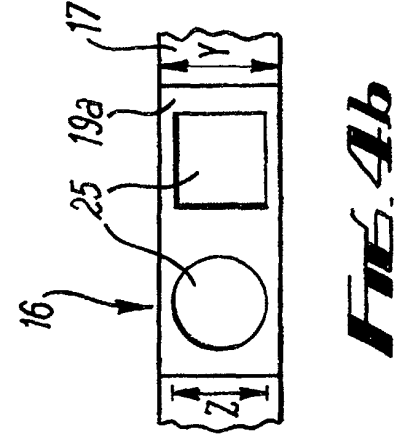
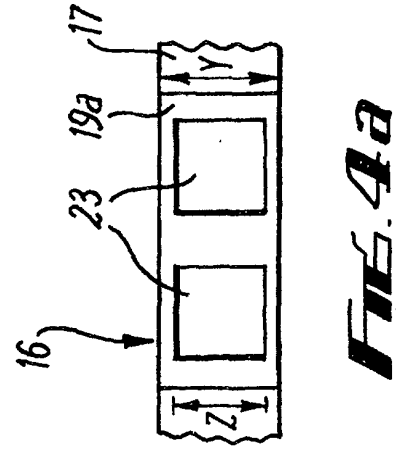
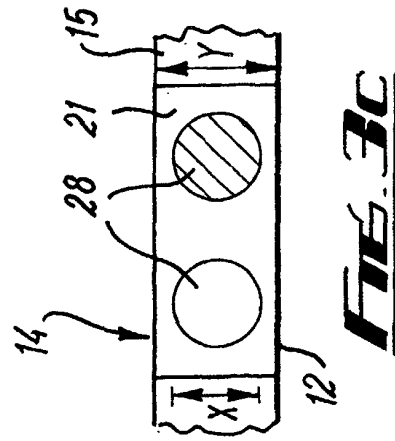
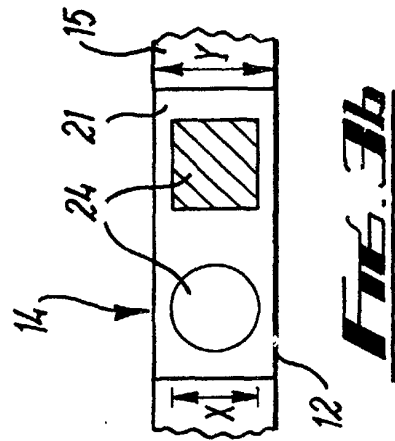
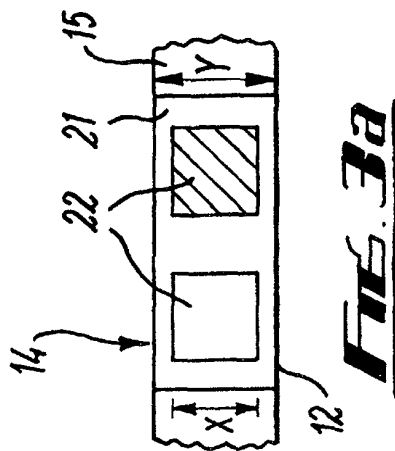


Fig. 1



File 2



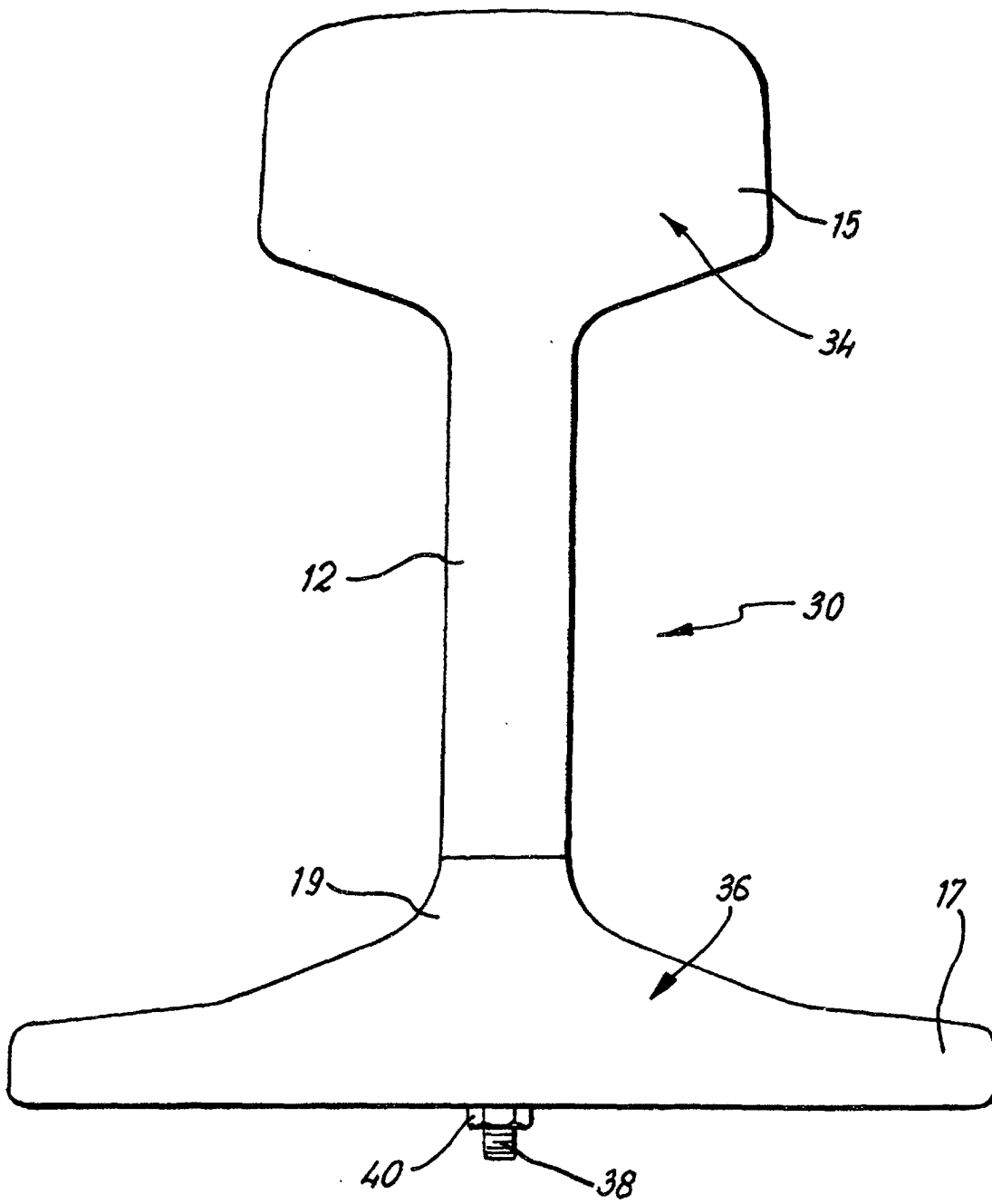


FIG. 5

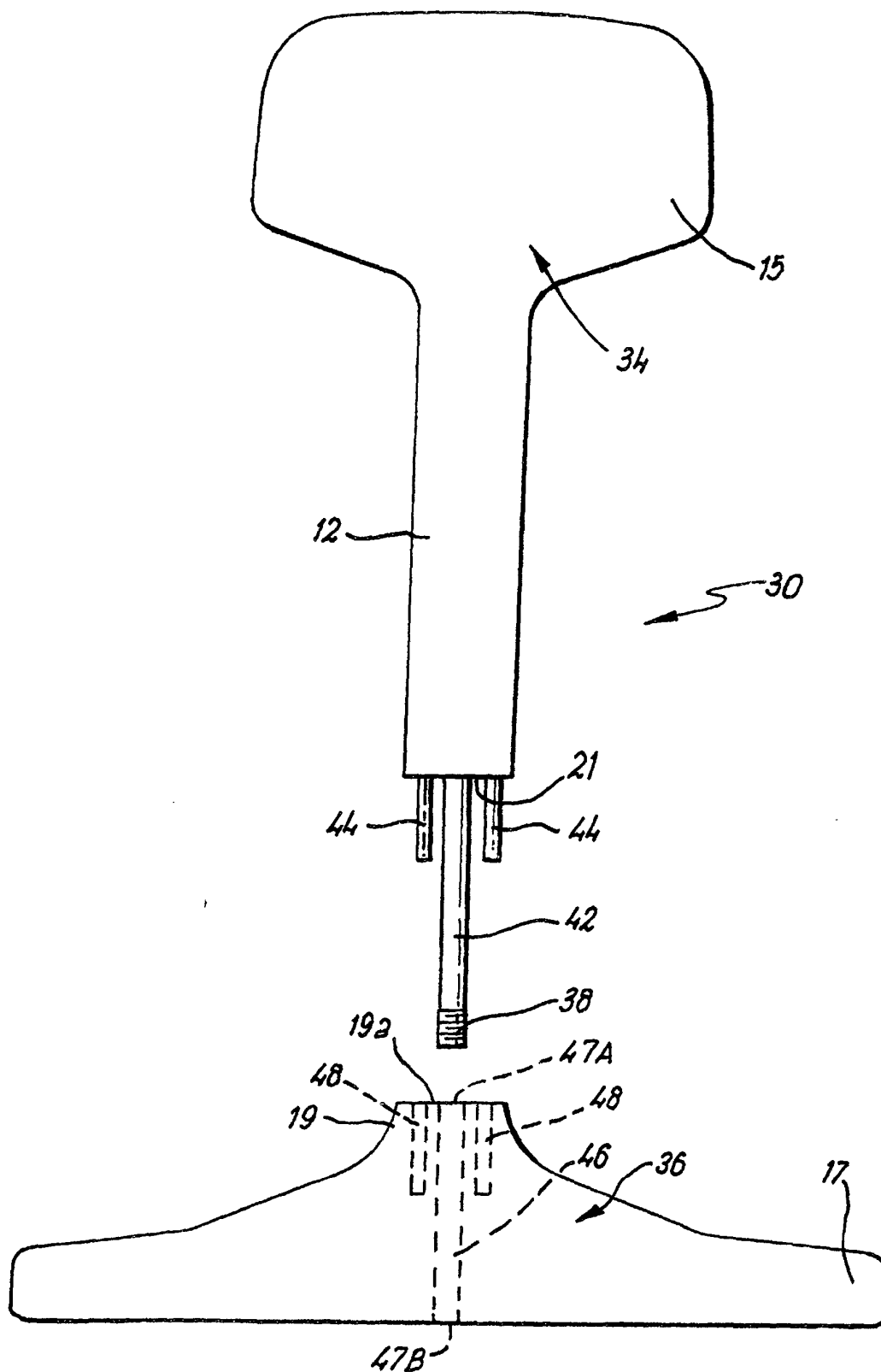


FIG. 6

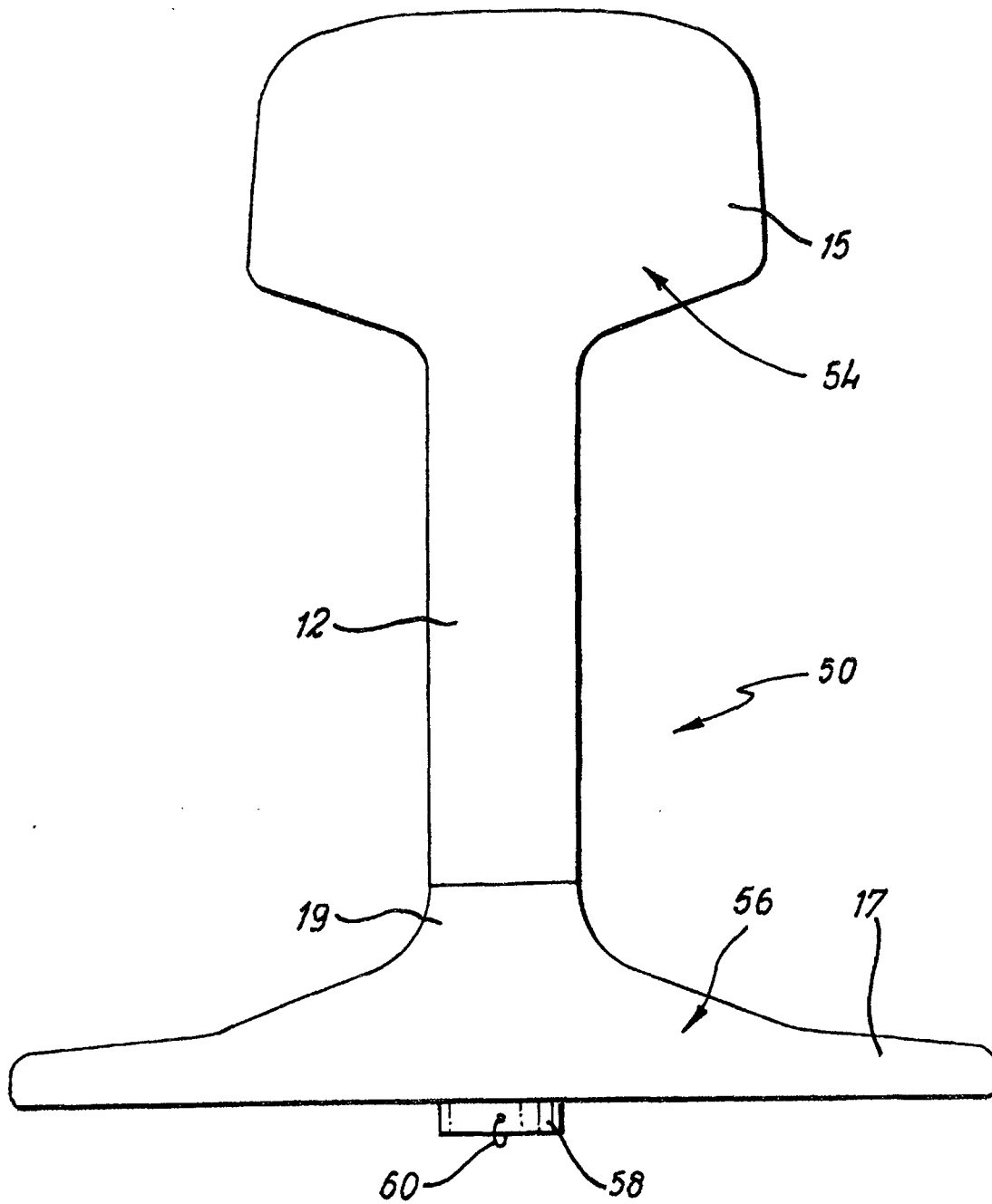


FIG. 7

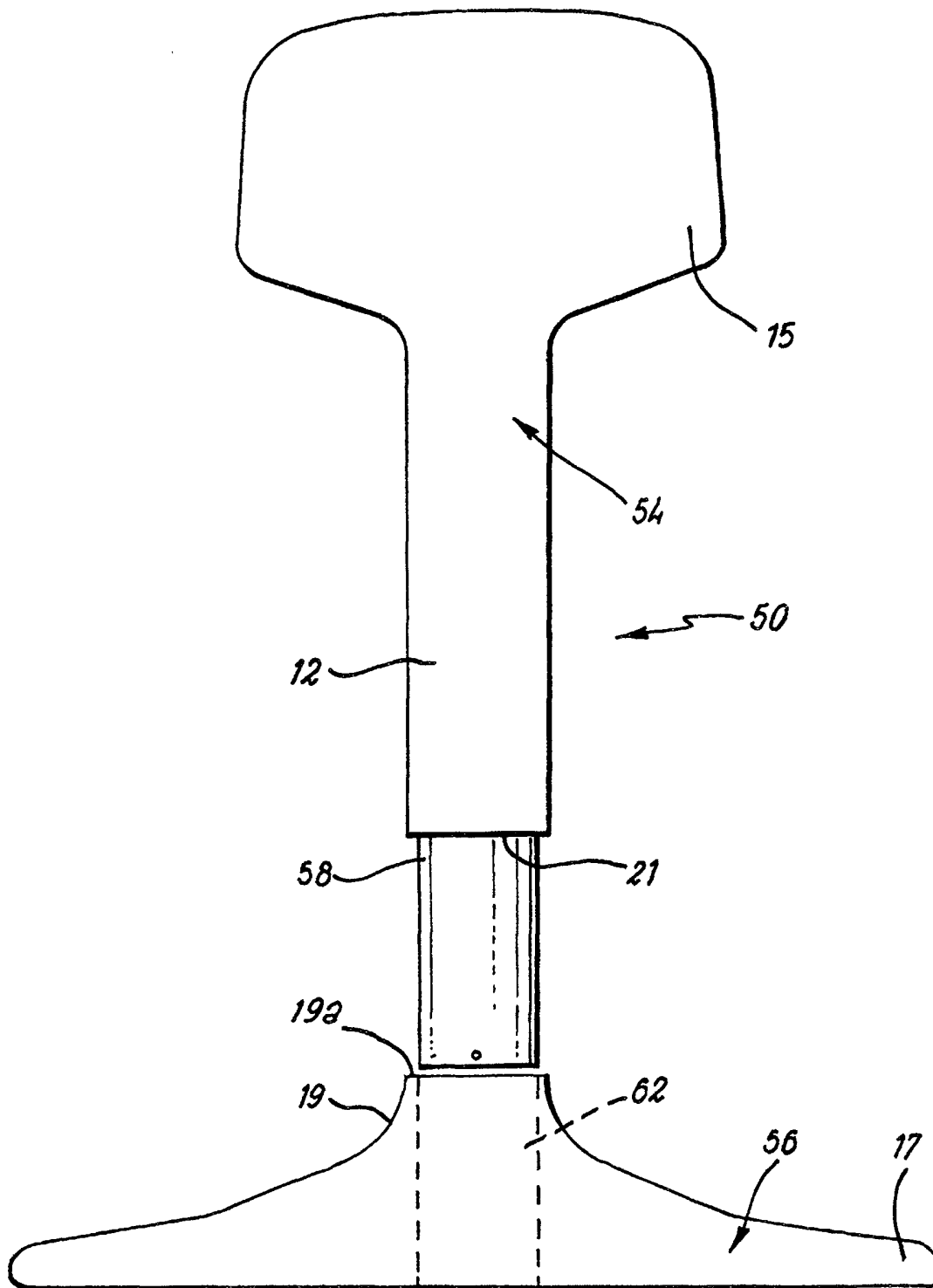


FIG. 8