PATENT SPECIFICATION 1,131,961

DRAWINGS ATTACHED.

1,131,961

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COMPLETE SPECIFICATION.

Rail Element for Inclusion in a Toy Building Set.

I, ARTUR FISCHER, a German citizen, of Tumlingen, Kreis Freudenstadt, Germany, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a rail element for toy building sets having basic building bricks adapted for interlocking engagement by means of re-entrant tenon and groove connections.

An object of the invention is to provide rail elements that may be used to simulate the most varied rail systems, for example ground level railway systems, suspended rail tracks for aerial railways, crane carriages and vertical rail tracks for lifts.

The invention provides a rail element for inclusion in a toy building set having basic building bricks adapted for interlocking engagement by means of re-entrant tenon and groove connections, the said rail element comprising a web portion both opposite longitudinal edges of which are beaded to form the running surfaces of the rail, and said web portion being provided with apertures for engagement by re-entrant tenons of building bricks, which apertures are of the nature of keyhole slots, comprising a wider section through which a re-entrant tenon can be introduced, and an adjacent narrower section for retention of the tenon by engagement in the re-entrant portion thereof. Assembly is further facilitated if the said apertures extend longitudinally of the rail, the dimension of each section of the aperture in the longitudinal direction being greater than the transverse dimension thereof. Assembly may be simplified still further by providing at the ends of each web apertures which comprise two narrower sections arranged on opposite sides of the said wider section. This configuration enables two basic bricks to be attached to one aperture.

In order to enable rail elements to be assembled with building bricks in yet another manner, the dimensions of the beaded edges of the rail elements are advantageously such that the bead can be interlocked with re-entrant grooves of the building bricks of a building set.

According to one embodiment of the invention each beading has a preferably rounded outer running surface and the cross-section of said beadings is such that in addition to such running surfaces provided thereby at the outermost opposite longitudinal edges of the rail, at the inner edges of each beading two running surfaces are provided on opposite sides of the web and extending substantially in a plane perpendicular to the latter. A rail element of this type may also be employed as a suspended rail, for example for an aerial railway.

According to a further embodiment of the invention a rail element to be used as a contact rail may comprise a central web portion of insulating material provided on its two opposite surfaces, at least in the regions of the beaded edges, with portions of electrically conducting material. Such a rail element is preferably of laminated construction, comprising a central lamina of insulating material provided over the entire area of its opposite faces with outer laminae of electrically conducting material. Assembly of the components of a building set is facilitated if the contact rail element has the same cross-sectional dimensions as a non-conducting element.

In order to allow versatility in the track lay-out of a rail system, the rail elements are

advantageously produced from a flexible material.

A building set including rail elements according to the invention may also include electric current leads intended to be suspended above the rails by means of supporting elements engaging in re-entrant grooves of the basic building bricks. In this way tram wires can easily be produced.

Such a building set may also include hinged building bricks to enable end-to-end connection of a pivotable rail track section intended to form railway points, and an adjacent stationary rail track section. The hinged brick is connected longitudinally between the rails between two adjacent transversely arranged building bricks each of which acts as spacer for the rail elements of a rail track section.

The invention is illustrated by way of example in the accompanying drawings, in which:—

Fig. 1 is a perspective view of a rail element,

Fig. 2 is a plan view of an assembly including a pair of rail elements as shown in Fig. 1,

Fig. 3 is a section along the line III—III of the rail assembly of Fig. 2, shown in cooperation with a wheel assembly,

Fig. 4 is an end view of the rail element of Fig. 1 shown assembled in a grooved building brick,

Fig. 5 is a plan view of an assembly including a pair of curved rail elements,

Fig. 6 is a side elevation of a rail element as shown in Fig. 1, associated with a wheel assembly,

Fig. 7 is a part-sectional end view of the rail element and associated assembly of Fig. 6,

Fig. 8 is a side elevation of two rail elements according to a further embodiment of the invention, arranged end to end,

Fig. 9 is a plan view of a rail assembly incorporating elements as shown in Fig. 8 joined end to end,

Fig. 10 is a perspective view of a further embodiment of rail element incorporating electric contacts,

Fig. 11 is a section along the line XI—XI of Fig. 10,

Fig. 12 is a plan view of a three-rail assembly incorporating outer rails as shown in Fig. 8 with a centre rail as shown in Fig. 10,

Fig. 13 is a part-sectional front elevation of a track system with overhead wires, and

Fig. 14 is a plan view of a model railway points system.

The rail element 1 shown in Fig. 1 comprises an elongated web 2, with beads 3, 3^1 of substantially triangular cross-section extending along the two longitudinal edges of the web 2. Two apertures 4 are provided in the web 2 each of which consists of two sections 4*a*, 4*b* of different width, x and y respectively.

As shown in Figs. 2 and 3, the apertures 4 enable two component rails 1 to be connected by building bricks 5, 6 to form a pair of rails. The bricks 5, 6 are provided with re-entrant grooves 12 on all four longitudinal faces, and with re-entrant tenons 7 on one or both end faces. The width of the front area 7*a* of each tenon 7 is less than the width x of the section 4*a*, so that the tenon 7 can easily be introduced into the section 4*a* of the aperture 4. The width y of the section 4*b* corresponds substantially to the width of the tenon 7 at the re-entrant portion 7*b*, (see Fig. 3). After introduction of the tenon 7 into the section 4*a*, each rail element 1 can be fixed to the bricks 5, 6 by sliding the bricks relatively to the rails to move the tenon 7 from the section 4*a* to the section 4*b* of the aperture 4.

Fig. 3 shows the rails of Fig. 2 in use as a ground level track system. When used in this way, the rounded outer edges 3*a* of the upper beads 3 serve as the supporting surfaces for wheels 8. The wheels 8 are fitted in pairs to an axle or shaft 9.

Fig. 3 also shows, in broken lines, the rails in use as a suspended or aerial track system. In this case the bearing surfaces $3a^1$ of the lower beads 3^1 serve to guide lower wheels 10 which are again fitted in pairs to an axle or shaft 11, the two axles or shafts 9, 11 being joined to one another by building bricks, not shown.

Fig. 4 shows a single rail element 1 used to make up a single rail track, for example a vertical guide rail for a lift. To enable this, the bead 3 is so dimensioned that it may be introduced into the groove 12 of a basic brick 6 and become held therein by friction.

Fig. 5 shows curved rail elements 13 which are joined to one another in the same way as the straight rail elements 1, by means of bricks 5, 6.

Figs. 6 and 7 show a suspended or aerial mono-rail system. The rail element 1 is suspended by means of a bead 3 held in a groove 12 of a brick 6, indicated by broken lines, in the manner shown in Fig. 4. On either side of the web 2 of the rail element is arranged a wheel 14. The wheels 14 run on bearing surfaces 3*b* and 3*c* respectively, provided by the inner surfaces of the lower bead 3 which extend perpendicular to the web portion 2. Each of the two wheels 14 is fitted to an axle 15, the latter being mounted in a long building brick 16, by engagement in a transverse groove 17. The bricks 16 which support the two axles 15 are connected with one another by means of further bricks 16 (see Fig. 7), so that the wheels 14 can not spread apart in the axial direction.

In order to facilitate the assembly of two adjacent sections of rail track, a rail element 18 shown in Fig. 8 is provided with an aperture 20 in its web 19, the aperture 20 being sub-divided into three sections 20*a*, 20*b*, 20*c*. The width of the central section 20*b* corresponds to the width x of the section 4*a* shown in Fig. 1, whereas the width of the sections 20*a* and 20*c* equals the width y of the section 4*b*.

When the two rail sections consisting of rail components 18 and 18¹ are to be assembled (see Fig. 9), first two building bricks (50, 60 and 50¹, 60¹ respectively) are inserted in each case as a strut between two rail components 18 and 18¹, as described above. The tenons 72, 72¹ of one strut 50, 60 engage the aperture sections 20*a* of the rail components 18 whereas the tenons 71, 71¹ of the other strut 50¹, 60¹ engage the aperture sections 20*c*¹ of the rail components 18¹. Then two central bricks 51, 61 which are to constitute a cross-joint, are laid between the struts. Now the two struts 50, 60 and 50¹, 60¹ are moved in opposition to one another while the tenons 73, 73¹ of the cross-joint 51, 61 are introduced into the widened ends 121*a*, 122*a* of the grooves 121, 122. Finally, in order to establish a connection which can absorb tensile forces, the tenons 73, 73¹ are urged into the re-entrant grooves 122, 121, of each strut 50, 60 and 50¹, 60¹, as shown in Fig. 9.

Since each rail component 18¹ is provided with apertures 20¹ comprising two narrow sections 20*a*¹, 20*b*¹, an additional brick may be attached, apart from the above-mentioned strut, in the region of the aperture 20¹, for example a brick 6 as shown in Fig. 9.

In order to enable the construction of a rail system for vehicles with electric motors or other electrical components, such as electric light bulbs, electrical contact rails 21 as shown in Figs. 10 and 11 may be used. The contact rail elements 21 have the same shape and dimensions as the rail elements 18, so that maximum versatility of construction is maintained. Each contact rail element 21 consists of a central lamina 22 of insulating material. On either side of the lamina 22 are fixed conductive laminae 23, 24 respectively. The laminae 22, 23, 24 are joined to one another by insulating elements, for example rivets 25. Again, apertures 26 are provided to enable other components to be attached. Their dimensions are the same as those of the apertures 20.

In the embodiment shown in Fig. 12, each contact rail 21 is arranged in the centre between two rail components 18, 18¹¹. To fix the relative positions of rails 18, 21, 18¹¹, building bricks 52, 53 are arranged at intervals, the tenons 74, 74¹, 75, 75¹ of which engage respectively a rail 21 and a rail 18 or 18¹¹. To secure the adjacent track sections together against longitudinal tension, in each case a further building brick 54, 54¹ is provided between the bricks 52, 52¹ and 53, 53¹ respectively, in a similar manner to the arrangement shown in Fig. 9. The two tenons 76, 76¹ of each brick 54, 54¹ again engage grooves 123, 124 respectively of the bricks 52¹, 52 and 53¹, 53.

In Fig. 13, in order to simulate a track system with overhead wires the two current leads 29 are fixed to a brick 16. This may be done, for example, by fastening the leads 29 to a carrier 27 which can be inserted in the re-entrant groove 28 of the brick 16. The brick 16 which supports the current lead 29 is positively connected by other bricks 5, 16 to the rail components 18, 18¹.

Fig. 14 shows a railway points system 30 using two curved flexible rail components 31, 31¹. The free ends of rails 31, 31¹ are again provided with apertures, not shown, in which the tenons 77, 77¹ of basic bricks 55, 65 engage, in order to space apart the rail elements 31, 31¹. In the grooves of the bricks 55, 65 is arranged one tenon 78 of a hinged element 33 of which a second tenon 78¹ is connected to the basic bricks 55¹, 65¹.

A pair of straight rails 34, 34¹ forming part of the points system is connected to the adjacent rail pair, 35, 35¹ in the same way as shown in Fig. 9. A hinged element 36, attached to the rail component 31 and constructed in the same way as the hinged element 33, has another brick 16 attached to its outer end and serves to actuate the points.

In order to keep the rail pairs 35, 35¹ and 36, 36¹ in their relative positions, they are connected by struts which consist of a triangular brick 37 and bricks 5, 16. The triangular brick may engage an aperture of the rail component 36¹ directly and be fixed by its tenon 79¹ to the basic brick 16, or it may engage bricks 16 with both tenons, as indicated in the drawing in broken lines.

WHAT I CLAIM IS:—

1. A rail element for inclusion in a toy building set having basic building bricks adapted for interlocking engagement by means of re-entrant tenon and groove connections, the said rail element comprising a web portion both opposite longitudinal edges of which are beaded to form the running surfaces of the rail, and said web portion being provided with apertures for engagement by re-entrant tenons of building bricks, which apertures are of the nature of keyhole slots, comprising a wider section through which a re-entrant tenon can be introduced, and an adjacent narrower section for retention of the tenon by engagement in the re-entrant portion thereof.

2. A rail element as claimed in claim 1, in which the said apertures extend longi-

In order to facilitate the assembly of two adjacent sections of rail track, a rail element 18 shown in Fig. 8 is provided with an aperture 20 in its web 19, the aperture 20 being sub-divided into three sections 20*a*, 20*b*, 20*c*. The width of the central section 20*b* corresponds to the width x of the section 4*a* shown in Fig. 1, whereas the width of the sections 20*a* and 20*c* equals the width y of the section 4*b*.

When the two rail sections consisting of rail components 18 and 18^1 are to be assembled (see Fig. 9), first two building bricks (50, 60 and 50^1, 60^1 respectively) are inserted in each case as a strut between two rail components 18 and 18^1, as described above. The tenons 72, 72^1 of one strut 50, 60 engage the aperture sections 20*a* of the rail components 18 whereas the tenons 71, 71^1 of the other strut 50^1, 60^1 engage the aperture sections $20c^1$ of the rail components 18^1. Then two central bricks 51, 61 which are to constitute a cross-joint, are laid between the struts. Now the two struts 50, 60 and 50^1, 60^1 are moved in opposition to one another while the tenons 73, 73^1 of the cross-joint 51, 61 are introduced into the widened ends 121*a*, 122*a* of the grooves 121, 122. Finally, in order to establish a connection which can absorb tensile forces, the tenons 73, 73^1 are urged into the re-entrant grooves 122, 121, of each strut 50, 60 and 50^1, 60^1, as shown in Fig. 9.

Since each rail component 18^1 is provided with apertures 20^1 comprising two narrow sections $20a^1$, $20b^1$, an additional brick may be attached, apart from the above-mentioned strut, in the region of the aperture 20^1, for example a brick 6 as shown in Fig. 9.

In order to enable the construction of a rail system for vehicles with electric motors or other electrical components, such as electric light bulbs, electrical contact rails 21 as shown in Figs. 10 and 11 may be used. The contact rail elements 21 have the same shape and dimensions as the rail elements 18, so that maximum versatility of construction is maintained. Each contact rail element 21 consists of a central lamina 22 of insulating material. On either side of the lamina 22 are fixed conductive laminae 23, 24 respectively. The laminae 22, 23, 24 are joined to one another by insulating elements, for example rivets 25. Again, apertures 26 are provided to enable other components to be attached. Their dimensions are the same as those of the apertures 20.

In the embodiment shown in Fig. 12, each contact rail 21 is arranged in the centre between two rail components 18, 18^{11}. To fix the relative positions of rails 18, 21, 18^{11}, building bricks 52, 53 are arranged at intervals, the tenons 74, 74^1, 75, 75^1 of which engage respectively a rail 21 and a rail 18 or 18^{11}. To secure the adjacent track sections together against longitudinal tension, in each case a further building brick 54, 54^1 is provided between the bricks 52, 52^1 and 53, 53^1 respectively, in a similar manner to the arrangement shown in Fig. 9. The two tenons 76, 76^1 of each brick 54, 54^1 again engage grooves 123, 124 respectively of the bricks 52^1, 52 and 53^1, 53.

In Fig. 13, in order to simulate a track system with overhead wires the two current leads 29 are fixed to a brick 16. This may be done, for example, by fastening the leads 29 to a carrier 27 which can be inserted in the re-entrant groove 28 of the brick 16. The brick 16 which supports the current lead 29 is positively connected by other bricks 5, 16 to the rail components 18, 18^1.

Fig. 14 shows a railway points system using two curved flexible rail components 31, 31^1. The free ends of rails 31, 31^1 are again provided with apertures, not shown, in which the tenons 77, 77^1 of basic bricks 55, 65 engage, in order to space apart the rail elements 31, 31^1. In the grooves of the bricks 55, 65 is arranged one tenon 78 of a hinged element 33 of which a second tenon 78^1 is connected to the basic bricks 55^1, 65^1.

A pair of straight rails 34, 34^1 forming part of the points system is connected to the adjacent rail pair, 35, 35^1 in the same way as shown in Fig. 9. A hinged element 36, attached to the rail component 31 and constructed in the same way as the hinged element 33, has another brick 16 attached to its outer end and serves to actuate the points.

In order to keep the rail pairs 35, 35^1 and 36, 36^1 in their relative positions, they are connected by struts which consist of a triangular brick 37 and bricks 5, 16. The triangular brick may engage an aperture of the rail component 36^1 directly and be fixed by its tenon 79^1 to the basic brick 16, or it may engage bricks 16 with both tenons, as indicated in the drawing in broken lines.

WHAT I CLAIM IS:—

1. A rail element for inclusion in a toy building set having basic building bricks adapted for interlocking engagement by means of re-entrant tenon and groove connections, the said rail element comprising a web portion both opposite longitudinal edges of which are beaded to form the running surfaces of the rail, and said web portion being provided with apertures for engagement by re-entrant tenons of building bricks, which apertures are of the nature of keyhole slots, comprising a wider section through which a re-entrant tenon can be introduced, and an adjacent narrower section for retention of the tenon by engagement in the re-entrant portion thereof.

2. A rail element as claimed in claim 1, in which the said apertures extend longi-

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tudinally of the rail, the dimension of each section of the aperture in the longitudinal direction being greater than the transverse dimension thereof.

3. A rail element as claimed in any one of claims 1 or 2, in which the cross section of each beaded edge is such that, in addition to running surfaces provided thereby at the outermost opposite longitudinal edges of the rail, at the inner edges of each beading two running surfaces are provided on opposite sides of the web and extending substantially in a plane perpendicular to the latter.

4. A rail element as claimed in any one of claims 1—3, in which apertures provided in the web portion adjacent the ends of the rail each comprise two narrower sections arranged on opposite sides of the said wider section.

5. A rail element as claimed in any one of claims 1—4, said element comprising a central web portion of insulating material provided on its two opposite surfaces, at least in the regions of the beaded edges, with portions of electrically conducting material.

6. A rail element as claimed in claim 5, being of laminated construction and comprising a central lamina of insulating material provided over the entire area of its opposite faces with outer laminae of electrically conducting material.

7. A rail element as claimed in claim 5 or 6, in which the insulating and conducting parts of the rail are attached together by connecting elements, more especially rivets, of insulating material.

8. A rail element as claimed in any one of claims 1—7, constructed of a flexible material.

9. A rail element substantially as described herein with reference to Fig. 1 of the accompanying drawings.

10. A rail element substantially as described herein with reference to Fig. 8 or Figs. 10 and 11 of the accompanying drawings.

11. A toy building set including, in addition to a rail element as claimed in any one of claims 1—8, building bricks as defined in claim 1 of which re-entrant tenons are dimensioned for engagement with the apertures in the rail element.

12. A building set as claimed in claim 11, of which the relative dimensions of the rail element and the bricks are such that the beaded edges of the rail element can make interlocking engagement with re-entrant grooves of the bricks.

13. A building set as claimed in claim 11 or 12, including electrically conducting rail elements as claimed in any one of claims 5—7 in addition to non-conducting rail elements, all rail elements being of the same cross-sectional dimensions.

14. A building set as claimed in any one of claims 11—13, including electric current leads for use as aerial current conductors or tram wires together with supporting elements for the same, the supporting elements being dimensioned for engagement in re-entrant grooves of said building bricks.

15. A building set as claimed in claim 11, including building components substantially as described herein with reference to any one of Figs. 1—7 of the accompanying drawings.

16. A building set as claimed in claim 11, including building components substantially as described herein with reference to any one of Figs. 8—14 of the accompanying drawings.

17. A model construction assembled from a building set as claimed in claim 11, said construction including two rail elements located in spaced relation to form a section of railway track by means of at least two building bricks connected transversely between the rail elements by means of re-entrant tenons provided at the ends of the bricks and engaging in the apertures of the rail elements.

18. A model construction as claimed in claim 17, including two track sections as defined in claim 17 connected end to end by means of a further building brick arranged longitudinally between the rails and interlocking at each end with bricks connected transversely between the rails at points adjacent the abutting ends of the track sections.

19. A model construction as claimed in claim 18, in which to provide for relative pivotal movement of the track sections to form a points system, the said longitudinally arranged brick is a brick provided with a hinged joint intermediate its ends.

20. A model construction as claimed in claim 19, in which one or more bricks arranged externally of the rail track is attached to a rail of the pivotally movable track section to enable manual movement of the latter.

21. A model construction as claimed in any one of claims 17—20, in which two adjacent diverging track sections are located relatively to one another by two or more building bricks connected end to end between the adjacent rail elements of the track sections, one of said building bricks being of triangular configuration.

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22. A model construction assembled from a building set as claimed in claim 11, substantially as described herein with reference to Figs. 2 and 3, Fig. 4, Fig. 5 or Figs. 6 and 7 of the accompanying drawings.

23. A model construction assembled from a building set as claimed in claim 11, substantially as described herein with reference to Fig. 9, Fig. 12, Fig. 13 or Fig. 14 of the accompanying drawings.

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