

[54] **TOY ASSEMBLY PLANT FOR VEHICLE**

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[56]

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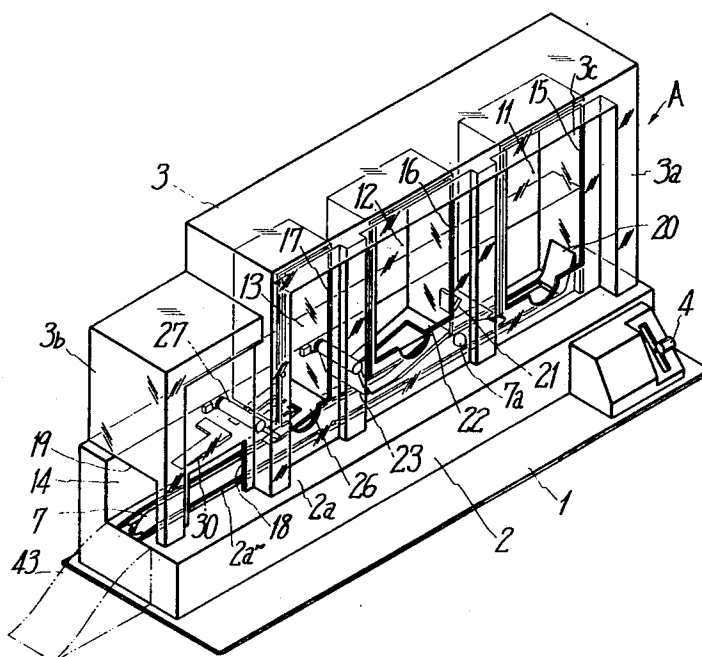
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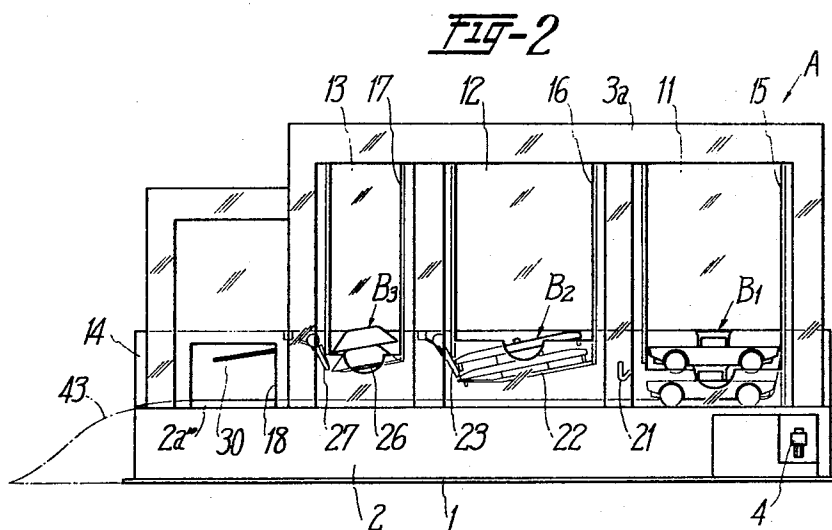
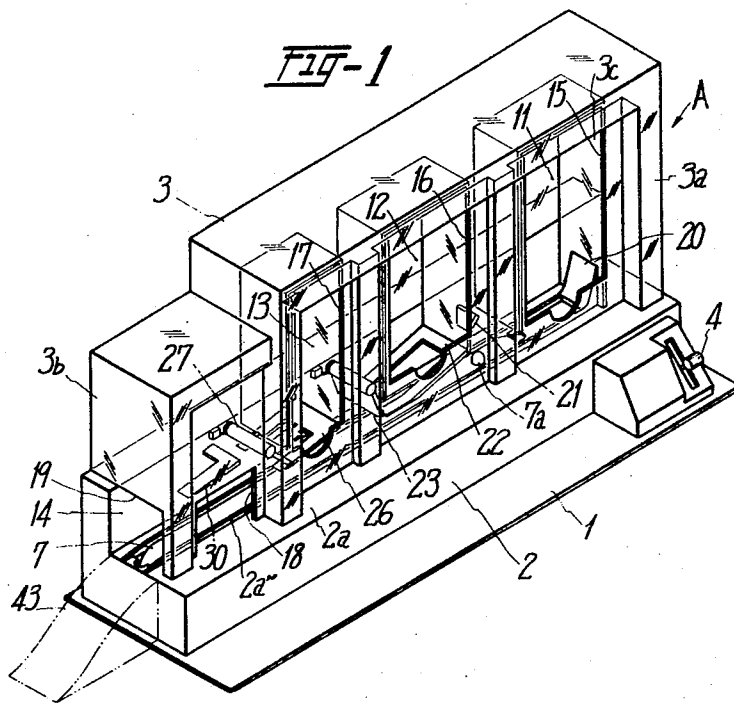
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ABSTRACT

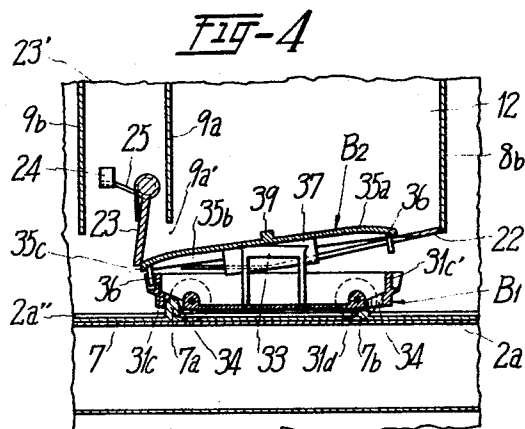
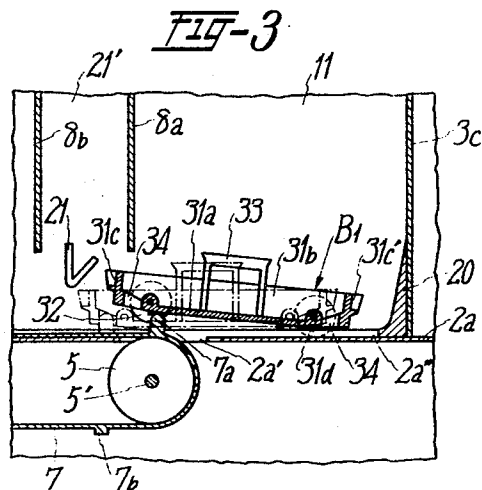
A toy comprising, in combination, an assembly plant and elements so constructed as to be assembled into a vehicle in superimposed relationship by the assembly plant. The assembly plant is equipped with a motor-driven conveyor for conveying the elements to the delivery side thereof and also with devices capable of automatically assembling the elements into a vehicle in co-operation with the moving conveyor in the course of conveyance of the elements.

9 Claims, 11 Drawing Figures





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FIG-5

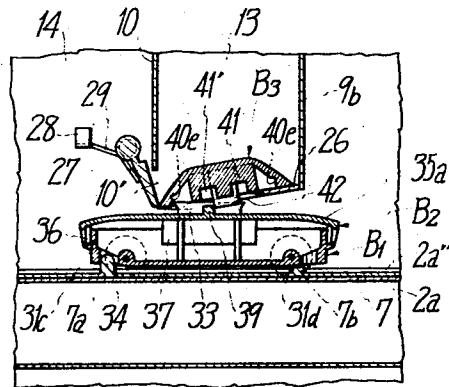
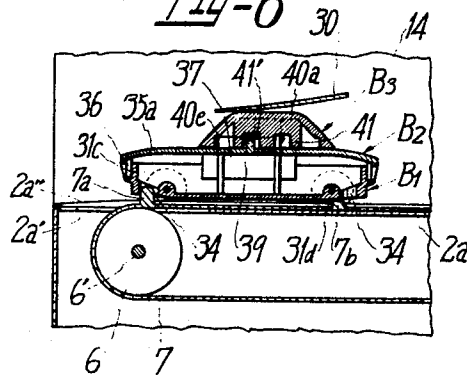
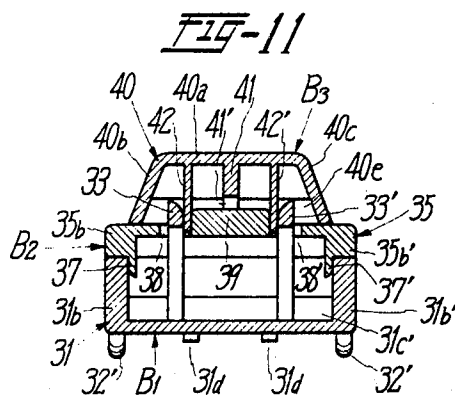
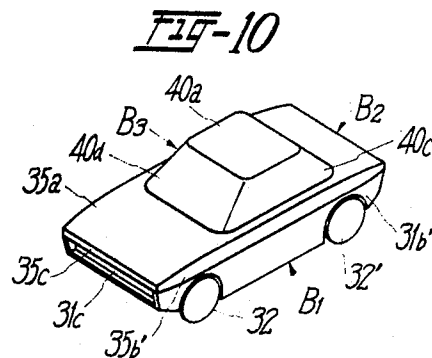
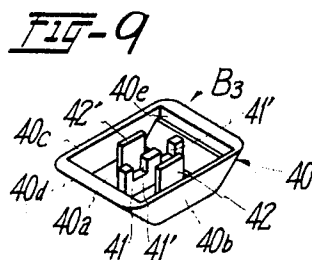
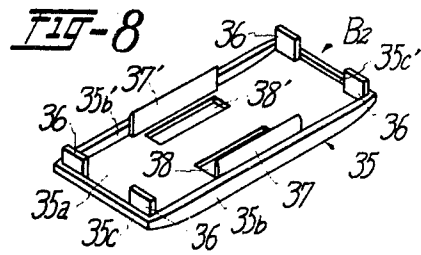
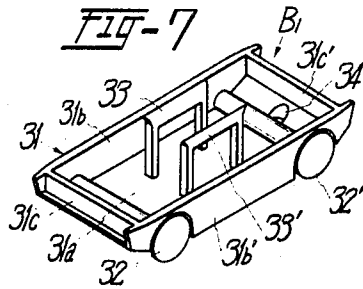


FIG-6



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TOY ASSEMBLY PLANT FOR VEHICLE

SUMMARY OF THE INVENTION

The present invention is concerned with a toy assembly plant for a vehicle which is capable of automatically assembling a toy vehicle with elements therefor.

In accordance with the present invention, there is provided a toy assembly plant for a vehicle comprising, in combination, a cabinet-like housing equipped with a driving mechanism including an electric motor, a horizontal conveyor means arranged to move within said housing, and vehicle-constituting members such as a chassis and body-forming members, said cabinet-like housing having on one side thereof a plurality of apertures for insertion, therethrough, of said respective vehicle-constituting members into said cabinet-like housing, said housing also having therein means for assembling said vehicle-constituting members together one after another, whereby by placing said vehicle-constituting members one after another onto the surface of the conveyor through said apertures in a predetermined order, the toy vehicle may be automatically assembled with said members during the course of conveyance of the same by the conveyor means.

It is, therefore, one object of the present invention to provide entertainment and amusement for children by providing a novel toy assembly plant for a vehicle of the type described above which is simple in structure and operation.

Another object of the present invention is to provide a toy assembly plant and elements or members to be assembled by the plant into a toy vehicle.

A further object of the invention is to provide a toy of the kind described above which can be manufactured and sold at a relatively low expense.

Other objects and advantages of the invention will become apparent upon reading the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of a toy assembly plant for a toy vehicle according to the present invention;

FIG. 2 is a front view of the plant shown in FIG. 1, illustrating the state in which the vehicle-constituting members are being assembled into a vehicle;

FIGS. 3, 4, 5 and 6 are vertical cross-sectional views, with parts broken away, of the plant, showing the respective sequential stages in which the members are assembled together one after another into a complete vehicle;

FIG. 7 is a perspective view of a chassis;

FIG. 8 is a perspective view of the underside of a vehicle body;

FIG. 9 is a perspective view of the underside of the top of the vehicle;

FIG. 10 is a perspective view of a completed toy vehicle; and

FIG. 11 is a transverse vertical cross-sectional view of the completed toy vehicle.

In the drawings like portions or parts are designated with like characters or numerals.

Referring now to the drawings in FIGS. 1 and 2, there is shown a toy assembly plant A for a toy vehicle which comprises a rectangular base plate 1, an elongated lower housing 2 mounted on said base plate longitudinally thereof and a cabinet-like upper housing 3 mounted on the lower housing 2. Preferably, the base plate 1, the lower housing 2 and the upper housing 3 are molded from a plastics material.

Within the lower housing 2, which is provided, on its front side and at a portion adjacent one end thereof, with a switch means 4, is provided a pair of rollers 5 and 6 with which a conveyor belt 7 is engaged. The rollers 5 and 6 are mounted on the shafts 5' and 6' which are rotatably mounted within the lower housing 2 transversely thereof at the portions adjacent to the longitudinal ends thereof, respectively, whereby the conveyor belt 7 is arranged to travel horizontally in the longitudinal direction of the lower housing. In the illustrated embodiment, the conveyor belt 7 is designed to rotate in the

counter-clockwise direction so that the upper portion of the conveyor belt 7 may travel from the right-hand side to the left-hand side.

As clearly shown in FIGS. 3 to 6, the conveyor belt 7 is provided with an appropriate number of traction projections 7a and delivery projections 7b which project outwardly from the outer surface of said endless belt and which are adapted to engage with lower portions of a chassis B1 which will be described later. Of the two rollers 5 and 6, the roller 5 which is located on the right-hand side is a belt-driving roller which is driven by an electric motor, not shown.

The upper portion of the conveyor belt 7 passes through the openings 2a' and 2a'' formed in a longitudinally extending elongated upper plate 2a, at the portions near both ends thereof, of the conveyor housing 2 and is movably supported on the upper surface of the upper plate 2a so that it can travel horizontally thereon. A pair of parallel spaced guide rails 2a' and 2a'' for guiding a chassis B1 project slightly upwardly from bilateral sides of the upper plate 2a and extend longitudinally thereof.

Partition walls 8a, 8b, 9a and 9b are provided vertically and transversely, with predetermined intervals, within the upper housing 3 to form a first chamber 11 for receiving the chassis, a second chamber 12 for assembling a body, a third chamber 13 for assembling the body and a fourth chamber 14 for finish, respectively. The front wall 3a of the upper housing 3 is provided with openings 15, 16, 17 and 18 which are formed in the respective portions of front wall 3a corresponding to the chambers 11, 12, 13 and 14. A delivery outlet 19 for delivering an assembled toy vehicle is formed in a lower portion of the left side end wall 3b of the finishing chamber 14 of the upper housing 3.

Inside the chamber 11 for chassis, there is formed an inclined guide wall 20 integrally with the right-hand end wall 3c of the upper housing 3 so that the chassis B1 inserted in the chamber 11 through the opening 15 thereof can be smoothly placed in position. A stopper 21 having a V-shape profile is arranged in the lower portion of an intermediate chamber 21' defined by the vertical partition walls 8a and 8b of the first chamber 11 and the second chamber 12. A first supporting plate 22 having a substantially U-shaped configuration is provided in the lower portion of the second chamber 12 in such a way that its base portion is fixed to the left side surface of the lower portion of the partition wall 8b of the second chamber 12 and that the U-shaped supporting plate 22 inclines somewhat downwardly as it extends toward the left side of the chamber 12.

A first holding member 23 is swingably mounted in the lower portion of an intermediate chamber 23' defined by the vertically depending partition walls 9a and 9b of the second chamber 12 and the third chamber 13. This holding member 23 is swingable about a horizontal axis and is normally urged counter-clockwise by the action of a spring means 25 having one end anchored to an anchor lug 24, so that one end of the holding member 23 is normally resiliently projected into the second chamber 12 through the opening 9a' formed between the lower end of the depending wall 9a of the second chamber 12 and the upper surface of the conveyor belt 7.

A second supporting plate 26 having a substantially U-shaped configuration is provided in the lower portion of the third chamber 13 in the same manner and position as the first supporting plate 22.

A second holding member 27 is swingably secured in place within the fourth chamber 14 so as to be swingable about a horizontal axis and is normally urged counter-clockwise by the action of a spring means 29 having one end secured to a securing lug 28, so that one end of the member 27 is normally resiliently projected into the third chamber 13 through the opening 10' formed between the lower end of the partition wall 10 for the third and fourth chambers 13 and 14 and the upper surface of the conveyor belt 7. A resilient member 30 having a generally L-shape is secured in place within the fourth chamber 14 in such a way that it is somewhat inclined

downwardly toward the left side of the chamber. The functions of the elements 21, 22, 23, 26, 27 and 30 previously mentioned will be described later.

Referring now to FIGS. 7, 8 and 9, there are shown a chassis B1 and vehicle body members B2 and B3 which are adapted to be assembled into a toy vehicle B by the assembly plant A, as described, according to the present invention. As shown in FIG. 7, the chassis B1 comprises a generally rectangular box-like shell 31 having a bottom wall 31a, side walls 31b and 31b' and front and rear walls 31c and 31c', front and rear wheel assemblies 32 and 32' and a pair of transversely spaced engaging members 33 projecting upwardly from a middle portion of the upper surface of the bottom wall 31a. Hook holes 34 and 34' are formed in the front and the rear end portions of said bottom wall.

FIG. 8 shows a first body member B2 which comprises a rectangular tray-like shell 35 having an upper wall 35a, side walls 35b and 35b' and front and rear walls 35c and 35c', four tongue-like engaging lugs 36 depending from the four corners of the upper wall 35a and a pair of transversely spaced parallel elongated engaging lugs 37 and 37' depending from the lower surface of the upper wall 35a along the inner surfaces of the side walls 35b and 35b'. A pair of transversely spaced longitudinally elongated parallel slots 38 and 38' are formed in the upper wall 35a on the inside of the elongated engaging lugs 37 and 37', respectively. Also, an engaging lug 39 projects upwardly from the central portion of the upper surface of the upper wall 35a of the shell 35.

FIG. 9 shows a second body member B3 for a vehicle top which comprises a generally frust-conical shell 40 having a top wall 40a and side walls 40b, 40c, 40d and 40e, a lug 41 having two notches 41' and depending from approximately the central portion of the lower surface of the top wall 40a, and a pair of spaced engaging lugs 42 and 42' depending from the lower surface of the upper wall 40a in opposed relationship and between which the lug 41 is located.

Description will now be made on the principle of manner of assembling the aforementioned chassis B1, first body member B2 and second body member B3 into a complete toy vehicle B. First, the first body member B2 is mounted on the chassis B1. When the member B2 is mounted on the chassis B1, the pair of engaging members 33 and 33' of the chassis B1 are received in their mating elongated slots 38 and 38' of the first body member B2. Along with this, the engaging lugs 36 of the body member B2 are brought into contact with the outer faces of the opposite end walls 31c and 31c' of the chassis B1. Then, on top of the body member B2 is mounted the second body member B3. In doing so, the pair of engaging lugs 42 and 42' of the second member B3 are inserted in the mating elongated slots 38 and 38' in which are already received the engaging members 33 and 33' of the chassis B1, so that the engaging lugs 42 and 42' are received in the elongated slots 38 and 38' jointly with the engaging members 33 and 33'. On the other hand, one of the notches 41' of the lug 41 is engaged with the projection 39 which is provided on the upper surface of the first body member B2.

Description will next be directed to the manner in which the assembly plant A of the present invention is used and operated for assemblage of the vehicle B.

As a first step, the vehicle-constituting members, i.e., the chassis B1, the first body member B2 and the second body member B3, are inserted through the front openings 15, 16 and 17 into the first chamber 11 which is a chamber for the chassis, the second chamber 12 which is a chamber for the first body member and the third chamber 13 which is a chamber for the second body member, respectively. With respect to the chassis B1, it is only necessary that this chassis B1 be set on the upper surface of the upper plate 2a of the conveyor housing 2 in such a way that the front and the rear wheels of the wheel assemblies 32 and 32' straddle the guide rails 2a'' and 2a'''.

Also, with respect to the first and second body members B2 and B3, it is only necessary that they be placed on the first and

second supporting plates 22 and 26, respectively. It should be understood that a desired number of each of said chassis B1, first body member B2 and second body member B3 may be housed in their corresponding chambers in piles in which the same vehicle-constituting members are placed one upon another in each chamber. In this connection, it is to be noted that the first and second vehicle body members B2 and B3 are held by the lower ends of the spring-loaded holding members 23 and 27, respectively, when placed on their respective supporting plates 22 and 26 in the chambers 12 and 13, so that they are prevented from slipping off the inclined supporting plates 22 and 26.

In operation, when the switch 4 is turned on, the motor circuit is closed and the motor starts rotating to drive the conveyor belt 7 for rotation in a counter-clockwise direction. As the conveyor belt 7 is moved counter-clockwise, its traction projections 7a and delivery projections 7b are caused to travel counter-clockwise therewith. By the travel of conveyor belt 7, one of the traction projections 7a is brought into sliding contact with the underside of the chassis B1 placed in the first chamber 11 and pushes it upwardly as shown in FIG. 3. Under this state, the chassis B1 is in engagement with the stopper 21 at the upper surface of its side wall 33 and is prevented from moving toward the left side. As the projection 7a moves further from that position, it is received in the hook hole 34 of the chassis B1 and the chassis B1 is caused to descend to assume its normal position. As a consequence, the chassis B1 is disengaged from the stopper 21 and the projection 7a is brought into complete engagement in the hook hole 34, so that the chassis B1 is subjected to traction force and is transferred toward the second chamber 12.

In case a pile of a plurality of chassis B1 is housed in the first chamber 11 for chassis, only the chassis B1 which is positioned lowermost of the pile and which is brought into engagement with the projection 7a can be conveyed into the next chamber 12. After the lowermost chassis B1 has been delivered from the first chamber 11, those chassis B1 which were located above said lowermost chassis and which were prevented from moving toward the left side by being stopped by the partition wall 8a will then be allowed to descend in their positions. The chassis B1 which is now positioned lowermost in the pile is then brought into engagement with the traction projection 7a to be transferred to the next chamber.

In accordance with the present invention, the first and second vehicle body members B2 and B3 are automatically stacked on the chassis B1 in assembled relationship in the course of the transfer of the chassis B1 by the conveyor belt 7 toward the delivery outlet 19, thus completing assemblage of a toy vehicle B. More specifically, as the chassis B1 is conveyed into the first vehicle body assembling chamber 12 which is the second chamber by the conveyor belt 7, the forward end wall 31c of the chassis B1 is brought into engagement with the forward engaging lugs 36 of the first body member B2 placed in the second chamber 12, so that the body member B2 is pushed or pulled forward by the chassis B1 along the inclined upper surface of the supporting plate 22. During this movement of the chassis B1, the elongated slots 38 of the first body member B2 are brought into engagement with the upright engaging members 33 of the chassis B1 with the aid of the depressing action of the first spring-loaded holding member 23 which is exerted upon the body member B2. As a consequence, the first body member B2 is lowered and mounted onto the chassis B1 in assembled relationship in the manner previously mentioned.

Likewise, in the vehicle top mounting chamber 13 which is the third chamber, the second body member B3 for forming a top of vehicle is mounted onto the first body member B2 carried by the chassis B1 in assembled relationship by the aid of the depressing action of the second spring-loaded holding member 27. Then, in the finishing chamber 14 which is the fourth chamber, the second body member B3 is pressed upon the first body member B2 by the action of the resilient member 30 so that the chassis B1 and the body members B2

and B3 are snugly held in completely assembled relationship with each other, as shown in FIG. 11. The toy vehicle B thus assembled is then transferred further toward the delivery outlet 19 in its state of being engaged with the traction projection 7a of the conveyor belt 7. As the assembled toy vehicle B approaches the delivery outlet 19, the traction projection 7a descends and disengages from the hook hole 34 of the chassis B1. In place of this traction projection 7a which has been disengaged, the delivery projection 7b which engages with the projection 31d slightly downwardly projecting from a rear portion of the bottom wall 31a of the chassis B1 pushes the completed toy vehicle B out from the delivery outlet 19. It should be understood that a delivery table 43 may be provided in the foreground of the delivery outlet 19 adjacent thereto.

As may be seen from the foregoing, with the toy assembly plant, as described, according to the present invention, by merely setting a desired number of the vehicle component members in the predetermined positions within the cabinet-like housing, it is possible to assemble a toy vehicle or vehicles automatically, thus providing unlimited entertainment for children.

What I claim is:

1. A toy comprising, in combination, an assembly plant and vehicle-constituting members so constructed as to be assembled into a vehicle in stacked relationship by the assembly plant, said assembly plant comprising a cabinet-like housing and a motor-driven conveyor arranged to move horizontally within said housing, said vehicle-constituting members comprising a chassis adapted to be conveyed in one direction by said conveyor, a first body member adapted to be mounted on said chassis and a second body member adapted to be mounted on said first body member, said cabinet-like housing comprising chambers located above said conveyor and adapted to receive said vehicle-constituting members, respectively, and means in co-operation with said conveyor for assembling said vehicle-constituting members into a vehicle, said cabinet-like housing further comprising openings through which said vehicle-constituting members are fed into said chambers, respectively, and a delivery outlet through which a toy vehicle assembled in said housing is discharged, whereby by feeding said vehicle-constituting members into the respective chambers through said openings, a toy vehicle can be automatically assembled with said vehicle-constituting members during the operation of said conveyor and discharged from said housing through said delivery outlet by said conveyor upon completion of its assemblage.

2. A toy as set forth in claim 1, wherein said cabinet-like housing is made of a plastics material and comprises a rectangular base plate, an elongated lower housing mounted on said base plate longitudinally thereof and a cabinet-like upper housing mounted on said lower housing, said lower housing having therein drive means for driving said conveyor, said upper housing having therein vertical partition walls to form the chambers into which said vehicle-constituting members

are fed.

3. A toy as set forth in claim 1, wherein the chambers located above said conveyor comprise a first chamber for receiving the chassis, a second chamber for receiving the first body member and a third chamber for receiving the second body member, said first, second and third chambers being capable of housing a plurality of the chassis and first and second body members, respectively, and arranged in spaced-apart relationship along said conveyor in a direction in which said conveyor moves toward said delivery outlet.

4. A toy as set forth in claim 3, wherein said chassis and said first body member are adapted to be assembled in stacked relationship substantially within a space between said second chamber and said conveyor, and wherein said second body member is adapted to be mounted on the first body member being carried by said chassis in stacked, assembled relationship substantially within a space between said third chamber and said conveyor.

5. A toy as set forth in claim 1, wherein the chambers located above said conveyor comprise a first chamber for receiving the chassis, a second chamber for receiving the first body member and a third chamber for receiving the second body member, said first, second and third chambers being arranged in spaced-apart relationship along said conveyor in a direction in which said conveyor moves toward said delivery outlet, said first chamber being provided with means for releasably stopping said chassis therewithin, said second and third chambers each including means for releasably supporting each of the first and second body members.

6. A toy as set forth in claim 5, further comprising a fourth chamber for completing assemblage of said vehicle-constituting members into a vehicle, said fourth chamber being provided within said housing at the forward portion thereof and having at its forward end the delivery outlet through which an assembled vehicle is discharged from said housing.

7. A toy as set forth in claim 1, wherein said conveyor is provided with a plurality of projections for the traction of said chassis toward the delivery side of said conveyor, said projections projecting outwardly from the outer surface of said conveyor at regular intervals so that any of the projections can engage with a portion of said chassis for traction when said chassis is placed on the moving conveyor on the feeding side thereof where the first one of said chambers is located.

8. A toy as set forth in claim 7, wherein said chassis comprises a generally rectangular box-like shell and front and rear wheel assemblies mounted thereon, said shell having at its lower portion a hole with which any of the projections of said conveyor is releasably engageable.

9. A toy as set forth in claim 1, wherein said chassis, said first body member and said second body member each comprises engaging means so that when superimposed one upon another they can be held in assembled relationship with each other in the form of a vehicle.

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