United States Patent

Boltrek et al.

[15] **3,707,220**

[45] **Dec. 26, 1972**

[54] **MODULAR PASSENGER CONVEYOR CONSTRUCTION**

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[73] Assignee: **Westinghouse Electric Corporation**, Pittsburgh, Pa.

[22] Filed: **Nov. 23, 1970**

[21] Appl. No.: **91,846**

[52] **U.S. Cl.**.....**198/16**, 198/204

[51] **Int. Cl.**.....**B65g 15/60**, B66b 9/12

[58] **Field of Search**.....198/16, 18, 204; 104/20, 25

[56] **References Cited**

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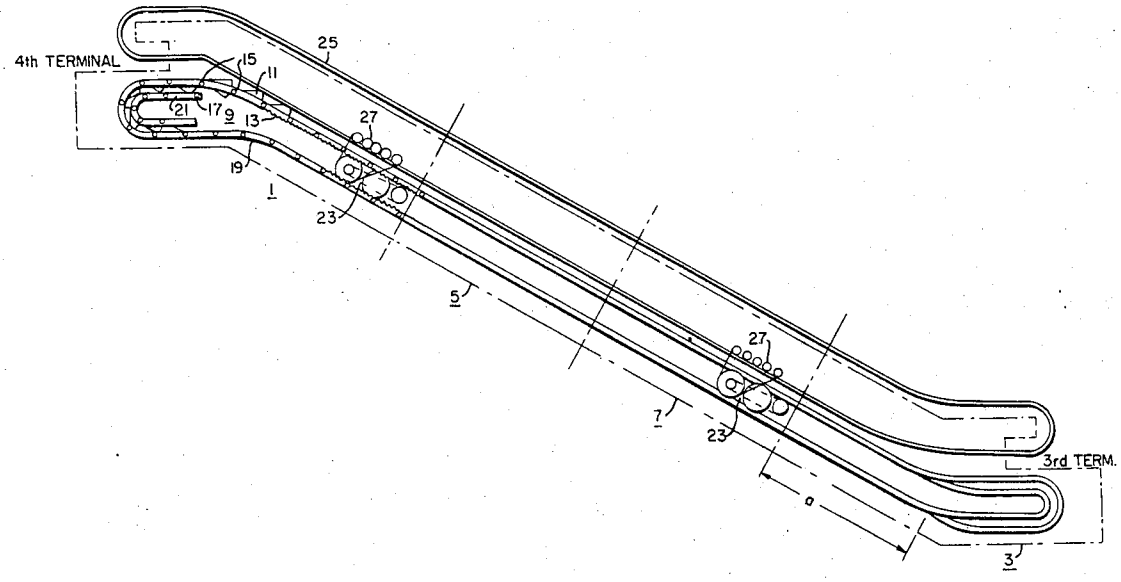
[57] **ABSTRACT**

A passenger conveyor is assembled from standard modular units which may be combined in the required numbers to fit any installation. The modular units for a moving stairway are fabricated with all of the components precisely aligned with respect to the tracks which guide the steps so that when the units are joined in the field no adjustment of the tracks is required. Standardized modular drive units are inserted into selected modules in accordance with the requirements of the particular installation.

20 Claims, 10 Drawing Figures



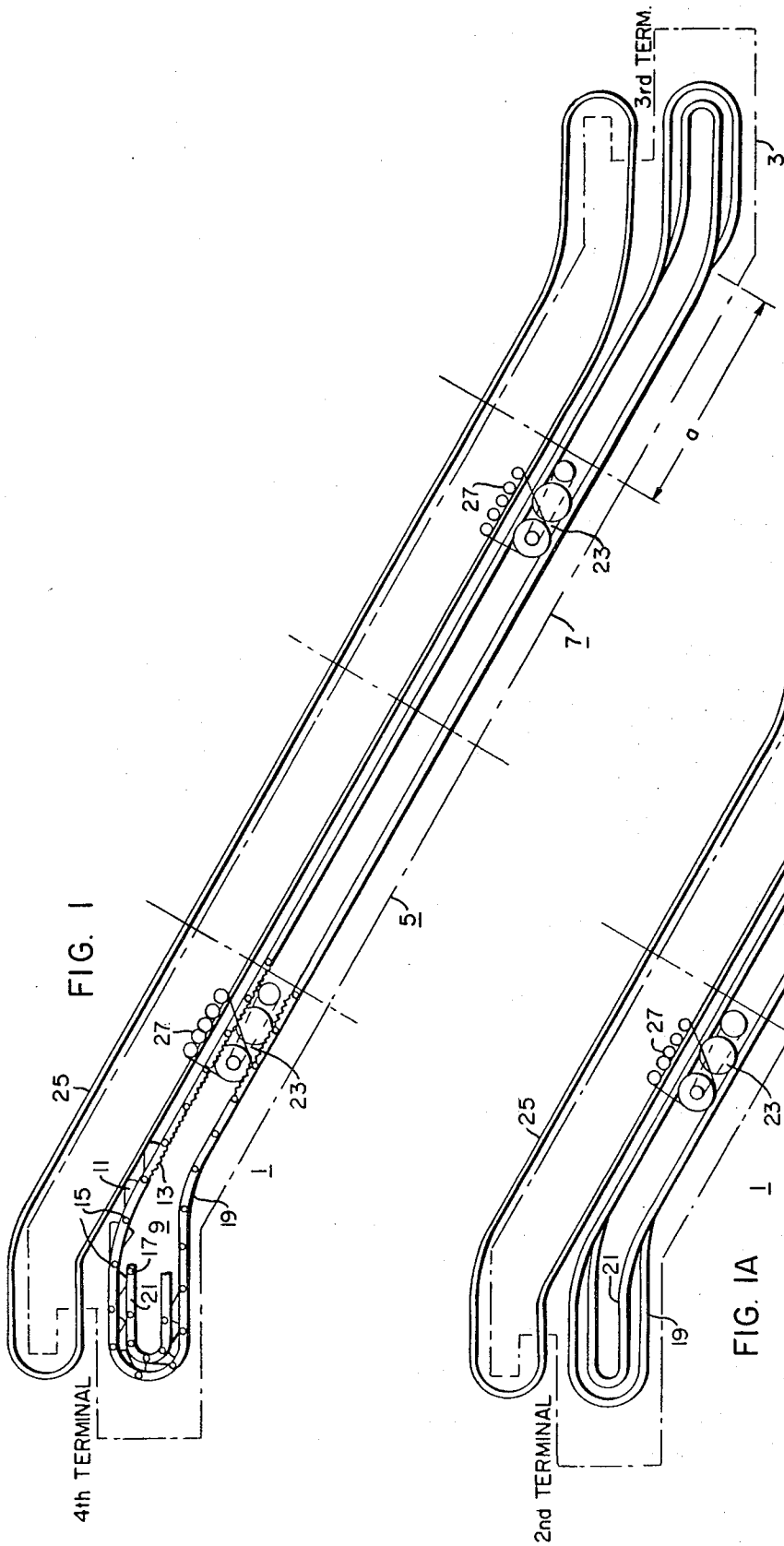

4th TERMINAL
3rd TERM.
1st TERMINAL
2nd TERMINAL
1
3
5
7
9
11
13
15
17
19
21
23
25
27
o

FIG. 1

FIG. 1A

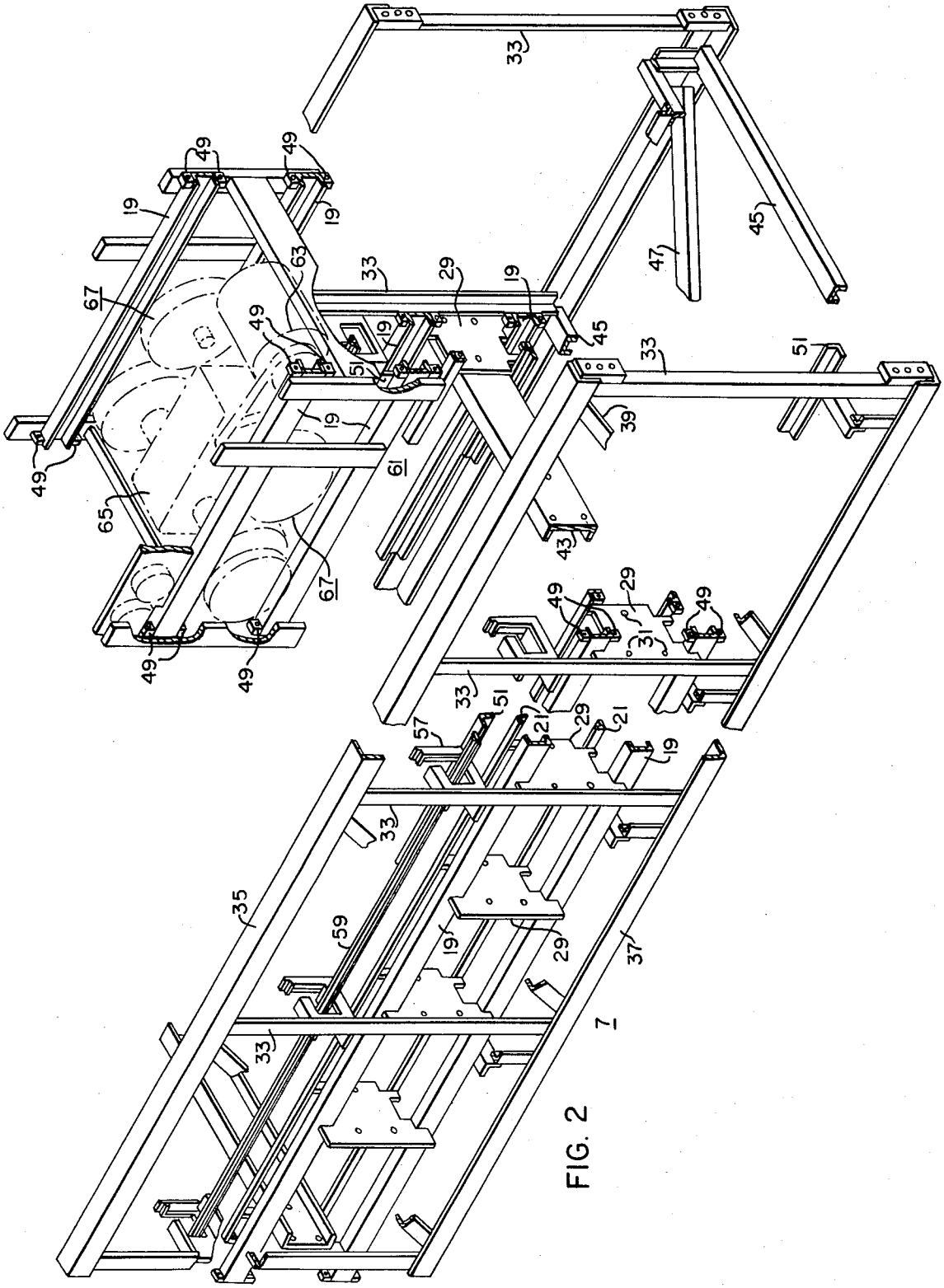


FIG. 2

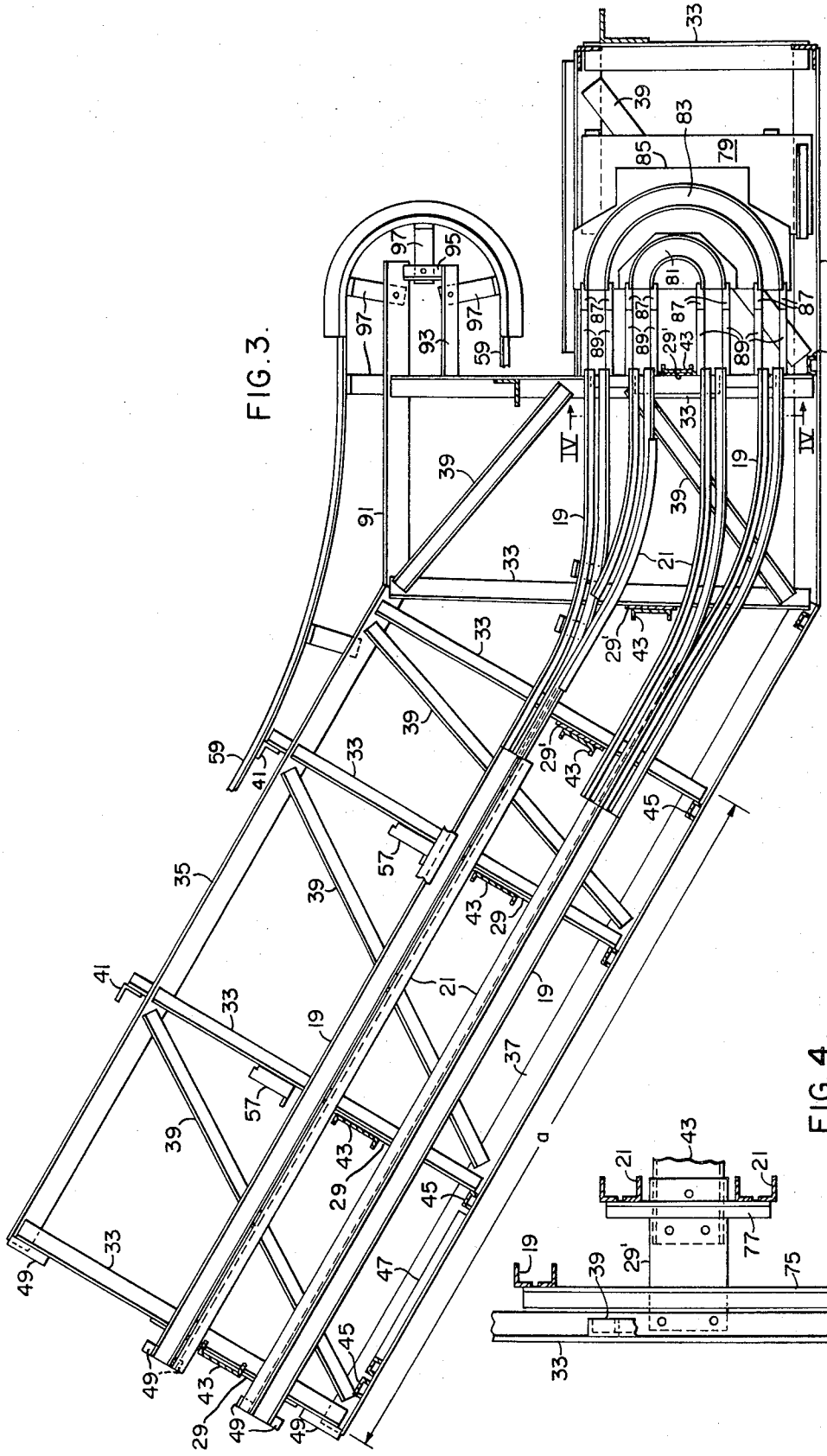


FIG. 3.

FIG. 4.

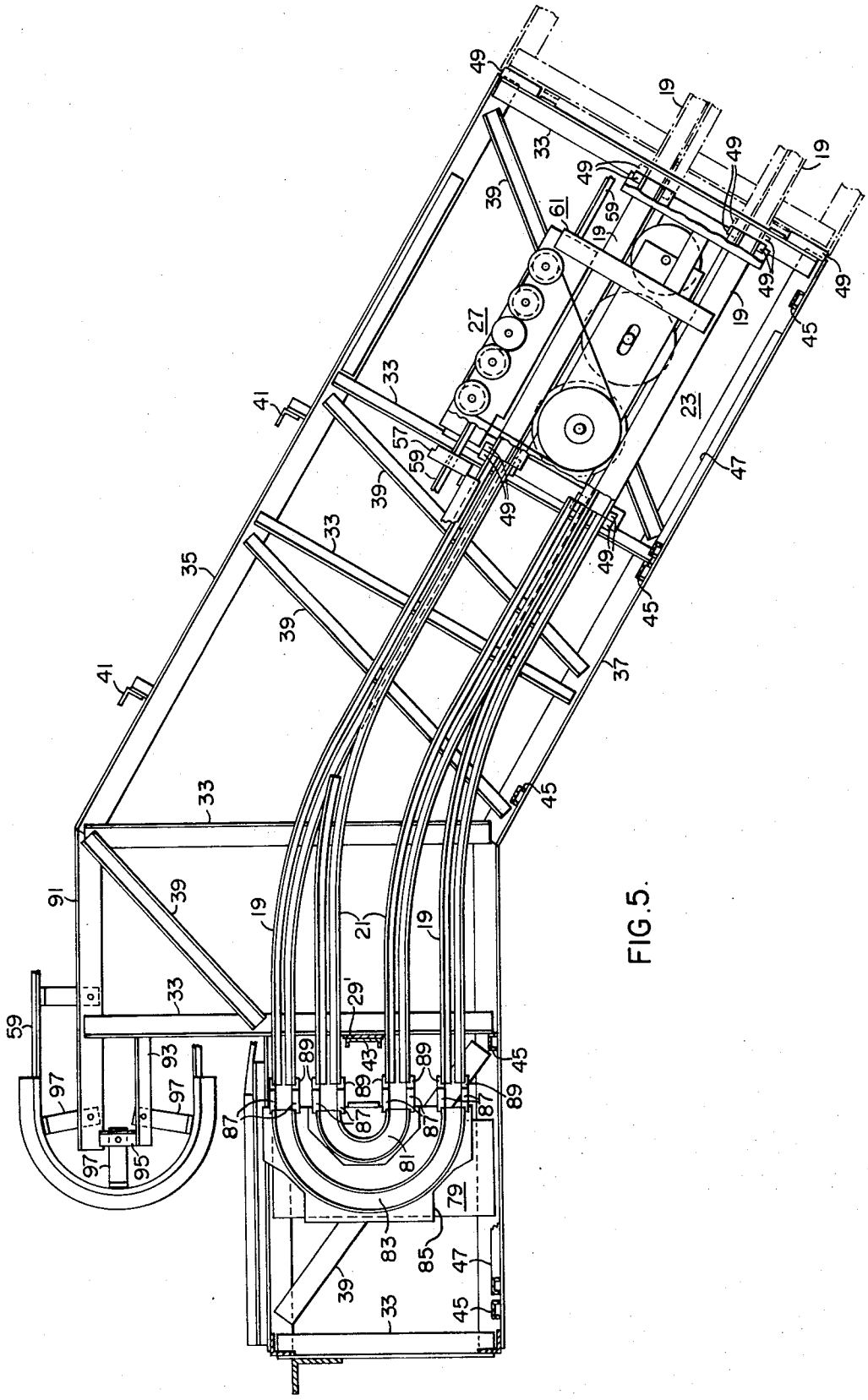


FIG. 5.

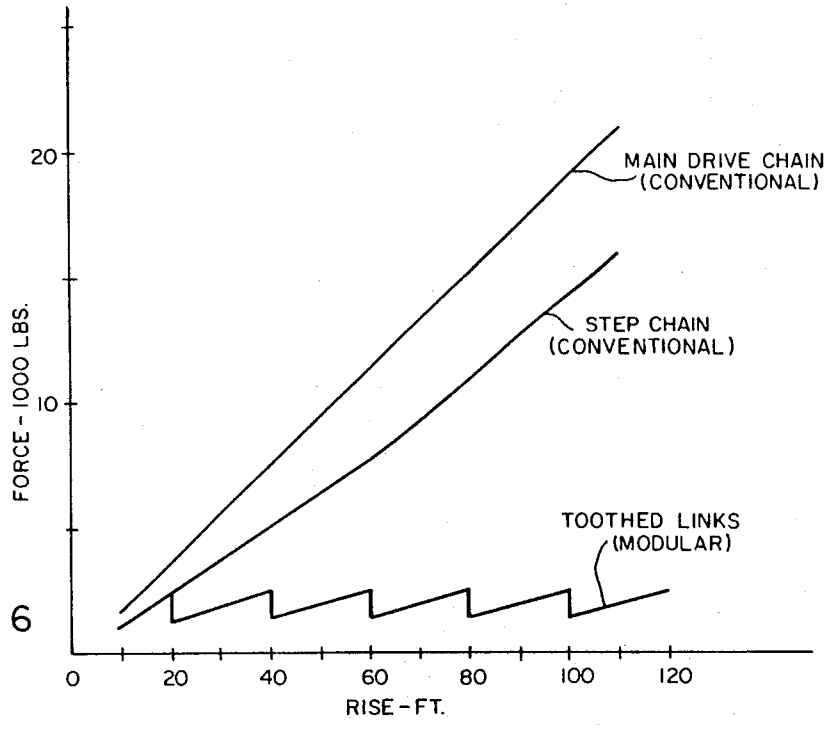

20
10
FORCE - 1000 LBS.
MAIN DRIVE CHAIN
(CONVENTIONAL)
STEP CHAIN
(CONVENTIONAL)
TOOTHED LINKS
(MODULAR)
0
20
40
60
80
100
120
RISE - FT.

FIG. 6

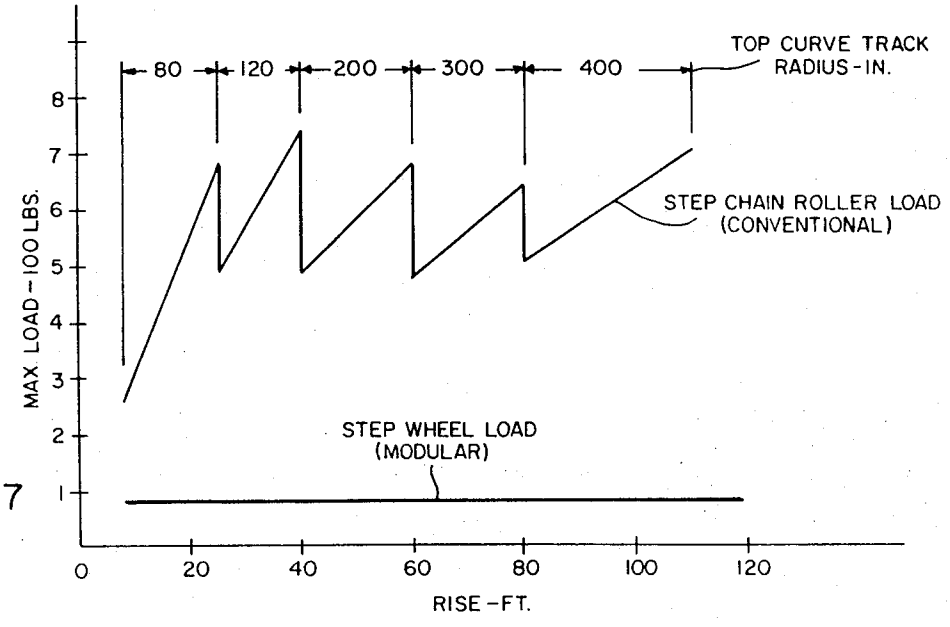

80
120
200
300
400
TOP CURVE TRACK
RADIUS - IN.
8
7
6
5
4
3
2
1
MAX LOAD - 100 LBS.
STEP CHAIN ROLLER LOAD
(CONVENTIONAL)
STEP WHEEL LOAD
(MODULAR)
0
20
40
60
80
100
120
RISE - FT.

FIG. 7

FIG. 8

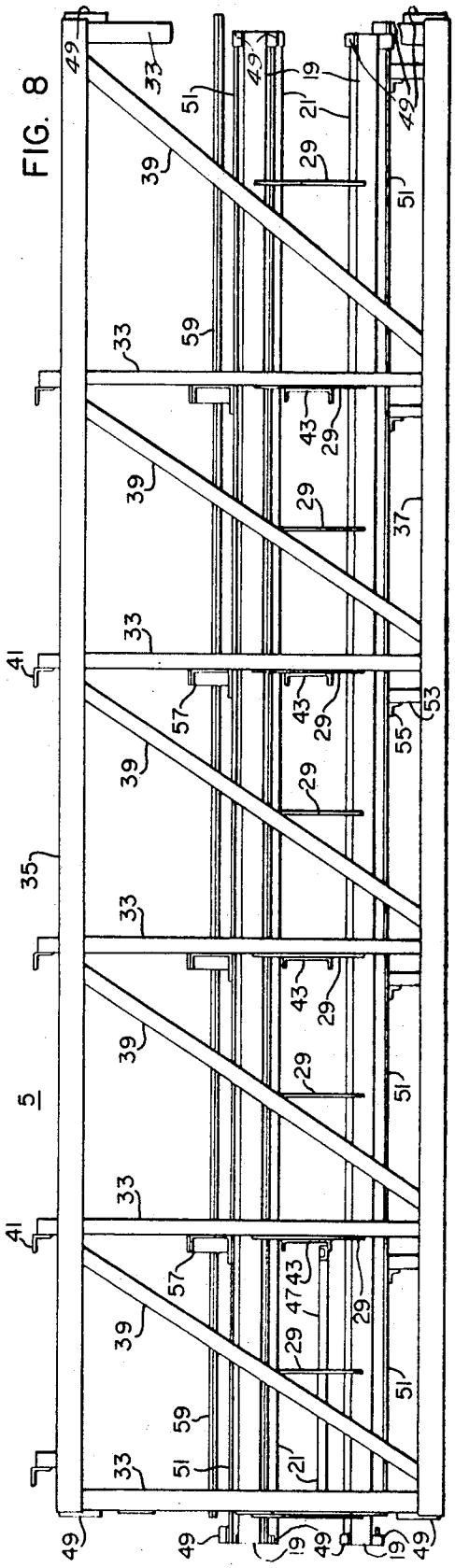
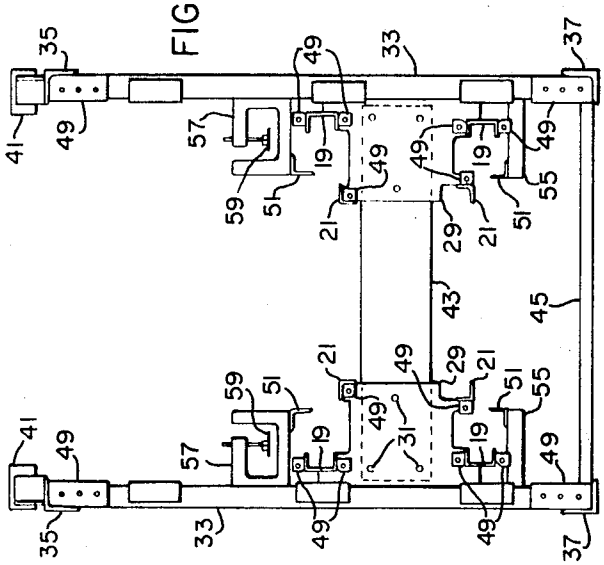


FIG. 9



MODULAR PASSENGER CONVEYOR CONSTRUCTION

RELATED APPLICATIONS

Application Ser. No. 91,959, filed Nov. 23, 1970, entitled "Modular Drive Unit For A Conveyor," filed concurrently herewith in the name of Henry Boltrek and Joseph K. Kraft and assigned to the same assignee as this application.

Application Ser. No. 91,960, filed Nov. 23, 1970, entitled "Apparatus For Guiding A Conveyor," filed concurrently herewith in the name of Joseph K. Kraft and assigned to the same assignee as this application.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to the construction of conveyors especially passenger conveyors of the moving stairway or moving walk variety.

2. Description of the Prior Art

It has long been the practice to fabricate the supporting structure for passenger conveyors in sections in a manufacturing plant and then ship the sections to the field for assembly. Although for instance, the same upper and lower terminal sections might be used for installations having differing rises, it is generally the case that the same sections can only be used within narrow limits. Even in those instances where the sections may be stretched to accommodate for higher rises, adjustments must usually be made in the capacity of the driving unit. Therefore, although the stairways are constructed in sections, the sections are not standardized for use in a wide range of installations. In effect, there are many support structures all of which may be broken-down into sections for shipment. In some instances, the same section may be utilized in more than one application but only over a very narrow range.

It is also common practice when fabricating the sections of the supporting structure for a passenger conveyor, to construct the truss and the insert the tracks which guide the steps or pallets about their endless paths afterwards. The tracks are made adjustable with respect to the truss so that when the truss sections are connected in the field the tracks may be manipulated for alignment with the tracks of the adjacent truss section. This practice necessitates the laying of plumb lines which is both time consuming and tedious.

It is common practice today to drive a passenger conveyor from one end or the other, with moving stairways usually driven from the upper terminal. Driving through a sprocket wheel in the turn-around has been widely used. One manufacturer had adopted a timing belt drive which engages the pallets of a moving walk on the upper horizontal section as disclosed in U.S. Pat. No. 3,191,743. With the use of such drives, very high loading is put on the step or pallet rollers as they traverse the upper curved section of track in a heavily loaded conveyor. As the rise increases and the loading becomes greater, larger machines must be used and the radius of curvature must be increased to maintain the loading on the step chains of a moving stairway within tolerances. By way of example, while the radius of curvature for a moving stairway with an 8 foot rise may be in the neighborhood of 80 inches, this radius of curvature for a moving stairway designed to transport a load over an 80 foot rise may be in the neighborhood of 400 inches.

Other driving devices have been suggested from time to time, such as the gear drive of U.S. Pat. No. 950,796 wherein a gear engages the teeth on racks on the steps on the upper and lower runs near the upper end of the inclined portion of the run. U.S. Pat. No. 3,297,127 suggests the use of additional gears engaging both the upper and lower runs of a moving stairway. U.S. Pat. No. 3,107,773 relates to a slider bed for urging a chain drive into engagement with racks on moving steps, while French Pat. No. 1,196,764 proposes the use of intermediate drive units in conjunction with the conventional sprocket wheel drive. U.S. Pat. No. 2,863,555 teaches the use of intermediate belt drives for a conveyor.

Where a single drive unit is used, it is obvious that the size of the machine must be increased as the rise increases. For very high rise moving stairways, the machine can weigh in the neighborhood of 20,000 pounds and require a separate machine room. Such large machines must be considered in the structural design of the building in which the stairway is installed. Furthermore, the high loading in such stairways necessitates the use of a heavier truss and heavier step chains.

SUMMARY OF THE INVENTION

According to this invention, the supporting structure of a passenger conveyor is assembled from a number of standard modules regardless of the length or rise of the conveyor. Standardized modular drive units are inserted in selected modules to meet the requirements of the installation. Preferably these drive units engage both the upper and lower runs of the conveyor and also preferably a drive unit is located just below the curvature from the inclined to the horizontal portion at the upper end of an inclined conveyor. Since standard modules are used, the radius of curvature between the horizontal and inclined portions may be kept constant.

With the standard terminal modules utilized in each case, as many intermediate modules as are required by the installation may be inserted in between. One module may be made variable in length in order to accommodate to the specifications of any installation. In the preferred embodiment of the invention all the adjustment is taken-up in the lower terminal module. The modular drive units can be inserted in any number of modules.

The modules are fabricated with all of the critical components aligned with respect to the tracks so that when the modules are joined together in the field, no track alignment is required. Preferably the modules are welded together. The tracks are made no longer than the truss and are provided with couplings by which tracks which are short because of manufacturing tolerances can be stretched to close the gap and facilitate an exact fit between the tracks of adjacent modules.

The modular drive units are constructed for easy installation and removal. They fit inside the loop of the conveyor endless belt and therefore can be located anywhere along the run. The driving units are mounted on a frame which includes sections of track. The driving elements are precisely aligned with respect to the track sections so that when the unit is installed in the module where it is supported through the track sections, the driving elements will be in precise alignment

for engaging the endless belt. Releasable connections between the gear reducer and the driving element permit easy replacement of either the gear reducer or the drive motor.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic elevation view of a moving stairway embodying the invention;

FIG. 1*a* is a schematic elevation view of another moving stiarway according to the invention;

FIG. 2 is an exploded isometric view of a standard intermediate module with a drive unit according to the invention;

FIG. 3 is a side elevation view of a lower terminal module;

FIG. 4 is a cross-section view of one-half of a lower terminal module taken along lines IV—IV in FIG. 3;

FIG. 5 is a side elevation view of an upper terminal module;

FIG. 6 is a diagram comparing the chain loading on a conventional stairway with that of a stairway according to the invention;

FIG. 7 is a diagram comparing roller loading on a conventional stairway with that on a stairway according to the invention;

FIG. 8 is a side elevation view of a standard intermediate module according to the invention; and

FIG. 9 is an end elevation view of the module of FIG. 8.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

The invention will be described as applied to a moving stairway although it is to be understood that the concepts herein disclosed could be equally applied to other types of conveyors. FIG. 1 illustrates a moving stairway which includes an upper terminal module 1, a lower terminal module 3 and two intermediate modules 5 and 7. The modules support an endless belt 9 which is composed of a series of steps 11 pivotally connected on either side by racks in the form of toothed links 13. The steps are guided and supported in their endless path by main wheels 15 and trailer wheels 17 which cooperate with main tracks 19 and trailer wheel tracks 21 carried by the modules. The main tracks and the trailer tracks support the steps on both the load bearing upper run and return run with the steps in stepped relationship to one another on the inclined portions of the run and in platform relationship to one another on the horizontal portions of the run at the upper and lower terminals as is well known in the moving stairway art.

Modular drive units 23 to be described in greater detail later, engage the toothed links 13 to drive the steps about their endless path. Handrails 25 on either side of the steps are driven by a handrail drive units 27 which are part of the modular drive units 23. Although the drive units 23 are shown in the upper terminal module 1 and the intermediate module 7, it should be understood that such units can be provided for any of the modules.

Although it is possible to make any of the modules variable in length to accommodate for the requirements of a particular installation, it is preferable that as many modules remain standard as possible. For reasons that will become evident shortly, it is preferred that all modifications be made on the lower terminal module 3. To this end, the dimension a of the lower terminal module 3 is made to the appropriate length to accommodate the requirements of the particular installation. The length of the section a is variable up to the full length of an intermediate module thereby providing a full range of adjustment. It can be seen then that as many intermediate modules as is necessary may be coupled together to form the supporting structure for a stairway with any odd portion of the module taken up by the variable section a of the lower terminal module 3. On the other hand, it can be seen from FIG. 1*a* that for a very low rise installation only the upper terminal module 1 and the lower terminal module 3, with the section a cut to the appropriate length, are required. Since it will be developed that it is appropriate to place the drive unit just below the curvature at the upper end of the stairway, the lower terminal module is the logical one to make variable in length.

It is evident at this point that any number of modules may be coupled together to achieve a desired rise. Since the modular drive units can be inserted at any of the modules, the loading at any point along the stairway can be kept within acceptable low limits. For ease of handling and versatility, the length of the intermediate modules has been set at approximately 20 feet. Since the standard angle of incline on a moving stairway is 30°, each intermediate module adds 10 feet to the rise. It has been determined that it is desirable to have a modular drive unit for each 20 feet of rise, therefore it is contemplated that for the normal installation, every other module beginning with the upper terminal module on down should be provided with a modular drive unit. No modular drive unit is provided for the lower terminal module since this is the variable section. Of course this particular arrangement is a function of the length selected for the modules and the characteristics of the particular drive unit utilized and is not meant to restrict the invention in anyway.

CONSTRUCTION OF THE MODULES

The critical components in the supporting structure for the steps of a moving stairway are the tracks which guide the steps about their endless paths. The conventional approach has been to construct the truss first and then insert the rails afterwards allowing for adjustment of the tracks to accommodate for manufacturing tolerances. According to our invention, the tracks are first precisely aligned with respect to each other and then the truss is built around the tracks with all of the components aligned with respect to the tracks.

FIG. 2 is an isometric view of a standard intermediate module with a drive unit while FIGS. 8 and 9 are side and end elevation views of such a module without a drive unit. Construction of the modules begins with the fabrication of right and left half-sections. For each half section, upper and lower channel shaped main tracks 19 and upper and lower angle shaped trailer tracks 21 are precisely aligned with respect to each other through rigid connection to precision templates 29 provided at spaced intervals on the order of 22½ inches in the preferred embodiment. The four track sections held in rigid alignment by the templates form track assemblies. The templates 29 are provided with aligning holes 31 by which the templates are

precisely located in a jig utilized in fabricating the track assemblies. Machining of the templates **29** assures the accurate alignment of the tracks. The tracks are rigidly joined to the templates through the use of techniques known in the art of precision welding.

The half sections are completed by welding the loose pieces of the truss to the track assemblies. Vertical truss members **33** are welded to alternate templates **29**. Upper longitudinal truss members **35** and lower longitudinal truss members **37** are then welded to the ends of the vertical truss members **33**. Added rigidity is given to the structure by diagonal truss members **39** which are welded to the upper longitudinal truss members **35** and the lower longitudinal truss members **37**. All of the truss members mentioned to this point may be angles. If the module is to be used in an installation with opaque balustrades, the vertical truss members **33** are on the order of 5 feet in height as shown and topped with deck brackets **41** which support the decking and upper run of the handrail. If the module is to be used with a transparent balustrade, the vertical truss members **33** may be on the order of 42 inches in height.

The right and left half sections are then joined by boxing members **43** welded to corresponding alternate templates. The track sections of the two half sections are precisely aligned with respect to each other by precision holes in the boxing members **43** which must be aligned with the precision holes **31** in the templates before welding. Added rigidity is given to the module by transverse channel members **45** welded to the lower longitudinal truss members **37** and a diagonal truss member **47**.

Coupling blocks **49** are welded to the ends of the tracks and to the four corners at each end of the truss. The coupling blocks **49** are provided with holes parallel to the longitudinal axis of the module through which a bolt is passed to clamp the coupling block to a similar coupling block on the corresponding component of the adjacent module. The coupling blocks on the truss members are provided with three holes so that the truss members may be joined by three bolts in each corner. All of the coupling blocks **49** are precisely aligned with respect to the track members so that no adjustments are required when the modules are coupled together in the field.

The steps are guided laterally by rollers mounted on the toothed links **13** as described in the copending application W.E. Case No. 41,814 mentioned above. The step guide angles **51** are supported on the return run by vertical angles **53** welded to the lower longitudinal truss member **37** and horizontal angles **55**. On the upper run the step guide angle **51** is supported by the handrail return bracket **57**. The handrail return bracket **57** also supports the handrail return guide **59**.

FIG. **2** also illustrates how a modular drive unit **23** is inserted in the modules. The modular drive unit has a frame **61** which incorporates sections of the channel shaped main tracks **19**. The unit includes a drive motor **63** which operates through a gear reducer **65** to transmit power to drive couplings **67** which straddle the drive motor and gear reducer. Each of the drive couplings **67** include a driving element in the form of a triple stranded chain which is supported in a loop by a pair of driven sprocket wheels and idler sprocket wheels which engage the outer strands of the triple stranded driving chain and lift the center strand of the chain into engagement with the toothed links **13** on either side of the stairway. This arrangement is shown in detail in our companion application entitled "Modular Drive Unit For A Conveyor" mentioned above. Two coupling blocks **49** provided on each end of each of the main track sections **19** on the modular drive unit cooperate with the coupling blocks on the corresponding tracks in the module so that a continuous track for the main wheels is provided through the drive unit. It will be noted that the modular drive unit is supported by the main track members in the module. The sprocket wheels on the modular drive unit are precisely aligned with respect to the track sections so that when the drive unit is dropped into a module the triple stranded drive chain will be in proper alignment to engage the toothed links **13** on the stairway. Since only sections of the main tracks **19** are incorporated into the drive units separate sections of trailer tracks **21** and step guide angles **51** must be inserted in this area.

It should be noticed from reference to FIG. **2** that the last two vertical truss members **33** at the lower end of the module are farther apart than the other vertical truss members to accommodate for the modular drive unit. In the module shown in FIG. **2**, the track members are cut short to receive the drive unit. In the module of FIG. **8** which does not have a drive unit, the track sections are extended and an additional template **29** is provided to give the track assembly rigidity. The track sections are offset approximately 4 inches from the ends of the truss sections with the upper ends extending beyond the end of the truss as shown in FIG. **2**. At the lower end of the truss, the track sections are cut approximately 4 inches short of the end of the truss on the dummy module and the end of the track sections provided in the modular drive units would also terminate 4 inches short of the end of the truss. With this arrangement, the cantilevered sections of the track allow for some flexibility in aligning the tracks of adjacent modules.

All of the track members are cut to $+0, -1/32$ inch tolerances in length. In this manner the track sections are never too long and the coupling bolts can easily stretch the tracks to take up the maximum one-sixteenth inch of manufacturing tolerance.

FIG. **3** illustrates a section through a lower terminal module wherein the steps are guided from their inclined path to a horizontal path and then reversed in direction. The inclined portion of the lower terminal module is similar in construction to the intermediate modules just described. It should be noted that the main tracks **19** and trailer tracks **21** extend approximately 4 inches beyond the end of the inclined portions and are provided with coupling blocks **49** for joining the tracks in the lower module with those of the adjacent module. As mentioned earlier, the dimension *a* of the lower terminal module may be varied over the full length of one of the intermediate modules. As this dimension is reduced, it can be appreciated that vertical truss members **33** and diagonal truss members **39** may be eliminated as the tracks and the longitudinal truss members **35** and **37** are shortened. As both the trailer tracks and the main tracks approach the curve between the inclined and the horizontal portions of the run, pairs of angles forming channels are substituted for

the single angle and the channel members used for the trailer tracks and main tracks respectively on the straight portions of the run. These angles are more easily conformed to the desired curvature than channel members.

On the straight portion of the lower terminal module, templates **29** similar to those used on the intermediate modules maintain the tracks in proper alignment. As the tracks negotiate the curve between the inclined and the horizontal portion of the run, the main tracks and trailer tracks must diverge so that the steps may transition from step to platform relation to one another. In this area another arrangement is utilized as can be seen by reference to FIG. **4** which is a sectional view taken along the lines IV—IV in FIG. **3**. An angle **75** supporting the upper and lower portions of the main track is welded to a template **29'**. Similarly a second shorter angle **77** supporting the upper and lower runs of the trailer track **21** is also welded to the template **29'**. A vertical truss member **33** is welded to and supports the template **29'**. A boxing member **43** aligns and fixes the position of the tracks **19** and **21** with respect to the corresponding tracks on the other side of the lower terminal module.

The turn-around **79** for the lower terminal module includes the idler turn-around hoop **81** and the main wheel turn-around hoop **83** which are both connected to a plate **85** which is horizontally slidable with respect to the truss. Fingers **87** on the ends of the turn-around hoop mesh with fingers **89** on the stationary tracks to provide a continuous guiding surface over an appreciable range of adjustment of the turn-around. It is well known that adjustment of the turn-around on a moving stairway is required to adapt the exact length of the endless path to the discrete number of steps in a particular stairway. Since the steps are 16 inches in length, the endless path must be adjustable over this range. Half of the adjustment can be taken up at the lower end and the other half at the upper end or the entire adjustment may be taken at one end of the stairway.

Returning to FIG. **3**, it can be seen that horizontal angles **91** and **93** together with the vertical angle **95** serve as supports for brackets **97** which support the handrail guide **59** through its turn-around.

FIG. **5** illustrates the construction of an upper terminal module. The horizontal and curved portions of this module are very similar to the corresponding portions of the lower terminal module. The main tracks **19** and trailer tracks **21** are composed of pairs of angles in this area as they diverge to cause the steps to transition from the step to the platform relationship as they approach the upper turn-around. The upper turn-around **79** is similar to the lower turn-around and is provided with fingers **87** which cooperate with the fingers **89** on the fixed tracks so that an adjustment in the length of the endless paths may be made while maintaining a continuous guiding surface for the step wheels. The tracks are not provided in the lower section of the upper terminal module so that a drive unit with the main wheel tracks incorporated into it may be dropped into place and coupled to the main wheel tracks **19** in the upper section and to the main wheel tracks in the adjacent intermediate module in the same manner in which it was described in detail for the intermediate modules. As was the case with the intermediate modules, individual sections of the trailer tracks **21** must be inserted below and above the drive unit separately to complete those portions of the trailer tracks.

ADVANTAGES OF THE MODULAR STAIRWAY

Some of the advantages of the disclosed stairway have already been pointed out including the fact that any number of standard modules can be assembled to meet the requirements of a particular installation with all of the adjustments for less than a whole module taken up in one standard lower terminal module. This advantage can be more fully appreciated when the charts of FIGS. **6** and **7** are considered.

In the conventional stairway driven by a sprocket wheel at the upper turn-around, the tension force on the step chain increases rapidly as the rise increases since the full weight of the total load including a portion of the weight of the steps is exerted on the chain. It can be seen from FIG. **6** that this force is in the neighborhood of 16,000 pounds for a 110 foot rise stairway which necessitates the use of a chain that weighs approximately 20 pounds per foot. Similarly, it can be seen from FIG. **6** that the force on the main drive chain which drives the sprocket wheel is approximately 21,000 pounds for a 110 foot rise. A seven strand chain has been used in such installations.

The higher loading present in high rise stairways driven by the top sprocket also affects the step wheels. To maintain the wheel loading below the rated 800 pounds, the track radius at the top curve must be increased. As seen in FIG. **7**, the track radius for the 110 foot rise must be 400 inches. Even with no load on the steps a force of approximately 240 pounds is exerted on the step wheels just due to the weight of the steps on the incline.

It can be appreciated then that the forces exerted on the critical components of a conventionally driven stairway increase greatly as the rise increases. One manufacturer has found it necessary to provide five different sizes of step chains, sprocket wheels, truss widths, top curve radii and drive machines and six different sizes of main drive chains to cover the range of stairways up to a 110 foot rise.

On the other hand, since standard modular drive units are provided according to the invention for every 20 feet of rise, the force on the toothed racks which replace the step chains does not exceed 2,500 pounds on a loaded stairway. Furthermore, with a drive unit located just below the top curve, the maximum force on the step wheels does not exceed 80 pounds for two 150 pound persons on a step and is only 15 pounds for an empty step regardless of the rise.

Another advantage is that the components of the modular drive unit are relatively light and can be easily replaced. The heaviest component is the gear reducer which weighs approximately 200 pounds, while the conventional machine for a 110 foot rise weighs approximately 20,000 pounds. The interchangeability of parts obviously simplifies maintenance and the training of maintenance personnel.

It is also evident that with very few straight-forward modifications, the modular stairway can be provided in either of the standard 32 or 48 inch step width sizes.

We claim as our invention:

1. A passenger conveyor system for transporting passengers from one terminal to another including an articulated endless belt comprising a series of pivotally connected rigid units, support means for supporting and guiding said endless belt along an upper load bearing run and a lower return run, said support means comprising a plurality of standard modules including two terminal modules, said terminal modules being vertically and horizontally separated so that at least a portion of said endless belt traverses an inclined path between the terminals, with the upper terminal module including means for supporting and guiding the endless belt from the inclined path to a horizontal path as it approaches the end of the run and a first drive unit inserted in the upper terminal module near the transition between the inclined and horizontal paths and coupled to the upper and lower runs of said endless belt for driving said belt in its endless path, whereby any number of modules some with and some without drive units can be assembled to meet the requirements of a particular installation.

2. The passenger conveyor of claim 1 wherein said support means includes at least one intermediate module and including a second drive unit, interchangeable with the first, inserted in one of the intermediate modules , said second drive unit being coupled to the upper and lower runs of the endless belt for assisting the first drive unit in driving said belt about its endless path.

3. The passenger conveyor of claim 1 including at least one intermediate module, wherein one of said modules includes a variable length section for providing a continuous selection of lengths for the assembled supporting structure.

4. The passenger conveyor of claim 1 wherein one of the terminal modules is provided with a variable length section, said variable length section being continuously variable up to the full length of an intermediate module.

5. A passenger conveyor system for transporting passengers from one terminal to another including an articulated endless belt comprising a series of pivotally connected rigid units, support means for supporting and guiding said endless belt along an upper load bearing run and a lower return run, said support means comprising a plurality of standard modules including two terminal modules and a plurality of straight intermediate modules, said terminal modules being horizontally and vertically separated so that at least a portion of the path traversed by said endless belt is inclined, said terminal modules supporting the endless belt on a portion of the inclined path and a horizontal path as the belt approaches the ends of the runs, and interchangeable drive units supported by selected ones of said intermediate modules , said drive units being coupled to both the upper and lower runs of said endless belt for driving said belt in its endless path, whereby any number of modules some with and some without drive units can be assembled to meet the requirements of a particular installation.

6. A passenger conveyor comprising an endless belt, a plurality of rollers mounted for rotational movement at selected points along the edges of said endless belt and support means in the form of a plurality of serially connected standard modules for guiding and supporting said endless belt along an upper load bearing run and a lower return run, each of said modules including right and left half sections, said half sections comprising upper and lower track members for guiding and supporting the endless belt through the edge mounted rollers on the upper and lower runs of the endless belt respectively, templates rigidly fastened to the track members at spaced intervals with said track members held in precise alignment to form assemblies, truss members rigidly fastened to the assemblies to give structural rigidity to the half sections, boxing members for rigidly connecting the half sections of each module together with all of the track members in precise alignment and coupling members rigidly connected to the ends of the modules in a predetermined precise alignment with the track members for coupling adjacent modules together with the corresponding track members of the adjacent modules in precise alignment.

7. The passenger conveyor of claim 6 wherein the coupling members include coupling means rigidly connected to the track members and precisely aligned with the ends of the track members for directly coupling the corresponding track members of adjacent modules.

8. The passenger conveyor of claim 7 wherein the track members of a module are no longer than the truss members and wherein said coupling means connected to the track members include tensioning means for stretching said track members to close any gaps left between corresponding track members of adjacent modules due to manufacturing tolerances.

9. The passenger conveyor of claim 6 including a modular drive unit having a driving element for engaging and driving said endless belt and mounting means for mounting said modular drive unit in a selected module with the driving element in precise predetermined alignment with respect to said track members.

10. The passenger conveyor of claim 9 wherein said mounting means comprises a frame for supporting the drive unit, said frame including a section of track member and coupling means for coupling the section of track member in precise longitudinal alignment with a track member of the module to form a portion of the guide for the edge mounted rollers.

11. The passenger conveyor of claim 10 wherein said frame includes upper and lower sections of track members and coupling means for coupling said upper and lower sections of track members to the corresponding track members in the module with the track sections in precise longitudinal alignment with the corresponding track members of the module.

12. The passenger conveyor of claim 11 wherein the driving element of the modular drive unit engages the endless belt on both the upper run and the lower run.

13. The passenger conveyor of claim 11 wherein said frame includes upper and lower sections of track members on each side of said frame, said sections of track members being precisely aligned with the upper and lower track members of both half sections of the modules.

14. In combination, a first conveyor for transporting load between a first terminal and a second terminal which is above the first terminal, and a second conveyor for transporting a load between a third terminal and a fourth terminal which is higher above the third terminal than the second terminal is above the first ter-

minal, each of said conveyors comprising an endless belt having upper and lower runs, support means and drive means, said support means including standard upper and lower terminal modules and standard intermediate modules with the support means for said first conveyor comprising at least said standard upper and standard lower modules, and with said support means for said second conveyor comprising in addition to said standard upper and standard lower modules at least one standard intermediate module, said drive means comprising standard modular drive units with each of said first and second conveyors including a modular drive unit inserted in the upper terminal module but spaced from the end thereof, with the drive unit coupled to the upper and lower runs of the endless belt.

15. The combination of claim **14** wherein one of the modules of at least one of the conveyors is an adjustable length module.

16. The combination of claim **15** wherein the second conveyor includes a plurality of intermediate modules and wherein the first conveyor utilizes one modular drive unit and the second conveyor utilizes a plurality of standard modular drive units.

17. The combination of claim **16** wherein the standard terminal modules guide said endless belts from an inclined to a horizontal path about a curved path having a predetermined fixed radius of curvature as the endless belt approaches the end of its run, said fixed radius of curvature being independent of the number of modules in the conveyor.

18. The combination of claim **17** wherein said fixed radius is less than 100 inches.

19. In combination, a first conveyor for transporting load between a first terminal and a second terminal which is above the first terminal, and a second conveyor for transporting a load between a third terminal and a fourth terminal which is higher above the third terminal than the second terminal is above the first terminal, each of said conveyors comprising an endless belt, support means and drive means, said support means including standard upper and lower terminal modules and standard intermediate modules with the support means for said first conveyor comprising at least said standard upper and standard lower modules, and with said support means for said second conveyor comprising in addition to said standard upper and standard lower modules a plurality of standard intermediate modules, an adjustable length module, one of said conveyors including, in addition to the standard upper, lower and intermediate modules, said adjustable length module, said standard terminal modules guiding said endless belts from an inclined to a horizontal path about a curved path having a predetermined fixed radius of curvature as the endless belt approaches the end of its run, said fixed radius of curvature being independent of the number of modules in the conveyor, said drive means comprising standard modular drive units which may be inserted in selected modules, with the first conveyor utilizing one modular drive unit and the second conveyor utilizing a plurality of standard modular drive units, and one modular drive unit for the first conveyor and one of the plurality of drive units for the second conveyor being located just below said fixed radius of curvature.

20. The combination of claim **19** wherein said modular drives are mounted in said upper terminal modules just below said fixed radius of curvature and engage said endless belts on both the upper and lower run.

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