Oct. 28, 1941. W. M. LEVY ET AL 2,260,528

CARRIER OR CONVEYER

Filed Jan. 18, 1940 7 Sheets-Sheet 1

FIG. 1.

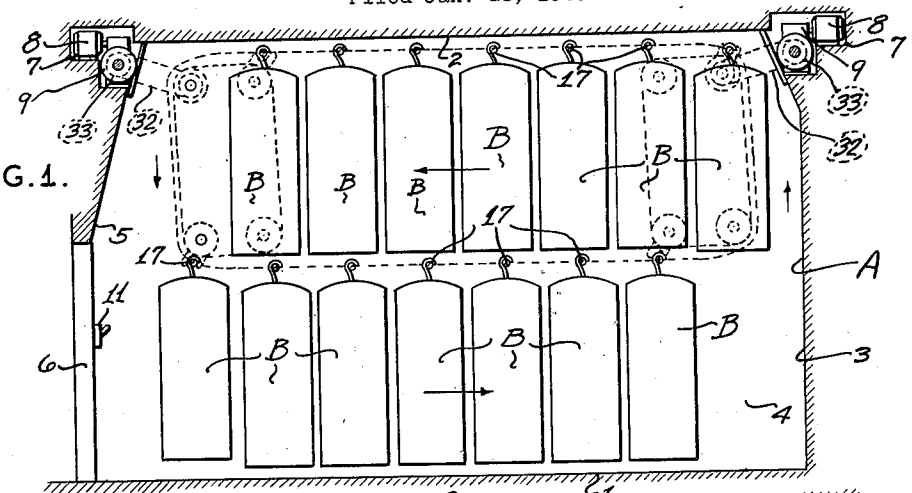


FIG. 2.

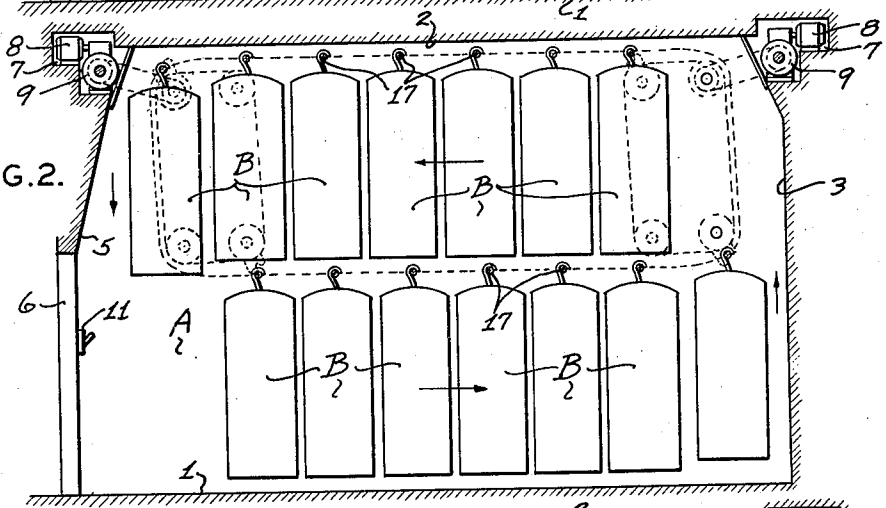
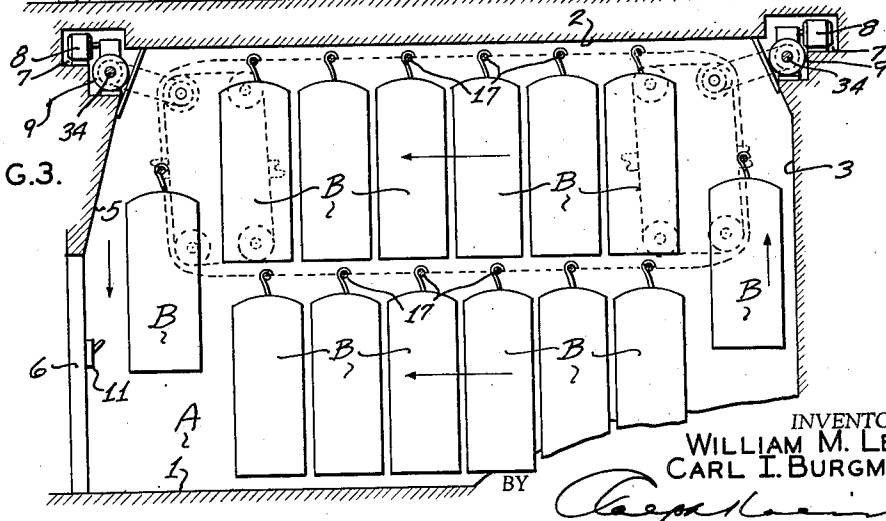


FIG. 3.



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CARRIER OR CONVEYER

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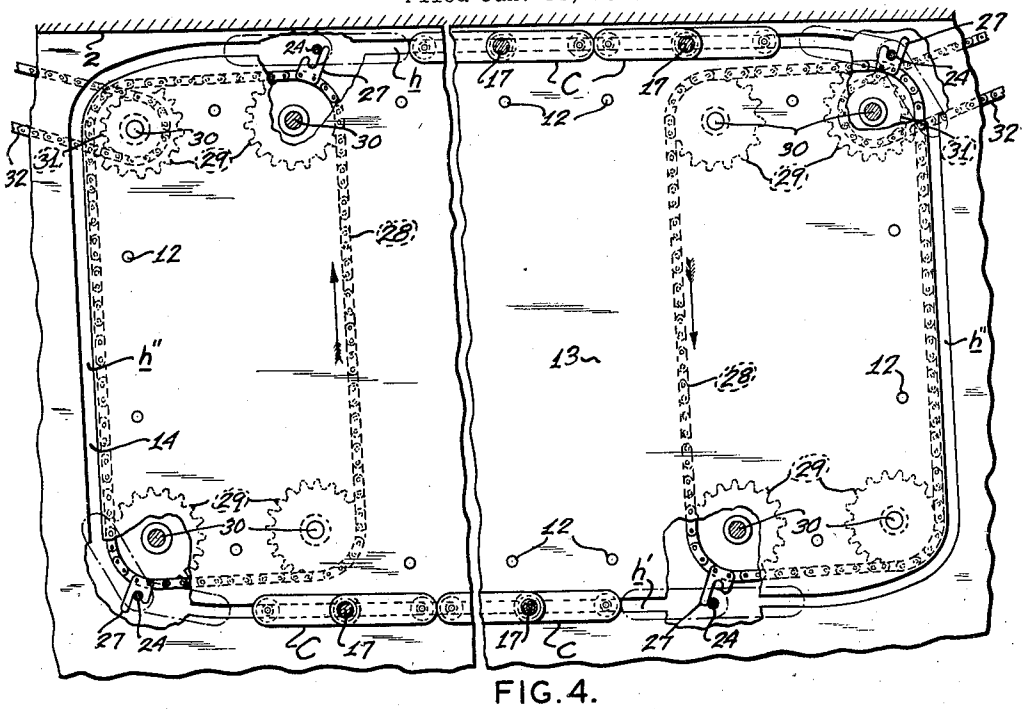


FIG. 4.

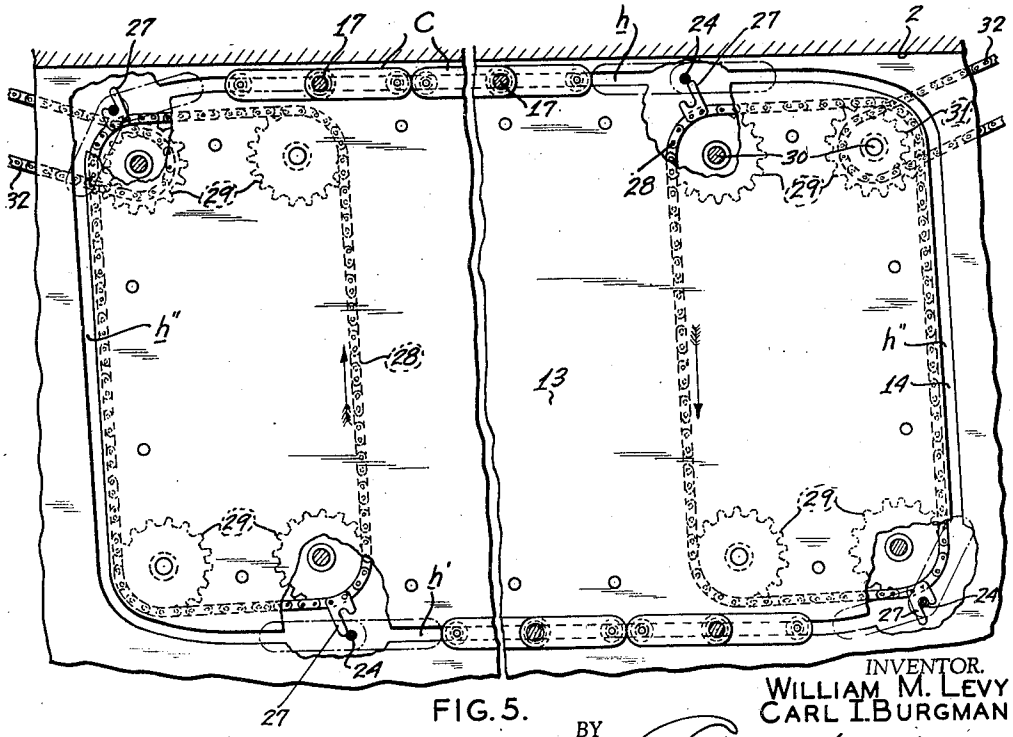


FIG. 5.

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CARRIER OR CONVEYER

Filed Jan. 18, 1940 7 Sheets-Sheet 3

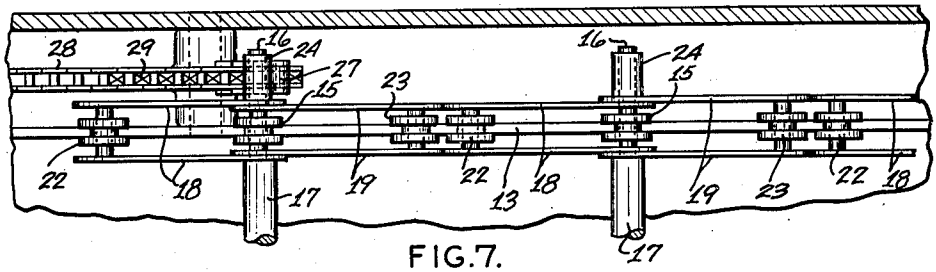


FIG.7.

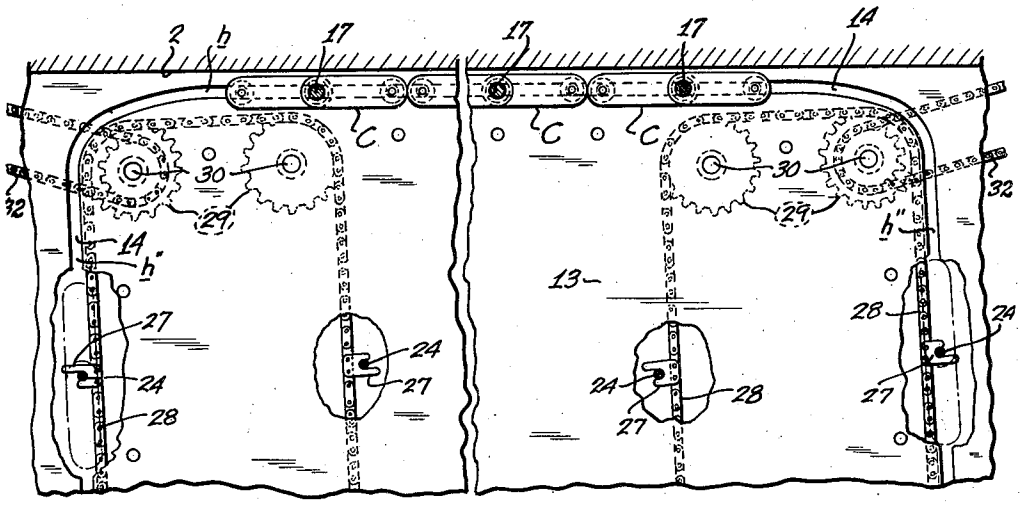


FIG.6.

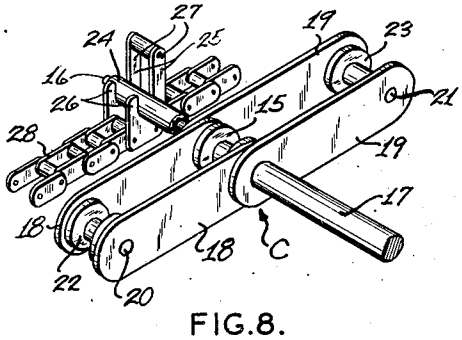


FIG.8.

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CARRIER OR CONVEYER

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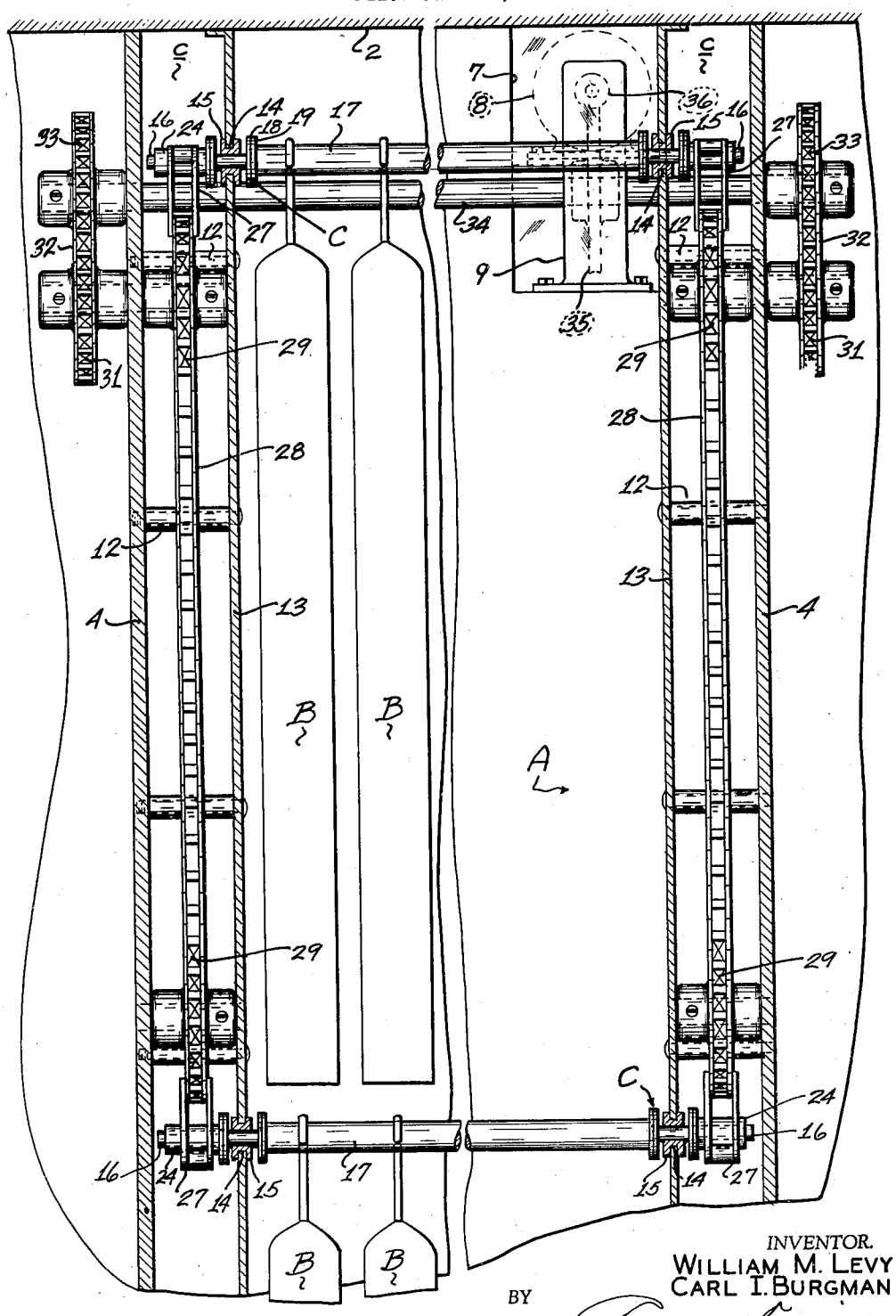


FIG. 9.

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CARRIER OR CONVEYER

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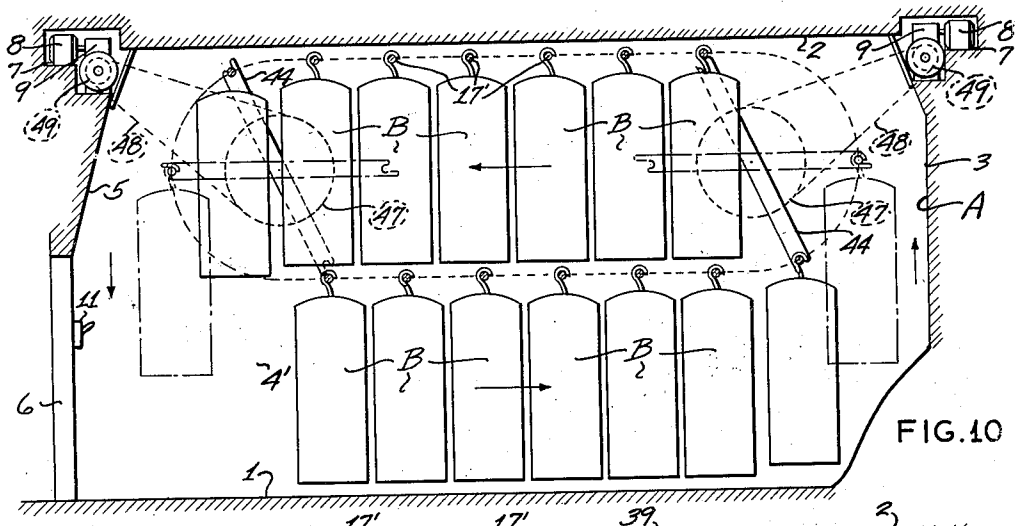


FIG. 10

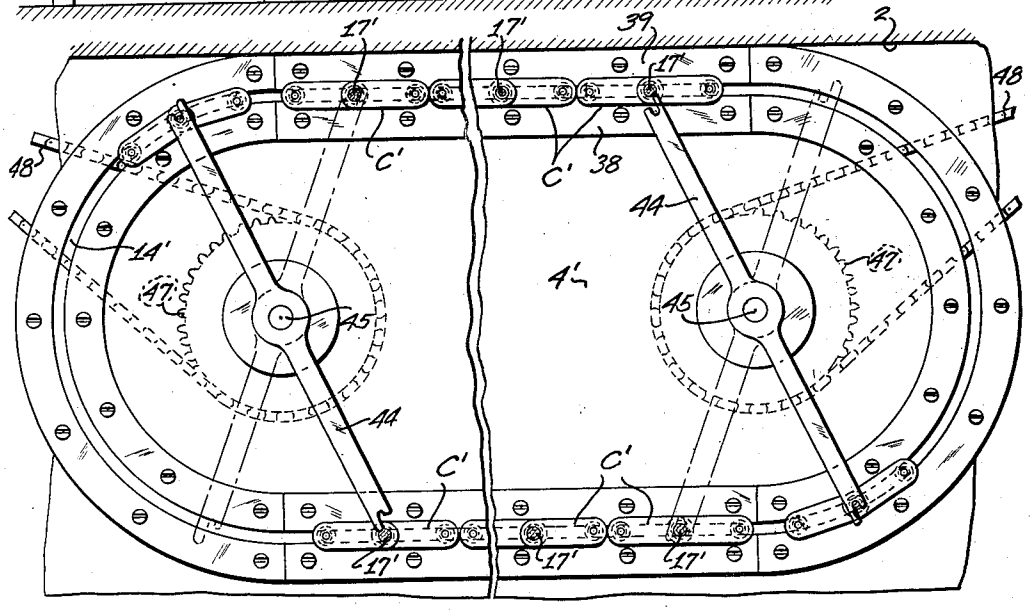


FIG. 11.

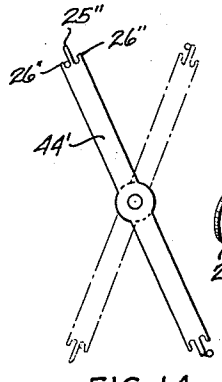


FIG. 14.

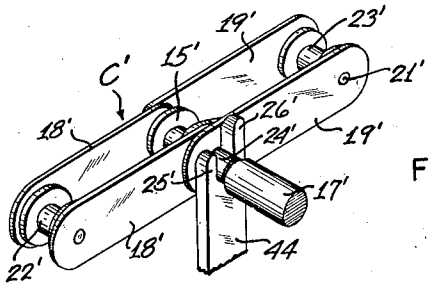


FIG. 12.

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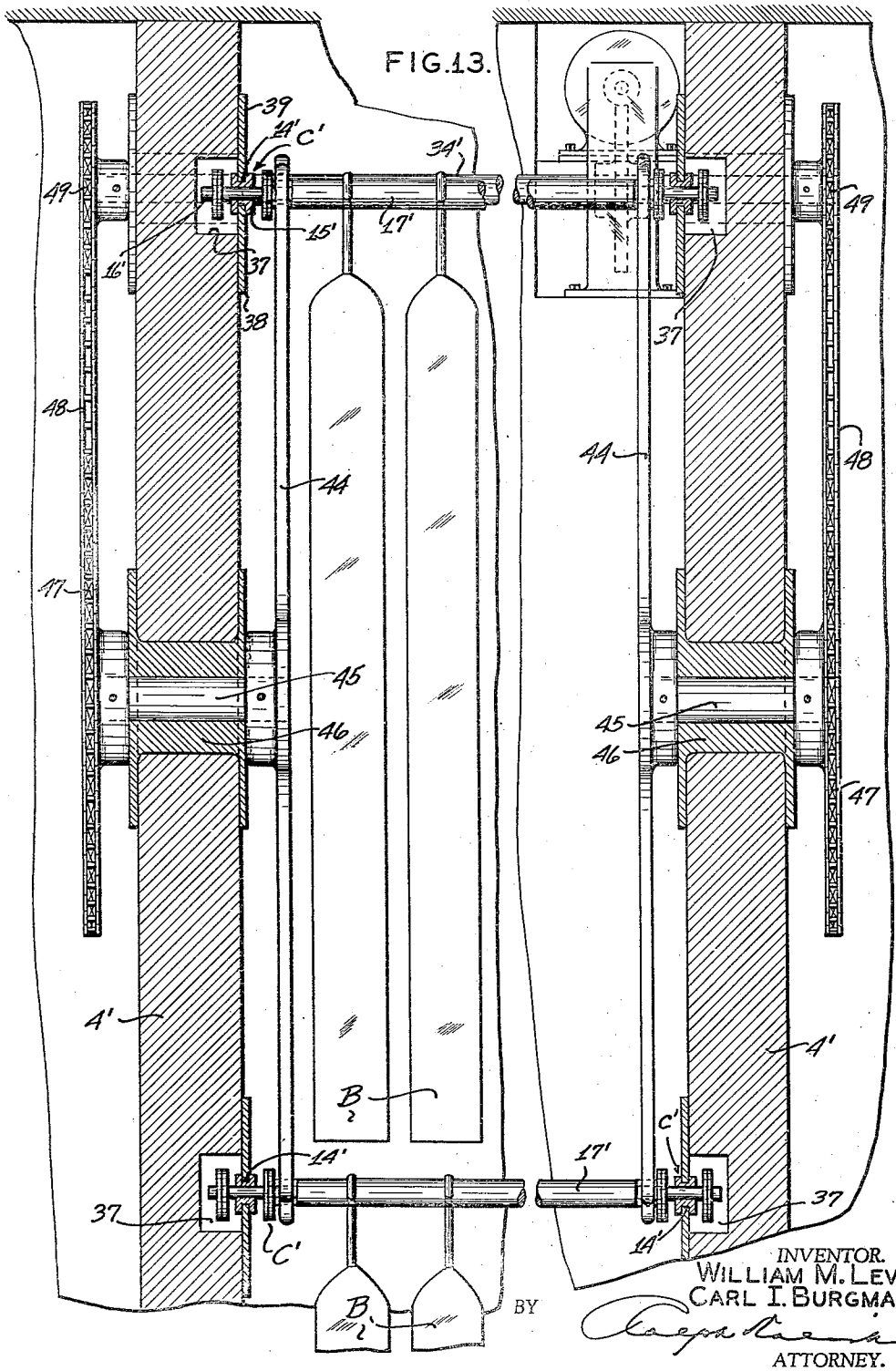
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CARRIER OR CONVEYER

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FIG. 13.



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CARRIER OR CONVEYER

Filed Jan. 18, 1940 7 Sheets-Sheet 7

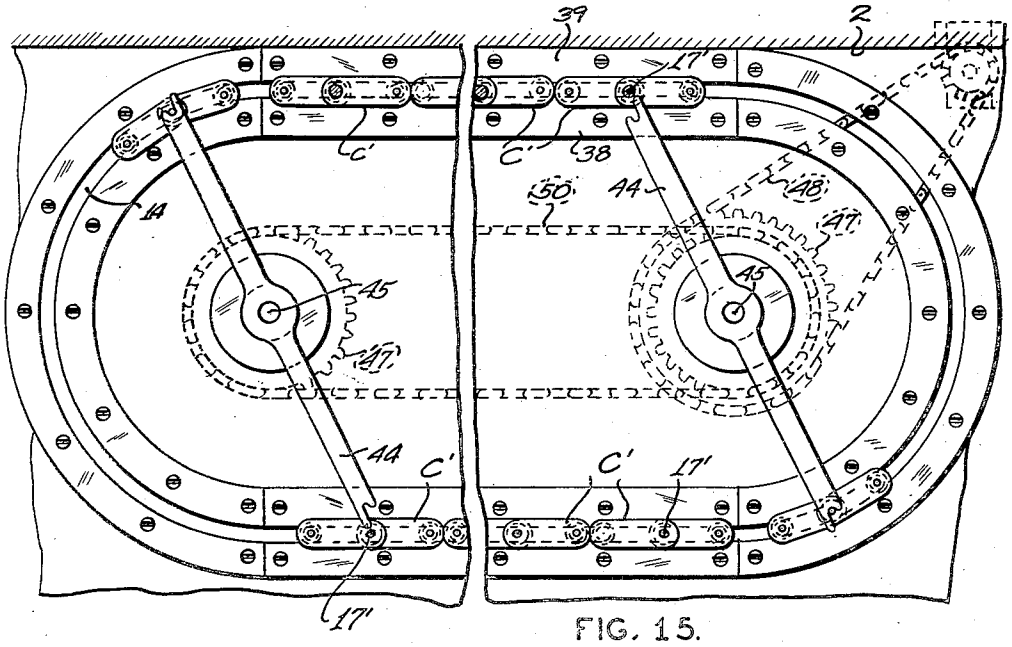


FIG. 15.

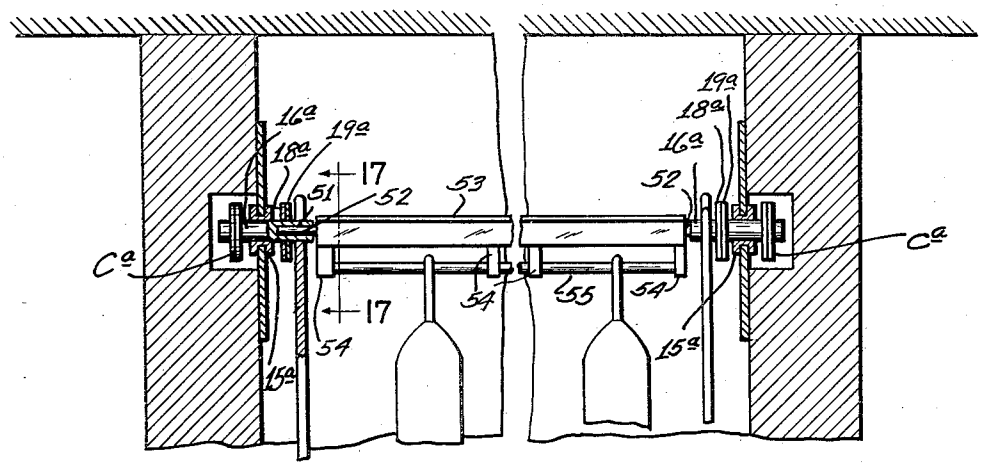


FIG. 16.

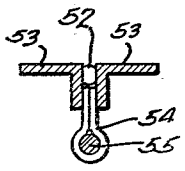


FIG. 17.

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Patented Oct. 28, 1941

2,260,528

UNITED STATES PATENT OFFICE

2,260,528

CARRIER OR CONVEYER

William M. Levy and Carl I. Burgman,
St. Louis, Mo.

Application January 18, 1940, Serial No. 314,394

11 Claims. (Cl. 211—1.5)

This invention relates generally to carriers or conveyers and, more particularly, to a certain new and useful improvement in carriers or conveyers adapted especially, though not exclusively, for the movable support of apparel-garments and the like.

Our invention has for its primary objects the provision of carrier or conveyer mechanism so uniquely constructed as to utilize a maximum of the available space within a case, vault, or compartment for the compact and efficient storage or display of a plurality of rows of apparel-garments or other merchandise and, at the same time, so movably support such garments or merchandise as to enable the convenient, simple, and facile introduction or removal of any particular or selected garment or article of merchandise or group of garments or merchandise-articles.

Our invention has for another object the provision of a carrier or conveyer comprising a plurality of separate or individual carriages adapted for travel in an endless somewhat elliptical path in such manner that the carriages on the upper run, and vice versa the carriages on the lower run, will be progressively shifted at the proper time so that the merchandise supported or displayed on any particular carriages may be caused to move or travel from the lower to the upper run, or again vice versa from the upper to the lower run, without interference with or engagement by the merchandise supported or displayed on any of the other carriages.

Our invention has for a further object the provision of carrier or conveyer mechanism of the type and for the purpose stated which is rugged, durable, and economical in construction and operation, and which, by reason of its space conservation and simplicity of manipulation, effects material economies in storage or display costs.

And with the above and other objects in view, our invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and pointed out in the claims.

In the accompanying drawings (7 sheets):

Figures 1, 2, and 3 are longitudinal elevational views of a storage or display compartment constructed and equipped with a garment or merchandise supporting and displaying carrier or conveyer embodying our present invention, the several views respectively illustrating different positions of the carrier or conveyer during storage or display operations;

Figures 4, 5, and 6 are enlarged broken detail views of the carrier or conveyer;

Figure 7 is a fragmentary longitudinal sectional view of the carrier or conveyer;

Figure 8 is an enlarged detail fragmental perspective view of a conveyer-carriage;

Figure 9 is a fragmentary or broken vertical sectional view of the carrier or conveyer;

Figure 10 is a longitudinal sectional view of a storage or display compartment equipped with a modified form of carrier or conveyer constructed in accordance with and embodying our present invention;

Figure 11 is an enlarged broken view of the carrier or conveyer of Figure 10;

Figure 12 is an enlarged detail perspective view, and Figure 13 is a transverse vertical sectional view, of the modified carrier or conveyer of Figures 10 and 11;

Figure 14 is a fragmental side elevational view of a modified carriage-shifter or actuator for incorporation selectively in the conveyer of Figures 10, 11, and 13;

Figure 15 is a view similar to Figure 11, illustrating a slightly modified drive for the carriage-shifters;

Figure 16 is a fragmental transverse sectional view of the conveyer or carrier equipped with a slightly modified type of carriage hanger-bar; and

Figure 17 is a detail sectional view on the line 17—17, Figure 16.

For present descriptive purposes, our conveyer will be described in connection with apparel-garments, although it is to be understood that the conveyer is equally adapted for merchandise of other types and forms.

Referring now in more detail and by reference characters to the drawings, which illustrate practical embodiments of our invention, A designates a storage or display compartment, vault, or the like having a bottom wall or floor 1, a top wall or ceiling 2, a rear wall 3, opposite side walls 4, and a front wall 5, the latter including a conventional airtight, fireproof door 6. The height of the compartment A, that is to say, the distance from the floor 1 to the ceiling 2, it may here be stated, should preferably be somewhat greater than twice the overall length of the garments B for storage or display of which a particular structure is designed. In width and length, however, the compartment A may be of any suitable selected dimensions within reasonable limits.

Formed preferably adjacent the intersections of the ceiling 2 with the rear and front walls 3, 5, respectively, are suitably shaped recesses or motor niches 7 for accommodating or housing

conventional synchronous motors 8, which are connected to suitable gear reduction units 9, it being, of course, understood that the motors 8 are synchronously connected in parallel to any convenient source of electric power (not shown), the main control switch 11 being interposed in series in the power line and preferably located for convenient manipulation upon the front wall 5 adjacent the door 6, all as best seen in Figure 1.

Mounted within the compartment A and spaced inwardly from the respective side walls 4 by means of supporting studs 12, are parallel preferably metallic partitions 13 having registering track-forming slots or ways 14 of continuous preferably somewhat elliptical or oval-shaped contour having an upper approximately horizontal run *h*, a lower approximately horizontal run *h'*, and connecting suitably arcuate end-sections *h''*.

Chambers, as at *c*, *c*, are thus provided intermediate the walls 4 and partitions 13, and disposed for movement on the trackways 14, is a series of registering pairs of spools or rollers 15 bored, as shown, for rotatably accommodating the spindle-ends 16 of suitable hanger-bars 17, which latter extend across the compartment A from one partition 13 to approximately the opposite partition 13, as best seen in Figure 9. The bar end or spindle-portions 16 are, in turn, sufficiently elongated to extend or project well within the respective opposite chambers *c*, and pivoted on the spindle bar-ends 16 on opposite sides of, and adjacent to, the spools or rollers 15, as best seen in Figures 8 and 9, are pairs of endwise overlapping link-plates 18, 19, provided at their respective outer ends with pintles 20, 21, for rotatively accommodating spacer rollers or spools 22, 23, also disposed for travel or movement on the trackways 14. Thus each set of spools or rollers 15, 22, 23, connected by the end-overlapping pairs of links 18, 19, constitutes or forms a so-called trolley-like carriage C. It will be understood that the conveyer includes a selected number of sets of the carriages C, each of such sets supporting a hanger-bar 17.

Laterally of the spools or rollers 15 and within the respective chambers *c*, the spindle bar-ends 16 are each provided with a suitable anti-friction roller 24 for engagement in the bight of approximately U-shaped propelling yokes 27 mounted at suitably spaced intervals upon respective flexible or roller chains 28, which are, in turn, conventionally trained over sets of four sprockets 29 rotatively mounted upon spindles 30 supported at their ends in, and extending crosswise the respective chambers *c* between the partitions 13 and the side walls 4. As indicated in Figures 1, 2, and 3, and as best seen in Figures 4, 5, and 6, the chains 28 are arranged in registering pairs or sets within the chambers *c* at or adjacent the opposite or front and rear ends of the structure, the forward pair of chains 28 having a portion of their run substantially conforming to the shape of the front end portion *h''* of the trackways 14 as such trackways extend from their upper run *h* forwardly and vertically downwardly into their lower or return run *h'*, while similarly, the rearward pair of chains 28 partially conforms to the shape of the rear end portion *h''* of the trackways 14 as they extend upwardly from their lower run *h'* to their upper run *h*, all as best seen in Figures 4 and 5.

In actually assembling the above-described mechanism within the vault or compartment A, the several chains and sprockets 28, 29, 31, 32, 33, and the spindles 30 are mounted in and assembled upon the walls 4. The outer rim or ring-like annular portion of each of the partitions 13 is then set in place. The lower carriages C, together with the associated garment-carrying rods or hanger-bars 17, are then set up on the lower or upwardly presented marginal edges of the trackways 14. Thereupon, the inner or disk-like portion of the partition 13 is fitted edgewise along its lower margin into the lower carriages or rollers 15 and shifted up into vertical position for securement in place by the studs 12. During this assembling operation, the pivoted links 18, 19, of the carriages C are disconnected from the rollers 20, 21, so that the entire number of carriages may be set up or assembled on the lower run. Once the inner or disk-like sections of the partitions 13 have been fastened in place, the carriages C and their associated rods 17 are shifted outwardly, the rollers 20, 21, inserted, and the links 18, 19, swung up and fastened thereto, introducing between the several carriages the desired amount of space. Approximately half of the carriages will, of course, be manually shifted during this latter assembling operation to the upper run in order to make room for the full set of properly spaced carriages.

For purposes presently appearing, it may be here stated that each yoke 27 preferably includes a rigid long finger 25 and a rigid short finger 26, and, as best seen in Figures 1, 2, 3, and 9, one of the supporting shafts 30 of each set of said sprockets extends laterally outwardly of the compartment A to receive a driving-sprocket 31 connected by means of an auxiliary drive chain 32 to a respective sprocket 33, which latter are, in turn, mounted upon a countershaft 34 provided intermediate its ends with a worm gear 35 driven by a worm 36 in a reduction unit 9.

In use and operation, the door 6 is opened and a selected number of garments or the like B by means of suitable hangers are dependingly engaged with any one of the hanger-bars 17. The switch 11 is then actuated for energizing the motors 8, the synchronous driving movement of each of which is transmitted through a reduction gear box 9, a worm 36, and a gear 35 to a shaft 34. In turn, the shafts 34 transmit rotary movement through the respective sprockets 33, chains 32, and sprockets 31 to the front and rear sets of chains 28, which thereupon move in the respective directions shown by the arrows in Figure 4 and bring the propelling yokes 27 of the front chains 28 into engagement with rollers 24 of such garment-carrying hanger-bar 17. At the same time, a second set of yokes 27 of said front chains engages the rollers 24 of the next succeeding or then empty hanger-bar 17.

Meanwhile, yokes 27 of the rear set of chains 28 are likewise engaging the rollers 24 of other particular hanger-bars 17 in the upper and lower runs of the trackways 14 in the respective positions shown in Figure 4. On continued movement of the front and rear chains 28, the carriages C of the loaded hanger-bar 17 will be shifted to, and progressed rearwardly along, the lower run *h'*, the carriages C of the next succeeding hanger-bar 17 will be shifted for lowering such bar to a position adjacent the door 6 for convenient loading, the carriages C of the last hanger-bar 17 of the upper run will be shifted forwardly one space or position, and the carriages C of the last succeeding hanger-bar 17 of the lower run will be raised or elevated into

the position formerly occupied by the preceding hanger-bar 17, all as best seen in Figures 5 and 6. The switch 11 is then turned off, shutting the motors down, and the next succeeding hanger-bar 17 may be readily loaded.

This process may be continued until all of the hanger-bars 17 are loaded to the extent desired, the carriages C engaged by respective yokes 27 being thus propelled in the proper direction, and the remaining carriages C shifted along the trackways 14 through and by endwise engagement with the so yoke-engaged carriages. Thus the several carriages C are intermittently shifted to and along the upper and lower runs of the trackways 14, and the carriages C given such movement that the garments B supported on the upper trackway run may be lowered to and for movement along the lower trackway run without interfering or engaging in the slightest with garments B then depending for movements on such lower trackway run, and, similarly, garments B supported on the lower trackway run may be elevated or raised to and for movement along the upper trackway run without interfering or engaging in the slightest with garments B then depending for movement on such upper trackway run, all as indicated in Figures 1, 2, and 3. Subsequently, any particular garment B disposed upon any particular hanger-bar 17 may be quickly progressed to the door 6 for convenient display or removal by simply actuating the switch 11 and allowing the conveyor to run continuously in the manner above described until the particular or desired hanger-bar 17 comes into position.

In each successive operation, one hanger-bar 17 is lowered from the upper run *h* to the lower run *h'* and another hanger-bar 17 is raised from the lower run *h'* to the upper run *h*. The intermediate carriages C and their hanger-bars 17 of the upper run *h* are intermittently progressed one space forwardly through carriage endwise impingement or engagement by the elevation of one of the hanger-bars 17 from the lower tier to the upper tier. Similarly, the intermediate carriages C and their hanger-bars 17 of the lower tier are intermittently progressed one space rearwardly by movement of the carriages of the particular hanger-bar 17 which is being lowered from the upper tier to the lower tier, the space between the respective hanger-bars 17 being always maintained substantially constant by the links 18, 19, and spacer rollers 22, 23, of the several carriages C, any shoulder to shoulder crushing engagement or abutment between the garments B on one hanger-bar 17 and the garments B of a preceding or succeeding hanger-bar, as the case may be, being thereby totally prevented.

In Figures 10 to 13, both inclusive, we show a modified garment storage or display conveying or carrying mechanism of our invention for installation in a compartment A. In such modified structure, the compartment walls 4' are each provided on its inner face with a suitably shaped continuous recess 37, and fixed on said walls 4' for co-operation with said recesses 37 in the formation of registering trackways 14', are suitably spaced concentric series of plates 38, 39, as best seen in Figure 13.

Disposed for travel or movement on the trackways 14', are carriages C' substantially similar in all respects to the carriages C and each likewise including a spool or roller 15' mounted upon the spindle end 16' of a hanger-bar 17' and having pairs of link plates 18', 19', provided with spindles 20', 21', for rotatively supporting spacer spools or rollers 22', 23'. The spindle portions 16' are suitably provided within the compartment A with rollers 24' for engagement by and between yoke-fingers 25', 26', of so-called spider bars 44 centrally pinned or otherwise fixed upon a shaft 45 journaled in suitable bearings 46 mounted in the compartment walls 4', as best seen in Figure 13, and provided on their respective outer end with sprockets 47 for driving connection by means of the sprocket chains 48 with intermediate drive sprockets 49, in turn, mounted upon the respective projecting ends of auxiliary drive shafts 34', substantially identical in all respects with the auxiliary drive shafts 34.

In use and operation, the modified conveyer of Figures 10 to 13 is substantially similar to the conveyer of Figures 1 to 9, both inclusive. When the switch 11 is closed, the driving mechanism is set in motion, which, in turn, simultaneously and synchronously rotates the forward and rearward shafts 45 and the associated spider bars 44 for simultaneously pushing one set of carriages C' and their hanger-bar 17 rearwardly, elevating another set of carriages C' and their hanger-bar 17, pushing a third set of carriages C' and their hanger-bar 17 forwardly, and lowering a fourth set of carriages C' and their hanger-bar 17, intermediate sets of carriages C' and their respective hanger-bars 17 being intermittently through carriage abutment or impingement progressed forwardly and rearwardly, as the case may be, for display or selective removal of dependingly supported garments B or the like, all as best seen in Figure 10.

And, if desired, to facilitate movement or travel of the carriages C' in either direction, the spider-bars 44' may be endwise provided with a double set of short fingers 26'' or, in other words, a single long finger 25'' and double bights for respective propelling engagement with the carriages C' depending upon the direction of rotation of the spider-bars 44'.

It will, of course, be understood that the front and rear sets of the chain actuating sprockets of Figures 1 to 7, both inclusive, may be quite readily chain or otherwise connected for synchronous actuation by a single prime mover just as easily as the gears or sprockets 47 of the modified structure may be so connected and driven. Illustrative is Figure 15, which shows the sprockets 47 connected by a chain or the like 50 for syncronous actuation by a single motor.

And Figures 16 and 17 illustrate a modified type of hanger-bar and supporting carriage. In such type, the links 18ª, 19ª, of each respective carriage are pivotally connected by a short shaft 16ª, and journaled on the shaft 16ª intermediate said links, is the central track-roller 15ª. The shafts 16ª of the carriages Cª of each set are oppositely disposed, and formed in the inner end-portion of each is an annular seat or bearing, as at 51, for an end-portion of a stub-shaft 52 having its opposite end-portion permanently fixed between back-to-back disposed so-called compression angle-bars 53, 53, in turn, permanently fixed together in such relation. Also fixed to, and depending from, the angles 53, are supports 54 for a tension-bar 55, which extends lengthwise in spaced parallel relation to the angles 53, 53, and with the angles 53 forms a trussed hanger-bar of relatively great strength and rigidity.

It should also be understood that other changes and modifications in the form, construction, arrangement, and combination of the several parts

of our conveyers may be made and substituted for those herein shown and described without departing from the nature and principle of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. A conveyer including an endless trackway having upper and lower runs and connecting end-runs, a series of separate carriages mounted for movement on the trackway, each of said carriages including a set of spaced rollers and links pivotally connecting said rollers, shafts projecting from the carriages, and means comprising synchronously moving yoke-members disposed adjacent the end-runs successively detachably engageable with said shafts for, in a spaced consecutive series, lowering the carriages from the upper to the lower run, elevating the same from the lower to the upper run, and shifting the same partially along the upper and lower runs.

2. A conveyer including spaced registering trackways having upper and lower runs and connecting end-runs, a series of separate sets of carriages mounted for movement on the trackways, hanger-bars supported by the carriages of each set extending transversely between the trackways, and means for simultaneously shifting a respective set of carriages along one end-run from the upper run to, and partially along, the lower run and another respective set of carriages along the opposite end-run from the lower run to, and partially along, the upper run, the intermediate sets of carriages being abuttingly by said respective sets of carriages further shifted along the upper and lower runs.

3. A conveyer including spaced registering trackways having upper and lower runs and connecting end-runs, a series of separate sets of carriages mounted for movement on the trackways, hanger-bars supported by the carriages of each set extending transversely between the trackways, and means comprising propelling yokes disposed for movement adjacent the end-runs for successive detachable engagement with the sets of carriages for shifting a particular set of carriages from the upper to, and partially along, the lower run and another particular set of carriages from the lower run to, and partially along, the upper run, the intermediate sets of carriages being through abutment by the yoke-propelled sets of carriages further shifted along the upper and lower runs.

4. A conveyer including spaced registering trackways having upper and lower runs and connecting end-runs, a series of separate sets of carriages mounted for movement on the trackways, hanger-bars supported by the carriages of each set extending transversely between the trackways, means comprising a set of propelling yokes for successive engagement with the sets of carriages for shifting the same from the upper to, and partially along, the lower run, and means comprising a second set of propelling yokes for consecutive engagement with the sets of carriages for shifting the same from the lower run to, and partially along, the upper run, the intermediate sets of carriages being through abutment by the particular yoke-propelled sets of carriages shifted further along the upper and lower runs.

5. A conveyer including spaced registering trackways having upper and lower runs and connecting end-runs, a series of separate sets of carriages mounted for movement on the trackways, hanger-bars supported by the carriages of each set extending transversely between the trackways, means comprising a plurality of sets of propelling yokes for successive engagement with the sets of carriages for shifting the same from the upper run to the lower run and from the lower run to the upper run, and means for synchronizing movement of said yokes for simultaneously effecting lowering and elevating movement of said respective sets of carriages and shifting of adjacent carriages along the upper and lower runs.

6. A conveyer including a trackway, a series of carriages mounted for movement on the trackway, each of said carriages including a set of spaced rollers and links pivotally connected at one end to each other and at their opposite end respectively connected pivotally to said rollers, shafts projecting from the carriages, and means for engaging said shafts successively for effecting movement of the carriages along the trackway.

7. A conveyer including a trackway having upper and lower runs and connecting end-runs, a series of separate carriages mounted for movement on the trackway, shafts projecting from said carriages, and means comprising synchronously actuable sets of yoke-members disposed for movement adjacent the end-runs successively detachably engageable with said shafts for, in a spaced consecutive series, lowering the carriages from the upper to, and out of the obstructing way of the suceeding carriage partially along, the lower run and elevating the same from the lower to and out of the obstructing way of the succeeding carriage partially along, the upper run, the intermediate carriages being intermittently through abutment by the yoke-propelled carriages further shifted along the upper and lower runs.

8. In a garment storage vault, garment conveying means including a plurality of horizontal hanger-bars mounted within the vault for movement in a spaced parallel series along a lower run and then forwardly along an upper run, a forward endless chain for lowering the bars from the upper to the lower run, a rear endless chain for elevating the bars from the lower to the upper run, and synchronized prime movers drivingly connected to the forward and rear chains.

9. A garment conveyer including spaced trackways having upper and lower runs and connecting end-runs, a series of sets of carriages mounted for movement on the trackways, hanger-bars supported by the carriages of each set extending transversely between the trackways, means comprising a set of propelling yokes for successive engagement with the sets of carriages for shifting a particular set of carriages from the upper to the lower run, means comprising a second set of propelling yokes for consecutive engagement with the sets of carriages for shifting another particular set of carriages from the lower run to the upper run, and means for synchronizing movement of said yokes for simultaneously effecting lowering and elevating movement of said respective sets of carriages, the intermediate sets of carriages being through abutment shifted by the yoke-propelled sets of carriages along the upper and lower runs.

10. A garment conveyer including spaced registering trackways having upper and lower runs and connecting end-runs, a series of sets of carriages mounted for movement on the trackways, each of said carriages including a set of spaced

runners and links pivotally connecting said runners, hanger-bars extending between, and having spindle-ends engaged by, the carriages of each set, and means comprising sets of yokes disposed for movement adjacent the end-runs successively engageable with the carriage spindle-ends for, in a spaced consecutive series, lowering the sets of carriages from the upper to the lower run and elevating the same from the lower to the upper run, said sets of yokes being synchronized for simultaneously lowering a particular set of carriages from the upper to the lower run and elevating another particular set of carriages from the lower run to the upper run, the intermediate sets of carriages being through abutment shifted by the yoke-propelled sets of carriages along the upper and lower runs.

11. In a garment conveyer having spaced parallel tracks, a garment carrier comprising a rod extending transversely between the tracks and provided at its opposite ends with track-engaging rollers, and pairs of oppositely projecting parallel links swingably mounted on the rods adjacent said rollers and respectively provided at their outer ends with auxiliary track-engaging rollers in the formation of self-spacing rod carriages.

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