June 17, 1969 H. S. FALL ETAL 3,450,446

HEAVY-DUTY CHASSIS TRACK

Filed Oct. 6, 1966 Sheet 1 of 3

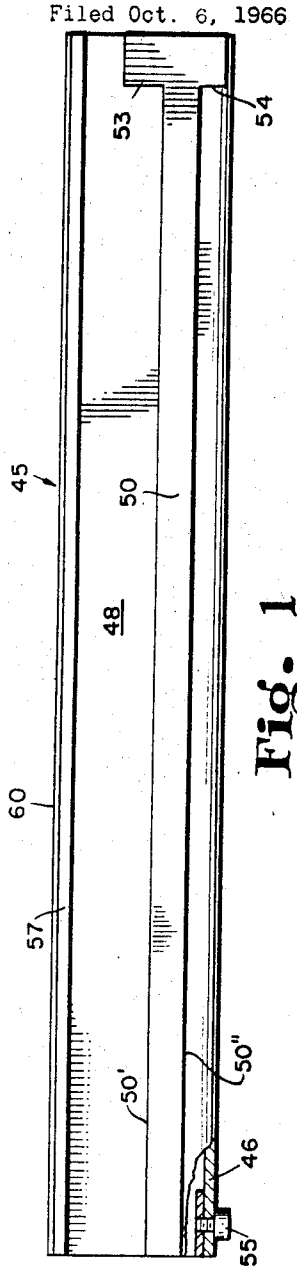


Fig. 1

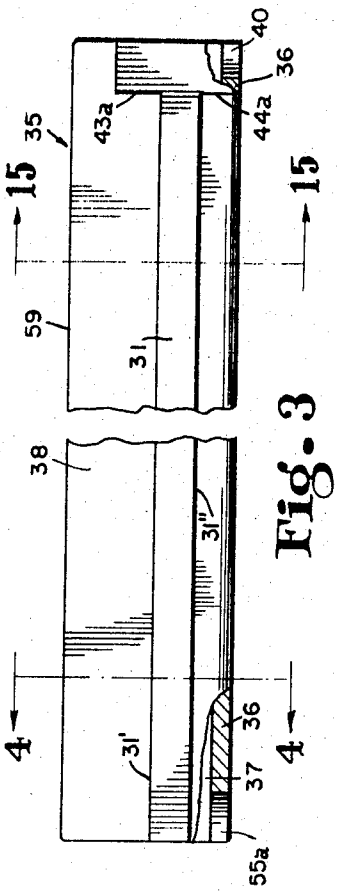


Fig. 3

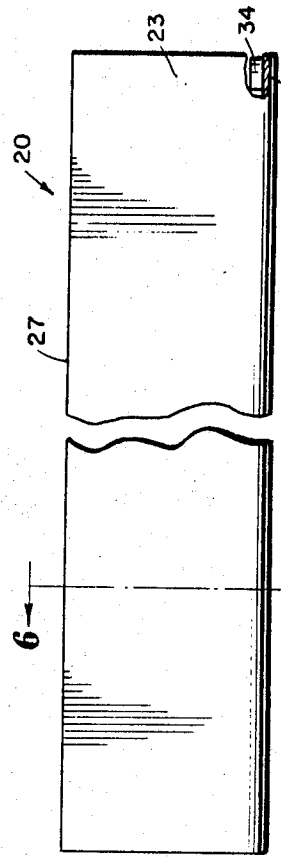


Fig. 5

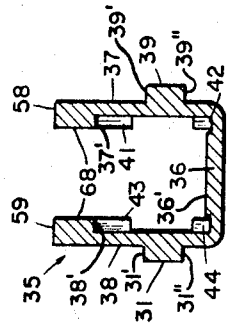


Fig. 4

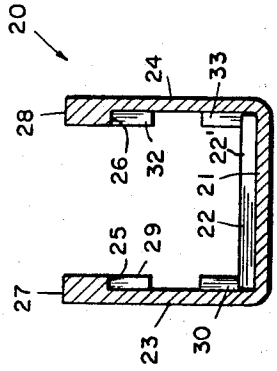


Fig. 6

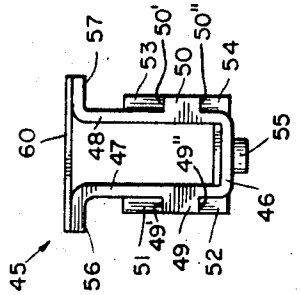


Fig. 2

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HEAVY-DUTY CHASSIS TRACK

Filed Oct. 6, 1966 Sheet 2 of 3

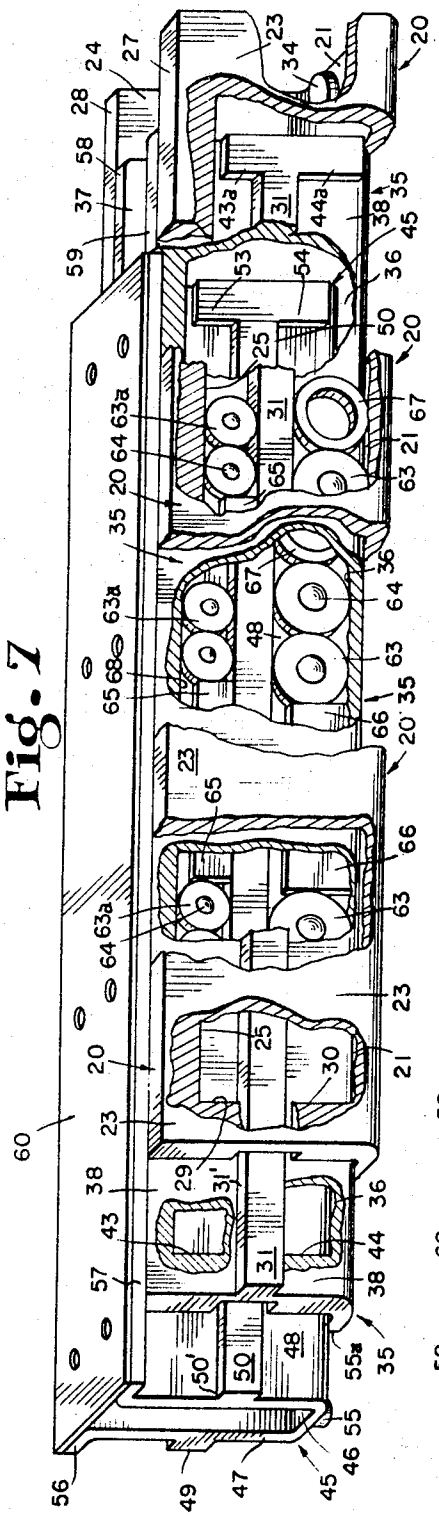


Fig. 7

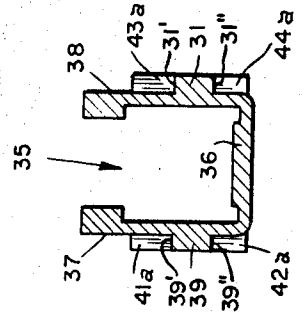


Fig. 15

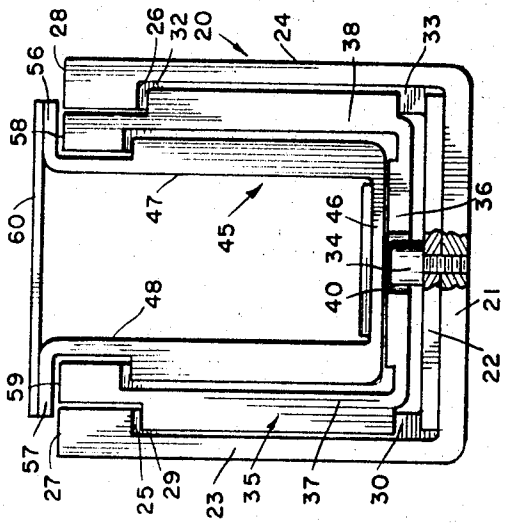


Fig. 9

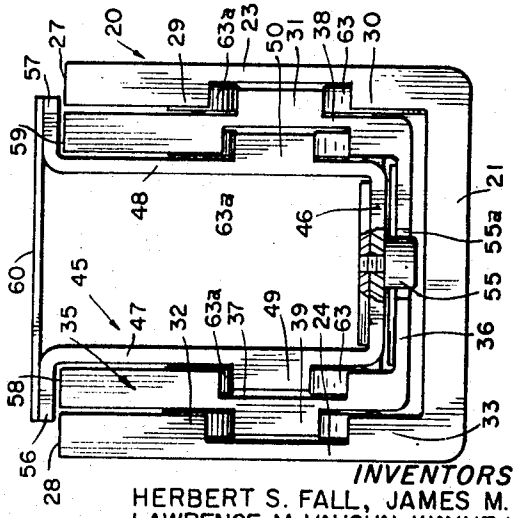


Fig. 8

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June 17, 1969 H. S. FALL ETAL 3,450,446

HEAVY-DUTY CHASSIS TRACK

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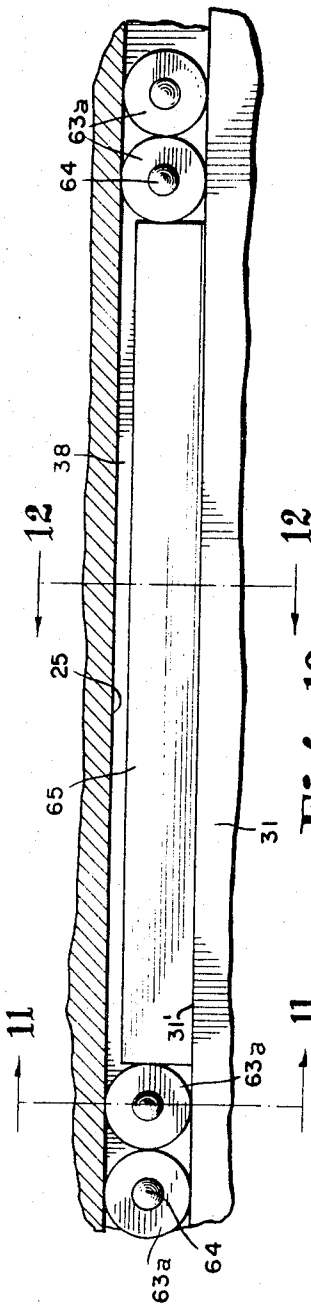


Fig. 10

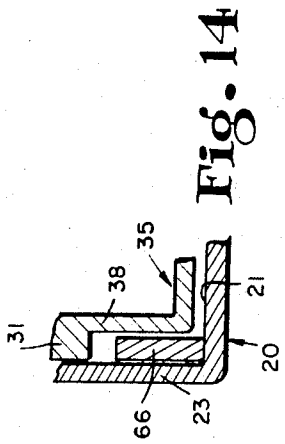


Fig. 14

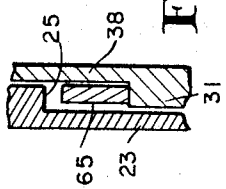


Fig. 12

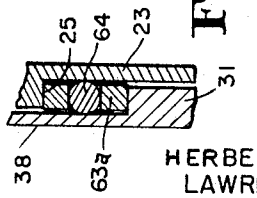


Fig. 11

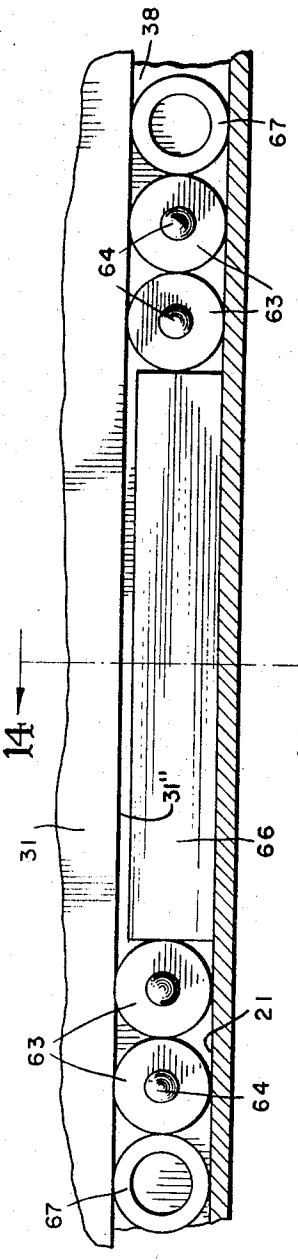


Fig. 13

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United States Patent Office 3,450,446 Patented June 17, 1969

3,450,446

HEAVY-DUTY CHASSIS TRACK

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Int. Cl. F16c *35/06, 29/04;* A47b *88/10*
U.S. Cl. 308—3.8 11 Claims

ABSTRACT OF THE DISCLOSURE

A heavy-duty chassis track comprising first, second and third telescopically disposed track means. The first track means comprises a pair of parallel, spaced apart, elongated, generally vertically disposed wall members, each wall member providing a first downwardly facing track surface extending inwardly therefrom and longitudinally therealong and a first upwardly facing track surface below and parallel to the first downwardly facing track surface and extending inwardly therefrom and longitudinally therealong; the second track means, which telescopes within the first track means, comprises a U-shaped channel having generally vertically disposed side walls, each of the side walls providing a second downwardly facing track surface extending inwardly therefrom and longitudinally therealong and a second upwardly facing track surface below the second downwardly facing track surface and extending inwardly therefrom and longitudinally therealong, and each of the side walls further providing a third upwardly facing track surface extending outwardly therefrom and longitudinally therealong and a third downwardly facing track surface below the third upwardly facing track surface and extending outwardly therefrom and longitudinally therealong, the second and third track surfaces being parallel; and the third track means, which telescopes within the second track means, comprises a track member having generally vertically disposed sides, each of the sides providing a fourth upwardly facing track surface extending outwardly therefrom and longitudinally therealong and a fourth downwardly facing track surface below and parallel to the fourth upwardly facing track surface and extending outwardly therefrom and longitudinally therealong. The third track surfaces are disposed between the first track surfaces and the fourth track surfaces are disposed between the second track surfaces. Rollers are disposed between opposing track surfaces, i.e., rollers are carried on each upwardly facing track surface and under the downwardly facing track surface disposed directly thereabove.

This invention relates to a heavy-duty chassis track composed of extensible units to support drawers, slides or trays and the like in a cabinet or rack wherein loads as high as one thousand pounds may be imposed on the track. Steel or other heavy load carrying material is formed into a plurality of U-shaped members of decreasing widths between upturned side members, one telescoping within another with roller carrying races or tracks held and spaced apart vertically and laterally therebetween.

Short cylinders, each with an axially centered hole therethrough, are used as load carrying rollers and are carried on said tracks. In the roller hole, a single ball bearing is rollably carried and has a diameter at least a few thousandths of an inch greater than the width of each roller, but smaller than the diameter of the roller hole.

This ball bearing in the roller serves to take the lateral

thrust between the side members rather than to allow that thrust to be taken on the sides of the rollers. By reason of this structure, a chassis track carrying higher loads than heretofore has been thought to be practical is had to be extremely easily shiftable under the heavy load in both outgoing and ingoing travel in respect to this cabinet or device in which the track is mounted.

High strength and ease of operation have been expressed as objects of the invention. One more object needs to be expressed and that is the cushioning or braking of the travel of inner U members toward their permissible travel ends.

The invention incorporates an automatic unit braking action. The load carrying rollers are not spaced by cages or the like but are free to roll separately. While the rollers normally remain in groups in any one of which the rollers remain approximately in contact one with the other, the rollers may become "out of time," that is, they are spaced apart with the result that, as the extensible track units are shifted toward the fully retracted or extended condition, as an example, one roller alone may come against a stop member and quit rolling, then subsequent rollers roll against the stalled roller and likewise become stalled without farther rolling. The result is that, to completely retract or extend the track units, the shiftable units will have to slide over these prematurely stalled rollers, and in so doing, the friction induced by this sliding over the then nonrolling rollers very effectively reduces the speed toward the limit of travel of the track units. Thus the invention incorporates in the track structure automatically operating friction means to prevent heavily loaded track units from breaking through the end stops.

With these features in mind, reference is made to the following specific description of one particular form of the invention as illustrated in the accompanying drawings, in which:

FIG. 1 is a view in outside elevation and partial section of an outer side of an innermost track unit;

FIG. 2 is a view in front end elevation of the track unit shown in FIG. 1;

FIG. 3 is an outside view in side elevation and partial section of an intermediate track unit;

FIG. 4 is a view in vertical transverse section on the line **4—4** in FIG. 3;

FIG. 5 is a view in outer side elevation of an outer track unit;

FIG. 6 is a view in vertical transverse section on the line **6—6** in FIG. 5;

FIG. 7 is a view in perspective and partial section of an assembly of the three track units including bearing rollers;

FIG. 8 is a view on an enlarged scale in front end elevation of the assembly shown in FIG. 7;

FIG. 9 is a view on an enlarged scale in rear end elevation of the assembly of FIG. 7;

FIG. 10 is a diagrammatic view of one of two minor, upper roller raceways;

FIG. 11 is a view in a vertical section on the line **11—11** in FIG. 10;

FIG. 12 is a view in vertical section on the line **12—12** in FIG. 10;

FIG. 13 is a diagrammatic view of one of two major, lower roller raceways;

FIG. 14 is a view in vertical section on the line **14—14** in FIG. 13; and

FIG. 15 is a view in transverse section on the line **15—15** in FIG. 3.

An outer U-shaped unit generally designated by the numeral **20** has a lower floor **21** preferably reinforced by a plate **22** extending throughout the length of that unit.

The upper surface 22' of this plate 22 provides first upwardly facing track surfaces. This length is selected to a large extent by the horizontal depth of the cabinet (not shown). From each side of the floor 21, sides 23 and 24 respectively extend upwardly substantially at right angles to the floor 21. On the inside faces of each of the sides 23 and 24, there are planar shoulders 25 and 26 extending the major length of those sides at right angles thereto and spaced downwardly from the top edges 27 and 28 of those sides, FIGS. 6 and 9, these shoulders 25 and 26 being substantially parallel to the floor 21 and forming upper sides of a track. Specifically, these shoulders 25 and 26 provide first downwardly facing track surfaces.

Roller stops 29 and 30 are carried within the front end portions of the side 23, the stop 29 extending downwardly on the inner face of the side 23 from the under side of the shoulder 25, and the stop 30 extending upwardly along the inner face of the side 23 terminating by an upper end spaced below the lower end of the upper stop 29 a distance to receive a track 31 on another unit freely therebetween. In the same manner, stops 32 and 33 are carried on the unit side 24 in opposition to the stops 29 and 30 on the side 23. A stop pin 34 is fixed to the outer unit floor 21 at its rear end to extend upwardly therefrom into the path of travel of an intermediate unit designated generally by the numeral 35. This unit 35 is U-shaped and has a transverse floor 36, from the outermost side edge portions of which respectively rise vertically side walls 37 and 38. The side edge portions of the upper surface 36' of the floor 36 provide second upwardly facing track surfaces. The track 31 above mentioned is fixed on the side wall 38 to extend longitudinally from end to end thereof and spaced below the center of the wall 38.

Each wall 37, 38 is formed to provide an inwardly and longitudinally extending shoulder 37', 38' along its upper edge portion, the shoulders 37' and 38' defining second downwardly facing track surfaces.

In the same manner, a track 39, FIGS. 4 and 15, is carried along the outside of the wall 37, FIG. 8. The upper faces 31', 39' and lower faces 31'', 39'' of the tracks 31 and 39 provide, respectively, third upwardly and downwardly facing track surfaces. The rear end of the floor 36 is provided with an entering notch 40. The pin 34 of the outer unit 20 is received in the notch 40 to stop rearward travel of the unit 35 in reference to unit 20. The unit 35 further has on its inner sides of the side walls 37 and 38, at the rear end portions thereof, stops 41 and 42 extending upwardly and downwardly respectively from the track 39 and at the front end, and stops 43 and 44 extending upwardly and downwardly from the track 31. At the other end of the unit 35, the rear end, FIG. 15 stops 41*a* and 42*a* extend respectively up and down from the track 39, and stops 43*a* and 44*a* extend respectively up and down from the track 31. The unit 35 thus formed fits within the unit 20.

An innermost unit 45 is U-shaped with a floor 46 and side walls 47 and 48 extending vertically upwardly from respective side edges of the floor 46. Each wall 47 and 48 carries respectively a track 49 and 50 which extend longitudinally along the walls. The upper faces 49', 50' and lower faces 49'', 50'' of the tracks 49, 50 provide, respectively, fourth upwardly and downwardly facing track surfaces. Stops 51 and 52 carried on the wall 47 extend upwardly and downwardly from the rear end portion of the track 49 and stops 53 and 54 carried on the wall 48 extend upwardly and downwardly from the rear end portion of the track 50. A pin 55 is fixed to the central front end portion of the floor 46 to extend downwardly to be in the path of the notch 55*a* of the unit 35 to stop rearward travel of the unit 45 in reference to the unit 35. The upper portions of the walls 47 and 48 turn outwardly one from the other respectively into horizontally, outwardly extending flanges 56 and 57 respectively. A plate 60 extends across the space between the walls 47 and 48 and overlays the flanges 56 and 57 and is secured thereto by any suitable means (not shown) such that will cause the plate to space apart rigidly the walls 47 and 48. This unit 45 telescopes within the unit 35. The flanges 56 and 57 preferably freely overlay the top edges 58 and 59 at least of the unit 35.

In the assembly operation of these units 20, 35 and 45, rollers 63 are employed, each with a bore 62 therethrough, FIG. 11, and a ball bearing 64 in the bore. The bearing 64 as indicated in FIG. 11, has a diameter exceeding the transverse width of the roller by at least a few thousandths of an inch and less than the diameter of the bore to allow the bearing to roll freely within that bore. In the present example of the invention two diameters of rollers are employed, the larger rollers being designated by the numeral 63 and the smaller rollers by the numeral 63*a* also each carrying a ball bearing 64.

On the one side of the assembly, FIG. 7, rollers 63*a* with their ball bearings 64 are placed on the top of the track 31 of the unit 35 under the track shoulder 25 between the outer unit 20 and the intermediate unit 35.

The number of rollers 63*a* used is limited. In the one form shown, FIG. 10, but two rollers are shown in each of two groups and with a straight bar 65 interposed as a spacer between the groups. The bar 65 has a height less than the diameters of the rollers 63*a*.

The shoulder 25 bears on the rollers 63*a* in turn bearing on the track 31. The combined length of the bar 65 and the two groups of rollers 63*a* is less than the length of either track 39 or 31 to permit maximum travel of the unit 35 with respect to the unit 20 and yet have a sufficient number of rollers to support the load.

The larger rollers 63 are placed, FIGS. 7 and 13, with their ball bearings 64 on the floor or track 21 and under the track 31. These rollers 63 are placed in two groups separated by a spacer bar 66, FIG. 13. Two rollers 63 are shown in each group plus a spring roller 67 which does not carry a ball bearing but does aid in carrying the load, and which has an outside diameter a few thousandths larger than that of the rollers 63. The height of the bar 66 is less than the outside diameter of the rollers 63. The track 31 bears on the rollers 63 in turn bearing on the track 21.

Then rollers 63*a* with their ball bearings 64 are placed on the track 50 of the unit 45 and under the shoulder 68 of the unit 35 and between the walls 48 and 38 of the respective units 45 and 35. The rollers 63*a* between both the upper zones of these units 45 and 35 follow the same pattern in all respects as described for the rollers 63*a* placed between the units 20 and 35. Likewise the larger rollers 63 and spring rollers 67 are placed between the units 45 and 35 under the track 50 and on the floor 36. The same procedure applies to the opposite sides of the units.

The plate 60 will receive and support the imposed load. The unit 20 will be supported and held stationary by any suitable means (not shown).

The units 35 and 45 are shown in FIG. 7 at the beginnings of their outward travel from the unit 20. Preferably, all three units have equal lengths. As the two units start their forward or outward travel, one relative to the other and to the stationary unit 20, all groups of rollers 63*a* and 63 will be approximately centered on their respective tracks.

Continued outward travel of the units 35 and 45 bring these rollers to the rear portions of the units 35 and 45 and the forward portion of the unit 20. The rollers 63*a* riding on to tracks 31 and 39 will come into abutment with the stops 29 and 32 on the unit 20 with the stops 41 and 43 and 41*a* and 43*a* of the unit 35 pressing against the two groups of rollers 63*a* from behind. The larger rollers 63 and 67 riding on the floor 21 will strike the lower stops 30 and 33 of the unit 20 with the stops 42*a* and 44*a* pressing against the two groups of rollers 63 and 67 from behind.

The two groups of rollers **63***a* riding on the tracks **49** and **50** will strike the stops **41** and **43** of the unit **35** with the stops **51** and **53** pressing the rollers **63***a* from behind.

The two groups of the larger rollers **63** and **67** riding under the tracks **49** and **50** on the floor **36** will strike the stops **42** and **44** of the unit **35** with the stops **42***a* and **44***a* pressing on the rollers **63** and **67** from behind. In this manner the two units **35** and **45** are limited in their outward travel wherein the rollers are engaged respectively between a stop on one unit and a stop on another unit.

By reason of the presence of the spring rollers **67** in the roller trains, the front or leading rollers **67** will come first against the stops **30, 33** and **42, 44** with not only a cushion affect, but primarily a vertically "swelling" affect by reason of the pressure of the rollers **63** coming therebehind. This "swelling" affect stops effectively the rolling of the following rollers **63** with the result that not only does the distortion of the spring roller introduce a greatly increased friction contact between that spring roller and the upper and lower tracks between which the roller is carried, but the rollers **63** are also stopped from rolling, so that all farther travel of one unit in respect to the other is quickly braked down by the sliding over those stationary rollers also. The inner unit **45** is finally stopped in the rear travel by the pin **55** engaging in the notch **55***a* of the unit **35**, and the notch **40** of the unit **35** in turn engaging about the pin **34** of the unit **20**.

The number of rollers, both **63***a* and **63** may be increased as desired providing that the number be limited to that train length which will normally roll from one unit set of stops to the limiting stops in another unit so as to avoid excessive sliding of units over the rollers which have been arrested in travel because of the presence of too many rollers in one or more raceways.

While we have herein shown and described our invention in the one particular form, it is obvious that mechanical changes therefrom may be employed without departing from the spirit of the invention, and we therefore, do not desire to be limited to that precise form beyond the limitations which may be imposed by the following claims.

We claim:

1. A heavy-duty chassis track structure comprising:
- a relatively stationary, U-shaped first unit having a pair of approximately vertically directed legs and a floor joining the lower ends of the legs;
- a second U-shaped unit telescoping within the first unit and having a pair of vertically directed legs and a floor joining the lower ends of the legs;
- a third U-shaped unit telescoping within the second unit and having a pair of vertically directed legs, and a floor joining the lower ends of the legs;
- a track extending longitudinally on and along each outer side of said second unit intermediate the upper edges of the second unit and the level of the floor thereof, and extending freely along the opposing sides of the first unit legs;
- a shoulder extending along the inside, upper opposing portion of each of the legs of the first unit and spaced respectively above said tracks;
- a track on each of outer sides of said third unit legs extending longitudinally therealong and freely along the insides of the legs of said second unit;
- a shoulder along the insides of said second unit legs adjacent the top edges thereof;
- rollers carried on upper sides of said tracks of said second and third units and under said shoulders of said first and second units;
- additional rollers carried under each of said tracks and on the respective floors of said first and second units;
- roller stops carried at forward ends of each of said first and second units both above and below said tracks; and
- roller stops at rear ends of said second and third units both above and below said tracks.

2. The structure of claim **1** in which there is antifriction means between all of said legs allowing all of the said rollers to roll free of lateral friction between the legs and the roller slides.

3. The structure of claim **2**, in which:
- said antifriction means includes rollers in part at least having axial bores therethrough;
- ball bearings carried in said bores; and
- said ball bearings are of greater diameter than the width of said rollers, and are freely rollable in said bores;
- said ball bearings taking lateral thrust between adjacent, opposing legs of said units.

4. The structure of claim **2**, in which:
- there is at least a spring roller at the end of groups of the rollers below each of said tracks for impact against said stops in the paths of those rollers and setting up friction between the tracks and floors by deformation of the spring rollers from round to slightly elliptical shapes.

5. The structure of claim **1**, in which:
- a rigid bar separates the rollers above and below each track into separate groups, one group at each end of the bar in each instance.

6. The structure of claim **3**, in which:
- said three units each comprises a channel iron wherein the respective legs are spaced apart; and there is means tying together upper end portions of the third unit legs and fixing those legs against bending toward or away from each other and resisting pressure thereon from the legs of said first and second legs.

7. A heavy-duty chassis track structure comprising:
- first means comprising a pair of parallel, spaced apart, elongated, generally vertically disposed wall members, each of said wall members providing a first downwardly facing rigid track surface extending inwardly therefrom and longitudinally therealong and a first upwardly facing rigid track surface extending inwardly therefrom and longitudinally therealong, said first upwardly facing track surface being parallel with said first downwardly facing track surface and disposed therebelow;
- second means telescoping within said first means, said second means comprising a U-shaped channel having generally vertically disposed side walls, each of said side walls providing a second downwardly facing rigid track surface extending inwardly therefrom and longitudinally therealong and a second upwardly facing rigid track surface extending inwardly therefrom and longitudinally therealong, said second upwardly facing track surface being below said second downwardly facing track surface, and each of said side walls further providing a third upwardly facing rigid track surface extending outwardly therefrom and longitudinally therealong to be in vertical registry with said first downwardly facing track surface and a third downwardly facing rigid track surface below said third upwardly facing track surface and extending outwardly therefrom and longitudinally therealong to be in vertical registry with said first upwardly facing track surface, said second and third track surfaces being parallel;
- third means telescoping within said second means, said third means comprising a track member having generally vertically disposed sides, each of said sides providing a fourth upwardly facing rigid track surface extending outwardly therefrom and longitudinally therealong to be in vertical registry with said second downwardly facing track surface and a fourth downwardly facing rigid track surface below said fourth upwardly facing track surface and extending outwardly therefrom and longitudinally therealong to be in vertical registry with said second

upwardly facing track surface, said first, second, third and fourth track surfaces being parallel;

first rollers carried on said first upwardly facing track surfaces and under and in rolling contact with said third downwardly facing track surfaces;

second rollers carried on said third upwardly facing track surfaces and under and in rolling contact with said first downwardly facing track surfaces;

third rollers carried on said second upwardly facing track surfaces and under and in rolling contact with said fourth downwardly facing track surfaces; and

fourth rollers carried on said fourth upwardly facing track surfaces and under and in rolling contact with said second downwardly facing track surfaces.

8. The structure of claim **7**, in which:

each of said wall members includes a rigid shoulder extending along the upper edge thereof and defining said first downwardly facing track surface and a first rigid portion extending along the lower edge thereof and defining said first upwardly facing track surface;

each of said side walls includes a rigid shoulder extending along the upper edge thereof and defining said second downwardly facing track surface and a second rigid portion extending along the lower edge thereof and defining said second upwardly facing track surface;

each of said side walls further includes a rigid track extending therealong and intermediate its upper and lower edges to define said third upwardly facing track surface and said third downwardly facing track surface; and

each of said sides includes a rigid track extending therealong and intermediate its upper and lower edges to define said fourth upwardly facing track surface and said fourth downwardly facing track surface.

9. The structure of claim **8**, in which:

said first rigid portions are arranged to provide a floor connecting said wall members, and

said second rigid portions are arranged to provide a floor connecting said side walls.

10. The structure of claim **7**, in which:

at least one of each of said first, second, third and fourth rollers is formed with an axial bore therethrough, a ball bearing carried in each of said bores, each of said ball bearings having a diameter which is less than the diameter of the bore in which it is carried and greater than the width of the roller in which the bore is formed.

11. The structure of claim **7**, in which:

a rigid bar is cooperatively associated with each of said first, second, third and fourth rollers, each bar being arranged to separate its associated rollers into separate groups.

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MARTIN P. SCHWADRON, *Primary Examiner.*

L. L. JOHNSON, *Assistant Examiner.*

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