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[33] Japan
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214/(Inquired); 52/(Inquired)

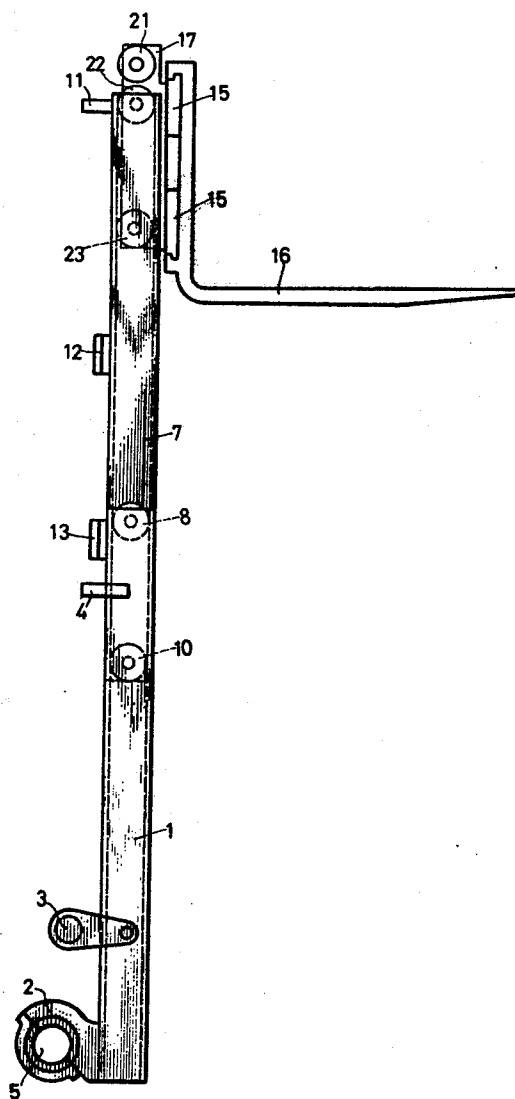
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[54] LIFT TRUCK
11 Claims, 14 Drawing Figs.

[52] U.S. Cl..... 187/9,
187/95

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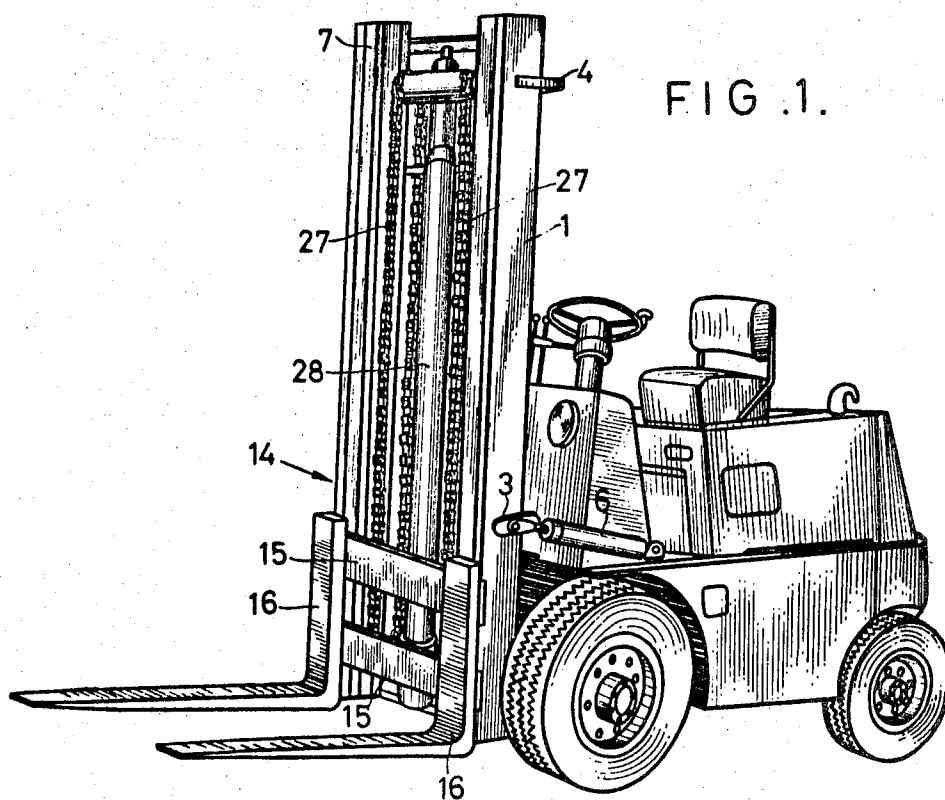
ABSTRACT: A load-lifting apparatus comprising a base, a pair of stationary uprights, a pair of extensible uprights, a load carriage and pairs of upper, middle and lower guide rollers positioned between said uprights and/or between said uprights and said load carriage, said upper and lower rollers cooperating with their respective uprights to resist the forward thrust caused by the load, said middle and lower rollers cooperating with their respective uprights to resist the side thrust caused by eccentric loading.



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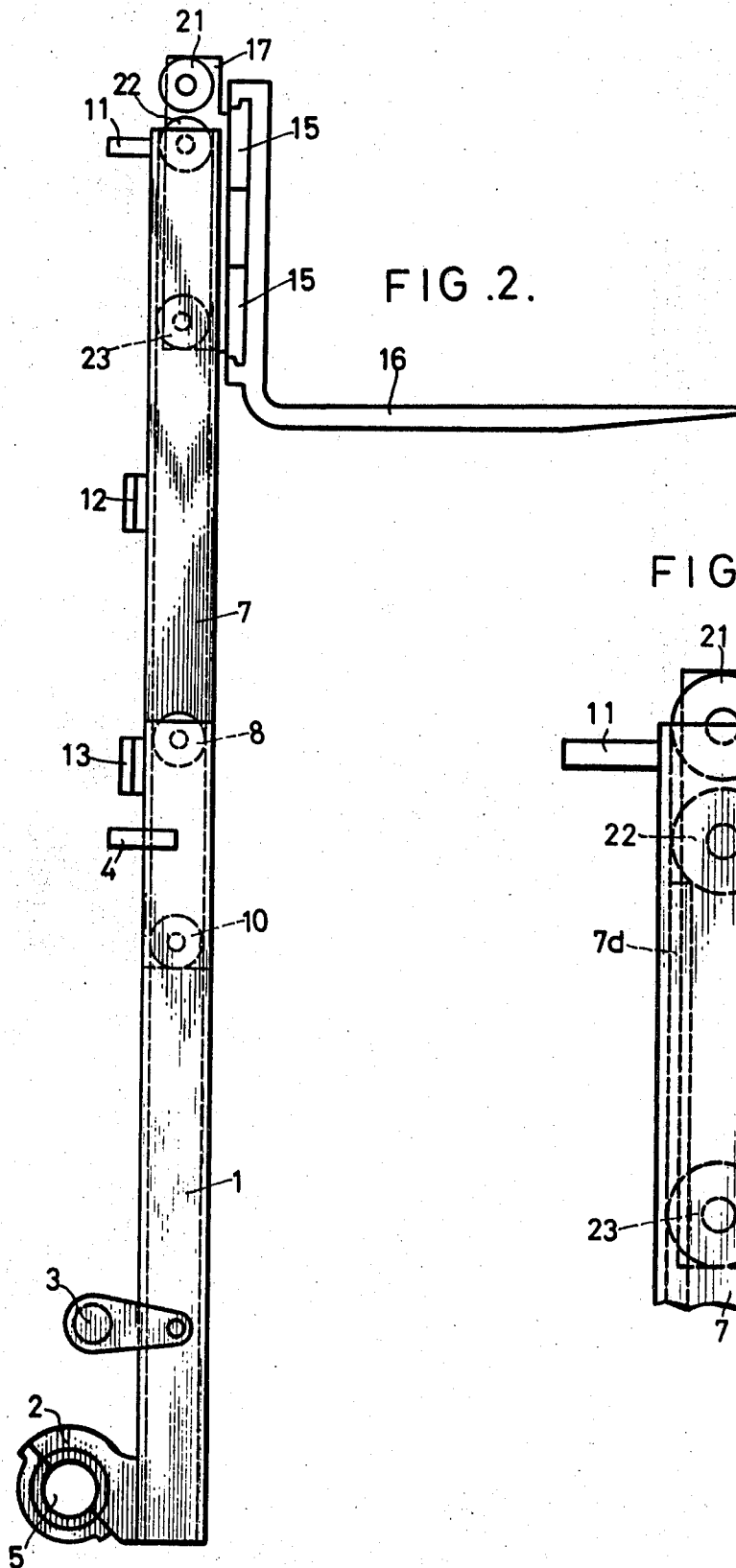
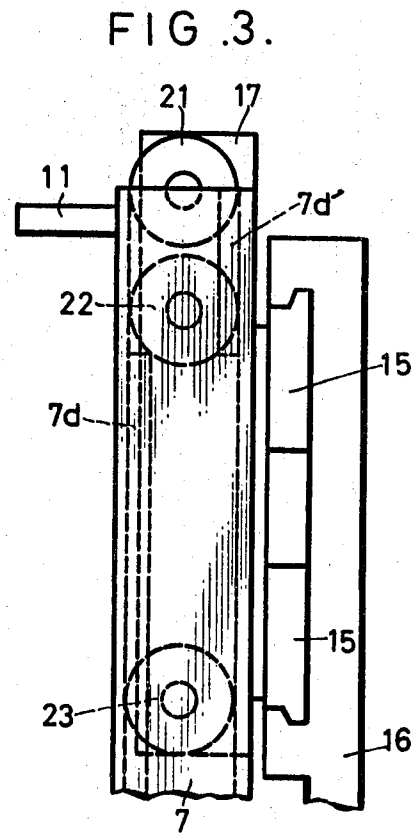


FIG. 4.

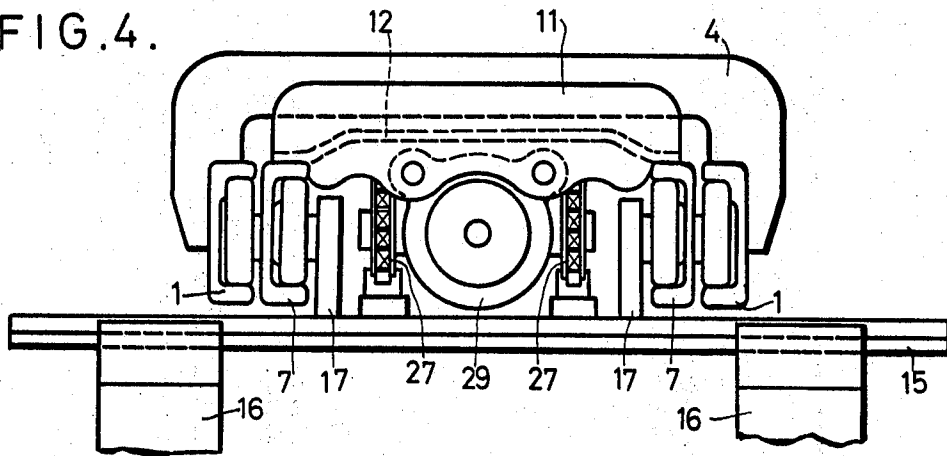
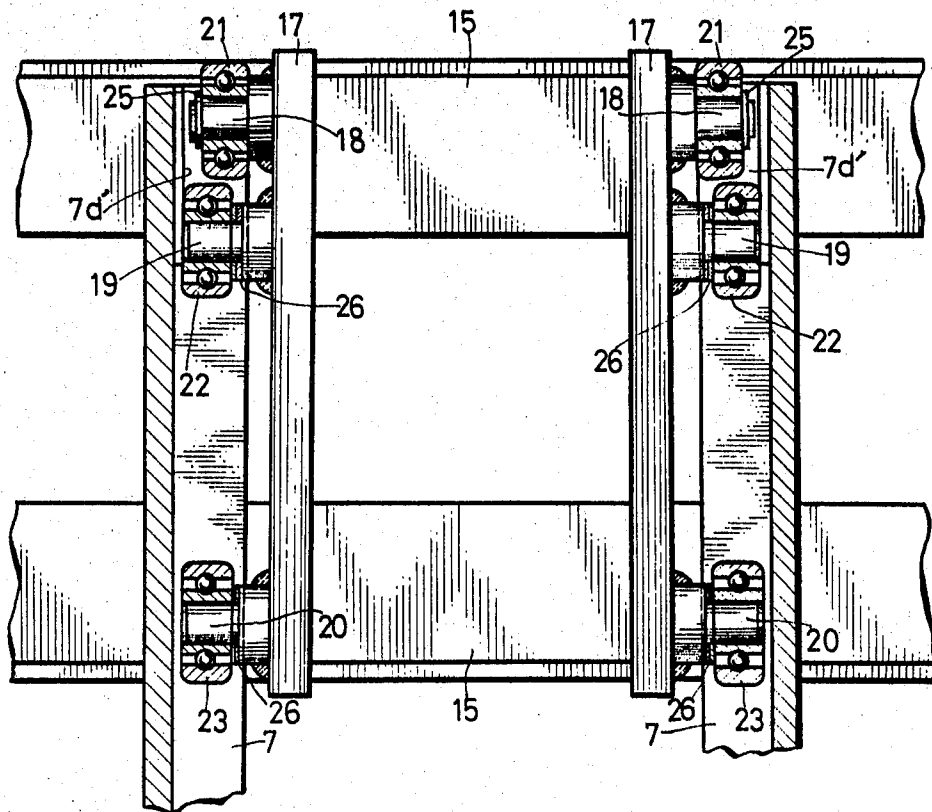
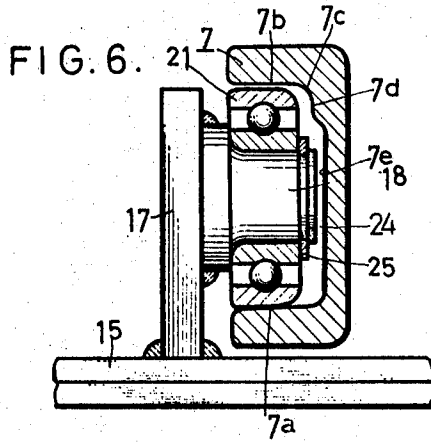
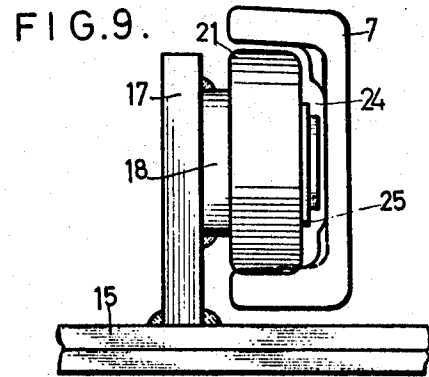
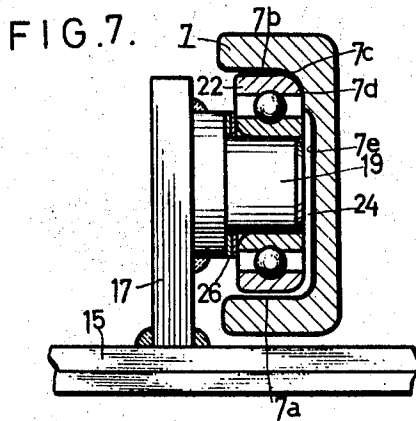
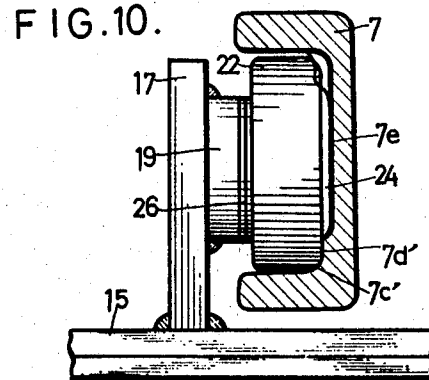
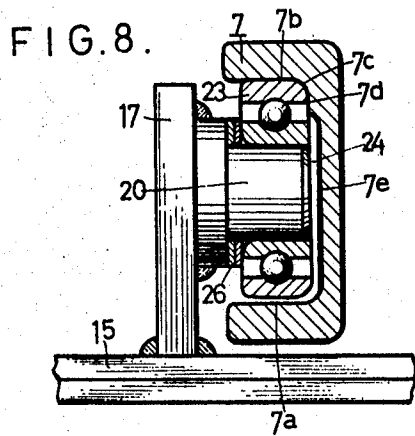
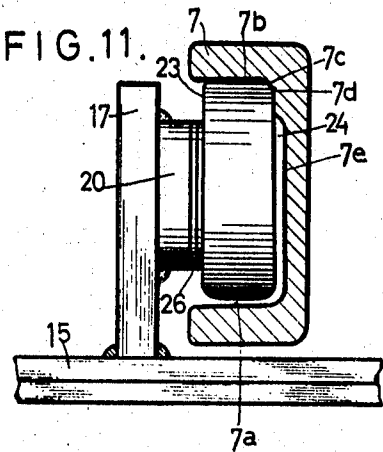
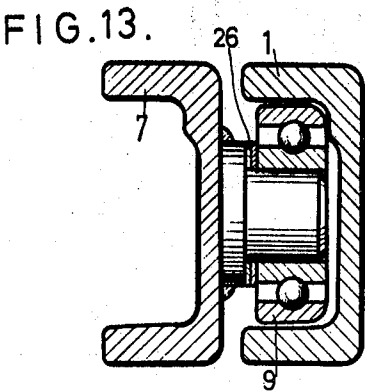
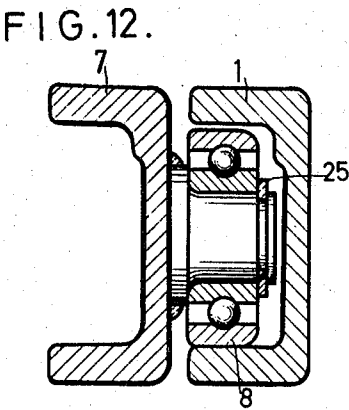
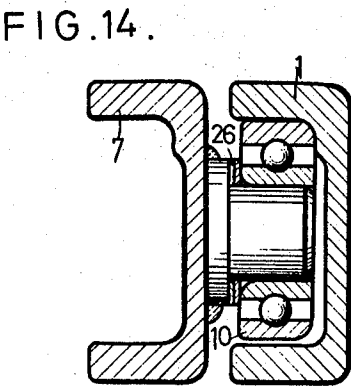


FIG. 5.







LIFT TRUCK

BACKGROUND OF THE INVENTION

This invention relates generally to load-lifting apparatus for handling goods and more specifically to the lift truck type of such apparatus utilized for elevating, storing and transporting desired load materials. Lifts trucks generally include a structure of uprights and a load carriage. The conventional uprights generally consists of a pair of stationary, laterally spaced uprights disposed in facing relation and fixed to the forward end portion of the industrial lift truck, and a pair of laterally spaced extensible uprights disposed between said stationary uprights and movable longitudinally relative thereto. In most cases, the inside of each of said extensible uprights is channel shaped. A load carriage having a load-engaging means called a "fork" is generally supported between said extensible uprights so that said load carriage is movable longitudinally along said extensible uprights guided by several pairs of rollers provided on said load carriage. Said rollers are required to stabilize the load carriage against the extensible uprights and, in the known lift trucks, generally consist of pairs of upper, lower and side rollers. Said upper and lower rollers are horizontally supported on stub shafts extending in a direction normal to the longitudinal axis of the truck and rotate contacting, respectively, the forward and rearward flanges of said extensible uprights. The side rollers, of which there are two pairs, are disposed between said upper and lower rollers. Said side rollers are disposed in planes substantially perpendicular to the planes of said upper and lower rollers and rotate contacting the webs of said extensible uprights.

However, it has been found that this arrangement is not satisfactory since it requires a large number of rollers and complicated adjustments of the position of the side rollers. In order to overcome this problem, it has been proposed that the upper and lower rollers of the load carriage which rotate relative to the extensible uprights be tilted in opposite directions against the web of the uprights, whereby the tread of said upper and lower rollers respectively contacts against the inside corner angles defined by the forward and rearward flanges and the web of said uprights. In this manner, the side rollers can be omitted. However, the force applied by the upper rollers against the inside corner angle defined by said forward flange and web has a substantial lateral component tending to force the extensible uprights apart. While such laterally applied force is present in all upright structures, it is particularly significant in the foregoing arrangement due to the structure of the uprights. The extensible uprights are generally connected on the outer surface of their rearward flanges and because of structural limitations, the connecting beams of said extensible uprights are generally weaker than the corresponding beams interconnecting the stationary uprights. Since the lateral forces in the foregoing arrangement are applied at the inside corner angle defined by the forward flange and the web, the moment of said lateral forces is substantially increased whereby the strain on the beams connecting the rearward flanges of the extensible uprights is substantially increased. For this reason, the above-described arrangement is subject to failure under high eccentric loads, and is therefore not a suitable solution to the problem presented.

SUMMARY OF THE INVENTION

Generally speaking, and in accordance with the invention, a load-lifting apparatus having pairs of upper, middle and lower guide rollers positioned between the uprights and the load carriage is provided, said upper and lower rollers cooperating with their respective uprights to resist the forward thrust caused by the load, said middle and lower rollers cooperating with their respective uprights to resist the side or lateral thrust caused by eccentric loading. Further, said middle rollers, in cooperation with their respective uprights, also assume the function of resisting the forward thrust when the load carriage is elevated to the region wherein the upper rollers project above said uprights.

More particularly, said upper, middle and lower rollers are mounted on stub shafts which lie in substantially the same plane and extend in a direction normal to the longitudinal axis of the load carriage. The uprights are formed with a curved surface in the inside corner defined by the rearward flange and web thereof and a supporting surface in continuation of said curved surface on a portion of the inner surface of said web. Said curved and supporting surfaces extend downwardly along said inside corner from a point a predetermined length from the upper end of said uprights. A second curved surface is provided in the other of said upright inside corners and a second supporting surface is provided in continuation of said second curved surface along a portion of said web, said second curved and supporting surfaces extending upwardly substantially from said point located a predetermined distance from the upper end of said uprights.

Along most of the length of the uprights, the upper rollers engage the forward flange thereof, and, in conjunction with the lower rollers, which engage the rearward flange and the adjacent first-mentioned curved and supporting surfaces to resist the forward driving force on the load carriage and uprights when the load carriage moves longitudinally. The middle rollers contact said first-mentioned supporting surface and in conjunction with the lower rollers resist the lateral thrust force. When the load carriage is raised so that the upper rollers are projected from the upper end of the extensible uprights, the middle rollers transfer to the forward flange and said second curved and supporting surfaces adjacent thereto, whereby said middle and lower rollers resist both the forward and lateral thrust forces on the load carriage and uprights. The portions of said upright webs not having said first-mentioned and second supporting surfaces formed thereon are recessed to limit the friction between the rollers and said uprights.

In a further embodiment of the invention, three pairs of rollers corresponding to the upper, middle and lower rollers described above are provided between the extensible and stationary uprights of the lift truck, the stationary uprights being U-shaped and formed to cooperate with said rollers in the manner described above are.

Accordingly, it is an object of this invention to provide a load-lifting apparatus wherein the twisting moment applied to the uprights by the lateral force due to eccentric loading is substantially eliminated by concentrating said lateral force at the inside corner defined by the rearward flange and web of each of said uprights, except where the load carriage elevated to the upper most position.

Another object of the invention is to provide a load-lifting apparatus of simple construction requiring a minimum of adjustment to resist the forward and lateral forces applied thereto.

A further object of the invention is to provide a load-lifting apparatus requiring a minimum of rollers to resist the forces applied between the load carriage and the uprights.

Still other objects and advantages of the invention will in part be obvious and will in part be apparent from the specification.

The invention accordingly comprises the features of construction, constructions of elements, and arrangement of parts which will be exemplified in the constructions herein after set forth, and the scope of the invention will be indicated in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

For a fuller understanding of the invention, reference is had to the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a lift truck provided with the load-lifting apparatus according to the invention;

FIG. 2 is a side elevational view of the load-lifting apparatus of FIG. 1 with the load carriage raised to its uppermost position;

FIG. 3. is an exploded side elevational view of the upper portion of the load-lifting apparatus of FIG. 2 with the load carriage slightly lowered;

FIG. 4 is a top plan view of the load-lifting apparatus of FIG. 3;

FIG. 5 is a partial sectional view of the load carriage, rollers and extensible uprights of the load-lifting apparatus of FIG. 3;

FIGS. 6, 7 and 8 are cross sectional views taken across horizontal planes of the upper, middle and lower rollers respectively and the associated extensible uprights as disposed in FIG. 1;

FIGS. 9, 10 and 11 are cross sectional views taking along horizontal planes of the upper, middle and lower rollers respectively and the associated extensible uprights, as disposed in FIG. 2; and

FIGS. 12, 13 and 14 are cross-sectional views taken along horizontal planes of the upper, middle and lower rollers respectively disposed between corresponding stationary and extensible uprights.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, the load-lifting apparatus according to the invention includes a pair of stationary uprights 1 laterally spaced and facing each other at the front portion of a lift truck. The stationary uprights 1 are of channel-shaped cross section, and, as shown in FIG. 4, are firmly braced together with the open channels in facing relation by lateral beams 2, 3 and 4 disposed at the lower end portion, the middle portion and the upper end portion thereof respectively. As well known in the art, the stationary uprights 1 can be tilted back and forth by means of tilting cylinders 6 secured at one end to the side frame of the lift truck and at the other end to lateral beam 3. Connecting portions 5 which extend from the back of lateral beam 2 serve as the fulcrum for the tilting of said stationary uprights.

A pair of laterally spaced extensible uprights 7 are provided between stationary uprights 1. Said extensible uprights may be channel-shaped or I-shaped and are disposed with the channels thereof in facing relation. Said extensible uprights are replaceable longitudinally along stationary uprights 1 and are supported in relation thereto by means of two pair of rollers 8 and 10. As shown in FIGS. 2 and 4, the upper end portions of the back surface of extensible uprights 7 are braced together by a relatively strong lateral beam 11, while the middle and lower end portions thereof are braced together by relatively thin and weak lateral beams 12 and 13. The strength of the latter two lateral beams is limited by the fact that they must pass lateral beams 3 and 4 as the extensible uprights are raised and lowered, while not interfering with other parts of the load-lifting apparatus. The latter limitations do not apply to the top most lateral beam 11.

The lifting device of the present invention has a load carriage 14 disposed on the front side of uprights 1 and 7. Said load carriage includes the conventional structures such as finger bars 15, forks 16 mounted on said finger bars and a pair of brackets 17 extending backwards from said finger bars 15 between extensible uprights 7. As shown in FIGS. 5 —8, brackets 17 have pairs of stub shafts 18, 19 and 20 extending respectively from the uppermost portion, the portion slightly below said uppermost portion, and the lowermost portion thereof. Said stub shafts extend horizontally from brackets 17 in substantially the same plane, said plane being substantially perpendicular to the plane of the longitudinal axis of the truck. Mounted on stub shafts 18, 19 and 20 respectively are upper rollers 21, middle rollers 22 and lower rollers 23, which are disposed within the channels of extensible uprights 7 whereby the load carriage 14 can move in the longitudinal direction relative to said uprights. The spacing between said rollers can be optionally selected in accordance with the design objects of the specific embodiment.

As shown in FIGS. 6 —8, the channel of each of the extensible uprights 7 along which the rollers ride, is formed by for-

ward flange 7a and rearward flange 7b which extend from the web thereof. Curved rolling surface 7c is formed at the inside corner defined by the intersection of the rearward flange 7a and the web. Said curved surface has the same radius of curvature as the front end periphery of the respective rollers. Supporting surface 7d is formed on the web in continuation of the curved surface 7c and defines a right angle or a slightly oblique angle with rearward flange b. The remaining internal surface of the web is recessed to define an escape surface 7e of the web and space 24 between said web and the forward end of the respective rollers.

The lateral movement of the upper rollers 21, mounted on stub shaft 18, is restricted and the forward end thereof is prevented from contacting the supporting surface 7d of said extensible uprights by means of retaining ring 25. On the other hand, the lower rollers 23, mounted on stub shafts 20, are adjusted and displaced laterally by an appropriate number of shims 26 inserted on said shaft so that the forward ends of the outer periphery thereof contact the curved surface 7c of extensible uprights 7. The middle rollers 22, mounted on stub shaft 19 are of a smaller diameter than upper rollers 21 so that the outer peripheral surface thereof is prevented from contacting forward flange 7a, even when said upper rollers are in contact with said forward flange. The lateral position along stub shafts 18 of said upper rollers is adjusted by the same means as lower rollers 23 so that the forward end of the side face thereof contacts supporting surface 7d of said extensible uprights. Thus, when the load carriage is disposed as shown in FIGS. 1 and 6 —8, and the fork 16 is loaded, the outer peripheral surface of the upper rollers 21 is press-contacted against forward flange 7a while the outer peripheral surface of lower rollers 23 press-contacted against rearward flange 7b to resist mainly against the forward bending load. When so disposed, middle rollers 22 are completely free from the forward driving force but, when an eccentric load is applied to load carriage 14, the middle roller 22 associated with one of said extensible uprights and the lower roller 23 associated to the other of said extensible uprights cooperate to resist the lateral thrust force resulting from said eccentric load.

A further feature of the load lifting apparatus according to the invention, shown in FIGS. 3 and 9 —11 rests in rolling curved surface 7c and supporting surface 7d which do not extend over the entire length of extensible uprights 7, but rather, extend downwardly only from a point a predetermined length from the upper end of said extensible uprights. Thus, the portion of the web of said extensible uprights above the cutoff point of said curved and supporting surfaces is recessed in the same manner as the central portion of the web. A second curved rolling surface 7c' is formed in the inside corner angle defined by the forward flange 7a and web of extensible uprights 7 while a second supporting surface 7d' is formed on a portion of said web in continuation of said second curved surface. As shown in FIG. 3, said second curved and supporting surfaces extend upwardly substantially from the upper cutoff point of the first mentioned curved and supporting surfaces 7c and 7d. The second supporting surface 7d' defines a right angle or a slightly obtuse angle with forward flange 7a. Thus, except for the portions on which supporting surfaces 7d and 7d' are formed, the web of said extensible uprights is recessed. If extensible uprights 7 are formed by a drawing process, second curved and supporting surfaces 7c' and 7d' are preferably separately formed and secured on the escape surface 7e of the web of said uprights. As shown in FIGS. 9 —11, first-mentioned supporting surface 7d extends a greater distance from the recessed escape surface 7e of the web than does second supporting surface 7d' for reasons that will be explained below.

As seen in FIG. 2, when load carriage 14 is elevated to its uppermost position, upper rollers 21 project above the upper end of extensible uprights 7. The above described arrangement permits middle rollers 22 to assume the function of resisting the forward thrust of the load normally performed by upper rollers 21 when the latter rollers extend above and are

out of engagement with the extensible uprights. Specifically, when upper roller 21 is raised to a level where it no longer contacts forward flange 7a of said extensible uprights, the outer peripheral surface of middle rollers 22 is press-contacted against and rotates on said forward flange in place of said upper rollers. Middle rollers 22 are of a diameter slightly smaller than that of upper rollers 21 and normally do not engage forward flange 7a. As seen in FIG. 10, in this area of operation, middle rollers 22 also engage second curved and supporting surfaces 7c' and 7d'.

The actual operating conditions of each roller of the load-lifting apparatus according to the invention, as load carriage 14 is elevated, is as follows. When the load carriage is disposed as shown in FIG. 1 and is being raised, both upper rollers 21 are in engagement with forward flange 7a and rotate in the clockwise direction (FIG. 3), while both lower rollers 23 engage rearward flange 7b, curved rolling surface 7c and supporting surface 7d and rotate in the counterclockwise direction (FIG. 3). The middle roller 22 on the side of load carriage 14 on which the eccentric load is placed contacts supporting surface 7d and rotates in the counterclockwise direction. The other middle roller 22, which is on the side of load carriage 14 on which the eccentric load is not placed, does not contact any surface of the adjacent extensible upright 7 and is stationary. Thus, in this region of operation, only one of said middle rollers rotates to resist the application of eccentric load in conjunction with the lower roller 23 disposed on the other side of the carriage.

When load carriage 14 is elevated and approaches the uppermost position, the curved rolling surface 7c and supporting surface 7d of extensible uprights 7 come to an end, and the middle roller 22, which resisted the lateral driving force due to an eccentric load by engaging supporting surface 7d then contacts supporting surface 7d' adjacent the forward flange and the rotating direction thereof is reversed into the clockwise direction (FIG. 3). In operation, the middle roller gradually reduces its contact with supporting surface 7d as it rotates upwardly. Of course, if the outer peripheral side face of said middle roller were to simultaneously contact both supporting surface 7d and supporting surface 7d' the roller would be prevented from smoothly rotating and a substantial frictional resistance would be interposed into the system. This problem is minimized and the transition between supporting surfaces is rendered relatively smooth by forming supporting surface 7d' so that it extends from escape surface 7e of the web a lesser distance than supporting surface 7d, as described above.

Thus, as the load carriage is raised, one of said middle rollers is press-contacted against supporting surface 7d' adjacent the forward flange and the direction of rotation thereof is reversed. When upper rollers 21 are projected above the upper end of extensible uprights 7, the outer peripheral surface of both middle rollers 22 engage forward flange 7a and curved rolling surface 7c', thereby enabling said middle rollers to resist both the lateral and forward directed load in cooperation with the lower rollers 23. As the middle rollers 22 are press-contacted to the curved surface 7c' disposed in the inside corner angle defined by the forward flange and web, the interval between the rollers is shortened. It is noted that the moment of the lateral force, which tends to expand extensible uprights 7 is slightly increased in this region, since it is applied adjacent the forward flange of the extensible uprights, this increase is present only when the load carriage is elevated to the region of its uppermost position. In this region, the increased moment can be supported by the upper lateral beam 11 of the extensible uprights 7 which can be preferably strengthened since the size thereof is not restricted by connecting beams 3 and 4 of stationary uprights 1.

Referring now to FIGS. 12-14, portions of a further embodiment of the load-lifting apparatus according to the invention is shown, wherein the roller arrangement according to the invention is applied to support the extensible uprights 7 on stationary uprights 1. Thus, three pairs of rollers, namely upper rollers 8, middle rollers 9 and lower rollers 10 are mounted on

the outer surface of the web of extensible uprights 7 and are adapted to ride in the adjacent channel of the respective stationary uprights 1. Said stationary upright channels correspond in structure to the extensible upright channels described above and rollers 8, 9 and 10 cooperate with said stationary upright channel and function in the same manner as rollers 21, 22 and 23 described above. Rollers 8, 9 and 10 may also be provided between the first and second extensible uprights in an assembly of three pairs of uprights. In any event, all of said rollers are disposed in substantially parallel planes at the lower portion of the extensible uprights which support said rollers.

As shown in FIGS. 1 and 4, load carriage 14 and extensible uprights 7 are operated through a pair of chains 27 and a conventional hydraulic mechanism 28. Said hydraulic mechanism is vertically secured on lateral beam 4 of the stationary uprights for the longitudinal displacement of extensible uprights 7 and load carriage 14. The head member 29 of said hydraulic mechanism is secured to the upper end of the longitudinally extensible piston rod and supports a pair of sprockets and chains 27, one end thereof being fixed on the hydraulic mechanism and the other end thereof being fixed on the load carriage 14 through said sprockets.

From the foregoing description, it is apparent that the roller arrangement of the load-lifting apparatus according to the invention is extremely simple in construction and easily adjusted. Said apparatus does not require the side rollers utilized in conventional arrangements. Further, through most of its range of operation, the lateral thrust force working through the middle and lower rollers is concentrated on the inside corner defined by the rearward flange and web of the extensible uprights or the supporting surface adjacent thereto so that the moment of the force tending to expand the extensible uprights sideways is substantially reduced.

Still a further advantage of the arrangement according to the invention rests in the use of the middle rollers to assume the function of resisting the forward thrust of the load when the upper rollers project beyond the upper end of the rollers. In this manner, the lifting height of a lift truck can be increased without changing the total height of the truck. Thus where rollers in accordance with the invention are disposed between the load carriage and the uprights and/or between the stationary and extensible uprights, the lifting height of the lift truck is increased by the distance between the upper and middle rollers.

It will thus be seen that the objects set forth above, among those made apparent from the preceding description, are efficiently attained and, since certain changes may be made in the above constructions without departing from the spirit and scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

We claim:

1. A load-lifting apparatus comprising a base; a pair of laterally spaced-apart uprights being braced together by a lateral beam at their back surfaces and mounted on said base; a movable member adapted for longitudinal movement with respect to said uprights for lifting the load; and pairs of upper rollers, middle rollers and lower rollers positioned between said uprights and movable member and supported by said movable member for guiding the movement of said movable member, each of said uprights having a web, forward and rearward flanges extending inwardly from said web, a curved surface formed in the inside corner defined by said rearward flange and said web, and a supporting surface formed in continuation of said curved surface on a portion of the inner surface of said web, one of each of said upper, middle and lower

pairs of rollers being disposed between the forward and rearward flange of each of said uprights, all of said rollers being rotatable in substantially parallel planes, said pair of upper rollers being in contact with said forward flanges, each of said middle rollers having a side face adapted to engage the adjacent supporting surface in response to an eccentric load, said lower rollers engaging said rearward flanges, curved surfaces and supporting surfaces, whereby said upper and lower rollers cooperate to resist the forward thrust of said load, and one of said lower rollers engaging one of said uprights cooperates with one of said middle rollers engaging the other of said uprights to resist the side thrust and substantially eliminating twisting moment applied to the uprights resulting from an eccentric load.

2. A load-lifting apparatus as recited in claim 1 wherein the portion of said webs between said supporting surface and said forward flange is recessed away from said rollers to decrease contact resistance between said rollers and said uprights.

3. A load-lifting apparatus as recited in claim 2 wherein said uprights are stationary with respect to said base, said movable member being a load carriage mounted for longitudinal movement with respect to said stationary uprights for lifting load, said rollers being positioned between said uprights and said load carriage.

4. A load-lifting apparatus as recited in claim 2 wherein said uprights are stationary with respect to said base, said movable member including a pair of laterally spaced extensible uprights longitudinally movable with respect to said stationary uprights for lifting load, said rollers being positioned between said stationary uprights and said extensible uprights.

5. A load-lifting apparatus as recited in claim 2 wherein said uprights are longitudinally extensible with respect to said base, said movable member including a load carriage mounted on said extensible uprights and longitudinally movable with respect thereto for lifting load, said rollers being positioned between said extensible uprights and said load carriage.

6. A load-lifting apparatus as recited in claim 2 wherein said uprights are stationary with respect to said base, said movable member including a pair of laterally spaced extensible uprights longitudinally movable with respect to said stationary uprights, a load carriage mounted on said extensible uprights for longitudinal movement with respect thereto for lifting load, and a second set of rollers including pairs of upper, middle and lower rollers positioned between said extensible uprights and said load carriage, said first-mentioned rollers being positioned between said stationary uprights and said extensible uprights, each of said extensible uprights having a web, forward and rearward flanges extending inwardly from said web, a curved surface formed in the inside corner defined by said rearward flange and web, and a supporting surface formed in continuation of said curved surface on a portion of the inner surface of said web, all of said second set of rollers being rotatable in substantially parallel planes, said second pair of upper rollers engaging said extensible upright forward flanges, each of said second pair of middle rollers having a side face engageable with the adjacent extensible upright support-

ing surfaces, said second pair of lower rollers engaging said extensible upright rearward flanges and curved and supporting surface, the portion of said extensible upright webs extending between said supporting surface and said forward flange being recessed away from said rollers.

7. A load-lifting apparatus as recited in claim 2, wherein said upright curved and supporting surfaces extend downwardly only from a point a predetermined distance from the top of said uprights, said middle rollers engaging said forward flanges when said upper rollers project above the upper end of said uprights, whereby said middle and lower rollers cooperate to resist the forward thrust of said load when said upper rollers project above the upper end of said uprights.

8. A load-lifting apparatus as recited in claim 7, wherein each of said uprights is formed with a second supporting surface adjacent said forward flange, the portion of said webs extending between said second supporting surface and said rearward flange being recessed away from said rollers, said second supporting surfaces extending upwardly substantially from said point located at a predetermined length from the top of said uprights, each of said middle rollers having a side face adapted to engage the adjacent second supporting surface in response to an eccentric load when said upper rollers project above the upper end of said uprights, whereby one of said lower rollers engaging one of said uprights cooperates with one of said middle rollers engaging the other of said uprights to resist the side thrust resulting from an eccentric load when said upper rollers project above the upper end of said uprights.

9. A load-lifting apparatus as recited in claim 8, each of said uprights having a second curved surface formed in the inside corner defined by said forward flange and web, said second supporting surface being formed in continuation of said second curved surface.

10. A load-lifting apparatus as recited in claim 8, wherein said first-mentioned supporting surface extends from said web towards said rollers a greater distance than said second supporting surface whereby contact with both of said supporting surfaces by said middle rollers is minimized.

11. A load-lifting apparatus as recited in claim 1, wherein said curved and supporting surfaces extend downwardly along said uprights only from a point a predetermined length from the top of said uprights, each of said uprights having a second supporting surface formed on a portion of the inner surface of said web adjacent said forward flange, said first-mentioned supporting surface projecting from said web toward said rollers a distance greater than said second supporting surface, the portions of said web aside from the portions having said first-mentioned and second supporting surfaces thereon being recessed away from said rollers, each of said middle rollers being engageable against said forward flange and second supporting surface of its respective upright when said upper rollers project from the upper end of said uprights, whereby said middle rollers cooperate with said lower rollers to resist the forward and lateral thrust of said load when said upper rollers project from the upper end of said uprights.

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