United States Patent

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[73] Assignee **The Alliance Manufacturing Company, Inc.**

[54] **DRIVE MECHANISM ENGAGING MEANS**
13 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **74/89.21,** 49/139
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[50] **Field of Search** 74/89.21, 25; 114/179, 180, 181, 182; 49/139, 199; 160/193

[56] **References Cited**

UNITED STATES PATENTS

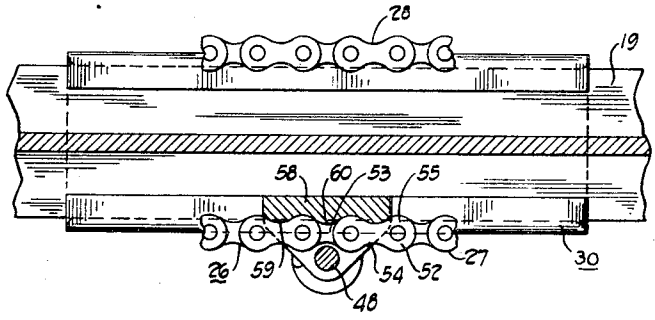
2,861,800	11/1958	McKee et al.	74/89.21
3,051,014	8/1962	Houk	49/139
3,066,729	12/1962	Gessell	49/139
3,264,785	8/1966	Miller	49/139

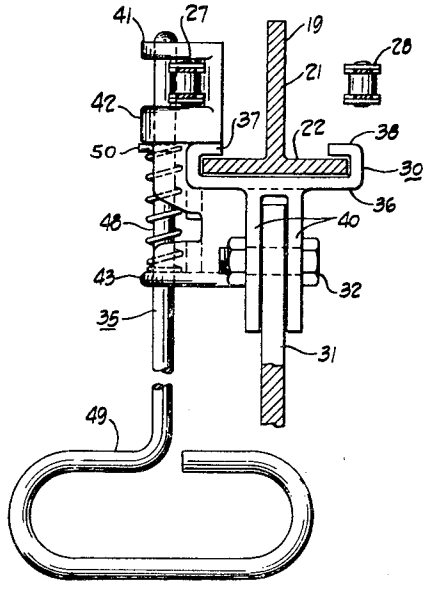
FOREIGN PATENTS

74,244	11/1948	Norway	114/179
172,532	12/1921	Great Britain	114/181
688,481	5/1930	France	114/179

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ABSTRACT: A drive mechanism engaging means is disclosed which may be used for a garage door operator to engage and disengage a chain as an example of a flexible drive member which is driven from a motor and speed-reducing drive train. The engaging means selectively engages and disengages a drive carriage from the chain so that in the event of electrical power failure, for example, the load carriage may be disengaged from the chain so that the garage door, which is fixed to the load carriage, may be manually operated to open and close the door. The engaging means may be actuated by a handle to be moved against a yieldable spring to stress the spring and thus release the load carriage from connection with the chain. The foregoing abstract is merely a resume of one general application, is not a complete discussion of all principles of operation or applications, and is not to be construed as a limitation on the scope of the claimed subject matter.





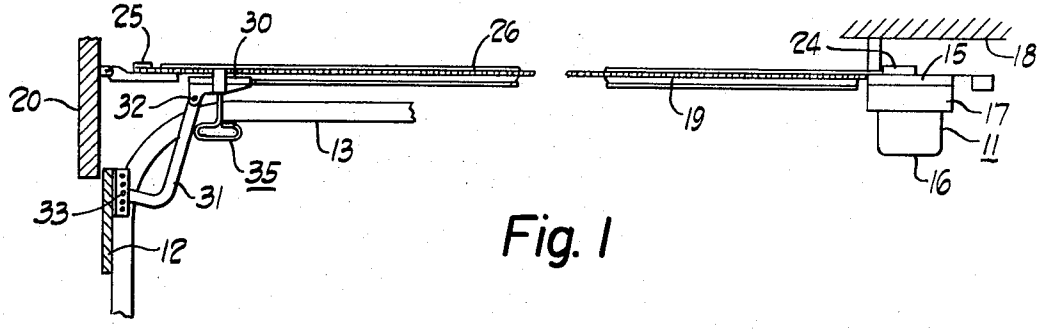


Fig. 1

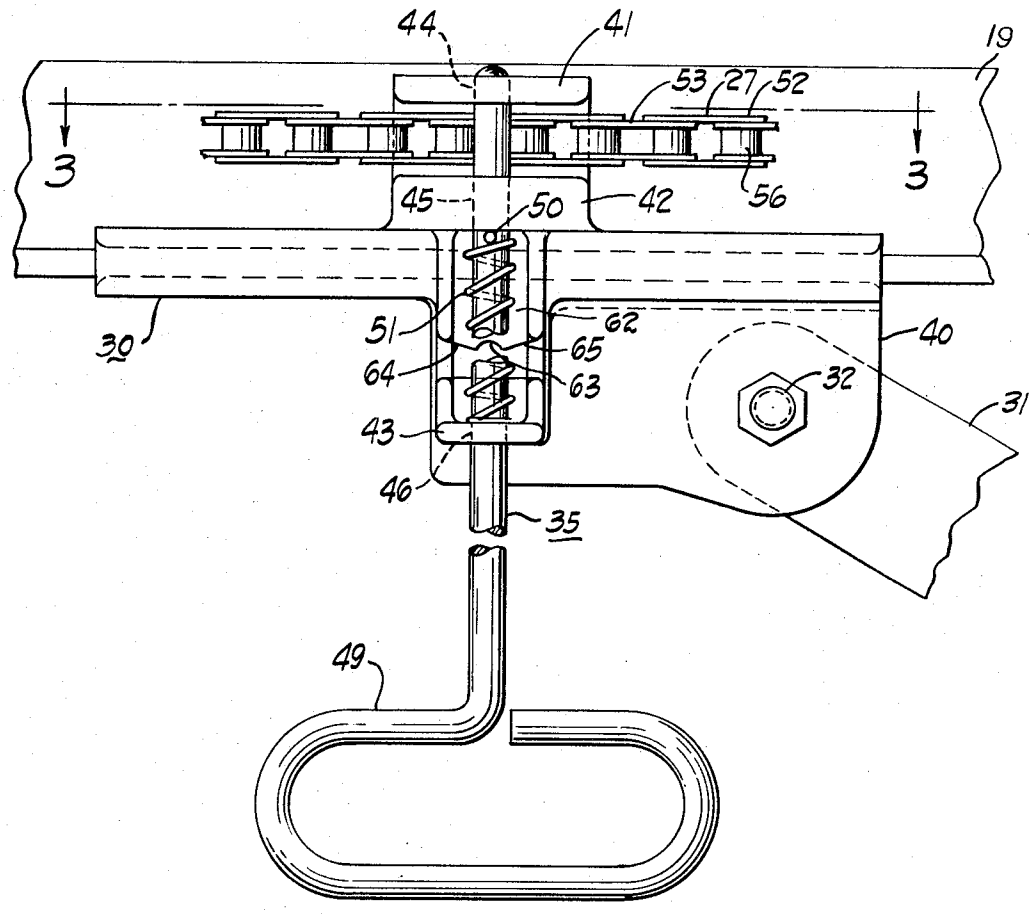


Fig. 2

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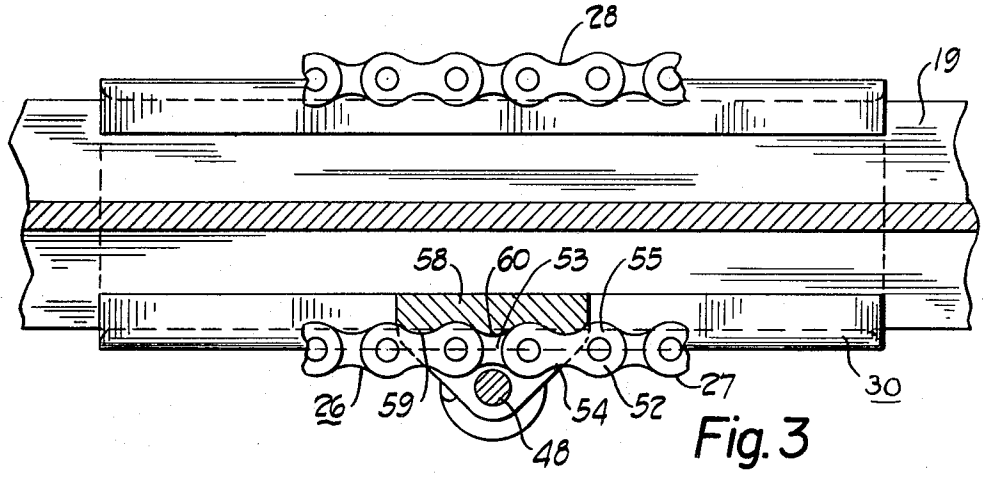


Fig. 3

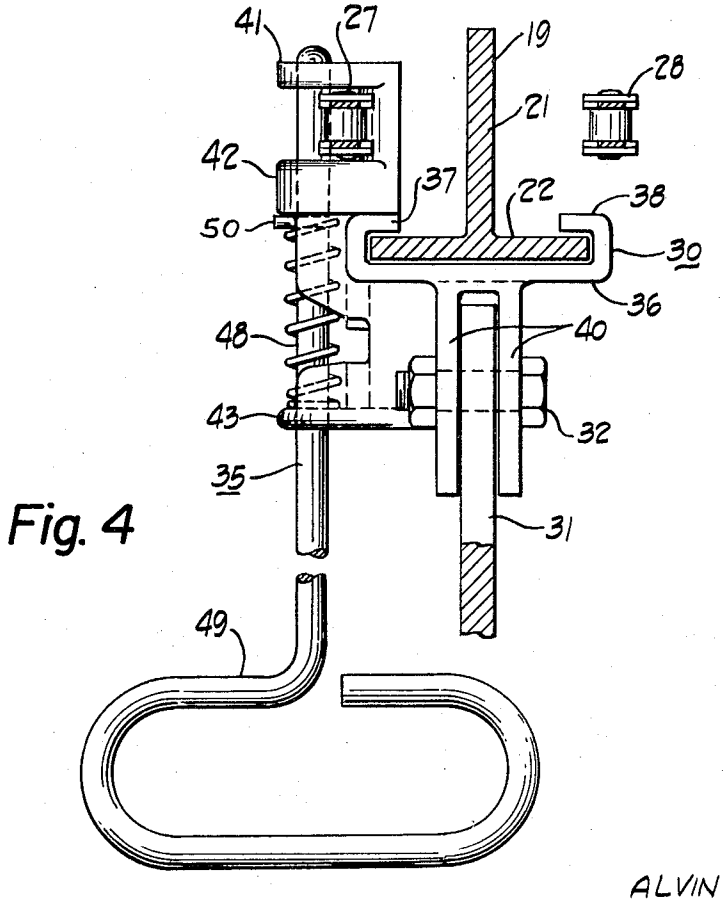


Fig. 4

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DRIVE MECHANISM ENGAGING MEANS

BACKGROUND OF THE INVENTION

In drive mechanisms for loads such as garage door operators, many different forms have been devised in the prior art to connect the door operator drive mechanism to the garage door to be moved. Such garage door operator is a great convenience but on rare occasions in event of electrical power failure the motor will not open the door, of course, and thus some means must be provided to disengage the door operator from the door so that the door may be manually operated. In many sectional garage doors of the overhead acting type which slide upwardly on a track to a position adjacent the ceiling of the garage, the garage door operator has some drive train which moves longitudinally along the garage ceiling, thus moving a load carriage longitudinally along this path. The drive train includes a door arm usually of an L-shape pivotally connected to the load carriage and also pivotally connected to the top section of the sectional garage door. This same construction is also used with slab or one-piece garage doors which are pivoted to swing upwardly adjacent the garage ceiling when in an open position. The prior art has known many different forms of disengagement means which disengaged the door arm pivotal connection and the load carriage which is reciprocally moved longitudinally along the garage ceiling. This permitted the L-shape door arm to hang downwardly when disconnected from the load carriage, and thus the garage door could manually be opened and closed. However, this has the very great disadvantage that the door arm which is an L-shape and might be about 2 feet long and of heavy iron construction, was left pivotally attached to the upper end of the garage door. Thus when the garage door was manually moved upwardly to an open position, if the person doing this was not careful, the garage door arm could swing free and puncture a hole in the top of an automobile or in the rear window or windshield of the automobile parked in the garage. Still worse it could act as a lethal weapon hitting someone in the head and could cause severe damage. This was all the more dangerous because generally the garage door manufacturer did not put any printed warnings on the garage door operator about such dangerous operation and because this electrical power failure only rarely occurred, the person doing the garage door opening would forget from one time to the next that this was such a potential hazard.

In other prior art devices the means to disconnect the garage door from the door operator was very unhandy or very awkward or very difficult to accomplish, usually provided as a sort of an afterthought and in many cases merely consisted of taking out one of the pivot pins somewhere in the drive train.

SUMMARY OF THE INVENTION

The invention may be incorporated in a drive mechanism for a load comprising, in combination, a frame, a motor on said frame, a speed-reducing drive train on said frame and having an input from said motor, a rotatable output on said drive train, a rotatable idler on said frame, a flexible drive member encircling said rotatable output and idler, a load carriage, means for longitudinally guiding movements of said carriage generally parallel to a portion of said flexible drive member, means for attaching said load carriage to a load to be moved, and engaging means selectively engaging and disengaging said load carriage and said flexible drive member.

An object of the invention is to provide a selectable engaging and disengaging means for a drive mechanism such as for a garage door operator.

Another object of the invention is to provide an engaging means for a drive mechanism wherein a load carriage remains guided for longitudinal movement even though disconnected from a flexible drive member.

Another object of the invention is to provide a yieldable lock bar which directly engages a flexible drive member.

Another object of the invention is to provide a lock bar which may selectively be moved between engaged and disengaged positions relative to a drive chain.

Another object of the invention is to provide a lock bar which is yieldably urged toward engagement with a chain and which may be longitudinally moved and rotated so that a latch will latch this lock bar in a disengaged condition relative to the chain.

Another object of the invention is to provide a garage door operator with an endless chain wherein a load carriage connected to the garage door is selectively engageable directly with one run of this chain.

Other objects and a fuller understanding of the invention may be had by referring to the following description and claims, taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of the complete drive mechanism embodying the invention;

FIG. 2 is an enlarged side view of the engaging means of the invention;

FIG. 3 is a sectional view on line 3—3 of FIG. 2; and

FIG. 4 is an end view of the engaging means of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 of the drawing shows the complete drive mechanism 11 to reversibly move a load 12 shown as a sectional overhead garage door. This door may be a one-piece or two-piece door which is pivoted to move to an open position adjacent the garage ceiling or as shown it may be a sectional door rolling upwardly with rollers in a track 13. The drive mechanism 11 includes a frame 15 on which a motor 16 and a speed-reducing drive train 17 is located. The frame 15 is adapted to be fastened in any suitable manner to the ceiling 18 of the garage. A frame extension 19 extends from the frame 15 and is fastened to the header 20 of the garage. This frame extension 19 may take the form of a T-shaped bar for stiffness and strength and has an upright stem 21 and a T-shaped flange 22, as shown in FIG. 4.

The drive train 17 has an output or drive sprocket 24 and an idler sprocket or idler roller 25 is provided near the header end of the frame extension 19. A roller chain 26 is a flexible drive member and in this preferred embodiment is an endless chain which is trained around the drive sprocket 24 and the idler roller 25. As such this chain 26 has first and second runs 27 and 28 on opposite sides of the stem 21 of the frame extension 19. A load carriage 30 is guided for longitudinal sliding movements on the frame extension 19. An L-shaped door arm 31 has a pivot connection at 32 to the load carriage 30 and a pivot connection 33 to the top of the door 12. Engaging means 35 is provided to selectively engage and disengage the load carriage 30 and the flexible drive member or chain 26.

The FIGS. 2, 3 and 4 show in greater detail the construction and operation of the engaging means 35. The load carriage 30 is made of some material which will readily slide longitudinally on the frame extension 19. For strength and economy this frame extension 19 may be an ordinary cold-rolled steel T-bar. The load carriage 30 is made of some material which will readily slide longitudinally on the frame extension 19. The load carriage 30 may be fabricated from sheet metal or may be a die-cast metal or a molded plastic material. This load carriage 30 has a base 36 plus two flanges 37 and 38 which partially wrap around the flanged head 22 of the frame extension 19 and thus establish the longitudinally guided movement of this load carriage 30. A fork 40 is fixedly attached to the bottom of the base 36 and the upper end of the door arm 31 slides between this fork and is pivoted thereto by the pivot connection 32 so that as the load carriage 30 reciprocates, this pulls open or pushes closed the door 12. First second and third vertically spaced horizontal flanges 41, 42 and 43 are fixed on the load carriage 30. Vertically aligned apertures 44, 45 and 46 are disposed in the flanges 41, 42 and 43, respectively. A lon-

gitudinally slidable and rotatable lock bar 48 is disposed for movement in the apertures 44, 45 and 46. A handle 49 is provided at the lower end of the lock bar 48. A cross pin 50 is disposed in a aperture in the lock bar 48 and this cross pin 50 is disposed below the second flange 42. A compression spring 51 acts between the cross pin 50 and the lower most third flange 43 and is a yieldable means urging the lock bar 48 upwardly through the first and second flanges 41 and 42.

The flexible drive member or chain 26 is constructed like an ordinary bicycle chain with alternate pairs of widely spaced and more closely spaced links 52 and 53, respectively. Each of these links has a narrowed waist 54 between enlarged ends 55 at which the rollers 56 are pivotally engaged with these enlarged ends 55. A vertical wall 58 is provided on the load carriage 30 between the first and second flanges 41 and 42 and this vertical wall is provided with an undulating surface 59 having a crest 60. The lock bar 48 in its upwardly urged position is parallel to this vertical wall 58 and is spaced from the crest 60 by a transverse horizontal dimension greater than the transverse dimension of the narrowed waist 54 of the links yet less than the transverse dimension across the enlarged ends 55 of such links. Accordingly when the lock bar 48 is urged upwardly by the spring 51 into the position shown in FIGS. 2, 3 and 4, the engaging means 35 establishes that the chain 26 is effectively locked to the load carriage 30.

A latch wall 62 depends from the base 36. This latch wall is vertical and parallel to the lock bar 48. A latch notch 63 is formed in the lower surface of this latch wall 62 and cam walls 64 and 65 are provided on either side of the notch 63. The cross pin 50 may engage the cam walls 64 or 65 and ultimately the latch notch 63 whenever the lock bar 48 is pulled downwardly and rotated. When this cross pin 50 does latchingly engage the latch notch 63, then the upper end of this lock bar 48 is disposed below the level of the upper surface of the second flange 42, and thus the load carriage 30 is completely disengaged from the chain 26. Accordingly a person may easily grasp the handle 49, pull downwardly on the lock bar 48 and rotate the handle approximately 150° or 180° to have the cross pin 50 engage this latch notch 63. At this time the load carriage is then disengaged from the chain and accordingly the door 12 is disengaged from the garage door operator which is the motor 16 and speed-reducing drive train 17. This is useful on those rare occasions when the electrical power fails and it is necessary to disengage the drive mechanism 11 so that the door 12 may be manually opened or closed. It will be noted that in such condition the load carriage 30 is still longitudinally slidably guided by the frame extension 19 so that the upper end of the door arm 31 does not swing uncontrollably as the garage door is opened thus eliminating the possibility that this door may damage the automobile or injure someone in the garage. In many prior art devices some pivot connection such as the pivot connection 32 has to be disengaged in order to disconnect the drive mechanism 11 from the door 12. Not only was this dangerous but this was often very difficult to do when the garage door was closed because the load carriage 30 usually assumes a position directly above the garage door 12 so that a toggle action is provided effectively locking the door closed when the garage door operator 16–17 is deenergized. In this toggle locking position of the door 12, there is considerable shearing stress placed on the pivot connection 32 and thus even though the nut is removed from the bolt of this pivot connection, it is often very difficult to remove this bolt from the fork 40 and door arm 31. This is another advantage of the present invention because the lock bar 48 may be easily retracted from its engaged position toward its disengaged position.

Also, it will be noted that the lock bar 48 engages the closely spaced links 53 and engages between the widely spaced links 52, as shown in FIGS. 2 and 3. Alternatively the lock bar 48 may engage the widely spaced links 52 and engage between the closely spaced links 53. This may be accomplished by moving the chain along to the next set of links. In any event the lock bar 48 engages the links at the narrowed waists 54. This engagement with the chain is an engagement with a flexible drive member and one advantage is that this flexible drive member may be made as an endless chain so that installation problems are simplified and the installer does not need to connect the ends of the chain to a door carriage nor to some adjustment device such as a turnbuckle. In the present case the idler roller 25 may be made adjustable by being on a slide block adjustably moved by a screw so as to take up for wear which would cause slack in the two runs 27 and 28 of the chain 26.

The engaging means 35 provides a selectable engagement or disengagement between the chain 26 and the load carriage 30. In this preferred embodiment the engaging means is mounted on the load carriage. The chain 26 is an elongated member which has varying transverse dimensions including the narrowed waists 54 and the enlarged ends 55. The lock bar 48 by engaging the links of the chain permits transmission of force lengthwise of the chain to the load carriage 30, yet the lock bar 48 may be easily withdrawn from engagement with the chain by movement of the lock bar in a direction transverse to the lengthwise dimension of the chain. It will be noted by observing FIG. 2 that the lock bar 48 moves between engaged and disengaged positions by movement substantially parallel to the rollers or pivots 56 of the chain 26. By the above-described construction it will be noted that the lock bar 48 may selectively engage the chain at any desired position along the length of this chain. The latch notch 63 engaging the cross pin 50 is a latch means or detent means which selectively will hold the lock bar 48 in a disengaged condition.

The present disclosure includes that contained in the appended claims, as well as that of the foregoing description. Although this invention has been described in its preferred form with a certain degree of particularity, it is understood that the present disclosure of the preferred form has been made only by way of example and that numerous changes in the details of the circuit and the combination and arrangement of circuit elements may be resorted to without departing from the spirit and scope of the invention as hereinafter claimed.

What is claimed is:

1. A drive mechanism for a load comprising, in combination, a frame,
   - a motor on said frame,
   - a speed-reducing drive train on said frame and having an input from said motor,
   - a flexible drive member drivingly connected to said rotatable output,
   - a load carriage,
   - means for longitudinally guiding movements of said carriage generally parallel to a portion of said flexible drive member,
   - means for attaching said load carriage to a load to be moved,
   - a chain having links included in said flexible drive member,
   - narrowed waists between enlarged ends on said chain links,
   - and engaging means selectively engaging and disengaging said load carriage and said chain at a narrowed waist to transmit force lengthwise of said chain to said carriage by abutment of an enlarged end of a link with said engaging means.

2. A drive mechanism as set forth in claim 1, wherein said chain has pivots between links, and said engaging means moves substantially parallel to said pivots between engaged and disengaged conditions.

3. A drive mechanism for a load comprising, in combination, a frame,
   - a motor on said frame,
   - a speed-reducing drive train on said frame and having an input from said motor,
   - a rotatable output on said drive train,
   - a flexible drive member drivingly connected to said rotatable output,
   - a load carriage,

means for longitudinally guiding movements of said carriage generally parallel to a portion of said flexible drive member,

means for attaching said load carriage to a load to be moved,

a chain having links included in said flexible drive member,

engaging means selectively engaging and disengaging said load carriage and said chain,

said chain engaging means including three vertically spaced horizontal flanges on said carriage,

vertically aligned apertures in said flanges,

a vertical lock bar slidable and rotatable in said vertically aligned apertures,

and a handle on the lower end of said lock bar to move said lock bar in said apertures to a disengaged condition relative to said chain.

4. A drive mechanism as set forth in claim 3, including a cross pin in said lock bar disposed below said second flange,

and a compression spring encircling said lock bar and disposed between said third flange and said cross pin to urge said lock bar upwardly.

5. A drive mechanism as set forth in claim 4, including said first and second flanges lying above and below one run of said chain,

a vertical wall between said first and second flanges,

an undulating surface with a crest on said vertical wall to lie closely adjacent the links of said chain,

said chain links having narrowed waists between enlarged ends,

and said lock bar when disposed in the apertures in said first and second flanges defining relative to the crest of said undulating surface a transverse horizontal dimension greater than the transverse dimension of the narrowed waist of the links of the chain and less than the dimension across the enlarged ends of the links of said chain.

6. A drive mechanism as set forth in claim 4, including a latch wall spaced between said second and third flanges,

a notch in said latch wall adapted to be engaged by said cross pin upon said lock bar being moved longitudinally to stress said compression spring and move said lock bar to a disengaged position relative to said chain and then said lock bar being rotated.

7. A drive mechanism as set forth in claim 6, including a cam wall on each side of said notch and cooperable with said cross pin.

8. A load carriage for use with a drive mechanism having a chain with links driving a load relative to a frame,

said chain links having narrowed waists between enlarged ends,

said load carriage comprising, in combination,

means guiding movement of said load carriage on the frame generally parallel to a portion of the chain,

means for attaching said load carriage to a load to be moved,

and engaging means selectively engaging and disengaging said load carriage and the chain at a narrowed waist to transmit force lengthwise of the chain to said carriage by abutment of an enlarged end of a link with said engaging means.

9. A load carriage for use with a drive mechanism having a chain with links driving a load relative to a frame,

said load carriage comprising, in combination,

means guiding movement of said load carriage on the frame generally parallel to a portion of the chain,

means for attaching said load carriage to a load to be moved,

engaging means selectively engaging and disengaging said load carriage and the chain,

the chain-engaging means including three vertically spaced horizontal flanges on said carriage,

vertically aligned apertures in said flanges,

a vertical lock bar slidable and rotatable in said vertically aligned apertures,

and a handle on the lower end of said lock bar to move said lock bar in said apertures to a disengaged condition relative to the chain.

10. A drive mechanism as set forth in claim 9, including a cross pin in said lock bar disposed below said second flange,

and a compression spring encircling said lock bar and disposed between said third flange and said cross pin to urge said lock bar upwardly.

11. A drive mechanism as set forth in claim 10, including said first and second flanges lying above and below one run of the chain,

a vertical wall between said first and second flanges,

an undulating surface with a crest on said vertical wall to lie closely adjacent the links of the chain,

the chain links having narrowed waists between enlarged ends,

said lock bars when disposed in the apertures in said first and second flanges defining relative to the crest of said undulating surface a transverse horizontal dimension greater than the transverse dimension of the narrowed waist of the links of the chain and less than the dimension across the enlarged ends of the links of the chain.

12. A drive mechanism as set forth in claim 10, including a latch wall spaced between said second and third flanges,

a notch in said latch wall adapted to be engaged by said cross pin upon said lock bar being moved longitudinally to stress said compression spring and move said lock bar to a disengaged position relative to the chain and then said lock bar being rotated.

13. A drive mechanism as set forth in claim 12, including a cam wall on each side of said notch and cooperable with said cross pin.

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