April 1, 1952 W. C. HODGES 2,591,153

SHIFTING BOLSTER TRANSFER MECHANISM

Filed July 22, 1948 4 Sheets-Sheet 1

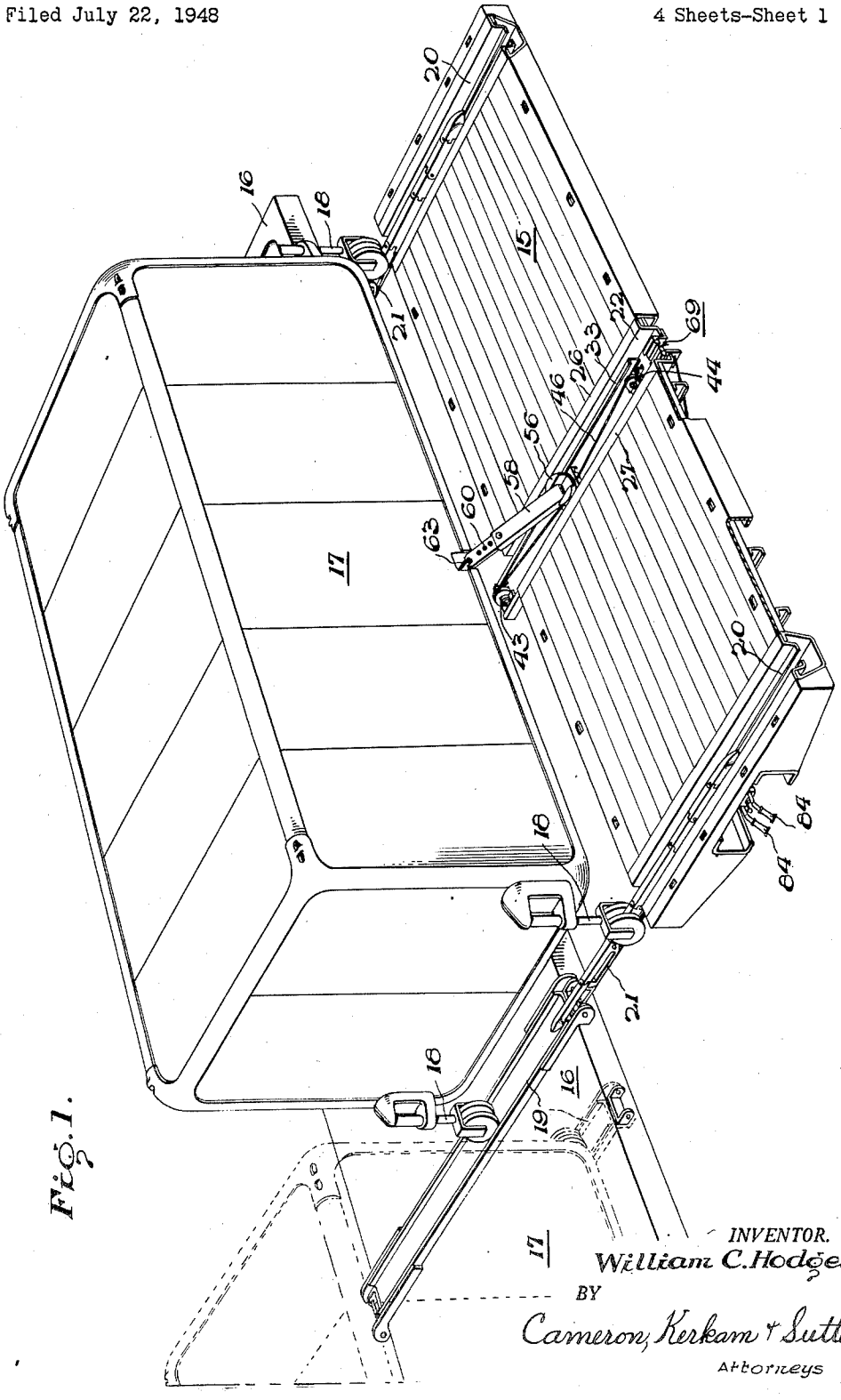


FIG. 1.

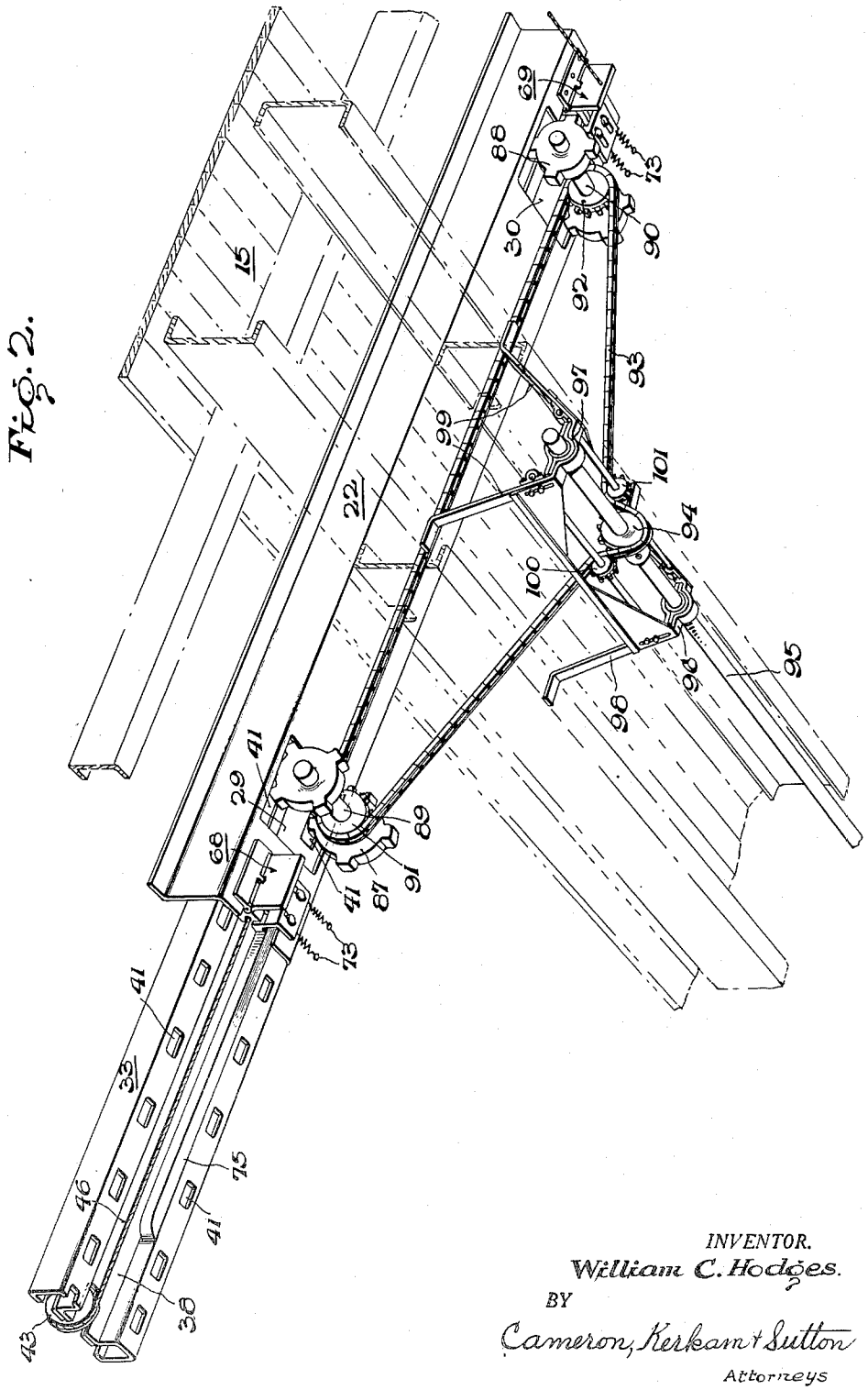
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Fig. 2.



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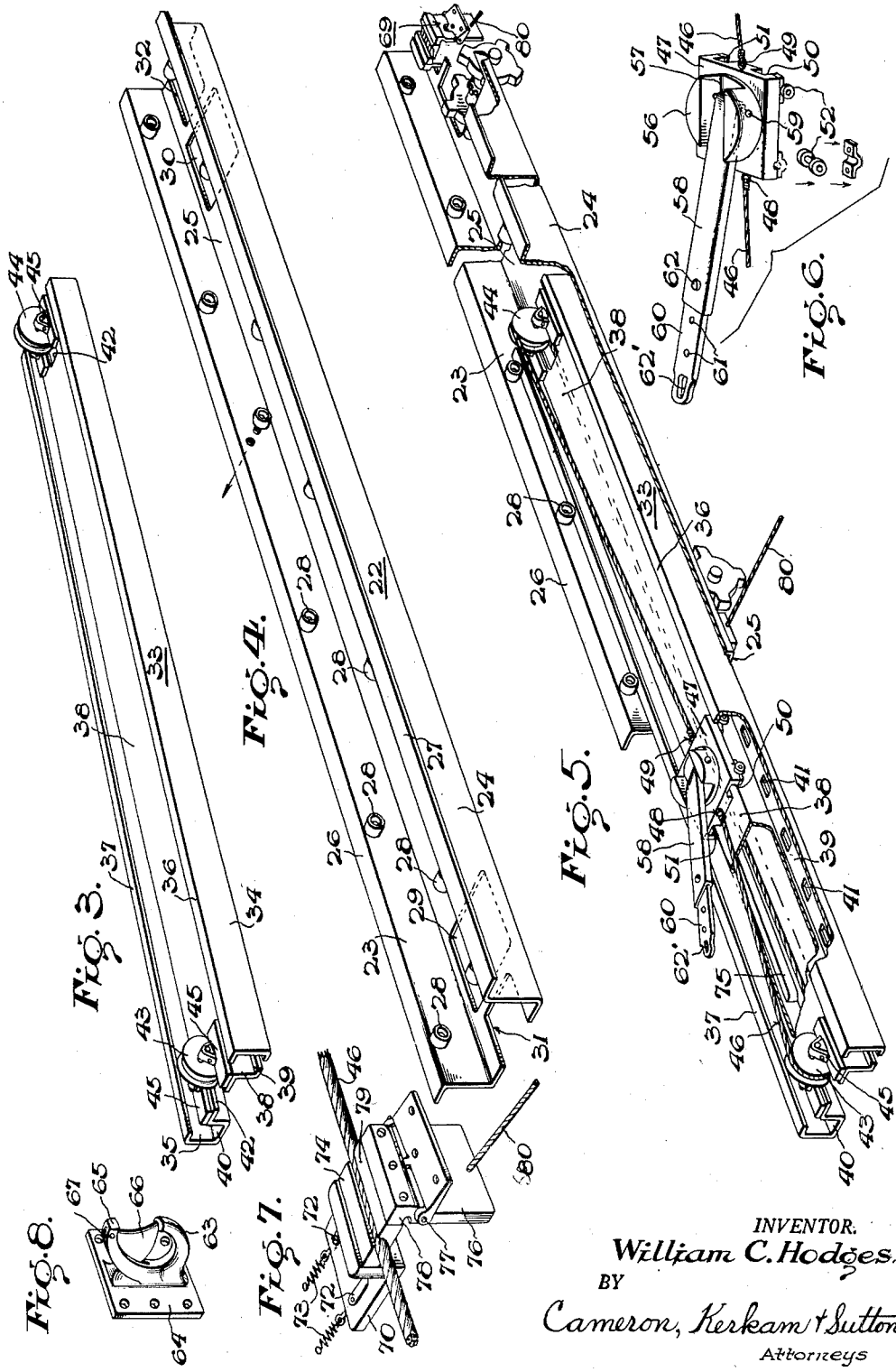


Fig. 3.

Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

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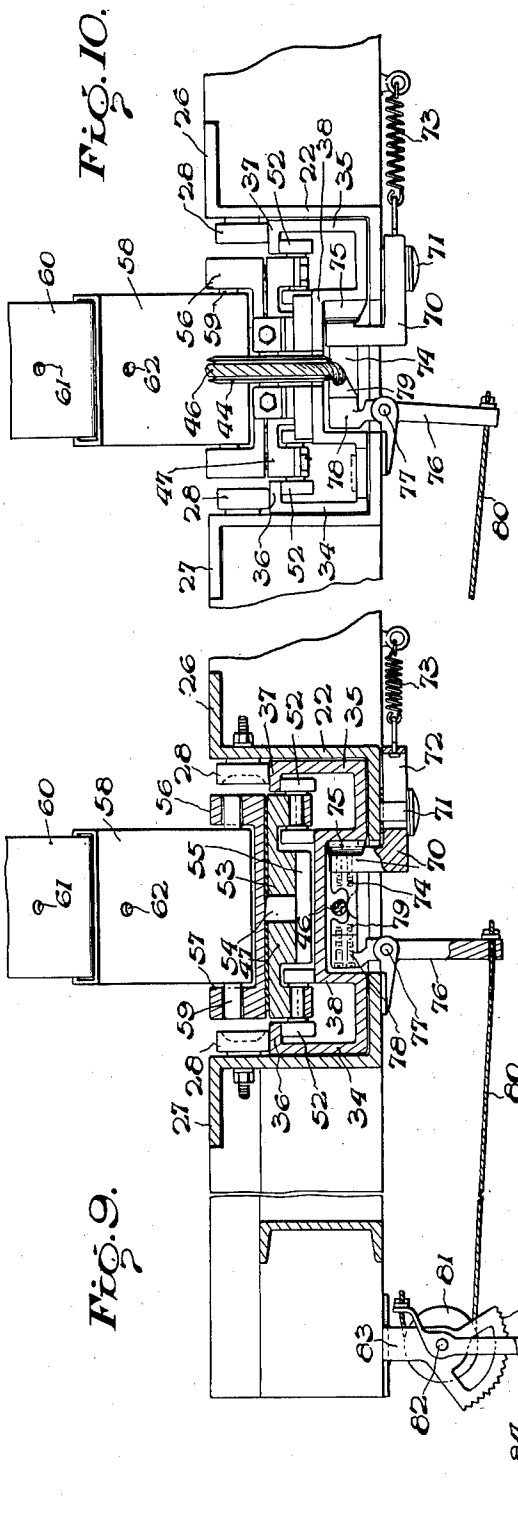


Fig. 9.

Fig. 10.

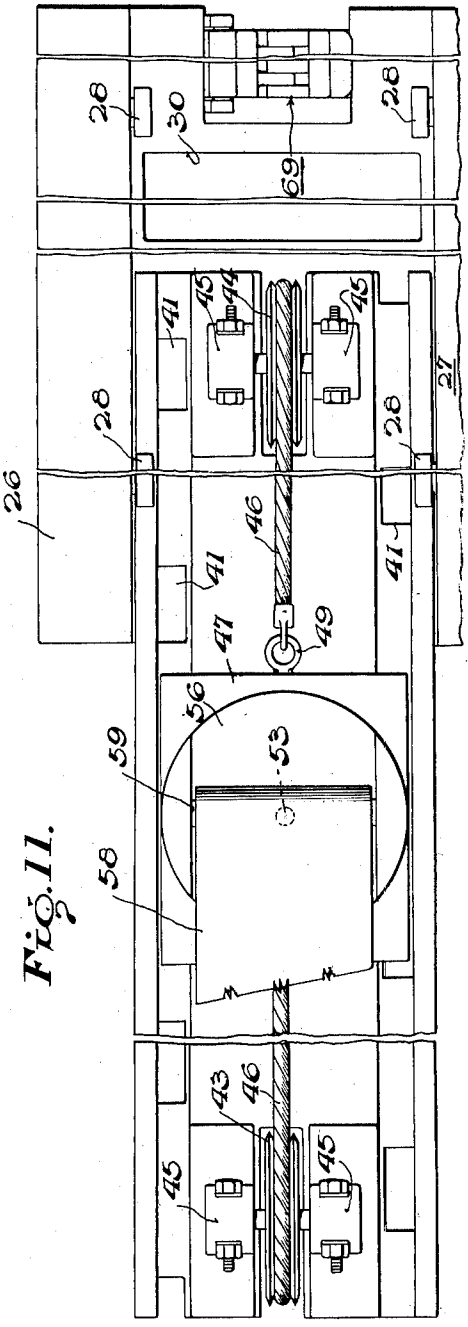


Fig. 11.

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SHIFTING BOLSTER TRANSFER MECHANISM

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12 Claims. (Cl. 214—83.12)

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This invention relates to load transferring mechanisms and more particularly to such mechanisms which may be carried by a load transporting device such as a truck, railroad flat car, barge, boat, aeroplane and the like to load and unload the same or to transfer loads.

More particularly this invention relates to such mechanisms which may be used to transfer loads carried in containers of less than car load size but is not limited to use with such containers.

Heretofore various devices have been proposed for effecting such load transfers such as disclosed in patents to Benjamin F. Fitch et al. No. 2,304,116 and to Harold W. Shonnard No. 2,352,129. In neither of these devices can the load be moved or transferred from one transporting means to the other, without at least one manually controlled reversal of the driving means and both require an abutment of the extension element against an unyielding object before the transfer can be started. In the Fitch et al. device the extension element must remain stationary while the initial stages of transfer are completed and must then be moved by reversal of the driving mechanism to complete the transfer. Shonnard's device requires a dual powered drive, one for the extension element and one for the endless chain, with clutching arrangements to power each separately and together in sequential operation to transfer the load.

By the present invention I provide a novel and simple transfer mechanism which overcomes the difficulties inherent in known structures by providing direct driving power only to the extension element and by utilizing the movement of the extension element to drive an endless flexible power means mounted on the extension element which flexible means is connected to the load to be transferred. The power connection between the extension element and the flexible power means is under the control of the operator and is so arranged that complete load transfer may be obtained without reversal of the mechanism driving the extension element. I have further provided dual spaced driving mechanisms for the extension element so that for a given length thereof a greatly increased reach can be had over that available in known devices. To give my invention greater flexibility of use I provide a novel means for connecting the load to be transferred with the endless flexible power means so that exact alignment of the load and the transporting means need not be provided in either horizontal or vertical planes.

Accordingly it is an object of the present invention to provide novel load transferring means in which a power driven extension element is carried by a load transporting means to transfer the load onto or off of the transporting means.

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Another object is to provide such transferring means in which movement of the extension element drives an endless flexible power means mounted thereon and to which the load is connected to transfer the load.

Another object is to provide such transferring means in which the movement of the endless flexible power means is subject to the control of the operator.

Another object is to provide such transferring means in which the extension element is driven without reversal of its driving mechanism to completely transfer the load in a given direction.

Another object is to provide such transferring means in which the driving mechanism for the extension element is so arranged that maximum reach is obtained approaching the length of the extension element.

Another object is to provide novel means for connecting the load to the endless flexible means which will permit transfer of loads not aligned with the transporting means.

Another object is to provide novel means controlled by the operator for imparting the movement of the extension element to the endless flexible power means.

Another object is to provide such transferring means which may be easily installed on existing transporting means; which are of simple construction and easy to operate by unskilled operators; and which provide a positive and efficient operation with a minimum of moving elements.

Other and further objects will appear from the following description.

As noted above, this invention is capable of use in the transfer, loading or unloading of any suitable type of load carried or to be carried by any type of transporting means equipped with my invention; and the inventive idea is capable of expression in various mechanism embodiments one of which is shown in the accompanying drawings to illustrate the invention. This illustrative embodiment should in no way be construed as defining or limiting my invention, reference being had to the appended claims for this purpose, and discloses my invention as applied to a trailer type of truck arranged to effect a load transfer from another load transporting means here identified as a railroad flat car. The load itself is illustrated as a less than car load type container provided with wheels to facilitate movement thereof

over articulated bridging elements connecting the flat car and the trailer.

The arrangement of bridging elements, guides for the wheels of the container and related structures are described and claimed in my copending application Serial No. 17,679 filed March 29, 1948, and now Patent No. 2,512,798 granted June 27, 1950, and reference is made to this application for the subject matter which is common to both.

In the several drawings, in which like reference characters designate like parts,

Fig. 1 is a view of an illustrative embodiment of my invention as applied to a trailer type truck and shows a less than car load container being moved from a railroad flat car to the trailer;

Fig. 2 is a view from beneath the trailer of a portion thereof showing the embodiment of my novel transfer mechanism of Fig. 1 from below;

Fig. 3 is a view of the extension element or bolster employed in the embodiment of Figs. 1 and 2;

Fig. 4 is a view of the channel member let into the deck of the trailer in Figs. 1 and 2 to receive the bolster;

Fig. 5 is a detailed view of my novel transfer mechanism disassociated from the transporting means with certain portions thereof broken away to show more clearly the mechanical features thereof;

Fig. 6 is an enlarged view of the carriage mounted for movement on the bolster showing the manually extensible link for connection with the container;

Fig. 7 is an enlarged view of the gripping mechanism for the flexible power means mounted at each end of the channel member;

Fig. 8 is a view of the pintle device mounted on the container for engagement with the link carried by the bolster carriage;

Fig. 9 is a cross sectional view of my novel transfer mechanism adjacent either gripping mechanism showing the gripping mechanism in open position;

Fig. 10 is an end view of my novel transfer mechanism as seen from either end showing the gripping mechanism in closed position; and

Fig. 11 is an enlarged plan view of my novel transfer mechanism.

Referring now to the several drawings and more particularly to Fig. 1 a trailer truck 15 is there shown arranged adjacent a railroad flat car 16 to transfer less than car load container 17. Container 17 is provided with wheeled jacks 18 and the wheels thereof run in guides 19 on car 16 and in guide channels 20 on truck 15. Articulated bridging elements 21 carried in channels 20 connect the two transporting means and guide the wheels of jacks 18 in movement thereover all as described in my copending application referred to above.

The transfer mechanism for moving container 17 is mounted medially in and across the load supporting surface or deck trailer 15 and comprises a track, guide or channel member 22, seen in detail in Fig. 4, let flush into the deck of the trailer and suitably secured thereto and to the main strength members of trailer 15. Track, guide or channel member 22 is U-shaped in cross section having upstanding sides 23 and 24 and a bottom 25. Sides 23 and 24 are provided with outwardly turned shoulders 26 and 27 respectively to engage the deck of trailer 15 and a plurality of aligned rollers 28 are mounted for rotation on sides 23 and 24 to engage the upper surface of the bolster, as will more fully appear hereinafter. Bottom 25 is rectangularly cut away at 29 and 30 and is provided with square notches 31 and 32 for reasons apparent hereinafter.

An extension element or bolster 33 is mounted for reciprocating movement in channel 22 beneath and in engagement with rollers 28 and is shown in detail in Fig. 3. Bolster 33 is provided with side walls 34 and 35 provided with inturned shoulders 36 and 37, respectively, at their upper extremities to engage rollers 28, and has a rectangularly shaped upstanding channel 38 running medially down its length and spaced from side walls 34 and 35 by bottom runners 39 and 40 which engage and slide in channel 22. Runners 39 and 40 are apertured at 41 to receive driving sprockets to be described hereinafter in detail. Each end of channel 33 is notched at 42 to receive rollers 43 and 44 which are rotatably mounted therein in bearings 45.

An endless flexible power means 46 such as a cable, chain or other suitable flexible endless element passes around rollers 43 and 44 and around bolster 33 and the ends thereof are suitably secured to bolster carriage 47 as at 48 and 49. Carriage 47 is shown in detail in Figs. 6, 9, 10 and 11 and comprises a body longitudinally grooved at 50 and 51 to receive the inner rollers of double rollers 52 which are mounted for rotation at each corner of the body. The inner rollers of rollers 52 engage the top of channel 38 and the outer rollers engage the under surfaces of shoulders 36 and 37. The body of carriage 47 is centrally bored at 53 (Fig. 9) to receive pivot 54 which is provided with a cap 55. A turret 56 is mounted on carriage 47 and is secured to pivot 54 so as to be completely rotatable on carriage 47. Turret 56 is contained within channel 22 and does not extend above the surface of the deck of trailer 15 and does not interfere with loads carried by trailer 15. Turret 56 is slotted at 57 to receive link 58 which is pivoted therein at 59. Link 58 is provided with an extension 60 which is manually adjustable longitudinally by reason of holes 61 and bolt 62. Extension 60 terminates in an eye 62' to engage a suitable hook 63 on container 17.

Hook 63 is seen in detail in Fig. 8 and is provided with a base plate 64 secured by any suitable means to container 17 and has an upwardly and outwardly extending finger 65 in which latch 66 is pivoted at 67. Latch 66 swings inwardly when eye 62' pushes against it and swings outwardly when eye 62' embraces hook 63 to hold eye 62' in hook 63.

A gripping mechanism for endless flexible power means 46 is mounted in notch 31 of channel 22 and a second gripping mechanism is mounted in notch 32 of channel 22. These gripping mechanisms may be of identical construction and are so shown at 68 and 69 in Figs. 2, 7, 9 and 10. Each device 68 and 69 includes a floating bracket 70 mounted for reciprocation on the underside of channel 22 by bolts or rivets 71 passing through slots 72. Springs 73 engage bracket 70 and the frame of trailer 15 to urge brackets 70 toward retracted or non-gripping position. A suitable friction shoe 74 to engage flexible power means 46 is mounted on bracket 70. A cam surface 75 is formed on the inside of channel 38 terminating adjacent the ends thereof to engage bracket 70 to force shoe 74 into engagement with power means 46. A bracket 76 is pivotally mounted on channel 22 at 77 and opposite bracket 70 and is provided with an extension 78 to which a suitable friction shoe 79 is secured for cooperation with shoe 74.

Any suitable means may be employed for operating bracket 76 to engage or disengage shoe 79 and power means 46 and is here shown as a cable and drum device having a cable 60 secured to bracket 76 and operated by a drum 81 (Fig. 9) mounted in any suitable position on the trailer and shown at the front thereof in Fig. 1. Drum 81 is supported by a shaft 82 mounted in brackets 83 and is rotated by handle 84 secured to shaft 82. Handle 84 may be provided with any suitable locking means 85 engaging rack 86 to lock drum 81 in any desired position.

Bolster 33 is reciprocated in channel 22 by means of pairs of sprockets 87 and 88 fixed on axles 89 and 90 respectively (Fig. 2). Bearings (not shown) are provided for axles 89 and 90 so that sprockets 87 and 88 will project through apertures 29 and 30 respectively in channel 22 sufficiently for the sprocket teeth to engage in apertures 41 in bolster 33. Axles 89 and 90 are provided with drive gears 91 and 92 respectively which are driven by endless driving chain 93. Chain 93 is driven by gear 94 mounted on a power shaft 95 driven by any suitable means such as the engine of the truck or by a separate motor. Shaft 95 is supported by bearings 96 and 97 carried by brackets 98 and 99 respectively which are secured to the structural elements of trailer 15. Idler gears 100 and 101 may be provided to take up slack in chain 93 and are adjustably mounted on brackets 98 and 99 by any suitable means.

With this embodiment of my invention set up as above described assume that a container 17 is to be moved from flat car 16 onto trailer 15 equipped with my invention. Trailer 15 is arranged adjacent car 16 and articulated bridging elements 21 are extended and connected thereto and the container is raised on its wheeled jacks 18, all as described in detail in my copending application referred to above, and shown generally in Fig. 1. Shaft 95 is then rotated in a counterclockwise direction to drive chain 93 and pairs of sprockets 87 and 88 in the same direction moving bolster 33 to the left as seen in Figs. 1 and 2 toward car 16. Shortly after bolster 33 starts movement to the left cam 75 engages bracket 70 and urges shoe 74 of gripping mechanism 68 into engagement with power means 46. The operator may now draw handle 84 of this gripping mechanism toward him to rotate bracket 76 to force shoe 79 into engagement with power means 46. Power means 46 is now held stationary at gripping mechanism 68 and as bolster 33 continues to move to the left carriage 47 is drawn to the left by reason of the movement of the bolster and at twice the speed of movement of bolster 33. Rotation of shaft 95 and movement of bolster 33 is discontinued when carriage 47 is close enough to container 17 so that eye 62' engages hook 63. Because of the position of sprockets 87 and 88 bolster 33 can be extended almost its entire length on either side of trailer 15 to give a greater reach than hitherto possible. Added reach is obtained by withdrawal of extension 60 of link 58. It should be noted that carriage 56 may be moved by hand during engagement of eye 62' with hook 63 or at any other time desired by releasing handle 84 so that shoe 79 does not engage power means 46.

When eye 62' has engaged hook 63, and with gripping mechanism 68 gripping power means 46, shaft 95 is rotated in a clockwise direction to rotate sprockets 87 and 88 in the same direction to slide bolster 33 to the right. Since power means 46 is held at 68 carriage 47 is drawn to the right

and container 17 is rolled to the right across bridging elements 21 and onto trailer 15. As the left end of bolster 33 approaches channel 22 cam 75 disengages bracket 70 and gripping mechanism 68 releases power means 46. The operator then rotates handle 84 of gripping mechanism 69 to grip power means 46 at that point, cam 75 meanwhile having engaged bracket 70 of mechanism 69, and as bolster 33 continues to move to the right so does carriage 47, pulley 43 passing through the open shoes 74 and 79 of mechanism 68, until container 17 is transferred completely onto trailer 15.

Rotation of shaft 95 is then stopped and jacks 18 are dropped to lower container 17 to rest on trailer 15. Eye 62' is now disengaged from hook 63 and link 58 and extension 60 are dropped into slot 57 so that carriage 47 may be moved under container 17. Shaft 95 is then rotated in a counterclockwise direction with mechanism 69 gripping power means 46 until bolster 33 and carriage 47 are drawn into channel 22 and beneath container 17. Articulated bridging elements 21 are then disconnected and slid into channels 20 (Fig. 1) and as described in my copending application, and trailer 15 is now ready to move off with its load.

Since bridging elements 21 are articulated, since turret 56 is free to rotate on carriage 47, and since link 58 is pivoted to turret 56 at 59, exact alignment of trailer 15 and car 16 is not required and considerable displacement both longitudinally and vertically may be tolerated without any loss of efficiency of operation of my invention.

When container 17 is to be unloaded from trailer 15 onto car 16, trailer 15 and car 16 are positioned adjacent each other and bridging elements 21 are extended and connected to car 16. Jacks 18 are now extended to lift container 17 from trailer 15 and shaft 95 is rotated in a clockwise direction, with gripping mechanism 69 gripping power means 46 until bolster 33 and carriage 47 are sufficiently extended to the right of trailer 15 (Figs. 1 and 2) so that eye 62' can be engaged on hook 63. Rotation of shaft 95 is then reversed and bolster 33 and carriage 47 are moved to the left and through link 58 push container 17 over bridging elements 22 onto car 16. As cam 75 releases gripping mechanism 69 gripping mechanism 68 must be closed to hold power means 46 at that point to continue movement of carriage 47 to the left until container 17 is properly positioned on car 16. Rotation of shaft 95 and movement of bolster 33 and carriage 47 is then stopped and jacks 18 are dropped lowering container 17 onto car 16. Eye 62' is then disengaged from hook 63 and with mechanism 68 gripping power means 46, shaft 95 is rotated in a clockwise direction until bolster 33 and carriage 47 are returned into channel 22. Bridging elements 21 are then disconnected and slid into channels 20. Trailer 15 is now ready to be driven away.

Trailer 15 can be used as an intermediate transfer means when it is desired to shift container 17 from car 16 to another car, truck, platform or the like by interposing trailer 15 between the two and connecting it to each by articulated bridging elements. Container 17 is then pulled across trailer 15 from car 16 by moving bolster 33 and carriage 47 to the right as above described to the full extension of bolster 33. Eye 62' is then disengaged from hook 63 and bolster 33 and carriage 47 are moved to the left until link 58 can be connected to container

17 to push it the rest of the way to complete the transfer.

It is to be particularly noted that in the operation of my invention carriage 47 is moved only by movement of bolster 33 when a load is to be transferred and yet is free for manual movement for any adjustment desired. It is also to be particularly noted that bolster 33 does not have to abut a fixed object before carriage 47 can be power driven and that such an abutment will stop movement of carriage 47. The differences in function and operation of my invention over known devices are now apparent and its varied utility can be appreciated.

Gripping mechanisms 68 and 69 may be operated automatically by presetting shoes 79 in gripping position so that engagement of cam 75 with bracket 70 will grip flexible power means 46 without action by the operator. When set for this automatic action control may be exercised by the operator by adjustment of position of shoes 79 to release the gripping action or to permit slippage to reduce the power of the movement of the bolster. When shoes 79 are pre-set in gripping position the operation is continuous and if the same transfer problem is to be repeated no change of position of shoes 79 is required. Adjustment of shoes 79 is therefore required only to adjust the tightness of the gripping action; to change the position of carriage 47; and to release or engage flexible power means 46 with the load in case the transfer is out of the ordinary and variations from maximum to minimum power and speed need to be employed.

The present invention therefore provides a novel load transferring mechanism in which a power driven bolster transfers the load onto or off of the transporting means; in which the movement of the bolster drives an endless flexible power means mounted thereon which is connected to the load; in which movement of the flexible power means is controlled by the operator; in which the bolster is driven without reversal of its driving mechanism to completely transfer the load; in which the bolster driving mechanism permits extension of the bolster approaching the length thereof; in which novel means connect the load and the endless power means to permit transfer of the load when not aligned with the transporting means; in which novel means, controlled by the operator, impart the movement of the bolster to the endless power means; which may be easily installed on existing transporting means; which is of simple construction and easy to operate; and which provides a positive and efficient operation with a minimum of moving elements.

Changes to or modifications of the above described illustrative embodiment of my invention may now be suggested to those skilled in the art without departing from my inventive concept and reference should therefore be had to the appended claims to determine the scope of this invention.

What is claimed is:

1. In a transfer mechanism, a channel member, an extension member mounted for reciprocation in said channel member, means for imparting reciprocating movement to said extension member mounted in and adjacent to each end of said channel member, an endless flexible element mounted for free movement on said extension member, means for holding said flexible element secured to and adjacent each end of said channel member, and means for connecting said flexible element to the load to be transferred.

2. In a transfer mechanism, a track, a bolster mounted for reciprocation on said track, means for imparting reciprocating movement to said bolster, an endles flexible element mounted or free movement on said bolster, means for gripping said flexible element mounted in and adjacent to each end of said track, and means for connecting said flexible element to the load to be transferred.

3. In a transfer mechanism, a guide member, a bolster mounted for reciprocation in said guide member, sprockets adjacent each end of said guide member for driving said bolster, an endless flexible element mounted for free movement on said bolster, manually operable means for gripping said flexible element secured adjacent each end of said guide member, and means for connecting said flexible element to the load to be transferred.

4. In a transfer mechanism, a guide member, a bolster mounted for reciprocation in said guide member, means mounted in and adjacent to the ends of said guide member for reciprocating said bolster, a carriage mounted for reciprocation on said bolster, an endless flexible element mounted for free movement on said bolster and secured to said carriage, manual means mounted at each end of said guide member for gripping said flexible element, and means for connecting said carriage to the load to be transferred.

5. In a transfer mechanism, a guide member, a bolster mounted for reciprocation in said guide member, means for reciprocating said bolster, an endless flexible element mounted for free movement on said bolster, means for gripping said flexible element adjacent each end of said guide member, each of said gripping means including a friction member moved into engagement with said flexible element by the movement of said bolster and a second cooperating friction member for manual engagement with said flexible element, and means for connecting said flexible element to the load to be transferred.

6. A mechanism as described in claim 5 including a cam surface mounted on said bolster and terminating short of each end thereof for engagement with said first named friction member.

7. In a transfer mechanism, a guide member, a bolster mounted for reciprocation in said guide member, means for reciprocating said bolster, a carriage mounted for reciprocation on said bolster, an endless flexible driving means mounted for free movement on said bolster and connected to said carriage, means for gripping said flexible driving means at each end of said guide member, and means mounted for universal movement on said carriage for connecting said carriage to the load to be transferred including a turret pivotally mounted on said carriage and a link pivotally connected to said turret, said pivots being disposed at right angles.

8. In a transfer mechanism, a channel member, a bolster mounted for reciprocation in said channel member, sprockets adjacent the ends of said channel member for reciprocating said bolster, a carriage mounted for reciprocation on said bolster, an endless flexible driving means mounted for free movement on said bolster and secured to said carriage, manually operable gripping means at each end of said channel member for holding said flexible driving means, and a link connected at one end to the load to

be transferred and secured at its other end for universal movement to said carriage.

9. In a transfer system the combination of a vehicle, a bolster shiftable on the vehicle, an endless flexible driving means mounted for free movement on said bolster, means mounted on the vehicle adjacent each side thereof for shifting said bolster, manually actuated means mounted on the vehicle adjacent each side thereof for clamping said flexible driving means with respect to said vehicle, and means for attaching a load to said flexible driving means.

10. In a transfer system the combination of a vehicle, a bolster shiftable on the vehicle, means for shifting said bolster, endless flexible driving means mounted for free movement on said bolster, means mounted on the vehicle adjacent each side thereof for clamping said flexible driving means with respect to said vehicle, and a push-pull link connecting the load to be transferred and said flexible driving means.

11. In a system of transferring freight including a transferable container, the combination of a vehicle, a bolster shiftably mounted

thereon, an endless flexible driving means mounted for free rotation about said bolster, a push-pull link connecting the container and said flexible driving means, means mounted on and adjacent to the sides of the vehicle for shifting said bolster, and manual means mounted at the sides of the vehicle for gripping said flexible driving means with respect to said vehicle to move the container with the movement of said bolster.

12. A system as defined in claim 11 including a carriage mounted for reciprocation on said bolster and secured to said flexible driving means, and means for securing said push-pull link to said carriage.

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The following references are of record in the file of this patent:

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