Nov. 6, 1951 B. M. HYMAN 2,573,908

PORTABLE ELEVATOR WITH TENSIONING MEANS FOR RAISING CONVEYER CHUTE

Filed May 13, 1949 2 SHEETS—SHEET 1

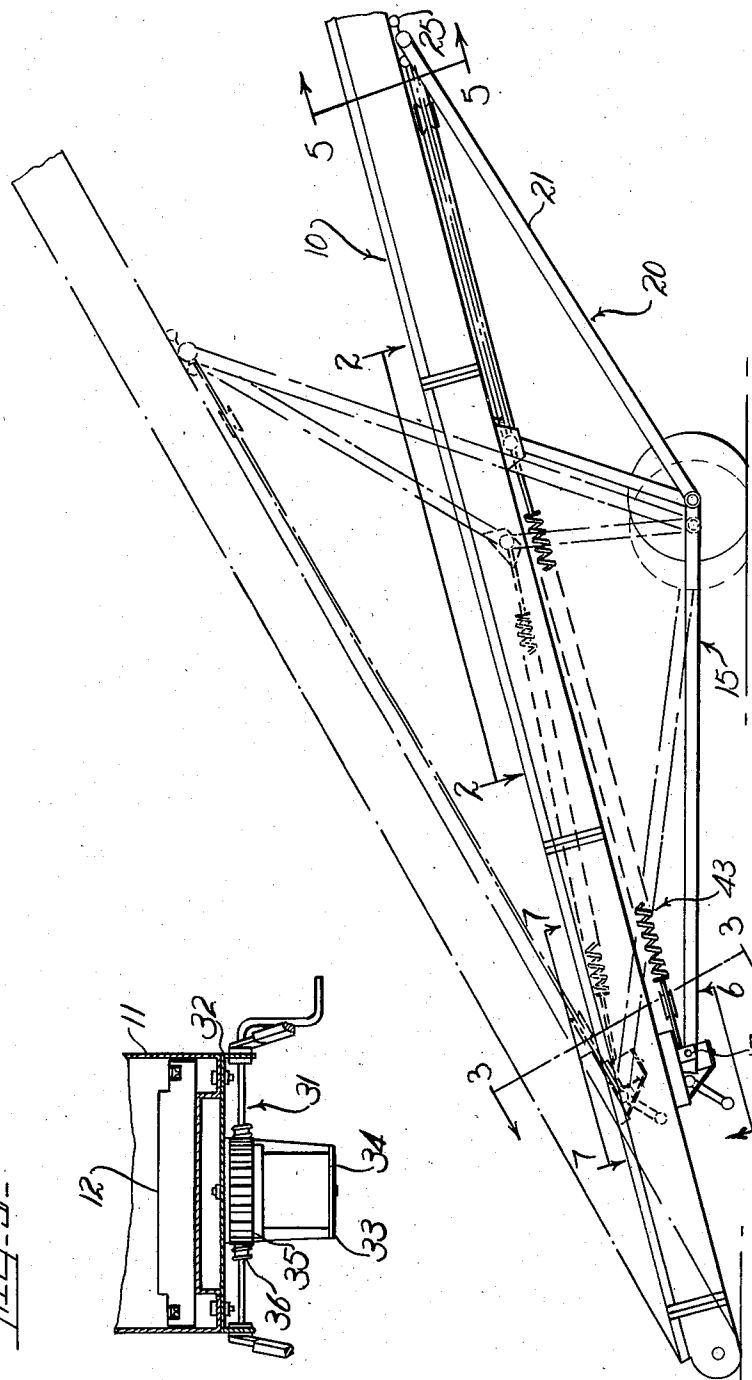


FIG. 1

FIG. 2

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FIG. 4

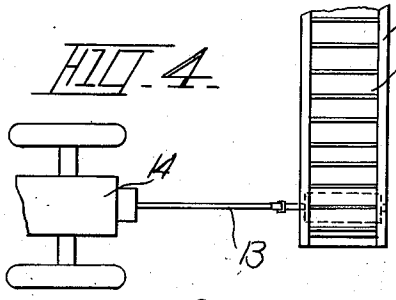


FIG. 6

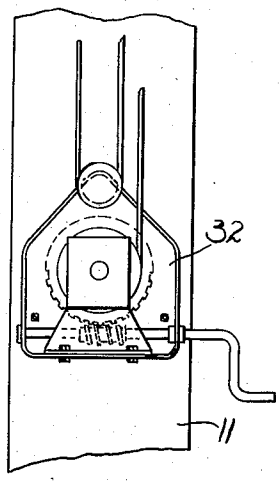


FIG. 7

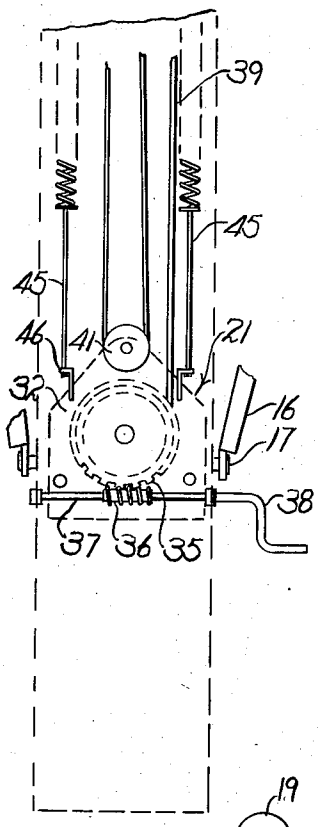


FIG. 5

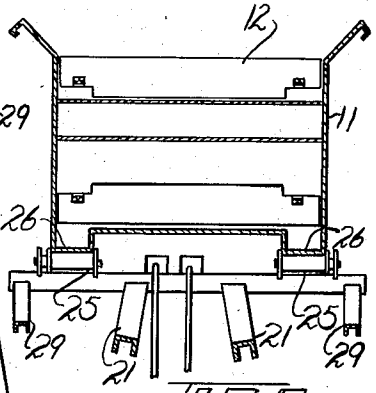
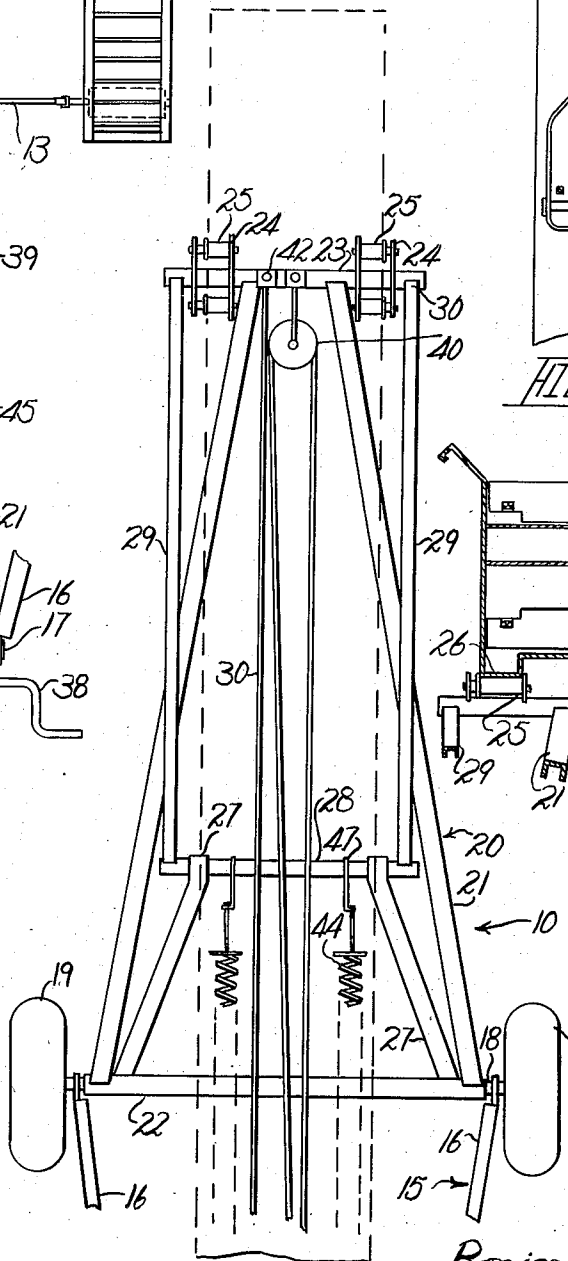


FIG. 2



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PORTABLE ELEVATOR WITH TENSIONING MEANS FOR RAISING CONVEYER CHUTE

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6 Claims. (Cl. 198—233)

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This invention relates to a material handling device. More specifically, the invention relates to a portable elevator for transporting material such as grain or the like.

The type of elevator with which the present invention is concerned usually consists of a portable main frame which is arranged to carry a longitudinally extending conveyor trough. The trough is hingedly positioned on the main frame and is adapted to be moved to a plurality of raised positions so that grain or the like may readily be transported to elevated structures such as silos or barns. The portable elevator generally also includes a lifting frame which may be pivoted into sliding engagement with the conveyor trough, and by means of a lifting mechanism such as a block and tackle the lifting frame may be moved for raising and lowering the elevator. The conveyor trough of a portable elevator is generally of considerable length and therefore is quite heavy. To raise and lower the elevator by means of a manual lifting mechanism such as a block and tackle or winch arrangement requires an unusual amount of effort and thus the task presents a major handicap to the user of such a device. It is applicant's prime object to provide a tensioning means which is arranged to urge the conveyor trough in an upward direction so that the energy required to raise the conveyor trough may be greatly diminished.

It is another object of the invention to provide a triangular lifting frame for a portable elevator, the triangular lifting frame having connected thereto a tensioning mechanism adapted to pivot the lifting frame into engagement with the conveyor trough of an elevator, thereby assisting in the raising of the conveyor to an elevated position.

These and other objects will become more readily apparent upon a reading of the specification when examined in connection with the accompanying drawings.

In the drawings:

Fig. 1 is a side elevational view of a portable elevator, the view also showing an elevated position of the elevator.

Fig. 2 is a partial plan view taken substantially along the line 2—2 of Fig. 1.

Fig. 3 is a sectional view of a lifting mechanism for a portable elevator, said view being taken along the line 3—3 of Fig. 1.

Fig. 4 is a detail view of a driving mechanism for a portable elevator.

Fig. 5 is a sectional view taken substantially along the line 5—5 of Fig. 1.

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Fig. 6 is a detail view of a lifting mechanism taken substantially along the line 6—6 of Fig. 1.

Fig. 7 is a top view of a portion of the elevator showing a lifting mechanism, said view being taken substantially along the line 7—7 of Fig .1.

A portable elevator is generally designated by the reference character 10. The elevator 10 includes a longitudinally extending conveyor trough or section 11 which may be of conventional design and which is arranged to movably support an endless conveyor 12. The trough 11 and conveyor 12 may be constructed in a well-known manner and incude generally endless conveyor chains and cleats which need not be described for the purpose of this application. As best shown in Fig. 4, the endless conveyor 12 may be driven by means of a power take-off 13 which is arranged to be driven by the the power unit (not shown) of a tractor 14.

A main frame 15 is provided to support the conveyor trough 11. The main frame 15 includes a pair of rearwardly extending frame members 16 which are pivotally connected at their rearward ends, as indicated at 17, to the conveyor trough 11. The forward ends of the frame members 16 are journaled on a transversely extending axle 18 which is suitably supported on ground wheels 19.

The conveyor trough 11 may be raised and lowered to a plurality of inclined positions by means of a triangular lifting frame 20. The lifting frame 20 includes a pair of longitudinally extending frame members 21 which extend forwardly and are arranged to converge underneath the conveyor trough 11. The frame members 21 are connected at their rearward ends by means of a tubular sleeve 22 which is journaled on the axle 18. The forward ends of the frame members 21 are connected by a transversely extending cross bar 23. As best shown in Figs. 2 and 5 the cross bar 23 has connected thereto a pair of spaced roller assemblies 24. Each roller assembly is provided with a pair of track rollers 25 which are adapted to engage a track 26 which is connected to and extends longitudinally on the underneath side of the conveyor trough 11. The lifting frame 20 also includes a pair of upwardly extending supporting members 27, which as best shown in Fig. 2, are pivotally secured to the sleeve 22. The upper ends of the supporting members 27 are connected by means of a cross bar 28. A pair of transversely spaced tension bars 29 are connected to the cross bar 28 and extend longitudinally forwardly for connection to the cross bar 23 as best indicated at 30.

A lifting mechanism in the form of a block and

tackle arrangement is generally designated by the reference character 31. The lifting mechanism 31 is supported by means of a plate 32, which as best shown in Figs. 3, 6 and 7, is connected to the underneath side of the conveyor through 11. The plate 32 has connected thereto a downwardly extending bracket 33 on which a drum 34 is journaled. The drum 34 is rotated by means of a driven gear 35 which is rigidly secured to the drum 34. The gear 35 is driven by means of a worm gear 36 which is securely mounted on a shaft 37. The shaft 37 is suitably supported on the bracket 33 and is arranged to be rotated by means of a crank handle 38. A cable 39 is wound on the drum 34. The cable 39 extends forwardly around a pulley 40 which is suitably connected to the cross bar 23. The cable 39 then extends rearwardly where it is trained about a pulley 41 as best shown in Fig. 7. The cable then extends forwardly for connection to the cross bar 23 as best shown at 42.

The lifting mechanism 31 above described clearly is of a conventional type and is so arranged as to permit a maximum degree of leverage in lifting and providing for pivoting movement of the triangular frame structure 20. Despite the favorable leverage thus provided great energy must still be expended in raising and lowering the conveyor trough. In order to expedite and assist in the raising and lowering of the conveyor trough applicant has provided the improved tensioning means 43 best shown in Figs. 1, 2 and 7. The tensioning means 43 includes a pair of coil springs 44 which are transversely spaced and which are positioned between the lifting frame 20 and the rear end of the conveyor trough 11. The coil springs 44 are attached to the plate 32 by means of links 45 which are adjustably connected to brackets 46. The brackets 46 are securely connected to the plate 32. The forward ends of the springs are suitably connected to the cross bar 28 by means of straps 47.

The tensioning means 43 is so positioned that the springs are continuously under tension when the conveyor trough 11 is in a lowered or partially raised position. In the dotted line or raised position of the conveyor trough 11 as best shown in Fig. 1 the springs 44 exert only a slight tension since the lifting frame 20 has been pivoted to its maximum lift position. The tension of the springs is, however, insufficient to maintain the conveyor trough in its raised position and the lifting mechanism 31 is the positive means effective to maintain the elevator in the raised position. As the lifting mechanism 31 is operated to unwind the cable 39 from the drum 34 the weight of the elevator trough 11 causes the frame 20 to pivot about the axle 18 to the lowered position indicated in Fig. 1. As the frame 21 is thus pivoted in a clockwise direction increased tension is placed on the springs 44 until they are in an extremely taut position. The springs are now tensioned so that they themselves are incapable of moving the lifting frame and raising the elevator, yet they exert a sufficient tension to assist in the raising of the conveyor trough when the operator employs the lifting mechanism or block and tackle arrangement 31. Thus, when the operator starts winding the cable 39 onto the drum 34 the springs are capable of urging the lifting frame 20 to pivot in a counter-clockwise direction whereupon the rollers 25 are effective to move along the tracks 26, thereby raising the conveyor trough 10 to a raised position. Sufficient energy is exerted by the springs 44 so that the task of thus raising the elevator trough is clearly lightened and the conveyor trough can be readily raised and lowered a number of times without increasing the burden on the operator. It is of course contemplated that the tensioning means 43 may likewise be utilized with a power mechanism and so arranged and constructed that the burden on the power mechanism is clearly diminished.

It is believed clearly apparent now that the applicant has devised a novel spring tensioning mechanism for assisting the operator in raising and lowering the elevator conveyor trough. A sturdy and rigid lifting frame has been provided, the frame being arranged to pivot in response to the spring pressure and the action of the lifting mechanism for engaging the conveyor trough and moving the same to a raised position. It must be understood that changes and modifications may be made in this construction which do not depart from the spirit of the invention as disclosed nor the scope thereof as defined in the appended claims.

What is claimed is:

1. A portable elevator comprising a main frame supported on ground wheels, a conveyor trough having a movable conveyor supported thereon, means pivotally connecting one end of said conveyor trough to the main frame, means for positioning said conveyor trough in a plurality of inclined positions with respect to the ground including a triangular shaped frame structure, said frame structure including a pair of forwardly extending frame members, said frame members having rearward ends pivotally connected to the main frame, the frame members converging toward the conveyor trough, means connecting the forward ends of said frame members, said means being arranged to slidably engage the conveyor trough, a pair of supporting members rigidly connected to the frame members adjacent their rearward ends thereof, said supporting members extending upwardly toward said conveyor trough, a pair of forwardly extending tension members connected to the supporting members and to the forward ends of the frame members, means for pivoting said frame thereby moving said conveyor trough including a winch mechanism supported by the main frame, said winch mechanism having a flexible element connected to the triangular frame structure, a pair of springs supported at one end by the main frame, means connecting said springs adjacent to the connection of said supporting members with said tension members, said springs being normally in tension thereby urging said triangular frame structure to pivot on said main frame for assisting in moving said conveyor trough.

2. A portable elevator comprising a main frame supported on ground wheels, a conveyor trough having one end pivotally conected to the main frame, means for positioning said conveyor trough in a plurality of inclined positions with respect to the ground including a triangular shaped frame structure, said frame structure including a pair of forwardly extending frame members, said frame members having rearward ends pivotally connected to the main frame, the forward ends of the frame members being arranged to engage the conveyor trough in relative sliding relation, a pair of supporting members rigidly connected to the frame members for pivotal movement therewith, said supporting members extending upwardly toward said conveyor trough, a pair of forwardly extending tension members connected to the frame members and to the supporting members, said tension

members being arranged substantially parallel to the conveyor trough in a lowered position of said trough, means for pivoting the frame on said main frame including a winch mechanism supported by the main frame and having a flexible element connected to the triangular frame structure, and resilient tension means supported by the main frame and connected to the triangular frame for normally urging said frame to pivotally move, thereby assisting in raising said conveyor trough.

3. A portable elevator comprising a main frame supported on ground wheels, a conveyor trough pivotally connected to the main frame, means for positioning said conveyor trough in a plurality of inclined positions with respect to the ground including a triangular shaped frame structure, said frame structure including a pair of forwardly extending frame members, said frame members having rearward ends pivotally connected to the main frame, the forward ends of the frame members being arranged to engage the conveyor trough in relative sliding relation, a pair of supporting members rigidly connected to the frame members for pivotal movement therewith, said supporting members extending upwardly toward said conveyor trough, means for pivoting the frame on said main frame including a winch mechanism supported by the main frame and having a flexible element connected to the triangular frame structure, and resilient tension means supported by the main frame and connected to the triangular frame for normally biasing said frame to pivotally move thereby assisting in raising said conveyor trough.

4. A portable elevator comprising a main frame supported on ground wheels, a conveyor trough pivotally connected to the main frame, means for positioning said conveyor trough in a plurality of inclined positions with respect to the ground including a triangular shaped frame structure, said frame structure including a pair of forwardly extending frame members, said frame members having rearward ends pivotally connected to the main frame, the forward ends of the frame members being arranged to engage the conveyor trough in relative sliding relation, a pair of supporting members rigidly connected to the frame members for pivotal movement therewith, said supporting members extending upwardly toward said conveyor trough, a pair of forwardly extending tension members connected to the frame members and to the supporting members, means for pivoting the frame on said main frame including a winch mechanism supported by the main frame and having a flexible element connected to the triangular frame structure, and resilient tension means supported by the main frame and connected to the triangular frame for normally basing said frame to pivotally move thereby assisting in raising said conveyor trough.

5. A portable elevator comprising a main frame supported on ground wheels, a conveyor trough having one end pivotally connected to the main

frame, means for positioning said conveyor trough in a plurality of inclined positions with respect to the ground including a lifting frame structure, said frame structure including a pair of frame members, said frame members being pivotally connected to the main frame and arranged to engage the conveyor trough in relative sliding relation, a pair of supporting members rigidly connected to the frame members for pivotal movement therewith, said supporting members extending upwardly toward said conveyor trough, a pair of forwardly extending tension members connected to the frame members and to the supporting members, means for pivoting the lifting frame on said main frame including a winch mechanism supported by the main frame and having a flexible element connected to the lifting frame structure, and resilient tension means supported by the main frame and connected to the lifting frame for normally urging said frame to pivotally move thereby assisting in raising said conveyor trough.

6. An elevator comprising a main frame adapted to be supported on the ground, a conveyor trough hingedly connected to the main frame whereby the trough may be raised to a plurality of raised positions, means for raising said trough including a lifting frame structure, said lifting frame structure including a forwardly extending frame member having a rearward end pivotally connected to the main frame, a supporting member rigidly connected to the forwardly extending frame member for pivotal movement therewith, a tension member connected to the supporting member, said tension member extending forwardly with respect to the supporting member and being connected to the forwardly extending frame member, a winch mechanism supported on said main frame, said winch mechanism including a lifting element connected to the lifting frame structure, and a spring tension means supported at one end by the main frame structure, said tension means being connected to the lifting frame for normally urging pivotal movement of said frame whereby said frame slidably engages said conveyor trough and the same is readily movable to a raised position.

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