July 24, 1956 C. G. FORSHEY 2,755,950

DRUM HANDLING APPARATUS

Filed Dec. 4, 1953 4 Sheets-Sheet 1

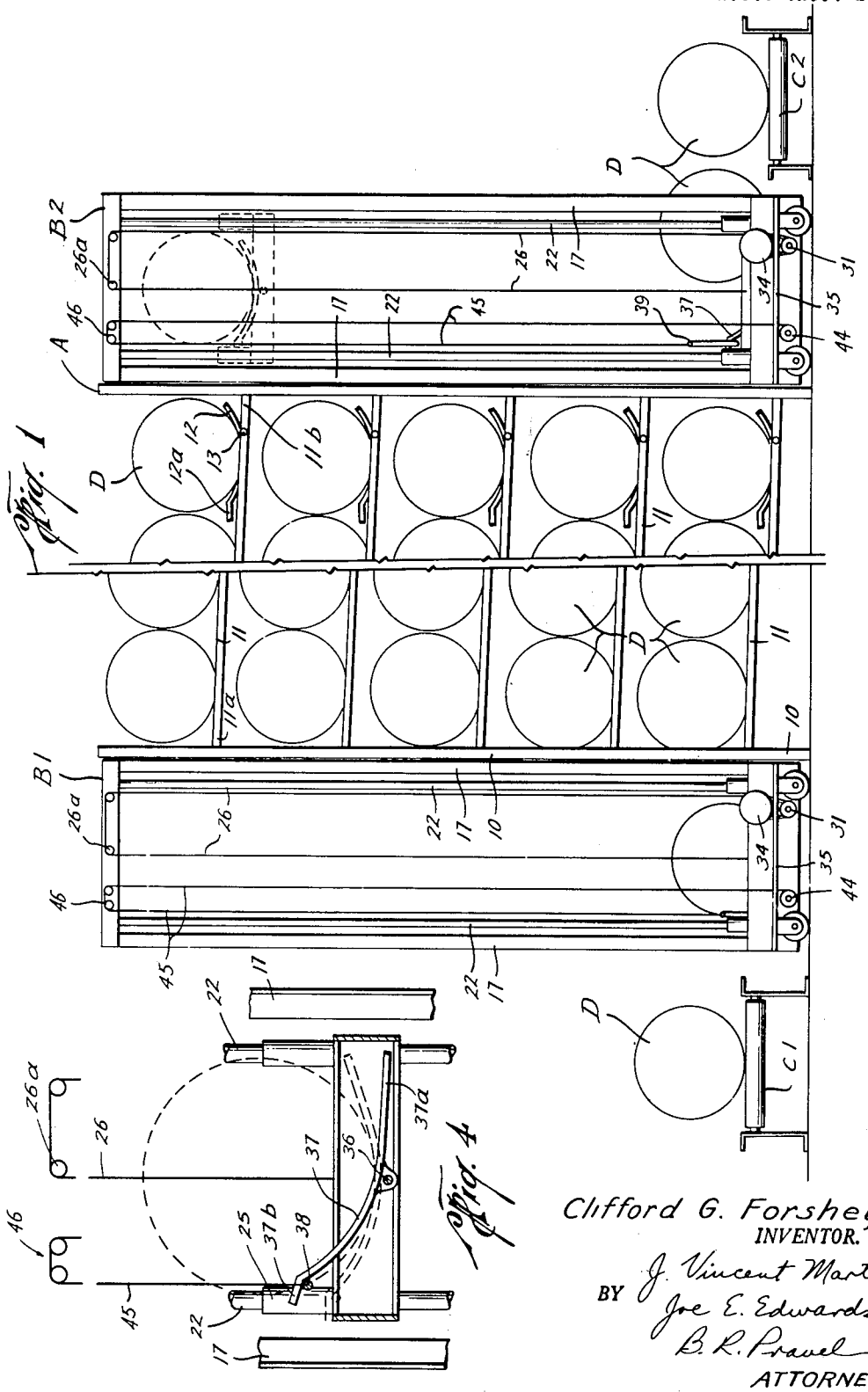

Fig. 1

Fig. 4

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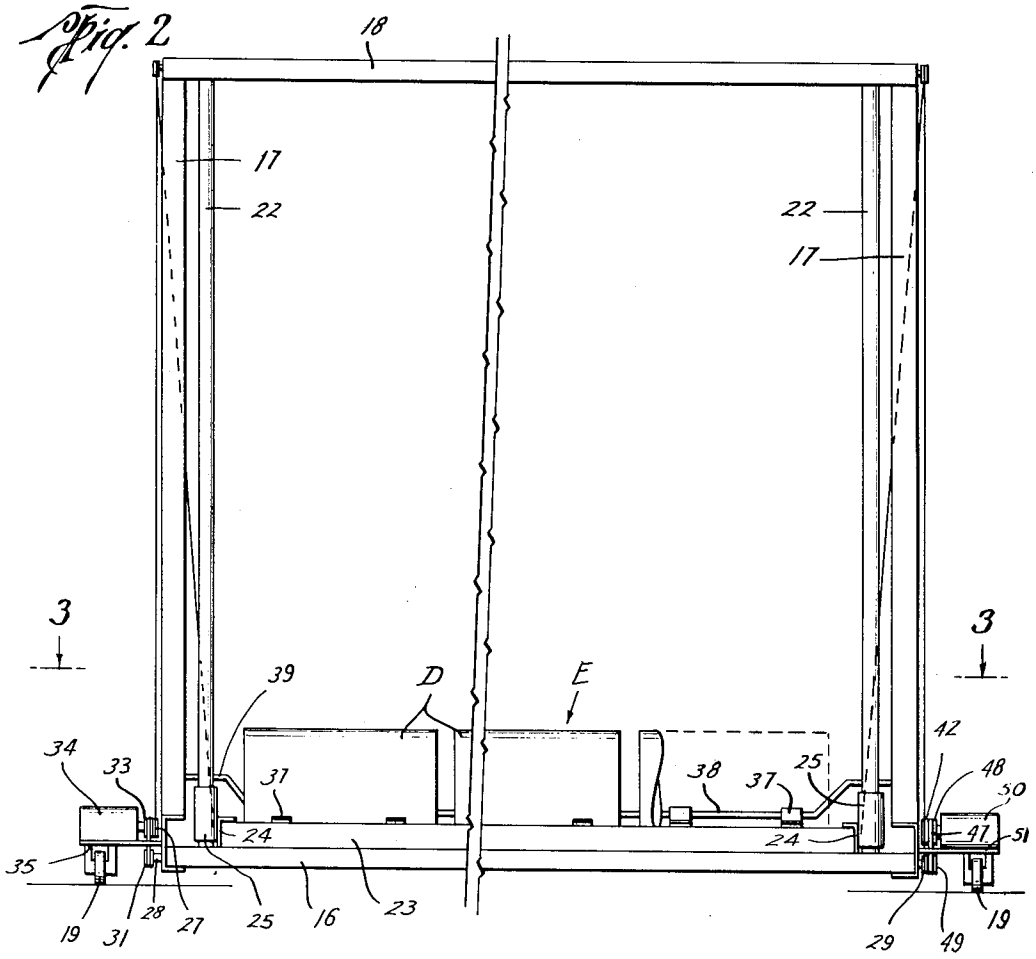
Filed Dec. 4, 1953 4 Sheets-Sheet 2

Fig. 2



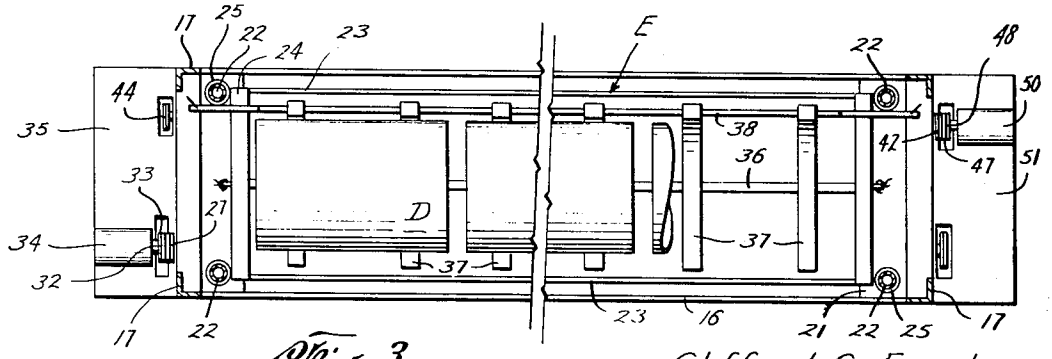


Fig. 3

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Filed Dec. 4, 1953 4 Sheets-Sheet 3

Fig. 5

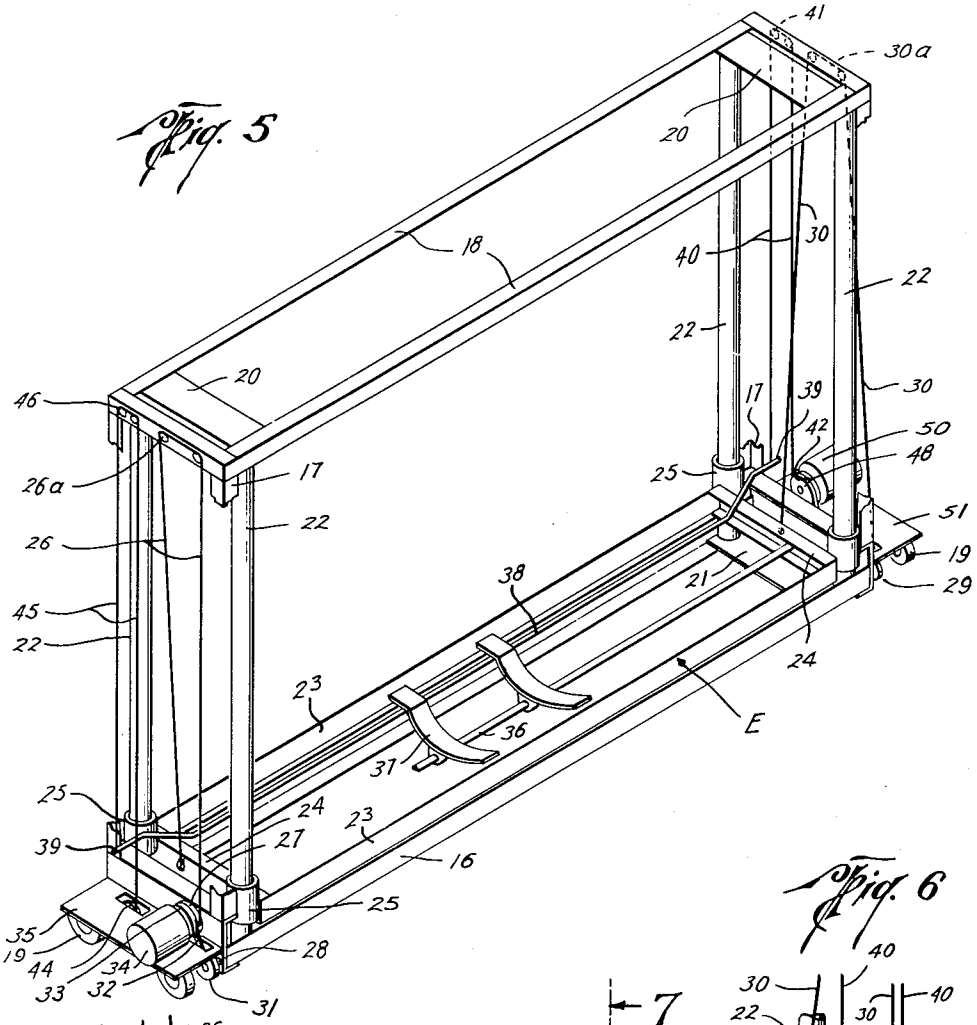


Fig. 6

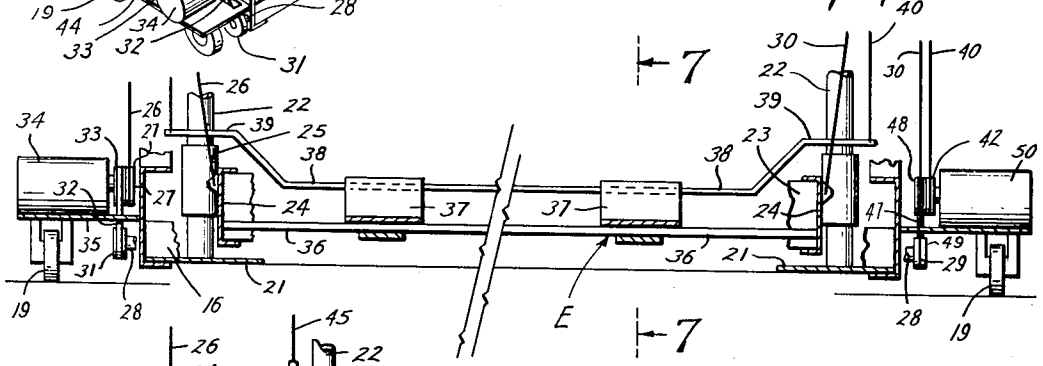
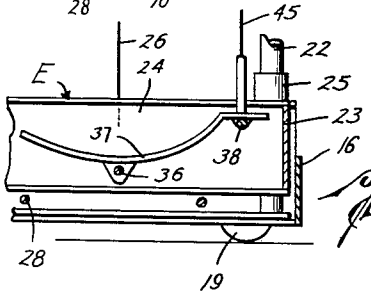


Fig. 7



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Filed Dec. 4, 1953 4 Sheets-Sheet 4

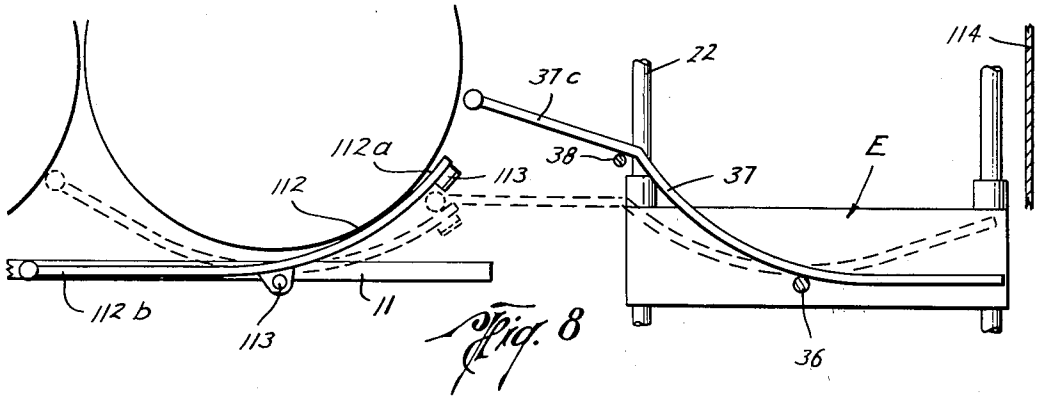

Fig. 8

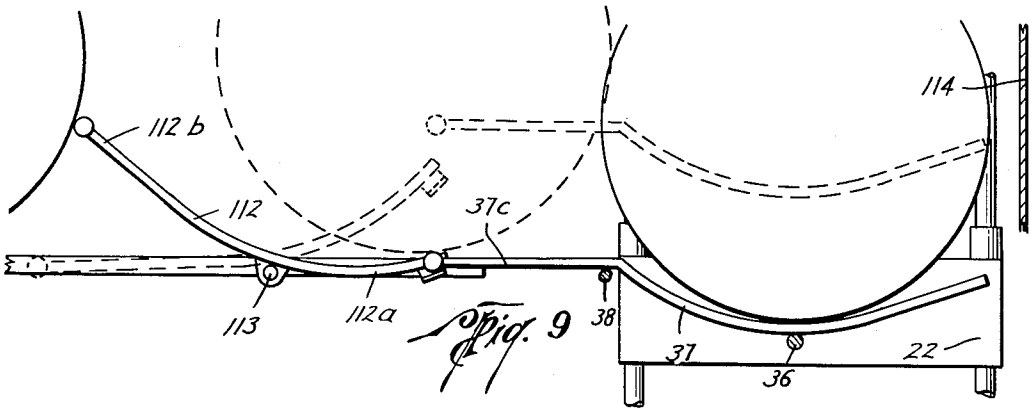

Fig. 9

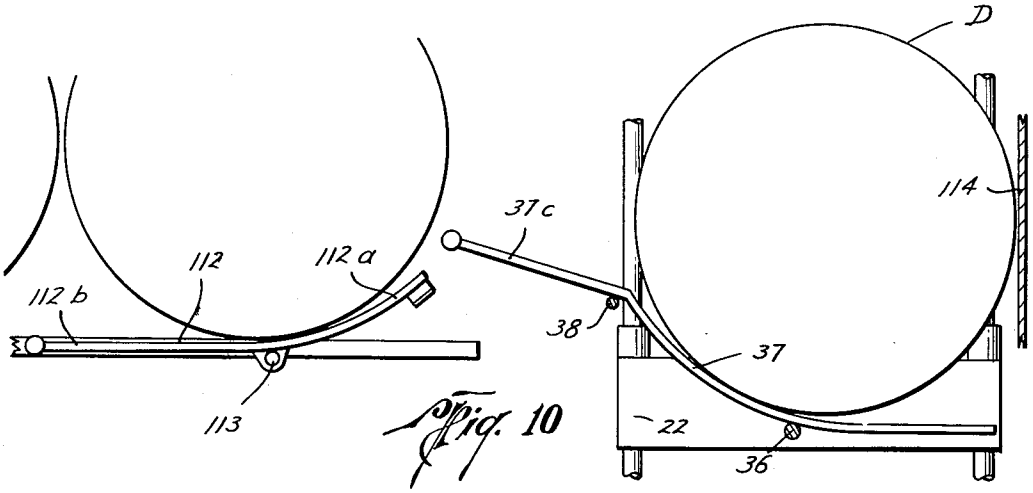

Fig. 10

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DRUM HANDLING APPARATUS

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Application December 4, 1953, Serial No. 396,227

2 Claims. (Cl. 214—701)

This invention relates to new and useful improvements in drum handling apparatus.

In various industries, the handling of metal drums or containers presents a considerable problem, and the present invention provides an apparatus for efficiently handling such drums or containers, particularly with reference to placing said drums in storage spaces and in removing or unloading said drums from such storage. It might be pointed out that where large quantities of the usual metal drum or container are necessary, it is the usual practice to temporarily store the empty drums while awaiting a filling operation. Such storage is usually within large racks to which the drums must be elevated for storage and from which the drums are withdrawn as needed in the particular operation.

It is one object of the present invention to provide an improved apparatus for handling relatively large metal drums or containers and which has means for receiving the drums from an incoming conveyor and then elevating said drums to their proper storage place in suitable bins; the apparatus also being useful in removing the drums from their storage space.

An important object of the invention is to provide an improved apparatus of the character described which comprises a portable elevator unit which may be readily moved from place to place and which has means for receiving drums, elevating the same to a desired elevation and then discharging said drums, whereby the unit may be moved to necessary locations to receive incoming containers and thereafter properly deposit said containers in suitable storage racks.

A particular object is to provide an apparatus of the character described, wherein the elevator unit includes an elevator framework which carries pivoted supporting elements which receive and support drums which are deposited upon the elevator, said supporting elements being tiltable to effect a discharge of the drums from the elevator at the desired or predetermined time.

Still another object is to provide a drum handling apparatus of the character described which is portable, simple in construction and which has the elevator, as well as the means for actuating the drum supporting elements electrically operated by suitable electric motors which are mounted upon and form part of the unitary apparatus.

Another object is to provide a portable elevator unit for handling drums or containers which is constructed to be associated with a storage rack, said rack also having tiltable supporting elements which will control the discharge of the drums or containers from the storage rack; the invention contemplating that the tiltable supporting elements of the rack may be actuated manually, electrically or by some other means to effect the desired discharge of the drums or containers.

The construction designed to carry out the invention will be hereinafter described, together with other features thereof.

The invention will be more readily understood from

a reading of the following specification and by reference to the accompanying drawings forming a part thereof, wherein an example of the invention is shown, and wherein:

Figure 1 is an elevation, which is somewhat schematic, of the improved drum handling apparatus constructed in accordance with the present invention;

Figure 2 is a side elevation of the elevator unit of the apparatus;

Figure 3 is a horizontal cross-sectional view taken on the line 3—3 of Figure 2;

Figure 4 is detailed cross-sectional view of one of the tiltable drum supporting elements;

Figure 5 is a partial isometric view illustrating the elevator unit;

Figure 6 is a partial longitudinal sectional view taken through the supporting frame and elevator;

Figure 7 is a sectional detail taken on the line 7—7 of Figure 6; and

Figures 8, 9 and 10 are schematic views illustrating the operation of the tiltable supporting element of the storage rack by one of the tiltable supporting elements of the elevator unit.

In the drawings (Figure 1) the letter A designates a storage rack on which the drums or containers D which are to be handled are adapted to be stored. The storage rack includes vertical standards or frame supports 10 and a plurality of generally horizontal shelves 11, which shelves are preferably constructed of spaced supporting bars or rods upon which the drums D are adapted to rest. Each shelf 11 is slightly inclined, and the drums are deposited upon each shelf at the higher end indicated by 11*a*, so that said drums may roll downwardly to the lower end 11*b* of said shelf. At this lower end of each shelf a supporting element 12 is mounted and this element is generally curved to substantially the contour of the drum D. The curved supporting element is pivoted on a rod 13 and is formed with a lateral extension 12*a* at one end thereof. As the drum rolls downwardly along the shelf, it engages over the extension 12*a* and imparts a slight swinging or tilting movement to the member sufficient for the drum to roll over the extension and seat within the curved element in the manner shown in Figure 1; upon seating within the element 12, further rotation of the drum is halted and thereafter the additional drums which are deposited upon the shelf are held against discharge from the inclined shelf by reason of the drum at the lower end of the shelf being held within the curved element. It will be evident that if the supporting element 12 is tilted by manual or other means in a direction which will lower the end opposite the extension 12*a*, the end drum will roll off of the element and the shelf by gravity. As the end drum is discharged the extension 12*a* will hold the other drums on the shelf against any downward movement along the shelf until such time as the element 12 returns to a normal position. When this occurs, the next drum may roll over the extension 12*a* and become seated in the element.

For loading and unloading the drums from the storage rack A, elevator units B1 and B2 are provided. These units are of substantially the same construction, with the unit B1 being provided for the purpose of elevating the drums or containers to the proper shelf in the rack and for depositing the drums on the desired shelf. The unit B2 is provided for the purpose of receiving drums which are to be discharged from storage and for lowering such drums from the particular shelf in the rack and thereafter discharging said drums from the elevator unit. Both elevator units B1 and B2 are readily portable, since they are mounted on rollers or similar means and thus said units may be rolled into place opposite any storage rack.

Normally, an inlet conveyor C1 transports the drums

D into the storage building, and this conveyor is usually disposed at a point somewhat adjacent the storage rack A. The elevator unit B1 is located between the inlet conveyor C1 and the storage rack A and is adapted to receive drums from the conveyor and to deposit the same onto the shelves 11 of the rack. The elevator unit B2 is located at the discharge end of the rack A, which discharge end is adjacent to a discharge conveyor C2. The unit B2 raceives the drums from the storage rack, lowers them to the floor level and discharges the same onto the discharge conveyor C2. Since each elevator unit is readily portable, it is evident that one unit could be provided for each storage rack, and during loading of said rack the unit would be utilized to transfer the drums from the inlet conveyor C1 to the various shelves of the rack. During unloading the elevator unit would be disposed opposite the discharge end of the rack and would be utilized to transfer the drums from the rack A to the discharge conveyor C2.

As has been stated, the elevator units B1 and B2 are of substantially the same construction and the details of each unit is illustrated in Figures 5–7. Referring to Figure 5, each unit comprises a main frame which includes a base 16 having upright standards or posts 17 which are preferably disposed at the corners; an upper frame member 18 connects the posts and all parts may be suitably welded or otherwise secured together. The frame is supported on suitable rollers 19 whereby it is readily portable. Transverse cross braces 20 extend across the upper frame member 18 while similar cross braces 21 extend across the base 16 and a plurality of guide posts 22 extend between the brace members 20 and 21. As shown, four guide posts 22 are provided and function to guide the movement of the elevator within the frame.

The elevator comprises a frame structure which includes side bars 23 and their channels 24 which are welded together to form a generally rectangular frame. The upper surface of the side bars 23 which are preferably angle bars have guide sleeves 25 secured thereto and such guide sleeves surround the guide rods 22. It will be evident that with this arrangement the elevator frame is movable vertically within the main frame, being guided in its movement by the guide rods.

For imparting vertical movement to the elevator frame, a cable 26 has one end fastened to one of the side bars 24 of the elevator frame with its opposite end wound about a drum 27 mounted on the shaft of the motor 34. A pulley 31 is mounted on a longitudinal shaft 28 which extends longitudinally of the main supporting frame and which has a cable drum 29 on its opposite end. One end of a cable 30 is secured to the drum 29 and passes upwardly over idler pulleys 30*a* on the upper end of the main frame and has its opposite end attached to the other side bar of the elevator frame. Cable 26 also passes over idler pulleys 26*a* on the upper end of the main frame.

It will be evident that when the cable drums 27 and 29 are rotated, the cables 26 and 30 will be wound about their respective drums 27 and 29 and will result in elevating the elevator frame indicated by the letter E and including the side bars 23 and end bars 24. Similarly, when the cables are unwound from their respective drums, the cable will be lowered. For transmitting rotation to the cable drum 29, the shaft 28 is extended adjacent the drum 27 and has a pulley 31 thereon. This pulley has connection through a drive belt 32 with a drive pulley 33 mounted on the shaft of an elevator motor 34. The motor is supported upon a suitable bracket 35 secured to the base of the main frame.

For supporting a plurality of drums on the elevator frame E, said frame has a longitudinal supporting rod 36 secured thereto and a plurality of curved supporting elements 37 are pivotally mounted on this rod. Each element 37 is generally curved to conform to the outer contour of the drum but has one end 37*a* substantially

straight, while its other end is formed with an extension 37*b*. Each supporting element is normally in the position shown in dotted lines in Figure 4 with the extension 37*b* in a substantially horizontal plane. As a drum is rolled from the inlet conveyor C1 into the area of an elevator frame, the surface of the drum will roll over the extension 37*b* and will rest upon said element as shown in Figure 1. It has been found that two supporting elements for each drum are sufficient and, as is obvious in the drawing, each supporting element is relatively narrow in width. The elevator may have any desired length and will be made of substantially the same length as the storage rack, it being preferable that several drums may be loaded upon the elevator at one time.

After the drums are placed in position on the various supporting elements of the elevator E, the elevator motor 34 is operated to elevate the drums to the particular shelf 11 of the rack on which said drums are to be stored.

It is then desirable to discharge the drums and for this purpose all of the supporting elements are connected together by a tilt rod 38. This rod extends longitudinally of the elevator frame and has its ends offset upwardly as indicated at 39. One end 39 has one end of a cable 40 connected thereto, and this cable passes upwardly over idlers 41 and has its opposite end mounted upon a cable drum 42 mounted on the shaft of the motor 50. A pulley 48 is mounted on a longitudinal shaft which has its other end carrying a cable drum 44. This drum has one end of a cable 45 secured thereto, which cable passes upwardly over idlers 46 and has its opposite end secured to the other offset end 39 of the tilt rod. The cable drums 42 and 44 are driven through a belt 47 and pulleys 48 and 49 by a motor 50 which is mounted on a bracket 51 secured to the main frame. The motor 50 is synchronized with the motor 34, and thus when the elevator motor is operating the cables 40 and 45 are wound upon their respective drums 42 and 44 at the same rate as the elevator cables 26 and 30 are wound upon their drums 27 and 29. This means that the supporting elements maintain the same relative position with respect to the elevator as said elevator is moved upwardly and downwardly within the frame. When it is desired to discharge the drums from the elevator, this is accomplished by a tilting movement of the supporting elements 37, said elements being moved to the position shown in full lines in Figure 4. This tilting of the elements to discharge the drums is effected by operating the motor 50 after the elevator motor 34 has been halted. Such additional operation of the motor 50 will cause an upward movement of the tilt rod 38 through cables 40 and 45 and will cause a tilting of the supporting elements 37 which causes a gravity discharge of the drums onto the adjacent shelf 11 of the storage rack. As explained, the shelves of the storage rack are inclined, causing the drums to roll downwardly on the shelf to stored position.

When drums are discharged from the storage rack, one of the elevator units is moved opposite said rack in the manner shown in Figure 1 and the elevator is operated to move the elevator E opposite the shelf. The curved retaining elements 12 of the shelf are then actuated, either electrically or by hand, and this causes the end drum or drums of the shelf to roll onto the supporting elements 37 of the elevator unit. Thereafter, the elevator motor 34 is actuated to lower the elevator opposite the discharge conveyor C. Upon reaching this position the tilt motor 50 is operated to tilt or swing the supporting elements 37 through the tilt rod 38, and thus automatically discharge the drums onto the discharge conveyor C2.

As has been noted, the tiltable retaining or supporting elements 12 of the rack A may be manually actuated to discharge the end drum or drums from each shelf or these elements may be mechanically operated in some manner. In Figures 8–10 an arrangement is illustrated

wherein the supporting elements **37** of the elevator E may be employed for actuating the retaining elements **112** of the shelves **11** of the rack. In this construction the retaining elements **112** which retain displacement of the drum from the shelf are of slightly different form and are pivoted on a supporting rod **113**. One end **112***a* of the element **112** is curved upwardly, while the opposite end **112***b* lies in substantially a horizontal plane parallel to the shelf when the element is in its normal position. It will be evident that the drum rolling along the shelf will roll onto the element **112** and the curved end **112***a* will prevent displacement of the drum from said shelf as shown in Figure 10. All of the retaining elements **112** on one shelf are connected together by a longitudinal rod or bar **113**.

For imparting a tilting movement to the elements **112** to permit discharge of the end drum, the curved supporting elements **37** of the elevator E are each formed with an actuating rod **37***c* which actually forms a continuation of the extension **37***b*. As the elevator moves upward, the extensions **37***c* move upwardly between the longitudinal supports forming each shelf and are of such length that when the elements are tilted by means of the tilt rod, as shown in Figure 8, the end of the rod **37***c* will clear the bar **113** and the end **112** of the retaining element. Thus, the tilt motor is actuated to first tilt the elements **37** and thereafter the elevator motor is operated to locate the rod **37***c* above the element **12**. When in this position the tilt motor is again operated to return the supporting element **37** to its normal position (dotted lines in Figure 9), and this swings the end of the rod **37***c* in overlying relationship to the bar **113** of the retaining elements **112**. Thereafter the elevator is lowered, and such lowering will cause the end of the rod **37***c* to engage the bar **113** in the manner shown in full lines in Figure 9, whereby the retaining element **112** is tilted to permit the drum to roll from the element **112** onto the supporting element **37**.

After the drum is loaded on the supporting element **37**, the elevator is again raised to the position shown in dotted lines in Figure 9 which again locates rod **37***c* above the bar **113**. At this point the tilt motor is actuated to cause the parts to assume the position shown in Figure 10, which allows the end of the rod **37***c* to clear the bar **113**, after which the elevator may be lowered. The construction shown in Figures 8–10 provides a means for operating the retaining elements **112** by means of the supporting elements which are carried by the elevator E. It is noted that in this form a suitable catch bar indicated at **114** is mounted upon the elevator in order to restrict the rolling movement of the drum as it moves

onto the supporting elements **37**. This catch bar may be detachably secured to the elevator frame since it will have to be removed when discharge of the drum from the elevator is to be effected.

The foregoing disclosure and description of the invention is illustrative and explanatory thereof, and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

Having described my invention, I claim:

1. An elevator unit for handling cylindrical containers including, a main supporting frame, an elevator movable vertically within the frame, a transversely extending supporting element pivotally mounted on the elevator, said element being curved to receive and support a container therein, a laterally extending tilt rod secured to the supporting element, an actuating cable having one end secured to the tilt rod, said cable extending upwardly over a support on the supporting frame and having its opposite end wound upon a first cable drum, a second cable having one end secured to the elevator with said cable extending over a support on the main frame and with its opposite end wound upon a cable drum, means for imparting movement to the last-named cable drum to wind or unwind the second cable and thereby raise and lower the elevator within the main supporting frame, and means mounted on the main supporting frame for imparting a rotation to the first cable drum to effect a tilting of the pivotally mounted supporting element to thereby discharge the container from said element by gravity.

2. An elevator unit as set forth in claim 1, wherein the means for imparting rotation to the first cable drum is a synchronous electric motor mounted on the main supporting frame and wherein the means for imparting rotation to the second cable drum is also a synchronous electric motor mounted on the main supporting frame, said motors being synchronized so that the elevator may be raised and lowered without causing a tilting of the supporting element during the movement of the elevator.

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