

Sept. 15, 1953

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2,652,174

TOTE BOX STACK CONSTRUCTION

Filed July 29, 1950

2 Sheets-Sheet 1

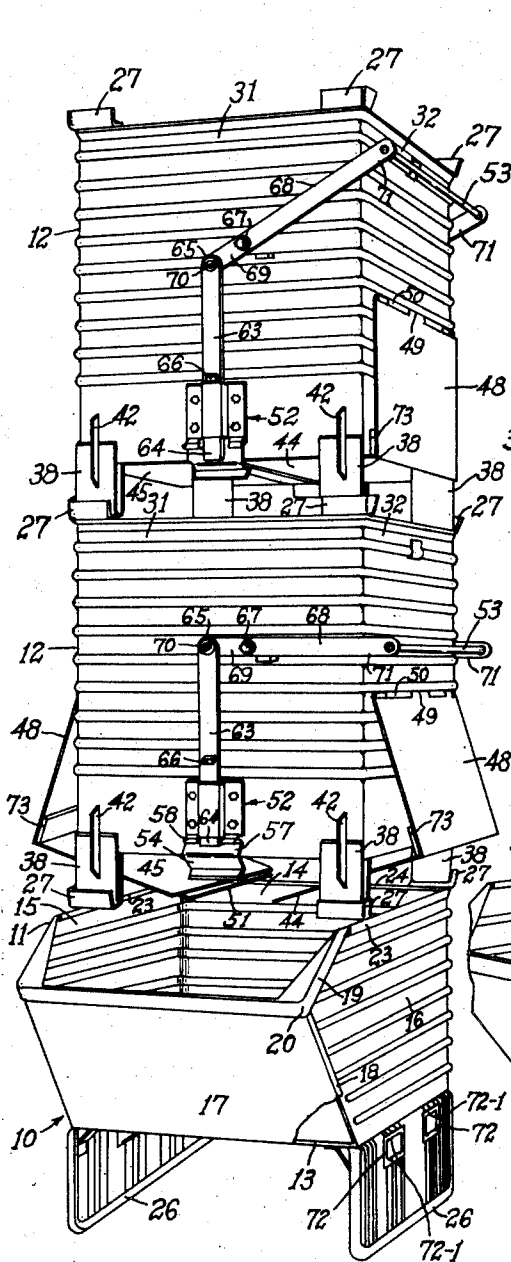


Fig. 2

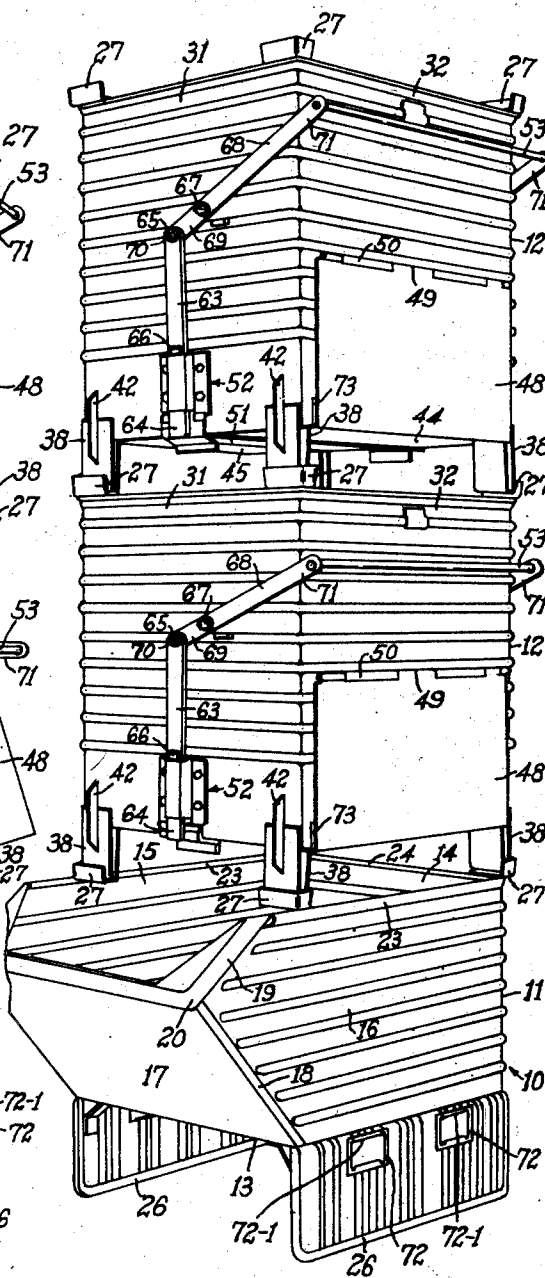


Fig. 1

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2 Sheets-Sheet 2

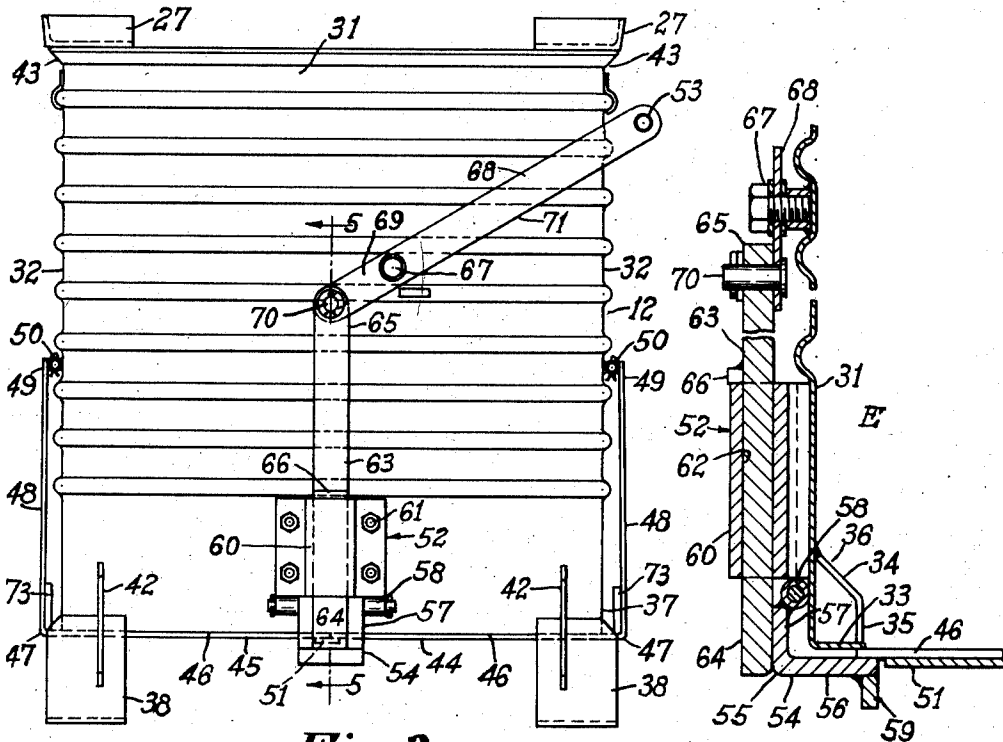


Fig. 3

Fig. 5

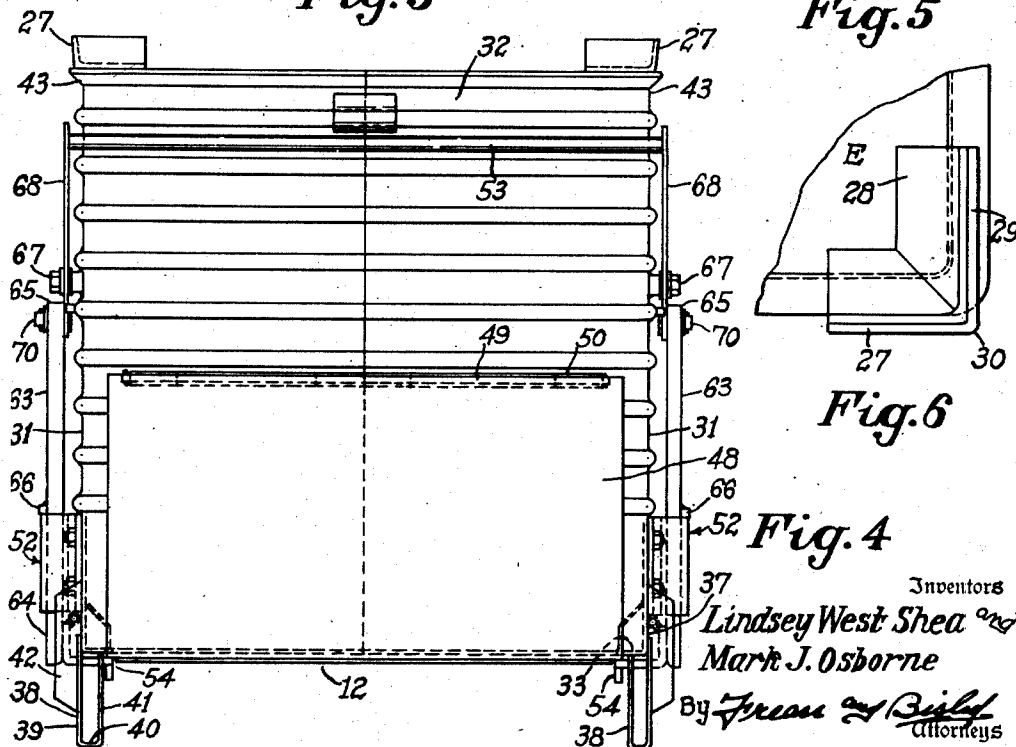


Fig. 6

Fig. 4

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UNITED STATES PATENT OFFICE

2,652,174

TOTE BOX STACK CONSTRUCTION

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Application July 29, 1950, Serial No. 176,564

13 Claims. (Cl. 222-185)

1

The invention or discovery relates to tote box stacks particularly adapted for use in production control in manufacturing plants such as automobile manufacturing plants. The machines or assembly lines are crowded so closely together in many such plants, that changing tote boxes frequently can only be done during lunch hours without stopping production.

This undesirable condition is augmented, because one machine, or one assembly line station, may be supplied in a single tote box with blank parts or parts for assembly sufficient for a production period of one hour, whereas there may be sufficient blank parts or parts for assembly in the same size tote box for a production period of two, three, or more hours for another machine, or another assembly line station. Consequently, in manufacturing plants where there is limited lateral space between machines or assembly line stations for the placement of tote boxes, it has been very difficult to provide a sufficient number of tote boxes full of blank parts or parts for assembly for a particular production run at machines or assembly line stations requiring a substantial number of tote boxes full of blank parts or parts for assembly for such a particular production run.

The handling of tote boxes in such manufacturing plants is usually done by the use of power fork lift trucks, each of which has the capacity to lift a tote box or stack of tote boxes to a substantial height from a lower supported position, as well as to transport a tote box or stack of tote boxes laterally from place to place, and to load and unload at any position of the fork.

The objects of the present invention or discovery include the provision of an improved tote box stack construction including box units each of which may be separately handled by a power fork lift truck, and which are adapted to be stacked one on top of each other, and each stack including a lower hopper box unit, and one or more upper bottom dump box units, each bottom dump box unit being arranged for dumping its contents through a bottom opening into the next lower unit of the stack.

It is a further object of the present invention or discovery to provide such an improved tote box stack construction having a simplified arrangement of parts, permitting economical manufacture and maintenance, and convenience in use.

In accordance with the present invention, it is possible to use the improved tote box stack construction to gear assembly or process materials handling to a predetermined production cycle. For many years it has been common practice to

2

schedule dies to run a predetermined number of pieces, but in some industries the dies are now geared to produce pieces for a certain predetermined number of hours.

Thus, through the use of the improved tote box stack construction it is possible to predetermine the placement of enough material at an assembly or processing station for a given length of time, such as two, three, or even eight, hours. The length of time is dependent upon the frequency of demand and the convenience of the operation. Through this means, it is possible to use valuable air space at the place of use of the part being supplied, thereby greatly reducing the need for temporary adjacent storage areas, and likewise reducing the amount of central storage required. The optimum use of the cube is thus achieved, greatly reducing the lateral movement of the parts from warehouse to assembly or process areas or stations.

Stated in another way, when one of the improved tote box stacks is placed at an assembly or process station, a supply of material is contained therein equivalent to that which would have been contained in three, four, or five usual materials handling boxes, but no additional floor space is occupied by the improved tote box stack.

In addition, the improved tote box stack construction serves a fundamental purpose of servicing operators and machines with a continuous supply of materials at a convenient access point so that idle time of operator and machine is greatly reduced. Idle time of either a machine or an operator or both in any plant represents a loss of production which can never be regained. Through the use of the improvements of the present invention a gain in production is obtained in place of lost production incident to idle time of both operator and machine which now is accepted as a normal incident to present-day operations.

Accordingly, it is a further object of the present invention to provide an improved tote box stack construction which in use will aid in recapturing a substantial portion of the now normally accepted lost idle time of both operator and machine and convert it into increased production. The additional productivity gained per operator or machine or assembly operation thus represents a savings in cost of production.

Since the productivity of a machine is dependent upon the material handling system which takes materials to that machine and away from it, and also upon that productive portion of the operator's time which is coordinated with the ma-

3

chine or assembly operation as compared with the remaining unproductive portion of the operator's time devoted to moving a part between the machine or assembly station and the handling equipment; a material handling system which reduces idle time of both machine and operator increases the volume of material processed by the machine.

For these reasons most machines, unless fully automatic, are producing but a fraction of their possible volume; and such production machines or equipment, even though dependent upon operator coordination, are, along with their operators, capable of an increased production volume if idle machine or unproductive operator time is reduced.

Accordingly, it is a further object of the present invention to provide an improved tote box stack construction which will increase the production obtained from a machine through making material available in a continuing flow and at a convenient position.

The foregoing and other objects are attained by the tote box stack construction, tote box units, parts, combinations, and sub-combinations, which comprise the present invention or discovery, and the nature of which is set forth in the following general statement, and preferred embodiments of which are set forth in the following description, and which are particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The nature of the improved tote box stack construction and component tote box units of the present invention or discovery may be stated in general terms as including a lower hopper box unit having an opening directed upwardly and to one side, a first bottom dump box unit supported on the upper end of the hopper box unit, and one or more similar dump box units stacked on the first dump box unit and on each other.

Each of the dump box units includes upright side and end box walls surrounding a lower opening, and preferably a pair of half bottom box walls having hinged connections with opposite upright walls of the dump box unit, whereby each half bottom box wall may be swung to and from a position closing half of the box lower opening, the swinging of each half bottom box wall to the open position being effected by the force of gravity, and improved latch means adapted for releasably engaging the half bottom box walls in their positions closing the box lower opening, and the latch means having operative connections with a single operating handle.

By way of example, embodiments of the improved tote box stack construction and component tote box units of the present invention or discovery are illustrated in the accompanying drawings forming part hereof, in which:

Figure 1 is a fragmentary perspective view showing one of the improved tote box stacks including a lower hopper box unit, a first bottom dump box unit stacked on the lower hopper box unit, and a second bottom dump box unit stacked on the first bottom dump box unit, the half bottom box walls of each bottom dump box unit being shown associated with the latch means in the closed positions across the bottom opening of the unit are shown swung open;

Fig. 2 is a perspective view similar to Fig. 1 but viewed at a different angle, and in which the half bottom box walls of the first bottom dump box units are shown swung open;

Fig. 3 is an end elevational view of one of the improved bottom dump box units of the stack

4

shown in Figs. 1 and 2, the half bottom box walls and associated parts of the latch means and the operating handle being shown in their relative positions when the half bottom box walls are in their positions closing the box unit lower opening;

Fig. 4 is a side elevational view thereof;

Fig. 5 is an enlarged fragmentary sectional view thereof as on line 5-5, Fig. 3, showing details of construction of the latch means; and

Fig. 6 is a fragmentary plan view of one of the upper corners of one of the tote box stack units.

Similar numerals refer to similar parts throughout the drawings.

The tote box stack illustrated in Figs. 1 and 2 is indicated generally by 10 and includes a lower hopper box unit 11, a first bottom dump box unit 12 stacked on the lower hopper box unit 11, and a second bottom dump box unit 12 stacked on the first bottom dump box unit 12. Any desired number of bottom dump box units 12 may be stacked on each other, and any bottom dump box unit 12 may be stacked on the lower hopper box unit 11.

The lower hopper box unit 11 is preferably made of sheet metal and includes a bottom wall 13, an upright rear wall 14 opposite upright side walls 15 and 16, and a sloping front wall 17, forming a hopper receptacle.

The bottom wall 13 is rectangular as shown and has a rear border portion connected with the lower border portion of the rectangular rear wall 14. The opposite side walls 15 and 16 have rear border portions connected with the side border portions of the rear wall 14 and bottom border portions connected with side border portions of the bottom wall 13. The front border portions of the side walls 15 and 16 have similar angular formations as shown, and each includes a lower outwardly sloping border portion 18 and an upper rearwardly sloping border portion 19, joining each other at a front apex portion 20. This sloping front wall 17 has side border portions connecting with the sloping front border portions 18 of the side walls 15 and 16, and the lower border portion of the wall 17 connects with the front border portion of the bottom wall 13. The walls 14, 15, and 16 may be and are preferably corrugated as shown, the corrugations extending laterally.

In the hopper box unit 11, as shown, the bottom wall 13 is included in a skid unit including laterally spaced skid runners 26 which space the bottom wall 13 above the floor upon which the hopper box unit 11 is seated a distance such as to permit the insertion of the forks of the power fork lift truck below the bottom wall 13 and above the floor.

The hopper box unit 11 furthermore includes stacking seat brackets 27 on the upper border portions 23 and 24. As best shown in Fig. 6, each stacking seat bracket 27 is formed from a length of angle bar having a mitered bottom leg wall 28 and an upright leg wall 29 which is bent at right angles at the upright corner 30. The bottom mitered leg wall 28 is connected on the upper faces of one of the corners of the members of the upper frame opening.

Each bottom dump box unit 12 is preferably made of sheet metal, and includes laterally spaced pairs of upright walls 31 and 32 having side border portions connected with each other at rectangular corners and forming a rectangular enclosure E having an open upper end and an open lower end. The walls 31 and 32 are pref-

erably provided with laterally extending corrugations, as shown.

As best shown in Figs. 4 and 5, each of the walls 31 and 32 is provided at its lower border portion with an intumed flange 33 which forms a tubular reinforcement with the immediately adjacent upright lower border portion of the wall 31 and with angled walls 34 and 35 of a longitudinally extending member 36 having its edges welded respectively to the walls 31 and 32. The flanges 33 frame the lower opening for the rectangular enclosure E.

At each lower corner 37 formed by the connecting walls 31 and 32, there is secured a supporting leg 38, which as shown is in the form of an upwardly opening U-member formed of sheet metal, the U-member including an outer leg wall 39, a bottom web wall 40, and an inner leg wall 41. The upper border portion of the outer leg wall 39 of each leg 38 is secured on the outer side of one of the upright box walls 31 and the upper end of the inner leg wall 41 is secured to the underside of the intumed flange 33 of the connected box wall 31.

Additional reinforcement for each leg 38 may be provided by an upright rib 42 having its inner edge secured to the outer faces of the leg wall 39 and the wall 31.

The legs 38 support the lower ends of the walls 31 and 32 a distance above the lower ends of the legs 38 and their supporting floor or seats, and this permits among other things the fork of a power fork lift truck to be inserted below the lower ends of the walls 31 and 32.

At each upper corner 43 formed by the connecting walls 31 and 32, there is secured one of the stacking seat brackets 27 in a manner similar to the securing of the seat brackets 27 on the hopper box unit 11.

The stacking seat brackets 27 on each bottom dump box unit 12 are located and arranged for seating and supporting the lower ends of the support members or legs 38 of the next upper bottom dump box unit 12 in the stack 10, and the seat brackets 27 on the hopper box unit 11 are similarly located and arranged for seating and supporting the lowermost bottom dump box unit 12 in the stack 10.

The bottom dumping box unit 12 furthermore includes a transversely L-shaped half bottom box wall 44 hinge connected with one of the upright box walls 32, and a half bottom box wall 45 hinge connected to the other upright box wall 32. The half bottom box wall 44 includes a closure wall portion 46 which in the closed position as shown in detail in Fig. 3 extends across half of the bottom opening of the enclosure E formed by the box walls 31 and 32. The closure wall portion 46 has an outer side border portion connecting at a corner 47 with an upwardly extending side portion 48 extending on the outside of the right-hand wall 32 as viewed in Fig. 3. The upper edge portion 49 of the half bottom wall portion 48 is connected by a longitudinally extending hinge 50 on the outer face of the adjacent box side wall 32.

The other half bottom box wall 45 is of similarly but oppositely arranged construction, and furthermore includes a sealing flange 51 secured on the outer face of the inner border portion of its closure portion 46 for overlapping the adjacent inner border portion of the closure portion 48 of the half bottom box wall 44.

The closure portion 46 of each half bottom box wall 44 and 45 extends across and closes

half of the bottom opening of the enclosure E formed by the walls 31 and 32 when in the closed positions shown in Figs. 3 to 6, inclusive, and in certain of the units shown in Figs. 1 and 2. Since each half bottom box wall portion 46 is at a right angle to its side portion 48, the centers of gravity of the half bottom box walls 44 and 45 are offset in the direction of the interior of the enclosure E formed by the walls 31 and 32 from the horizontal axis of the hinges 50, so that unless otherwise restrained the half bottom box walls 44 and 45 will swing laterally under the action of the force of gravity to the open positions shown in the lower dump bottom box unit 12 in Fig. 2. The closure portion 46 of each half bottom box wall also swings downwardly into the space below the enclosure walls provided by the legs 33.

Each bottom dump box unit 12 furthermore includes improved latch means indicated generally by 52 on each upright wall 31 adapted for releasably engaging the half bottom box walls in their positions closing the box lower opening. The latch means 52 have operative connections with a single operating handle 53 as set forth hereinafter in detail. Each latch means 52 includes a gravity opening catch 54 including an angle member 55 having one leg 56 and another leg 57, the leg 56 extending generally beneath the wall 31, and the leg 57 extending at right angles to the leg 56 on the outside of the wall 31 and having an upper hinge connection 58 with the wall 31. On the underside of the leg 56 there is preferably provided a rib 59.

Each latch means 52 furthermore includes an upright guide member 60 mounted as by bolts 61 on the upright side wall 31 on which the particular latch means 52 is mounted. The guide member 60 has formed therein a rectangular guideway 62 in which is slidably fitted a rectangular latch bar 63 having a lower end 64 and an upper end 65. The lower end 64 of the latch bar 63 is located below the guide member 60. The upper end of the latch bar 63 is located a substantial distance above the upper end of the guide member 60. Preferably as shown, an outwardly protruding stop piece 66 extends outwardly from the outer face of the latch bar 63 and limits the downward movement of the latch bar 63 by abutment against the top end of the guide member 60 as best shown in Figs. 3, 4, and 5.

On each upright wall 31 at one side of and above the upper end 65 of the latch bar 63, there is secured an outwardly extending pivot bolt 67 on which is pivotally mounted an operating lever 68 having one lever arm 69 extending from the pivot bolt 67 on the inside of the upper end 65 of the latch bar 63, and a pin and slot connection 70 is provided between the outer end of the lever arm 69 and the upper end 65 of the latch bar 63. The lever 68 includes on the other side of the pivot bolt 67 a longer lever arm 71 extending beyond one of the upright box walls 32. The operating handle bar 53 extends between and has its ends connected with the outer ends of the lever arms 71.

In each bottom dump box unit 12, when the half bottom box walls 44 and 45 are in their closed positions as shown in Fig. 1, the upper box unit 12 in Fig. 2, and in Figs. 3, 4, and 5, the sealing flange 51 on the wall 45 overlaps the adjacent side closure portion 48 of the wall 44. As shown in Fig. 5 the sealing flange 51 terminates short of the ends of the closure portion 46, and the leg 56 of each catch 54 extends under adjacent

corner portions of the closure portions 46 of the closed walls 44 and 45, clamping the end border portions of the closure portions 46 against the flange 33. The latch bar 63 is extended to its lowermost position in which its lower end 64 is in latching abutment with the leg 57 of the catch 54.

Referring to Fig. 2, the latch operating handle bar 53 in the upper bottom dump box unit 12 is shown in its raised position, and the other latch parts being in their latching or locking positions maintaining the half bottom box walls 44 and 45 in their closed positions. When an operator pulls the handle bar 53 downward to the position shown in the lower bottom dump box unit 12 in Fig. 2, the latch bar 63 is lifted to the position shown in which the angle leg 57 of the catch 54 is cleared by the lower end 64 of the latch bar 63, whereby the catch 54 drops downwardly as shown under the force of gravity to a position clearing the previously engaged corner portions of the closure portion 46 of the half bottom box walls 44 and 45, whereby the force of gravity serves to swing the walls 44 and 45 outwardly and downwardly clearing a substantial portion of the bottom opening of the enclosure E formed by the upright walls 31 and 32 of the bottom dump box unit 12.

It is to be noted that the gravity opening catches 54 and the gravity opening walls or doors 44 and 45 are operative regardless of whether or not there is any material or parts within the box 12, and independently of the weight of any material or parts which may be carried therein when the walls 44 and 45 are in their closed positions and latched.

In use, one of the improved tote box stacks 10 has its hopper box unit 11, and each of its bottom dump box units 12 filled with a number of parts, either for further machining or other manufacturing operations, or for assembly. The floor space required for the stack 10 is, however, only the floor space required for the lower hopper box unit 11.

In a preferred use of the improved tote box stack 10, the machine tool operator or the assembler pulls down the handle bar 53 of each of the upper stacked bottom dump box units 12, with the result that in each dump box unit 12 the walls 44 and 45 swing open, and the contents of each dump box unit 12 fall on top of the parts below. There is thus formed a vertical reservoir of parts in each tote box stack 10.

In one of the improved tote box stacks 10, when all of the upper bottom dump box units 12 are emptied, they are removed and replaced by a stack of dump box units 12 filled with the required parts.

In the case of machine tool operation by the use of the tote box stacks 10 in a manufacturing plant department including a number of different machine tools operating on different size blank parts, the aggregate production in a particular period of all of these various parts being necessary for the final assembly of a finished product or sub-assembly thereof, the overall production of the particular department is controlled so that there is never an over-production of one part and an under-production of another part in a particular production period. In an analogous manner, at any particular assembly line station, where a number of different size parts are utilized in the assembly of a product, by the use of a number of the tote box stacks 10 each made up of a suitable number of units 11 and 12, con-

tinuous and uninterrupted assembly operations may be conducted at the particular assembly line station without running out of any particular part during any particular production period.

In certain manufacturing operations the assembly of parts may be done at a bench station instead of at an assembly line station, and from a broad standpoint the use of the improved tote box stacks 10 at an assembly line station, at an assembly bench station, or at a machine for providing the necessary parts during any particular production period serves to reduce the idle time of the operator at the assembly line station or at the assembly bench station, and serves to reduce the idle time of the operator and the machine where the tote box stacks 10 are used. Thus, the primary objective of the present invention of providing production handling equipment for reducing the idle time of man and machine is obtained.

Although the hopper box unit 11 is shown as mounted on a usual skid unit providing the bottom wall 13 for the hopper unit; it is to be understood that the runners of the skid unit may be lower or higher for locating the hopper box at any desired height. Alternatively, the skid runners may be replaced by legs to locate the hopper box at the approximate level of a work bench so as to eliminate stooping or bending by a workman in removing parts from the hopper box. Similarly, the hopper box bottom wall may be angled, rather than horizontal, as shown, if desired.

Each skid unit runner 26 has preferably formed therein a pair of spaced openings 72 each having an upper edge 72—1 aligned with the bottom wall 13 for enabling the fork of the power fork lift truck to be inserted through the openings 72, as well as beneath the bottom wall 13 between the skid runners 25, whereby each tote box stack 10 may be handled by a power fork lift truck from any side.

The half bottom box walls 44 and 45 are generally L-shaped as shown, and each is provided with a counterweight bar 73 on the inner face of the side portion 43 at the corner 47. By this construction the half bottom walls 44 and 45 in each bottom dump box unit 12 swing partially inwardly after the box is emptied so as to provide space below the closure wall portions 46 permitting entry of the fork of a fork lift truck from any side to close the bottom walls and enable the latch means 52 to latch the half bottom box walls 44 and 45 in the closed position.

Moreover, the location of the pivot for the bottom box walls 44 and 45 considerably above the bottom corners of the side walls of the bottom dump box units 12 permits the members 44 and 45 to swing to positions providing a wide bottom opening, within the confines of the relatively narrow fork entry space between two adjacent stacked bottom box or dump box units.

Finally, the improved tote box stacks 10 may be used in aisles between assembly line stations, assembly bench stations, or machines which have a minimum width; and the stacks and component units may be handled and positioned by cranes instead of by fork lift trucks which could not enter such minimum width aisles.

In the drawings and the descriptive specification where the specific means of connection between parts is not shown or described in detail, it is to be understood that the connections of the sheet metal and metal bar stock parts are

effected by any desired means which is preferably by the use of arc welding or resistance welding.

In the foregoing description, certain terms have been used for brevity, clearness and understanding, but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such words are used for descriptive purposes herein and are intended to be broadly construed.

Moreover, the embodiment of the improved construction illustrated and described herein is by way of example, and the scope of the present invention is not limited to the exact details of construction.

Having now described the invention, the construction, the operation and use of a preferred embodiment thereof, and the advantageous new and useful results obtained thereby; the new and useful constructions, and reasonable mechanical equivalents thereof obvious to those skilled in the art, are set forth in the appended claims.

We claim:

1. In tote box stack construction, a stack of tote box units including a lower hopper box unit, and a plurality of bottom dump box units stacked on each other and the lowest bottom dump box unit being stacked on the hopper box unit, the hopper box unit including walls forming a hopper receptacle having an opening directed upwardly and to the side, and each bottom dump box unit including walls forming an enclosure having an upper opening and a lower opening, the opening of the hopper box unit and the openings of the dump box units being aligned with each other, and each dump box unit including gravity actuated bottom closure means operatively mounted thereon for inward and outward and up and down movement to and from closure position across the lower opening of the dump box unit, and releasable latch means operatively mounted on one of the walls of each dump box unit for selectively engaging the closure means in closure position and releasing the closure means to permit opening thereof.

2. In tote box stack construction as set forth in claim 1, and in which the walls of each box unit include upright walls having upper and lower ends and support members extending below the lower ends of the upright walls and terminating in lower ends spaced below the lower ends of the upright walls.

3. In tote box stack construction as set forth in claim 2, and in which stacking seat members adapted for seating and supporting the lower ends of the support members of the next upper box unit are mounted on the upper ends of the upright walls of each box unit.

4. In tote box stack construction as set forth in claim 1, and in which the enclosure forming walls include a pair of opposite upright walls and the bottom closure means includes a first bottom wall and a hinge connection between the first bottom wall and one of the opposite enclosure walls and a second bottom wall and a hinge connection between the second bottom wall and the other opposite enclosure wall, the first and second bottom walls each including a closure portion extending across and closing part of the lower opening of the dump box unit when in the closed position, the two closure portions closing the entire lower opening when in the closed position.

5. In tote box stack construction as set forth in claim 4, and in which each bottom wall includes a side portion extending on the outside

of one of the opposite enclosure walls, and the hinge connection being between the bottom wall side portion and the adjacent enclosure wall.

6. In tote box construction, a bottom dump box unit including walls forming an enclosure having an upper opening and a lower opening, the enclosure forming walls including opposite pairs of laterally spaced rectangular upright walls, each wall of each pair having opposite upright side border portions, and each side border portion of each upright wall being connected with the adjacent side border portion of one of the upright walls of the other pair at a corner, and the dump box unit including bottom closure means operatively mounted thereon for inward and outward and up and down movement to and from closure position across the lower opening of the dump box unit, and releasable latch means operatively mounted on each wall of one of the opposite pairs of laterally spaced rectangular upright walls including a gravity opening catch and a latch bar mounted for movement to and from engaging position with the gravity opening catch, and the catch being in supporting position beneath the bottom closure when the latch bar is in engaging position with the gravity opening catch, and the bottom closure means being arranged for moving from the closure position under the action of the force of gravity when the catch is disengaged by the latch bar.

7. In tote box stack construction as set forth in claim 6, and in which are included actuating means for each latch bar, and a single operating handle connected with each actuating means.

8. In tote box stack construction as set forth in claim 7, and in which the actuating means includes pivot means on each latch means mounting wall, a lever pivoted on the pivot means, the lever having a first arm extending from the pivot means towards the latch bar, and a slot and pin connection between the first lever arm and the latch bar, and the lever including a second arm extending from the pivot means beyond the side border of the latch means mounting wall, and the single operating handle including a bar extending between and having end connections with the second lever arms.

9. In tote box construction, a bottom dump box unit including walls forming an enclosure having an upper opening and a lower opening, bottom closure means operatively mounted on one of the enclosure walls for outward and downward movement to and from closure position across the lower opening, and releasable latch means operatively mounted on one of the enclosure walls for selectively engaging the closure means in closure position and releasing the closure means to permit opening thereof, the releasable latch means including a gravity opening catch and a latch bar mounted for movement to and from engaging position with the gravity opening catch, and the catch being in supporting position beneath the bottom closure means when the latch bar is in engaging position with the gravity opening catch, and the bottom closure means being arranged for moving from the closure position under the action of the force of gravity when the catch is disengaged by the latch bar.

10. A bottom dump box unit for tote box stack construction, the bottom dump box unit including walls forming an enclosure having an upper opening and a lower opening, and bottom closure means, and means on the dump box unit operatively mounting the closure means for inward

11

and outward and up and down movement to and from closure position across the lower opening, and releasable latch means operatively mounted on one of the dump box unit walls including a gravity opening catch and a latch bar mounted for movement to and from engaging position with the gravity opening catch, and the catch being in supporting position beneath the bottom closure means when the latch bar is in engaging position with the gravity opening catch, and the bottom closure means being arranged for moving from the closure position under the action of the force of gravity when the catch is disengaged by the latch bar.

11. In tote box stack construction, a stack of 15 tote box units including a lower hopper box unit and a bottom dump box unit stacked on each other, the hopper box unit including walls forming a hopper receptacle having an opening directed upwardly and to the side, and the bottom dump box unit including walls forming an enclosure having an upper opening and a lower opening, the opening of the hopper box unit and the openings of the dump box unit being aligned with each other, and the dump box unit including bottom closure means operatively mounted thereon for inward and outward and up and down movement to and from closure position across the lower opening of the dump box unit, and releasable latch means operatively mounted on one of the walls of the dump box unit for engaging the closure means in closure position.

12. In tote box stack construction as set forth in claim 11, and in which the walls of each box unit include upright walls having upper and

12

lower ends and support members extending below the lower ends of the upright walls and terminating in lower ends spaced below the lower ends of the upright walls.

13. In tote box stack construction as set forth in claim 12, and in which stacking seat members adapted for seating and supporting the lower ends of the support members of a next upper box unit are mounted on the upper ends of the upright walls of each box unit.

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