Feb. 9, 1960

J. G. KAY ET AL

2,924,325

ELEVATORS FOR LIFTING ARTICLES OR WORKPIECES

Filed Feb. 24, 1958

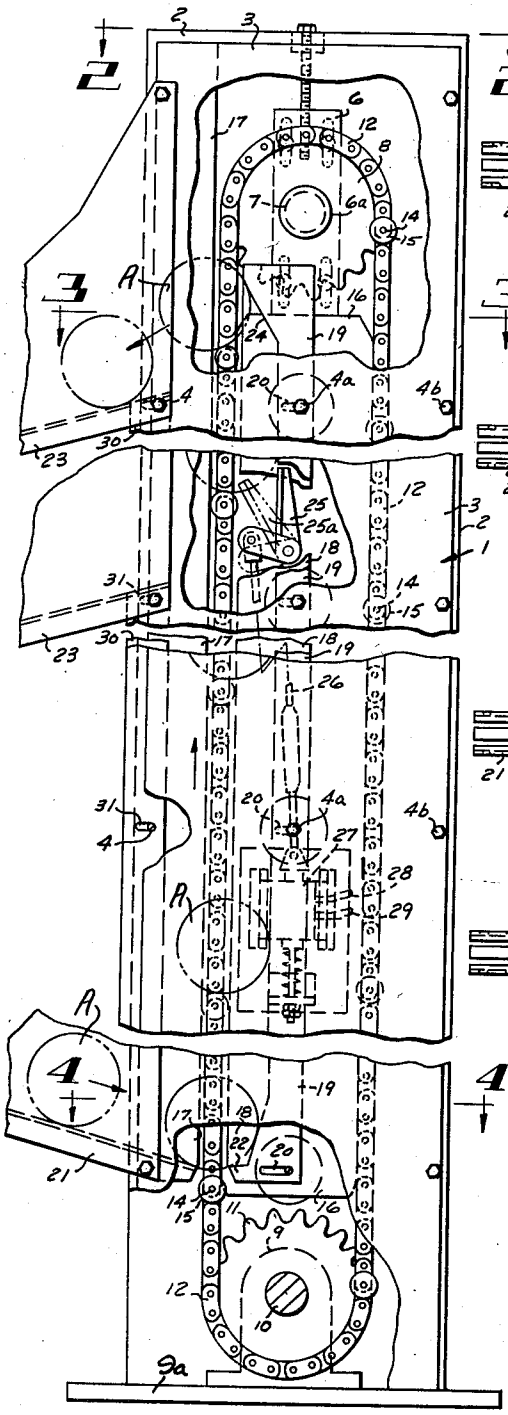


Fig. 1

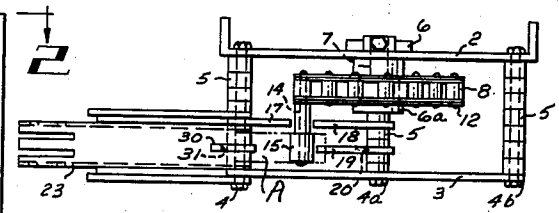


Fig. 2

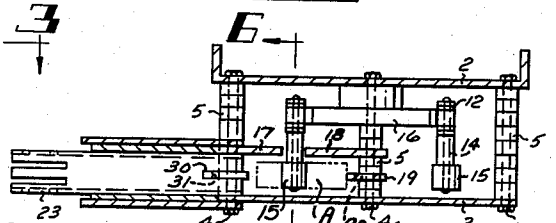


Fig. 3

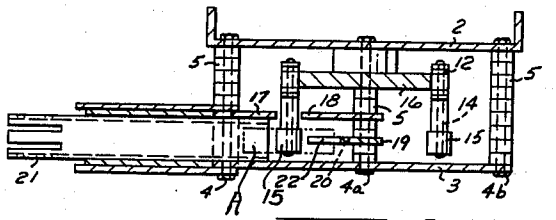


Fig. 4

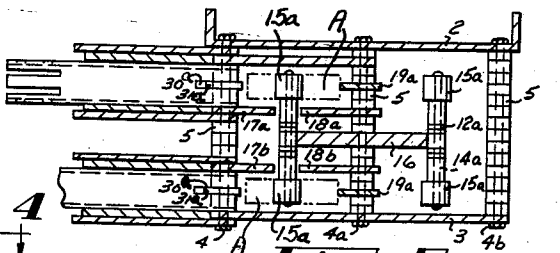


Fig. 5

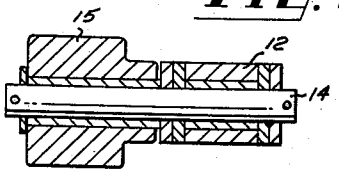


Fig. 6

INVENTOR.
John G. Kay
John K. Rye

BY

Grover L. Baldwin
Attorney

United States Patent Office 2,924,325
Patented Feb. 9, 1960

2,924,325

ELEVATORS FOR LIFTING ARTICLES OR WORKPIECES

John G. Kay, Detroit, and John K. Rye, Southfield Township, Oakland County, Mich., assignors to F. Jos. Lamb Company, Detroit, Mich., a corporation of Michigan

Application February 24, 1958, Serial No. 717,198

7 Claims. (Cl. 198—168)

This invention relates to improvements in elevators for lifting articles or workpieces which are substantially circular in cross section, from one level to another; and refers more particularly to elevators for handling workpieces in process of mass production during their transfer from one machine to another by which consecutive operations are performed upon them.

So long as the dimensions of the workpieces remain the same they may, of course, be satisfactorily lifted from one elevation to another by any one of a wide range of elevators, but when a model of which the workpieces form a part, is changed it frequently happens that either the width or the diameter, or both, of the workpieces is altered so that they can no longer be satisfactorily handled by the elevator.

It is, therefore, an object of the invention to provide an elevator having means therein for adjusting the horizontal width or depth, or both, of the clearance in the elevator shaft so that workpieces delivered thereinto may be supported in such position as to insure their ready discharge irrespective of their exact dimensions.

Another object of the invention is to provide such an elevator wherein such adjustments may be quickly and easily made without in any way affecting the operativeness of the means whereby the workpieces are loaded or unloaded.

Yet another object of the invention is to provide such an elevator in one modification of which parallel vertical shafts may be arranged to permit adjustability of the width or the depth, or both, of the shafts to suit different sized workpieces so that the capacity of the elevator may be at least doubled, and the necessary adjustments quickly and easily made.

Having thus briefly and broadly stated some of the objects and advantages of the invention we will now describe it in detail with the aid of the accompanying drawing, in which:

Figure 1 is a side elevation of the invention.

Figure 2 is a plan view taken on the line 2—2 of Figure 1.

Figures 3 and 4 are sections on the lines 3—3 and 4—4 respectively of Figure 1.

Figure 5 is a cross sectional view showing a slightly modified form of construction wherein parallel elevator shafts are provided upwardly in each of which one extremity of a pin extending from a double pin chain travels.

Figure 6 is an enlarged detail showing a cross section of the single pin chain shown clearly in Figures 2 to 4, inclusive.

Referring to the drawing, 1 designates an elevator including opposed parallel side walls 2 and 3 held in spaced relation by vertical rows of bolts 4, 4*a* and 4*b*, each having a plurality of spacers 5 removably mounted thereon. Supported for vertical adjustment on the wall 2 adjacent its upper extremity is a plate 6 having a horizontal bearing 6*a* mounted thereon the axis of which extends at right angles to and between the walls 2 and 3. Rotatably supported in the bearing 6*a* is a stub shaft 7 on

which a sprocket 8 is secured. The wall 2 is also secured as by welding upon a base 9*a* having a horizontal bearing 9 mounted thereon the axis of which is parallel with that of the shaft 7. Mounted in the bearing 9 is a shaft 10 which is rotated by any suitable means not shown, and has a sprocket 11 secured thereon. Extending around the sprockets 8 and 11, thus positioned adjacent the upper and lower extremities of the walls 2 and 3 respectively, is an endless chain 12 which in Figures 2, 3, 4 and 6 is shown as a single pin chain, the pins being indicated at 14. In Figure 5 a double pin chain 12*a* is employed having pins 14*a* projecting laterally from opposite sides thereof. Mounted for rotation on each pin 14, or 14*a*, is a roller 15, or 15*a*, to support a workpiece A thereon. Held in position by the central row of bolts 4*a* and extending between the opposed inner faces of the chain 12, or 12*a*, throughout the major portion of its length, is a spacer plate 16 for retaining the opposite sides of the chain substantially in straight lines intermediately of their length and thus preventing the chain from buckling.

Mounted on the vertical rows of bolts 4 and 4*a* are aligned guide plates 17 and 18 respectively, the adjacent vertical margins of which are sufficiently spaced to permit free passage of the pins 14 between them. The guide plates 17 and 18 limit axial movement in one direction of the workpieces as they are being lifted by the rollers, and their axial movement in the other direction is limited by the wall 3. It will be noted that the distance between the plates 17 and 18 and the wall 3 is controlled by the number and thickness of the spacers 5 on the bolts 4 and 4*a* so that by removing some spacers and substituting others of a different thickness the distance between the said plates and the wall may be adjusted to accommodate workpieces of a different length.

Also supported by the central vertical row of bolts 4*a* substantially midway between the guide plate 18 and the adjacent side wall 3 is a bearing strip 19 against one vertical edge face of which the workpieces A are adapted to bear when resting upon the rollers 15 and being lifted by the chain. In order that the horizontal spacing between the strip 19 and the axes of the rollers 15 may be adjusted to suit workpieces of different diameters horizontal slots 20 are formed through the said strip for the passage of the bolts 4*a*; for in order to properly cradle the workpieces between the rollers and the adjacent vertical edge face of the strip the distance between the axes of the said rollers and the said vertical edge must be somewhat greater than the radius of the workpieces to be lifted. Consequently by loosening the bolts 4*a* the strip 19 may be horizontally adjusted towards or from the rollers 15 to satisfactorily support the workpieces. Again by utilizing rollers of relatively large diameter the exact spacing between their axes and the adjacent vertical edge face of the strip 19 is not so critical and therefore relatively large rollers are preferable for this purpose.

Extending at a downward inclination into one side of the elevator adjacent the bottom of the latter is a feed chute 21 which terminates opposite and in proximity to a forwardly projecting step 22 formed on the lower extremity of the bearing strip 19. Workpieces to be elevated roll down the chute 21 to the step 22 and are then positioned to be picked up by one of the rollers 15 on the chain. Secured to the elevator and projecting outwardly therefrom at a downward inclination are vertically spaced discharge chutes 23, and suitably mounted on the elevator somewhat above each discharge chute is any preferred means for plowing workpieces from the rollers 15 onto the adjacent chute. For instance, somewhat above the top discharge chute 23 an outwardly and upwardly projecting plow 24 may be formed on the upper

extremity of the bearing strip **19** by which workpieces are pushed forward as they travel upward until they roll off their supporting rollers and drop onto the top chute **23**. Somewhat above each intermediate discharge chute **23** a plow **25** may be suitably pivoted on the elevator so that when it is turned to its position **25***a* workpieces riding upward on the rollers are plowed off thereby and drop onto the discharge chute immediately beneath. Any preferred means may be employed for turning the plows to or from their operative positions **25***a*, in the instance shown a plow **25** is connected by a rod **26** to a solenoid **27** which is suitably mounted on the elevator, and extending from the solenoid are leads **28** and **29** forming part of a circuit (not shown) so that when the circuit is closed the plow is turned to its position **25***a*.

Extending vertically from somewhat above each chute **21** or **23** to just beneath the chute **23** immediately above it is a retainer strip **30**. These strips are in vertical alignment with one another and in horizontal alignment with the bearing strip **19**. Formed through each retainer strip **30** are a plurality of horizontal slots **31** through which some of the bolts **4** extend. These strips **30** are to prevent possible forward movement of workpieces as they are being elevated upon the rollers **15** betwen the chutes. It will also be noted that due to the provision of the slots **31** the strips may be adjusted to rest slightly in front of the workpieces and prevent any material rolling movement of the latter irrespective of their diameter. Thus it will be clearly seen that by the number and thickness of the spacers **5** and by the spacing between the adjacent edge faces of the bearing strip **19** and the retainer strip **30** which is readily adjustable the elevator may be quickly adjusted to handle workpieces of different thicknesses and different diameters. In the present instance opposite sides of the chutes **21** and **23** at their extremities adjacent the elevator have openings formed therethrough through which the bolts **4** extend so that the longitudinal center lines of the chutes extend midway between the walls **3** and the aligned guide plates **17** and **18** to which the sides of the chutes are further secured in any preferred manner.

In the modification shown in Figure 5 the arrangement is the same as that already described except that a double pin chain **12***a* is employed; a roller **15***a* is mounted on each extremity of each pin **14***a* on the chain; longitudinally spaced guide plates **17***a* and **18***a* and **17***b* and **18***b* extend adjacent opposite sides of the chain; and a bearing strip **19***a* and retainer strips **30***a* having horizontal slots **31***a* therethrough are mounted on the bolts **4***a* and **4** respectively opposite each roller **15***a* centrally of its width. In this manner two parallel elevator shafts are provided thereby doubling the capacity of the device while still affording the same ready means of adjustment so that workpieces of different lengths or diameters, or both, may be satisfactorily handled.

While in the foregoing the preferred embodiments of the invention have been described and shown it is understood that further alterations and modifications may be made thereto provided they fall within the scope of the appended claims.

What we claim is:

1. An elevator including two walls opposite one another, means for holding the walls in parallel spaced relation, horizontal shafts mounted for rotation at right angles to and between the walls, a sprocket on each shaft, said shafts being vertically spaced from one another, an endless chain extending around the sprockets having pins projecting laterally therefrom, said pins having a roller mounted for rotation to support a cylindrical workpiece thereon, a bearing strip vertically supported between the walls opposite the path of movement of the upwardly moving pins whereby workpieces are adapted to be supported for lifting by and between said pins and the opposite face of the bearing strip so that the center of gravity of said workpiece lies between the axis of said pins and the forward edge of said bearing strip, and means for adjusting the horizontal spacing between the bearing strip and said upwardly moving pins to afford effective support for workpieces of different diameters.

2. The combination in claim 1, wherein the means for holding the walls in parallel spaced relation include bolts extending through said walls, and the means for adjusting the spacing between the bearing strip and the pins consisting of horizontal slots formed through said strip through which some of the bolts extend, and removable spacers on said bolts which project through said slots.

3. An elevator including two walls opposite one another, means for holding the walls in parallel spaced relation, horizontal shafts mounted for rotation at right angles to and between the walls, a sprocket on each shaft, said shafts being vertically spaced from one another, an endless chain extending around the sprockets having pins projecting laterally therefrom, guide means mounted between and parallel with said walls, said guide means and the adjacent wall defining opposite extremities of an elevator shaft, means for adjusting the spacing between the guide means and said adjacent wall to suit the length of workpieces to be lifted in said elevator shaft, a vertical bearing strip mounted between said walls opposite the upwardly moving pins to support the workpieces for lifting by and between the pins and said bearing strip, and means for adjusting spacing between the bearing strip and the path of upward movement of the pins whereby said strips may be spaced from said pins to effectively support workpieces of different diameters.

4. An elevator including two walls opposite to one another, bolts extending through both walls holding them in parallel spaced relation, removable spacers on the bolts, horizontal shafts mounted for rotation at right angles to and between the walls, a sprocket on each shaft, said shafts being vertically spaced from one another, an endless chain extending around the sprockets having pins projecting laterally therefrom, aligned guide plates mounted between and parallel with the walls, said plates extending outwardly from opposite sides of the upwardly travelling pins adjacent their inner extremities, said guide plates and the wall adjacent thereto defining opposite ends of an elevator shaft, and said guide plates being supported by some of the bolts whereby the lateral width of the elevator shaft intermediate the spacers may be changed by adjustment of said spacers.

5. An elevator including spaced parallel walls opposite one another, horizontal shafts mounted for rotation at right angles to and between the walls, said shafts being vertically spaced from one another, a sprocket on each shaft, an endless chain extending around the sprockets, pins projecting laterally outward from the chain, a vertical bearing strip supported by the walls and spaced between the upward and downward paths of movement of the pins, a step on the lower extremity of the bearing strip opposite the upward path of movement of the pins, a conveying means terminating at its discharge extremity between the walls for delivering workpieces across the upward path of movement of the pins and upon the step whereby each workpiece is adapted to be lifted by one of the pins with one extremity thereof against the opposite vertical face of the bearing strip, other conveying means supported by and extending outwardly from between the walls each at a different elevation and above the first named conveying means, a plurality of vertically spaced pivotally operated plows supported by the walls each adapted to discharge workpieces off the pins onto one of said other conveying means, means for operating said pivotally operated plows and vertically spaced retainer strips mounted between the walls each extending downwardly from beneath one of said other conveying means and having its lower extremity spaced above the conveying means next beneath, said retainer strips and the bearing strip being in transverse alignment and the upward path of movement of the pins passing directly between them, said retainer strips

being horizontally adjustable toward and from the path of movement of the pins.

6. An elevator including two walls opposite to one another, bolts extending through the walls for holding them in parallel spaced relation, removable spacers on the bolts to permit adjustment of the distance between the walls, horizontal shafts mounted for rotation at right angles to and between the walls, said shafts being substantially vertically spaced from one another, sprockets fixed on the shafts, an endless chain extending around the sprockets and having a set of spaced pins projecting laterally from each side thereof, means for supporting the upwardly travelling side of the chain whereby intermediately of its length it moves in a substantially straight line, said supporting means being mounted on some of the bolts, aligned guide plates extending parallel with said walls from opposite sides of the path of movement of each set of pins adjacent their inner extremities whereby an elevator shaft is defined between each aligned pair of guide plates and the wall adjacent thereto, said guide plates being mounted on bolts fastened to said walls, said bolts having removable spacers thereon to permit adjustment of the distance between said guide plates and the wall adjacent thereto, a bearing strip mounted on some of the

bolts in each elevator shaft parallel and opposite the path of movement of the pins adapted to travel upwardly therein, and vertically spaced retainer strips supported by some of the bolts opposite and uniformly spaced from each bearing strip, said bearing strips and said retainer strips being adjustable towards and from the path of movement of the pins adapted to travel between them.

7. An elevator as in claim 6 in which there is a plurality of aligned pairs of guide plates defining an elevator shaft between each adjacent pair of guide plates and between the outside guide plates and the walls adjacent thereto.

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