Feb. 13, 1951 E. CROOKS 2,541,574

APPARATUS FOR HANDLING GLASSWARE

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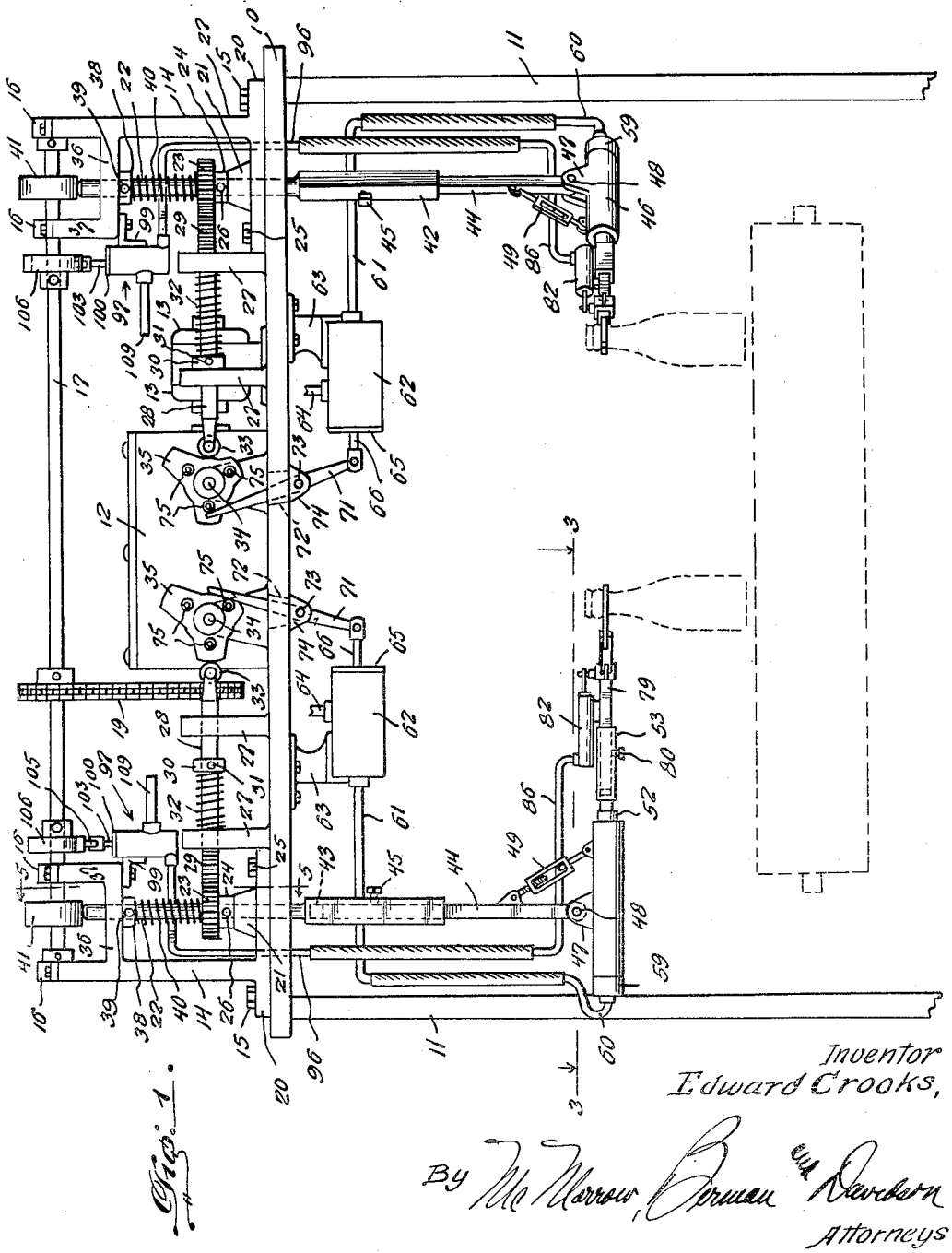


Fig. 1.

Inventor
Edward Crooks,

By McMorrow, Berman & Davidson
Attorneys

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Fig. 6.

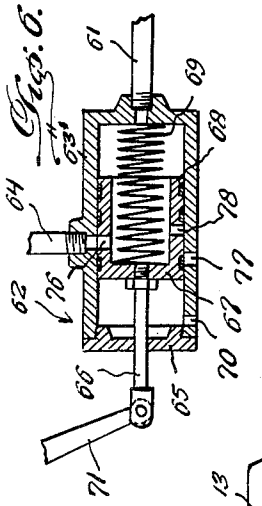


Fig. 7.

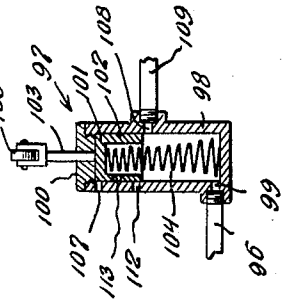


Fig. 2.

Inventor
Edward Crooks,

By McMorrow, Berman & Davidson
Attorneys

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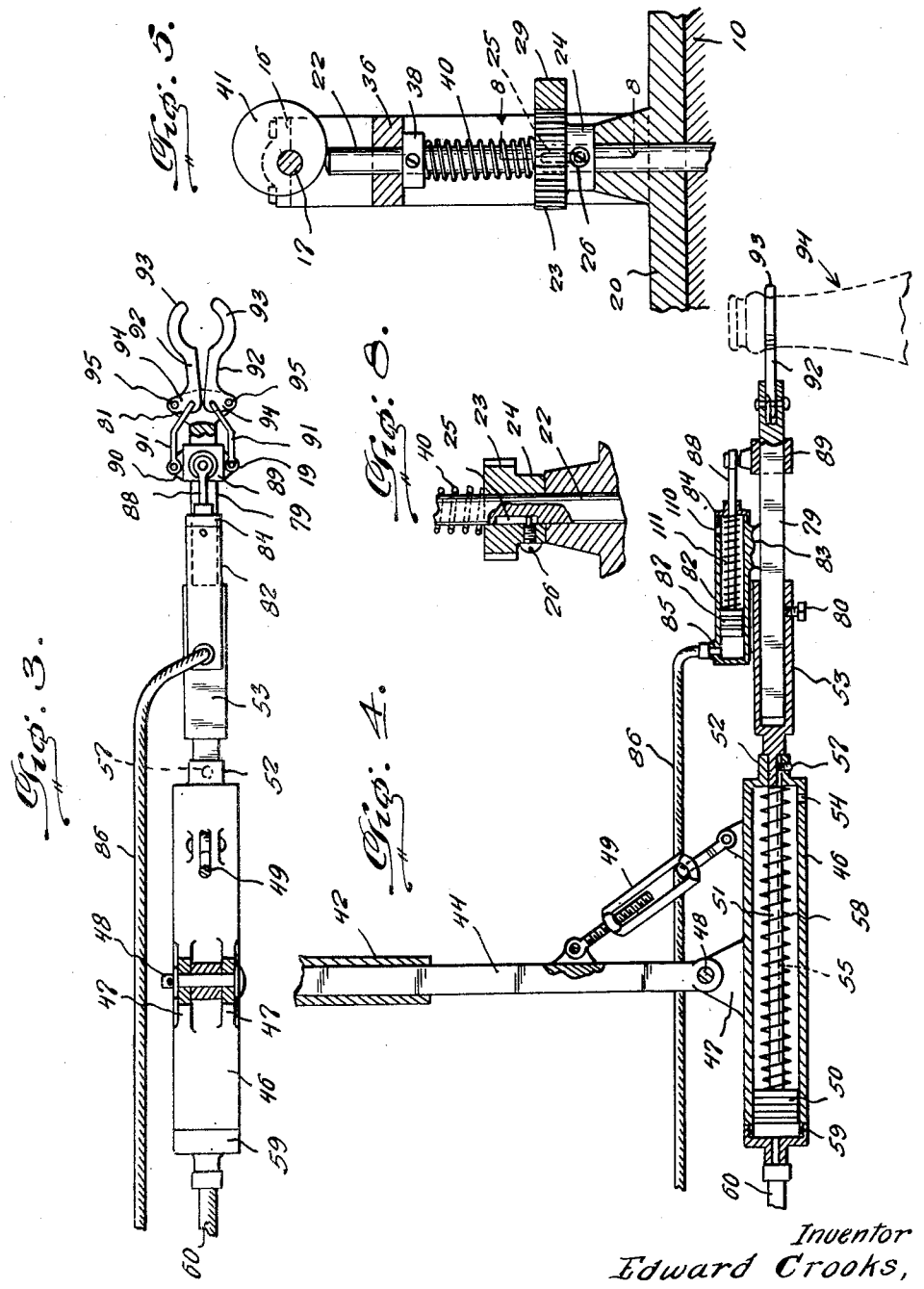


Fig. 3.

Fig. 5.

Fig. 8.

Fig. 4.

Inventor
Edward Crooks,
By McMorrow, Berman and Davidson
Attorneys

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UNITED STATES PATENT OFFICE

2,541,574

APPARATUS FOR HANDLING GLASSWARE

Edward Crooks, Glenshaw, Pa.

Application February 15, 1946, Serial No. 647,849

5 Claims. (Cl. 214—1)

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My invention relates to apparatus for handling glassware and more particularly to devices commonly called stackers, for receiving and picking up glassware, such as bottles, from one conveyor and depositing them on a lehr conveyor or the like in predetermined positions in relation to each other.

One object of my invention is to provide a stacker for glassware adapted to deposit the bottles or the like picked up from a conveyor, buck or the like in a predetermined number of rows on a lehr conveyor or the like.

Another object of the invention is to provide a stacker for glassware having one or two oscillating arms for handling the glassware, the angle of oscillation whereof is variable.

A further object of the invention is to provide a stacker for glassware having one or two oscillating arms for handling the glassware of variable oscillating capacity, the degree of variation in the oscillating movement being predetermined.

Other objects of my invention may appear in the following specification describing my invention with reference to the drawings illustrating a preferred embodiment of my invention. It is however to be understood that my invention is not to be limited or restricted to the exact construction or combination of parts described in the specification and shown in the drawings, but that such changes and modifications can be made which fall within the scope of the claims appended hereto.

In the drawings:

Figure 1 is an elevational view of a stacker for glassware according to my invention.

Figure 2 is a top plan view of the stacker shown in Figure 1.

Figure 3 is a sectional view taken on line 3—3 in Figure 1 shown in a larger scale and illustrating a stacker arm used in the stacker according to my invention.

Figure 4 is a sectional view of the stacker arm shown in Figure 3 and the support thereof partly shown in elevation.

Figure 5 is a sectional view taken on line 5—5 in Figure 1 shown in a larger scale.

Figure 6 is a longitudinal sectional view of the air valve regulating the operation of the stacker arm in longitudinal direction.

Figure 7 is a longitudinal sectional view of the air valve regulating the operation of the bottle clamps on the stacker arm, and

Figure 8 is a sectional view taken on line 8—8 in Figure 5.

Referring now to the drawings in detail, the stacker for glassware according to my invention has a platform 10 resting on uprights 11. On the center portion of the platform a transmission housing 12 is fastened containing transmission gears (not shown). A motor 13 on the platform

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10 acts as driving medium for the transmission.

Adjacent each end of the platform 10 a bearing frame 14 is fastened onto said platform by means of bolts 15. Each bearing frame 14 has on its upper portion two bearings 16. A main shaft 17 is rotatably supported in said bearings. A shaft 18 forming a part of the transmission extends outside of the housing 12. A sprocket drive 19 connects the shafts 17 and 18, so that the main shaft 17 is driven at a predetermined speed by the motor 13.

Each bearing frame 14 has a base 20 and a vertically extending bearing 21 is formed on each base. A vertically arranged support shaft 22 is rotatably located in each bearing 21 and a pinion 23 is slidably mounted on each shaft 22. Each pinion 23 has a hub 24 extending downwardly and resting on the top surface of the bearing 21. In each shaft 22 a keyway 25 is provided and a screw 26 in each hub 24 extends into the corresponding keyway 25 so that each shaft 22 can be moved axially independently of the pinion 23 thereon but that the rotary movement of said pinion is imparted to the shaft.

Adjacent each bearing frame base 20 and somewhat rearward thereof a pair of guide posts 27 extends upwardly from the platform 10 with which these posts may be formed integrally or to which they are securely fastened. The posts of each pair are spaced from each other and in their upper ends are coaxial holes provided to guide a bar 28 slidably arranged therein. On the outer end of each bar 28 a rack 29 is formed integrally therewith and the bars 28 are so arranged that each rack meshes with the adjacent pinion 23. Between each pair of guide posts 27 a stop collar 30 is mounted on each bar 28 and secured in position by means of a set screw 31. A spiral spring 32 surrounds each bar between the outer guide post 27 and the stop collar 30 and urges the bar inwardly. On the inner end of each bar 28, which extends beyond the inner guide post 27, a roller 33 is rotatably mounted. On each of two horizontal shafts 34 extending through the front wall of the transmission housing 12 adjacent the end walls thereof a cam 35 is rigidly mounted. Each cam has a plurality of projecting portions or angularly spaced lobes of different radial extent. In the drawings three such portions are shown. It is however, to be understood that any desired and practical number of arms may be used.

The shafts 34 are driven by the transmission in the housing 12 in such a manner that one of the shafts rotates in clockwise and the other in counterclockwise direction.

As stated above the springs 32 urge the bars 28 to slide inwardly. Thereby the rollers 33 are kept in engagement with the cams 35. These cams are arranged so that when the one roller 33 is in contact with a projecting portion of the

corresponding cam, the other roller will be in engagement with the recessed portion between two adjacent projecting cam portions. It is to be noted that the projecting portions of each cam are of different lengths.

Each bearing frame 14 has a horizontally extending member 36 on which an upwardly extending arm 37 is formed supporting the inner bearing 16. Each vertical shaft 22 extends rotatably through a hole in the corresponding horizontal member 36. A collar 38 is adjustably mounted on each vertical shaft 22 and is secured in adjusted position by a set screw 39 and a spiral spring 40 surrounds each vertical shaft 22 between the pinion 23 and the collar 38 urging the shaft upwardly. A cam 41 is adjustably mounted on the main shaft 17 adjacent each end thereof, between the bearings 16 on each frame 14 and directly above the vertical shaft 22. The collar 38 on each vertical shaft is adjusted so that the spring 40 will keep the upper end of the shaft in permanent contact with the corresponding cam 41.

Each shaft 22 extends downwardly from the frame base 20 and through a hole provided in the platform 10. The part 42 of each shaft 22 located below the platform 10 is shaped square and hollow to form a socket as indicated at 43 in Figure 1.

A square rod 44 is adjustably arranged in each socket portion 42 and is secured in adjusted position by a set screw 45.

To the lower end of each square rod 44 a cylinder 46 is pivotally linked. Each cylinder has a pair of upstanding lugs 47 between which the corresponding square rod 44 is located and a pin 48 extends through the lugs and the rod between them connecting the cylinder 46 pivotally to said rod. A turnbuckle 49 extends between each rod 44 and the cylinder 46 thereon to adjust the cylinder so that it is arranged in horizontal position.

In each cylinder 46 a piston 50 is slidably located, which has a forwardly extending piston rod 51 each cylinder and piston assembly constituting an expansible chamber device for varying the distance between an article-grasping device at the outer end of the arm and the corresponding vertical shaft. The forward end of each cylinder 46 is reduced in diameter as shown at 52. Each piston rod 51 extends through said reduced cylinder portion and has on its outer forward end a comparatively long square socket 53, which is either integrally formed therewith or firmly attached thereto. Adjacent its forward end each cylinder 46 is provided with vent holes 54. Each cylinder rod 51 is provided with a keyway 55 extending over the entire length of the rod from the piston 50 to the outer end of the cylinder 46. A screw 57 in the reduced cylinder portion 52 engages this keyway slidably and thereby prevents the piston from rotary movement in the cylinder, so that the sides of the square sockets 52 will always extend horizontally and vertically respectively.

A spiral spring 58 surrounds each piston rod 51 and abuts the forward cylinder wall with one of its ends and the piston with its other end urging the piston into rearward position as shown in Figure 4.

Each cylinder 46 has a cap 59 on its rearward end and a flexible tube 60 is air-tight connected therewith and communicates with the interior of the cylinder. Each flexible tube 60 leads to a tube 61, which in turn communicates with an air cylinder valve 62 fastened by a bracket 63 to the underside of the platform 10.

As clearly shown in Figure 6 each of these valves has a cylinder 63' connected with a source of compressed air (not shown) by a pipe 64. The pipe 61 communicates with the cylinder on its outer end. The other end of the cylinder 63 is closed by a head 65 through which a piston rod 66 extends. A piston 67 is fastened on the end of the piston rod and has a hollow cylindrical body 68. A spiral spring 69 is arranged in the hollow piston engaging the piston with one of its ends and the end wall of the cylinder 63 with the other end, urging the piston toward the cylinder head 65. To facilitate this movement a vent hole 70 is provided in the cylinder wall adjacent the cylinder head.

Two levers 71 extend through slots 72 provided in the platform 10 and are pivotally mounted intermediate their ends on pins 73 extending through lugs 74 on the under side of the platform 10. The lower end of each of these levers is pivotally connected with the outer end of the piston rod 66. On the forward face of each projecting portion of each cam 35 a roller 75 is mounted adapted to engage the upper arm of the corresponding lever 71, thereby pivoting the lever about the pin 73 and forcing the piston 67 outwardly in the cylinder 63 against the pressure of the spring 69. In the wall of the piston an inlet port 76 is provided and arranged so that it will coincide with the air pipe 64, when the piston is moved outwardly by the lever 71, when the cam 35 is rotated by the motor 13. When a roller 75 releases the lever 71 the piston will be moved inwardly by the spring 69 and will close the inlet pipe 64, cutting off the flow of air.

As long as the air is flowing into the cylinder 63 of the valve 62 it will be conducted by the pipes 61 and the flexible tubes 60 into the cylinders 46 driving the piston 50, the piston rod 51 and the square socket 52 forward. When the flow of compressed air into the valve 62 is shut off as described above, the spring 58 urges the piston 50, piston rod 51 and socket 52 into retracted position. To make this possible a bleed opening 77 is provided in the wall of the cylinder 63 of the valve 62 and a cooperating bleed opening 78 in the wall of the piston body 68. These two openings are arranged so as to coincide with each other when the valve piston is moved inwardly by the spring. The compressed air contained in the valve 62, pipe 61, tube 60 and cylinder 46 can escape then through the bleed holes 77 and 78.

A square arm 79 fits slidably into each square socket 52 and a set screw 80 in one of the walls of the sockets is adapted to secure the arms in adjusted position. The outward end of each arm 79 is flattened as shown at 81 in Figure 3. On top of each square arm 79 a cylinder 82 is fastened by means of a bracket 83. The cylinders 82 are closed at their inner ends and have caps 84 at their forward ends. In the cylinder wall an air inlet port 85 is provided adjacent the inner end of the cylinder and a flexible tube 86 communicates therewith. A piston 87 is slidably arranged in each cylinder 82 and a piston rod 88 extends forwardly therefrom and through the cap 84. A hollow cube 89 open fore and aft is slidably mounted on each square arm 79 and connected with the outer or forward end of the piston rod 88. Each slide cube has two laterally and horizontally extending fins 90, and on each of said fins a forwardly extending bar 91 is pivotally mounted.

On each flattened portion 81 of the arms 79 a clamp arm 92 is pivotally mounted. Each clamp arm has an arcuate forward portion 93 adapted to engage approximately one-half of a bottle neck 94. At its rear end each clamp arm has an outwardly extending lug 94, through the outer end of which a pivot pin 95 extends to connect the clamp arm pivotally to the arm 79 as stated above. The bars 91 are pivotally connected with the clamp arms 92 so that a forward movement of the slide cube 89 will pivot the clamp arms 92 into open position and a rearward movement of the cube will put said clamp arms into bottle clamping position.

Each flexible tube 86 is connected to a pipe 96 which in turn communicates with an air valve 97. Each air valve has a cylinder 98, which is firmly connected with one of the horizontal members 36 of the bearing frames 14 by means of a bracket in a vertical position. The pipe 96 connects with the valve 97 through an inlet port 99 in the valve cylinder wall adjacent the lower end thereof. The cylinder 98 is closed on the bottom and has a cylinder head 100 on its upper end. A piston 101 with a hollow body 102 is slidably located in each valve cylinder 98 and has a piston rod 103 thereon extending upwardly through the cylinder head 100.

A spiral spring 104 is located in each valve cylinder, entering the hollow piston body 102 and abutting the piston and the bottom of the cylinder, thereby urging the piston upwardly in the cylinder.

On the outer upper end of each piston rod 103 a roller 105 is rotatably mounted and directly about it a cam 106 is rigidly mounted on the main shaft 17, so that the roller 105 under the pressure of the spring 104 is in permanent contact with the cam 106. The valve cylinder 98 is provided with a vent hole 107 in its wall adjacent its upper end.

Underneath the level of the lower rim of the piston body 102 an inlet port 108 is provided in the valve cylinder wall and a pipe 109 leading from a source of compressed air (not shown) communicates therewith.

When the cam 106 is positioned so that the valve piston is in the position shown in Figure 7 the inlet port 108 is open and compressed air flows through pipe 109, inlet port 108, valve cylinder 98, outlet port 99, pipe 96 and tube 86 into the cylinder 82 forcing the piston 87 and the slide cube 89 connected therewith forwardly whereby the clamps 93 will be opened as described above. To make the forward movement of the pistons 87 in the cylinders 82 possible a venthole 110 is provided in the cylinder wall adjacent the cylinder head 84. When the cam 106 is rotated in position to force the valve piston 101 downward in cylinder 98 the inlet port will be closed by said piston and the flow of compressed air shut off.

A spiral spring 111 surrounds the piston rod 88 between the piston 87 and the cylinder head 84 urging the piston and all parts connected therewith to move into retracted position, whereby the clamps 93 will be closed. To enable the spring 111 to operate a bleed hole 112 is provided in the wall of the valve 97 which normally is covered by the valve piston 102. There is however, a second bleed hole 113 provided in the wall of the valve piston body 102 which will coincide with the bleed hole 112 when the cam 105 forces the piston downward. Then the compressed air back of the piston 87 can escape and spring 111 can operate as described above.

When the motor drives the transmission (not shown) the cams 35 will rotate and the projecting portions of the cams will engage the rollers 33 on the bars 28 and force the latter to slide outwardly. Since the racks 29 are formed integrally with said bars and are in mesh with the pinions 23 these pinions and the vertical shafts and all parts connected therewith will rotate, or pivot about the axes of the vertical shafts. The degree of rotation depends on the length of the longitudinal movement of the rack, and that in turn depends on the size of the projections of the cams 35, so that the degree of rotation can be predetermined selectively. The springs 32 will return the bars 28 into normal position, and will thereby rotate the shafts 22 in the opposite direction.

The above description shows clearly how the stacker according to my invention operates. When the motor 13 is started the shaft 17 will position the cams 41 so that the springs 40 will lift the shafts 22 and the parts attached thereto up. At the same time cams 35 will operate the racks 29 to pivot the bottle engaging mechanisms rearward in Figures 1 and 2. Air valves 62 will operate to extend the sockets 53 on the cylinders 46 and air valves 97 will open the clamps 93. Then the cams 41 will force the whole apparatus downward, the clamps will close about the neck of a piece of glassware, the apparatus will start to lift and swing forward to deposit and release the glassware on a selected place.

In the present embodiment the glassware will be placed in six rows. There are two stacker arms and the control cams have each three projections of selected different length, so that each arm will execute oscillations through three different predetermined degrees and deposit the glassware in three rows on the lehr conveyor.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. In glassware transferring mechanism operative to pick up glassware articles at one location and arrange such articles in a predetermined manner in another location and including a support, a substantially vertical shaft journaled in said support, a substantially horizontal arm supported at one end by said shaft, and article-grasping means at the end of said arm opposite said shaft; means operative to impart oscillating movement of different predetermined angular extent to said arm comprising a rotatable, multi-lobed cam, cam-driving means carried by said support, and rack and pinion means operatively connecting said cam with said shaft, and means imparting vertical movement to said arm during oscillating movements thereof comprising a substantially horizontal shaft journaled in said support above said substantially vertical shaft, means drivingly connecting said horizontal shaft with said cam-driving means, a cam on said horizontal shaft contacting the upper end of said vertical shaft, and spring means operatively connected between said vertical shaft and said support resiliently maintaining the upper end of said vertical shaft in contact with said cam on said horizontal shaft.

2. In glassware transferring mechanism operative to pick up glassware articles at one location and arrange such articles in a predetermined manner in another location and including a support, a substantially vertical shaft journaled in said support, a substantially horizontal arm sup-

ported at one end by said shaft, and article-grasping means at the end of said arm opposite said shaft; means operative to impart oscillating movement of different predetermined angular extent to said arm comprising a rotatable, multi-lobed cam, cam-driving means carried by said support, and rack and pinion means operatively connecting said cam with said shaft, and means operative to vary the distance between said vertical shaft and said article-grasping means comprising an arm for said grasping means, expansible chamber means operatively interposed between said shaft and said arm to move said grasping means away from said shaft upon admission of pressure fluid thereto, spring means operatively associated with said expansible chamber means to move said article-grasping means toward said vertical shaft upon release of fluid under pressure from said expansible chamber means, a pressure-fluid conduit connected with said expansible chamber means, a control valve interposed in said conduit and having a control lever thereon, and means on said multi-lobed cam operatively engaging said valve-control lever to move said grasping means relative to said vertical shaft in timed relationship to oscillating movements of said arm.

3. In a glassware transferring mechanism operative to pick up glassware articles at one location and arrange such articles in a predetermined manner in another location and including a support, a substantially vertical shaft journaled in said support, a substantially horizontal arm supported at one end by said shaft, and article-grasping means at the end of said arm opposite said shaft; means operative to impart oscillating movement of different predetermined angular extent to said arm comprising a rotatable, multi-lobed cam, cam-driving means carried by said support, and rack and pinion means operatively connecting said cam with said shaft, said article-grasping means comprising a pair of opposed clamp arms each pivotally connected at one end to the outer end of said arm, a slide on said arm, respective bars pivotally connected to said slide and each of said clamp arms to move said clamp arms toward and away from each other upon movement of said slide along said arm, an expansible chamber device carried by said arm and operatively connected with said slide, a pressure-fluid conduit connected with said expansible chamber device, a control valve operatively interposed in said conduit and having a control member extending therefrom, a substantially horizontal shaft journaled in said support above said substantially vertical shaft, a cam on said horizontal shaft controlling vertical movement of said vertical shaft, and a second cam on said horizontal shaft engaging said valve-control member to operate said valve in timed relationship with the vertical movements of said substantially vertical arm-carrying shaft.

4. Glassware transferring mechanism operative to pick up glassware articles at one location and arrange such articles in a predetermined manner in another location and including a support, a substantially vertical shaft journaled in said support, a substantially horizontal arm supported at one end by said shaft, and means carried by said support and operatively connected with said shaft to move said arm through a range of angular movements between said locations and impart vertical movement to said arm in timed relationship to the angular movements thereof; wherein said horizontal arm comprises a cylinder secured to said vertical shaft, a piston reciprocal in said cylinder, a piston rod extending from said cylinder and provided at its outer end with an elongated socket, an arm member adjustably secured in said socket, a pair of clamp arms on the outer end of said arm member, expansible chamber means carried by said arm member operative to open and close said clamp arms, and spring means operatively connected between said piston rod and said cylinder resiliently urging said piston rod to retracted position within said cylinder, said cylinder, piston and spring being operative to vary the distance between said vertical shaft and said clamp arms upon admission of pressure fluid to, and release of such fluid from said cylinder.

5. In glassware transferring mechanism operative to pick up glassware articles from one location and arrange said articles at an adjoining location and including a support, a substantially vertical, oscillating shaft journaled in said support, an arm mounted at one end on the upper portion of said shaft and provided at its opposite end with article-grasping means movable in a substantially horizontal arc from one location to the other; means operative to move said arm through successively varying arcs to place said articles in a predetermined arrangement at one of said locations, said means comprising a power-driven shaft journaled on said support, a cam on said shaft having a plurality of angularly-spaced lobes of different radial extent, rack means slidably mounted on said support and longitudinally movable by said cam lobes, a pinion on said shaft meshing with said rack means to convert longitudinal movement of said rack means into oscillating movements of said shaft, and means operative to vary the distance of said article-grasping means from said shaft comprising an expansible chamber device included in said arm and operatively connected to said grasping means to move said grasping means longitudinally of said arm, a control valve pneumatically connected between said expansible chamber device and a source of fluid under pressure, a control arm carried by said valve, and means on said cam operatively engageable with said valve-control arm to vary the distance of said grasping means from said shaft in accordance with movements of said shaft by said cam lobes.

EDWARD CROOKS.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
315,270	Fowler	Apr. 7, 1885
1,974,837	Shillinger et al.	Sept. 25, 1934
2,259,728	Bridges	Oct. 21, 1941