

Nov. 24, 1942.

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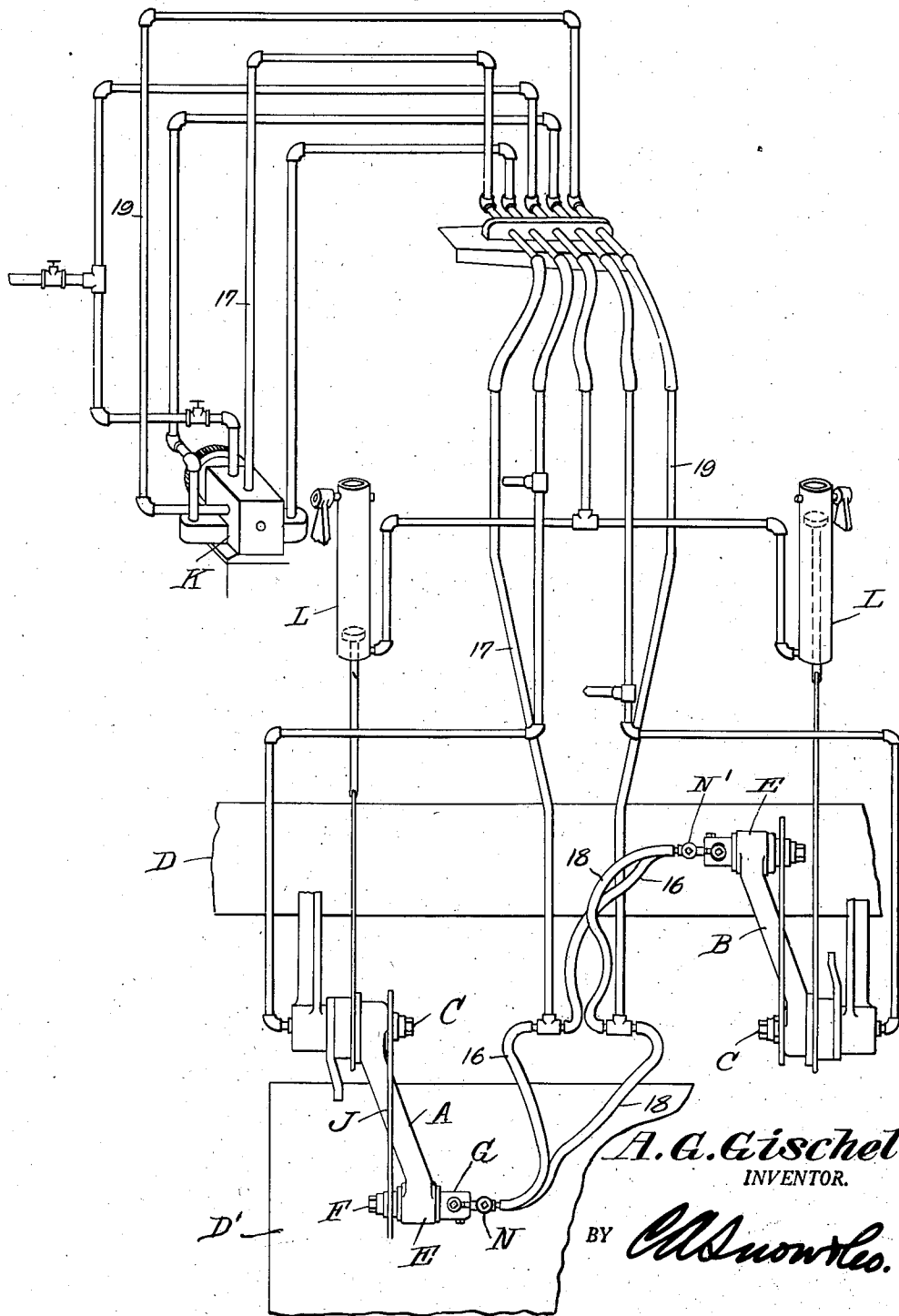
2,303,040

COMPENSATING TONG ARM

Filed May 29, 1941

3 Sheets-Sheet 1

Fig. 1.



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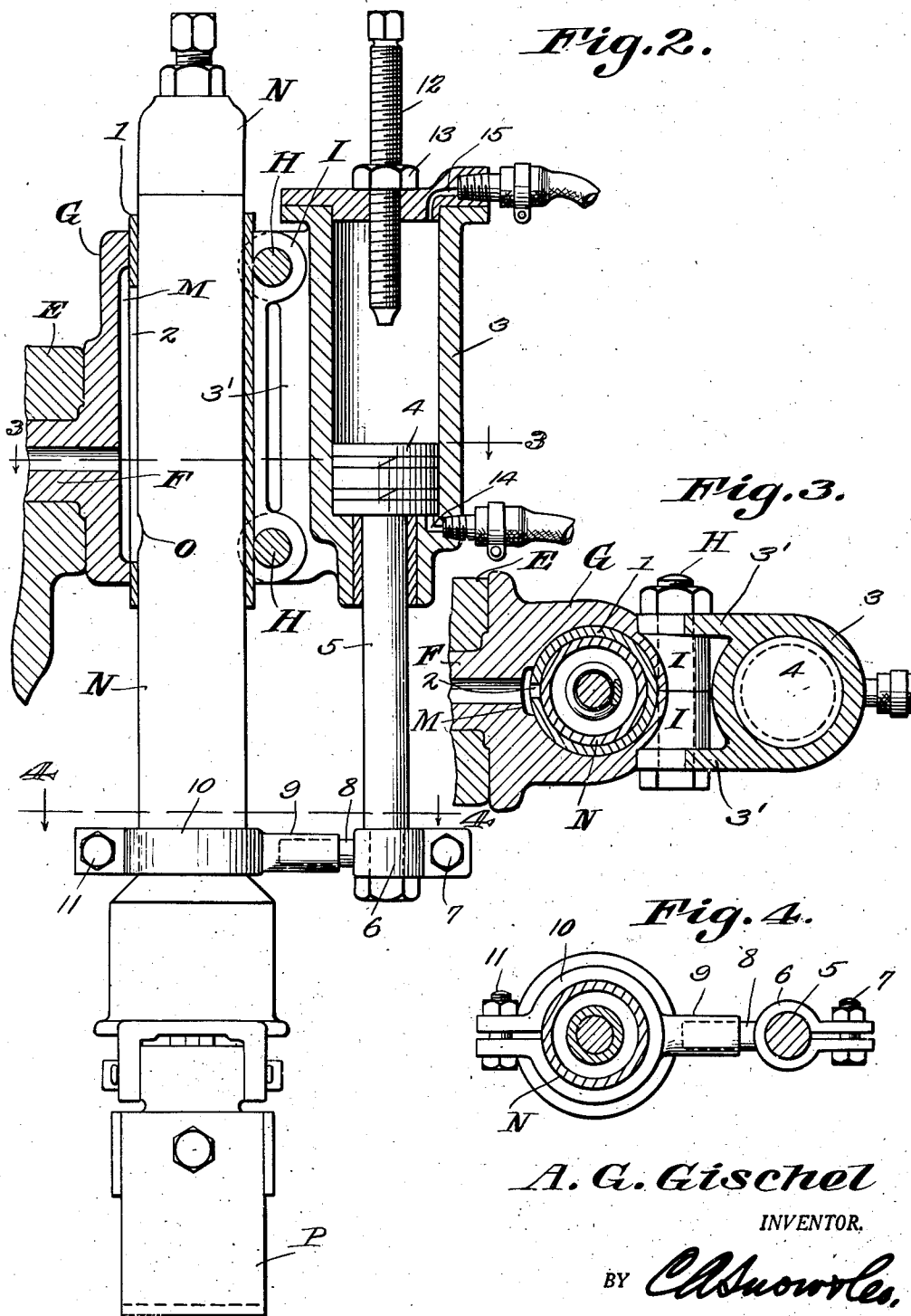
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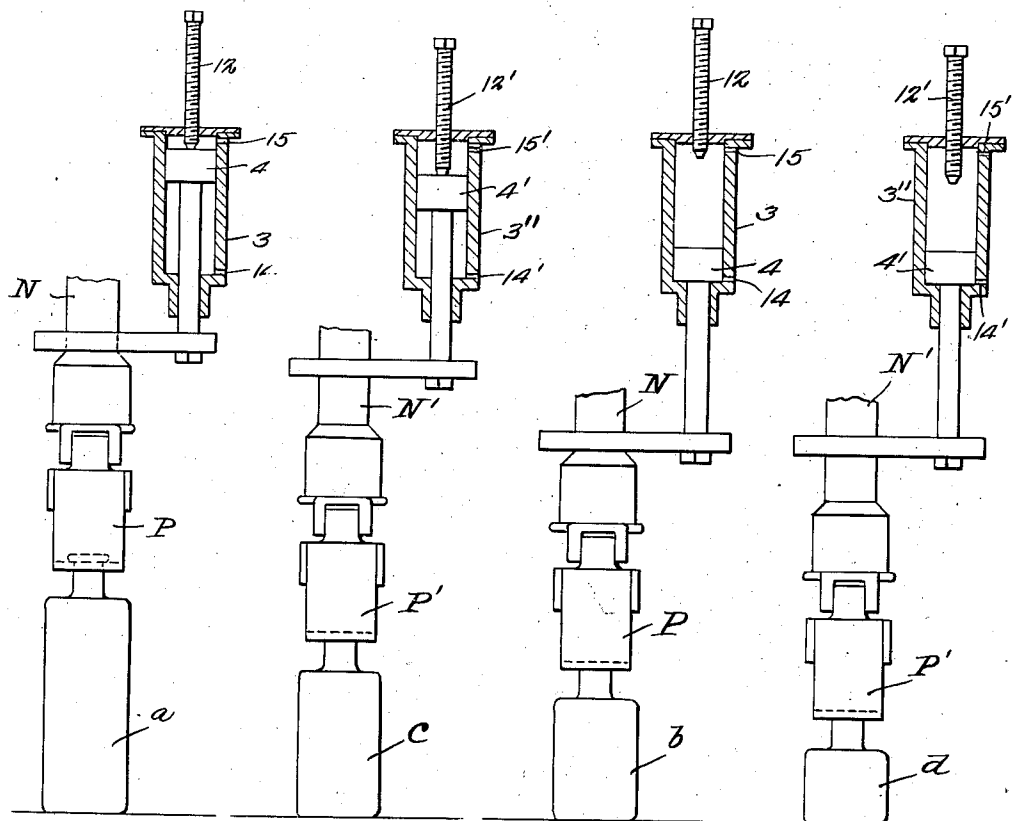


Fig. 6. Fig. 7. Fig. 8. Fig. 9.

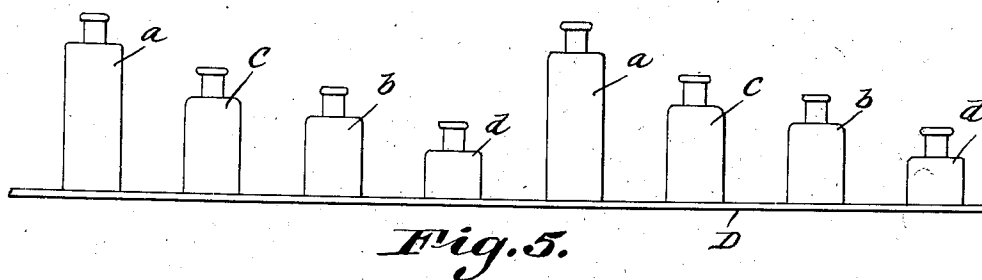


Fig. 5.

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COMPENSATING TONG ARM

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10 Claims. (Cl. 214—1)

This invention relates to a compensating tong arm such as used for the purpose of transferring hot glassware from one station to another, as, for example, from a shaping machine to the conveyer of a lehr.

Various mechanisms have been provided for the purpose stated but while these mechanisms have been capable of operating satisfactorily for delivering articles of one height or of two different heights to the lehr, none of them have been capable of handling articles of more than two different heights delivered successively to the transfer mechanism.

It frequently happens that a considerable saving in the production of glass bottles and the like can be effected by transferring to a lehr, articles of different heights produced at the same time in different molds, and obviously by increasing the range of operation of the lehr loader or stacker so that the number of different heights handled thereby during a continuous run can be increased, the efficiency of the stacker can be proportionately increased because it becomes possible not only to handle small quantities of bottles of different heights, but also to feed into a long run of bottles of one height, one or more shorter runs of bottles or the like of other heights.

An object of the present invention is to provide an improvement in the form of an attachment which can be incorporated readily in machines of a type already in use whereby the efficiency of the machines is increased in the manner herein stated.

A further object is to provide a means by which a tong arm can be readily adjusted to pick up articles of any predetermined heights in any desired succession and to transfer them to a conveyer.

With the foregoing and other objects in view which will appear as the description proceeds, the invention consists of certain novel details of construction and combinations of parts herein-after more fully described and pointed out in the claims, it being understood that changes may be made in the construction and arrangement of parts without departing from the spirit of the invention as claimed.

In the accompanying drawings the preferred form of the invention has been shown.

In said drawings:

Figure 1 is a view showing more or less in diagram, portions of one type of lehr loader or stacker to which the present improvements have been applied.

Figure 2 is an enlarged view, partly in vertical section and partly in elevation showing the present improvements applied to the tongs mechanism of the stacker.

Figure 3 is a section on line 3—3, Figure 2.

Figure 4 is a section on line 4—4, Figure 2.

Figure 5 is a side elevation of a portion of a conveyer on which are arranged series of bottles of different heights positioned to be engaged and transferred by means of the improvements constituting the present invention.

Figure 6 is a view showing one position of the attachment and tongs mechanism of one transfer arm of a stacker when the parts are adjusted to engage and pick up successively bottles of two different heights, the tongs in said figure being shown in engagement with the tallest bottle of a group.

Figure 7 is a view similar to Figure 6 but showing the attachment and tongs mechanism carried by the second transfer arm of the stacker with the parts adjusted to pick up and transfer bottles of two other heights, the positions of the parts in Figure 7 being such that the tongs will engage and lift a bottle of a height differing from that shown in Figure 6.

Figure 8 is a view similar to Figure 6 and showing the same structure but with the parts in a second position so that the tongs shown in Figure 6 will engage and lift a bottle of a third height.

Figure 9 is a view showing the same parts as those illustrated in Figure 7 but with the parts so shifted as to engage and lift a bottle of a fourth height.

While the mechanism constituting the present invention may, with certain modifications of structure, be applicable to different types of lehr stackers, the structure as shown and herein described is designed for use primarily with a lehr stacker of the type disclosed, for example, in Patent 1,878,156, dated September 20, 1932. In a structure such as shown in the patent referred to there are used two transfer arms A and B adapted to swing in opposite directions about horizontal axes C so that when one arm is swinging in a vertical plane from one extreme position, which can be above a buck or conveyer D leading from a glass forming machine, the other arm will be swinging in a vertical plane in the opposite direction from an extreme position which can be above the conveyer D' of a lehr. Thus while one arm is transferring an article from the buck or conveyer D to the conveyer D' of the lehr, the other arm is returning from the conveyer of the lehr to the buck or conveyer D for the purpose of picking up another bottle or other formed article.

In the structure referred to, each of the arms A and B has a hub portion E at its free end in which is journaled a tubular shaft F provided at one end with a split sleeve G adapted to be contracted by bolts H extending through ears I extending from the sleeve at opposite sides of the slots therein. Chain and sprocket mechanism is provided for connecting each shaft F to the fixed shaft C on which the arm A or B is mounted to swing so that after each sleeve G

has been positioned so as to assume a vertical position at each limit of movement of its arm A or B, the chain and sprocket connections will insure the maintenance of the sleeve G in a vertical position at all times during its movement from one extreme position to another.

In the stacking mechanism referred to there is provided a timing valve operated by a suitable mechanism and indicated at K whereby air will be distributed at proper intervals to arm-operating mechanisms indicated at L and to the hollow shafts F.

As all of the foregoing mechanism, which has been shown in diagram in Figure 1, constitutes no part of the present invention, it is not deemed necessary to give a detailed description of the structure or of the operation.

By referring particularly to Figures 2 and 3 it will be noted that the sleeve G is provided with a longitudinal recess M constituting a distributing chamber which is in constant communication with the interior of shaft F.

Located in the sleeve G is a tubular bearing member 1 having a longitudinal slot 2 which extends longitudinally of and opens into the chamber M. By tightening the bolt H the sleeve G will tightly grip this bearing member so as to hold it fixedly within the sleeve and also provide an efficient bearing for the barrel N of a tongs mechanism such as disclosed in the patent hereinbefore referred to. There is no departure in the construction of this tongs mechanism from what has been disclosed in the patent and it will be noted that the barrel has a port O through which air can flow into the barrel from slot 2 and chamber M for the purpose of actuating the tongs P of the mechanism so that they can be caused to close together when they are brought to one position, thereby to grip the formed article to be transferred and subsequently, on the release of air under pressure, to open and deposit the gripped article onto the conveyor of a lehr.

The present arrangement of the parts differs from that heretofore used, as in the patent mentioned, in that the barrel N carrying the tongs P is mounted for reciprocation instead of being fixedly secured. This sliding action of the barrel is provided for the purpose hereinafter explained.

In addition to the provision of a tubular bearing member for the sliding barrel of the tongs mechanism, applicant's invention includes a cylinder 3 provided with means, such as flanges 3' whereby the bolts H employed for tightening sleeve G about the tubular bearing member 1, can also be employed for holding cylinder 3 fixedly to the sleeve G and with its longitudinal axis parallel with the longitudinal axis of the bearing member 1. In cylinder 3 is located a piston 4 having a stem 5 slidable within and projecting beyond the lower end of the cylinder. A split collar 6 is mounted on stem 5 and is adapted to be held thereto at any desired point so as to move therewith. This collar, which can be tightened by means of a bolt 7, has a radial pin 8 projecting therefrom for engagement with a socket member 9 extending laterally from a split collar 10 embracing the barrel N. This collar can be tightened on the barrel by means of a bolt 11 and obviously can be placed at any desired position on said barrel before it is tightened.

Extending into that end of the cylinder 3 remote from the stem 5 is a stop screw 12 which

can be adjusted so as to project any desired distance toward the piston and which can be provided with a lock nut 13 or the like for holding it in adjusted position.

An intake port 14 opens into the cylinder below piston 4 and another port 15 opens into the upper end of the cylinder.

Thus far there has been described only one cylinder 3 and its connecting parts, and only one tongs P has been referred to. It is to be understood that the parts thus far described are carried by the arm A and that similar parts are carried by the arm B, the barrel being designated N', the tongs P', the cylinder 3'', the piston 4' and the screw 12'.

For the purpose of supplying air to the cylinders 3 and 3'' at the proper times for the purpose of effecting the operation hereinafter described, the port 15 of cylinder 3 and the port 14' of cylinder 3'' are suitably connected, as by means of flexible pipes 16 or other devices to an air line 17 leading to the timing valve K and the ports 14 of cylinder 3 and 15' of cylinder 3'' are connected by flexible pipes 18 or by other means to an air line 19 leading to the timing valve K. The construction of the timing valve can be such as commonly employed and said valve can be so formed that when one transfer arm starts away from above the conveyor in the lehr after depositing a bottle, air will be admitted into one end of the cylinder carried by said arm so as to move its piston to one extreme position where it will be held until after said arm returns to delivery position whereupon following the delivery of a second article, air will be admitted to the cylinder of said arm so as to shift the piston therein to the other extreme position. The arrangement of the connections is such that this operation of the pistons is entirely independent from the operation of the tongs which latter operation is effected through the direction of air under pressure at properly timed intervals into the slidable barrels N for the purpose of actuating the tongs.

After a loader or stacker has been equipped with the improvements herein described, it becomes a simple matter to adjust the improvements so that articles of as many as four different heights can be handled in predetermined succession for the purpose of transferring them from a feeding conveyor such as D to the lehr. For example, assuming that it is desirable to transfer bottles of four different heights, it is necessary first to determine the order in which these bottles are to be deposited on the conveyor D. As shown in Figure 5 the bottles can be arranged in successive groups, the bottles of each group being regularly spaced and being progressively smaller from the first to the fourth bottle of the group. Thus the distance of the neck of each bottle from the belt D is known and the parts of the present invention can then be adjusted so that the tongs conveyed by the two arms A and B can be brought to the proper levels for the purpose of engaging the bottles and conveying them to the lehr. Obviously the tongs on arm A do not engage successive bottles on the conveyor D but engage alternate bottles which, in Figure 5, have been indicated at a and b. The tongs on the other arm B will likewise engage alternate bottles which, in Figure 5, have been indicated at c and d. In order to adapt tongs P on arm A to the operation of picking up successively two bottles of different heights, the connections between stem 5 and also the screw 12 are adjusted so that when the piston 4 is in the

uppermost position permitted by screw 12, tongs P will be at such a height as to engage, for example, the neck portion of bottle *a* and, when the piston 4 is in its lowermost position, tongs P will be at such a height that they can properly engage the neck portion of the bottle *b*. In other words by adjusting the parts 6, 10 and 12, the relative locations of the two limits of movement of the tongs P can be made to coincide with the difference between the heights of the two bottles of different sizes to be engaged and transferred. After the mechanism on the arm A has thus been adjusted so as to engage and pick up, for example, the bottles *a* and *b*, the tongs P' of the arm B can also be adjusted so that they can successively pick up the bottles *c* and *d*. It is to be understood of course that these bottles are to be placed on the belt D in the order in which they are to be picked up successively by the two arms on the lehr stacker. When bottle *a* arrives at position for engagement by its tongs P, the timing mechanism, operating as is well known in structures of this type and as shown in the patent heretofore referred to, will come into action so as to swing the tongs P from delivering position to position over the conveyer D. As before stated, at the commencement of this movement, air will be directed into one of the ports of the cylinder 3 and by properly adjusting and timing the parts, the air will be admitted to port 14 as the arm A is approaching a position to pick up the bottle *b*. As a result of this action the tongs P will be moved upwardly until the piston 4 arrives against the screw 12 as shown in Figure 6 so that as the tongs P approach their position above the conveyer D, they will be brought astride the neck portion of bottle *a*. As soon as the tongs arrive at this position the tongs-operating mechanism, which is of the type shown in the patent mentioned, will be brought into play, thereby closing the tongs after which said tongs will proceed to swing upwardly away from conveyer D and bring the bottle to position on the conveyer in the lehr. While bottle *a* is thus being transferred the arm B is swinging into position over the conveyer D and during this movement the piston 4' has been thrust upwardly to the position shown in Figure 7, thereby bringing the tongs P' to a point where they will properly engage the next bottle *c* when the tongs are lowered to bottle-engaging position. In the meantime the tongs P have not only deposited bottle *a* on the lehr conveyer but have also become disengaged therefrom and as the tongs P' operate to convey the bottle *c* toward the lehr, the tongs P commence their return movement toward the conveyer D during which time the timing valve operates to reverse the flow of air under pressure so that it will enter the port 15 and drive the piston 4 downwardly to the position shown in Figure 8. Thus when arm A returns to position above the belt or conveyer D, the tongs P will be at a lower level where they can embrace and grip the neck portion of the bottle *b*. Continuance of the operation of the mechanism results in the arm A swinging back toward the lehr and while this is taking place the arm B, which has delivered and released bottle *c* in the lehr, is returning to position above the conveyer D during which time the direction of air under pressure in its cylinder 3' is reversed so that piston 4' is forced downwardly, thereby lowering the tongs P' to a level where they can properly embrace and grip the smaller bottle *d*. As the operation of the mechanism continues, this smaller bottle will be picked up

and carried into the lehr and during this operation arm A will repeat the operation heretofore described, the piston 4, during the return movement of the arm toward conveyer D, being forced upwardly by air admitted under pressure through port 14 with the result that tongs P are thus raised into position where they can properly embrace and grip the bottle *a* of the second series.

The foregoing operation continues throughout the entire operation of the mechanism, the bottles being picked up in proper succession and transferred to the lehr.

Obviously the heights of the bottles can be varied and the bottles of any group can be in any desired relationship. It is merely essential that the bottles be properly spaced and that the same arrangement as to height be followed in each group which must not consist of more than four different heights of bottles.

The particular succession in which the pistons can be shifted downwardly or elevated can be varied by changing the direction of the pipe connections 16 and 18 and, if all of the bottles to be transferred are of the same height, the pistons 4 and 4' can be held against movement by adjusting screws 12—12' thereagainst while they are in their lowermost positions.

What is claimed is:

1. Apparatus for handling glassware, including a transfer member, an article receiving and gripping element carried by said member, means for swinging said member about a horizontal axis between a ware-receiving station and a ware-delivery station, to transfer gripped articles from the former to the latter, a cylinder carried by said member, a piston therein, means for conducting fluid under pressure to both sides respectively of the piston, a timing valve for controlling the flow of fluid to the cylinder thereby to move the piston in opposite directions successively during separate movements of the member in one direction, and means for vertically shifting the article-gripping element thereby to change its vertical position when at the receiving station, said means including an operative connection between the piston and the gripping element.

2. Apparatus for handling glassware, including a transfer member, a barrel slidably and pivotally connected to said member, an article-receiving and gripping element carried by the barrel, means for swinging said member about a horizontal axis between a ware-receiving station and a ware-delivery station, to transfer gripped articles from the former to the latter, a continuously operated timing valve, a piston mounted for reciprocation and movable with the transfer member, an operative connection between the piston and said barrel, and means controlled by the valve for raising and lowering, relative to the transfer member, the piston and the barrel joined thereto while in transit between the stations.

3. In apparatus for handling glassware, a transfer member mounted for back and forth movement between a ware-receiving station and a delivery station, a barrel slidably supported by said member, an article-gripping element carried by the barrel and mounted to slide substantially vertically with the barrel to either of two extreme article-gripping elevations relative to said member, means for operating said element while at either of the said two extreme elevations to grip an article at the receiving station and release it at the delivery station, and means for automatically shifting the said element vertically

from one extreme article gripping position to the other prior to its return to its receiving station, said means including a piston movable with and mounted for reciprocation relative to the transfer member, a continuously operating timing valve, means controlled by the valve for moving the piston to either of its extreme positions, and an operative connection between the piston and the barrel.

4. In apparatus for handling glassware, a transfer member mounted for back and forth movement between a ware receiving station and a delivery station, a barrel slidably mounted and movable with the transfer member, an article-gripping element carried by the barrel and mounted to slide substantially vertically with the barrel to either of two extreme article gripping elevations relative to said member, means for operating said element while at either of the said two extreme elevations to grip an article at the receiving station and release it at the delivery station, and means for automatically shifting the said element vertically from one extreme article-gripping position to the other prior to its return to its receiving station, said means including a piston movable with the transfer member and mounted for back and forth movement relative thereto, a continuously operating timing valve, means controlled by the valve for moving the piston first in one direction and then in the other direction, each movement of the piston occurring while the transfer member is in transit between the stations, and an adjustable connection between the piston and barrel for actuating the barrel with the piston.

5. A mechanism for handling glassware of different heights, including a transfer device mounted to swing about a substantially horizontal axis, a member carried thereby and mounted to swing about a substantially horizontal axis relative thereto, means for maintaining said member in a substantially vertical position during said movements, article gripping mechanism mounted for substantially vertical movement in said member, means for limiting the movement of said mechanism in one direction relative to said member, adjustable means for limiting the movement of said mechanism in the opposite direction relative to said member, and means for successively shifting the mechanism to the respective limits of its vertical movement during successive movements of the said device in one direction.

6. A mechanism for handling glassware of different heights, including a transfer device mounted to swing about a substantially horizontal axis, a member carried thereby and mounted to swing about a substantially horizontal axis relative thereto, means for maintaining said member in a substantially vertical position during said movements, article gripping mechanism mounted for substantially vertical movement in said member, and means for bringing the article gripping mechanism to different predetermined elevations at the completion of successive movements of said device in one direction, said means including a cylinder movable with the device, a piston therein, means for shifting the piston in opposite directions successively during successive movements

of said device in one direction, and adjustable means for limiting the movement of the piston in one direction.

7. A mechanism for handling glassware of different heights, including a transfer device mounted to swing about a substantially horizontal axis, a member carried thereby and mounted to swing about a substantially horizontal axis relative thereto, means for maintaining said member in a substantially vertical position during said movements, article gripping mechanism mounted for substantially vertical movement in said member, and means for bringing the article gripping mechanism to different predetermined elevations at the completion of successive movements of said device in one direction, said means including a cylinder movable with the device, a piston therein, means for shifting the piston in opposite directions successively during successive movements of said device in one direction, adjustable means for limiting the movement of the piston in one direction, and an adjustable connection between said piston and mechanism.

8. An apparatus for handling glassware including a transfer member movable between a point of loading and a point of delivery, tongs mechanism carried thereby and including a barrel and gripping jaws, means for guiding the barrel for sliding movement, and means for shifting the barrel in one direction prior to one arrival of the member at loading position, and in the opposite direction prior to the next arrival of said member at said position.

9. Apparatus for handling glassware comprising a delivering element, a receiving element, a transfer arm mounted to swing back and forth between said elements to positions thereabove, means carried by the arm for engaging glassware on one element and delivering it onto the other element, and means operating in timed relation with the arm for shifting the glassware-engaging means during successive movements of the arm to one extreme position thereby to change the said article-engaging means to either of two elevations when positioned successively to engage articles on the delivery element.

10. Apparatus for handling glassware, including a transfer member, means for swinging said member about a horizontal axis between a ware-receiving station and a ware-delivery station to transfer articles from the former to the latter, tongs mechanism carried by said member and mounted to swing about a horizontal axis relative thereto, means for maintaining the tongs mechanism substantially vertical during the swinging movement of said member, and means carried by the member for moving the tongs mechanism upwardly and downwardly while in substantially vertical position, said means including a cylinder, a piston mounted for reciprocation therein, means adjustable relative to the piston and to the tongs mechanism for transmitting motion from said piston to the tongs mechanism, thereby to slide said mechanism relative to the member, means projecting into the cylinder and adjustable relative thereto, for limiting the sliding movement of the piston in one direction, and time-controlled means for directing air under pressure against either face of the piston.

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