

PATENT SPECIFICATION

(11) 1 368 698

1 368 698

- (21) Application No. 28558/72 (22) Filed 19 June 1972
 (31) Convention Application No. 7 123 550
 (32) Filed 21 June 1971 in
 (33) France (FR)
 (44) Complete Specification published 2 Oct. 1974
 (51) International Classification B65G 57/28
 (52) Index at acceptance
 B8C 10B1A 10B1B 10B1D2B 10B1D3 10B1F1 9



(54) APPARATUS FOR EXTRACTING HOLLOW MOULDED ARTICLES FROM A MOULDING DEVICE AND FOR SUBSEQUENTLY STACKING AND DISCHARGING THE ARTICLES

(71) We, INJELEC, a Body Corporate organised and existing under the laws of France, of 112 Avenue Franklin Roosevelt, Vaulx-en-Velin (Rhône), France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to apparatus for extracting from a moulding device, hollow articles such as cups, jars, and other similar packaging articles produced by moulding synthetic plastics material and for subsequent stacking and discharge of the hollow articles.

It is known that hollow articles such as cups, jars and other similar packaging articles of substantially cylindrical shape are frequently produced by injecting, blowing, or vacuum-shaping an appropriate synthetic material under vacuum. The shaping mould device generally comprises several cavities, and it is arranged so that the articles are released from two parts of the moulding device when the latter is opened, consequently the articles can be extracted from the moulding device. In current practice, the articles which are removed from their moulding cavities are expelled either mechanically or pneumatically (current of compressed air) and they are collected in disorderly fashion in any appropriate receptacle. The article thus collected must then be placed manually one inside the other in order to form stacks comprising a predetermined number of articles, these stacks are then arranged in containers or other means for transportation. It will be understood that the manpower necessary for removing the articles from the receptacle, for stacking them and for counting them is considerable, so that it actually slows down the manufacturing process, and therefore increases the cost.

[Price 25p]

With a view to removing this drawback, an object of the invention is to provide an apparatus intended to be associated with a moulding device for the manufacture of hollow articles of the aforesaid type, which apparatus is arranged in such a way as to extract the articles from the moulding device when the latter opens, to insert them one in the other and to discharge them in the form of stacks comprising a predetermined number of articles, all these operations taking place entirely automatically without any manual operations.

According to the invention there is provided an apparatus for extracting from a moulding device, hollow articles such as cups, jars and similar packaging articles produced by moulding synthetic material, and for subsequent stacking and discharge of the hollow articles, the apparatus comprising extraction means having suction means adapted to hold the articles released by parts of the moulding device, to change the orientation of the articles and to deposit the articles on a receiving plate in a condition in which they are partially inserted in each other, stacker means having a reciprocating motion and arranged for axially pushing each article previously deposited on the plate by the extraction means in order to fully insert the article in the previous one and to axially move the same, and discharge means comprising retractable abutments associated with conveying means for axially expelling the stacks obtained when the latter comprise a predetermined number of articles.

In a preferred embodiment of the invention the extraction means comprises a hollow shaft, the interior of which is connected to a source of suction and to a series of radial suction means adapted to be brought near to the walls of the articles released from the parts of the moulding device. This shaft is displaced transversely

50

55

60

65

70

75

80

85

90

and it has an arm or crank engaged with a profiled ramp in such a manner as to cause said shaft to pivot during its transverse displacement, the suction effect stopping automatically when articles are placed on the receiving plate.

The stacker means is advantageously controlled by a moving part of the mould device. It comprises a swinging arm having one end movable over the receiving plate and its other end integral with a pivot shaft of a crank secured to the moving part of the mould device.

The discharge means preferably comprises a series of pneumatic jacks equal in number to that of the moulding cavities. These jacks are mounted on a moving cross member forming a carriage, the arrangement being controlled such that once each stack comprises the desired number of articles, the jacks project above the receiving plate and are consequently displaced longitudinally with respect to the latter in order to expel the aforesaid stacks axially.

The accompanying drawings illustrate, by way of example, one embodiment of the apparatus formed according to the invention;

Fig. 1 is a fragmentary side view thereof in partial longitudinal section, it being assumed that the apparatus is associated with a vacuum moulding device for the manufacture of cups;

Fig. 2 is a fragmentary plan view of Fig. 1, partly in section;

Figs. 3 and 4 are side views partially reproducing Fig. 1, at the time of two different stages of the operating process;

Fig. 5 is a perspective view showing the general arrangement of the apparatus;

Fig. 6 is a sectional view of the device intended for the pneumatic control of the extraction suction devices;

Fig. 7 is a diagram illustrating the operation of the discharge device.

In Figs. 1 to 4 it is assumed that the apparatus illustrated is associated with a machine or moulding device for the manufacture of cups *a* by shaping a strip or ribbon of synthetics material under vacuum. The moulding device comprises a stationary upper part 1 and a mobile lower part 2, the latter being integral with a plate 3 slidably mounted on two vertical columns 4 and appropriately controlled in its reciprocating motion. The strip, indicated by reference 5, is unwound continuously and passes over a hollow heating drum 6 supplied through a conduit 7, said drum being supported at its ends by two vertical arms 8 secured at their bases to side plates 9. This strip 5 is introduced between the parts 1 and 2 of the mould, which comprises four shaping cavities; the moving part 2 is provided with a release mechanism such that when the moulding device is open as

shown in Fig. 3, the four cups *a* are located above the part 2, the cups being merely supported at their base.

In the first place the apparatus comprises an extraction device constituted by a tubular shaft 10 extending horizontally, transversely with respect to the direction of displacement of the strip 5. As shown more particularly in Fig. 5, this shaft 10 is supported by two lateral bearings 11 integral with slides 12; each slide 12 is mounted on a horizontal rod or guide 13 provided inside the corresponding side-plate 9. The two slides 12 are connected to each other by a stirrup 14 directed parallel to the shaft 10 and the central part of which is secured to a moving member 15 of a double acting pneumatic jack 16, which is intended to effect the alternating displacement of the aforesaid shaft. The jack 16 is secured in cantilever fashion to a cross member 17 which connects the two side-plates 9.

The ends of the shaft 10 project beyond the bearings 11 and are engaged in apertures 9a of the side plates 9. One of these projecting ends is angularly integral with a radial crank 18 the free end of which supports a roller 19; the latter is introduced with reduced clearance inside an aperture or curved ramp 20a cut out in a lateral side member 20 connected to the outside of the corresponding side plate 9. The opposite end of the shaft 10 is connected to a flexible pipe 21 which is connected to a low pressure container or other appropriate source of suction. Between the two bearings 11, the tubular shaft 10 is provided with four radial suction devices 22. It will also be noted that this shaft is equally provided with a "vacuum-breaking" mechanism 23 intended for controlling the suction devices 22, and the arrangement of which is illustrated in detail in Fig. 6.

As shown in this figure, this mechanism 23, comprises a rocking valve 24 provided with a gasket 25. This valve 24 is pivoted at 26a to a part 26 integral with the shaft 10, which has a lateral cut-out and is arranged in such a way as to provide a cylindrical lateral extension 10a forming a seat for the above mentioned gasket 25. The control of the valve 24 is ensured by abutment against a threaded rod 27 secured in adjustable manner to the cross member 17.

The operation of the above described extraction device is easily understood. In Fig. 3 the shaft 10 is in its most advanced position in which the free end of the suction devices 22 is substantially in contact with the cups *a* released by the mould parts 1, 2. The reduced pressure effect prevailing inside the shaft 10 keeps the valve 24 and the gasket 25 against the seat 10a such that due to suction the suction devices grasp the four cups *a*. At this moment the jack 16 begins

to contract, in such a way that the shaft 10 displaces towards the rear. Nevertheless, and as illustrated in Fig. 4, the ramp 20a controls the crank 18 of this shaft 10 which rotates about itself; at the end of the stroke of the jack 16 the suction devices 22 are thus orientated in a substantially vertical manner above a receiving plate 28 provided below the cross member 17. Since simultaneously the rod 27 supported by this cross member has caused the valve 24 to open, the negative pressure effect ceases at the end of the suction devices 22 such that the latter release the cups *a* which are collected by the plate 28. The jack 16 returns the shaft 10 to its advanced position, said shaft pivoting under the effect of the ramp 20a and crank 18; the extraction device is thus ready for a new operating cycle.

The apparatus also comprises a stacker mechanism which is constituted by an arm 29 (Fig. 5) in the form of a stirrup the ends of which are fixed on a lower shaft 30 supported by bearings 31 integral with two front side members 28a of the plate 28. Keyed on the shaft 30 is an arm or crank 32 provided at its end with a roller 33 which is introduced with reduced clearance into a slide 3a (Fig. 1) provided at the base of the plate 3.

It will be understood that under these circumstances the vertical alternating displacement of the plate 3 causes the swinging of the shaft 30 and of the stacker arm 29; the latter is shaped in such a way that it comes to be located above the plate 28 whilst gently pushing the cup *a* which has been removed, towards the rear along the axial direction of the cups. During the general operation of the arrangement, the cups *a* successively removed as they are formed are deposited on the plate 28 by the suction devices 22 which, due to their swinging movement, partially engages them in each other. Immediately after the return of the suction devices 22 the stacker arm 29 pushes the cups axially towards the rear so as to completely insert them in each other and to produce horizontal stacks *a'* directed parallel to each other on the plate 28.

These stacks *a'* are held on the plate 28 by means of longitudinal guides 34 appropriately spaced transversely with respect to each other. Between these guides 34 the plate 28 is provided with axial grooves 28b inside each of which there is engaged the moving member 35a of a small pneumatic jack 35 directed vertically. The four jacks 35 are supported by a cross member 36 equipped with rollers 37 which co-operate with longitudinal rails 38, the arrangement 36,37 constituting in this way a carriage which displaces below the plate 28. In the contracted position (Figs. 1 and 3) the moving members

35a are located inside grooves 28b without projecting above the aforesaid plate. The carriage 36,37 is controlled longitudinally in its reciprocating motion by a pneumatic jack 39,40 the moving member 39 of which is appropriately secured to the cross piece 36.

With the plate 3 of the movable part of the moulding device there is associated a feeler member referred to at 3' which actuates a counting mechanism 3'', which controls the supply of the jacks 35 and jacks 39,40. In these circumstances, when the stacks *a'* comprise the desired number of cups *a*, the counting mechanism causes the jack 35 to extend, such that the members 35a rise above the grooves 28b (vertical stroke *w—x* of Fig. 7). Immediately afterwards the jack 39,40 is caused to retract (horizontal stroke *x—y*) which has the effect of moving the stacks *a'* backwards axially in the manner illustrated in Fig. 4. These stacks may be removed manually in order to be placed directly in devices. At the end of the stroke of the jack 39,40, the jacks 35 are caused to retract (stroke *y—z*) then the jack 39,40 is itself caused to extend stroke (*z—w*) in order to return the carriage 36,37 to the advanced position, without the moving members 35a, banging into the cups *a* which have meanwhile been deposited by the suction devices 22 on the plate 28.

Finally, it will be understood that all the operations for removing the cups *a* from the moulding device, for stacking the latter to form stacks *a'* and for discharging the latter from the apparatus, are carried out entirely automatically without any manual operations.

It will be understood that other mechanisms for the pneumatic control of suction devices 22 may be provided.

WHAT WE CLAIM IS:—

1. An apparatus for extracting from a moulding device, hollow articles such as cups, jars and similar packaging articles produced by moulding synthetics material, and for subsequent stacking and discharge of the hollow articles, the apparatus comprising extraction means having suction means adapted to hold the articles released by parts of the moulding device, to change the orientation of the articles and to deposit the articles on a receiving plate in a condition in which they are partially inserted in each other, stacker means having a reciprocating motion and arranged for axially pushing each article previously deposited on the plate by the extraction means in order to fully insert the article in the previous one and to axially move the same, and discharge means comprising retractable abutments associated with conveying means for axially expelling the stacks



to contract, in such a way that the shaft 10 displaces towards the rear. Nevertheless, and as illustrated in Fig. 4, the ramp 20a controls the crank 18 of this shaft 10 which rotates about itself; at the end of the stroke of the jack 16 the suction devices 22 are thus orientated in a substantially vertical manner above a receiving plate 28 provided below the cross member 17. Since simultaneously the rod 27 supported by this cross member has caused the valve 24 to open, the negative pressure effect ceases at the end of the suction devices 22 such that the latter release the cups *a* which are collected by the plate 28. The jack 16 returns the shaft 10 to its advanced position, said shaft pivoting under the effect of the ramp 20a and crank 18; the extraction device is thus ready for a new operating cycle.

The apparatus also comprises a stacker mechanism which is constituted by an arm 29 (Fig. 5) in the form of a stirrup the ends of which are fixed on a lower shaft 30 supported by bearings 31 integral with two front side members 28a of the plate 28. Keyed on the shaft 30 is an arm or crank 32 provided at its end with a roller 33 which is introduced with reduced clearance into a slide 3a (Fig. 1) provided at the base of the plate 3.

It will be understood that under these circumstances the vertical alternating displacement of the plate 3 causes the swinging of the shaft 30 and of the stacker arm 29; the latter is shaped in such a way that it comes to be located above the plate 28 whilst gently pushing the cup *a* which has been removed, towards the rear along the axial direction of the cups. During the general operation of the arrangement, the cups *a* successively removed as they are formed are deposited on the plate 28 by the suction devices 22 which, due to their swinging movement, partially engages them in each other. Immediately after the return of the suction devices 22 the stacker arm 29 pushes the cups axially towards the rear so as to completely insert them in each other and to produce horizontal stacks *a'* directed parallel to each other on the plate 28.

These stacks *a'* are held on the plate 28 by means of longitudinal guides 34 appropriately spaced transversely with respect to each other. Between these guides 34 the plate 28 is provided with axial grooves 28b inside each of which there is engaged the moving member 35a of a small pneumatic jack 35 directed vertically. The four jacks 35 are supported by a cross member 36 equipped with rollers 37 which co-operate with longitudinal rails 38, the arrangement 36,37 constituting in this way a carriage which displaces below the plate 28. In the contracted position (Figs. 1 and 3) the moving members

35a are located inside grooves 28b without projecting above the aforesaid plate. The carriage 36,37 is controlled longitudinally in its reciprocating motion by a pneumatic jack 39,40 the moving member 39 of which is appropriately secured to the cross piece 36.

With the plate 3 of the movable part of the moulding device there is associated a feeler member referred to at 3' which actuates a counting mechanism 3'', which controls the supply of the jacks 35 and jacks 39,40. In these circumstances, when the stacks *a'* comprise the desired number of cups *a*, the counting mechanism causes the jack 35 to extend, such that the members 35a rise above the grooves 28b (vertical stroke *w*—*x* of Fig. 7). Immediately afterwards the jack 39,40 is caused to retract (horizontal stroke *x*—*y*) which has the effect of moving the stacks *a'* backwards axially in the manner illustrated in Fig. 4. These stacks may be removed manually in order to be placed directly in devices. At the end of the stroke of the jack 39,40, the jacks 35 are caused to retract (stroke *y*—*z*) then the jack 39,40 is itself caused to extend stroke (*z*—*w*) in order to return the carriage 36,37 to the advanced position, without the moving members 35a, banging into the cups *a* which have meanwhile been deposited by the suction devices 22 on the plate 28.

Finally, it will be understood that all the operations for removing the cups *a* from the moulding device, for stacking the latter to form stacks *a'* and for discharging the latter from the apparatus, are carried out entirely automatically without any manual operations.

It will be understood that other mechanisms for the pneumatic control of suction devices 22 may be provided.

WHAT WE CLAIM IS:—

1. An apparatus for extracting from a moulding device, hollow articles such as cups, jars and similar packaging articles produced by moulding synthetics material, and for subsequent stacking and discharge of the hollow articles, the apparatus comprising extraction means having suction means adapted to hold the articles released by parts of the moulding device, to change the orientation of the articles and to deposit the articles on a receiving plate in a condition in which they are partially inserted in each other, stacker means having a reciprocating motion and arranged for axially pushing each article previously deposited on the plate by the extraction means in order to fully insert the article in the previous one and to axially move the same, and discharge means comprising retractable abutments associated with conveying means for axially expelling the stacks



obtained when the latter comprise a predetermined number of articles.

2. An apparatus according to claim 1, wherein the extraction means comprises a hollow shaft, the interior of which is connected to a source of suction and to a series of radial suction means adapted to be brought near to the wall of the articles released by said parts of the moulding device.

3. An apparatus according to claim 2, wherein a transverse reciprocating motion is imparted to the hollow shaft which has a radial crank engaged with a profiled ramp in such a way as to cause said shaft to pivot during transverse displacement of the shaft, the suction effect ceasing when this shaft arrives above the receiving plate.

4. An apparatus according to claim 3, wherein bearings supporting the hollow shaft are supported by slides mounted on horizontal guides, these slides being connected to each other by a transverse stirrup to which a driving member is secured.

5. An apparatus according to anyone of claims 2 to 4, wherein the interior of the hollow shaft is connected to the atmosphere through a rocking valve controlled by a stationary rod which bears against the aforesaid valve when the hollow shaft arrives above the receiving plate.

6. An apparatus according to any one of the preceding claims adapted to be associated with a moulding device comprising a stationary part and a moving part,

in which apparatus the stacking means comprises a swinging arm integral with a shaft on which is keyed a crank controlled by displacement of the moving part of the moulding device.

7. An apparatus according to any one of the preceding claims, wherein each of the retractable abutments of the discharge means is constituted by a moving part of a pneumatic jack, which part is engaged in a longitudinal groove of the receiving plate.

8. An apparatus according to claim 7, wherein the pneumatic jacks are supported by a moving cross member, provided in the manner of a carriage arranged to undergo controlled reciprocating motion.

9. An apparatus according to claims 6 and 8, wherein the retractable abutments and means for reciprocating the cross member are placed under the control of a counting mechanism actuated by the moving part of the mould device.

10. An apparatus for extracting from a moulding device, hollow articles such as cups, jars and similar packaging articles produced by moulding synthetics material and for subsequent discharge and stacking of the hollow articles, the apparatus being substantially as herein-before described with reference to the accompanying drawings.

MARKS & CLERK,
Chartered Patent Agents.
Agents for the Applicants.