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L. FINK ET AL

3,608,152

MOLD CARRIER FOR INJECTION OR VULCANIZING MOLDS

Filed May 18, 1970

2 Sheets-Sheet 1

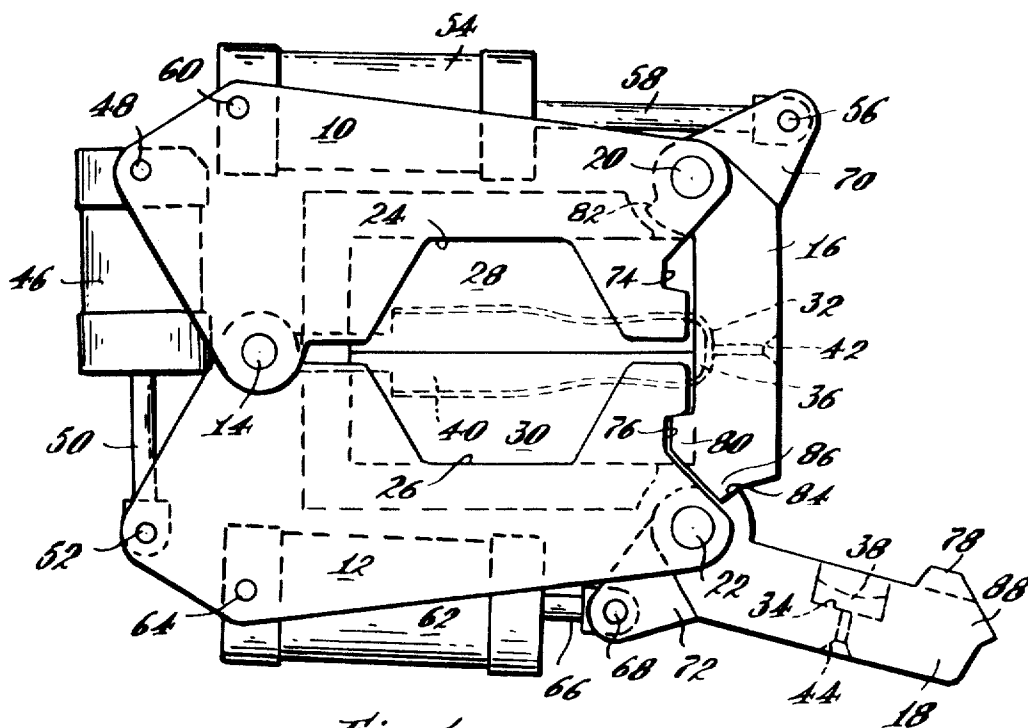


Fig. 1

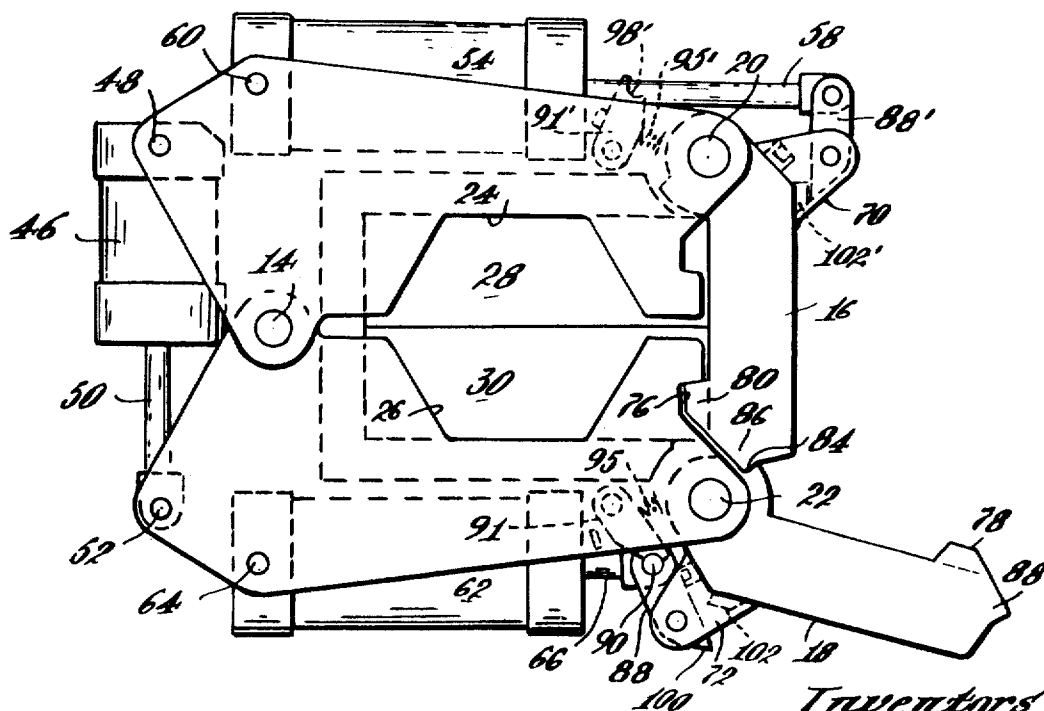


Fig. 2

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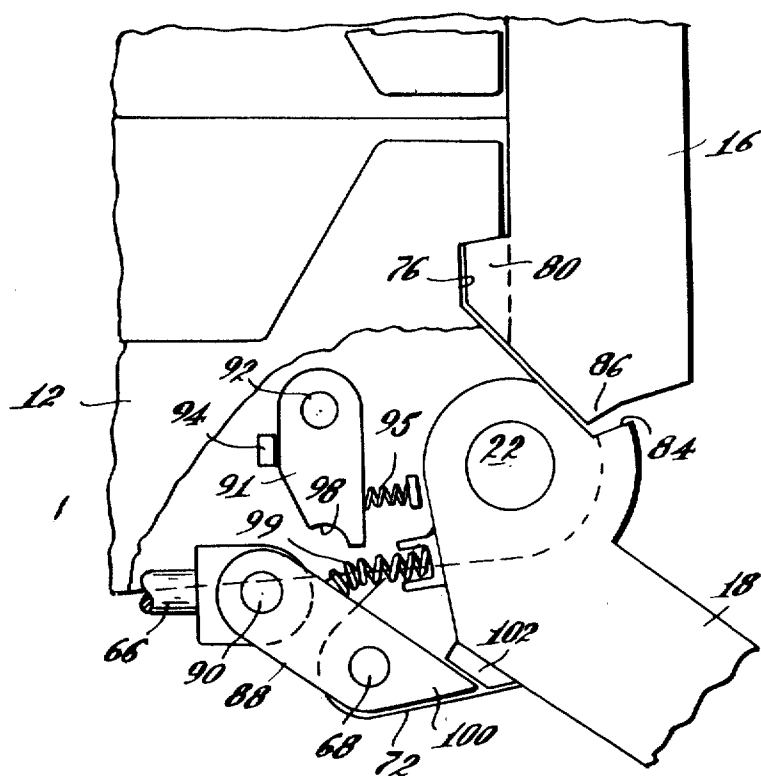


Fig. 3

1

3,608,152

MOLD CARRIER FOR INJECTION OR VULCANIZING MOLDS

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8 Claims

ABSTRACT OF THE DISCLOSURE

A mold carrier comprising two side parts pivotally connected at one end for movement of the parts toward and from each other and third and fourth end parts pivotally connected to the respective opposite ends of the side parts which are alternatively engageable with the ends of the two side parts to provide an enclosure for holding the component parts of a mold assembly clamped together. There are shoulders on each of the end parts engageable with notches on the side parts by means of which each end part when disposed across the ends of the side parts is adapted to hold the side parts clamped together, while the other end part is disposed in a lateral, inoperative position. There is a cylinder and piston assembly including a piston rod operably connected to the side parts to move them toward and away from each other and cylinder and piston assemblies including rods connecting the side and end parts for moving the end parts into and out of engagement with the side parts. Additionally, there are auxiliary locking means comprising at each side a link pivotally connected to the end of the piston rod at that side and a latch plate pivotally connected to the side part having a notch at one end adapted to engage the pivot connecting the link to the piston rod by extension of the latter to move the adjacent ends of the lever and latch plate beyond the line of centers of these pivots to a locking position whereupon the cylinder may be exhausted without unlocking the parts.

BACKGROUND OF THE INVENTION

Mold carriers comprised of two side parts and differently functioning end parts cooperable therewith to hold the parts of a multi-part mold together during molding operations are disclosed in U.S. Pat. Nos. 3,128,505 and 3,160,921. The purpose of this invention is to provide means for locking the side parts and one or the other of the end parts together during the molding operation, which means is duplicated for each combination of side parts with an end part thereby reducing the cost of manufacture and to provide means which is simple in construction and operation and yet is reliable.

SUMMARY

As herein illustrated, the carrier comprises pivotally connected side parts and alternately functioning end parts pivotally connected to the respective distal ends of the side parts, the side and end parts when closed encompassing the mold parts. Each side part has at its distal end a recess situated between the line of centers of the pivots connecting the end parts to the distal ends of the side parts and the pivot connecting the side parts and each end part has, respectively, a boss adjacent its distal end adapted to be engaged with the recess in the distal end of the side part other than that to which it is pivotally connected. A piston and cylinder assembly including a rod is provided for moving the side parts to and from each other and piston and cylinder assemblies including rods are provided for moving each end part relative to the side part to which it is connected. Each end part has also at

2

its proximal end a radial shoulder and at its distal end an extension, the shoulder of one end part being engageable with the distal end of the other end part when the latter is disposed across the ends of the side parts to prevent its disengagement from the end parts and vice versa. Auxiliary locking means may be provided at each side comprising a link pivotally connecting the distal end of the piston rod to the end part at that side and a latch plate pivotally mounted to the side part adjacent the pivot connecting the link to the piston rod. The adjacent ends of the link and latch plate are adapted to be moved beyond the line of centers of their respective pivots to a locking position by extension of the piston rod.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is an elevation of the holder with the parts closed;

FIG. 2 is a similar elevation of the holder with auxiliary locking means; and

FIG. 3 is a fragmentary section, to much larger scale, of the locking means shown in FIG. 2.

Referring to the drawings, the holder comprises side parts 10 and 12 pivotally connected at one end by a hinge pin 14, the aforesaid side parts having at their opposite ends end members 16 and 18 pivotally connected thereto by hinge pins 20 and 22. The side parts 10 and 12 of the holder contain interior confronting recesses 24 and 26 adapted to receive the side parts 28 and 30 of a multi-part mold assembly and the end members 16 and 18 of the holder contain recesses 32 and 34 adapted to receive mold parts 36 and 38 alternately cooperable with the side parts to provide for differently shaped mold parts and/or for multi-color injection.

As illustrated, the mold is adapted to have supported interiorly thereof a last 40, as disclosed, for example, in Pat. No. 3,160,921, about which the molding compound is adapted to be molded. The end members 16 and 18 contain injection passages 42 and 44 through which the moldable material is adapted to be injected into the mold about the last. It is to be understood, however, that the holder can be employed advantageously for holding the parts of a mold assembly wherein the moldable material is placed in the mold prior to closing rather than injected into the mold after closing to form an article by compression molding.

To enable moving the mold parts into engagement preparatory to a molding operation and after molding to separate the mold parts to permit removing the molded article, the side parts 10 and 12 of the holder are pivotally connected by the hinge pin 14 so that they may be moved toward and away from each other about the axis of the hinge pin. Such movement is provided for by a piston and cylinder assembly comprising a cylinder 46 pivotally connected by a hinge pin 48 to the side part 10 and a piston rod 50 extending from the cylinder pivotally connected by a pin 52 to the side part 12. The line of centers of the hinge pins 48 and 52 are disposed rearwardly of the axis of the hinge pin 14 in relation to the forward ends of the side parts so that extension of the piston rod 50 moves the side parts toward each other and contraction moves the side parts away from each other.

As related above, after the side parts are brought together a first injection may be made with one end part 16 and then with the other end part 18, while the other end part or the one end part is moved to a lateral out of the way position. Such movement is effected by power-operable means in the form of cylinder and piston assemblies comprising a cylinder 54 pivotally connected by a hinge pin 60 to the side part 10 and a piston rod 58 extending from the cylinder and pivotally connected by a pin 56 to the end part 16, and similar power operable

means comprising a cylinder 62 pivotally connected by a hinge pin 64 to the side part 12 and a piston rod 66 extending from the cylinder and pivotally connected by a hinge pin 68 to the end part 18. Radially extending arms 70 and 72 at the pivoted ends of the end members 16 and 18 provide for connecting the ends of the rods 58 and 66 to the end members. By contraction of the piston rods 58 and 66, the end members 16 and 18 may be swung about their hinge pins 20 and 22 to lateral positions away from the ends of the side parts 10 and 12 and by extension of the piston rods 58 and 66 the end parts 16 and 18 may be moved into engagement with the ends of the side parts.

It is desirable to lock the side parts and alternately one end member or the other end member in engagement with each other during the molding operation and this is achieved herein in accordance with this invention by interengagement of certain parts of the end members 16 and 18 with the ends of the side parts 10 and 12 and with each other. As illustrated (FIG. 1) the ends of the side parts 10 and 12 contain notches or depressions 74 and 76 and the ends members 16 and 18 in turn are provided at their inner sides, that is, the sides which confront the ends of the side parts when they are disposed across the ends of the side parts with projections 78 and 80, corresponding in configuration to the notches 74 and 76 for interengagement therewith. Since the bottoms of the notches 74 and 76 are disposed rearwardly of the line of centers of the hinge pins 20 and 22, pressure exerted in a direction to force the side parts away from each other will have a tendency to displace the end members away from the ends of the side parts and to prevent such displacement the end members 16 and 18 are provided at their hinged ends with radial shoulders 82 and 84 for engagement with protrusions 86 and 88 at the ends of the end parts. Engagement of the radial shoulder 84 with the protrusion 86 is effected when the end part 16 is disposed transversely of the side parts and the end part 18 is disposed in its lateral position as shown in FIG. 1. Engagement of the radial shoulder 82 with the protrusion 88 is effected when the end part 18 is disposed transversely of the side parts and the end part 16 is disposed in its lateral position.

In the form of the invention shown in FIG. 1, the end member 18, for example, when held in the lateral position by the cylinder and piston assembly associated therewith, takes up a position which is slightly divergent with respect to the center line of the mold support, that is, a line passing through the hinge pin 14, in which position the shoulder 84 abuts the protrusion 86 thus directly opposing movement of the end member 16 away from the ends of the side parts. If desired, pressure can be supplied to the cylinder and piston assembly to positively apply pressure through the end member 18 and hence prevent any degree of internal pressure within the holder from disengaging the end member 16 from the ends of the side members. In the same manner, if the end member 18 is engaged with the ends of the side members, the end member 16 may be held forcibly locked against the end member 18.

Auxiliary locking means is shown in FIGS. 2 and 3, which eliminates having to maintain pressure in the cylinders 54 and 62 to hold the end members in locking position. This auxiliary locking means is identical for both end members and hence the following description will be confined to a description of the components of the locking means at one side only, the corresponding components at the other side being identified by the primes of the reference characters applied to the side to be described. As illustrated (FIG. 3), the auxiliary locking means comprises a link 88 pivotally connected at one end by a hinge pin 90 to the piston rod 66 and at its other end to the hinge pin 68 thus providing an intermediate connection between the piston rod and the arm 72. A latch plate 91 is pivotally connected at one end by a hinge pin

92 to the side part 12 in a position extending laterally outward from its hinge pin toward the end of the piston rod 66, in which position it is held between a fixed stop 94 and a spring member 95. The distal end of the latch plate 91 contains an arcuate notch 98 which is adapted to be engaged with the hinge pin 90 when the piston rod is extended to a position such as to swing the end member 18 into locking engagement of its radial shoulder 84 with the protrusion 86 and by extension into this locking position to move the axis of the hinge pin 90 and hence the adjacent ends of the link and latch plate beyond the line of centers of the hinge pins 92 and 68 (FIG. 2), thus biasing the link and latch plate to a position such that any pressure exerted on the end member 18 will merely increase the locking action of these parts. By providing this auxiliary locking means it is safe to exhaust the pressure from the cylinder 62 without danger of the end member 18 moving away from its locking position. To release the locking engagement of the end member 18 with the end member 16, it becomes necessary to supply pressure to the opposite end of the cylinder 62 to positively move the link and latch plate rearwardly from their biased positions across the line of centers of the hinge pins. The spring 95 assists rearward movement of the latch plate 91 toward the stop 94 and a spring 99 assists movement of the link 88. Preferably the link 88 is provided with an extension 100 engageable with a shoulder 102 on the end member 18 to limit the lateral position of the end member.

The locking means disclosed herein are automatic in operation in that they are engaged to effect locking by the simple expedient of applying pressure to the respective cylinders and are disengageable after the molding process by again supplying pressure to the respective cylinders but in the opposite direction, thus eliminating the necessity for manual engagement and disengagement of the locking mechanism and the attendant hazards.

It should be understood that the present disclosure is or the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

We claim:

1. A mold carrier or holding the component parts of a multi-part mold clamped together, comprising a pair of pivotally connected side parts and alternately functioning end parts pivotally connected to the respective distal ends of the side parts, said side and end parts, when closed, encompassing the mold parts; characterized in that each side part has at its distal end a recess situated between the line of centers of the pivots connecting the end parts to the distal ends of the side parts and the pivot connecting the side parts, and each end part has, respectively, a shoulder adjacent its distal end adapted to be engaged with the recess in the distal end of the side part other than that to which it is pivotally connected.

2. Apparatus according to claim 1, comprising a piston and cylinder assembly including a rod extending from the cylinder, said cylinder being pivotally connected to one side part and said rod being pivotally connected to the other side part, said pivots being located rearwardly of the pivot connecting the proximal ends of the side parts, said cylinder being operable by extension of the rod to swing the side parts toward each other to close the side parts forwardly of the pivot connecting the proximal ends on a mold assembly placed therebetween, and said side parts containing confronting recesses of corresponding configuration for receiving the mold parts.

3. Apparatus according to claim 1, comprising an arm on each end part extending substantially radially from its pivot and a cylinder and piston assembly including a rod mounted on each side part with the cylinder pivotally connected to the side part and the rod pivotally connected to the distal end of the arm, said cylinders being adapted by extension of the rod to move the end parts from a lateral position to a position of engagement with the distal

5

ends of the side parts, and by contraction of the rods to move the end parts from engagement with the distal ends of the side parts to lateral positions, said cylinders being independently operable to simultaneously move one end member into operative position and the other member out of operative position and vice versa.

4. Apparatus according to claim 1, comprising a second shoulder at the distal end of each of the end parts and a recess at the proximal end of each of the end parts, the second shoulder of the one end part being adapted to be engaged with the recess at the proximal end of the other end part when the one end part is engaged with the ends of the side parts and the other is disposed laterally thereof.

5. Apparatus according to claim 1, comprising locking means for fixing the lateral position of each end part, each locking means comprising a link pivotally connected at one end to the distal end of the piston rod on the side part at that side and at its other end to the distal end of the arm on the end part at that side, and a latch plate pivotally mounted on the side part adjacent the pivot connecting the end part thereto, said latch plate containing a notch at its distal end engageable with the pivot connecting the distal end of the rod to the link when the end part occupies its lateral position, by extension of the rod, said link and latch plate being movable beyond the line of centers of said pivots so as to lock the end part at said lateral position without maintaining pressure in the cylinder.

6. Apparatus according to claim 5, comprising spring means opposing movement of said link and latch plate

6

to said locking position so as to assist in returning said link and latch plate to their non-locking position when the link is retracted by the piston rod connected thereto.

7. Apparatus according to claim 5, comprising a stop on the end part limiting off-center displacement of the latch plate.

8. Apparatus according to claim 5, comprising an extension on said link and an abutment on the proximal end of the end part adjacent thereto, operable to limit lateral movement of said end part.

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U.S. Cl. X.R.

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