United States Patent

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[33] **Italy**
[31] **12160A/68**

[54] **MOLD-CARRYING APPARATUS FOR MULTISTATION INJECTION-MOLDING MACHINES FOR THE FORMATION OF FOOTWEAR IN GENERAL**
4 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** ..... **18/4 P,** 18/17 E, 18/17 S, 18/34 S
[51] **Int. Cl.** **B29h 7/08**
[50] **Field of Search** ..... 18/4 P, 17 E, 17 S, 34 S

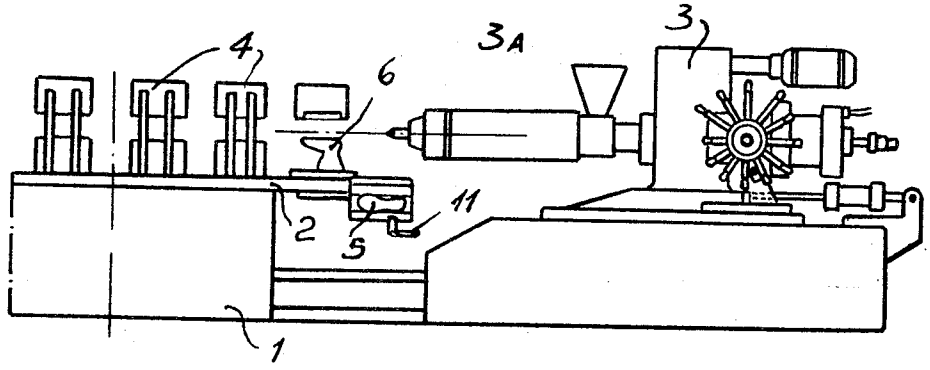
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ABSTRACT: This disclosure relates to a mold-carrying apparatus to be fitted to a multistation injection molding machine for the molding or articles of natural or synthetic resin, and particularly for the molding of footwear, said apparatus comprising a support pin projecting from the front entrance of each of the dies of said molding machine, a multipositionable sleeve member rotatably mounted on said pin, a plurality of plates fast with the said peripheral rim of said sleeve member, guide means of each of said plates and arranged to extend parallel to the axis of said sleeve and said pin, a plurality of molds provided with support plates and slide guides, each of said molds being engaged with one of said plates the arrangement being such that, in at least one of the positions which said sleeve may assume, said plates are in relation with the lower internal horizontal plane of said dies, locking means being provided for releasably locking said support plates with the respective plates secured to said molds.



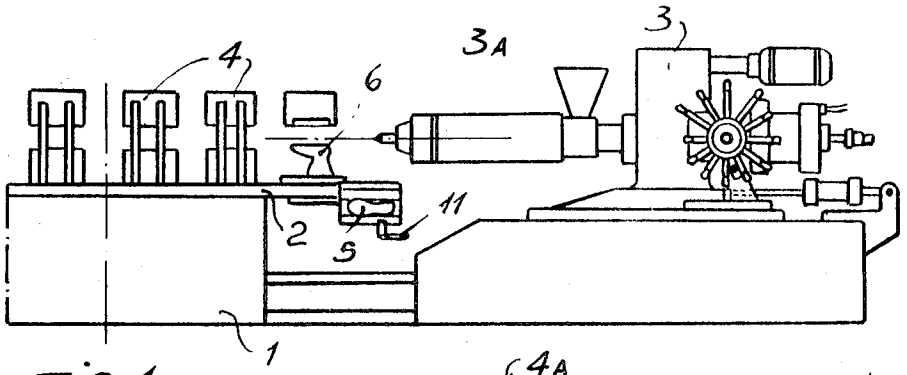


FIG. 1

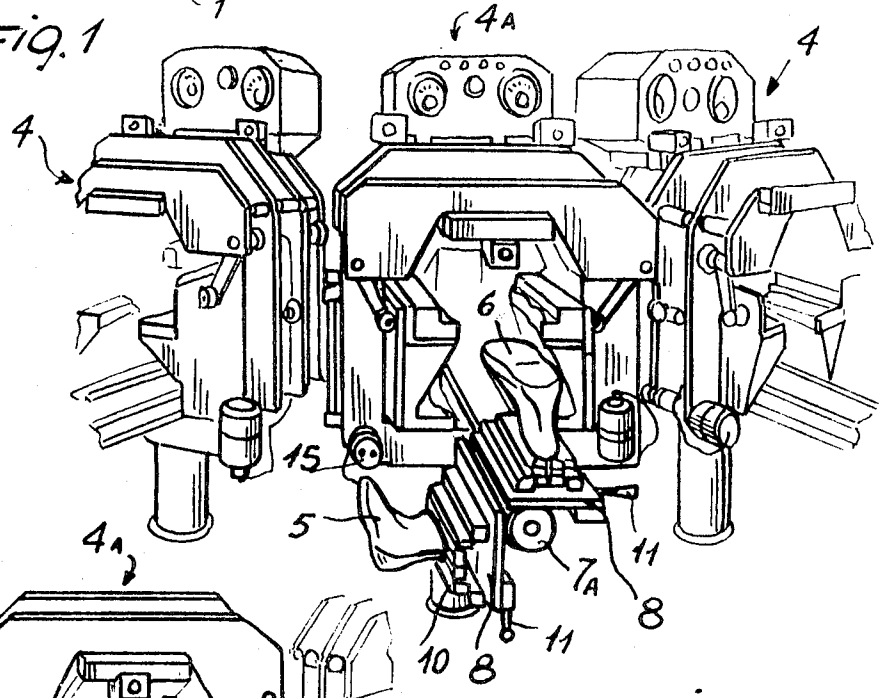


FIG. 2

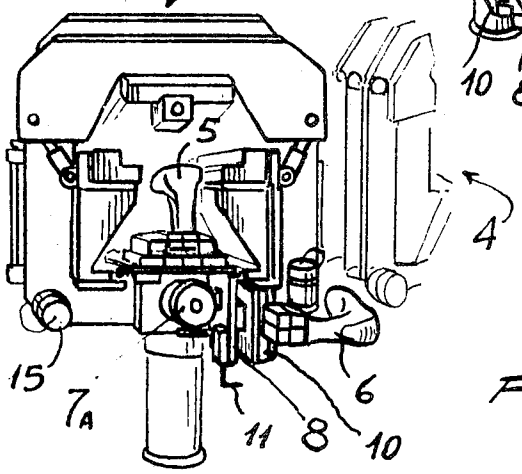


FIG. 3

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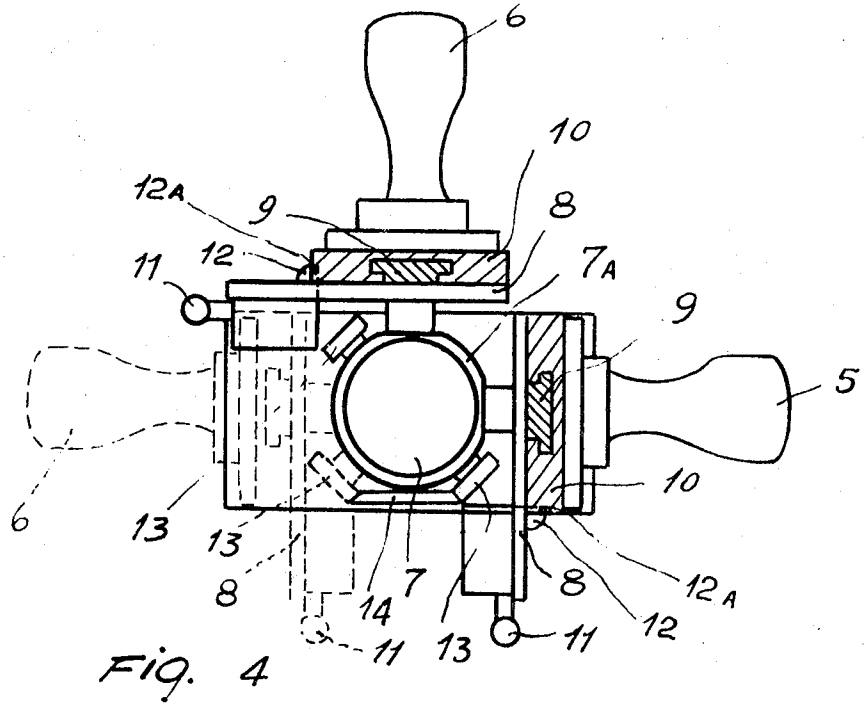


FIG. 4

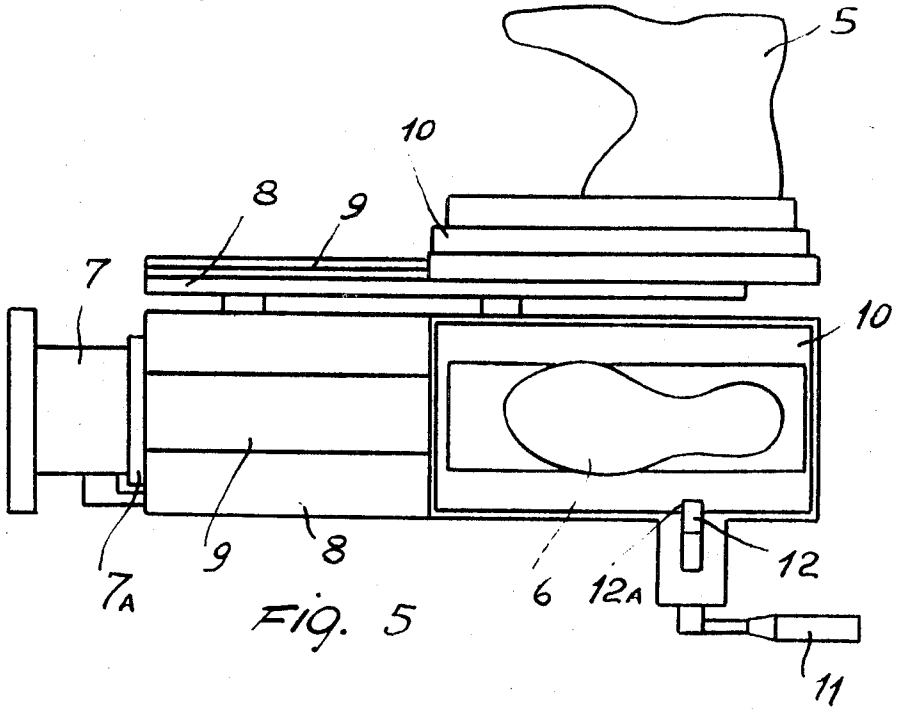


FIG. 5

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MOLD-CARRYING APPARATUS FOR MULTISTATION INJECTION-MOLDING MACHINES FOR THE FORMATION OF FOOTWEAR IN GENERAL

BACKGROUND OF THE INVENTION

This invention relates to a mold-carrying apparatus with molds to be fitted to multistation injection molding machines for the molding of articles of natural or synthetic resin, and particularly for the formation of footwear in general.

It is known that in the formation of footwear with soles of natural or synthetic resin, the previously formed vamp must be introduced at the terminal phase of manufacture into the dies which determine the formation of the sole by injection fitted on to suitable molds.

However, prior to the formation of the sole, or in some cases after the sole has been formed, it is often necessary to heat for a sufficiently long time the said mold with the vamp fitted on it, either without or with the sole already formed, for the purpose of obtaining a particular heat treatment of some parts of the vamp or sole.

For example, it is sometimes necessary before forming the sole, to heat the vamp for a certain time in order to complete a process of vulcanization of the strengthening piece applied to the back of the footwear. The manufacturing phases are mostly carried out separately on separate apparatus in a manner which is not always rational, with a high consumption of time and labor and a considerable adverse effect on the cost of the finished product.

In order to obviate this disadvantage, it has already been proposed to employ double molds which enable the formation of the sole on one mold and at the same time the pre- or after-treatment on the other mold. These double molds have, however, the disadvantage of not being utilizable on injection machines with rotating platforms provided with groups of dies, because the presence of the cylinder of the injector for the synthetic or natural material impedes the fitting of members to the groups of the dies which could interfere with the injector cylinder during the rotation.

The main object of this invention is that of obviating the disadvantage mentioned above relative to conventional systems by providing a mold-carrying apparatus with at least two molds, by means of which the said manufacturing phase which precedes or follows the formation of the sole, is effected in a rational manner simultaneously with the normal manufacture, thus without giving rise to idle production times, the apparatus also being applicable to injection machines with multiple die stations mounted on rotating platforms.

According to the invention there is provided a mold-carrying apparatus for injection-molding machines with multiple dies mounted on a rotating platform for the molding of articles of natural or synthetic resin, particularly for the formation of footwear in general, which comprises a support pin arranged to project at the front opening of each of said dies, a multipositionable sleeve rotatably mounted on said pin, a plurality of plate members, rigidly secured to the peripheral rim of said sleeve, guide means on each of said plate members and arranged to extend parallel to the axis of said sleeve and said pin, a plurality of molds provided with support plates and slide guides, each of said molds being engaged with a corresponding member of said plurality of plate members, the arrangement being such that in at least one of the positions assumable by said sleeve said plate members are in relation with the lower internal horizontal plane of said dies, locking means being provided for temporarily locking said support plates for the molds with the respective plate members secured to said sleeve.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will appear more clearly from the following detailed description of a preferred embodiment of a mold-carrying apparatus for an injection machine, with multiple dies on a rotating platform for the molding of footwear in natural or synthetic resin according to the invention, illustrated by way of example in the accompanying drawings in which:

FIG. 1 is a lateral diagrammatic view of an injection machine with multiple stations provided with the apparatus according to the invention;

FIG. 2 is a perspective view of part of the rotating platform of the same multiple die machine, with a mold-carrying mechanism in the rest position;

FIG. 3 is a perspective view of a mold-carrying mechanism during the phase of introduction of a mold into the dies;

FIG. 4 is a transversal sectional view of a mold-carrying mechanism; and

FIG. 5 is a lateral view of the mold-carrying mechanism shown in FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to said figures, the mold-carrying apparatus according to the invention is secured to an injection-molding machine of the multiple die type, which comprises a rotating platform 2 carrying the dies and an injection mechanism 3 whose injection cylinder 3*a* is arranged radially to said rotating platform 2. The said injection mechanism 3, may be, for example, of the type described in Italian Pat. No. 701,564 of the same applicant.

According to one known arrangement, the rotating platform 2 supports a plurality of die-carrying units 4 for the formation of the sole of the footwear.

The apparatus according to the invention provides a pair of molds 5 and 6 for each die unit 4, said molds being arranged to be fitted with the vamps of the footwear to be molded. As is clearly shown in FIGS. 4 and 5, said molds 5 and 6 are arranged to project radially so as to correspond with each die unit 4. More precisely, a sleeve structure 7A is mounted on each pin (see FIGS. 4 and 5) so that it rotates, and rigidly supports two plates 8 to which prismatic guides 9 are secured. Two plates 10 are slidably mounted on said prismatic guides 9 and support said molds 5 and 6.

Said plates 10 can be locked or unlocked relative on the guides 9 by means of handles or levers 11 linked to respective stops 12 which are inserted into corresponding slots 12A formed on the side of the plates 10.

With such an arrangement the molds 5 and 6 are arranged at 90° to one another and can be rotated simultaneously around the pin 7 so as to be positioned as represented in FIG. 4, or in an arrangement at 90° to this by rotation in anticlockwise direction, once again with reference to FIG. 4 (in this figure the position of the mold 6 after the said rotation of 90° in the anticlockwise direction is shown with the dotted line). The position of the molds 5 and 6 is determined by the use of projections 13 with a stop 14 (FIG. 4). Said projections 13 are fast with the structure 7A rotating around the pin 7 and the stop 14 is fast with the fixed frame of the apparatus.

Both the molds 5 and 6 are provided internally with heating means, such as, for example, electrical resistances, which can be connected to a current supply 15 (FIG. 2) associated with each die unit 4.

The working of the apparatus according to the invention is as follows:

Starting with the arrangement shown in FIG. 2, and supposing that the operator is in front of the die 4A with the mold 6 in the raised position, and that the heating means of the molds 6 and 5, are connected to the current supply 15, then the parts of the footwear mounted on the said molds 5 and 6 can be suitably heated for the desired time, there being available a time interval practically corresponding to a complete revolution of the rotating die-carrying platform 2. In this way the vulcanization of parts of the footwear, such as the stiffener on the back of the footwear, can be completed before the operation of molding the sole. All this occurs, as can be seen, without the mold carrying the vamp to be treated interfering with the injector cylinder 3A because of the overturned positioning of the mold, outside the horizontal plane of the rotating platform.

The vamp fitted on the the mold **6**, assuming it to be already ready, is introduced into the respective die unit **4A** by sliding the plate **10** on the guide **9**, after unhooking the stop **12** by moving the respective lever **11**. When, after a complete revolution and after having passed in front of the injector which has carried out the formation of the sole, said die unit **4A** once again reaches the initial position in front of the operator, said mold **6** with the vamp will be extracted, so obtaining a finished product (with the sole finished), while the connection between the heating means and the current supply **15** will be maintained.

At this point it is possible to rotate the molds **5** and **6** through 90° so as to move the mold **5** upwards and the mold **6** sideways, after having removed the already finished footwear from the mold **6**. A new vamp to be processed is then fitted on to this latter mold, while maintaining the heating means of the mold **6** connected to the current supply **15**.

The mold **6**, which is now in the upper position, supports a vamp ready to be introduced into the relative die unit **4A** and to receive the sole, as the hot pretreatment carried out by the relative heating means incorporated in the mold has been completed.

The mold **5** is then introduced with the respective vamp into the die unit **4A** which, during the rotation of the plate **2**, moves so as to correspond with the injector **3** for the application of the sole.

When the die unit **4A** returns in front of the operator, the mold **5** is carried outwards because of sliding of the relative plate **10** on the guide **9**, and the finished product can be removed, thence proceeding to the fitting of a new vamp and to the rotation of the molds **5** and **6** through 90° so as to arrive at the initial position.

The process proceeds in the same way, by operating on each pair of molds **5** and **6** associated with each of the die units **4** in the manner indicated.

As can be seen, the apparatus according to the invention allows the application of multiple molds, even to an injection-molding machine of the rotating platform type. The invention as conceived is susceptible to numerous modifications and

variations within the scope of the appended claims. For example the multiple molds which in the apparatus described are two in number, can evidently be of greater number, care being taken to ensure that the vamps undergoing pre- or after-treatment, do not interfere during the rotation of the platform **2** with the cylinder of the injector **3A**.

I claim:

1. A mold-carrying apparatus for injection-molding machines with multiple dies mounted on a rotating platform for the molding of articles of natural or synthetic resin, particularly for the formation of footwear in general, which comprises a support pin arranged to project at the front opening of each of said dies, a multipositionable sleeve rotatably mounted on said pin, a plurality of plate members rigidly secured to the peripheral rim of said sleeve, guide means on each of said plate members and arranged to extend parallel to the axis of said sleeve and said pin, a plurality of molds provided with support plates and slide guides, each of said molds being engaged with a corresponding member of said plurality of plate members, the arrangement being such that in at least one of the positions assumable by said sleeve said plate members are in relation with the lower internal horizontal plane of said dies, locking means being provided for temporarily locking said support plates for the molds with the respective plate members secured to said sleeve.

2. An apparatus as claimed in claim **1** in which said plate members are secured to the periphery of said sleeve at points 90° apart with respect to the axis of the said sleeve.

3. An apparatus as claimed in claim **1** in which said locking means temporarily locking said support plates of the molds on to the respective plate members comprise a clasp flexibly attached to each of said plate members and a slot formed on the side of each of said support plates, together with a lever attached to said clasp for its engagement and disengagement with said slot.

4. An apparatus as claimed in claim **1** in which each of said molds includes incorporated electrical heating means, fed from a supply associated with said dies.