Jan. 5, 1971 H. RAMM 3,551,957

METHOD AND APPARATUS FOR MOLDING ICE SKATES

Filed Nov. 5, 1968 3 Sheets-Sheet 1

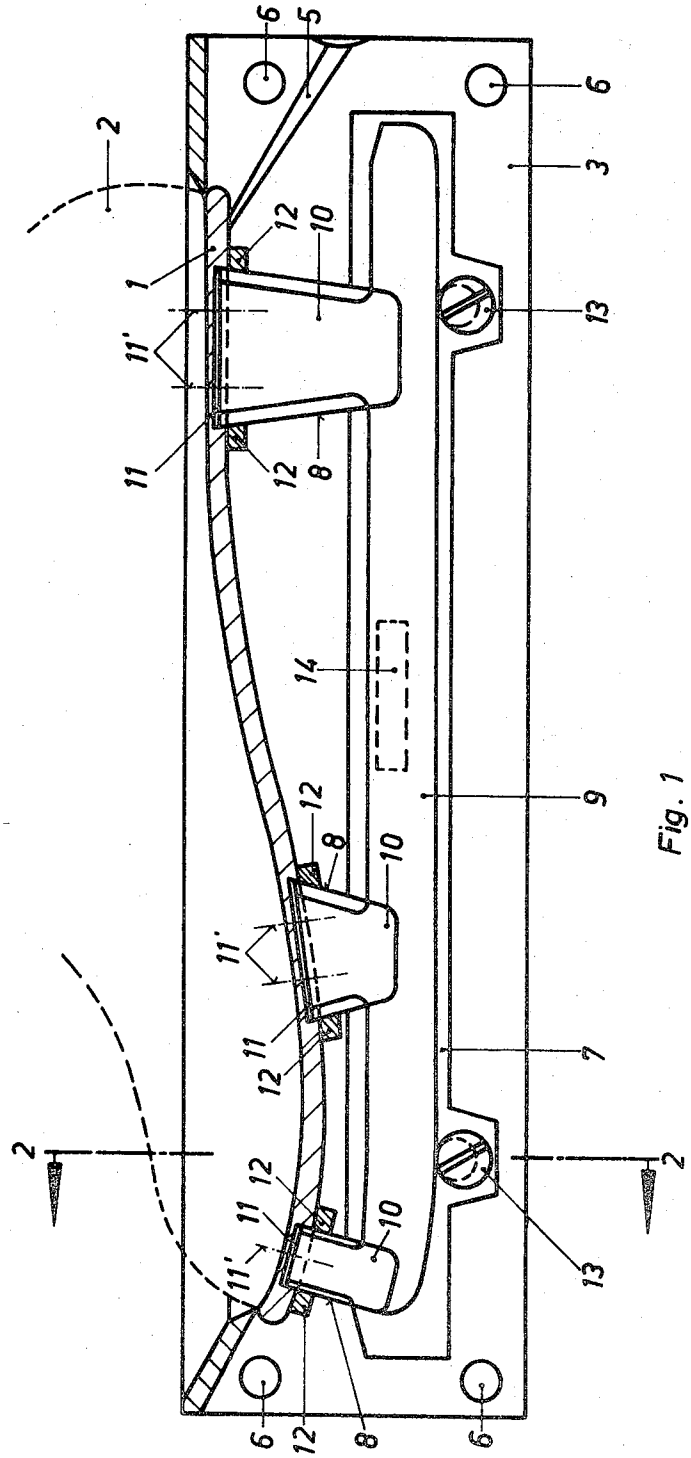

Fig. 1

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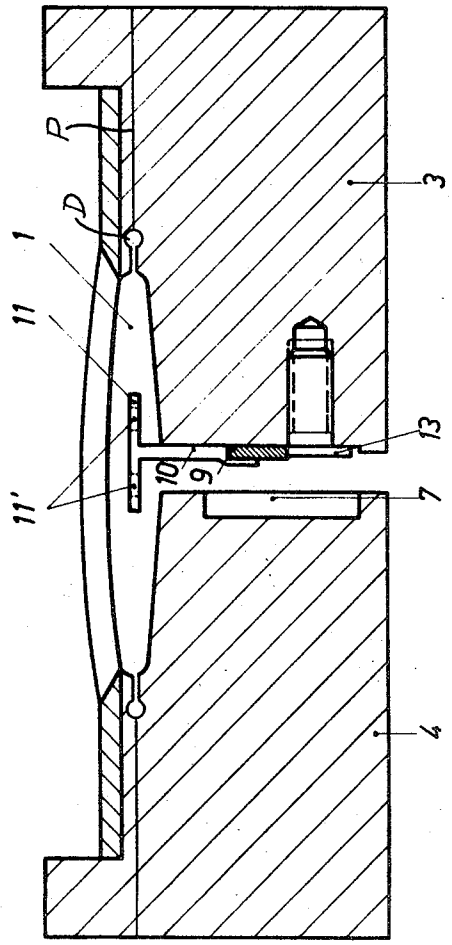

Fig. 2

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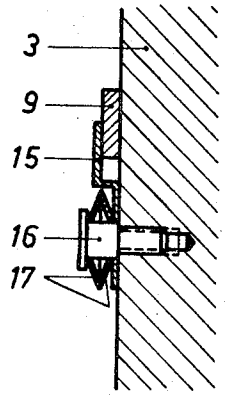

Fig. 3

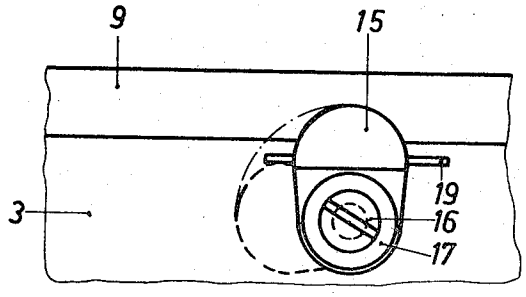

Fig. 4

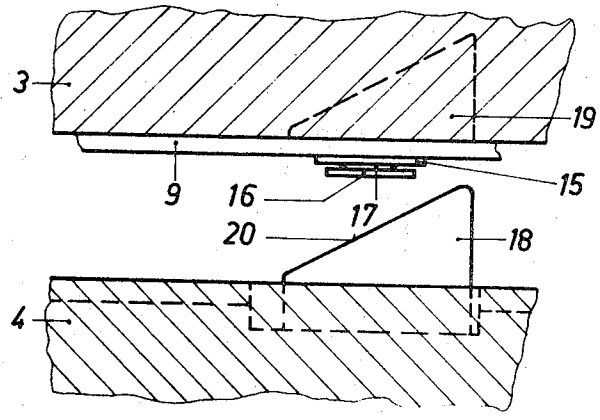

Fig. 5

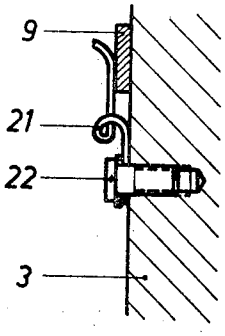

Fig. 6

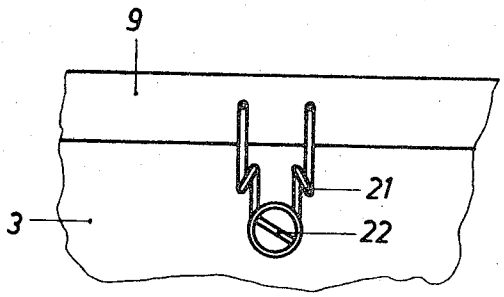

Fig. 7

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3,551,957

METHOD AND APPARATUS FOR MOLDING ICE SKATES

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Int. Cl. B29c 6/00
U.S. Cl. 18—36 12 Claims

ABSTRACT OF THE DISCLOSURE

A method and apparatus for making ice skates comprises positioning the flanged portions of the skate blade which are adapted to be attached to the shoe sole of the skate in a mold cavity and also positioning the bottom of the skate shoe top in the cavity, the blade flanged portions being positioned relative to the shoe top. The shoe sole is formed by introducing a composition into the cavity, embedding the flanged portion of the blade and the bottom of the shoe top in the sole.

BACKGROUND OF THE INVENTION

This invention relates to apparatus for making ice skates and, more particularly, to apparatus for making ice skates in which the blades and shoe tops are directly cast in embedded relationship with the sole of the ice skate shoe.

Up to now, the blades of ice skates have been customarily fastened to the finished sole of the skate shoe by screwing, riveting or otherwise appropriately connecting flanged portions of the blades to the bottom of the finished shoe sole after the shoe has been formed. This is both time consuming and expensive, especially where quantity production is desired. In addition, correct and exact placement of the skate blades is not always assured and the danger exists that after a period of use, the blades will become loose. The last-mentioned difficulties are particularly undesirable where the skates must be of high quality for demanding use, such as for use by professional skaters. Also, in practice, skates formed in the customary manner have resulted in considerable production expenditures.

By employing the apparatus of my invention in the manufacture of skates, the abovementioned disadvantages are avoided. The soles of the skates formed in accordance with the principles of my invention are formed by directly casting the sole to the shoe top and the upper ends or flanged portions of the blades, the flanged portions being completely embedded in the sole material and maintained at a fixed and exact position and distance from the shoe top. By embedding the blade flanges in the sole material during the casting of the sole onto the shoe top, one single working procedure only is necessary to unite the sole, the shoe top and the skate blade, consequently avoiding the additional operating procedures required in the previous skate constructions. In addition, it has been discovered when the apparatus of my invention is employed, decidedly narrow tolerances in the position of the blade relative to the shoe can be maintained and that a durable attachment of the blade is realized, the blade remaining firmly fixed even after long periods of use.

SUMMARY OF THE INVENTION

In a principal aspect, the apparatus of my invention comprises a two part mold having a cavity formed therein such that when the mold parts are positioned together the cavity takes the shape of the sole of the skate shoe. The mold includes means for receiving and positioning the skate blade with its flanged portion in the cavity and the cavity also includes an opening therein for positioning the bottom of the skate shoe top therein. Means is provided

for introducing a sole forming composition into the cavity whereby a shoe sole with the shoe top and blade flanges firmly embedded therein is formed.

These and other objects, features and advantages of my invention will become evident upon a consideration of the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

In the course of this description, the drawings will frequently be referred to in which:

FIG. 1 is a side elevation view of one mold half of my invention with a view onto the mold junction plane;

FIG. 2 is a cross sectioned end elevation view of the mold taken substantially along line 2—2 of FIG. 1 and additionally showing another embodiment of injection passages;

FIG. 3 is a cross sectioned elevation view of one embodiment of a skate blade holding device;

FIG. 4 is a side elevation view of the holding device of FIG. 3;

FIG. 5 is a cross sectioned plan view of the two mold halves and the holding device of FIGS. 3 and 4;

FIG. 6 is a cross sectioned elevation view of another embodiment of the skate blade holding device; and

FIG. 7 is a side elevation view of the holding device of FIG. 6.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 and 2, a mold is shown which is constructed in two parts, having mold halves 3 and 4 which are set together in a suitable installation (not shown), such as a mold jig, in such a manner that they may be easily shifted way from one another in an opening motion and toward one another in a closing motion. When the two halves are moved to closed position, their precise position in relation to one another is assured by centering pins 6 which extend in the junction plane of the mold halves from one mold half and which are adapted to enter an appropriate bore in the other mold half. A recess is located at the upper side of each of the two mold halves which, when the mold halves are closed, combine to form a mold cavity 1. During the molding process, the cavity is closed by a shoe top 2 indicated by dotted lines, which is mounted on a tree or other suitable form to maintain the shoe top in its ultimately desired shape as the sole forming composition is introduced into the mold cavity to form an intimate bond with the bottom of the shoe top.

The sole composition material is injected into the cavity through a passage 5 in the mold. As shown in FIG. 1, the passage 5 is intersected over its length by the junction plane of the mold halves to facilitate cleaning. The injection passage may also be formed by a distribution passage running approximately parallel to the mold cavity 1 and which is connected with the mold cavity via several inwardly directed passages. An example of the latter construction is shown as D in FIG. 2. Where the distribution passage and inwardly directed passages are provided, the junction plane of the two mold halves will not bisect the passages. In this event, each of the mold halves 3 and 4 are preferably constructed in two additional separable parts along a second junction plane D in FIG. 2, so that the distribution passage and inwardly directed passages are accessible for cleaning after the injection process is completed.

The junction plane of the two mold halves longitudinally substantially bisects the shoe top 2 and cavity 1 and intersects a cavity 7 positioned below the mold cavity 1 in the mold halves. Cavity 7 is connected with mold cavity 1 by several connecting passages 8. The skate blade 9 is received in cavity 7 in such a manner that its posts 10 extend into mold cavity 1 through the connecting passages 8. A seal 12, formed of a material such as Teflon,

is provided about the cavity end of the passages **8** where the passages open into the cavity to prevent the material which is injected into the mold cavity under pressure from entering the gap between the posts **10** and the wall of the connecting passage **8**. The seal **12** also acts to provide exact lateral placement and positioning of the posts **10** in the connecting passages.

The skate blade **9** is laid in such a manner that it first of all temporarily held in the junction plane of the one of the two mold halves **3** when the mold is open. To hold the blade two eccentric screws **13** and an adhesive magnet **14** are provided on mold half **3** intermediate the ends of the blade **9**. The skate blade **9** is placed on the eccentric screws **13** and the position of the fastening flanges **11** in mold cavity **1** is adjusted by turning the eccentric screws **13** such that during the sole molding process the flanges are at the desired distance relative to the bottom of the shoe top **2** and properly positioned in the cavity **1**. Such distance and location relative to the shoe top becomes fixed after the sole has been formed in its final hardened state.

If conventional blades are used, the fastening flanges **11** usually include apertures **11'** for accommodating the conventional fastening screws, rivets, or the like. These apertures are not only useful, but it is preferred to even enlarge the apertures **11'** somewhat and/or to increase their number so that the sole material flows into and positively fills the apertures to firmly embed the fastening flanges in the sole material. Also, since the flange **11** is spaced from the cavity walls and the shoe top, the sole material completely surrounds the flange itself to insure a rigid durable placement of the attached skate blade.

The adhesive magnet **14** acts to only temporarily hold the skate blade abainst the side of mold half **3** when the mold is in the opened state. When the mold is closed, the skate blade is accurately positioned and held through the guidance imparted upon the posts **10** in the connecting passages **8**, and as soon as the mold is opened again after the sole injection is terminated, the adhesive magnet releases the skate blade so that the two mold halves **3** and **4** can easily move away from the skate blade now connected with the shoe. At the moment of the detachment of the adhesive magnet **14** from the skate blade, a small movement of flexure is exercised upon the blade. However this does not result in any disadvantageous consequences because, as a rule, the material injected into the mold cavity **1** is hardened in the mold to such an extent that during the opening of the two mold halves, the skate is already connected with the sole material of the shoe with sufficient firmness.

If it is necessary that no force be exerted on the blade upon separation of the mold halves, where, for example, the hardening of the sole material has not yet progressed sufficiently, a holding device shown in FIGS. 3, 4, and 5 may be used. The holding device comprises a sheet metal holder **15** which is rotatably fastened to mold half **3** with a screw **16** and two cup springs **17** which exert a force which tends to maintain the holder **15** in its instant position and in positioning contact with the blade **9**. During the closing of two mold halves **3** and **4**, a sheet meal tab **18** is mounted on mold half **4** enters a corresponding slit **19** in mold half **3**, as viewed in FIG. 5. Then angled edge **20** of the tab **18** engages an edge of the holder **15** when the mold is closed to shift the holder from the solid line position to the position indicated by dotted lines in FIG. 4. Thus, during the molding process the blade is positioned by the connecting passages **8** and on subsequent reopening of the mold, the skate blade **9** is released without force.

In place of the adhesive magnet **14**, another particularly simple and inexpensive holding device for the skate blade may be employed, such device being shown in FIGS. 6 and 7. A helical spring wire **21** is bent as shown and fastened to mold **3** by means of a screw **22**. The spring wire exerts a force on the blade substantially perpendicular to the junction plane. During removal of the skate blade **9** from the mold, the holding device springs back to release the blade.

It should be understood that the embodiments of the present invention which have been described are merely illustrative of a few applications of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. Apparatus for forming an ice skate having the blade of the skate embedded in the sole of the ice skate shoe thereof, comprising

a mold separable into a first half and a second half along a junction plane, a recess defined in each of the halves, the recesses being constructed and arranged to form a cavity having walls substantially conforming in shape to the shoe sole when the mold halves are positioned next to each other along the junction plane,

an opening communicating with one wall of the cavity for positioning the bottom portion of the shoe top in the cavity,

blade positioning means adjacent the junction of plane for receiving the blade and positioning the flanged portion of the blade in the cavity in spaced relation to the cavity walls and the bottom of the shoe top, said blade positioning means including at least one passage communicating with said cavity, and

means for introducing a composition into said mold cavity for forming the sole, whereby the flanged portion of the blade and the bottom of the shoe top are completely embedded in the sole.

2. The apparatus of claim **1** wherein the junction plane substantially bisects the cavity along its longitudinal length.

3. The apparatus of claim **1** wherein said blade positioning means includes variable support means extendtherein for selectively adjusting the position of the flanged portion of the blade in the cavity.

4. The apparatus of claim **3** wherein said support means comprises eccentric screws.

5. The apparatus of claim **1** including holding means for holding the blade against one of the halves of the mold when the mold halves are separated.

6. The apparatus of claim **5** wherein said holding means comprises a magnet adhesively mounted on said one mold half.

7. The apparatus of claim **5** wherein said holding means normally holds the blade against said one half when the mold halves are separated, and disengaging means on the other of the halves contacting the holding means for disengaging said holding means when the molds are positioned next to each other.

8. The apparatus of claim **5** wherein said holding means comprises spring means normally exerting a spring force on the blade in a direction substantially perpendicular to the junction plane.

9. The apparatus of claim **8** wherein said spring means comprises at least one helical spring wire.

10. The apparatus of claim **1** including sealing means in said passage for restraining the passage of the composition from the cavity.

11. The aparatus of claim **1** wherein said means for introducing the composition comprises a passage communicating between at least one of the recesses and the exterior surface of the mold and said junction plane intersects said passage over a major portion of its length.

12. The apparatus of claim **1** wherein a passage communicates between the recess and the exterior surface comprises a distribution passage extending substantially parallel to the cavity and a plurality of inwardly directed passages connecting the cavity and the distribution passage, at least some of said passages being bisected by a second junction plane.

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U.S. Cl. X.R.

18—30; 249—95; 264—244