Dec. 9, 1958 F. LE BARON, JR 2,863,193

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Filed May 22, 1956 5 Sheets-Sheet 1

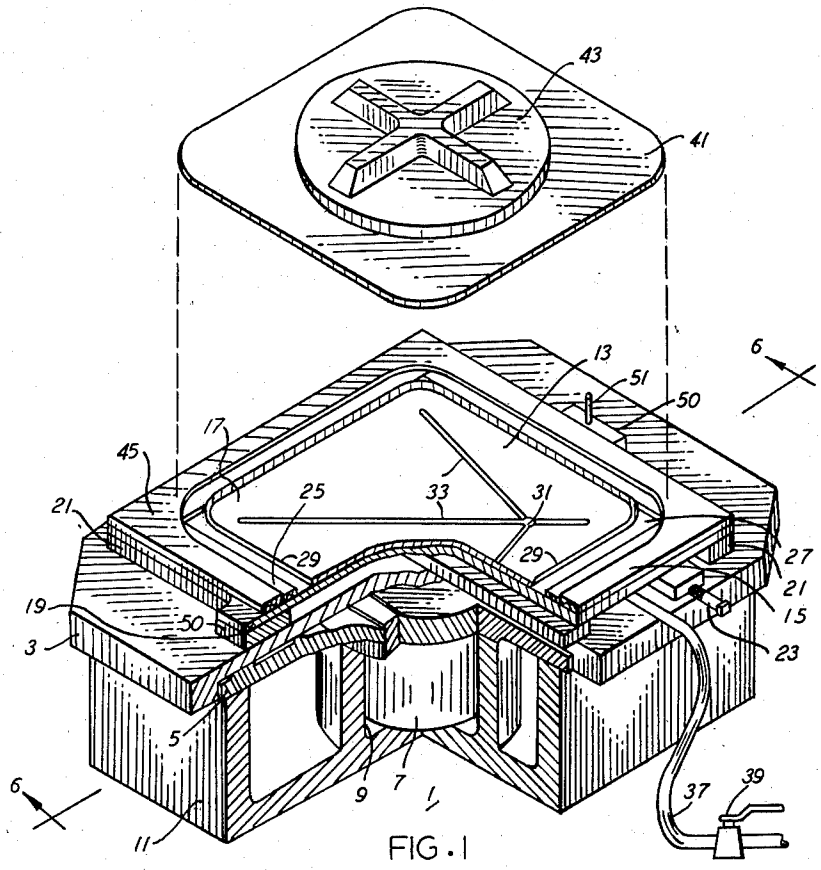


FIG. 1

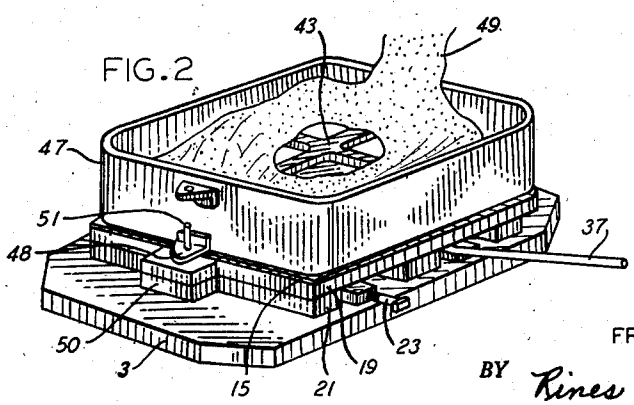


FIG. 2

INVENTOR.
FRANCIS LeBARON JR

BY Rines and Rines

ATTORNEYS

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Filed May 22, 1956 5 Sheets-Sheet 2

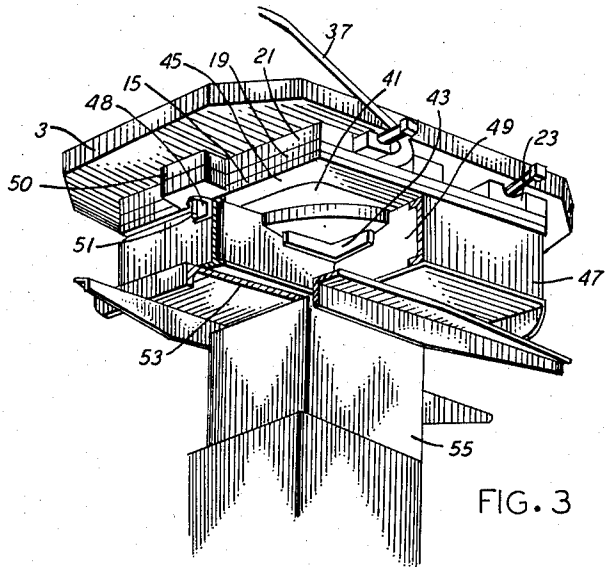


FIG. 3

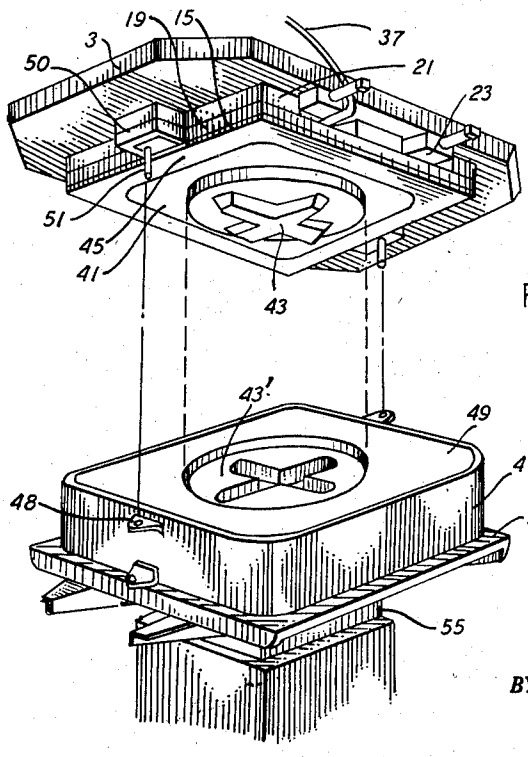


FIG. 4

INVENTOR.
FRANCIS LeBARON JR.
BY Rines and Rines
ATTORNEYS

Dec. 9, 1958 F. LE BARON, JR 2,863,193

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Filed May 22, 1956 5 Sheets-Sheet 3

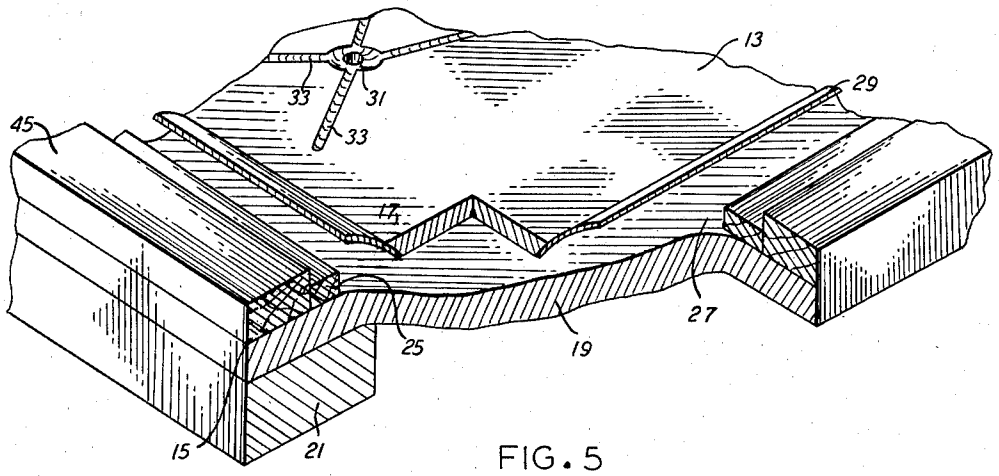


FIG. 5

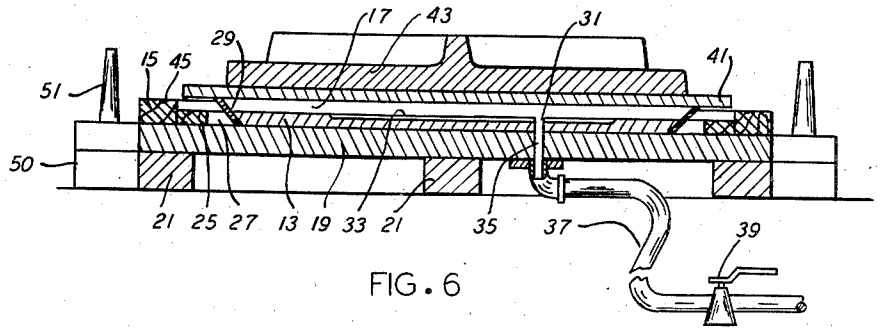


FIG. 6

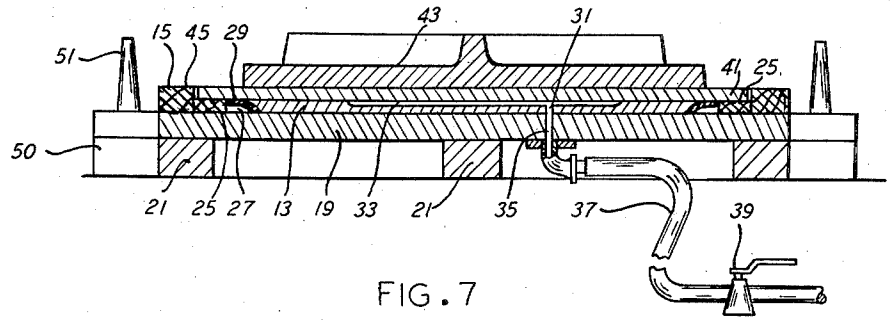


FIG. 7

INVENTOR.
FRANCIS LeBARON JR

BY Rines and Rines

ATTORNEYS

Dec. 9, 1958 F. LE BARON, JR 2,863,193

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Filed May 22, 1956 5 Sheets-Sheet 4

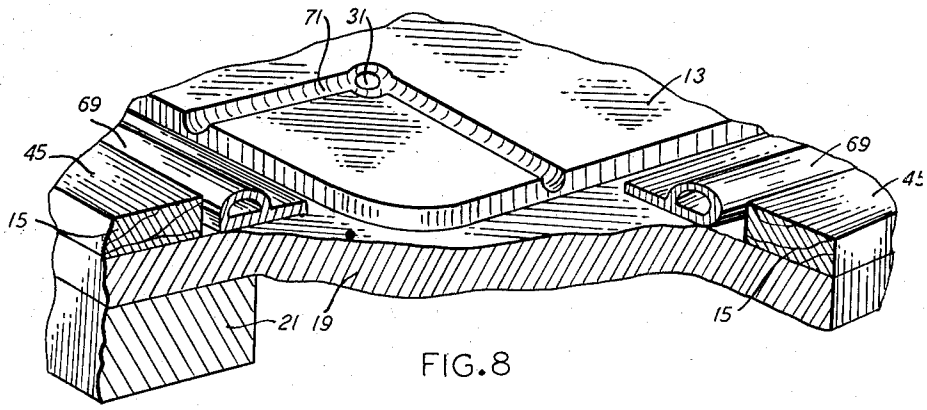


FIG.8

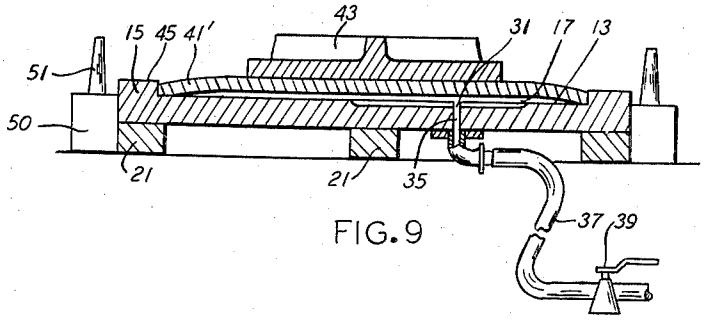


FIG.9

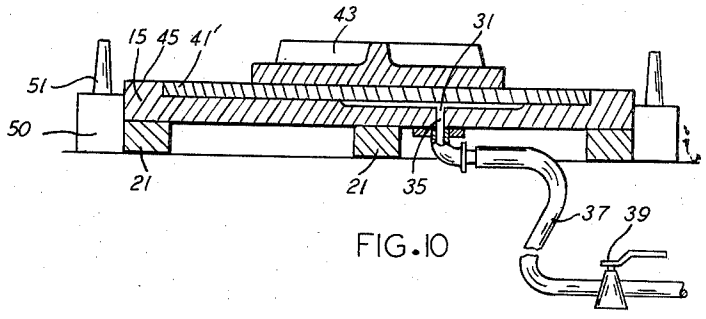


FIG.10

INVENTOR.
FRANCIS LeBARON JR.

BY Rines and Rines

ATTORNEYS

Dec. 9, 1958 F. LE BARON, JR 2,863,193

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Filed May 22, 1956 5 Sheets-Sheet 5

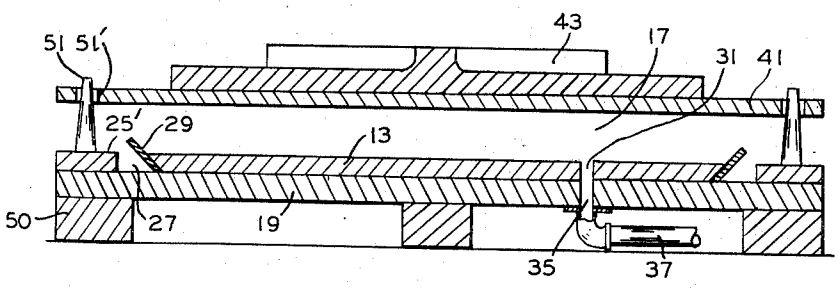


FIG. 11

INVENTOR.
FRANCIS LeBARON JR.
BY
Kines and Kines
ATTORNEYS

United States Patent Office 2,863,193 Patented Dec. 9, 1958

2,863,193

CASTING-MOLD PATTERN-BOARD FIXTURE AND APPARATUS

Francis Le Baron, Jr., West Bridgewater, Mass.

Application May 22, 1956, Serial No. 586,585

18 Claims. (Cl. 22—157)

The present invention relates to casting-mold pattern-board fixtures and apparatus.

Casting molds have for years been fabricated in foundries by packing a mixture of sand and clay or the like over a pattern having the configuration that it is desired to impart to the mold cavity. In what is commonly called "machine molding," the pattern itself is secured to a heavy rigid pattern board, which, in turn, is bolted or clamped to a table of a molding machine. An open-ended container, termed a flask, is applied to surround the pattern board, and a refractory sand and clay mixture or the like is poured within the flask. The sand-filled flask, the pattern, the pattern board and the table are thereupon jolted by being raised and dropped several times through distances of, say, three or four inches, in order to compact the sand and clay mixture. The top of the mixture is then struck off flush with the top of the flask and a cover board is applied to the top of the flask and clamped to the table. The whole apparatus is then inverted to cause a withdrawing mechanism to engage the cover board, which, at such time, is at the bottom of the inverted apparatus. The withdrawing mechanism withdraws the cover board, and the sand-filled flask as a unit from the pattern, exposing a sand and clay mold.

The pattern boards have been heavy and rigid devices since they are subjected to considerable shock in the jolting process and they are also subjected to the wear attendant upon the application of the flask. A further requirement that has demanded heavy pattern boards resides in the necessity of resisting warping or other damage. The removal of the entire pattern board and pattern assembly or the removal of the pattern from the pattern board itself and the substitution of a different pattern are laborious steps. Very heavy weights are involved, usually of the order of several hundred pounds, and skilled personnel are required properly to assemble the heavy pattern board and pattern. As before stated, the pattern board is secured to the table with the aid of bolts, screws, or even wedge-shaped chucks and the like. All of this procedure is strenuous work that is time-consuming and demanding of precise adjustment. In the case of ordinary wedge-shaped or guiding chucks employed without any fastening elements, moreover, the jarring and jolting of the apparatus may loosen the pattern board, so that special attention must continually be paid to the operation.

An object of the present invention, accordingly, is to provide a new and improved pattern-board fixture that shall not be subject to any of the above-described disadvantages but that, to the contrary, shall be of light weight and shall materially reduce the time and degree of skill involved, not only in positioning and securing the pattern board, but, also, in substituting other patterns.

A further object is to provide a new and improved casting-mold-producing apparatus.

In summary, the invention resides in the employment of a light-weight pattern board supporting the pattern and which is aligned upon or received within a frame

disposed upon and peripherally bounding a base member. Aperture means communicates between a point external to the base and frame or other aligning means and the air space defined between the base member and the pattern board. Means is provided at the external point for applying suction to the air space through the aperture means, rigidly and accurately to secure the light-weight pattern board and pattern to the base member in aligned position, as within the frame. Preferred gasketing and other structional details are later more fully discussed.

Other and further objects of the invention will also be explained hereinafter and will be more particularly pointed out in the appended claims.

The invention will now be explained in connection with the accompanying drawings, Fig. 1 of which is a perspective view, partly sectionalized to illustrate details of construction, showing the invention in preferred form;

Fig. 2 is a similar view, drawn upon a somewhat reduced scale, illustrating the application of the flask to the apparatus of Fig. 1;

Fig. 3 is a view similar to Fig. 2 after reversal of position, commonly termed "rolled over";

Fig. 4 is a view similar to Fig. 3 illustrating the withdrawal of the flask and mold;

Fig. 5 is a fragmentary perspective view, upon an enlarged scale, illustrating the details of construction of the apparatus of Fig. 1;

Figs. 6 and 7 are sections taken upon the line **6—6** of Fig. 1, loking in the direction of the arrows, and illustrating successive positions of operation of the apparatus of Fig. 1;

Fig. 8 is a view similar to Fig. 5 of a modification;

Figs. 9 and 10 are views similar respectively to Figs. 6 and 7 of further modified apparatus; and

Fig. 11 is a similar view of still a further modification.

Referring to Fig. 1, a conventional molding machine is illustrated at **1** having a table **3**, commonly known as a "rollover" table, for reasons hereinafter explained, mounted upon a jolt table **5**. The jolt table **5** may be vertically reciprocated in response to vertical upward and downward movement of a jolt piston **7** disposed centrally within an aperture **9** in the machine frame **11**, as is well known in the art.

In accordance with the present invention, a fixture is employed that comprises a base **13** peripherally bounded by a frame **15**, preferably L-shaped in cross section and defining an air space **17** into which a pattern board **41**, constructed in accordance with the present invention, may be inserted as later described. The vertical portion of the L-shaped frame **15** has a rather flat upper surface **45** and the horizontal portion **25** extends toward the base **13** so that the included angle of the L faces inward. While the frame **15** is shown of substantially rectangular form, preferably with rounded edges, other frame contours may also be employed. The base **13** and the frame **15** are carried by a planar support **19** which, in turn, may be secured to the machine table **3** by threaded securing members **23**, with cleats **21** interposed, or by other securing techniques.

For purposes later more fully explained, the height of the base **13** preferably corresponds substantially to the height of the horizontal portion **25** of the L-shaped frame **15** so that the upper surfaces of the portion **25** and the base **13** are substantially co-planar. The periphery of the base **13** is preferably separated from the frame **15** by a channel **27**. Associated with and bounding the channel **27** is a resilient gasket or sealing member **29**, illustrated as of the type inclining from the substantially rectangular periphery of the base **13** upward above the upper surface of the base **13**. An aperture **31** is provided in the base **13** communicating by means of an outlet **35**, Figs. 6 and

7, with a vacuum or suction control line 37 connected by a valve 39 to a source of evacuating pressure, not shown. Preferably, though not in all cases essentially, the aperture 31 communicates with one or more channels 33.

It has been found that if a thin light-weight pattern board 41 mounting or carrying upon its upper surface any desired pattern 43 is employed, as distinguished from the heavy prior-art pattern boards, and having dimensions corresponding substantially to the inner dimensions of the vertical member 45 of the L-shaped frame 15, suction may be applied to the air space 17 between the base 13 and the under surface of the pattern board 41 by operation of the valve 39, rapidly and accurately to clamp the pattern board 41 tightly within the frame 15 adjacent the plane of the horizontal portion 25 and the base 13. As more particularly shown, through exaggeration, in Fig. 6, the light-weight pattern board 41 will normally be maintained slightly above the upper surface of the base 13 by virtue of the extension thereabove of the resilient gasket or sealing member 29. The top edge 45 of the frame 15 may extend somewhat above the free or upper edge of the gasket 29 to provide for rapid alignment of the pattern board 41 into correct position within the frame 15. The workman can thus easily effect accurate alignment of the pattern board 41 within the frame 15, and the application of suction or vacuum pressure has been found to maintain the pattern board 41 aligned with and tightly secured to the base 13 within the frame 15 as the resilient gasket 29 seals downward, Fig. 7. Through the use of the frame of L-shaped cross section, moreover, edge support is provided for the board 41. The necessity for such support may be seen from the fact that the sealing gasket 29 is disposed inward from the periphery of the board 41 a distance sufficient to insure that damage to the peripheral edges of the board will not permit leakage of the vacuum pressure. The resulting overhang of the peripheral board edges may be too great for the thin board 41 to support by itself, so that the horizontal portion 25 of the frame provides the required edge support.

The before-mentioned flat upper surface of the vertical portion 45 of the frame 15 serves as an effective wear-strip surface for receiving the flask or container 47, Fig. 2. The flask 47 is held in aligned position by a pin 51 that positions a lower flask pin lug 48 on either side of the flask upon frame extensions 50. The sand-clay mixture or other refractory compound from which the mold is to be formed is poured into the open upper end of the flask 47 over the pattern 43, as illustrated at 49 in Fig. 2. A cover, usually termed a "bottom board" for reasons hereinafter apparent and not shown in Fig. 2, but illustrated at 53 in Figs. 3 and 4, is then placed upon the flask 47 and is clamped to the table 3. The complete assembly is then inverted, as shown in Fig. 3, so that the bottom board 53 is on the bottom adjacent and engaging a withdrawing mechanism 55. The cover 53 is then unclamped from the table 3 and the withdrawing mechanism 55 is lowered, Fig. 4, separating the flask 47 containing the refractory material 49 from the pattern-board assembly 41, 43. It is to be understood, of course, that in Figs. 3 and 4 the well-known roll-over and clamping mechanism of molding machines is not illustrated in order not to confuse the drawing with unnecessary details. The separated refractory material 49 will have formed therein the cavity pattern 43', having the configuration of the original pattern 43 and suitable for use as a mold to receive molten metal or other material to be molded into the shape of the pattern 43.

Though past experience with heavy pattern boards indicated that the securing of the pattern to the table should be sufficient to withstand removal forces of the order of two hundred pounds, more or less, particularly in view of the inversion of the equipment, as shown in Figs. 3 and 4, it has been found that vacuum pressures of the order of a third of an atmosphere or less, corresponding substantially to five pounds per square inch, can adequately hold even the heaviest of patterns to the fixture 15. Thin planar pattern boards 41 roughly two feet square have been successfully tested with even one pound per square inch of vacuum, representing a pattern-holding force over the area of the board of about 576 pounds. The initial height of the gasket 29 above the base 13 may be about an eighth of an inch, more or less. While an extremely skillful operator with prior-art techniques could assemble a conventional heavy pattern and pattern board unit on the molding machine in five minutes, more or less, even an unskilled operator can, with the aid of the present invention, assemble the much lighter pattern board, say of the order of three-eighths of an inch in thickness, and carrying a light-weight pattern 43, accurately in place in the matter of a few seconds, and without the straining attendant upon the manipulation of the heavy prior-art boards. The complete assembly of pattern board and pattern, 41, 43, adapted for operation with a flask twenty-nine inches on the side, may only weigh of the order of twenty to thirty pounds, whereas the prior-art more sizeable and necessarily sturdier pattern boards weigh of the order of one hundred to one hundred twenty pounds, or more. In addition, the time presently consumed in securing the patterns to the heavy pattern boards and securing the same to the table is completely eliminated by the present invention since the pattern maker merely secures a desired light-weight pattern 43 to the light-weight pattern board once and for all without ever having to remove the same.

The present invention, therefore, not only vastly increases the speed with which patterns can be removed and applied through the extremely fast vacuum-release and vacuum-application techniques and, if desired, through the utilization of air pressure to blow out the pattern board, not shown, but the present invention also enables the use of extremely lightweight patterns with very light boards which are much easier to handle in application, in transit and in storage; and, indeed, permit smaller-size construction and demand much less storage volume. The present invention also greatly increases the life of patterns and pattern boards, since they are subjected only to the wear of the refractory material 49, with the wear strip surface 45 of the external fixture 15 taking the brunt of the abuse of the flask 47. The wear strip 15 may be replaced from time to time as it wears down.

Though the pattern boards 41 have been illustrated and described as having planar surfaces, moreover, this is not always essential as later discussed, for example, in connection with the embodiment of Fig. 9. The upwardly extending edges of the frame 15, moreover, need not be vertical, as shown, but may taper upward as, for example, at a forty-five degree incline, more or less.

Other types of sealing devices may also be utilized than the particular resilient gasket 29. As another illustration, a modified gasket in the form of a tubular member 69 is shown in Fig. 8. Other types of base-member aperture and channel arrangements for communicating with the space between the base member 13 and the lower surface of the pattern board 41 may be provided than the particular configuration of Fig. 1. In Fig. 8, therefore, another example in the form of a right-angular channel 71 communicating with the aperture 31 is illustrated. The advantage in utilizing channels resides in the fact that any sand or dirt may be easily blown out so as not to clog the main suction aperture. In Fig. 8, the horizontal portion 25 of the frame 15 may, if desired, be omitted.

As still another modification, the thin pattern board 41 itself may be utilized to effect the sealing of the space 17 between it and the base 13 of the fixture. Thus, in Fig. 9, the thin pattern board 41' is originally slightly bowed or distorted. When the suction is applied, however, the thin board becomes drawn closely to the

base surface **13** of the frame, providing its own seal, Fig. 10.

While the invention has heretofore been described, moreover, in connection with a complete peripheral frame **15** for aligning and receiving the pattern board **41**, partial frame sections or elements may be used and such are to be considered as embraced within the term "frame" as herein used. Other types of aligning devices such as, for example, the pins **51** of Fig. 11, may also be employed, such aligning pins, indeed, comprising perhaps the limiting case of frame elements. In Fig. 11, the board **41** is shown provided with peripherally disposed apertures **51'** for receiving the pins **51**, and the portions of the board **41** just inward of the apertures **51'** will rest upon the surface **25'**, beyond the seal effected by the gasket **29**.

It is also to be understood that the invention, though of particular importance with casting-mold pattern boards, may be applied to secure other types of shaping or forming devices than the pattern **43** such as, for example, shaping or forming tools, punches or dies and the like. In accordance with the present invention, the forming device mounting itself is aligned and held in fixed position.

Further modifications will occur to those skilled in the art and all such are considered to fall within the spirit and scope of the invention as defined in the appended claims.

What is claimed is:

1. A casting-mold pattern-board fixture comprising a base, pattern-board aligning means disposed upon the base to define an air space in which a pattern board may be received, aperture means communicating between the air space and a point external to the base and the aligning means, and means operable at the external point for applying suction to the air space through the aperture means.

2. A casting-mold pattern-board fixture comprising a base, pattern-board aligning means disposed upon the base to define an air space in which a pattern board may be received, aperture means disposed in the base communicating between the air space and a point external to the base and the aligning means, and means operable at the external point for applying suction to the air space through the aperture means.

3. A casting-mold pattern-board fixture comprising a base, a frame disposed upon and peripherally bounding the base to define an air space in which the pattern board may be received, resilient sealing means carried by the base inward of the peripheral frame, aperture means disposed in the base inward of the sealing means and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

4. A casting-mold pattern-board fixture comprising a base, a frame disposed upon and peripherally bounding the base to define an air space in which the pattern board may be received, resilient sealing means carried by the base inward of and having substantially the same contour as the peripheral frame, aperture means disposed in the base inward of the sealing means and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

5. A casting-mold pattern-board fixture comprising a base, a frame substantially L-shaped in transverse cross-section disposed upon and peripherally bounding the base with the included angle of the L facing inward of the base to define an air space in which a pattern board may be received with the peripheral edges of the pattern board resting adjacent the vertex of the said included angle, aperture means communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

6. A casting-mold pattern-board fixture comprising a base, a frame substantially L-shaped in transverse cross-section disposed upon and peripherally bounding the base with the included angle of the L facing inward of the base to define an air space in which a pattern board may be received with the peripheral edges of the pattern board resting adjacent the vertex of the said included angle, aperture means disposed in the base communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

7. A casting-mold pattern-board fixture comprising a base, a frame substantially L-shaped in transverse cross-section disposed upon and peripherally bounding the base with the included angle of the L facing inward of the base to define an air space in which a pattern board may be received with the peripheral edges of the pattern board resting adjacent the vertex of the said included angle, resilient sealing means carried by the base inward of the peripheral frame, aperture means disposed in the base inward of the sealing means and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

8. A casting-mold pattern-board fixture comprising a base, a frame substantially L-shaped in transverse cross-section disposed upon and peripherally bounding the base with the included angle of the L facing inward of the base to define an air space in which a pattern board may be received with the peripheral edges of the pattern board resting adjacent the vertex of the said included angle, resilient sealing means carried by the base inward of and having substantially the same contour as the peripheral frame, aperture means disposed in the base inward of the sealing means and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

9. A casting-mold pattern-board fixture comprising a base, a frame substantially L-shaped in transverse cross-section disposed upon and peripherally bounding the base with the included angle of the L facing inward of the base to define an air space in which a pattern board may be received with the peripheral edges of the pattern board resting adjacent the vertex of the said included angle, a wear-strip surface provided along the top of the L of the frame, aperture means communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

10. A casting-mold pattern-board fixture comprising a base, a frame disposed upon and peripherally bounding the base to define an air space in which the pattern board may be received, aperture means comprising an opening entering into at least one channel disposed in the base and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

11. A casting-mold pattern-board fixture comprising a base, a frame disposed upon and peripherally bounding the base to define an air space in which a bowed pattern board may be received, aperture means disposed in the base and communicating between the air space and a point external to the base and frame, and means operable at the external point for applying suction to the air space through the aperture means.

12. A casting-mold pattern-board fixture comprising a table, a base of predetermined height disposed upon the table, a resilient gasket extending about the periphery of the base and normally extending above the base for receiving thereupon a pattern board, a frame having a resting portion of substantially the said predetermined

height and peripherally bounding the gasket, aperture means disposed in the base and communicating with a point external to the base and frame, and means operable at the external point for applying suction through the aperture means, the gasket having sufficient resilience to become compressed to the level of the said predetermined height.

13. A casting-mold pattern-board fixture comprising a table, a base of predetermined height disposed upon the table, a resilient gasket disposed upon the table extending about the periphery of the base and normally extending above the base for receiving thereupon a pattern board, a frame having a resting portion of substantially the said predetermined height and peripherally bounding the gasket, a wear-strip surface provided external to the resting portion of the frame and extending thereabove, aperture means disposed in the base and communicating with a point external to the base and frame, and means operable at the external point for applying suction through the aperture means, the gasket having sufficient resilience to become compressed to the level of the said predetermined height.

14. A casting-mold pattern-board fixture comprising a table, a substantially rectangular base of predetermined height disposed upon the table, a substantially rectangular resilient gasket extending about the periphery of the base and normally extending above the base for receiving thereupon a pattern board, a substantially rectangular frame having a resting portion of substantially the said predetermined height and peripherally bounding the gasket, aperture means disposed in the base and communicating with a point external to the base and frame, and means operable at the external point for applying suction through the aperture means, the gasket having sufficient resilience to become compressed to the level of the said predetermined height.

15. A casting-mold pattern-board fixture as defined in claim 1 and in which the suction-applying means is operated with a pressure substantially equal to or less than one-third of an atmosphere.

16. Apparatus of the character described having, in combination, a substantially planar base, a frame disposed upon and peripherally bounding the base to define an air space, a substantially planar pattern board carrying thereupon an upwardly projecting mold pattern and disposed in the said air space, aperture means disposed in the base and communicating between the space between the pattern board and the base and a point external to the base and frame, and means operable at the external point for applying suction through the aperture means to secure the pattern board to the base.

17. Apparatus of the character described having, in combination, a substantially planar base, a frame disposed upon and peripherally bounding the base to define an air space, resilient sealing means disposed inward of the peripheral frame, a substantially planar pattern board carrying thereupon an upwardly projecting mold pattern and disposed in the said air space, aperture means disposed in the base and communicating between the space between the pattern board and the base and a point external to the base and frame, and means operable at the external pojnt for applying suction through the aperture means to secure the pattern board to the base.

18. A casting-mold pattern-board fixture comprising a table, a base of predetermined height disposed upon the table, a resilient gasket extending about the periphery of the base and normally extending above the base for receiving thereupon a pattern board, a frame having a resting portion of substantially the said predetermined height and peripherally bounding the gasket, a wear-strip surface provided external to the resting portion of the frame and extending thereabove, securing means disposed external to the wear-strip surface for securing a flask to the fixture with the bottom of the flask received upon the wear-strip surface, aperture means disposed in the base and communicating with a point external to the base and frame, and means operable at the external point for applying suction through the aperture means, the gasket having sufficient resilience to become compressed to the level of the said predetermined height.

References Cited in the file of this patent

UNITED STATES PATENTS

Re. 21,046	Hagemeyer	Apr. 11, 1939
1,717,245	Patterson	June 11, 1929
1,922,744	Oyster	Aug. 15, 1933
2,346,182	Pattison	Apr. 11, 1944
2,435,507	Pattison	Feb. 3, 1948
2,672,664	Sudziarski	Mar. 23, 1954