

[72] Inventor **Werner Geiger**
Meggen, Switzerland
 [21] Appl. No. **775,614**
 [22] Filed **Nov. 14, 1968**
 [45] Patented **Mar. 9, 1971**
 [73] Assignee **Inventio Aktiengesellschaft**
Hergiswil, (Nidwalden), Switzerland
 [32] Priority **Nov. 17, 1967**
 [33] **Switzerland**
 [31] **16165/67**

[56]

References Cited

UNITED STATES PATENTS

1,626,225 4/1927 Campbell 164/191
 2,544,499 3/1951 Hovey 269/24X

Primary Examiner—Robert D. Baldwin
 Attorney—Werner W. Kleeman

[54] **CENTERING APPARATUS FOR MATCH PLATES
 ARRANGED AT A MATCH PLATE SUPPORT FOR
 MOLDING MACHINES**
7 Claims, 5 Drawing Figs.

[52] U.S. Cl. **164/159,**
164/241, 269/24
 [51] Int. Cl. **B22c 7/04,**
B23q 3/18
 [50] Field of Search **164/239,**
237, 241, 412, 159, 191, 225; 269/24, 20, 35

ABSTRACT: There is disclosed a centering apparatus for match plates arranged in a match plate support of a molding machine wherein the match plate or plates possess predetermined impact surfaces which are to be pressed against impact means of the match plate support. According to an important aspect of the invention there are provided pressure transmission means adapted to be operatively connected with fluid energy-supply means, such pressure transmission means being disposed between the match plate support and the surfaces of the match plate situated opposite the impact surfaces thereof.

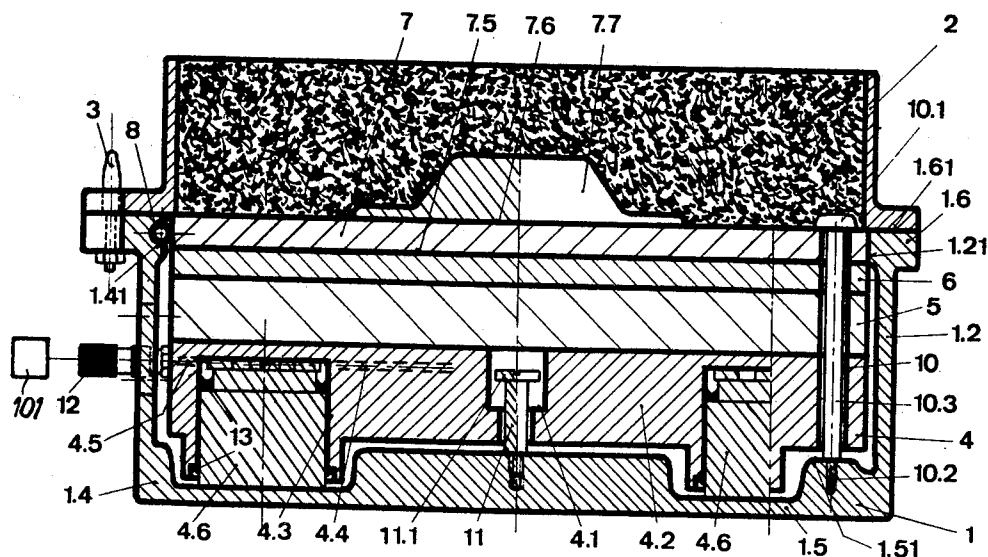


Fig. 3

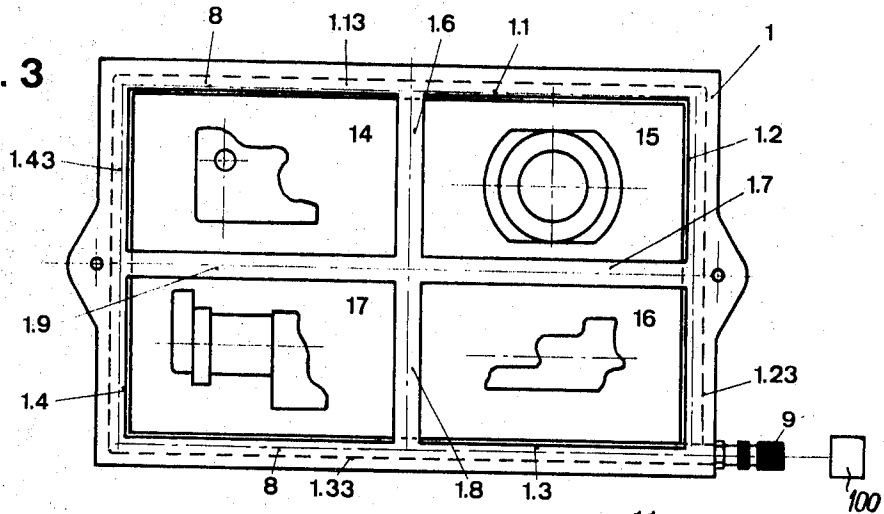


Fig. 4

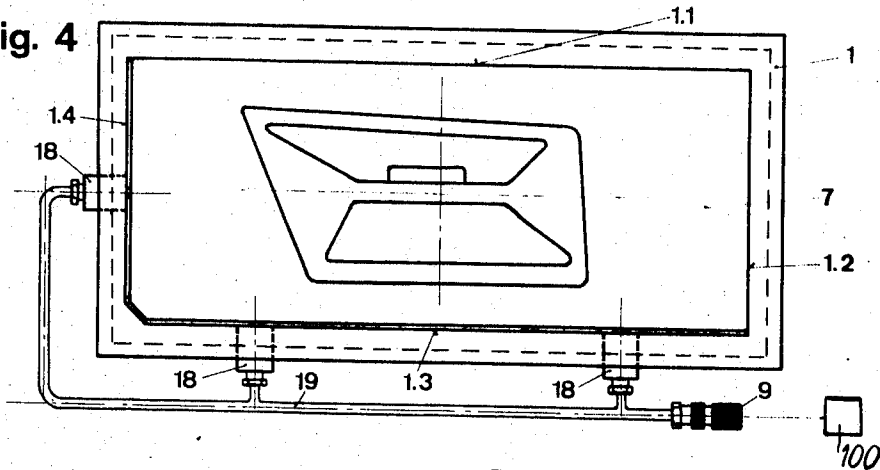
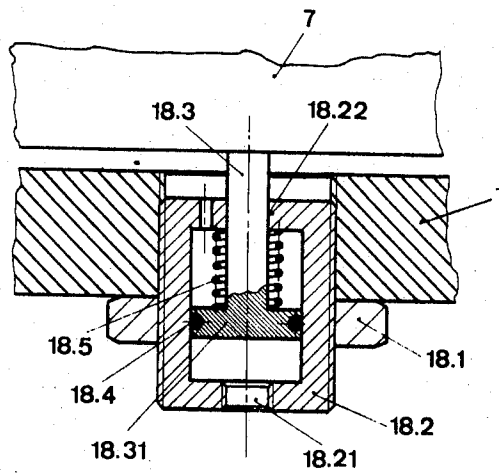


Fig. 5



INVENTOR

WERNER GEIGER

BY *Jaechi & Davidson*

ATTORNEYS

CENTERING APPARATUS FOR MATCH PLATES ARRANGED AT A MATCH PLATE SUPPORT FOR MOLDING MACHINES

BACKGROUND OF THE INVENTION

The present invention broadly relates to the foundry art and, in its more specific aspects, concerns a new and improved centering apparatus for pattern or match plates arranged at a match plate support for molding machines, wherein the match plates are pressed at predetermined impact surfaces against impact or stop means associated with the match plate support.

In order to render possible the exchange of the match plates or molding machines these match plates are inserted into a match plate support secured to the molding machine table by means of screws or clamps. The molding box or flask is then secured upon the match plate support. This match plate support generally consists of a metallic pot or dishlike member possessing in plan view a substantially rectangular configuration into which there are displaced from above the pattern or match plates. Since, in order to carry out such displacement a certain lateral play must be available, and, on the other hand, match plates of different plate thicknesses come into use, there is required for the exact alignment of the subsequently joined together mold parts or portions a horizontal and vertical centering of the match plates at the support. In order to perform the centering operation in the horizontal plane, the match plate is pressed, for instance, against two inner walls of the match plate support which are disposed perpendicular to one another and are exactly machined. For vertical centering setbolts or headbolts passed, for instance, through the match plates are threaded in an exactly predetermined position into the support floor or base and then the match plate is brought to bear upon the bolt heads.

According to a prior art centering apparatus the match or pattern plate is displaced by means of wedges and fixedly clamped. In order to carry out the horizontal displacement wedges are driven between the match plate and the walls of the match plate support which are situated opposite the machined walls. Vertical displacement takes place by means of pairs of oppositely directed wedges arranged upon the support floor or bottom and which can be externally adjusted by means of screws. This known centering apparatus possesses a number of drawbacks. Many times the match plate is bent during driving in of the wedges. Furthermore, a great deal of time is required for the removal and reinsertion of the wedges during exchange of the match plates. In the case of molds of smaller lot size this results in large downtimes for the molding machine, especially if the match plate support cannot be easily exchanged, whether it be because of its attachment to the molding machine table or because different smaller match plates which are arranged next to one another in a subdivided support cannot all be simultaneously exchanged.

SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide an improved centering apparatus for the match plates of a molding machine arranged at a match plate support which effectively overcomes the aforementioned drawbacks of the prior art structures.

Another, more specific object of the present invention relates to the provision of an improved centering apparatus by means of which it is possible to shorten the time required for the exchange of a match or pattern plate and therefore reduce the standstill or downtime of the molding machine.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive centering apparatus is manifested by the features that pressure transmission means are provided between the match plate support and the surfaces of the match plates which are situated opposite the impact surfaces, such pressure transmission means being operatively connectable via connection coupling means to supply means for pneumatic or hydraulic energy.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a sectional view taken substantially along the line A-A of FIG. 2, through a match plate support equipped with a first embodiment of inventive match plate-centering apparatus;

FIG. 2 is a plan view of the arrangement shown in FIG. 1; FIG. 3 illustrates the application of the centering apparatus of FIG. 1 at a match plate support for four match plates;

FIG. 4 illustrates a second embodiment of inventive centering apparatus; and

FIG. 5 shows the details of a piston-cylinder unit used in the modified arrangement of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, the exemplary embodiment of inventive centering apparatus depicted in FIG. 1 represents a sectional view taken substantially along the line A-A of FIG. 2. In these Figures reference numeral 1 designates a substantially pot-shaped match plate support means which incorporates four walls 1.1, 1.2, 1.3, 1.4, a bottom or base 1.5 and at its open side a flange 1.6 possessing an exactly machined surface 1.61. A molding box 2 is mounted upon the flange 1.6 and centered by means of box-guide pins or dowels 3.

Furthermore, it will be seen that arranged with lateral play in the match plate support 1, as viewed from the bottom towards the top there are a fluid-operated e.g. pneumatic piston-cylinder unit 4, a spacer plate 5, a heating plate 6, and a match plate 7 equipped with a pattern 7.7. The match plate 7 possesses the side surfaces 7.1, 7.2, 7.3, 7.4, and the lower and upper plate surfaces 7.5 and 7.6 respectively. The surfaces 7.1, 7.2, and 7.6 are constructed as impact or stop surfaces in order to preserve clarity in illustration in the drawings, the attachment means for securing the match plate support 1 to the molding machine table have been conveniently omitted.

The walls 1.1 and 1.2 of the match plate support 1 possess exactly machined surfaces 1.11 and 1.21 at their upper region. Grooves or channels 1.31 and 1.41 are milled or otherwise machined into the oppositely situated walls 1.3 and 1.4 at the height of the match plate 7 and a flexible member, for example a rubber hose 8 is inserted in such grooves. At the wall 1.2 there is provided a through passage aperture or opening 1.22 which communicates with the groove 1.31 and into which there is threaded a connecting coupling 9 attached with the rubber hose 8. By means of this connecting coupling 9 it is possible to operatively communicate in flow relationship the rubber hose 8 with a conventional schematically depicted pneumatic or hydraulic source of energy 100.

Continuing, it will be seen that in the four corners of the match plate support 1 there is passed with play through the piston-cylinder unit 4 and the three plates 5, 6, and 7, the respective setbolts or headbolts 10 which are threaded into the bottom or floor 1.5 of the match plate support 1. Furthermore, at the locations of threadable attachment of these bolts 10 the bottom 1.5 of the match plate support 1 is provided with exactly machined or worked surfaces 1.51, as best seen by referring to FIG. 1. Each of the setbolts 10 consists of a bolt head 10.1, a threaded portion 10.2 which is completely threaded into the bottom or floor 1.5 of the support 1, and a shaft portion 10.3, the length of which is exactly equal to the spacing between the bottom or floor surface 1.51 and the flange surface 1.61. Reference numeral 11 designates two further setbolts which are threaded into the bottom 1.5 of the match plate support 1, but which, however, only piercingly extend through the piston-cylinder unit 4 with their bolt heads 11.1 being received in suitable recesses 4.1 of this piston-cylinder unit 4. These setbolts or headbolts 11 limit the piston stroke of the piston-cylinder unit 4. The latter consists of a cylinder portion 4.2 in which there are provided five similar

cylinder bores 4.3. These five cylinder bores 4.3 are in flow communication with one another through the agency of the conduit bores 4.4 which are arranged in a substantially horizontal plane. Furthermore, these five cylinder bores 4.3 can be operatively connected with a suitable pneumatic or hydraulic source of energy 101 (FIG. 1), by means of a connection coupling 12 which is threaded into a further bore 4.5 communicating with the conduit bores 4.4. Additionally, piston members 4.6 are arranged in the cylinder bores 4.3 and equipped with the sealing rings 13.

After the insertion of a match plate 7 the connection couplings 9 and 12 are operatively connected with the fluid energy sources 100 and 101, respectively. The flexible rubber hose 8 expands and presses the match plate 7 with its impact surfaces 7.1 and 7.2 against both of the machined wall surfaces 1.11 and 1.21, respectively, of the match plate support 1, whereby such match plate 7 is centered in the horizontal plane. Furthermore, the piston-cylinder unit 4 is actuated which, in turn, presses the plates 5, 6, and 7 upwardly until the match plate 7 comes to bear by means of its impact surface 7.6 at the bolt heads 10.1, and therefore the match plate is also centered in the vertical direction. The entire centering operation occurs in an extremely short period of time, no complicated manipulations being required. During removal of the match plate 7 the positive pressure is removed from the rubber hose 8 and the piston-cylinder unit 4 and then the headbolts 10 are threadably detached.

The modified arrangement of centering apparatus depicted in FIG. 3 differs from that shown in the embodiment of FIGS. 1 and 2 insofar as, in this instance, four match plates 14, 15, 16, and 17 are provided at the match plate support 1, and furthermore, such match plate support is equipped with the partition walls 1.6, 1.7, 1.8, and 1.9 which are exactly machined or worked at both surfaces thereof. Additionally, in this variant construction all four walls 1.1, 1.2, 1.3, and 1.4 of the match plate support 1 possess grooves or channels 1.13, 1.23, 1.33, and 1.43, respectively, at the height of the match plates 14, 15, 16, and 17, respectively. The flexible hose 8 is inserted in these grooves 1.13, 1.23, 1.33, and 1.43. During centering of the match plates 14 to 17, the rubber hose 8 connected with the fluid source of energy 100 presses such match plates against the machined surfaces of the partition walls 1.6, 1.7, 1.8, and 1.9.

In the further embodiment shown in FIG. 4 there is used for the horizontal centering operation, instead of the rubber hose 8, an individual piston-cylinder units 18. The details of the structure of each of such piston-cylinder units 18 is shown with greater clarity in FIG. 5 and it will be seen that each such unit 18 consists of a cylinder 18.2 threaded into a wall of the match plate support 1 and secured by means of a suitable nut member 18.1. Cylinder 18.2 possesses an opening 18.21 for the introduction of a pressurized fluid medium and also has a cylinder bore 18.22 in which is slidably arranged the associated piston unit 18.3. This piston unit 18.3 includes a piston member or flange 18.31 which is situated within the cylinder 18.2 and equipped with a suitable sealing ring 18.4. Furthermore, between the piston member or flange 18.31 and the cylinder wall there is arranged, as shown, a pressure or compression spring 18.5 which strives to retract the piston unit 18.3 into the cylinder 18.2. In the retracted position the front end of the piston unit 18.3 is located behind the wall surface of the match plate support 1.

In the arrangement shown in 4 two piston-cylinder units 18 are disposed at the wall 1.3 of the match plate support 1 and are spaced at a considerable distance from one another as far as possible. At the other wall 1.4 there is only arranged a single piston-cylinder unit 18 since such is sufficient for carrying out the centering operation. The introduction of the pressurized fluid medium occurs through the agency of a pressurized medium conveying conduit 19 which can be connected, on the one hand, to the cylinder inlets 18.21 and, on the other hand, via the connection coupling 9 to the pneumatic or hydraulic source of energy 100.

Furthermore, it is here mentioned that as far as the remaining structure of the embodiments or of centering apparatus depicted in FIG. 3 and FIGS. 4 and 5 such can be similar to the arrangement previously considered in conjunction with FIGS. 1 and 2. Additionally, it should be apparent that during the course of the description of FIGS. 3, 4, and 5 the same reference numerals have been conveniently employed for designating similar or analogous components found in the construction of FIGS. 1 and 2.

The various embodiments of centering apparatus described heretofore render possible an extremely quick exchange of the match plates. The standstill times of the molding machines are therefore markedly reduced, and thus, the economy of operation is increased by a considerable degree. Furthermore, with the proposed embodiments of centering apparatus the possibility exists of automating in a simple manner the exchange operations for the match plates.

The invention is, of course, not limited to the described embodiments which have been set forth for purposes of illustration, rather can encompass different variations which may be undertaken within the realm of the inventive concepts. For instance, many different types of pattern combinations can be arranged at the match plate support by appropriately changing the guiding of the hose means. Also, it is readily possible to use different pressure transmission means other than a hose or the piston-cylinder units.

It should be apparent from the foregoing detailed description, that the objects set forth at the outset to the specification have been successfully achieved.

I claim:

1. A centering apparatus for match plates arranged in a match plate support of a molding machine, comprising in combination:

- a. a match plate support provided with impact means;
- b. at least one match plate arranged at said match plate support, said match plate possessing predetermined impact surfaces which are to be pressed against said impact means of said match plate support;
- c. pressure transmission means adapted to be operatively connected with fluid energy-supply means, said pressure transmission means being disposed between said match plate support and the surfaces of said match plate situated opposite said impact surfaces thereof; and
- d. said pressure transmission means including hose means formed of elastic material and serving for effectuating horizontal centering of said match plate, said match plate support being provided with two substantially horizontally extending grooves which are disposed at two walls of said match plate support which are situated substantially perpendicular to one another, said hose means being arranged in said grooves, so that upon connection to said fluid energy-supply means, said hose means radially expands past the plane of the associated walls of said match plate support and therefore presses said match plate with its corresponding impact surfaces against the oppositely situated walls of said match plate support which are constructed to possess said impact means for the horizontal centering operation.

2. A centering apparatus for match plates arranged in a match plate support of a molding machine, comprising in combination:

- a. a match plate support provided with impact means;
- b. at least one match plate arranged at said match plate support, said match plate possessing predetermined impact surfaces which are to be pressed against said impact means of said match plate support;
- c. pressure transmission means adapted to be operatively connected with fluid energy-supply means, said pressure transmission means being disposed between said match plate support and the surfaces of said match plate situated opposite said impact surfaces thereof; and
- d. said pressure transmission means comprising piston-cylinder units for horizontally centering said match plate,

said match plate support being provided at approximately the height of said match plate at two walls thereof which are disposed substantially perpendicular with one another with recess means for receiving said piston-cylinder units, whereby when said piston-cylinder units are connected with said fluid energy-supply means the piston portion of each such piston-cylinder units extends past the plane or the associated wall of said match plate support and therefore presses the match plate against the opposite walls of said match plate support which are constructed to possess said impact means for the horizontal centering operation.

3. A centering apparatus as defined in claim 2, wherein said piston-cylinder units comprise two piston-cylinder units arranged in substantially spaced relationship from one another at one of said two perpendicularly extending walls of said match plate support and one further piston-cylinder unit at the other wall thereof.

4. A centering apparatus for match plates arranged in a match plate support of a molding machine, comprising in combination:

- a. a match plate support provided with impact means;
- b. at least one match plate arranged at said match plate support, said match plate possessing predetermined impact surfaces which are to be pressed against said impact means of said match plate support;
- c. pressure transmission means adapted to be operatively connected with fluid energy-supply means, said pressure transmission means being disposed between said match plate support and the surfaces of said match plate situated opposite said impact surfaces thereof; and
- d. said pressure transmission means incorporating a piston-cylinder unit for effectuating the vertical centering of said match plate, said piston-cylinder unit including a substantially plate-shaped cylinder portion possessing a number of cylinder bores, means defining a plurality of pressurized fluid medium conducting channels for operatively interconnecting said cylinder bores with one another, a piston unit arranged in each of said cylinder bores and bearing against the bottom of said match plate support,

intermediate plate means disposed between said cylinder portion and said match plate, said cylinder portion acting upon said match plate through the agency of said intermediate plates, and headbolt means defining said impact means for the vertical centering operation piercingly extending through said match plate, said intermediate plates and said cylinder portion being threadably connected with said bottom of said match plate support, whereby upon operable connection of said pressure transmission means with said fluid energy-storage means, said match plate is pressed with its impact surface operable for vertical centering against the heads of said headbolts.

5. A centering apparatus as defined in claim 1, further including intermediate partition wall means substantially forming a cross provided for said match plate support, in order to accommodate four match plates, said hose means extending throughout the entire periphery of said match plate support.

6. A centering apparatus for horizontal and vertical centering of match plates arranged in a match plate support of a molding machine, comprising in combination:

- a. a match plate support;
 - b. impact means provided for said match plate support for the horizontal and vertical centering operations;
 - c. at least one match plate arranged at said match plate support, said match plate possessing predetermined impact surfaces which are to be pressed against said impact means of said match plate support; and
 - d. pressure transmission means being disposed between said match plate support and the surfaces of said match plate situated opposite said impact surfaces thereof, said pressure transmission means including a first pressure transmission unit for effectuating horizontal centering of the match plate and a second pressure transmission unit for effectuating vertical centering of said match plate.
7. A centering apparatus as defined in claim 6, wherein said impact means includes at least two wall portions of said match plate support for use during horizontal centering and a number of headbolts mounted at said match plate support for use during vertical centering of said match plate.

45

50

55

60

65

70

75