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(19)



(54) AN INJECTION MOULDING MACHINE

(71) I, KARL HEHL, of 32 Arthur-Hehl-Strasse, 7298 Lossburg 1, Federal Republic of Germany; a German national,

do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:–

The present invention relates to a plastics material injection moulding machine for producing mouldings with coloured regions merging into one another, especially with marbling or mottled patterns, including two injection units each having a plastification cylinder and plastification screw and being incorporated in a die closing device forming an injection mould which is supplied with plasticised material from the two plastification cylinders each having an injection drive means controllable at different intervals to generate pulses in the plastics material being supplied by the injection units and to inject such via a common injection head, in which two injection head passages arriving from the nozzles of the plastification cylinders are combined into a central injection head passage which leads into an injection head nozzle whereby the plasticising compartments of the plastification cylinders, the injection head passages and the moulding cavity of the injection mould are communicating cavities.

In known plastics material injection moulding machines of this type it is a question of special machines for producing marbled injection mouldings without permitting these injection moulding machines to be used for other purposes or their essential components (injection units, mould closing units) e.g. for normal injection moulding. Moreover, the pulsation passages are joined together in a relatively large spacing from the mould cavity of the mould, whereby these passages are charged from plastification cylinders extending parallel or diagonally to one another.

Injection moulding machines of comparable kind having plastification cylinders located at right angles to one another are known which are used to produce shaped members having a foam core and a covering of compacted plastics material (DT-OS 2 425 627).

An object of the invention is the further development of a plastics material injection moulding machine of the aforesaid kind in such a manner that it may be used to produce marbling patterns, especially natural horn imitations of pleasingly aesthetic aspect of extreme variety and for the essential components, such as plastification cylinder and die closing units alternately useable for normal injection moulding.

According to the present invention there is provided an injection moulding machine for plastics material for producing mouldings with coloured regions merging into one another, especially with marbling or mottled patterns, including two injection units each having a plastification cylinder and plastification screw and being incorporated in a die closing device forming an injection mould which is supplied with plasticised material from the two plastification cylinders having an injection drive means controllable at different intervals to generate pulses in the plastics material being supplied by the injection units and to inject such via a common injection head, in which two injection head passages arriving from the nozzles of the plastification cylinders are combined into a central injection head passage which leads into an injection head nozzle, whereby the plasticising compartments of the plastification cylinders, the injection head passages and the moulding cavity of the injection mould are communicating cavities, characterised by the feature that the injection head is adapted to be secured on the stationary die carrier of the plastics material injection moulding machine and the stationary die section is located on this injection head, whereby a plastification cylinder extending at right angles to the direction of closing of the die closing unit and to the other plastification cylinder is adapted to be coupled via supporting rods to the tie rods of the die closing unit in the region of the injection head.

The invention will be described further,

by way of example, with reference to the accompanying drawings, in which:–

Fig. 1 is a longitudinal cross section of a die closing unit of a plastics material injection moulding machine; and

Fig. 2 is a sectional plan view of Fig. 1 without the vertical injection unit.

A die closing unit supported on a machine base (not shown) includes a stationary die carrier member 30 securely mounted on two parallel horizontally orientated tie rods 20 with die carrier plate 29 and includes a displaceable die carrier member 17 with die section 15*a* displaceably mounted on this pair of tie rods 20. The die carrier 17 is driven by means of a toggle linkage the drive arm 18 of which is connected to the pivot connections 19 of the die carrier 17. Machined cavities 33 and 34, when the injection die 15*a*, 16*a* is closed, form the mould cavity 33, 34 which, during injection is filled with plastics materials of different colours or hues which become partly mixed. The stationary die carrier 30 with die securing plate 29 has a plastification cylinder 27 of a horizontal injection moulding unit I extending through cavity 41. This injection moulding unit I is detachably secured to tie rods 26 which are secured in attachment collars or eyes 38 of the stationary die carrier 30 by means of securing bolts 39. A further identical injection moulding unit II with plastification cylinder 21 is detachably secured in vertical arrangement to the tie rods 20 of the die closing device. Both injection moulding devices I and II operate with a plastification screw which plasticises the plastics material during rotation and injects it into the die by axial stroke, whereby the injection pressure and injection speed are controllable over a wide range. The die cavity 33, 34 of the injection mould is adapted to be supplied with the plasticised plastics material from the plastification cylinders 27, 21 via a common injector head 11*a*. Combined therein are two plastics material flow passages 31*a*, 32*a* arriving from the nozzles of the plastification cylinders 21, 27 to form a central passage 40*a* in the injection head nozzle 12*a*. The plastification chambers of the plastification cylinders mountable on the injection head 11*a*, the passages 31*a*, 32*a* and the injection cavity 33, 34 are intercommunicating cavities and thus the nozzle 12*a* of the injection head 11*a*, the nozzles 23 and 25 of the plastification cylinders 21, 27 do not include any closures. The injection head 11*a* is heatable by means of an electric heating element 14 and may be clamped on the stationary die carrier 30 with mould securing plate 29 — as especially evident from Fig. 1. The stationary die section 16*a* is in turn located on the injection head 11*a*. Seen in the direction of closing of the die closing unit, the injection head 11*a* is defined on both sides by insulating plates 13, 28. Its dimensions extending in two directions at right angles to the direction of closing of the die section are identical with the dimensions of the stationary die section 16*a*. The die head may be considered as a component of the stationary die section. The vertical plastification cylinder 21 is connectable via supporting rods 36 and coupling elements 10*a* with connecting sleeves 35 and securing bolts 37 to the tie rods 20 of the mould closing device, as known from the DT-PS 1 300 201. The passage 31*a* of the plastification cylinder 21 at first extends vertically in order then to merge into a section of passage inclined to the direction of closing and which is located substantially within the injection head nozzle 40*a*. The injection head nozzle 40*a* extends through the plate of the die section 16*a* provided with the cavities 34 and hence participates in forming the wall of the mould cavity 33, 34. The flow passage 31*a* leads into the mould cavity directly in front of the mouth in the passage 32*a*, the entry section being located at right angles to the entry section of the passage 31*a*.

The plastics material injection moulding machine with the exception of the injection head and some nozzles, is built up from standardised components (injection moulding units and die closing devices) which may also be used for standard injection moulding machines. The plastics material injection moulding machine may either be fitted with an interval switching controlling the axial strokes of the plastification screws, by means of which an intermittent stroke of one and a non-intermittent stroke of the other plastification screw is obtained or intermittent axial strokes mutually staggered in time of both plasticising screw 42 may be controlled with regard to speed and interval dimension.

Standard injection moulding, i.e. the manufacture of non-marbled, monochrome mouldings is possible on removal of the injection moulding unit II and the injection head 11*a* and replacement of the injection mould with a normal die section half.

Hence with a machine of identical basic fittings it is possible to alternately produce two-coloured and single coloured mouldings. In the latter case, there is, available an injection moulding unit operating at right angles to the parting line of the injection mould.

The integration of the injection head into the stationary mould section provides the structural condition for a simple maximum approach of the uniting point of the passage 31*a*, 32*a* to the mould cavity. This favours the quality of the marbling pattern.

The present invention is divided out of Application No. 42772/77. (Serial No. 1

595 806).

WHAT I CLAIM IS:

1. An injection moulding machine for plastics material for producing mouldings with coloured regions merging into one another, especially with marbling or mottled patterns, including two injection units each having a plastification cylinder and plastification screw and being incorporated in a die closing device forming an injection mould which is supplied with plasticised material from the two plastification cylinders each having an injection drive means controllable at different intervals to generate pulses in the plastics material being supplied by the injection units and to inject such via a common injection head, in which two injection head passages arriving from the nozzles of the plastification cylinders are combined into a central injection head passage which leads into an injection head nozzle, whereby the plasticising compartments of the plastification cylinders, the injection head passages and the moulding cavity of the injection mould are communicating cavities, characterised by the feature that the injection head is adapted to be secured on the stationary die carrier of the plastics material injection moulding machine and the stationary die section is located on this injection head, whereby a plastification cylinder extending at right angles to the direction of closing of the die closing unit and to the other plastification cylinder is adapted to be coupled via supporting rods to the tie rods of the die closing unit in the region of the injection head.

2. An injection moulding machine as claimed in claim 1, in which the injection head is adapted to be heated and seen in the closing direction of the die closing unit, is defined at both ends by insulating plates.

3. An injection moulding machine as claimed in claim 1 or 2, in which the injection head as a component of the stationary die section has the same dimensions as the die section in the two directions at right angles to the direction of closing.

4. An injection moulding machine as claimed in any of claims 1 to 3 in which the injection head nozzle penetrates the insulating plate and the die section and participates in forming the mould cavity.

5. An injection moulding machine as claimed in any of the preceding claims, in which the portions of the flow passages leading from the injection units extend at right angles to each other and are joined together in the injection head nozzle immediately in front of the mouth of the mould cavity.

6. An injection moulding machine as claimed in any of the preceding claims in which the plastification cylinders are plastification screw cylinders and identical with each other and displaceable on support rods of the associated injection units.

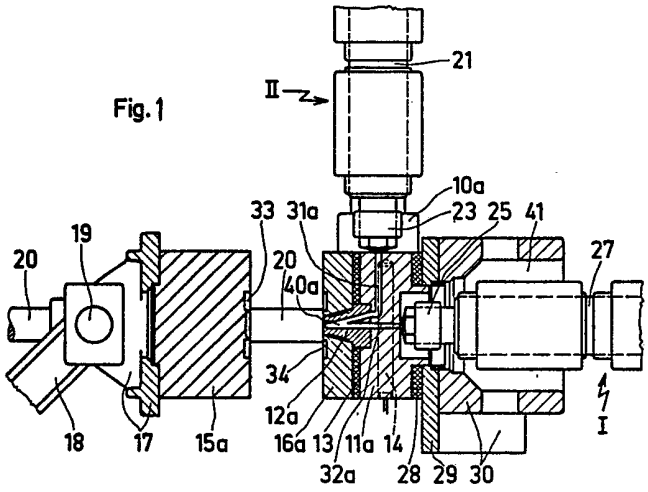
7. An injection moulding machine substantially as herein described with reference to and as illustrated in the accompanying drawings.

POTTS, KERR & CO.,
Chartered Patent Agents,
15, Hamilton Square,
Birkenhead,
Merseyside, L41 6BR,
and
27 Sheet Street,
Windsor, Berkshire SL4 1BY.

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1 SHEET *This drawing is a reproduction of the Original on a reduced scale*

Fig. 1



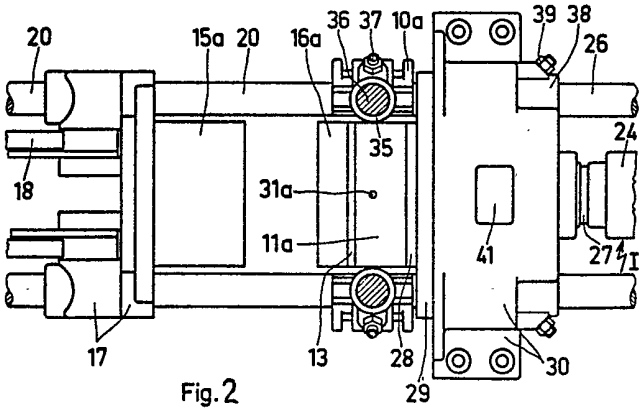


Fig. 2