

PATENT SPECIFICATION

(11) 1271⁵342

1271342

DRAWINGS ATTACHED

- (21) Application No. 38538/70 (22) Filed 11 Aug. 1970
(31) Convention Application No. 6929103 (32) Filed 26 Aug. 1969 in
(33) France (FR)
(45) Complete Specification published 19 April 1972
(51) International Classification B29B 5/04
(52) Index at acceptance
B5A 2A4A 2A4X 2D1X



(54) IMPROVEMENTS IN OR RELATING TO MACHINES FOR PRODUCING SYNTHETIC PLASTICS ARTICLES

(71) We, DANIEL BADOUX and ROBERT CARRY, both French citizens residing at 112, rue Franklin Roosevelt, Decines (Rhône, France), do hereby declare the invention for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to machines for producing articles from a strip of extruded synthetic material.

It has already been proposed to combine with a standard extruding machine an assembly which is able to receive the strip of synthetic material continuously extruded through the extruder die head, and to guide it to a moulding device which forms the desired articles from the said strip.

Nevertheless, experiments have shown that in practice known machines of this type are not entirely satisfactory. Due to the time necessary for the operation of the moulding device, it is naturally essential to impart to the strip of synthetic material an abrupt longitudinal displacement in such a way that during the periods of stoppage the strip, continuously emerging from the die head, accumulates upstream of the moulding device.

The accumulating synthetic material cools relatively quickly so that it is necessary to provide either heated panels for keeping it at an adequate temperature, or even heating means for bringing it to the said temperature; in both cases, it will be realised that such a requirement complicates the machine construction considerably and in any case is detrimental to a perfect regulation of the temperature. In addition, it is to be noted that the drive means provided downstream of the moulding device for longitudinally displacing the part of the strip which has accumulated during the stoppage upstream of the device, causes localised drawing out which affects the regularity of thickness and texture of the articles.

The improvements which are the object of

the present invention are intended to remedy the above-mentioned disadvantages and to facilitate production of a machine which is able to fulfil the various requirements efficiently.

According to the present invention there is provided a machine for moulding articles from a strip of extruded synthetic materials, of the kind in which there is imparted to the strip a stepwise displacement for feeding a moulding device, the machine comprising a build-up or accumulation system located between an extrusion die head and the moulding device, the system being constituted by two heated spaced-apart drums for supporting the strip of synthetic material, the drum adjacent to the die head being rotated continuously, and the other drum, which is located immediately upstream of the moulding device according to the direction of displacement of the strip, having imparted thereto an abrupt angular movement in synchronism with drive means which ensure displacement of the strip through the said device.

Experiments have shown that, on condition of an appropriate regulation of the temperature of the two heated drums, such a machine will ensure entirely satisfactory operation, without any irregularity.

An embodiment of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which:—

Fig. 1 is a diagrammatic side view showing the general arrangement of a machine according to the invention; and,

Fig. 2 is a plan view, to an enlarged scale, showing the build-up or accumulation system of the machine according to Fig. 1.

In Fig. 1, the reference 1 indicates the end of an extruding machine, whose die head 2 is provided so as to extrude a strip of synthetic material 3. This strip 3 is fed between two plates 4 and 5 of a moulding device of conventional type, which plates support the two parts of the mould of the said

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Price 33p

device; the upper plate 4 is stationary whereas there is imparted to the plate 5, by means of a cam mechanism (not shown), an alternating vertical displacement indicated by the arrow F. The moulded articles are ejected automatically and are removed in an appropriate manner, for example, on an inclined chute or conveyor such as indicated at 6. The perforated strip which leaves the moulding device passes between two drive drums 7 and 8, at least one of which is stepwise controlled in its rotation at the instant of the separation of the plates 4 and 5, the strip 3 finally being served by a guillotine 9, operated by a pneumatic jack 9a.

According to the invention, there is provided, between the die head 2 and the plates 4 and 5, a build-up or accumulation system comprising two drums 10 and 11, and provided so as to store to some extent the strip during the periods when it is not moved, i.e. during the operation of the moulding device 4-5.

As is shown in more detail in Fig. 2 the upstream drum 10 is keyed on a shaft 10a appropriately supported by the frame of the machine. This drum 10 is bored by at least one longitudinal duct, through which passes a fluid at an appropriate temperature; the fluid supply being ensured by means of two rotating seals 12 associated with inlet and outlet pipes. On the shaft 10a is fixed a toothed wheel 13 for a chain 14 which is wound round the output pinion 15 (Fig. 1) of a reduction drive motor 16. The chain 14 and the heated drum 10 are thus driven continuously at an appropriate speed.

This chain 14 is also wound round a wheel 17 (Fig. 2) loosely mounted on an intermediate shaft 18 located lower than the drums 10 and 11. An electromagnetic clutch mechanism 19 is associated with the wheel 17 and is arranged so as to couple together, when it is excited, the toothed wheel 17 and the shaft 18. On the opposite side of the machine frame, this shaft 18 supports a toothed wheel 20 which co-operates with a one-way drive mechanism 21; the latter which is of the ratchet type or similar, allowing the wheel 20 to rotate freely on the shaft 18 in one direction and to drive this shaft only in the opposite direction of rotation. On the wheel 20 there is wound a chain 22 (Fig. 1) one end of which is connected to a return spring 23 whereas the opposite end is connected to the piston of a pneumatic jack 25, operated in synchronism with the opening of the moulding device 4, 5.

The intermediate shaft 18 is also integral with a toothed wheel 26 (Fig. 2) connected by a chain 27 to a wheel 28 keyed on the corresponding end of a shaft 29 supporting the downstream drum 11 of the build-up or accumulation system. This drum 11 is also heated similarly to the drum 10, its supply of

fluid also being ensured by rotating seals 30. The shaft 29 is provided with a toothed wheel 31 provided at the side of the wheel 28 and connected by a chain 32 to the lower drum 7 of the stepwise drive mechanism 7-8.

The operation of the above-described machine is easily understood. To start the machine, the electro-magnetic clutch 19 is excited, in such a way that the reduction motor 16 continuously rotates not only the upstream drum 10, but also the downstream drum 11 and the drive mechanism 7, 8, the moulding device 4, 5 naturally being kept in the open position. The continuous displacement of the strip 3 makes it possible to pass the latter over the various components necessary for its guidance and its treatment.

When the machine has been made operational, the moulding device 4-5 is placed under the control of a programmer or automatic time-switch which ensures the correct sequence of operations, which causes simultaneously the opening of the circuit for the excitation of the clutch 19 and the periodic operation of the valve connected to the jack 25. Under these circumstances it is understood that the toothed wheel 17 no longer drives the shaft 18, which is, by way of contrast, controlled only one-way by the jack 25; in fact each time the piston 24 of the latter descends in opposition to the reaction of the spring 23, the chain 22 imparts to the wheel 20 and, by means of the chains 27 and 32, to the drums 11 and 7, an angular displacement of given amplitude. By way of contrast, when the piston 24 re-ascends under the action of the spring 23, the mechanism 21 disconnects the toothed wheel 20 and the shaft 18 in such a way that the latter remains stationary. There is thus obtained the desired stepwise rotational or abrupt angular movement for the heated drum 11 and for the drive mechanism 7-8 associated with the strip 3.

Under these circumstances it is understood that at the time of each stoppage the strip 3 builds up or accumulates between the heated drums 10 and 11, the drum 10 continuing to rotate. The part of the strip comprised between these drums grows longer and thus tends to fall downwards under the effect of the weight; however, this strip remains at a regular temperature due to the heating by the drums. When the drums 7 and 11 are rotated the strip becomes taut without jerks, such that the drum 11 partially recovers the strip length which had accumulated, without the strip suffering an exaggerated pulling force.

Moreover, it should be understood that the preceding description has only been given as an example and that it in no way limits the scope of the claimed invention. For example, it will be understood that the means for heating the two drums may be of different

construction to that described (for example electric resistances).

WHAT WE CLAIM IS:—

- 5 1. A machine for moulding articles from a strip of extruded synthetic material of the kind in which there is imparted to the strip a stepwise displacement for feeding a moulding device, the machine comprising a build-up or accumulation system located between
10 an extrusion die head and the moulding device, the system being constituted by two heated spaced apart drums for supporting the strip of synthetics material, the drum adjacent to the die head being rotated continuously,
15 and the other drum which is located immediately upstream of the moulding device according to the direction of displacement of the strip, having imparted thereto an abrupt angular movement in synchronism with drive
20 means which ensure displacement of the strip through the said device.
2. A machine according to claim 1, in which the drums are heated by circulation of fluid through rotating seals located at the
25 ends of the shafts which support the drums.
3. A machine according to claim 1 or 2, in which the drum adjacent to the die head is rotated by a reduction motor.

4. A machine according to any one of the preceding claims, in which the drum adjacent to the moulding device is rotated abruptly by a pneumatic jack connected to a one-way mechanism able to oppose any angular displacement of the drum during the return movement of the piston of the jack. 30 35

5. A machine according to any preceding claim, in which the two drums are connected for rotation together by a connecting member associated with an electromagnetic clutch which ensures continuous rotation of the drum adjacent to the moulding device during the starting period of the machine. 40

6. A machine according to claim 5, in which the drum adjacent to the moulding device is connected for rotation to the strip driving mechanism located downstream of the said device. 45

7. A machine according to claim 4 and 5, in which the electromagnetic clutch and the one-way mechanism are mounted on an intermediate shaft located between the two drums. 50

8. A machine for producing articles from a strip of extruded synthetics material substantially as hereinbefore described with reference to the accompanying drawing. 55

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