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A. RUSSELL ET AL

2,379,655

MACHINE FOR WRAPPING PLASTIC MATERIALS

Filed March 9, 1944

3 Sheets-Sheet 1

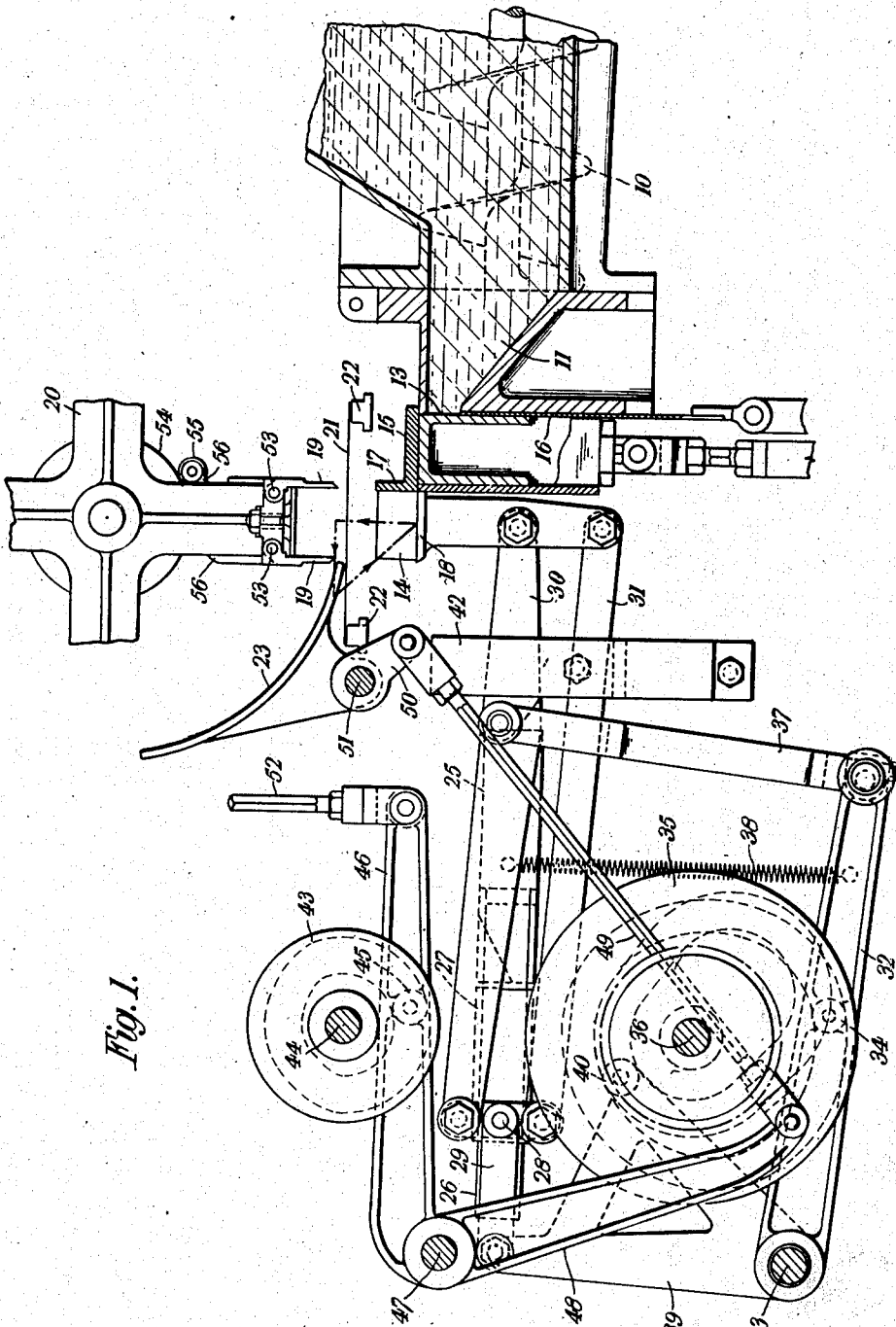


Fig. 1.

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3 Sheets-Sheet 2

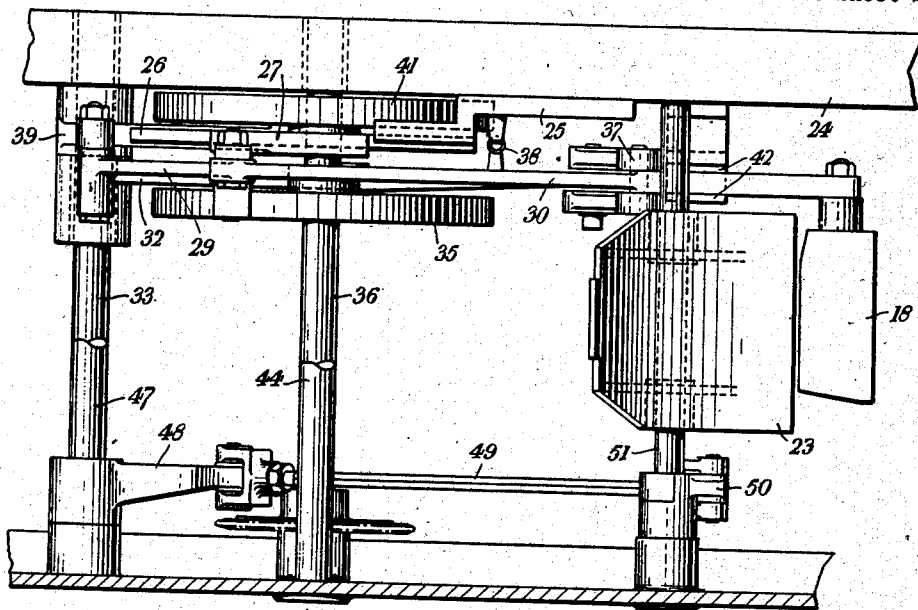


Fig. 2.

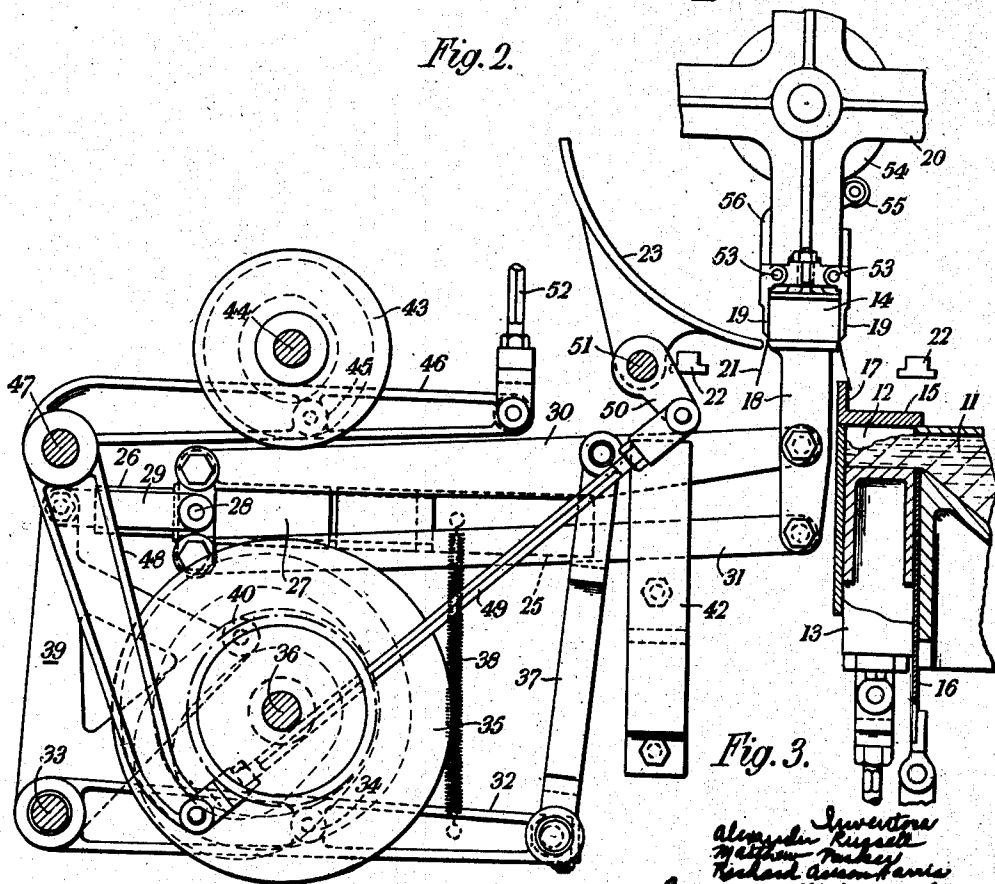


Fig. 3.

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Fig. 4.

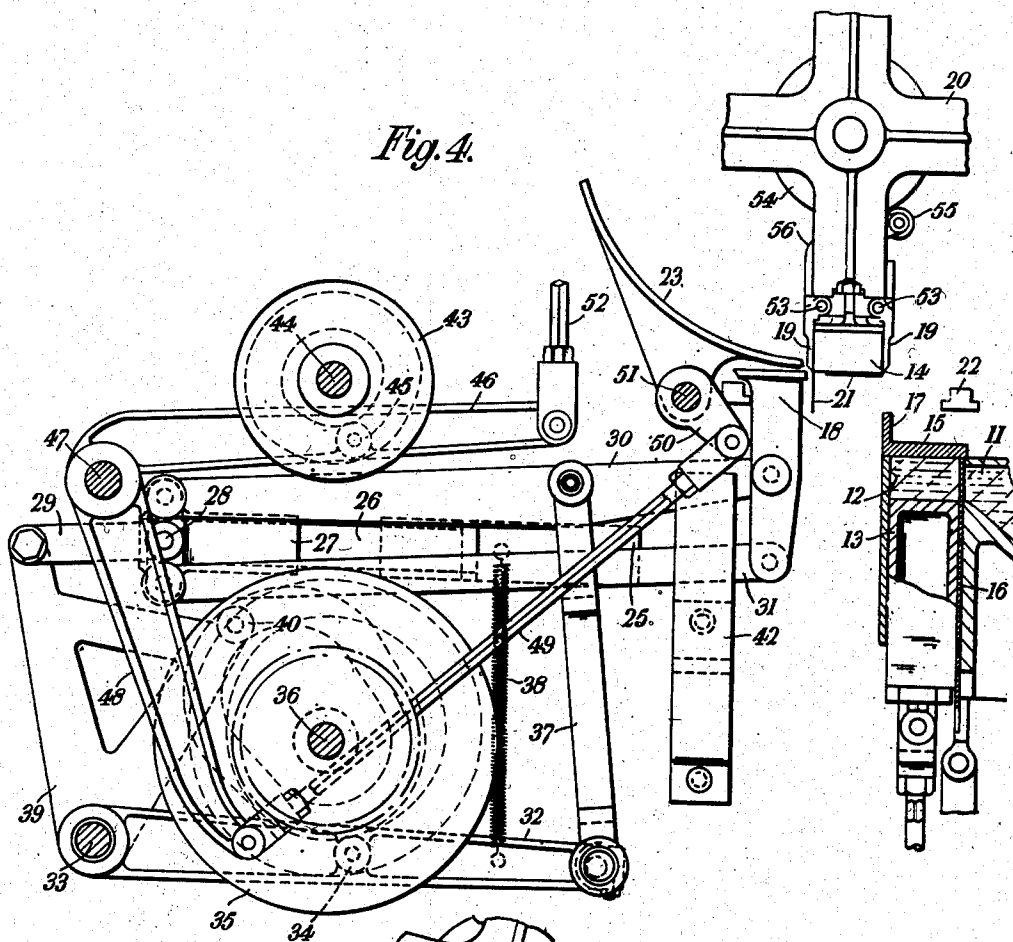
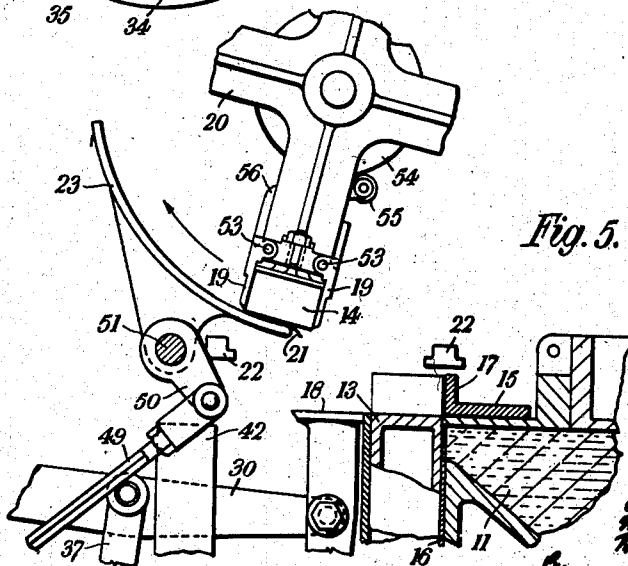


Fig. 5.



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UNITED STATES PATENT OFFICE

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MACHINE FOR WRAPPING PLASTIC MATERIALS

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In Great Britain May 5, 1943

6 Claims. (Cl. 93—2)

In the wrapping by mechanical means of plastic materials, such for example as margarine, butter or the like, difficulty is often encountered in transferring the material from one to another of the various members of the machine during the process of wrapping, because of the adhesion of the plastic material to the members. To overcome this trouble a liquid, such as water, is sometimes sprayed on the members concerned, and in other cases special materials (e. g. parchment paper) are interposed between the plastic material and the members. Yet another method in use is to provide for a sliding action to take place between the plastic material and the members when effecting removal of the former from the latter. This invention has for its object the provision of a wrapping machine in which the aforesaid sliding action is obtained in a manner having advantages over existing methods designed for the same purpose.

Hitherto it has been common practice in this type of machine to extrude plastic material from a feed hopper by means of rotating worms into a die chamber having a horizontally slidable top cover, and a bottom formed by a vertically slidable die plunger. The die plunger lifts the extruded block or "print" into one of several sets of gripper jaws carried on a wrapping wheel, the block being arranged to contact and carry with it a wrapper suitably interposed in its path between the die chamber and the gripper jaws. To slide the block from the die plunger, the gripper jaws are moved horizontally, whilst the die plunger dwells in its top position.

Usually there are four sets of gripper jaws on the wrapping wheel, and each set requires mechanism for its movement, thus adding considerable weight to the wrapping wheel. Also the space required for the gripper jaw mechanism and movement sets a limit to the minimum size of the wrapping wheel, so that the effect of the weight cannot be offset by reducing the size of the wrapping wheel.

Furthermore, the time required for the long die plunger stroke demanded by this scheme reduces the amount of time available for extruding the material into the die chamber. There appears also to be some risk of damage to the moving jaw type of machine, owing to the possible breakage of certain springs. These springs retain the moving jaws against stops on the wrapping wheel, except when the jaws are pulled over the plunger position to receive a block, and they have to be strong enough to ensure without fail that the blocks are slid off the plunger when the jaws are permitted to return to their stops.

To minimize this risk of damage, the springs are often duplicated, but as each one must be capable of carrying on if the other one breaks, this

remedy entails doubling the weight of the springs (which is considerable) and doubling the load on the gripper jaw movement.

The object of the present invention is to provide an alternative mechanism for transferring to the wrapping wheel the wrappers and prints of plastic material delivered from the die chamber, which will permit of the use of a simpler and lighter wrapping wheel, and of a shorter die plunger stroke, thus enabling a larger share of the available time to be devoted to the extrusion of the plastic material into the die chamber and the risk of breakage of parts associated with the wrapping wheel to be eliminated.

The invention provides a machine for wrapping plastic materials, such for example as butter, margarine or the like, which includes an extrusion device for forming the plastic material into shaped blocks, a lifting plunger for receiving the blocks from the extrusion device and operative at each machine cycle to deliver into the jaws of a wrapping wheel one of said blocks and a wrapper, said lifting plunger being arranged to move in a triangular path, viz. first upwardly to feed the block into the jaws, then horizontally or almost so to a position in which it is clear of the block held in the jaws, and finally diagonally downwards to its starting position.

The invention thus permits of the use of a wrapping wheel furnished with pairs of stationary jaws. By the expression "stationary," we mean that the jaws do not execute any horizontal movement for the purpose of sliding the print off the lifting plunger, this horizontal movement being executed by the lifting plunger, as stated. We do not, however, exclude the provision of the usual opening and closing movement required to enable the jaws to receive and embrace the print.

Owing to the elimination of horizontal movement of the jaws, the construction of the wrapping wheel is much simplified and the wheel can be made smaller and lighter and the risk of breakage of springs for controlling the horizontal movement of the jaws is removed. Also, since the die plunger no longer has to operate also as a lifting plunger, its stroke is shortened and more time is available for feeding the plastic material into the die chamber. The machine speed can therefore be increased as the result of the more favourable time distribution and the simplification of the wrapping wheel.

One specific form of wrapping machine according to the invention will now be described in further detail, by way of example, with reference to the accompanying drawings, in which

Fig. 1 is a side elevation, partly in section, showing the die chamber, lifting plunger, operating gear therefore, and part of the wrapping

wheel, the lifting plunger being shown in its down position and about to commence its upstroke,

Fig. 2 is a corresponding plan view, and

Figs. 3, 4 and 5 are views similar to Fig. 1 showing respectively the positions occupied by the parts at the conclusion of the upstroke of the lifting plunger, at the end of its horizontal sliding movement, and after its return to the down position.

Like reference numerals indicate like parts throughout the figures.

The plastic material is fed from a hopper by intermittently rotating feed worms, one of which is shown at 10 in Fig. 1, to an extrusion box 11 located to one side of a die chamber 12. In the die chamber is disposed a reciprocating die plunger 13 which constitutes the bottom of the die chamber. This serves to lift out of the die chamber a succession of prints 14 of the extruded plastic material, which are slid off the top of the die plunger by a sliding plate 15 constituting a top cover for the die chamber.

The operation of the die chamber and associated parts is fully described in our copending United States application Serial No. 525,684 and it will be sufficient to state here that the plastic material is extruded into the die chamber when the die plunger 13 is in its down position as indicated in Fig. 3, the top cover 15 then closing the top of the die chamber. A knife 16 then moves up to close the extrusion orifice between the die chamber 12 and the extrusion box 11 (see Fig. 4), the top cover 15 moves to the right to open the top of the die chamber, and the die plunger 13 moves up to lift the shaped block or print 14 of plastic material out of the die chamber as shown in Fig. 5. In this position the upper surface of the die plunger 13 is level with the undersurface of the top cover 15.

The top cover 15 then moves to the left, and an upstanding flange 17 thereon pushes the print off the die plunger 13, which remains dwelling in its up position, on to a reciprocating lifting plunger 18 (see Fig. 1), the knife 16 meanwhile returning to the down position. The die plunger then return to its down position (Fig. 3) and a fresh extrusion operation commences (see Fig. 3).

The sliding top cover 15 thus transfers the prints in succession to the lifting plunger 18, which receives them when in its down position. As will be clear from Fig. 1, the upper surface of the lifting plunger 18, when in its down position, is level with the position occupied by the upper surface of the die plunger 13 when in its top position. The lifting plunger is operated by the cam and linkage mechanism described below, which is so designed that, starting from the down position of the lifting plunger, the latter is first lifted vertically (or substantially so) into its up position. This slides the print off the flange 17 of the top cover 15 and lifts it (see Fig. 3) into the pair of gripping jaws 19 then located at the bottom of an intermittently rotating wrapping wheel 20 having four pairs of jaws, the print carrying with it a wrapper 21 which has meanwhile been fed along guides 22 into the path of the lifting plunger by the mechanism described in our copending United States application Serial No. 511,670. The wrapper is thus folded in inverted U formation about the print.

The gripping jaws 19 are hinged at 53 and connected by meshing quadrants so as to open and close together. They are spring urged towards the closed position. These details are not illustrated because the construction is common

practice in wrapping wheels for wrapping toffee and other non-plastic materials. The jaws are opened, by cam action, prior to entry of the print and are thereafter permitted to close against the sides of the print. This is effected by a cam 54, which is periodically rocked to and fro and engages a roller 55 on an extension 56 of one of the jaws.

The lifting plunger dwells in the up position, and after the jaws have closed on the print, the plunger is moved sideways horizontally (or nearly so), sufficiently to slide it clear of the undersurface of the print (see Fig. 4). Thereafter the plunger is returned diagonally into its down position. Its upper surface therefore moves in a triangular path, shown in chain dotted lines in Fig. 1, i. e. first of all vertically up, then horizontally and finally in a straight inclined path back to the down position.

During or immediately after the horizontal sliding movement of the lifting plunger, a folder (not shown) moves in, in known manner, to fold against the bottom of the print the depending end of the wrapper at the side remote from the plunger (see Fig. 4). The wrapping wheel then moves, see Fig. 5, through 90° to transfer the print to the next wrapping station. On its way, the other depending end of the wrapper is folded against the undersurface of the print by a stationary folder 23. This folder is stationary in the sense that it occupies a fixed position during movement of the wrapping wheel. It is, however, lifted by a cam and link mechanism, as later described, out of the way of the lifting plunger during the horizontal movement thereof, and is returned to its operative position after the plunger has passed and before the wrapping wheel begins to rotate.

The cam and linkage mechanism for actuating the lifting plunger 18 operates as follows:

To a fixed member 24 of the machine framework (Fig. 2) is attached a bracket 25 carrying a fixed guide 26 on which is slidably mounted a carriage 27. To the carriage are pivoted parallel links 30, 31 supporting the lifting plunger 18.

The lifting movement is communicated to the plunger 18 by a lever 32 pivoted on a shaft 33 and carrying a roller 34 engaging a track in a cam 35 on the cam shaft 36, the lever being connected to the upper link 30 of the parallel linkage by a lifting link 37. A spring 38, attached at its upper end to the bracket 25, supports the weight of the parallel linkage and lifting gear.

The horizontal movement is imparted to the lifting plunger by a link 29 pivoted at one end by a pin 28 to the carriage 27 and at the other end to a triangular lever 39 pivoted to the shaft 33 and carrying a roller 40 engaging a track in a cam 41 on the cam shaft 36. The cams 35, 41 are so shaped that, after the plunger 18 has executed a substantially vertical upward movement under the action of the cam 35, it dwells in the up position while the cam 41 imparts to it a substantially horizontal movement towards the left, so moving it from the position shown in Fig. 3 to that in Fig. 4. Thereafter both cams operate simultaneously on the plunger to return it diagonally downwards to its down position (Fig. 5). The links 30, 31 of the parallel linkage are guided in their movements by the forked upper end of a guide bracket 42 fixed to the machine framework.

The stationary folder 23 is lifted from its operative position to the position shown in Fig. 4 to

permit of the horizontal sideways movement of the lifting plunger, by means of a cam 43 on a shaft 44. A track in the cam engages a roller 45 on a lever 46 fixed to a shaft 47. Also fast on the shaft 47 is a lever 48 connected by a link 49 to a crank 50 on a shaft 51 supporting the folder 23. The cam 43 thus rocks the shaft 51 sufficiently to lift the right hand end of the folder 23 out of the path of the lifting plunger 16. The lever 46 also operates the top presser plate mentioned above through the agency of a link 52.

What we claim as our invention and desire to secure by Letters Patent is:

1. In a machine for shaping and wrapping plastic materials, having an extrusion device for forming the plastic material into shaped blocks and a wrapping wheel for wrapping the blocks so formed, the combination with the wrapping wheel of a lifting plunger for receiving said blocks from the extrusion device and delivering them in succession, each with a wrapper, to a wrapping wheel, and operating gear for moving the lifting plunger in a triangular path, consisting of an upward lifting movement, then a substantially horizontal movement to slide said plunger clear of the block held in the wrapping wheel, and finally a diagonal return movement to the down position.

2. In a machine for shaping and wrapping plastic materials, having an extrusion device for forming the plastic material into shaped blocks and an intermittently rotating wrapping wheel for wrapping the blocks so formed, said wrapping wheel having a plurality of pairs of jaws, the combination with the wrapping wheel of a reciprocating lifting plunger, means for delivering the shaped blocks from the extrusion device to said lifting plunger when in the down position, and operating gear for the lifting plunger for imparting thereto at each machine cycle first an upward movement to lift a block and a wrapper into the jaws of the wrapping wheel, then a substantially horizontal sliding movement to clear the plunger from the undersurface of the block in said jaws and finally a return movement to the down position, said return movement commencing only after the plunger is clear of the block.

3. In a machine for shaping and wrapping plastic materials, having an extrusion device for forming the plastic material into shaped blocks and an intermittently rotating wrapping wheel for wrapping the blocks so formed, said wrapping wheel having a plurality of pairs of jaws, the combination with the wrapping wheel of a reciprocating lifting plunger, means for delivering the shaped blocks from the extrusion device to said lifting plunger when in the down position, a horizontally reciprocating carriage, a parallel linkage carried thereon and supporting the lifting plunger, a lifting link connected to the parallel linkage and a pair of cams, one for imparting reciprocating movement to the carriage and the other for imparting up and down movement to the parallel linkage, through the agency of the lifting link, said cams serving at each machine cycle first to move the plunger upwards to deliver a block and wrapper to the wrapping wheel, then to move the plunger substantially horizontally to slide it clear of the undersurface of the block held in the jaws, and finally to return the plunger to its down position.

4. In a machine for shaping and wrapping plastic materials, having an extrusion device for

forming the plastic material into shaped blocks and an intermittently rotating wrapping wheel for wrapping the blocks so formed, said wrapping wheel having a plurality of pairs of jaws, the combination with the wrapping wheel of a reciprocating lifting plunger, operating gear for the lifting plunger for imparting thereto at each machine cycle first an upward movement to lift a block and a wrapper into the jaws of the wrapping wheel, then a substantially horizontal sliding movement to clear the plunger from the undersurface of the block in said jaws and finally a return movement to the down position, said return movement commencing only after the plunger is clear of the block, a folder located at that side of the wrapping wheel to which the plunger moves in its horizontal sliding movement, said folder serving, on movement of the wrapping wheel, to fold the wrapper against the bottom of the block held in the lowermost pair of jaws, and means for displacing said folder out of the path of the plunger during said horizontal movement thereof.

5. In a machine for conveying blocks of plastic material from an extrusion device to mechanism including a wrapping wheel for wrapping the blocks, means including a lifting plunger for successively receiving the blocks from said extrusion device, and means for moving said lifting plunger cyclically in timed relation with the operation of said extrusion device in a triangular path consisting of a first path over which the plunger has an upward lifting movement from a position close to said extrusion device to a position wherein a block carried by the plunger is delivered to said wrapping wheel, a second path wherein the plunger is given a substantially horizontal movement to slide the plunger clear of a block held in said wrapping wheel, and a third path wherein the plunger is given a diagonal return movement to the starting position of said first path in time to receive the next successive block from said extrusion device.

6. In a machine for conveying blocks of plastic material from an extrusion device to mechanism including a wrapping wheel for wrapping the blocks, a die chamber having a reciprocating die plunger providing the bottom wall of the chamber and serving by its upward movement to eject blocks of plastic material from the chamber, said chamber having a cover sliding transversely of the chamber and providing the top wall thereof, said die plunger having a travel path ending at the level of the bottom of said cover, a lifting plunger for receiving successive blocks of plastic material, the top of said lifting plunger having a starting position level with the top of said die plunger in its upper position, said cover having a flange for sliding from the top of said die plunger to the top of said lifting plunger the blocks successively ejected from the chamber by said die plunger, means for cyclically raising said lifting plunger to a position in which a block carried thereby is delivered to said wrapping wheel, and means for clearing said lifting plunger laterally away from said wrapping wheel at the place where the block is delivered thereto and then returning said lifting plunger diagonally to said starting position, said respective means operating cyclically in timed relation with said die plunger and said cover.

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