

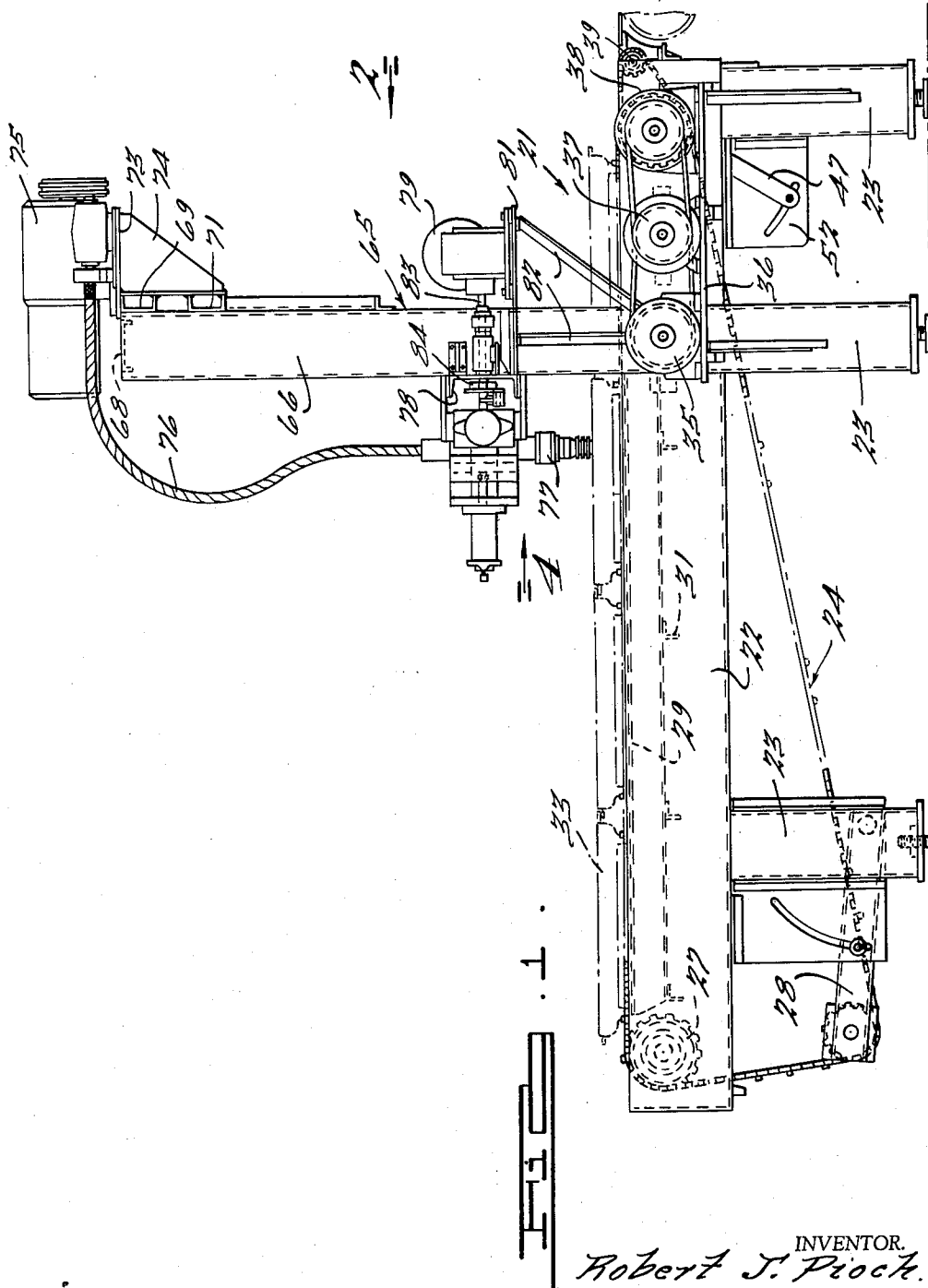
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 1



INVENTOR.
Robert J. Pioch.

BY
Harnes, Dickey & Paine
ATTORNEYS.

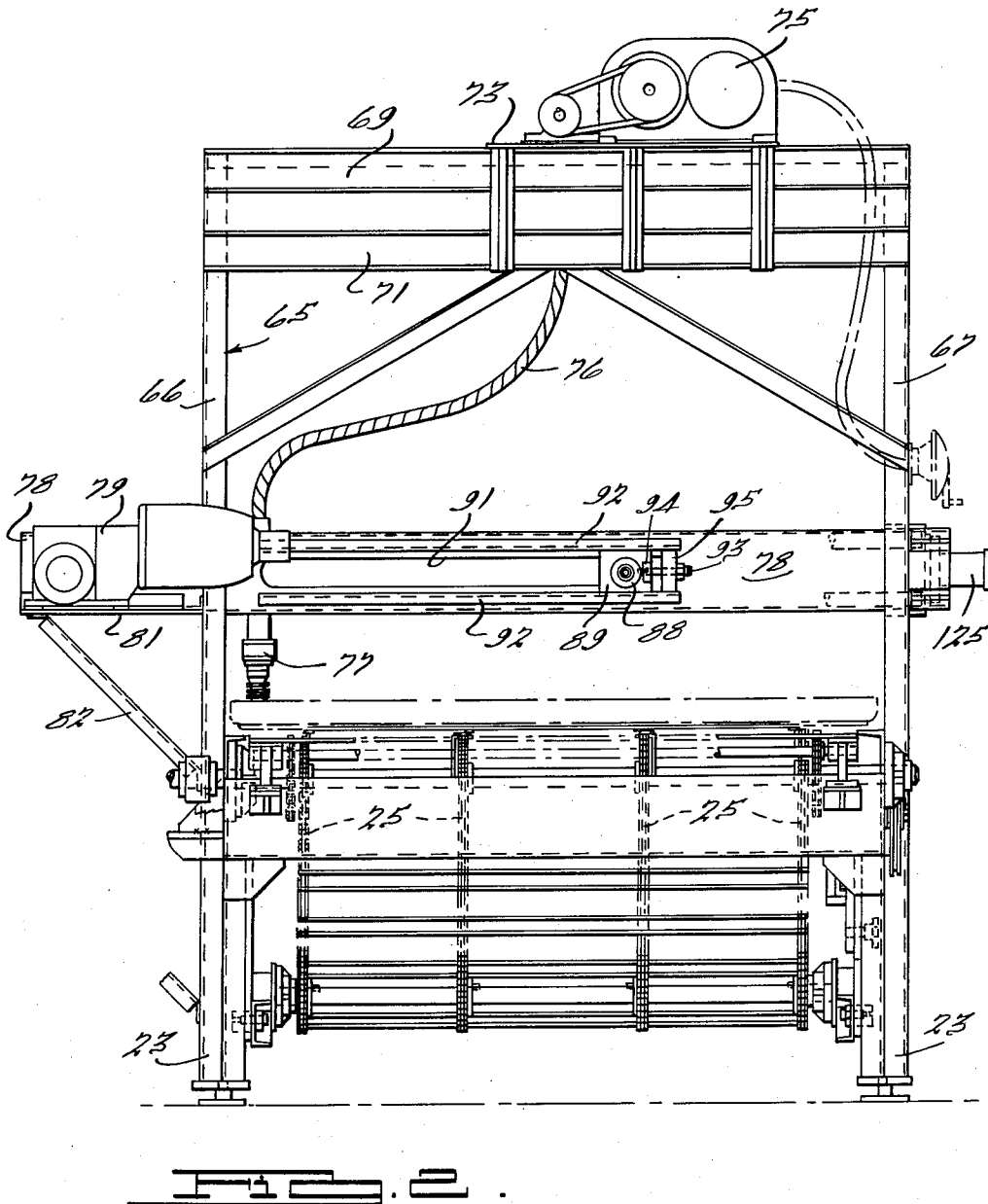
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 2



INVENTOR
Robert J. Pioch.
BY
Harniss, Dickey & Purcell
ATTORNEYS.

June 26, 1962

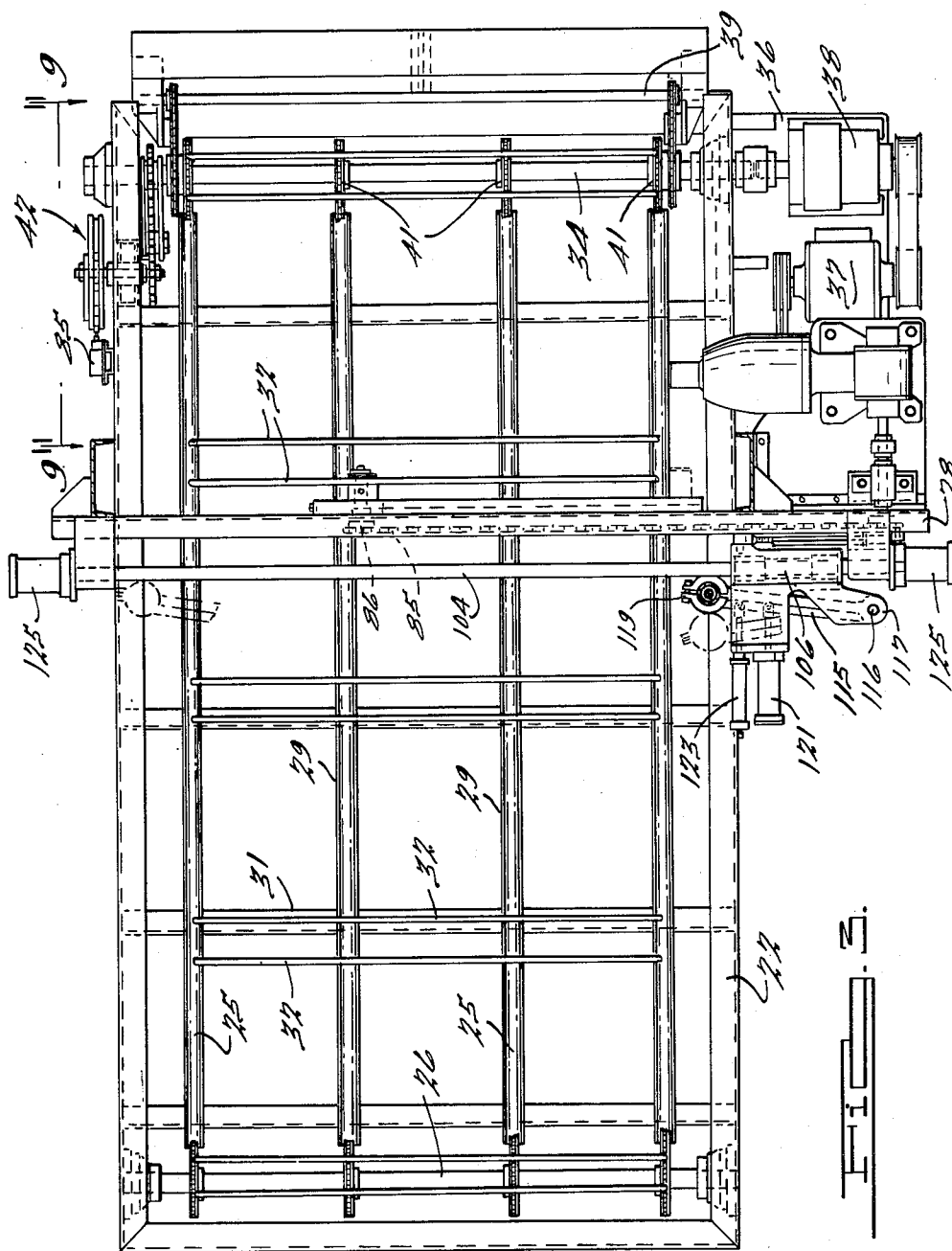
R. J. PIOCH

3,040,381

DEPOSITING MACHINE

Filed Nov. 6, 1958

11 Sheets-Sheet 3



INVENTOR.

Robert J. Pioch

BY

Karnes, Dickey & Piers
ATTORNEYS

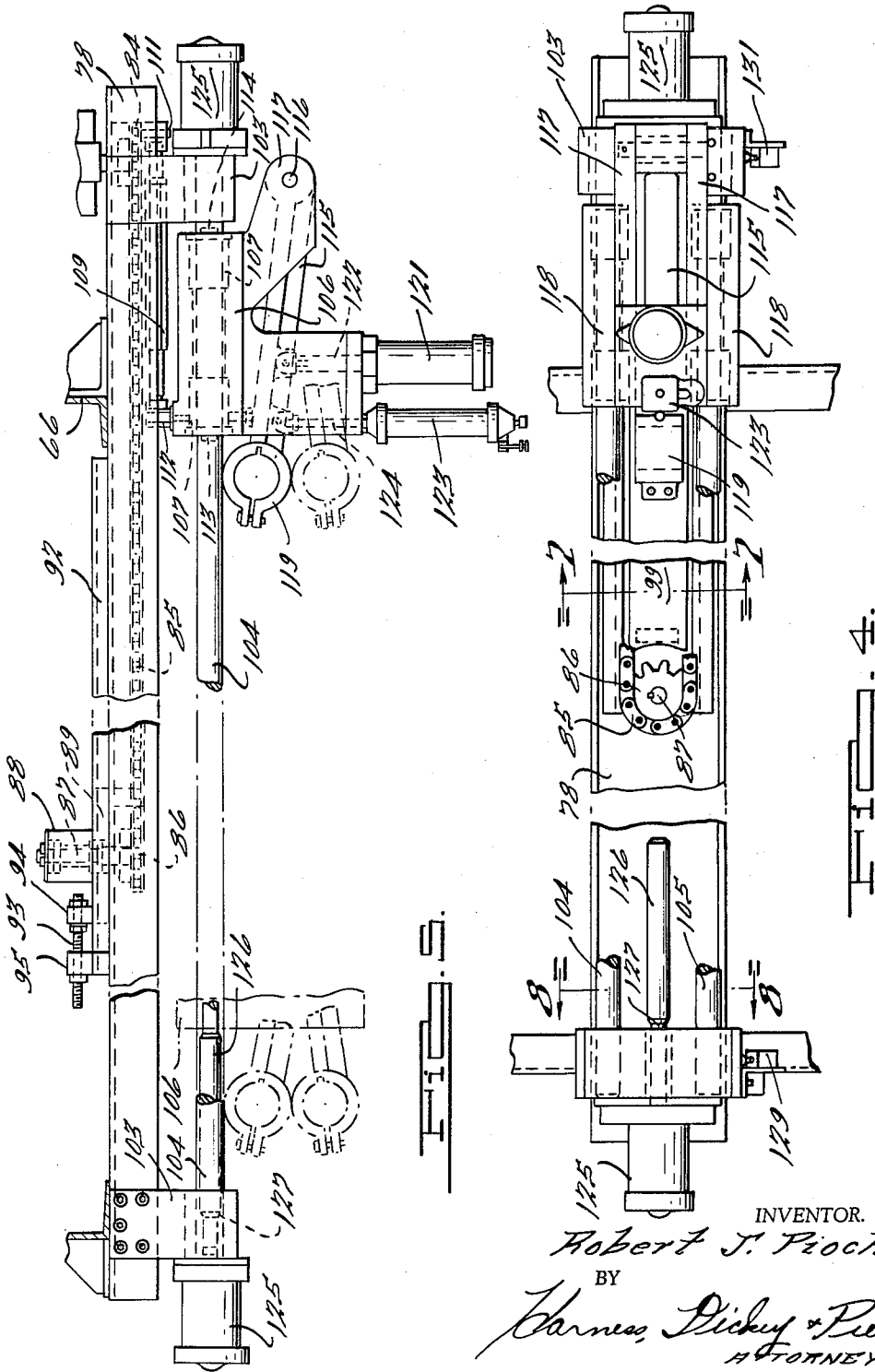
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 4



INVENTOR.
Robert J. Pioch.
BY
Carroll Dickey & Piers.
ATTORNEYS.

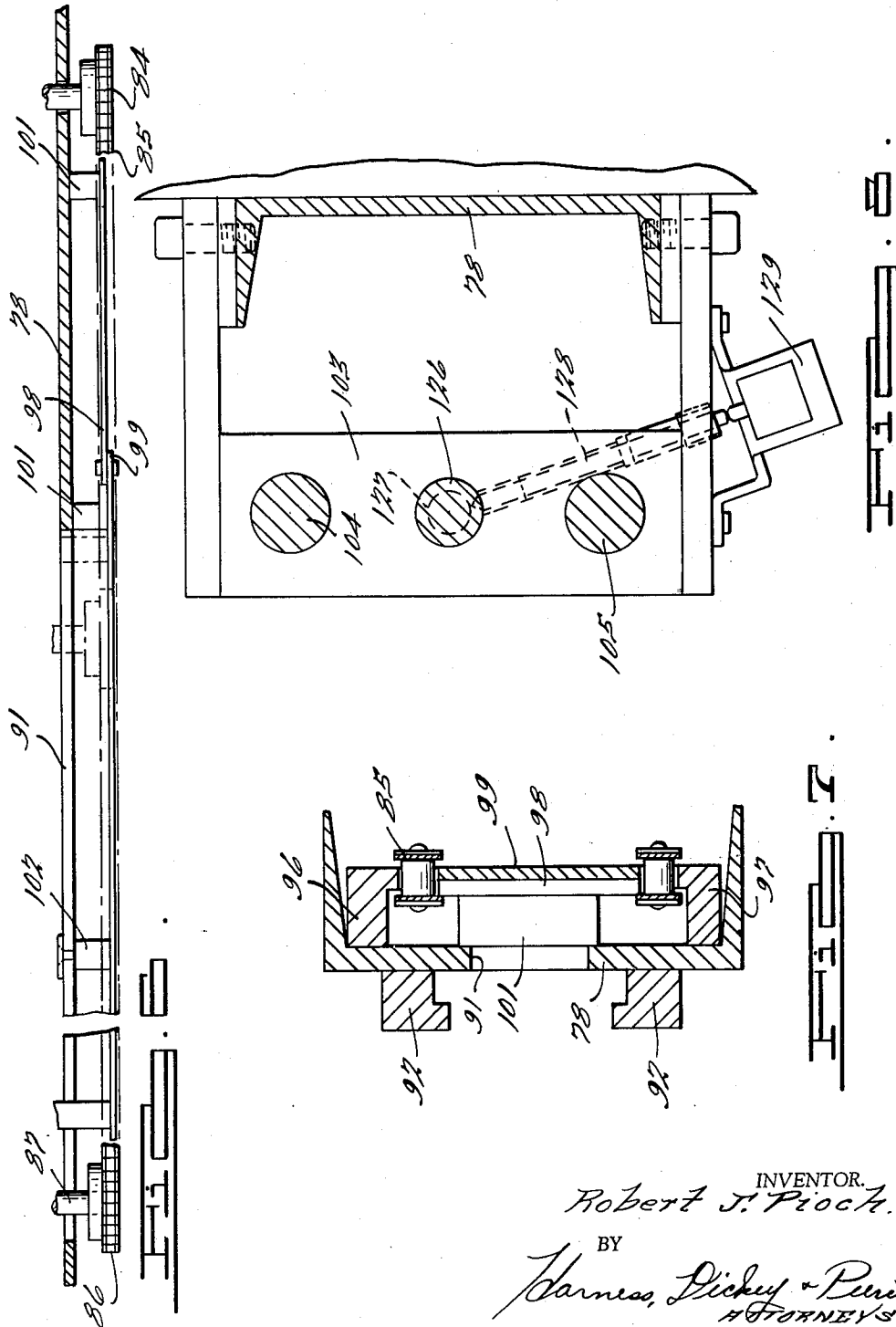
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 5



INVENTOR.
Robert J. Pioch.

BY
Harnes, Dickey & Penick.
ATTORNEYS.

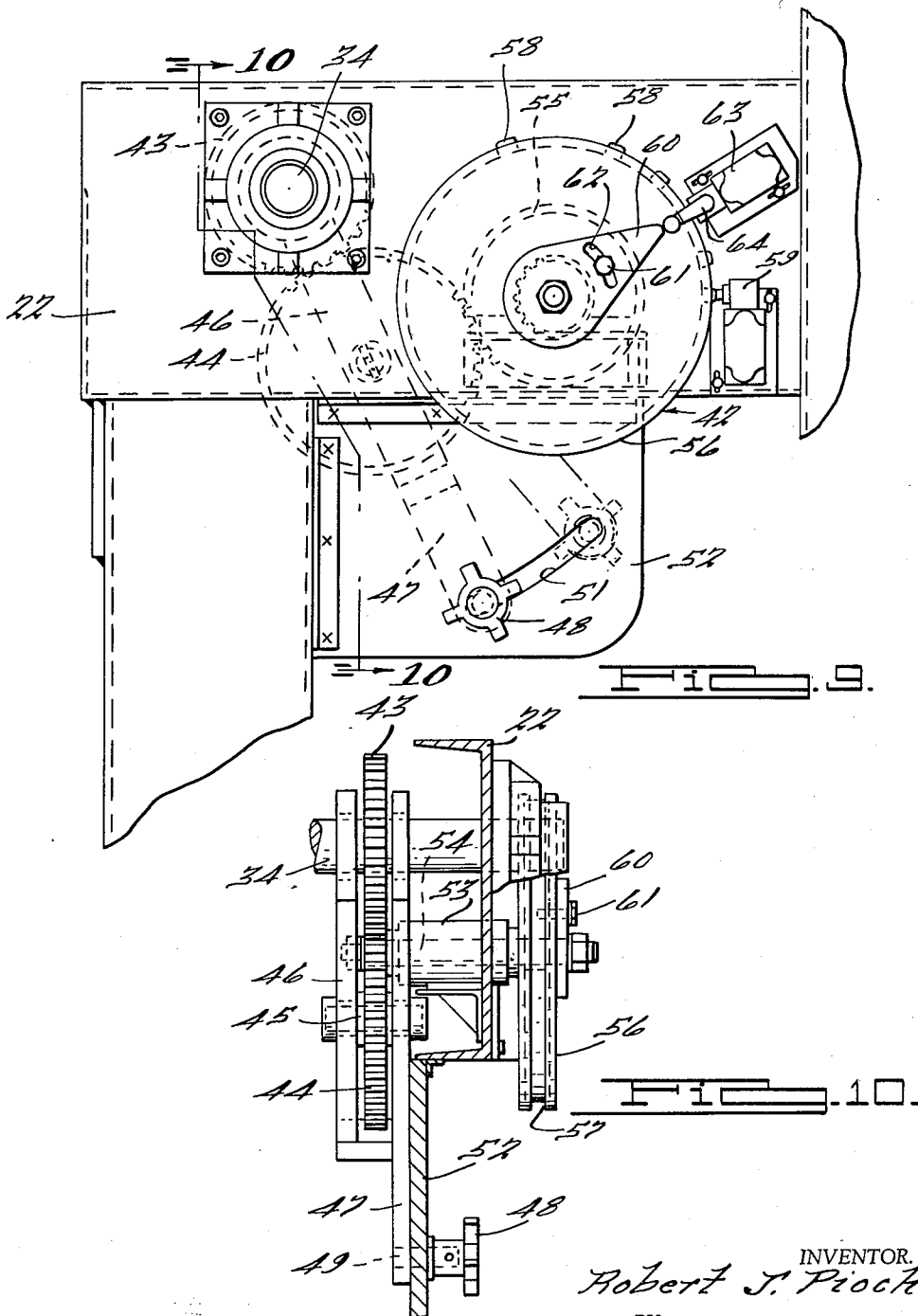
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 6



INVENTOR.
Robert J. Pioch.
BY
Harness, Dickey & Perle.
ATTORNEYS.

June 26, 1962

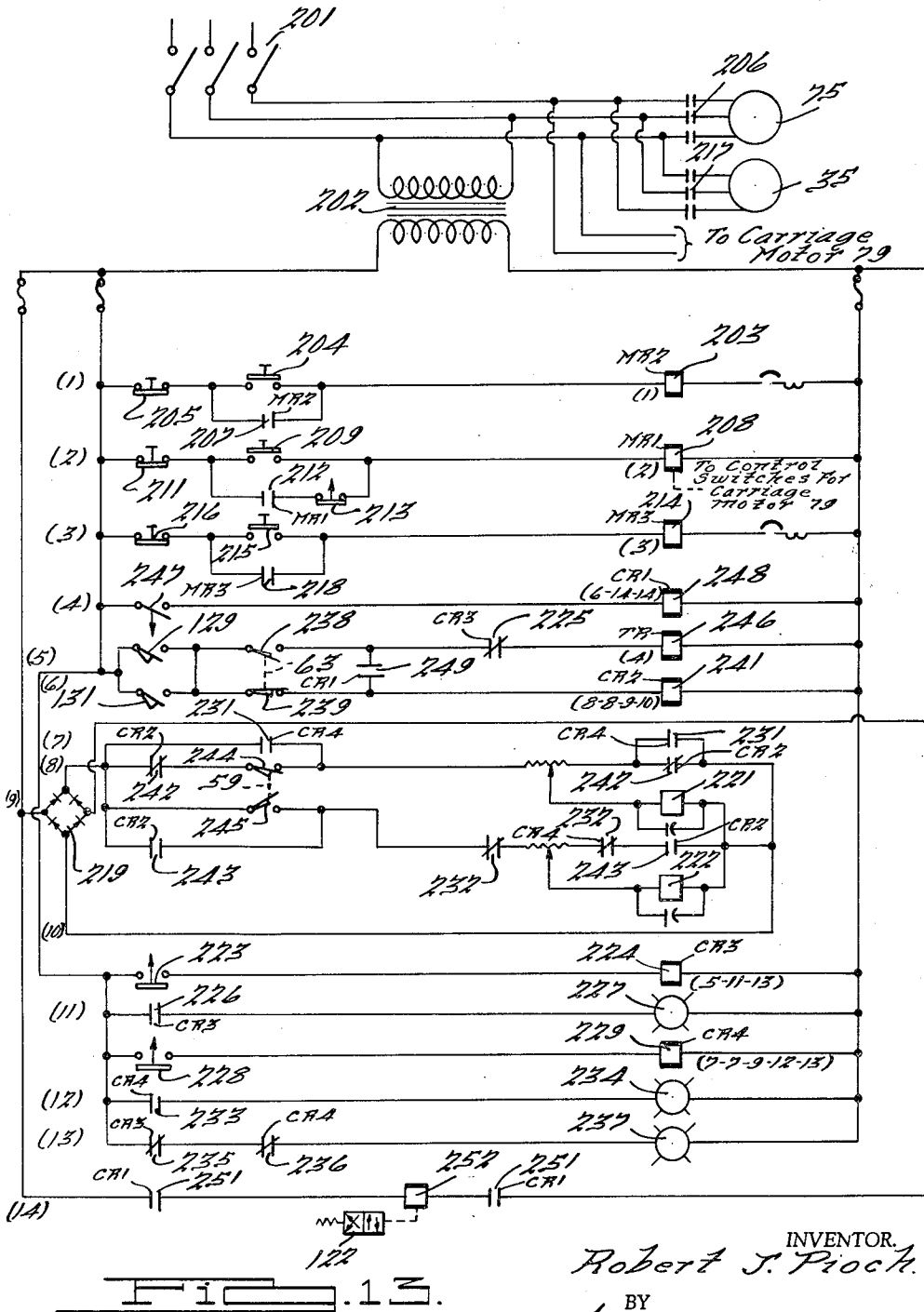
R. J. PIOCH

3,040,381

DEPOSITING MACHINE

Filed Nov. 6, 1958

11 Sheets-Sheet 8



INVENTOR.
Robert J. Pioch.
BY
Harnes, Dickey & Paine.
ATTORNEYS.

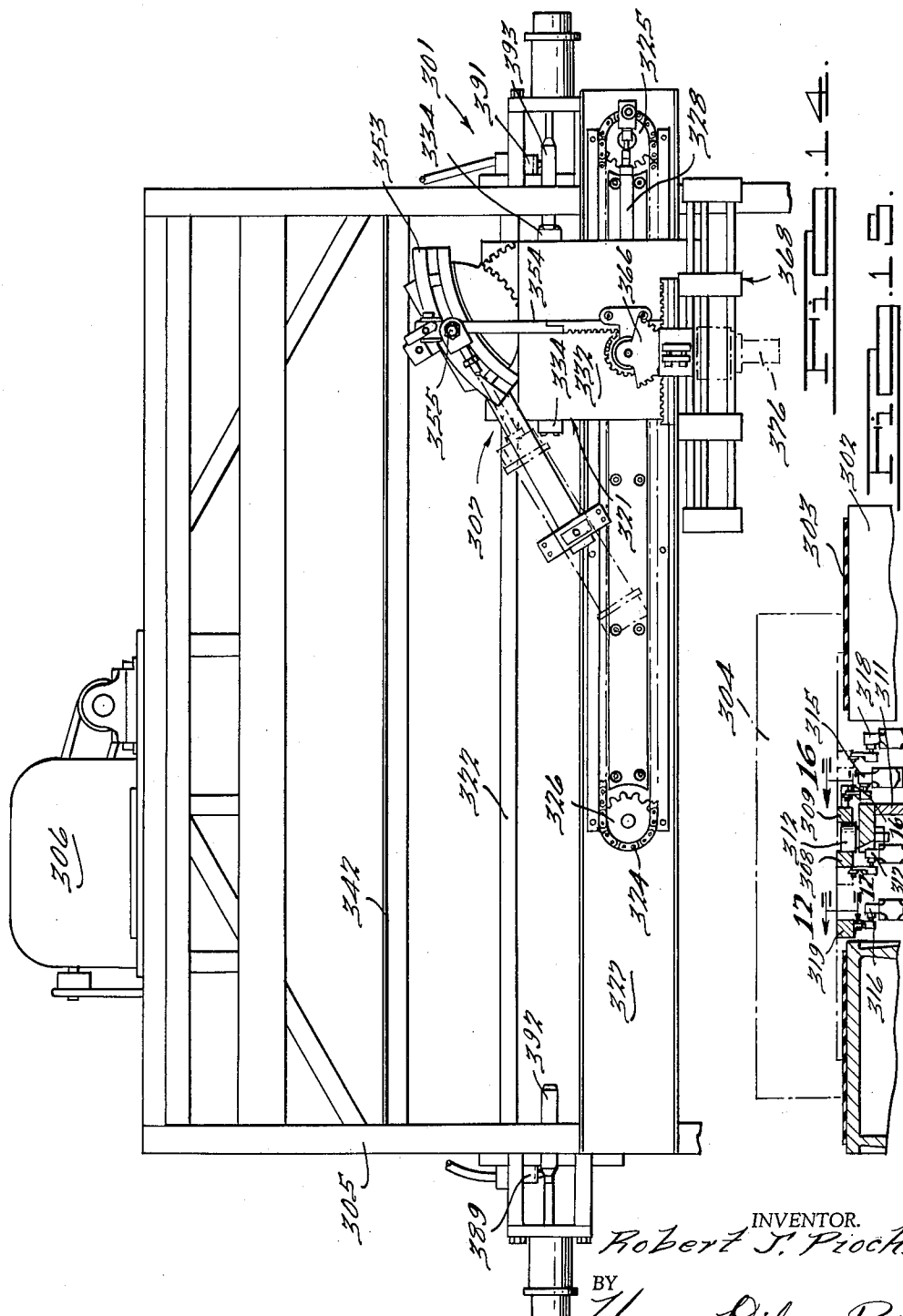
June 26, 1962

R. J. PIOCH
DEPOSITING MACHINE

3,040,381

Filed Nov. 6, 1958

11 Sheets-Sheet 9

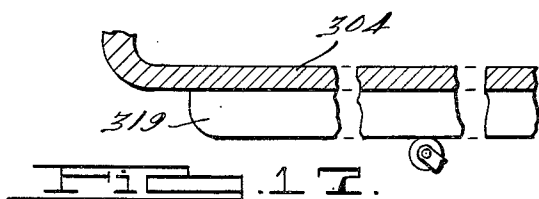
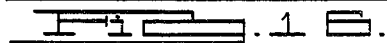
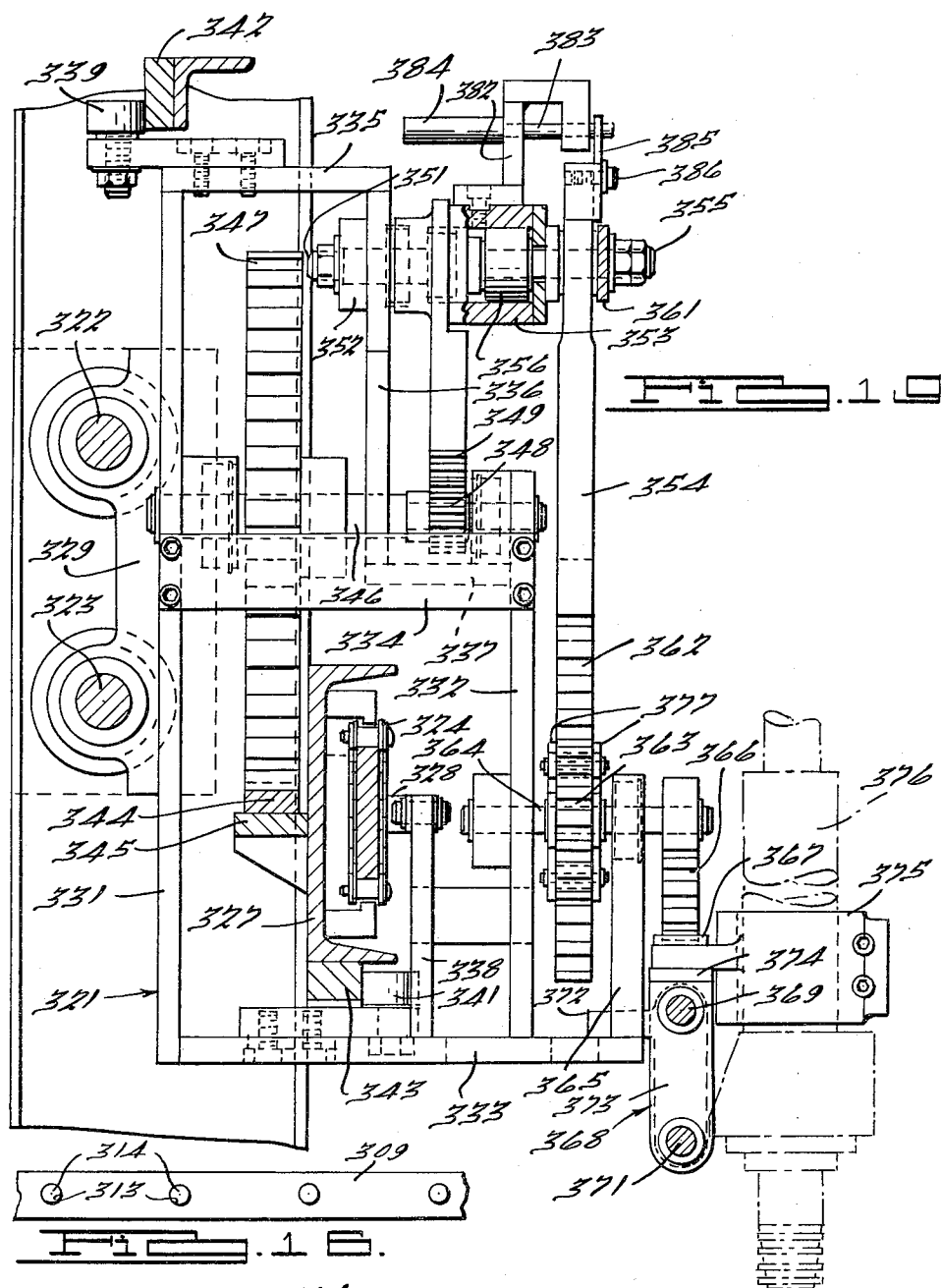


INVENTOR.
Robert J. Pioch.
BY
Harniss, Dickey & Pirie
ATTORNEYS.

R. J. PIOCH
DEPOSITING MACHINE

11 Sheets-Sheet 10

Filed Nov. 6, 1958



INVENTOR.
Robert J. Prock.
BY
Charles Dickey & Purdie
ATTORNEYS.

June 26, 1962

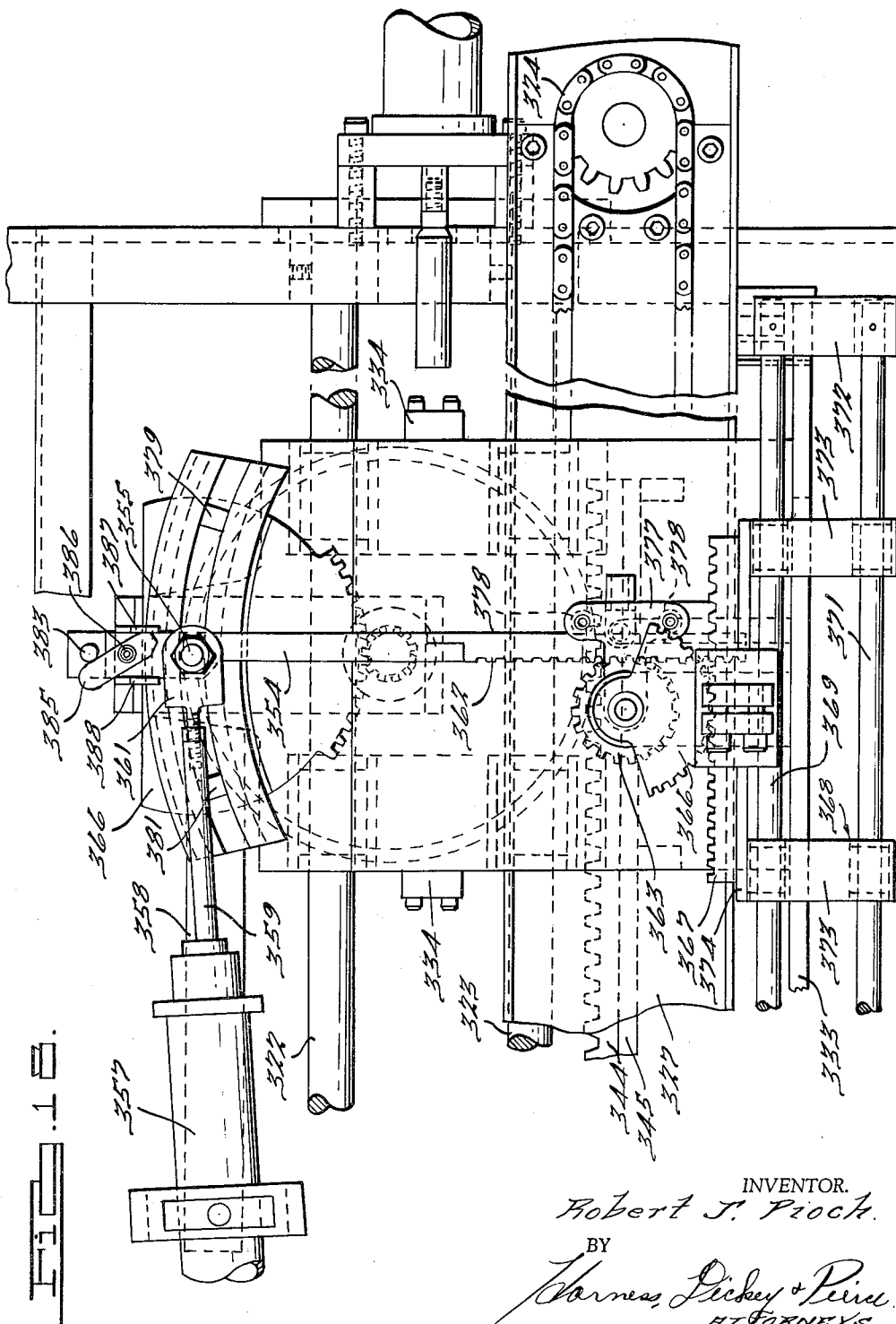
R. J. PIOCH

3,040,381

DEPOSITING MACHINE

Filed Nov. 6, 1958

11 Sheets-Sheet 11



1

3,040,381

DEPOSITING MACHINE

Robert J. Pioch, 116 Forst St., Jackson, Mich.

Filed Nov. 6, 1958, Ser. No. 772,221

30 Claims. (Cl. 18—26)

This invention relates to depositing machines, and more particularly to apparatus for emitting plastic or liquid material into molds in the form of a sinuous or serpentine ribbon, so that the material flows together into a homogeneous mass or layer.

It is a general object of the invention to provide a novel and improved machine of this type which will insure an accurately metered and continuous flow of the liquid material and will prevent the piling up of deposited material at any point along the sinuous path.

It is another object to provide an improved depositing machine of this nature which is especially adapted for the deposition of quick setting plastic materials of the type which require continuous and uninterrupted flow and rapid deposition, the arrangement being such that a plurality of molds or similar receivers may be moved beneath a transversely moving depositing head, the forward movement of the molds being controlled by arrival of the head at the end of each stroke.

It is a further object, in one form of the invention, to permit the continuous flow of liquid material from the depositing head while at the same time depositing this material onto separate receivers such as a plurality of molds on a conveyor, thus eliminating the need for interrupting the flow which might cause difficulties in the case of quick-setting materials.

It is also an object to provide an improved depositing machine of this character which is versatile in use and in which the spacing as well as the width and pattern of the sinuous ribbon may be quickly and easily adjusted.

It is a further object to provide, in one form of the invention, an improved depositing machine having the above characteristics in which a number of molds of different lengths and widths may be successively filled with a minimum of machine adjustment or wastage of material.

Other objects, features, and advantages of the present invention will become apparent from the subsequent description, taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a side elevational view of one form of the depositing machine showing the mold conveyor and the base and frame elements;

FIGURE 2 is a front elevational view of the machine looking in the direction of the arrow 2 of FIGURE 1 and showing the overhead frame support for the depositing head carriage, motor drive, and associated parts;

FIGURE 3 is a plan view of the machine showing the relative locations of the driving elements and limit switch cams;

FIGURE 4 is a detailed elevational view of the carriage feed taken in the direction of the arrow 4 of FIGURE 1;

FIGURE 5 is a top plan view of the construction in FIGURE 4 showing the pivoted depositing head supporting arm and its controls as well as the idler sprocket adjusting means;

FIGURE 6 is a fragmentary plan view of one of the chain guide plates and its adjacent parts illustrating various positions of the idler sprocket;

FIGURE 7 is a cross-sectional view in elevation taken along the line 7—7 of FIGURE 4 and showing the guide means for the chain;

FIGURE 8 is an enlarged cross-sectional view in eleva-

2

tion taken along the line 8—8 of FIGURE 4 and showing the means for operating the limit switches at the ends of each stroke of the depositing head carriage;

FIGURE 9 is an elevational view of the cam means and limit switches for halting advance of the conveyor and for shifting of the depositing head to the next mold;

FIGURE 10 is a cross-sectional view in elevation taken along the line 10—10 of FIGURE 9 and showing the supporting and driving means for the cams;

FIGURE 11 is a schematic view of the depositing head drive means and its limit switches as well as the operating means for the pivoted depositing head supporting arm;

FIGURE 12 is a schematic view of a typical pattern of material deposited by the machine;

FIGURE 13 is an electrical circuit diagram showing a suitable power and control means for the machine;

FIGURE 14 is an end elevational view of another embodiment of the invention in which the length of stroke and stroke spacing are controlled by means attached to the individual molds;

FIGURE 15 is a fragmentary cross-sectional view in elevation of the mold conveyor track showing the location of the various switches;

FIGURE 16 is a fragmentary side elevational view in cross-section, taken along the line 16—16 of FIGURE 15 and showing the rail beneath a mold which supports the pins for actuating the conveyor arresting limit switch;

FIGURE 17 is a cross-sectional view taken along the line 17—17 of FIGURE 15 and showing the cam beneath a mold which actuates a stroke length selector switch;

FIGURE 18 is an enlarged elevational view of the carriage drive mechanism showing means for varying the stroke thereof; and

FIGURE 19 is a cross-sectional view in elevation taken along the line 19—19 of FIGURE 18 and showing the construction of the carriage.

In general terms, the illustrated embodiments of the invention each comprises an elongated base frame on which is mounted an endless conveyor adapted to carry rectangular molds or other forms for receiving a liquid or plastic material deposited in a sinuous pattern. The illustrated embodiments of the machine are especially adapted to deposit a foaming type of plastic which may be molded into such products as automotive seat cushions, arm rests or dashboard pads. This type of plastic, when mixed in liquid form with a liquid catalyst, swells and forms a plastic foam which quickly sets, forming a rubber-like foamy substance. When properly deposited in molds in a sinuous pattern, adjacent lines of deposited material blend into each other to form a homogeneous mass, which may then be subjected to heat in a baking oven before being removed from the mold.

Because of the rapidity with which the foaming and setting reaction takes place, the plastic and catalyst must be kept separate until the plastic is immediately adjacent its depositing point, since the foamy substance will not travel far from its point of deposit before it sets. The plastic and catalyst are mixed in the depositing head immediately before being discharged. Adjacent lines of the mixture must be deposited quickly so that they may flow into each other. It is also important that the depositing head move continuously and at an even rate as it deposits the plastic, since the deposition of excessive material in one location would create an unevenly distributed mass which could, for example, result in lumpiness if the finished product is a seat cushion. Shutting off of the flow during operation should also be avoided, since this is likely to cause clogging of the head, hampering its efficiency.

The depositing head is mounted on a carriage which

3

is slidably supported on tracks extending transversely above the base frame and its conveyor. Means are provided for reciprocating the carriage at an even rate of speed and intermittently advancing the mold conveyor beneath the head as the carriage reaches each end of its stroke. In the first illustrated embodiment, limit switches are actuatable at each end of the carriage stroke to cause the mold conveyor to advance as the carriage reverses its stroke, the advancement being at such a rate that the carriage will have partially completed its return stroke before the conveyor stops, thus resulting in a deposited line which is partially at a slight inclination and is partially transverse. The amount of advance of the conveyor during each stroke of the carriage is controlled by a cam wheel which is geared to the conveyor drive shaft and carries adjustable cams which operate limit switches. This will of course determine the spacing between lines. The length of the carriage stroke may be adjusted by means provided in the carriage drive as well as the depositing head support.

The depositing head is carried by a pivoted arm secured to the carriage, and when the last line of a mold is reached, another cam geared to the conveyor drive will operate a head shifting switch. When the carriage finishes this last line, it will cause the mold conveyor to advance as before, but the head shifting switch will further cause the depositing head supporting arm to shift quickly, moving the depositing head over to the first part of the next mold, the plastic being continuously fed from the head during this interval. The carriage will then begin its next stroke, the head supporting arm remaining in its advanced position. After the second or third line in the new mold has begun, the supporting arm will begin a slow withdrawal to its retracted position, the rate of withdrawal being such that it will not reach its retracted position until the new mold has been filled. Meanwhile, the mold conveyor will move intermittently at the end of each carriage stroke as before, and will of course move at a faster rate than the rate of retraction of the supporting arm. In this manner, each mold may be filled with a minimum of waste material and while maintaining continuous plastic flow.

The second embodiment of the invention differs from the first in that the amount of advancement of the mold conveyor after each carriage stroke is determined not by a timing cam geared to the conveyor drive but by limit switch actuating pins secured to each mold. In this manner, successive molds of different sizes or requiring different line spacing of the sinuous ribbon may be mounted on the conveyor without the necessity of stopping and re-setting the machine. This would reduce the total number of molds required for a given product, since molds for other products could be run through the machine while the first molds were in the baking oven. This embodiment also includes means for varying the length of carriage stroke quickly and easily by means carried on each mold, and without the necessity of stopping the machine, so that successive molds of varying transverse widths may be filled.

Referring more particularly to the embodiment of FIGURES 1-13, the depositing machine is generally indicated at 21 and comprises an elongated base frame 22 of generally rectangular shape as seen in FIGURE 3 which is supported by legs 23. The frame carries a mold conveyor generally indicated at 24 which comprises a plurality of endless chains 25 extending between opposite ends of frame 22. A shaft 26 is rotatably supported at the rearward end of frame 22 (that at which the molds are placed on the conveyor) and carries idler sprockets 27 for supporting chains 25. A chain take-up device 28 may be mounted below idler sprockets 27 to maintain the conveyor in taut condition. The upper runs of chains 25 are supported by tracks 29, these tracks extending longitudinally of the frame and being supported by cross members 31. Bars 32 extend

4

across and are removably secured to chains 25, the bars being adapted to receive molds such as those indicated in dot-dash lines at 33 in FIGURE 1. By adjusting the positions of bars 32 on chains 25, molds of different sizes may be accommodated.

The molds may be of varying length, transverse width or depth, according to the product to be formed, and could be fabricated of an appropriate material such as cast aluminum. In the first embodiment of the invention, sufficient molds should be provided for each product to permit continuous production while the filled molds are retained in the baking oven or other post-filling process.

The forward end of frame 22 carries a conveyor drive shaft 34 which is driven by a motor 35 on a platform 36 secured to one side of frame 22. This platform also supports a combined clutch and brake unit 37 driven by motor 35, unit 37 driving a transmission 38 connected to shaft 34. An auxiliary conveyor shaft 39 may be mounted on frame 22 forwardly of shaft 34 and is driven from this shaft. Shaft 34 carries sprockets 41 for driving the conveyor, and also carries means for driving a cam assembly generally indicated at 42 which is mounted on the side of frame 22 opposite that which carries platform 36.

The details of cam assembly 42 are best seen in FIGURES 9 and 10. Shaft 34 carries a cam driving gear 43 which meshes with an idler gear 44 mounted on a stub shaft 45, the stub shaft being mounted on a stub shaft frame 46 which is rockably mounted on shaft 34 as seen in FIGURE 10. One arm 47 of frame 46 extends downwardly and carries at its lower end a rotatable handle 48 with a locking stud 49 threaded in arm 47. Stud 49 extends through an arcuate slot 51 in a locking plate 52 secured to the underside of frame 22, as seen in FIGURE 9.

Frame 22 carries a bearing member 53 adapted to receive a camshaft 54. The inner end of the camshaft removably carries a driven change gear 55 which is adapted to mesh with idler gear 44 when supporting frame 46 is swung to proper position. The outer end of camshaft 54 carries a cam wheel 56 keyed thereto having a slot 57 on its outer periphery. This slot is adapted to receive a plurality of removable projections or lugs 58 for actuating a conveyor stop switch 59 mounted adjacent cam wheel 56. Lugs 58 may be spaced apart any desired distance and, as later described, control the amount of advancement of the mold conveyor after each stroke of the carriage. As illustrated in FIGURE 9, some of lugs 58 may be more closely spaced than others; this could be the case, for example, where one part of a mold is deeper than the other and therefore requires more closely spaced lines of deposited material.

A head shifting cam 60 is removably secured to shaft 54 outwardly of cam wheel 56, this cam being rotatably adjustable to a limited extent by a locking screw 61 extending through an arcuate slot 62 in cam 60 and threadably mounted in wheel 56. The outer end of cam 60 is adapted to actuate a head shifting switch 63 by means of an intermediate lever 64 each time camshaft 54 completes one revolution.

The drive ratio between conveyor drive shaft 34 and camshaft 54 is such that shaft 54 will complete one revolution each time shaft 34 has rotated an amount sufficient to advance conveyor 24 the length of one mold plus the distance between molds, if any. This ratio may be selected by properly choosing gear 55. In a suitable embodiment, the length of conveyor travel for each mold may be calculated in terms of number of links on the conveyor chain. If the number of teeth on cam driving gear 43 is a multiple of the number of teeth on each sprocket 41, this multiple may be used in selecting gear 55. For example, with twenty teeth on each sprocket 41, a mold distance of forty links would require two revolutions of conveyor drive shaft 34. Assuming that gear 43 has forty teeth (twice the number of teeth on each

5

sprocket 41), the setup man would multiply the mold length in links (forty) by the multiple (two) and thus choose an eighty tooth change gear 55. This would result in a single revolution of camshaft 54 for each mold.

The direction of movement of the upper run of conveyor 24 is from left to right as seen in FIGURE 1, so that molds 33 may be loaded onto the conveyor at the rearward or left hand end of the machine and removed therefrom at the forward or right hand end. A bridge-like frame generally indicated at 65 extends above frame 22 adjacent the forward end thereof, frame 65 having a pair of upright channel members 66 and 67 connected at their upper ends by channel members 68, 69 and 71, as seen in FIGURES 1 and 2. A platform 73 is secured to channel members 69 and 71 by brackets 74, and a mixer motor 75 having a variable speed drive is mounted on this platform. Motor 75 drives a flexible shaft 76 which extends downwardly and is connected to a mixing and depositing head 77. Since the details of head 77 in themselves do not form part of the present invention, they are not shown in detail. However, it will be understood that the head incorporates ports for receiving the plastic and catalyst, check valves for controlled flow of these substances, and additional ports for receiving air as well as a cleaning solvent. Flexible shaft 76 is adapted to be connected to a mixer auger within head 77, the lower end of the head constituting a nozzle from which the mixed plastic and catalyst are dispensed.

When considering in detail the construction of the head carriage and its driving mechanism, reference is made to FIGURE 11 in which these parts are shown schematically. It is important to bear in mind, when studying FIGURE 11, that the upper portion of this figure, that is the endless chain drive for the head carriage, is shown in elevation, whereas the carriage itself and its attached parts are shown in plan. A channel-shaped cross beam 78 is secured between posts 66 and 67 a substantial distance below cross member 71, as best seen in FIGURES 1 and 2, this cross beam supporting the head carriage and its driving mechanism as described below. Cross beam 78 extends a substantial distance outwardly of post 66, as seen in FIGURE 2. The carriage is driven by a cross travel motor 79 mounted on a platform 81 which is supported by brackets 82 outwardly of post 66. Motor 79 may be of a direct current variable speed type capable of closely controlled speed and immediate compensation for load variations.

The output shaft 83 of motor 79 and its attendant reduction mechanism is best seen in FIGURE 1, the shaft extending rearwardly through the central web of cross beam 78 and having appropriate bearing supports and couplings. A chain drive sprocket 84 is secured to the outer end of shaft 83 and carries an endless chain 85, this chain being disposed within the confines of cross beam 78. The opposite end of chain 85 is supported by an idler sprocket 86. The chain is preferably of the type having removable links so that its length can be adjusted. Idler sprocket 86 is secured to a shaft 87 which, as seen best in FIGURES 2 and 5, is rotatably mounted in a bearing 88 carried by a bracket plate 89 on the forward side of cross beam 78, a clearance slot 91 being provided in the cross beam for this purpose. A pair of tracks 92 are provided on cross beam 78 for slidably supporting bracket plate 89. An adjusting screw 93 extends between a projection 94 on bracket 89 and a projection 95 on cross beam 78, so that the distance between idler sprocket 86 and driving sprocket 84 may be varied in accordance with the length of chain 85. It should be observed that with this arrangement the parts are easily accessible for adjustment purposes.

Means are provided for supporting and guiding chain 85 along its upper and lower runs. This means is best seen in FIGURES 6 and 7 and comprises an upper chain guide 96 and a lower chain guide 97 secured within cross beam 68 and engageable with the outside of the chain.

6

For supporting the inside of the chain, a stationary plate 98 and one or more slidably adjustable plates 99 are provided. Stationary plate 98 is removably secured to cross beam 78 by members 101 on the portion of the cross beam adjacent sprocket 84. A slidable plate 99 may be connected at one end to stationary plate 98 and at its other end to the slotted portion of cross beam 78 by securing means 102. In this manner, the total length of members 98 and 99 may be adjusted in accordance with the selected distance between sprockets 84 and 86, so that chain 85 will be supported along its entire length. Interchangeable plates of various lengths may be provided for this purpose.

The opposite ends of cross beam 78 have rearwardly extending brackets 103, one of these brackets being seen clearly in FIGURE 8. Brackets 103 support a pair of vertically spaced carriage tracks 104 and 105, these tracks being in the form of rods and supporting a carriage 106 which carries the mixing and depositing head. Carriage 106 is provided with appropriate bushings 107 and aligned clearance apertures for receiving tracks 104 and 105. The side of carriage 106 facing cross beam 78 is connected to chain 85 by means of a link 109, as seen in FIGURE 5. This link is of adjustable length so that, after the length of stroke is adjusted by means of chain 85 and idler sprocket 86, the stroke may be centered with respect to the molds by adjusting link 109. The link is rockably connected to one point on chain 85 by a pin 111 and to carriage 106 by a pin connection 112. Link 109 extends to the left as seen in FIGURE 5, so that when the carriage reaches the furthest extremity of its movement as seen in dot-dash lines in FIGURE 5, it will be positioned beyond idler sprocket 86. Carriage 106 also carries a pair of projections 113 and 114 of adjustable length, seen best in FIGURE 5. As will be later described, these projections serve to actuate limit switches in the extreme positions of the carriage.

A head supporting arm 115 is pivotally secured by a pin 116 to an extension 117 of frame 106, this extension being to the right as shown in FIGURE 5 and on the side of carriage 106 remote from link 109. Extension 117 actually comprises a pair of spaced arms, as seen in FIGURE 4, between which supporting arm 115 is disposed. Arm 115 extends to the left, as seen in FIGURES 4 and 5, between another pair of extensions 118 on carriage 106. The outer end of supporting arm 115 carries a split clamp 119 for receiving and securing head 77 in a vertical position. A double-acting head shifting cylinder 121 is secured to carriage extensions 118, this cylinder having a piston rod 122 connected to an intermediate portion of arm 115. As seen in FIGURE 11, cylinder 121 is connected to a four-way solenoid-operated valve shown schematically at 122 so that pressure applied to one end of the cylinder will cause arm 115 to swing counterclockwise as shown in FIGURE 5, whereas pressure applied to the other end of the cylinder will cause arm 115 to swing in the opposite direction. As mentioned previously, valve 122 is controlled by head shifting switch 63 which in turn is operated by head shifting cam 60 each time a mold has been filled. A dashpot cylinder 123 is also mounted on extensions 118 of carriage 106 and is connected to arm 115 by a piston rod 124. This cylinder acts to retard the return or clockwise movement of arm 115 in FIGURE 5 from its dot-dash line to its solid line position. The rapid forward movement to the dot-dash line position is accomplished when the head shifts from one mold to the next, and the slow return movement occurs during the filling of the next mold.

Pneumatic shock absorber cylinders 125 are mounted on brackets 103, as seen in FIGURE 5. These cylinders serve to absorb the impact of the carriage at each end of the stroke and to aid in the reversal of carriage movement thus facilitating a smooth transitional movement. A pair of rods 126 are slidably mounted in the central portions of brackets 103 as seen in FIGURES 5 and 8,

these rods extending between projections 113 and 114 on carriage 106 and shock absorbers 125. Intermediate portions of these rods are provided with inclined surfaces 127, and actuating pins 128 are slidably mounted within brackets 103 at right angles to rods 126. Pins 128 are spring-urged against the inclined surfaces 127 of rods 126, so that movement of either rod 126 toward its corresponding shock absorbing cylinder 125 will cause outward movement of the corresponding pin 128. Limit switches 129 and 131 are secured to the undersides of brackets 103, limit switch 129 being clearly visible in FIGURE 8. These limit switches are actuated by outward movement of their respective actuating pins 128. It will thus be seen that arrival of carriage 106 at each extreme of its movement will cause actuation of limit switch 129 or 131.

Operation

Machine 21 will first be set up by mounting mold bars 32 in proper location on conveyor chains 25, positioning the desired number of lugs 53 on cam wheel 56, choosing change gear 55 in accordance with mold length, and setting the desired length of stroke of carriage 106 in the manner described above. Assuming that molds 33 have been placed on the conveyor, head 77 adjusted to the proper height, and the flow and mixing of the plastic and catalyst initiated, the machine will deposit a sinuous ribbon of the foaming and setting plastic in a pattern similar to that illustrated in FIGURE 12. More particularly, assuming that the leg indicated at 132 in FIGURE 12 represents the first deposited strip of plastic in a mold 33', this leg will have a first portion 133 which is slightly inclined with respect to a perpendicular transverse line, and a second portion which is along such a line. This is because conveyor 24 will have advanced during the first part of the carriage movement and will remain stationary during the second part of such movement. When carriage 26 reaches the end of its stroke, say the end at the upper portion of FIGURE 3, it will cause actuation of limit switch 129. This will cause conveyor 24 to advance mold 33'. Carriage 106 will smoothly reverse its movement, aided by shock absorber 125, as the connection between link 109 and chain 85 rounds idler sprocket 86. Conveyor 24 will continue to advance until a lug 58 on cam wheel 56 actuates conveyor stop switch 59. This will cause conveyor 24 to halt its advancing movement. The result will be a second strip 134 of deposited material having a first portion 135 which is slightly inclined in the direction of filling of the mold. The second portion 136 of strip 134 will be inclined in the opposite direction, and to an even lesser extent. This is because head supporting arm 121 will begin a slow retracting movement from the dot-dash line to the solid line position in FIGURE 5. This action will be described in further detail below with respect to the next mold 33". When carriage 106 reaches the opposite end of its stroke it will cause limit switch 131 to be actuated and will again reverse its movement. Limit switch 131 will cause advancing movement of conveyor 34, and the depositing sequence will continue. The strips will of course be so closely spaced and deposited with sufficient rapidity as to cause the foaming plastic of adjacent strips to blend into each other, forming a homogeneous mass of foamy and rubber-like material as the plastic sets.

As described previously, when mold 33' has arrived at a position in which it is receiving the last strip 137 of plastic material, cam assembly 42 will have rotated one full revolution, so that head shifting cam 60 will cause actuation of switch 63. This will cause cylinder 121 to shift arm 115 from its solid line to its dot-dash line position in FIGURE 5 after stroke 137 has been completed. The line of deposited material will thus jump to the next mold 33", as indicated at 138. At the same time, carriage 106 will reverse its movement and conveyor 24 will advance due to engagement of a lug 58 with switch 59. This action will prevent waste of the plastic by deposition between or on the edges of the molds. After the machine has deposited

the first strips 139 in new mold 33" and has begun its second stroke 141, the action of cylinder 121 will be reversed, and arm 115 will slowly return to its solid position as retarded by dashpot cylinder 123. This return will be so timed with respect to the length of the molds that the original retracted position will not be reached until the last strip of material in mold 33' has been deposited, after which the cycle will be repeated.

FIGURE 13 is an electrical circuit diagram showing a suitable manner in which the above described operation of machine 21 may be effectuated. Although reference numerals are used to describe the circuit elements in FIGURE 13, each relay and its contacts are additionally identified to aid in understanding the operation. The lines in the circuit where the contacts of each relay are located are also given. It should be understood that the circuit diagram of FIGURE 13 could be varied within the scope of the invention to suit individual requirements.

A source 201 of three-phase alternating current is provided, this source supplying power to mixer motor 75, conveyor motor 35, and carriage motor 79, the latter being supplied through rectifying means (not shown). Power source 201 is also connected to a step-down transformer 202 which supplies power to the various control relays and lamps. More particularly, a mixer motor relay 203 is controlled by a mixer start switch 204 and a mixer stop switch 205. Relay 203 controls a switch 206 for motor 75 and a holding switch 207. A carriage motor relay 208 is controlled by a carriage start switch 209 and a carriage stop switch 211. Relay 208 controls switches (not shown) for carriage motor 79 and also controls a holding switch 212. A manually operable switch 213 is provided in series with switch 212, which when opened permits jogging of motor 79 for setup purposes. A conveyor motor relay 214 is controlled by a conveyor start switch 215 and a conveyor stop switch 216, this relay controlling a switch 217 for motor 35 and a holding switch 218. A rectifier 219 is provided which supplies power to a brake 221 and a clutch 222 which are incorporated in clutch and brake unit 37. A head shift selector switch 223 controls operation of a head shift enabling relay 224. This switch will be normally open during a running cycle but may be closed for setup purposes. When switch 223 is closed, relay 224 will open a switch 225, preventing shifting of mixer head supporting arm 115 and causing the conveyor to come to a stop when a mold has been filled, although the carriage drive will continue to run. A switch 226 will also be closed by relay 224, illuminating a lamp 227 to indicate the setup condition of the machine. A brake selector switch 228 is also provided, this switch controlling a relay 229 and being normally open during a running cycle. When switch 228 is closed, relay 229 will close switches 231 to apply brake 221 and open switches 232 to deactivate clutch 222. At the same time, a switch 233 will be closed, illuminating a lamp 234 to indicate the braked condition of the machine. Energization of relays 224 or 229 will open switches 235 or 236 respectively, thus extinguishing a lamp 237, which when illuminated, indicates the automatic running condition of the machine.

The remainder of the circuit components in FIGURE 13 may perhaps best be explained by a description of the operation of the circuit during a running cycle. With carriage setup switch 213 in its closed position and switches 223 and 228 in their open positions, mixer motor 75 may be started by push button switch 204 and conveyor motor 35 by switch 215. Carriage motor 79 will also be started by switch 209, and the carriage will reciprocate as previously described, alternately closing limit switches 129 and 131. Head shifting switch 63 will normally be in a position with switch arm 238 open and switch arm 239 closed when cam 60 is not actuating switch 63. Actuation of either limit switch 129 or 131 will thus energize a conveyor advancing relay 241 at the end of each carriage stroke. Energization of this relay will open switch 242 and close switch 243, these switches being in the brake and

clutch circuits respectively. At this time, conveyor stop switch 59 will be engaged by a lug 58 so that its switch arm 244, which is in series with switch 242, will be closed, and switch arm 245 in the clutch circuit will be open. Switch 243 will thus bypass switch 245, energizing clutch 222 and causing advance of the conveyor until lug 58 leaves switch 59, so that switch arm 245 will close and switch arm 244 open. The limit switch 129 or 131 must thus be closed for a sufficient period to permit lug 58 to leave switch 59; in a typical installation, this could be about one-half a second.

As the carriage reverses its stroke and opens limit switch 129 or 131, deenergizing relay 241, the conveyor will continue to advance until the next lug 58 engages switch 59, at which time the brake circuit will again be closed and the clutch circuit opened, stopping the conveyor.

This action will continue until the last strip of material is being deposited in the mold. As the conveyor reaches its stopping position during this last stroke, cam 50 will engage switch 63, closing switch arm 238 and opening switch arm 239. This will have no immediate effect on the operation. However, when either switch 129 or 131 is next closed, a relay 246 will be energized instead of relay 241. This relay is of a time delay type and will remain in its energized position for a short period, say from one to five seconds after it has been deenergized. Energization of relay 246 will close a switch 247, this switch remaining closed for the time delay period. Closure of switch 247 will energize a head control relay 248. This will cause closure of a switch 249 bypassing switch arm 239 and thus causing energization of conveyor advancing relay 241, so that the conveyor will advance in the usual manner. Relay 248 will also close switches 251 in series with a valve operating solenoid 252, this solenoid causing actuation of valve 122 and thus swinging head supporting arm 115 to its dot-dash line position in FIGURE 5. The mixing head will thus be shifted to the next mold. Upon opening of switch 247 and deenergization of relay 248, solenoid 252 will be deenergized, shifting valve 122 and causing retraction of the head supporting arm at a retarded rate, as determined by dashpot cylinder 123. The delay before which arm 115 begins its retracting movement may occupy one or more strokes of the carriage, depending on the nature of the delay relay 246. It should be noted at this point that since the retarding rate of dashpot cylinder 123 may also be varied, it would be possible to cause a quick retraction of the head after, say, the second stroke. This could be useful in cases where it is found that shifting of the head to the next mold, combined with the conveyor advance, causes an unfilled area to appear at the beginning of the first strip of the next mold. The quick retraction could serve to fill this gap.

FIGURES 14 to 19 illustrate another embodiment of the invention which is generally similar to that previously shown but is especially adapted for situations where it is desired to fill different shapes of molds during a single operation. Such a production schedule could be advantageous, for example, where the filled molds must be placed in a baking oven or otherwise occupied for a considerable time after leaving the depositing machine. Making several different products during the same production run would then require less molds for each product, while still permitting the machine to run continuously, and the saving in mold costs could be considerable.

The depositing machine of FIGURES 14 to 19 is generally indicated at 301 and has a base and frame arrangement similar to the first embodiment. More particularly, the base 302 is provided with a conveyor 303 for molds 304, and a bridge-like frame 305 extends above base 302 for carrying a mixer motor 306 and a carriage assembly, generally indicated at 307. Conveyor 303 may be of an endless belt type in the present embodiment since, for reasons which will become apparent, a fixed relationship between the molds and conveyor need not be maintained.

In the present embodiment, the amount of conveyor

advance after each carriage stroke is determined by pins mounted on the molds themselves which operate a switch carried by base 302. As shown in FIGURE 15, the underside of each mold has a pair of guide rails 308 and 309, and base 303 is provided with a center bar 311 which carries a plurality of spaced guide rollers 312 receivable by the rails 308 and 309 to maintain proper lateral positioning of the molds. As seen in FIGURE 16, guide rail 309 is provided with a plurality of spaced apertures 313 and cam actuating pins 314 are insertable in these apertures. The pins will be inserted in those apertures which are necessary to create the proper flow pattern for the particular mold. If for example it is desired that adjacent strips of the sinuous flow path be closely spaced, pins will be inserted in adjacent apertures 313. These pins will actuate a conveyor travel stop switch 315 mounted on base 303 adjacent bar 311. A plurality of stroke length selector switches 316, 317 and 318 may be mounted on base 302 at various lateral positions. Each one of these switches, when actuated, will cause selection of a different cross travel stroke of the carriage in a manner described below. On any particular mold 304, only one cam 319 will be mounted, as seen in FIGURE 17, thus actuating the desired one of limit switches 316, 317 and 318. Although the embodiment of FIGURES 14 to 19 contains no means for shifting the depositing head between molds, it will become apparent from the subsequent description that such means could be provided similarly to the previous embodiment. The head shifting cylinder could be controlled by a mold-operated switch in the same general location as switches 316, 317 and 318.

Carriage assembly 307 comprises a carriage generally indicated at 321 slidably mounted on a pair of horizontal rails 322 and 323 supported by frame 305, as in the previous embodiment. The carriage is adapted to be reciprocated by an endless chain 324 mounted on a driving sprocket 325 and an idler sprocket 326, as seen in FIGURE 14. These sprockets are rotatably supported by a cross beam 327 secured to frame 305, the carriage being connected to chain 324 by an adjustable link 328.

As best seen in FIGURE 19, carriage 321 comprises an apertured bracket 329 mounted on tracks 322 and 323, a plate 331 secured to bracket 329, a plate 332 in spaced parallel relation with plate 331, a bottom plate 333 connecting plates 331 and 332, and a plurality of cross pieces 334. An upper horizontal plate 335 is secured along one edge to plate 331 and has a vertical plate 336 extending downwardly from its other edge, the lower edge of plate 336 having a plate 337 joining it with the upper portion of plate 332. Cross beam 327 extends through the space bounded by plates 331, 332, 333 and 334, chain 324 being mounted within channel-shaped cross beam 327, with link 328 connecting the chain with carriage 321 by means of an intermediate plate 338 secured to the lower portion of the carriage. To aid in guiding and supporting carriage 321, a plurality of upper rollers 339 and lower rollers 341 are rotatably mounted thereon, these rollers engaging guide tracks 342 and 343 respectively. Track 342 extends between the side posts of frame 305, as seen in FIGURE 14, whereas track 343 is secured to the underside of cross beam 327.

The side of cross beam 327 opposite that which carries chain 324 is provided with a horizontally extending rack 344 as seen in FIGURE 19, this rack being supported by a bedplate 345 secured to cross beam 327. A shaft 346 is rotatably mounted at the upper portion of frame 321, this shaft extending through plates 331, 336 and 332. A relatively large gear 347 is keyed to this shaft and meshes with rack 344, so that movement of carriage 321 during operation will cause rotation of shaft 346.

A pinion 348 is secured to shaft 346 and meshes with a gear sector 349 rockably mounted at the upper portion of carriage 321. More specifically, gear sector 349 is secured to a stub shaft 351 which is rotatably mounted in a bearing 352 carried by plate 336. Also secured to stub

shaft 351 is an arcuate slotted member 353 which extends outwardly on both sides of the gear sector. The slot in member 353 is of T-shaped cross section, and the member is centrally located so that the center line of the slot passes through the axis of shaft 351, the member being symmetrical on both sides of this axis. It will thus be seen that when shaft 351 is rotated, slotted member 353 will rock about the shaft axis so that one end will be raised and the other lowered, as seen in FIGURE 18. The arrangement is such that with carriage assembly 307 on the right hand side as seen in FIGURE 14, the right hand end of member 353 will be raised and the left hand end lowered. The position of member 353 at the midstroke of carriage 307 is seen in FIGURE 18, and the left hand position will be symmetrically opposite that of FIGURE 14.

A rack arm 354 is vertically positioned adjacent slotted member 53 and carries a pin 355 at its upper end, this pin extending into the slot of member 353 and supporting a roller 356 slidably adjustable within slotted member 353 along with pin 355. Means for moving these parts are provided, comprising a cylinder 357 mounted on an extension bracket 358 on member 353 as seen in FIGURE 18. Piston rod 359 which extends from cylinder 357 is connected at 361 to pin 355, so that extension or retraction of the piston rod will cause pin 355, together with roller 356, to assume any desired position within member 353. The position of double-acting cylinder 357 will be controlled, through appropriate electrically operated valves, by any of the switches 316, 317 and 318 which is actuated by a mold cam 319. In other words, each mold may set its own length of depositing stroke in the manner hereafter described, by the cam which it carries on its underside.

The lower end of arm 354 has rack teeth 362 which mesh with a pinion 363 mounted on a shaft 364, the shaft being rotatably supported at the lower portion of carriage 321 by plate 332 and an outboard supporting plate 365. The outer end of shaft 364 carries a gear sector 366 which meshes with a rack 367 on a sub-carriage generally indicated at 368. This sub-carriage is slidably supported by an upper track 369 and a lower track 371 which in turn are secured to the lower portion of carriage 321 by a plurality of brackets 372. The sub-carriage comprises a pair of brackets 373 slidably mounted on tracks 369 and 371, these brackets supporting a platform 374 therebetween, with rack 367 being mounted on platform 374. A head clamping member 375 of split construction is mounted on platform 374 and serves to support the mixing and depositing head indicated in dot-dash lines at 376 in FIGURE 19. In order to maintain engagement of rack 362 with pinion 363, a pair of flat T-shaped members 377 are carried by shaft 364 and extend on opposite sides of rack 362, as seen in FIGURES 18 and 19. Brackets 377 have clearance apertures which permit rotation of shaft 364, and also carry a pair of rollers 378 which engage the back surface of the rack, thus maintaining it in engagement with pinion 363.

In order to positively position pin 355 within member 353 at any desired location, adjustable stops are preferably provided. More particularly, two stops 379 and 381 may be mounted within slotted member 353, as seen in FIGURE 18, so that roller 356 will engage the proper stop when it is shifted in one direction or the other. It should be understood of course that stops 379 or 381 may both be mounted on the same side of member 353 if desired. In addition, a bracket 382 is mounted on member 353 as seen best in FIGURE 19, this bracket carrying a slidable locating pin 383 which may be actuated to extended or retracted position by a cylinder motor 384. When in its extended position, pin 383 is in obstructing relation with an abutment member 385 pivoted at 386 on the upper end of arm 354, as seen in FIGURE 18. Member 385 is swingable between two positions as limited by ears 387 and 388 which project

from arm 354 on either side of member 385. The positions of ears 387 and 388 are such that pin 355 will be stopped in the same position regardless of whether member 385 approaches pin 383 from the right or from the left in FIGURE 18. In other words, the purpose of swingable abutment member 385 is to compensate for the thickness of locating pin 383. After pin 355 has been located, pin 383 may be retracted. Preferably, bracket 382 is mountable in various positions along the top of arcuate member 353, so that a number of different stop positions are available.

In operation of the embodiment shown in FIGURES 14-19, molds 304, each provided with proper cam actuating pins 314 and the appropriately positioned cam 319, will be selected and placed on conveyor 303. As stated, successive molds 304 may have different arrangements of pins 314 and cam 319, so that the appropriate filling pattern for each mold may be achieved. Controls (not shown) for double acting cylinder 357 and locating pin cylinder 384 will also be provided so that the position of pin 355 within member 353 may be varied as each mold reaches its filling position. As stated previously, the embodiment of FIGURES 14-19 does not incorporate means for quickly shifting the depositing head from one mold to the next, although such means could be added within the principles of the invention.

The sinuous pattern for filling each mold will be generally the same as in the previous embodiment. As carriage 321 completes each stroke and begins to reverse its movement, it will operate a limit switch 389 or 391, as seen in FIGURE 14. These limit switches may be actuated by slidable rods 392 and 393 respectively, the rods being engageable by cross pieces 334. Actuation of a limit switch will cause advancing movement of conveyor 303 until the next pin 314 actuates limit switch 315 to stop the conveyor travel. The wider the spacing between successive pins 314, the greater will be the spacing between successive strips of deposited material.

Let us assume that the first mold 304 carries a cam 319 which actuates stroke length selector switch 316, and that this switch causes cylinder 357 to move pin 355 to a central position within arcuate member 353. This adjusting of pin 355 may take place when member 353 is in its intermediate position as seen in FIGURE 18, after which locating pin 383 may be withdrawn so as not to interfere with rocking of member 353 with respect to rack arm 354. FIGURE 14 shows the position of member 353 when carriage 321 is at the right hand end of its stroke. As carriage 321 advances to the left in FIGURE 14, member 353 and gear sector 349 will swing clockwise due to the rolling of gear 347 on track 344. However, since pin 355 is centered in member 353, no axial movement of arm 354 will take place. Sub-carriage 368 will thus remain fixed with respect to carriage 321.

Should the next mold require a longer carriage stroke, its cam 319 will be such that cylinder 357 will shift pin 355 to the right in FIGURES 14 and 18, until roller 356 engages stop 379. At this point, it should be noted that the center of curvature of member 353 is at the pitch point of the meshing teeth on rack arm 354 and pinion 363, so that with the parts centered as shown in FIGURE 18, sub-carriage 368 will always be in the same position with respect to carriage 321, no matter where pin 355 is located on member 353. With roller 356 engaging stop 379, movement of carriage 321 to the right in FIGURE 18 will cause rack arm 354 to be raised, rocking gear sector 366 counterclockwise and moving sub-carriage 368 progressively (to the right) with respect to carriage 321. As carriage 321 begins its leftward movement from the position of FIGURE 14, member 353 will swing clockwise, lowering arm 354 and shifting sub-carriage 368 progressively (to the left) with respect to carriage 321. Member 353 will pass through its central position as seen in FIGURE 18 and will continue its clockwise rocking movement until carriage 321 reaches the opposite end of

its stroke. Thus, sub-carriage 368 will be shifted outwardly with respect to carriage 321 at each end of the carriage stroke.

To shorten the head stroke, pin 355 will be shifted against stop 381 on the other side of member 353. Sub-carriage 368 will then have a regressive movement with respect to the movement of carriage 321, as will be obvious from the foregoing description. These shifting movements of pin 355 may take place automatically through actuation of the proper switches by each mold as it reaches its filling position. It will thus be seen that an efficient means has been provided for varying the length of stroke as well as the spacing between adjacent strips to suit individual molds, without the necessity of resetting the machine for such purposes.

While it will be apparent that the preferred embodiments of the invention disclosed are well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claims.

What is claimed is:

1. In combination, a conveyor for carrying objects which are to receive a deposited material, conveyor actuating means shiftable between advance and stop positions, a depositing head carriage, means for reciprocating said carriage in a direction transverse to the direction of movement of said conveyor, and means responsive to arrival of said carriage at each end of its stroke for shifting said conveyor actuating means from its stop to its advance position.

2. In combination, a conveyor for carrying objects which are to receive a deposited material, conveyor actuating means shiftable between advance and stop positions, a head for depositing said material on said objects, means for continuously feeding material from said head, a carriage for said head, means for reciprocating said carriage in a direction transverse to the direction of movement of said conveyor, and means responsive to arrival of said carriage at each end of its stroke for shifting said conveyor actuating means from its stop to its advance position.

3. In combination, a conveyor for carrying objects which are to receive a deposited material, conveyor actuating means shiftable between advance and stop positions, a head for depositing said material on said objects, means for continuously feeding material from said head, a carriage for said head, means for reciprocating said carriage in a direction transverse to the direction of movement of said conveyor, means responsive to arrival of said carriage at each end of its stroke for shifting said conveyor actuating means from its stop to its advance position, and means responsive to movement of said objects a predetermined distance for shifting the said conveyor actuating means from its advance to its stop position.

4. The combination according to claim 3, said last-mentioned means comprising a cam driven in timed relation with said conveyor, and means for maintaining a fixed relation between said objects and said conveyor.

5. The combination according to claim 3, said last-mentioned means comprising a cam mounted on the material-receiving object carried by said conveyor.

6. In combination, an elongated frame, a conveyor mounted on said frame and adapted to carry objects which are to receive a deposited material, a carriage mounted above said conveyor for movement in a path across the conveyor, means for reciprocating said carriage along said path, means for preselecting the length of said reciprocating path, a head carried by said carriage, means for continuously emitting material from said head toward said conveyor, means for driving said conveyor, a limit switch actuatable at each end of the stroke of said carriage, and means responsive to actuation of either of said limit switches for actuating said conveyor driving means.

7. The combination according to claim 6, further provided with a limit switch actuatable to stop said conveyor driving means, and the last said limit switch having adjust-

able actuating means for preselecting the travel distance of said conveyor before it stops.

8. The combination according to claim 7, said last-mentioned limit switch actuating means comprising a cam wheel interconnected with said conveyor driving means to rotate in timed relation therewith, and a plurality of adjustable members on said cam wheel for actuating said last-mentioned limit switch.

9. The combination according to claim 6, said carriage reciprocating means comprising an endless chain, a link connecting said carriage and chain, and means for driving said chain at a constant rate of speed.

10. In a device for depositing a sinuous pattern of material into successive aligned molds, an elongated conveyor for carrying said molds, driving means for said conveyor, a carriage supported above said conveyor for reciprocating movement in a direction transverse to the conveyor movement, a depositing head, means for continuously delivering material to said head, and a support for said depositing head, said support being mounted on said carriage and being reciprocable with respect to said carriage in the direction of movement of said conveyor.

11. The combination according to claim 10, said support comprising an arm pivotally mounted on said carriage, said head being carried at the outer end of said arm.

12. The combination according to claim 10, said head support being movable from a first position to a second position in a direction counter to the direction of advance of said conveyor, means responsive to the arrival of the last portion of a mold beneath said depositing head for rapidly moving said head support to its second position, and means for slowly returning said head support to its first position while the next mold is being filled.

13. The combination according to claim 12, the means for moving said head support to its second position comprising a reciprocating motor, a head shifting switch actuatable in response to arrival of the last portion of a mold beneath said depositing head for enabling operation of said motor, and a limit switch actuatable at the end of a stroke of said carriage when said head shifting switch is actuated for causing said motor to move the head support to its second position.

14. The combination according to claim 13, further provided with means for reversing the action of said motor a predetermined time after said head support has been moved to its second position, and means for retarding the return movement of said head support.

15. In a device for depositing a sinuous pattern of material on a succession of aligned objects, a conveyor for carrying said objects, means for driving said conveyor, a track extending transversely above said conveyor, a carriage slidably mounted on said track, an endless chain of adjustable length extending parallel to and adjacent said track, a driving sprocket for said chain, an idler sprocket for said chain, means adjustably supporting said idler sprocket for movement toward and away from said driving sprocket, a link connecting said chain and carriage, means for adjusting the length of said link, means on said carriage for supporting a material depositing head, a limit switch at each end of said track, means on said carriage for actuating a limit switch as the carriage reaches each end of its stroke, means responsive to actuation of either limit switch for causing said conveyor driving means to advance said conveyor, and means responsive to a predetermined advancement of an object on said conveyor for stopping said conveyor driving means.

16. In a device for depositing a sinuous pattern of material on a succession of aligned objects, a conveyor for carrying said objects, means for driving said conveyor, a track extending transversely above said conveyor, a carriage slidably mounted on said track, an endless chain of adjustable length extending parallel to and adjacent said track, a driving sprocket for said chain, an idler

15

sprocket for said chain, means adjustably supporting said idler sprocket for movement toward and away from said driving sprocket, a link connecting said chain and carriage, means for adjusting the length of said link, means on said carriage for supporting a material depositing head, a shock absorber at each end of said carriage, a slidable rod connected to each shock absorber and engageable by said carriage as it reaches each end of its stroke, and a limit switch actuatable by movement of said rod for causing said conveyor driving means to advance said conveyor.

17. In a device for depositing a sinuous pattern of material onto a plurality of aligned objects, a conveyor for carrying said objects, a drive shaft for said conveyor, the ratio of said drive shaft and conveyor speeds being constant, a depositing head carriage mounted for transverse reciprocation above said conveyor, means responsive to the arrival of said carriage at each end of its stroke for rotating said drive shaft to advance said conveyor, a camshaft, means for driving said camshaft in timed relation with said drive shaft, means for adjustably mounting a plurality of cams on said camshaft, a conveyor stop switch actuatable by each of said cams to halt rotation of said drive shaft, means for preselecting the ratio between said drive shaft and said camshaft rotational speeds, whereby said camshaft may be caused to rotate once during the travel of one object beneath said carriage, a head shifting cam on said camshaft, a head shifting switch actuatable by said head shifting cam after each complete rotation of said camshaft, and means responsive to actuation of said head shifting switch for causing said head to move rapidly a short distance counter to the direction of movement of said conveyor.

18. In a device for depositing a sinuous pattern of material onto a plurality of aligned objects, a conveyor for carrying said objects, a drive shaft for said conveyor, the ratio of said drive shaft and conveyor speeds being constant, a depositing head carriage mounted for transverse reciprocation above said conveyor, means responsive to the arrival of said carriage at each end of its stroke for rotating said drive shaft to advance said conveyor, a camshaft, means for driving said camshaft in timed relation with said drive shaft, means for adjustably mounting a plurality of cams on said camshaft, and a conveyor stop switch actuatable by each of said cams to halt rotation of said drive shaft.

19. The combination according to claim 18, further provided with means for preselecting the ratio between said drive shaft and said camshaft rotational speeds, whereby said camshaft may be caused to rotate once during the travel of one object beneath said carriage.

20. The combination according to claim 19, said ratio preselecting means comprising a gear on said conveyor drive shaft, a gear on said camshaft, one of said gears being interchangeable, an idler gear connecting said first two gears, and means for adjusting the position of said idler gear.

21. In a machine for depositing a sinuous pattern of material in a plurality of molds, a conveyor for said molds, a depositing head carriage mounted for transverse movement above said conveyor, means responsive to arrival of said carriage at the end of each stroke for actuating said conveyor driving means, and means carried by said molds for deactivating said conveyor driving means.

22. The combination according to claim 21, said last-mentioned means comprising switch actuating means carried by each mold, means for adjusting the position of said switch actuating means in the direction of advance of said conveyor, and a conveyor stop switch mounted adjacent said conveyor and actuatable by said switch actuating means.

23. In a machine for depositing a sinuous pattern of material in a succession of molds, a mold conveyor, a plurality of molds carried by said conveyor, a pin sup-

16

porting bar secured to each of said molds, a plurality of switch actuating pins capable of being mounted in selected positions in said bars, a depositing head carriage mounted for transverse movement in successive reciprocating strokes above said conveyor, means for intermittently advancing said conveyor after each carriage stroke, and a switch actuatable by said pins for stopping said conveyor advancing means.

24. The combination according to claim 23, said conveyor advancing means comprising a limit switch actuatable at the end of each stroke of the carriage.

25. In a machine for depositing a sinuous pattern of material in a plurality of molds, a mold conveyor, a depositing head carriage mounted for transverse movement above said conveyor, means for advancing said conveyor after each stroke of the carriage, means carried by said molds for determining the amount of advancement of said conveyor after each carriage stroke, and means mounted on said molds for varying the length of stroke of said carriage.

26. The combination according to claim 25, said last-mentioned means comprising switch actuating means carried by said molds, stroke length selector switch means mounted adjacent said conveyor and actuatable by said switch actuating means, a depositing head sub-carriage movably mounted on said carriage and means interconnecting said switch means and sub-carriage for determining the position of said sub-carriage with respect to said carriage.

27. In a machine for depositing a sinuous pattern of material in a plurality of molds, a mold conveyor, a depositing head carriage mounted for transverse movement above said conveyor, a sub-carriage mounted on said carriage and adapted to support a depositing head, said sub-carriage being movable with respect to said carriage in a direction parallel to the carriage movement, sub-carriage shifting means mounted on said carriage and movable in response to carriage movement, and means interconnecting said sub-carriage shifting means with said sub-carriage, said interconnecting means being adjustable between a first position in which progressive movement is imparted to said sub-carriage in the direction of movement of said carriage, and a second position in which regressive movement is imparted to said sub-carriage counter to the direction of movement of said carriage.

28. The combination according to claim 27, further provided with means on said molds for shifting said interconnecting means to one or the other of its adjustable positions.

29. The combination according to claim 27, said sub-carriage shifting means comprising a gear rotatably mounted on said carriage, a stationary rack meshing with said gear, and a rockable member mounted on said carriage and connected to said gear, said interconnecting means comprising a rack arm adjustably mounted on said rockable member, and gear means connecting said rack arm with said sub-carriage, whereby the movement of said sub-carriage relative to said carriage will be determined by the position of the connection between said rack arm and said rockable member.

30. In a machine for depositing a sinuous pattern of material in a plurality of molds, a mold conveyor, a depositing head carriage mounted for transverse movement above said conveyor, means actuated by the carriage as it reaches each end of its stroke for advancing said conveyor, means on each mold for halting advancement of said conveyor after it has traveled a predetermined distance, a sub-carriage mounted on said carriage and adapted to support a depositing head, said sub-carriage being movable with respect to said carriage in a direction parallel to the carriage movement, sub-carriage shifting means mounted on said carriage and movable in response to carriage movement, means interconnecting said sub-carriage shifting means with said sub-carriage, said interconnecting means being adjustable between a first posi-

17

tion in which progressive movement is imparted to said sub-carriage in the direction of movement of said carriage, and a second position in which regressive movement is imparted to said sub-carriage counter to the direction of movement of said carriage, and means on each mold for selecting the position of said adjustable inter-connecting means.

References Cited in the file of this patent

UNITED STATES PATENTS

1,266,475	Hunt	May 4, 1918	
1,929,896	Merritt et al.	Oct. 10, 1933	
1,935,088	Greene	Nov. 14, 1933	
1,941,802	Howell	Jan. 2, 1934	
1,942,840	Sheppard	Jan. 9, 1934	15

10

2,145,861
2,203,851
2,605,948
2,792,104
2,796,975
2,816,741
2,827,665

18

Casto	Feb. 7, 1939
Tucci	June 11, 1940
Bridge	Aug. 5, 1952
Biedess	May 14, 1957
Da Costa	June 25, 1957
Shuffman	Dec. 17, 1957
Rogers et al.	Mar. 25, 1958

FOREIGN PATENTS

France	Nov. 12, 1956
Great Britain	Mar. 13, 1957

OTHER REFERENCES

Modern Plastics, March 1957, pp. 126, 127, 128 and 264.
Rubber World, August 1958, pp. 733 through 737.