

July 3, 1945.

R. P. SCHERER

2,379,831

MACHINE FOR FORMING CAPSULATING MATERIAL

Filed March 7, 1941

4 Sheets-Sheet 1

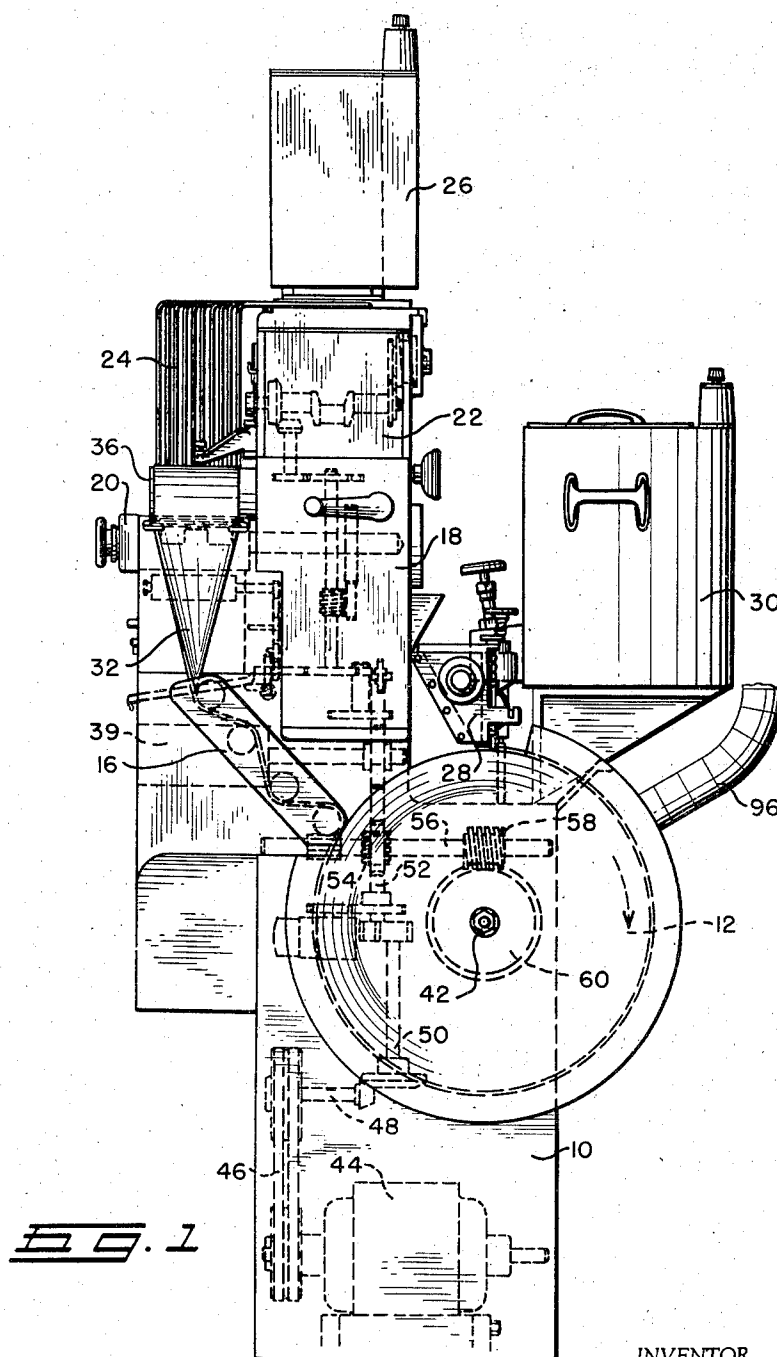


FIG. 1

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4 Sheets-Sheet 2

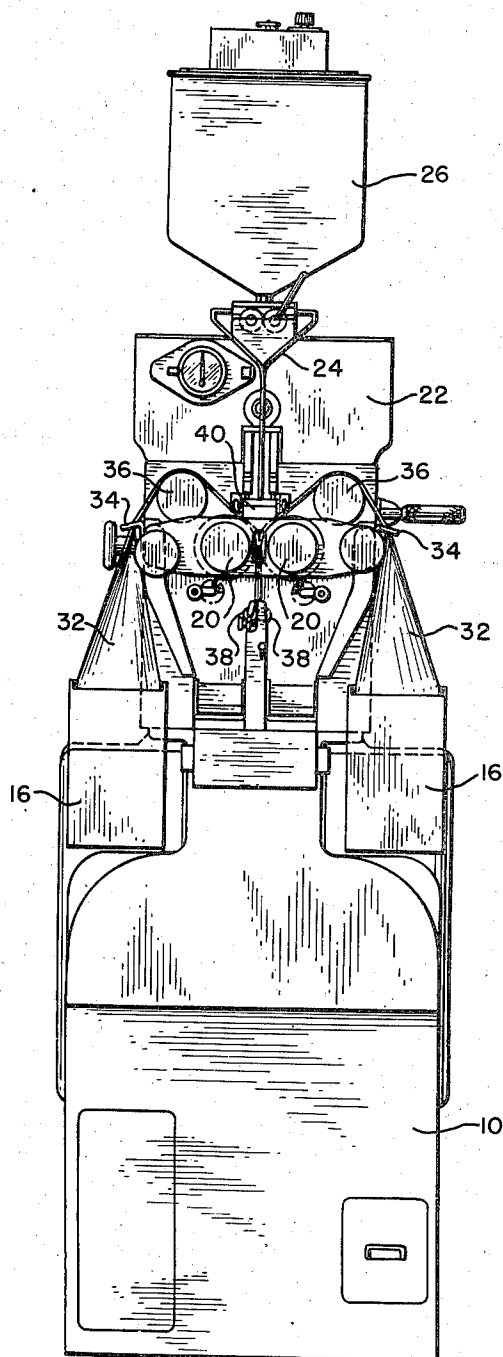


Fig. 2

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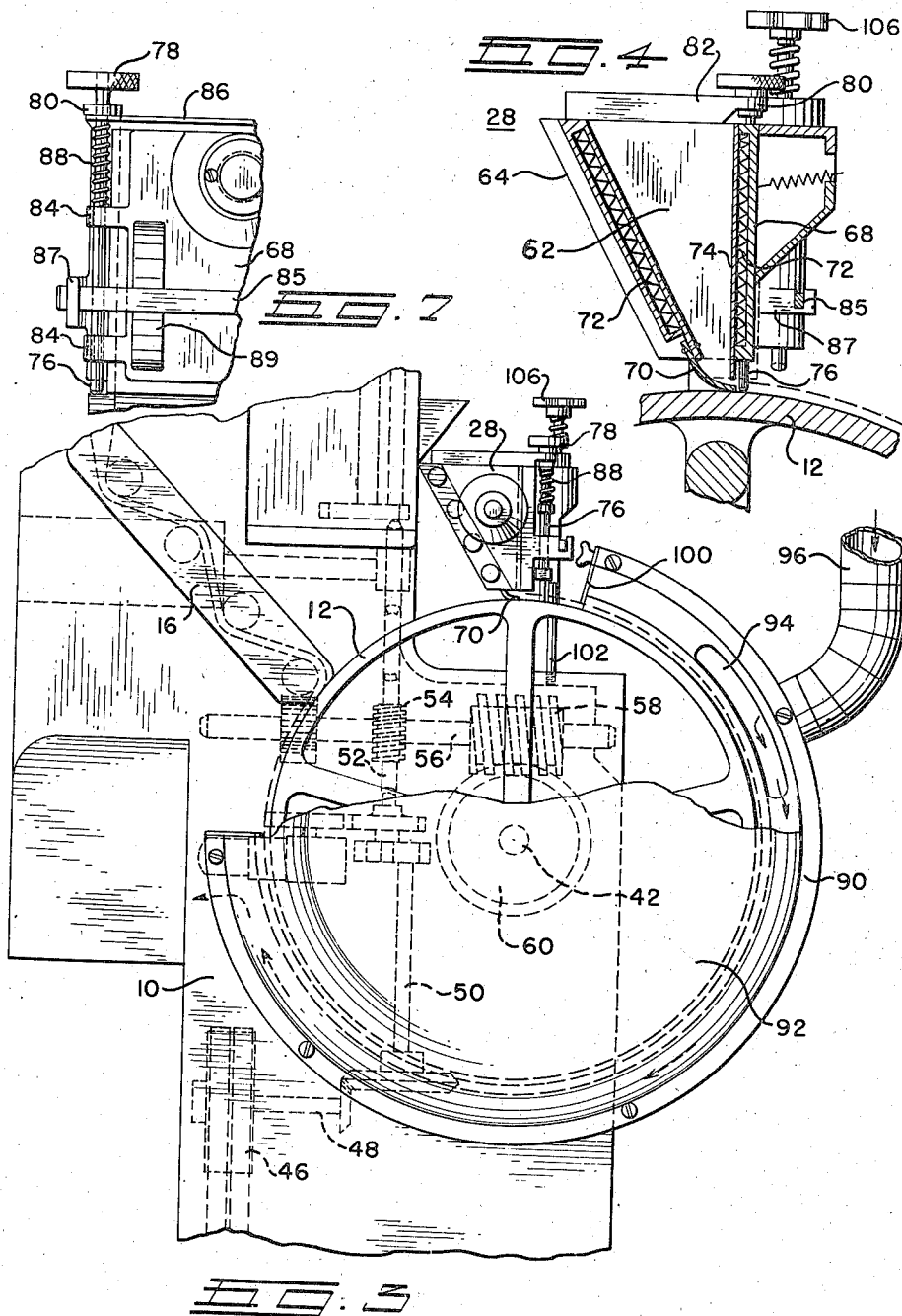
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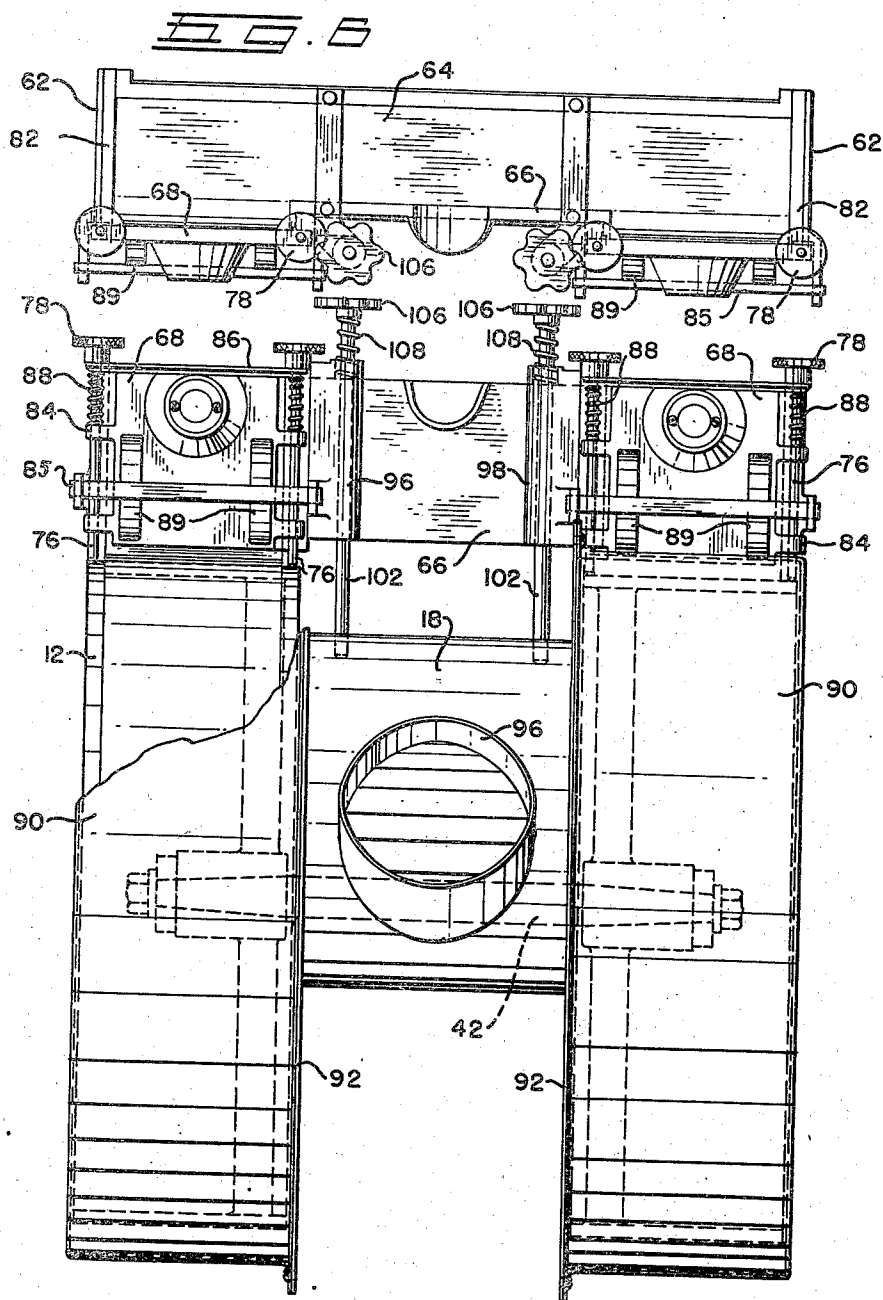


Fig. 6

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UNITED STATES PATENT OFFICE

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MACHINE FOR FORMING CAPSULATING MATERIAL

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Application March 7, 1941, Serial No. 382,148

7 Claims. (Cl. 18—15)

This invention relates to machines for forming capsules and more particularly to improvement in the type of apparatus described and claimed in my Patent No. 1,970,396, dated August 14, 1934, and in my copending application, Serial No. 44,017, filed October 9, 1935, now Patent No. 2,288,327.

An important object of this invention is to provide improved apparatus for forming material, out of which the capsule shells are formed, into sheet or band like formations so that this material can be utilized in the capsule shaping and filling apparatus which may be located on the same or another machine. More particularly, it is an important object of this invention to provide a novel device for spreading thin layers of capsule shell forming material of various definite thicknesses upon the periphery of one or more drums and a novel means for treating the layer on the drum so that it quickly forms an integral structure capable of being removed from the drum in a sheet or ribbon condition.

A feature of importance is a novel gate structure for controlling the flow of the capsule shell forming material upon one or more drums. This feature includes a novel adjusting means for varying the height of the gate structure relative to the periphery of the drum. Another feature of the invention is the drum assembly and particularly the means and method employed for passing air in close proximity to the layer of shell material spread upon the drum.

Various other objects, advantages and meritorious features of this invention will become more fully apparent from the following specification, appended claims, accompanying drawings, wherein:

Figure 1 is a side elevation of a capsulating machine illustrating the position of the parts thereof including the drum assembly and the apparatus for spreading a thin layer of capsule shell forming material on the drums,

Fig. 2 is a front elevation of the machine in Fig. 1,

Fig. 3 is an enlarged detail view of the drum assembly partly broken away to show the interior construction,

Fig. 4 is an enlarged cross-sectional view through the spreader box and an adjacent section of the drum illustrating the manner of spreading the shell material on the latter,

Fig. 5 is a back view of the drum assembly showing the manner in which the spreader box is mounted over the drums and the method of

delivering an air current to the peripheral portion of the drums,

Fig. 6 is a top view of the spreader box, and

Fig. 7 is a detail view of the floating mounting for a gate member on the spreader box.

A capsulating machine constructed in accordance with this invention is made up of a plurality of units assembled together in operative association. An illustrative embodiment of the invention is depicted on the drawings. Referring particularly to Figs. 1 and 2, the machine comprises a base unit or column 10 carrying a pair of rotatable casting drums 12—12. Forwardly on the base unit are a pair of oil roll assemblies 16 on each side thereof. Superimposing the base unit is a third unit 18 having journals for rotatably supporting a pair of die rolls 20—20 and enclosing operating mechanism therefor. Superimposing the die roll unit is a fourth unit 22 housing pump mechanism for delivering capsule filler material through feeder tubes 24 to a feeder head located between the die rolls 20—20. Mounted on top of the pump unit is a vat 26 for containing the filler content material to be capsulated. On the rear side of the machine above the casting drums is a spreader box 28 which is adapted to deliver capsule shell forming material in a thin stream upon the peripheries of the drums for casting the same thereon. Above and to the rear side of the spreader box is a vat 30 for containing shell forming material of gelatinous composition, for example, which is customarily used for this purpose.

In general, the operation of the machine is as follows: Capsule shell forming material is discharged from the vat 30 into the spreader box 28 and thence under control gates in thin streams to the top side of the drums 12—12. Each drum rotates slowly in the direction of the arrow in Fig. 1 and by the time the shell forming material spread thereon reaches the oil roll assemblies 16 it has assumed a unitary band-like formation. The lowermost roll of each die oil roll assembly 16 takes off the band of shell forming material from the casting drum with which it is associated and passes it through the oil roll assembly in the manner indicated in dotted line in Fig. 1. The bands of gelatinous material as indicated at 32 are now led upwardly past guides 34 and over elevator rolls 36 above the level of the die rolls. From the elevator rolls the two bands are led downwardly in converging paths between the die rolls 20—20. After passage between the die rolls the two bands are compressed together into a single band which is led between stripper rolls

38—38 and mangle rolls 39—39 to a suitable container.

Content material for filling the capsule is delivered from the vat 26 to the pump unit 22 and from there is ejected under pressure through tubes 24 to a feeder head 40 having converging side faces projecting downwardly between the die rolls. The die rolls and the feeder head are preferably constructed like that described and claimed in my copending application Serial No. 307,666, filed December 5, 1939, now Patent No. 2,318,718, although either or both may be constructed in other ways if desired. As described in my copending application the filler content material is ejected from the lower thin edge of the feeder head between the bands 32—32 at the point where these bands are pressed together by the die rolls. The pump mechanism in unit 22 functions in timed relationship to the position of die cavities or pockets on the die rolls.

The various units of the machine heretofore mentioned form separate elements capable of being installed on the machine and removed therefrom as separate units and interchangeable with like units substituted therefor. Operating mechanism extends throughout the machine connecting the moving parts together for operation in timed relationship to one another. Connecting shafting extending throughout the machine as will be later described operates the moving parts in the various units from a single source of power.

The invention claimed herein relates primarily to the drum assembly including the apparatus for spreading a thin layer of shell forming material over the drums. Although the drum assembly is shown associated with the machine illustrated in Figs. 1 and 2, it is understood that the assembly may be incorporated upon other types of apparatus and the claims appended hereto are to be understood in this light.

The two drums 12—12 are mounted on opposite sides of a machine on a common shaft 42. These drums are rotated from a motor 44 through operating connections including the belt drive 46, shafting 48, 50 and 52, worm gear 54, and a horizontal drive shaft 56 having a worm gear 58 engaging with a gear wheel 60 on the shaft 42.

The spreader box extends parallel to the shaft 42 supporting the drums and has its opposite end sections superimposing the drums. The spreader box includes the end walls 62—62, the slanting front wall 64, a vertical back wall section 66 in the center of the box, and two vertical back wall sections 68—68 one over each drum indicated in Fig. 5. The last described wall sections are movable vertically with respect to both the drum periphery and the remainder of the box and when raised provide narrow openings or slits of adjustable width between their bottom edges and the surface of each drum through which the shell forming material discharges from the box upon the peripheries of the drums. These movable wall sections are hereinafter referred to as gates or gate members in view of their ability to bar the egress of the material or control the flow of the material from the spreader box.

The slanting wall 64 of the spreader box is provided opposite each gate member 68—68 with an extension along its bottom edge in the form of a flexible metal band 70. When the spreader box properly surmounts the drums, these flexible bands bear upon the periphery of the drums and are flexed rearwardly as is illustrated in Fig. 4 to form a sufficient seal along this joint to prevent leakage of the shell forming material. It is evi-

dent from this construction that the material in the box will flow down the concave surfaces presented by the bands and under the gate member 68 onto the surfaces of the drums.

It has been found highly desirable to maintain the contents of the spreader box at a certain heat for flowing the shell forming material upon the drums. To provide means for maintaining the contents at the desired temperature, the spreader box is constructed in a novel way to provide one or more walls with heating means in the form of electric heating coils or water jackets. As shown in Fig. 4, both the slanting wall 64 and the gate members 68—68 are made with hollow interiors for containing the heating means such as electric resistance elements designated by the reference numeral 72. Heating elements of this kind may be provided in the end walls 62—62 and the back center wall section 66, if desired.

The gate members 68—68 are constructed alike. Each gate member is preferably formed of two wall members, an outer one which is recessed to provide room for receiving the heating means and an inner member in the form of a flat sheet metal plate 74. This plate is made larger than the recessed part and is arranged to project below the latter as shown in Fig. 4. The lower edge of each plate 74 is intended to cooperate with the periphery of the drum with which it is associated to form the slit through which the shell material flows upon the drum upon which the band 70 bears. The plate 74 of each gate extends sideways sufficiently far to bear against the end walls 62—62 and the center wall section 66.

The gate members 68—68 are mounted in a novel manner for adjustment relative to the periphery of the drums. Heretofore, as in my above referred to patent and copending application, gate members of similar character were adjusted relative to the bottom of the spreader box. The improved method of adjusting the gate relative to the periphery of the drum as illustrated herein makes it possible to precisely regulate the thickness of the shell material spread on the drum and accurately maintain the prescribed thickness despite irregularities in the construction and operation of the parts.

The novel adjusting means for each gate member comprises a pair of vertical or upright members or rods 76 located on the opposite ends of the gate members. The upper ends of these rods are provided with knurled handles 78 to facilitate turning. Under the handle of each end is a collar 80 in which the rod is journaled. These collars or journals are fixed to the spreader box such as by forming them on the ends of braces 82 fixed to the top of the end sections as illustrated in Fig. 4.

The bottom ends of the rods 76 are fitted with wearing surfaces which bear upon the peripheral surfaces of the drums, preferably on the marginal portions thereof as illustrated in Fig. 5. Each gate member 68 is provided with one or more ears 84 through which the rods 76 extend. Each rod is threaded to one of these ears and it is obvious that if each rod is held against vertical movement and allowed to rotate it will raise or lower its respective end of the gate member. Extending across the top of each gate and under the collars 80 is a bar 86, the opposite ends of which are apertured to receive the rods 76. Encircling each rod is a coiled spring 88. One end of each spring is seated on an ear 84. The other end bears against the bar 86 which serves the purpose of a washer.

The relation of the rods 76 to the gate members and the springs 88 is such that when a rod is rotated the gate will be raised or lowered relative to the periphery of the drum depending on the direction of its rotation. Since the collars 80 are fixed the springs 88 will exert a downwardly yielding pressure on the ears of the gate members and thence to the rods 76 threaded thereto. The wearing surfaces on the bottom of the rods are thus yieldingly pressed into engagement with the periphery of the drums. Rotative adjustment of each control rod 76 will therefore raise or lower its respective end of the gate relative to the periphery of the drum. As a result, each gate will, by action of the springs 88 above and the bearing faces of the rods below, always maintain the lower edge of the plate 74 of the gate at a predetermined distance from the periphery of the drum, although it may shift with respect to the spreader box.

To prevent the leakage of shell forming material around the sides of the plates 74 of the gate members, these plates are spring pressed against the walls of the spreader box but in such a manner as to allow vertical adjustment of the gate members. As shown, a bar 85 is mounted horizontally across the back of each gate member in slightly spaced relation thereto. The ends of each bar are supported in notches formed in arms 87 projecting from the back side of the spreader box on either side of the gate members. The two outer arms are extensions rearwardly of the end walls 62 of the box as shown in Figures 4 and 6. The two inner arms are extensions rearwardly from the bosses 104—104 of the back wall section 66 of the spreader box as shown in Figure 5. Between the bars and the gate members are springs in the form of flat spring metal elements 89 which press the gate members into non-leaking engagement with the edges of the walls 62 of the spreader box. As illustrated, the spring elements 89 have their mid sections supported on the bars 85 and their opposite flexible ends extending forwardly and pressing into engagement with the back sides of the gates.

The machine is provided with novel means for treating the shell material spread on the peripheries of the drum in order to rapidly advance the setting of the material for use on the machine. This novel means comprises essentially an enclosed air space around portions of the drum peripheries through which cool dry air is passed in direct contact with the surface of the spread material. This is accomplished by the provision of a novel cowling enclosing sections of the drums through which a current of air is forced in a direction parallel to the surface of the drums.

Referring to the drawings, the cowling of each drum is formed by an arcuate member 90 extending almost completely around the drum and spaced a slight distance from the periphery thereof to provide an air passage therearound. On opposite sides of the drums are suitable metal panels 92 which are attached to the member 90 and enclose the drums therebetween. These side panels extend close to the drum to substantially seal the air passage above the drum against air leakage.

Air is conducted under pressure to the passages about the peripheries of each drum. This is accomplished by providing corresponding slots 94 on the inside panels 92. An air duct 96 conveys the air under pressure to a point between the drums and opposite the slots. A housing 98 on the end of the duct between the drums and ex-

tending in opposite directions to the slots divides the air current between the two drums. In order to direct the air current in one direction around the drum, one end of the cowling is closed off. Preferably, as shown, an adjustable plate 100 is provided on the upper end of the cowling adjacent to the spreader box. This plate is adjustable radially of the drum so that its lower end can be spaced from the periphery of the drum just sufficiently far enough for the gelatin layer to pass thereunder.

The entire weight of the spreader box is borne by the drums. The spreader box bears on each drum at two points being the bottom edges of the end walls 62 fixing the width of the cast ribbon. The box is yieldingly held down upon the drums by the provision of two screw members 102—102 having their lower ends threaded into the fixed base unit 10 as indicated in Fig. 3. These members are located alongside of the central back wall section 66 of the spreader box and extend through bosses 104—104 forming a part thereof. Each member 102 is provided with a hand knob 106 and a coiled spring 108 seated on the handle and exerting a yielding downward pressure on the spreader box. It is evident that upon rotation of members 102—102 the spreader box can be clamped down firmly but flexibly upon the drum peripheries.

What I claim:

1. In combination, a rotatable drum, a receptacle adjacent thereto for containing plastic material and having a discharge slit through which said material flows onto the periphery of the drum, a well portion forming one margin of the slit and movable to adjust the opening of the slit, positioning means extending between the said movable wall portion and the drum and bearing upon the drum positioning the movable wall portion with respect to the opposite margin of the slit, and including spring means urging said movable wall portion toward the periphery of the drum.

2. In combination, a rotatable drum, a receptacle superimposing the drum and containing plastic material, said receptacle having a wall portion mounted for vertical movement and adapted when raised to form a slit through which said material will flow upon the periphery of the drum, said receptacle having wall sections extending substantially perpendicularly to said movable wall portion, said movable wall portion overlapping upon the ends of said perpendicularly extending wall sections, spring means urging said movable wall portion against said perpendicularly extending wall sections while permitting adjustable vertical movement, and means for holding said movable wall portion at adjusted vertical position relative to the periphery of the drum to vary the slit opening, including positioning means bearing upon the periphery of the drum and positioning said wall portion with respect thereto, and spring means holding said movable wall portion to vertically adjusted positions.

3. In combination, a pair of axially spaced rotatable drums, an elongated plastic containing box extending across from one drum to the other and having its end sections superimposing the drums, said box having a fixed portion and each end section of the box having a wall portion above each drum movable vertically to provide a slot along the bottom of the end section above the drum through which said plastic material will flow upon the drum, and means carried by a fixed portion of the box floatingly bearing upon the

peripheries of the drums and having an adjustable connection with each of said movable wall portions such that upon adjustment each movable wall may be raised and lowered relative to the periphery of the drum, said adjustable connection functioning in such a manner that despite circular irregularity of the drums the gaps between the drums and the movable wall members will remain constant.

4. In combination, a pair of aligned rotatable axially spaced apart casting drums, a pair of connected spreader boxes supported for vertical movement as a unit superimposing said drums, means yieldingly urging said spreader boxes as a unit toward the drums to rest upon the drums during drum rotation, each individual spreader box including a relatively vertically movable wall portion defining with a cooperating wall portion of the box a discharge slit through which material is discharged from the box on to the periphery of the drum below the box, means coupling each movable wall portion with the remainder of the box operable to raise and lower said wall portion with respect to the drum, said means including contact means bearing upon the periphery of the drum, means holding each movable wall portion yieldingly slidably against the end walls of the box and means yieldingly urging said movable wall portion in a downward direction.

5. In combination, a pair of aligned rotatable axially spaced apart casting drums, a pair of connected spreader boxes supported as a unit superimposing said drums, means yieldingly urging said spreader boxes as a unit toward the drums, each individual spreader box including a relatively vertically movable wall portion defining with a cooperating wall portion of the box a discharge slit through which material is discharged from the box on to the periphery of the drum below the box, means coupling each movable wall portion with the remainder of the box operable to raise and lower the movable wall portion with respect to the remainder of the box, said means having a part forming slidably contact with the drum to

position the movable wall portion with respect to the drum, and means yieldingly urging each movable wall portion toward that portion of the spreader box relative to which it is movable.

5 6. In combination, a rotatable drum, a spreader box superimposing the drum, said spreader box having its end walls resting upon the drum and supporting the box for vertical floating movement thereupon, said spreader box having a front wall
10 fixed to the end walls and having a rear wall overlapping the rear edges of the end walls and supported for vertical adjustment with respect thereto and having a lower edge defining a discharge slot from the box above the drum, said end walls
15 provided with brackets projecting rearwardly of the rear wall, a bar extending between said brackets, spring means between said bar and the rear wall yieldingly holding the rear wall against the end walls while permitting vertical slidable
20 adjustment of the rear wall and screw means bearing upon the drum and coupled with the rear wall to raise and lower the same with respect to the drum and relatively to the end walls of the box.

25 7. In combination, a pair of axially aligned axially spaced apart rotatable casting drums, a pair of spreader boxes superimposing said drums and having end walls resting thereupon, said spreader boxes connected together and supported for vertical floating movement upon the drums,
30 each spreader box having a front wall provided along its lower edge with a flexible doctor blade bearing upon the periphery of the drum, each spreader box provided with a rear wall overlapping the end walls of the box and vertically slidably adjustable to define a discharge slot between its lower margin and said doctor blade,
35 spring means yieldingly urging each rear wall against the rear edges of the ends of the spreader box, screw means bearing upon the drum and operable to adjust the vertical position of the rear wall and spring means urging each rear wall
40 downwardly toward the drum.

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