Jan. 26, 1943. R. P SCHERER 2,309,545

CAPSULATING MACHINE

Filed May 20, 1940 5 Sheets-Sheet 1

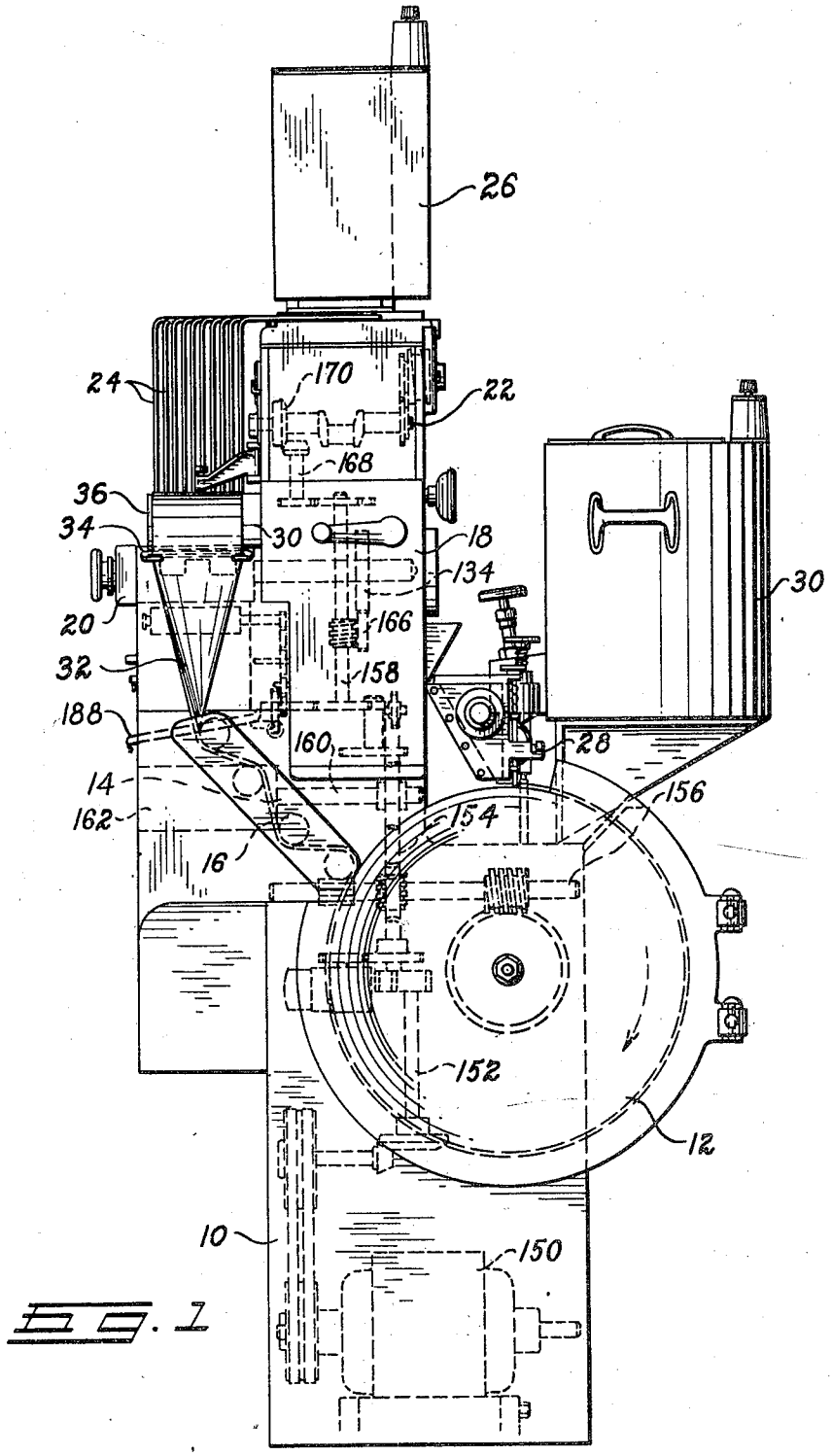


FIG. 1

INVENTOR.
ROBERT P. SCHERER
BY
Parker & Burton
ATTORNEYS.

Jan. 26, 1943. R. P SCHERER 2,309,545

CAPSULATING MACHINE

Filed May 20, 1940 5 Sheets-Sheet 2

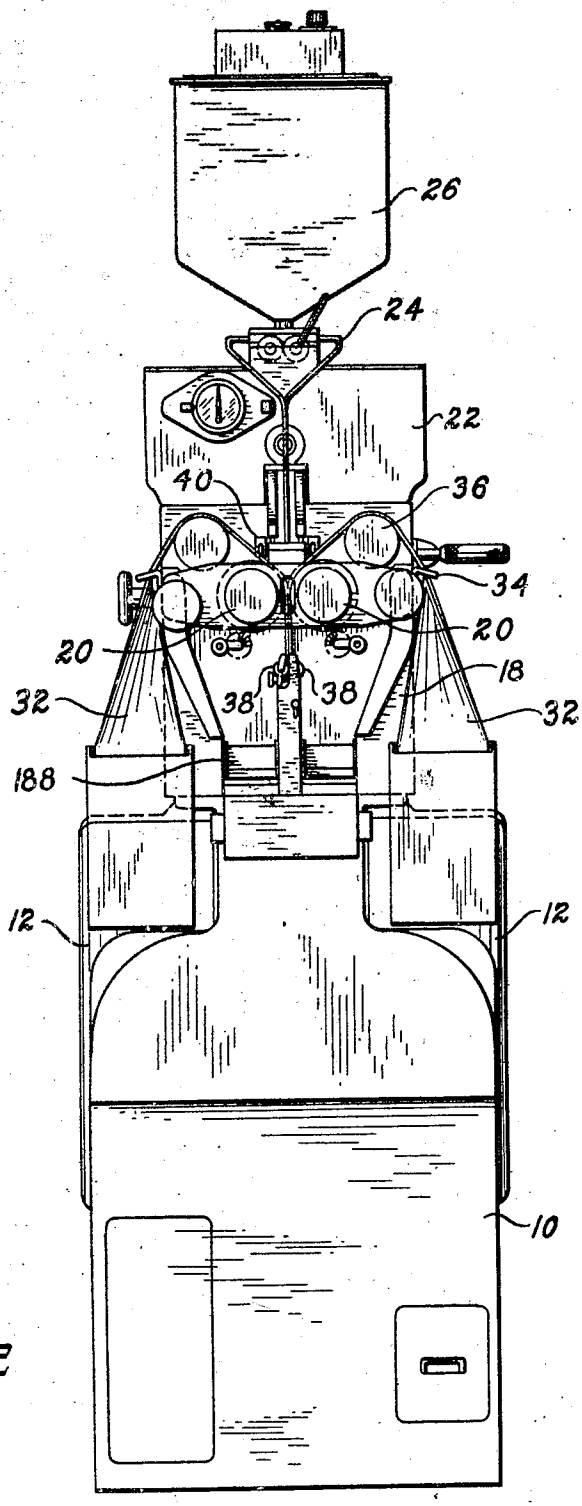


FIG. 2

INVENTOR.
ROBERT P. SCHERER

BY
Parker & Burton
ATTORNEYS.

Jan. 26, 1943. R. P SCHERER 2,309,545

CAPSULATING MACHINE

Filed May 20, 1940 5 Sheets-Sheet 3

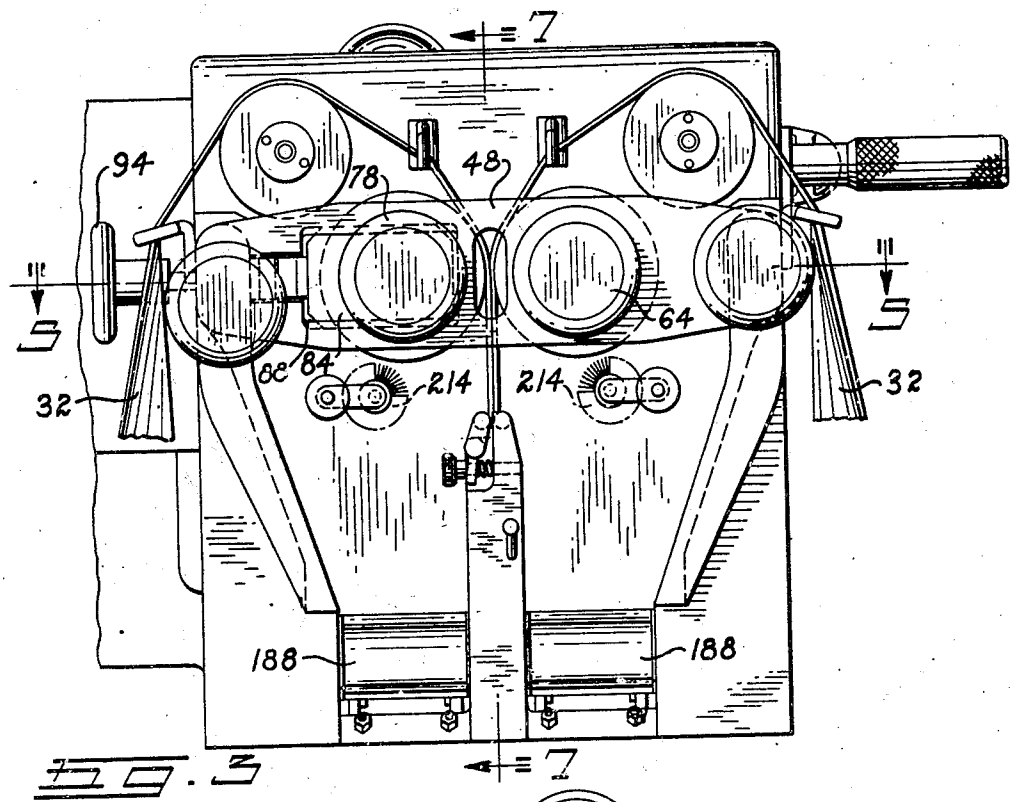


FIG. 3

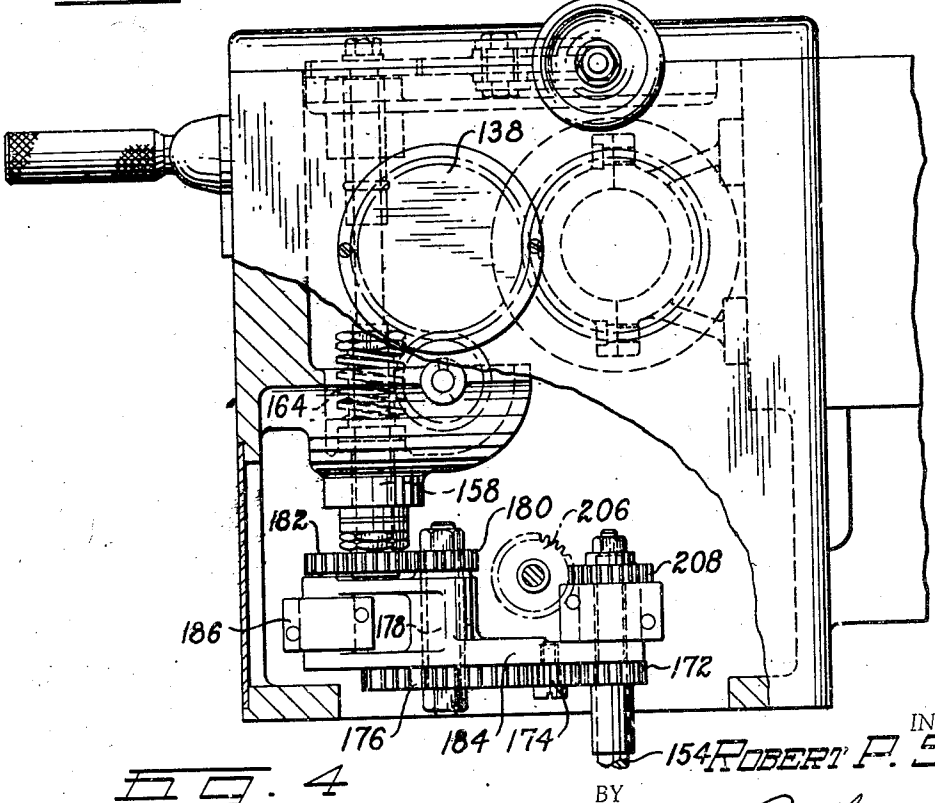


FIG. 4

INVENTOR.
ROBERT P. SCHERER

BY

Parker & Burton
ATTORNEYS.

Jan. 26, 1943. R. P SCHERER 2,309,545

CAPSULATING MACHINE

Filed May 20, 1940 5 Sheets-Sheet 4

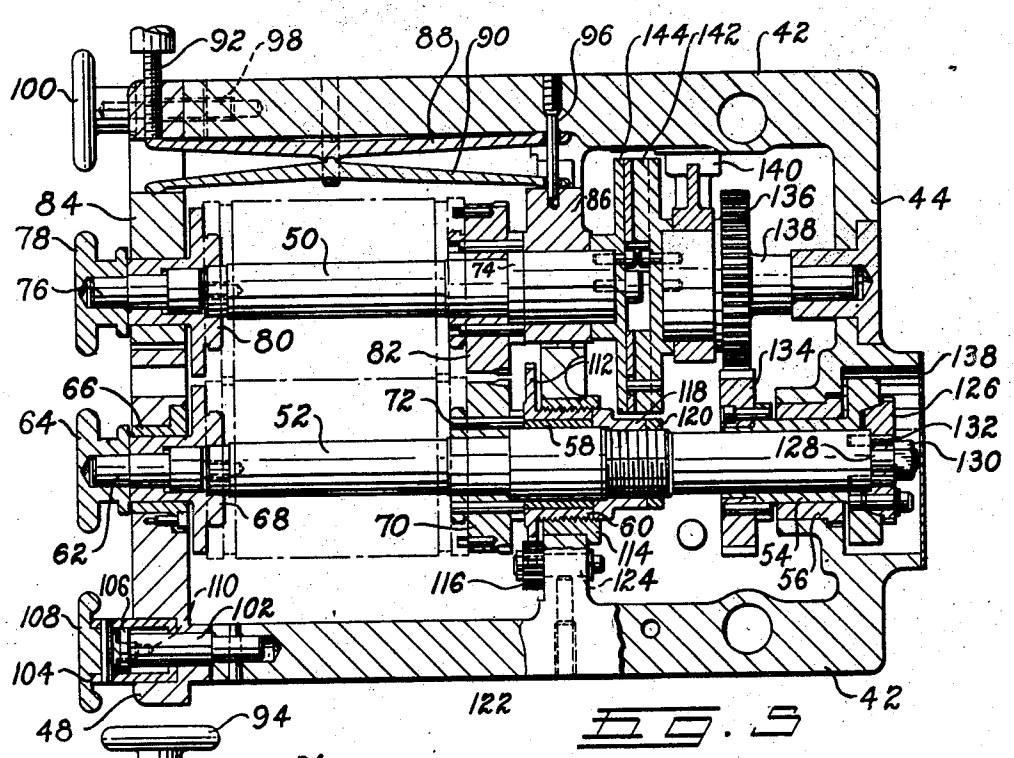


FIG. 5

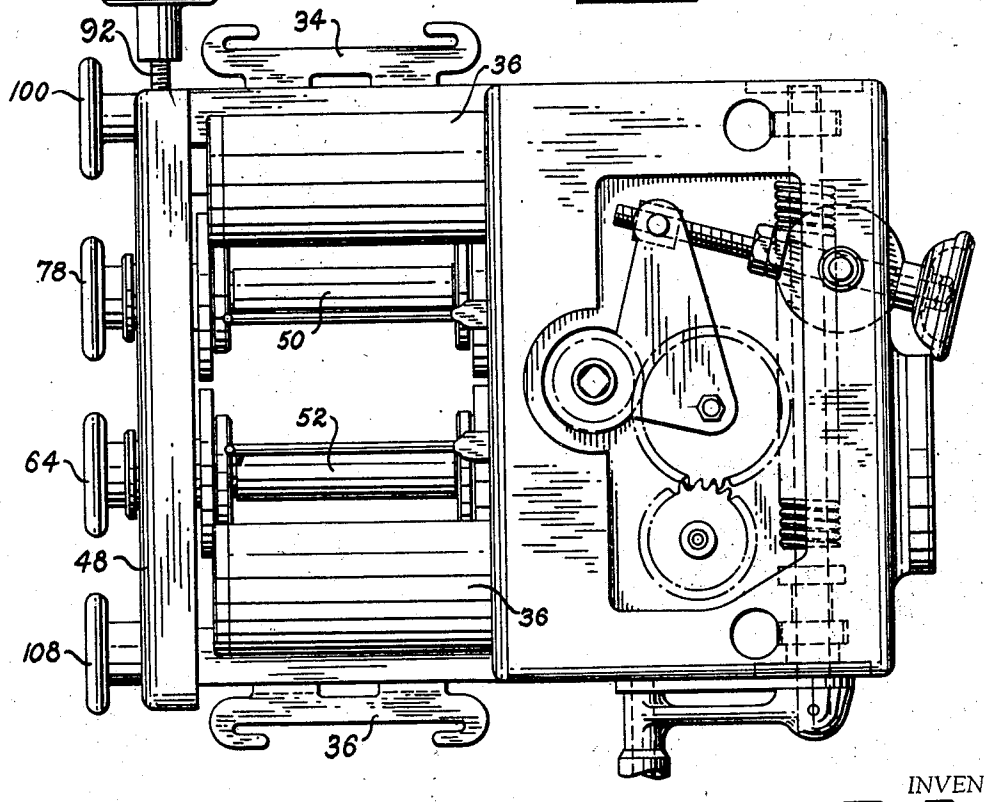


FIG. 6

INVENTOR.
ROBERT P. SCHERER
BY
Parker & Burton
ATTORNEYS.

Jan. 26, 1943. R. P SCHERER 2,309,545

CAPSULATING MACHINE

Filed May 20, 1940 5 Sheets-Sheet 5

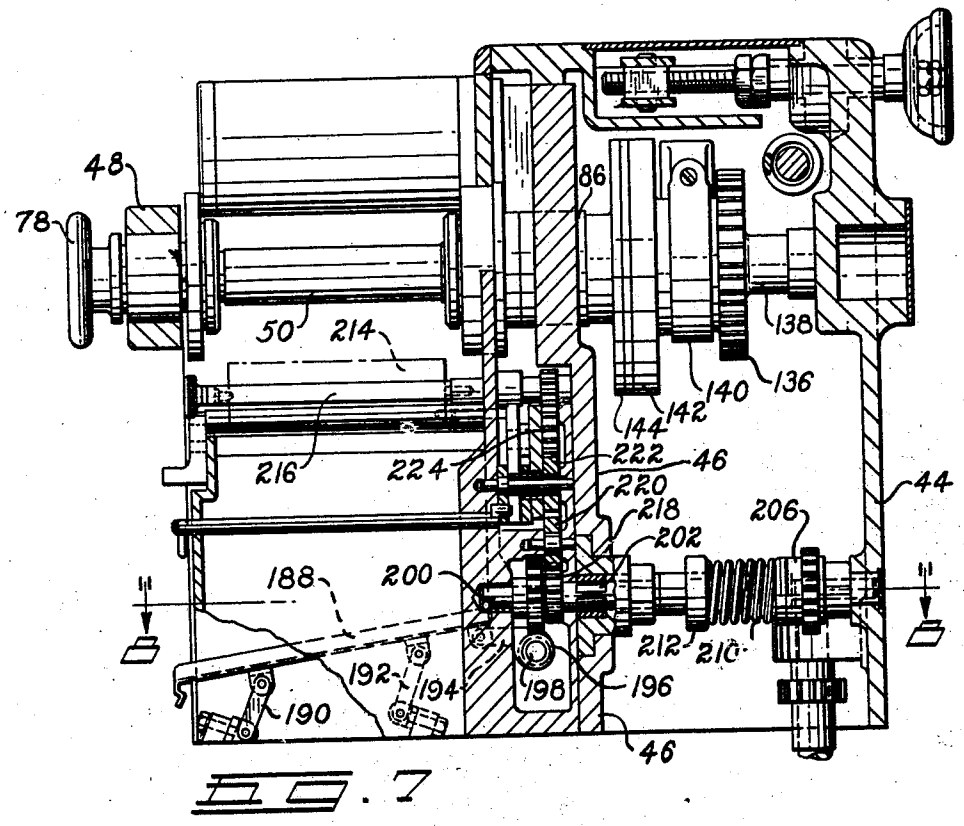


FIG. 7

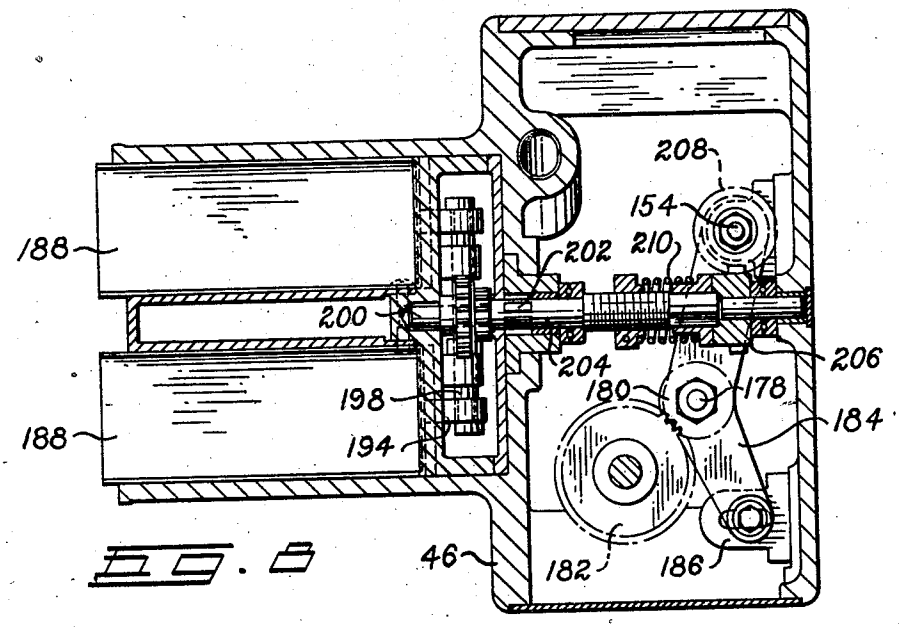


FIG. 8

INVENTOR.
ROBERT P. SCHERER
BY
Parker & Burton
ATTORNEYS.

Patented Jan. 26, 1943 2,309,545

UNITED STATES PATENT OFFICE

2,309,545

CAPSULATING MACHINE

Robert P. Scherer, Detroit, Mich.

Application May 20, 1940, Serial No. 336,110

16 Claims. (Cl. 18—21)

This invention relates to the manufacture of capsules and particularly to improvement in capsulating machines of the type 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 8, 1935.

An important object of this invention is to provide a novel form of capsulating machine composed of a plurality of parts or units each having a particular function in the capsulating process and capable of being quickly assembled and taken apart. The units of the machine are preferably made interchangeable and the units may be substituted for one another while adjustment and repairs are made without interrupting the use of the machine.

Another important object of this invention is to provide improved die roll mounting and operating means to thereby facilitate the adjustment, control, installation and removal, and the manner of operating the die rolls to form and seal the capsules. One feature of importance is the manner of mounting the die rolls so that they exert an even yielding pressure on the sheets or bands of capsule shell forming material continuously passing therebetween. The mounting is such that one of the die rolls is sidewise bodily movable toward and away from the other roll and is held against the latter under yielding pressure. Another novel feature of the invention is the provision of means for driving the die rolls in predetermined rotative relationship irrespective of the position of the die rolls with respect to one another. Another feature of the invention is the provision of novel adjusting means for quickly and easily aligning the die rolls axially and angularly with respect to one another. All these improvements contribute to the production of a stronger and more accurately filled capsule.

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

Figure 1 is a side elevation of a capsulating machine constructed and assembled in accordance with this invention,

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

Fig. 3 is a front elevation of the die roll unit of the machine,

Fig. 4 is a back view of the die roll unit partially broken away to show the interior construction,

Fig. 5 is a horizontal cross-sectional view through the die roll unit along line 5—5 of Fig. 3,

Fig. 6 is a top view of the die roll unit with a cover plate removed to show the assembly for adjusting the pump unit of the machine,

Fig. 7 is a vertical cross-sectional view of the die roll unit along line 7—7 of Fig. 3, and

Fig. 8 is a horizontal cross-sectional view along line 8—8 of Fig. 7.

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, 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 12—12. 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 topside 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 be-

tween 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 betwen the die rolls. Filler content material is discharged from the pump unit through the tubes 24 to the feeder head. 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, 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 as heretofore mentioned form separate elements capable of being installed on the machine and removed therefrom separate as 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 die roll unit 18 includes novel means for mounting the die rolls 20—20 and for driving the same. Referring to Figs. 3 to 8, inclusive, the unit comprises a housing on the rear side thereof for the die roll operating means including side walls 42—42, back wall 44 and an intermediate wall 46. The side walls 42—42 project forwardly beyond the intermediate wall 46 and secured to their front ends is a yoke or brace member 48. Shafts carrying the die rolls extend between the yoke 48 and the intermediate wall 46 and novel journals on these elements support the shafts for rotation and adjustment as will be described hereinafter. One die roll shaft is indicated at 50, the other at 52. In the embodiment of the invention illustrated herein, shaft 52 is the driving shaft, shaft 50 is driven therefrom as will be later described.

Both shafts are rotated in opposite directions at speeds such that the capsule forming cavities on each die roll are brought into registration with corresponding cavities on the other roll once each revolution of the die rolls. The direction of rotation of the die rolls is such that the bands 32—32 are drawn downwardly therebetween. Novel provision is made for mounting the shafts so that the die rolls carried thereby are urged together by yielding pressure applied equally on all parts of the die rolls. This is accomplished by mounting one of the shafts, preferably the driven shaft as shown, for bodily movement toward and away from the other and the provision of spring means yieldingly urging the shaft toward the other shaft to bring the surfaces of the die rolls into abutting engagement. Novel provision is made for adjusting the die rolls before the machine is operated in order to align the die cavities on the die rolls so that they will exactly complement one another as they are carried by the die rolls through the plane intersecting the axes of the rolls. This is accomplished by mounting one of the die roll shafts, preferably the driving shaft as shown, for axial bodily adjustment and for angular or rotative adjustment relative to the other shaft.

Referring particularly to Fig. 5, the rear end of the shaft 52 is received in a sleeve 54 which is journaled in a fixed bearing 56 carried in the rear wall 44. The middle section of the shaft is journaled in a bearing 58 locked within a sleeve 60 longitudinally adjustable as will be later described. The forward end of the shaft is provided with a removable extension 62 passing through the yoke and carrying a knob 64 on the outside of the yoke. The extension 62 is threaded into the end of shaft 52 for joint rotation therewith. A fixed bearing 66 is carried in the yoke member. Carried by the shaft 52 are two collars 68 and 70 each shaped to support one end of the die roll intended to be rotated by the shaft. Collar 68 has a sleeve portion entering between the shaft extension 62 and the bearing 66 and serving to rotatably journal the shaft to the bearing. Collar 70 is fixed to the shaft by pins 72 projecting from the collar and entering recesses provided for these pins in a circular flange 74 of the shaft. The die roll carried by shaft 52 is not shown in Fig. 5 but the dotted lines extending from collar to collar show the position it would assume when properly mounted. Die roll shaft 52 is adjustable as will be later described both axially and rotatively relative to the other shaft. It is however held against bodily sidewise movement whereas shaft 50 is mounted for bodily movement toward and away from shaft 52.

The forward end of shaft 50 is in general similar to that of shaft 52 and includes a shaft extension 76, knob 78 and a collar 80 having a sleeve portion surrounding the reduced extension 76. Collar 82 adjacent the intermediate wall 46 is constructed similar to a collar 70 including like means for pinning the collar to the shaft for joint rotation. Shaft 50, as previously described, is mounted in a novel way for movement toward and away from shaft 52. This is accomplished by mounting the forward end of shaft 50 in a journal block 84 and the rear end in a journal block 86 and providing means for mounting the journal blocks for reciprocating movement in the plane intersecting the axes of the die rolls. As best shown in Fig. 3 the journal block 84 is disposed in a horizontal slot in the yoke member indicated at 88. This slot is slightly oversize the horizontal dimensions of the journal block 84 so that the latter may slide horizontally therein. Journal block 86 is similarly mounted, a horizontal slot in the intermediate wall 46 granting limited horizontal movement to journal block 86. The construction is perhaps best shown in Fig. 7.

As previously described the die rolls are yieldingly urged against one another. This is accomplished by the provision of a novel spring system which equally distributes its pressure along the length of the die roll journaled in the blocks 84 and 86 urging the roll toward the shaft 52. Referring to Fig. 5, a cantilever spring system includes the two leaf springs 88 and 90 mounted back to back and arranged with their point of contact opposite the center of the die rolls. As shown, the extremities of leaf spring 90 bear upon the journal blocks. The opposite extremities of leaf spring 88 bear upon fixed portions of the unit.

The journal blocks 84 and 86 are unequally spaced from the center of the die roll on shaft 50 and is evident in Fig. 5. The inner ends of the leaf springs 88 and 90 are longer than the outer or front ends, but due to the location of the contact point of the two springs opposite the center of the die roll their expansive force is transmitted equally to the opposite ends of the die roll. Means in the form of a screw member 92 acting on one end of the leaf spring 88 is capable of varying the force exerted by the cantilever spring device. A knob 94 on the exposed end of the screw member facilitates turning movement. A threaded member 96 projects into a recess in journal block 86 restricting the same to a straight line movement and limiting the backward movement of the journal block.

The machine described herein is capable of forming capsules of various sizes and shapes. The size and shape of the capsule produced on the machine is determined by the number and formation of the die cavities on the die rolls. The die rolls are removable in order to substitute rolls capable of forming capsules of different sizes and shapes. In order that this may be done expeditiously, the machine illustrated herein is provided with novel means for accomplishing this purpose. The yoke member 48 is arranged to be retracted and then swung to one side to gain access to the ends of the shafts 50 and 52. The shaft extensions 62 and 76, and the collars 68 and 80 form unitary parts of the yoke and are carried away thereby when the yoke is retracted and swung out of the way. In use, the extensions 62 and 76 are threaded to the shafts 52 and 50 respectively. Rotation of the knobs 65 and 78 will unloosen and withdraw the extension from their respective shafts.

One end of the yoke member is capable of being freed entirely from the wall of the unit, the other end however can only be freed sufficiently to allow the yoke to be swung in an arc around this end as a pivot. Referring to Fig. 5, the upper or left end of the yoke shown in this figure is attached to the front end of the wall 42 of the unit by a pin 98 adapted to make threaded engagement with the front end of the wall. Outside control means in the form of knob 100 is capable of unthreading the pin from the wall and completely detaching this end of the yoke from the unit.

At the other end of the yoke, however, a pin 102 is locked in projecting position to the front end of the other wall 42 of the unit. In the end of the yoke there is a sleeve 104 surrounding the projecting end of the pin in spaced relation thereto. The pin is headed at 106 and the end of the sleeve is inwardly flanged so that the head and the flange of the sleeve will abut when the sleeve is pulled out a predetermined distance. When the yoke is properly secured on the unit the flanged end of the sleeve is remote from the head of the pin as shown in Fig. 5. On the outer extremity of the sleeve is a knob 108 keyed or otherwise secured to the sleeve for retractible movement together. The knob is provided with inwardly projecting stem 110 shaped with threads for threaded engagement with the outer end of the pin 102. When it is desired to remove the yoke and journal supports from the outer ends of shafts 50 and 52, knob 108 is turned to unthread its stem from pin 102. When free the knob and sleeve 104 can be pulled out until the head of the pin abuts the flange of the sleeve. This enables the yoke to be pulled out the same distance thus retracting the collars 68 and 80 from the die rolls. The yoke may then be moved out of the way carrying the journal elements, extension shaft and collars 68 and 80 therewith.

Shaft 52, as previously mentioned, is capable of adjustment both axially and angularly. This adjustment is highly desirable in order to properly align the die cavities in the two die rolls. Fine adjustments are necessary and the novel means utilized in the machine illustrated insures accuracy with a minimum amount of effort. As previously set forth, the middle portion of shaft 52 is journaled in a bearing 58 locked within a sleeve 60. This sleeve is externally threaded and in addition is provided with a gear wheel 112 of relatively large diameter. The threads of sleeve 60 engage with internal threads on a surrounding ring 114 fixed in the intermediate wall 46. A small pinion 116 meshes with the gear wheel 112. It is obvious that upon rotation of the pinion sleeve 60 will be rotated and by virtue of its threaded engagement with ring 114 will be advanced in either direction axially of the shaft 52.

The sleeve 60 is disposed between the circular flange 74 of the shaft 52 and a nut 118 threaded to the shaft and retained thereon by lock nut 120. Thus, when axially advanced, the sleeve 60 will thrust the shaft 52 forwardly or backwardly and hold the same in any adjusted position. In order to rotate pinion 116 from the outside, a specially made long handled tool may be used. This tool may be shaped on its extremity to engage the front side of the pinion to rotate the same. To lock the pinion 116 against rotation once the parts have been adjusted, a long threaded pin 122 accessible through the side of the unit may be tightened into engagement with the side of the pinion shaft 124 in the manner shown in Fig. 5. It is then possible as a result of this construction to adjust the die roll on shaft 52 until the die cavities therein are aligned axially with the die cavities on the die roll mounted on shaft 50. Due to the gear differential between pinion 116 and gear 112, precise adjustments are possible. After adjustment the parts are positively locked against loosening in operation.

In order to bring the cavities of the die rolls into alignment it is also necessary to adjust either one or the other of the die rolls angularly about their axes of rotation. The present machine has novel means for accomplishing this adjustment with precision and convenience. In general, it is in the form of a clutch between the driving mechanism and one of the die rolls shafts, in the present instance the shaft 52. It is of such a construction that axial adjustment of the shaft will not affect its function.

Referring particularly to Fig. 5, the sleeve 54 in which the rear end of the shaft 52 is received forms one member of a cone clutch. The second member of the cone clutch is indicated at 126 and is centrally apertured to be received over a projecting stud 128 formed on the end of the shaft 52. A nut 130 threaded to the stud draws the conical faces of the clutching member into tight frictional engagement. Pins 132 serve to bind the member 126 and shaft 52 together for joint rotation irrespective of the clutch engaging position of the member.

Both shafts 50 and 52 are driven from a common source and are geared together to rotate in opposite directions at the same rate of speed, if the rolls are of the same diameter and have die cavities corresponding in number and position. As shown in Fig. 5, sleeve 54 is provided with a

gear wheel 134 pinned thereto. A similar gear wheel 136 meshing with gear 134 drives the shaft 50 as will be later described. These gears are in constant mesh and cause their respective shafts to rotate at the same speed but in opposite directions. It is thus apparent that when nut 130 is loosened, member 126 of the cone clutch mechanism can be disengaged and both the member and the shaft 52 rotated relative to shaft 50. This allows the die roll carried by shaft 52 to be rotated relative to the companion die roll on shaft 56 and thus bring the die cavities on the two rolls in circumferential alignment. To facilitate this operation and to make fine adjustments, member 126 is provided with a tooth periphery which may be engaged by a small pinion (not shown) either mounted on member 126 or carried on the end of a tool. The clutch assembly is contained within a housing having a removable cover plate 138 permitting easy access thereto for the adjustment.

As previously mentioned, the die roll on shaft 50 is driven at a uniform rate of speed in any position which it might be shifted laterally. This is accomplished by the provision of a driving connection which is not affected by this bodily movement. Referring to Figs. 5 and 7, gear 136 is carried upon a stub shaft 138 mounted in approximate alignment with shaft 50 and having its rear end journaled in the rear wall 44 and its wider front end journaled in a bracket support 140. Carried on the front end of stub shaft 138 and rear end of shaft 50 are members 142 and 144 respectively forming the parts of an Oldham coupling. The characteristic of the Oldham coupling is that it transmits rotation uniformly while permitting parallel displacement between driving and driven members. In this particular instance, the coupling allows the die roll on shaft 50 to shift bodily toward and away from the companion die roll on shaft 52 and yet maintain alignment of the die cavities as originally adjusted.

The moving parts in the die roll unit 18 are driven from operative connection extending the length of the machine and all operated from a source of power in the form of an electric motor 150 in the base unit. In the manner shown in Fig. 1 the motor drives the vertical column shafts 152 and 154. A horizontal column shaft 156 takes off power to drive the drums on the one hand and the die roll assembly on the other hand. The vertical shaft 154 continues upwardly into the die roll unit 18 where through gear connections to be described later it drives vertical shaft 158. Before leaving the base unit, vertical shaft 154 drives a horizontal shaft 160 which in turn drives a pair of mangle rolls represented at 162. Vertical shaft 158 is provided with a worm gear 164 which as shown more clearly in Fig. 4 drives a gear 166 meshing with gear wheel 134 of the cone clutch mechanism. Vertical shaft 158 continues upwardly to the top of the die roll unit when through speed change mechanism it drives a shaft 168 entering the pump unit 22 and connected to the pump crank shaft 170.

The gear connections referred to above connecting vertical shafts 154 and 158 are best on shaft 154 connected through pinion 174 with shown in Fig. 4. They comprise a small gear 172 on shaft 156 connected through pinion 174 with a larger gear 176 fixed on the lower end of a stub shaft 178. This stub shaft carries on its upper end a small gear 180 meshing with gear 182 fixed to the lower end of shaft 158. The stub shaft 178 and the gears 174, 176 and 180 are all carried on a bent arm 184 (see Fig. 8) swingable about shaft 154 as an axis and capable of having its opposite end bolted in adjusted position to a slotted bracket 186. Such adjustment allows the substitution of gears of different sizes in the gear train between the two shafts 154 and 158 and thus varying the speed of all moving operating parts above this point relative to the moving parts therebelow.

Under pressure of the die rolls the capsules formed in the bands 32 are almost always severed from the band. The two bands on passage between the die rolls are compressed together into a single double band. This double band with the filled capsules sometimes adhering thereto is led downwardly between the two stripper rolls 38—38 and thence between the two mangle rolls 162—162. The latter rotate at a speed tending to pull or stretch the double band. The stripper rolls are rotated in a direction opposite to the direction of movement of the double band and their function is to release or tear out filled capsules. The tension imposed by the mangle rolls aids in releasing the filled capsules from the bands. The filled capsules when thus released fall down on opposite sides of the bands upon inclined chutes 188—188 for discharge into a suitable receptacle not shown.

The capsules are relatively soft and sticky when they are first formed. In order to advance the capsules along the chutes at such a speed so that they may be examined, the chutes are vibrated or shaken quide rapidly. Referring to Fig. 7, each chute 188 is supported upon links 190 and 192 having their lower ends pivoted to a fixed part of the machine and their upper pivoted to the chute. The rear end of each chute is connected by arm 194 to an eccentric 196 encircling a transverse shaft 198. This shaft extends crosswise below a rearwardly extending stub shaft 200, clutched at 202 to a longer shaft 204 having its rear end journaled in the rear wall 46 of the die roll unit. Keyed to the last shaft is a pinion 206 normally meshing with a gear wheel 208 on the upper end of vertical drive shaft 154 as shown in Fig. 4. Pinion 206 is urged by coil spring 210 into engagement with gear 208. The spring is seated on nut 212 adjustably threaded on shaft 204.

Brushes 214—214 are provided, one for each die roll for wiping the oil film transferred to the die rolls from the bands 32—32 onto the tops of the cutting and sealing ledges as the rolls revolve. The brushes also remove any capsules or capsule shells which stick to the die rolls. These brushes are each mounted on a shaft 216 driven from stub shaft 200 through a train of gears including gear wheels 218, 220, 222 and 224 (Fig. 7). The last gear wheel drives a wheel 226 on the rear end of each brush shaft 216.

What I claim:

1. A capsulating machine including, in combination, a pair of die rolls having correspondingly formed cavities in their faces adapted to be brought successively opposite one another as the die rolls rotate and between which bands of capsule forming material are fed, means mounting one of said die rolls for bodily movement toward and away from the other, means yieldingly urging said bodily movable die roll toward the other, and means for continuously rotating said die rolls and maintaining the same in a definite rotative phase relationship irre-

spective of the position assumed by said bodily movable die roll with respect to the other.

2. A capsulating machine including, in combination, a pair of die rolls having cavities in their faces adapted to be brought successively opposite one another as the die rolls rotate, means mounting one of said die rolls for axial movement but holding the same against lateral bodily movement, means for securing said axially movable die roll in adjustable position along its axial path of movement, means mounting the other die roll for limited sidewise bodily movement toward and away from said axially movable die roll but holding the same against axial movement, means yieldingly urging said sidewise bodily movable die roll toward the other die roll, and drive means for rotating said die rolls in the same rotative phase relationship irrespective of the positions to which said die rolls are moved in their respective paths of bodily movement.

3. In a capsulating machine, a pair of shafts extending in parallel relationship, complementary die rolls mounted on said shafts, said die rolls provided with complimentary die cavities adapted to register upon rotation of the rolls for the formation of capsules from plastic band material fed between the rolls, means mounting one of said shafts for limited bodily movement toward and away from the other shaft, means yieldingly urging the bodily movable shaft toward the other shaft, common drive means for rotating said shafts at the same speed, and a coupling between the drive means and the bodily movable shaft providing said bodily movement of the latter without altering the rotating phase relation of the two shafts.

4. In a capsulating machine, a pair of die rolls disposed in juxtaposed side by side relationship, said die rolls provided with cavities of the same formation in their respective peripheral faces and corresponding ledges extending around each cavity for cutting and sealing the capsules, means mounting one of said die rolls for limited bodily sidewise movement from a position spaced from the other die roll to the position where the ledges of the two die rolls abut, means for passing a pair of opposed plastic bands of capsule forming material between the die rolls, means yieldingly urging the bodily movable die roll against the other die roll so that the ledges thereof successively abut one another and sever the bands as the die rolls rotate, and means for driving said die rolls at the same rotative phase relationship regardless of the position assumed by said bodily movable die roll in its sidewise bodily movement relative to the other die roll.

5. A capsulating machine including, in combination, a pair of die rolls having their peripheral faces shaped to form capsules, means mounting one of said die rolls for sidewise bodily movement toward and away from the other die roll, means urging the bodily movable die roll against the other die roll but yieldable to allow lateral displacement of the die rolls with respect to another, means for axially adjusting the setting of one of said die rolls relative to the other, means for angularly adjusting the setting of one of the die rolls relative to the other, and means for rotating said die rolls in the same rotative relationship throughout the permitted range of the axial or angular adjustment or the lateral displacement of the die rolls with respect to one another.

6. A capsulating machine including, in combination, a pair of shafts extending parallel to one another, a pair of die rolls having their peripheral faces shaped with corresponding cavities for forming capsules, means on each shaft for rigidly attaching one of said die rolls thereto, a member rotatable on one of said shafts, means on said last mentioned shaft locking said member against axial movement along the shaft, said member provided with an externally threaded section in threaded engagement with an internally threaded section on a fixed part of the machine, and means controllable from outside the machine for rotating said member on the shaft and causing said member and the shaft upon which it is mounted to shift axially relative to the other shaft, said adjustment enabling the cavities on the die rolls to be brought into axial alignment with one another.

7. A capsulating machine including, in combination, a pair of shafts extending parallel to one another, a pair of die rolls having their peripheral faces shaped with corresponding cavities for forming capsules, means on each shaft for rigidly attaching one of said die rolls thereto, drive means for rotating said shafts, a clutch at the end of one of said shafts including a friction element associated with the drive means and a friction element associated with the shaft, said elements when frictionally engaged adapted to transmit driving forces from said drive means to said shaft, one of said elements being retractible to a disengaged position, said element associated with the shaft being provided with a circular set of gear teeth for rotating the same and the shaft to which it is associated relative to the companion die roll shaft when the elements are frictionally disengaged.

8. A capsulating machine including, in combination, a pair of shafts extending parallel to one another, a pair of die rolls, means on each shaft for attaching one of said die rolls thereto, said die rolls having their peripheral faces shaped with corresponding cavities for forming capsules, journal blocks supporting one of the shafts on opposite sides of the position assumed by the die roll attachable thereto, means forming a guide for said journal blocks allowing bodily movement of the journal blocks and the shaft carried thereby toward and away from the shaft of the companion die roll, and a cantilever spring system having one leaf thereof acting on a fixed part of the machine and the ends of the other leaf thereof bearing upon the journal blocks, said cantilever spring system arranged to distribute its pressure equally on opposite ends of the die roll on the shaft journaled in the blocks and urge it into yielding abutting engagement with the companion die roll.

9. In a capsulating machine, a fixed support, a pair of shafts each having one end journaled to said support and projecting therefrom in spaced parallel relationship, means on the projecting portions of each shaft for mounting a die roll thereon, a brace member having journals for receiving the other ends of said shafts, and means for detachably securing said brace member to said fixed support with the remote ends of the shaft rotatably mounted in said journals for support.

10. In a capsulating machine, a fixed support, a pair of shafts each having one end journaled to said support and projecting thereform in spaced parallel relationship, means on the projecting portion of each shaft for mounting a die roll thereon, means on said support providing

limited bodily sidewise movement of one of the shafts toward and away from the other shaft, a brace having journals for receiving the opposite ends of the shafts, means for detachably securing said brace member to said support to aid in supporting the shafts, and means on the brace member providing limited bodily sidewise movement of the same shaft permitted the same movement on the fixed support.

11. In a capsulating machine, a pair of die rolls mounted side by side between which plastic bands of capsule forming material is fed and having cavities therein which successively appear opposite each other as the die rolls rotate, means for rotating the die rolls at predetermined rates of speed in directions opposite to one another, means for stripping formed capsules from the bands after they have passed through the die rolls, a container on each side of the bands below the stripper device to catch the capsules stripped from the bands, said containers each having an inclined bottom, and means operated from said die roll rotating means for vibrating said containers in order to advance the capsules along the inclined bottom thereof.

12. A capsulating machine comprising, in combination, a fixed base unit including a pair of drums for casting two bands of capsule shell forming material, a second unit superimposing said base unit including a pair of die rolls rotatable about parallel horizontal axis, means for converging the two bands of shell forming material from the casting drums to a point above the die rolls and thence in converging downward paths between the die rolls, a third unit superimposing said second unit including a feeder head arranged between the converging portions of the bands for injecting filler content material between the bands at approximately the point where the bands pass between the die rolls and pumping mechanism for delivering filler material to the feeder head, said units of the machine capable of removal and assembly together as separate units, and disconnectable operating mechanism extending from one unit to the other and operatively coupling the moving parts for movement in timed relationship to one another.

13. Capsulating mechanism including, in combination, a pair of shafts extending parallel to one another and adapted to carry die rolls having their peripheral faces shaped with corresponding cavities for forming capsules, drive means for rotating said shafts in opposite directions, means providing bodily movement of one shaft toward and away from the other, means between said last shaft and said drive means permitting said bodily movement without effecting its rate of rotation, means providing axial and rotatable movement of the other shaft relative to the first shaft, and means for adjustably holding said last shaft in any position of its axial and rotatable movement relative to the other shaft.

14. Capsulating mechanism including, in combination, a support, a pair of spaced apart parallel shafts rotatably journaled in said support, common drive means for said shafts adapted to rotate the same in opposite directions, means providing limited sidewise bodily movement of one shaft toward and away from the other, means providing limited axial movement of the other shaft relative to the first described shaft, means in the driving connection between said sidewise bodily movable shaft and said drive means permitting said sidewise bodily movement of the shaft without effecting the relative rotative phase relationship of the two shafts, means yieldingly urging said sidewise bodily movable shaft toward said other shaft, means for axially adjusting said axially movable shaft and for holding the shaft in adjusted position, and means in the driving connection between the last mentioned shaft and the driving means providing rotatable adjustment of the shaft relative to the other shaft.

15. In a capsulating machine, a pair of die-supporting members rotatable about parallel axes, drive means for rotating said members in opposite directions, means providing bodily displacement of one member sidewise toward and away from the other member, means in said drive means to said last member permitting said sidewise bodily displacement without varying its rotative phase relationship with said other member, means for axially and rotatively adjusting one of said members relative to the other member, and means for holding said axially and rotatably adjustable member in any axial or rotatable position to which it is adjusted by said adjusting means.

16. In a capsulating machine, a support, a pair of die-supporting members rotatably journaled on said support about parallel axes, common drive means for said members adapted to rotate the same in opposite directions, means providing limited sidewise bodily movement of one member toward and away from the other, means providing limited axial movement of one member with respect to the other member, means in the driving connection between said sidewise bodily movable member and said drive means permitting said sidewise bodily movement of the member without varying its rotative phase relationship with the other member, means yieldingly urging said sidewise bodily movable member toward said other member, means providing axial adjustment of said axially movable member and for holding the member in adjusted position, means for disconnecting the driving connection between one of said members and said drive means, and means providing rotatable adjustment of said last described member relative to the other member when the driving connection thereto is disconnected.

ROBERT P. SCHERER.