Dec. 1, 1959 L. H. MORIN 2,914,800

MACHINE FOR CASTING RIMS ON SPOOLS

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FIG. 1a

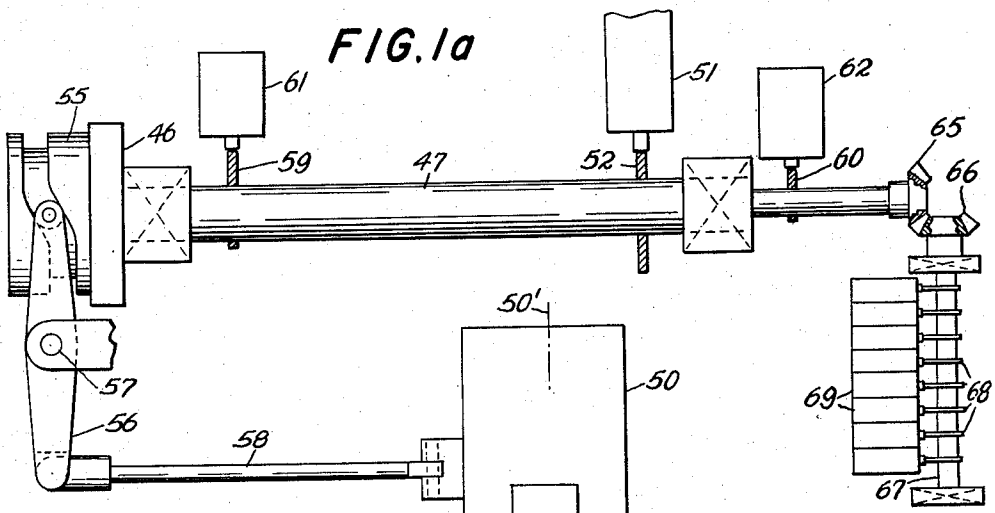
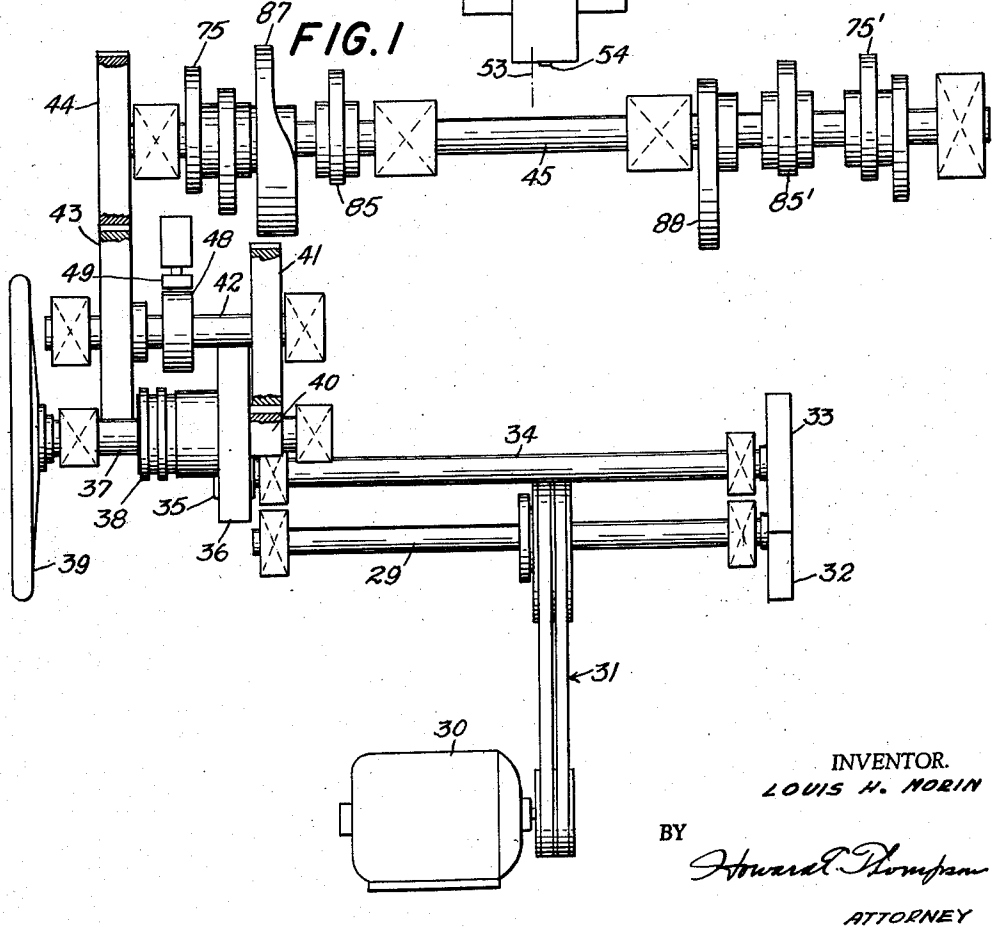


FIG. 1



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MACHINE FOR CASTING RIMS ON SPOOLS

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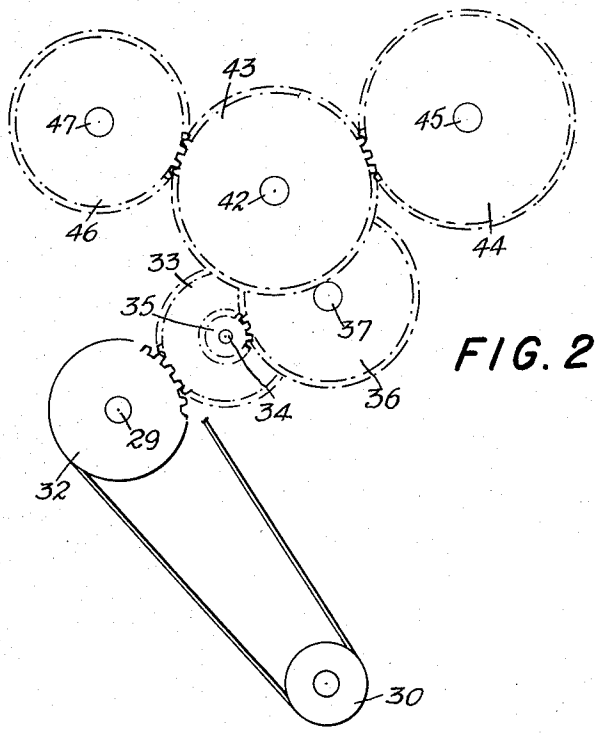


FIG. 2

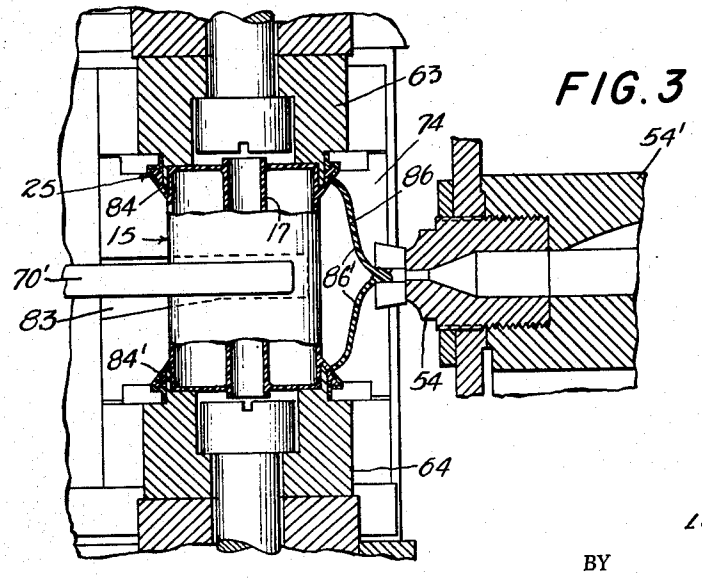


FIG. 3

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MACHINE FOR CASTING RIMS ON SPOOLS

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FIG. 4

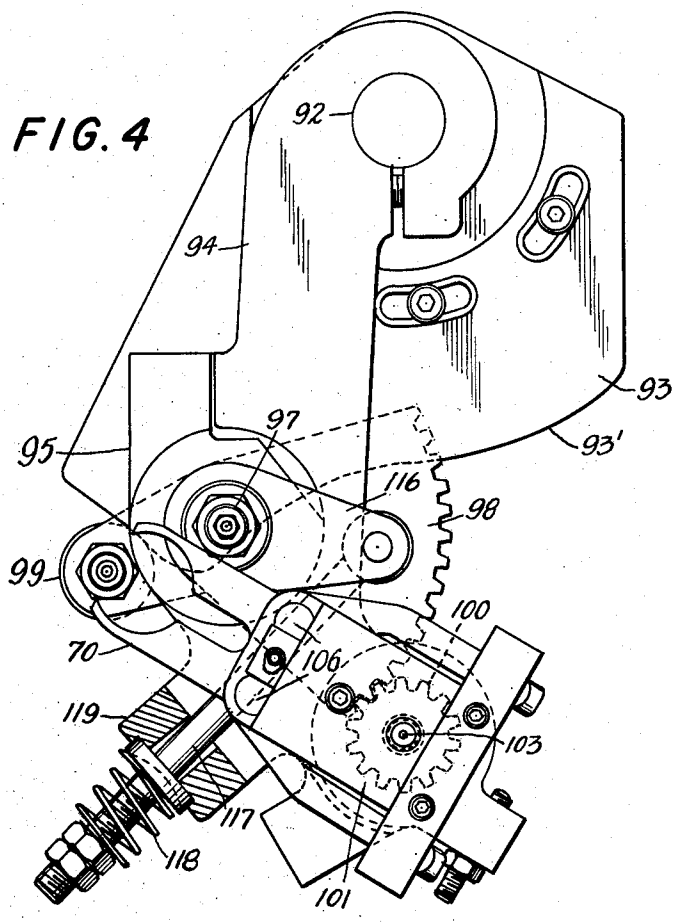
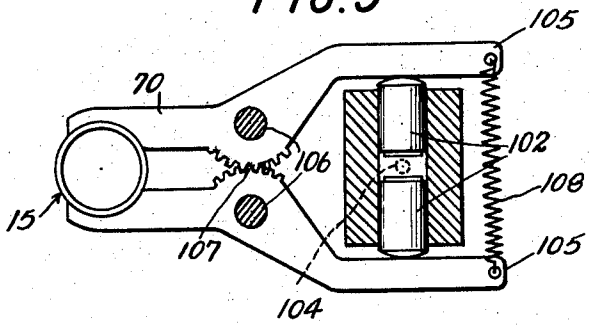


FIG. 5



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MACHINE FOR CASTING RIMS ON SPOOLS

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FIG. 11

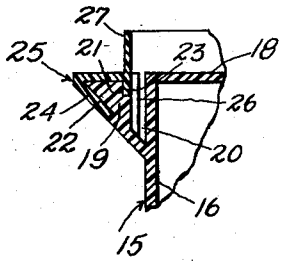


FIG. 6

FIG. 7

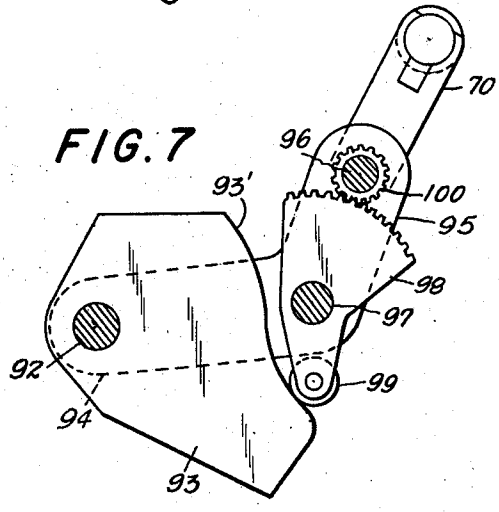
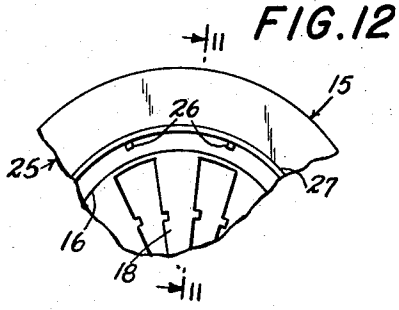


FIG. 12



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MACHINE FOR CASTING RIMS ON SPOOLS

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FIG. 10

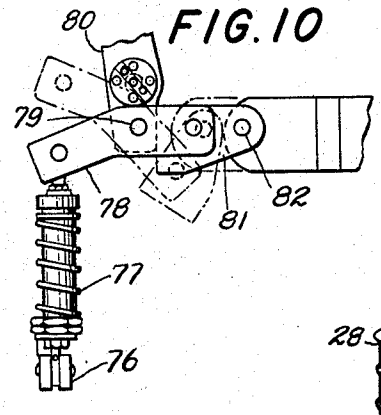
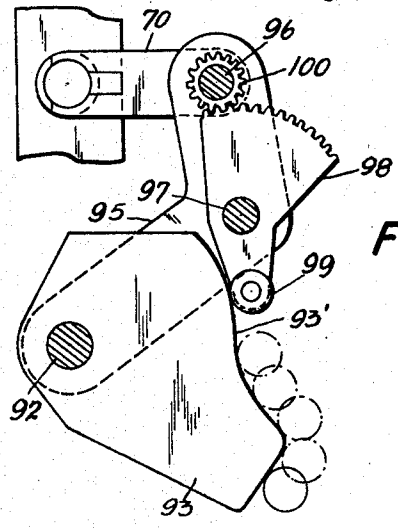


FIG. 8

FIG. 9



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United States Patent Office 2,914,800
Patented Dec. 1, 1959

2,914,800

MACHINE FOR CASTING RIMS ON SPOOLS

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Application August 15, 1957, Serial No. 678,307

9 Claims. (Cl. 18—5)

This invention relates to machines for use in casting or molding secondary parts on a preformed part or body such, for example, as the casting of rims on the ends of a cast or molded spool body. More particularly, the invention deals with a machine of the character described, wherein a spool body is delivered to a predetermined station in the machine and there picked up by a pickup and die delivery unit, which swings the spool body into position between a pair of dies; whereupon, the dies and associated members move into engagement with the spool body and, then, another trimming pickup and carry unit engages the rimmed product and swings it from open dies to a trimming station, preparatory to discharge of the trimmed product from the machine.

Still more particularly, the invention deals with a machine of the character described, wherein the first pickup and die delivery unit picks up and delivers a next successive spool body to the die, while the first spool body is trimmed at the trimming station and discharged from the machine.

The novel features of the invention will be best understood from the following description, when taken together with the accompanying drawing, in which certain embodiments of the invention are disclosed and, in which, the separate parts are designated by suitable reference characters in each of the views and, in which:

Fig. 1 is a diagrammatic showing of the main shaftings of the machine, omitting all illustration of the frame parts and showing most of the gears in plain elevation and parts in section.

Fig. 1*a* is a view of part of the shafting not illustrated in Fig. 1 and diagrammatically illustrating the movement of the injection mechanism with respect to the die parting line.

Fig. 2 is a diagrammatic end view illustrating the arrangement of the shaftings shown, in part, in Figs. 1 and 1*a*.

Fig. 3 is an enlarged sectional detail view through the parting line of the dies, showing the cores and injection cylinder in section and illustrating the formation of the rim ends upon end portions of a preformed or cast spool body and indicating part of the grippers engaging the spool body, preparatory to delivery of the finished molded product to the trimming station.

Fig. 4 is a detail plan and sectional view of the spool pickup and delivery unit for delivering the spool into position between the dies of the machine, the unit being shown in position preparatory to picking up a spool from a spool delivery station.

Fig. 5 is a diagrammatic sectional plan of part of the construction shown in Fig. 4, illustrating the mechanism for actuating the grippers of the unit shown in Fig. 4.

Fig. 6 is a rough schematic view diagrammatically showing the two pickup and delivery units of the machine and the means for actuating the same, the units being illustrated in an intermediate position, preparatory to delivering the spools or workpieces to their respective die and trimming tool stations.

Fig. 7 is a diagrammatic sectional plan of part of the mechanism illustrated in Fig. 4, showing the position of the parts of the unit consistent with the diagrammatic showing of Fig. 6.

Fig. 8 is a view, similar to Fig. 6, diagrammatically illustrating the units positioning the spools or workpieces adjacent the dies and trimming station.

Fig. 9 is a view, similar to Fig. 7, showing the position of the unit delivering the spool or workpiece in position between the dies.

Fig. 10 is a diagrammatic detail view of mechanism at one side of the machine for applying servo-power pressure to the die in moving the same into closed position.

Fig. 11 is an enlarged detail view of a corner portion of a spool body, showing the rim attached thereto, the section being substantially on the line 11—11 of Fig. 12; and

Fig. 12 is an end view of the structure as seen in Fig. 11.

In order to simplify the presentation and consideration of the machine forming the subject matter of this application, the showing in the accompanying drawings, with the exception of Figs. 3, 4, 11 and 12, are diagrammatic and roughly schematic, particularly with respect to the showing in Figs. 6 and 8 of the drawing.

My machine deals with the casting or molding of a secondary part, or parts, upon a preformed article or workpiece which, in some instances, can be a cast or molded part such, for example, as the spool body **15** shown in elevation and in section in Fig. 3 of the drawing and partially in detail in Figs. 11 and 12.

The spool comprises a tubular body, or barrel, **16** joining a central tube **17** in end rib wall members **18**, the body **16** being formed, at its ends, with outwardly projecting rim supporting portions **19**, one of which is shown in enlarged sectional detail in Fig. 11 of the drawing, the portions **19** being spaced from the ends of the body **16**, as seen at **20**. The portions **19** have, at their outer ends, recesses **21** and, on the bevelled wall portions thereof, other recesses **22** which receive portions **23** and **24** of the resulting cast-on rims **25**, as clearly shown in Fig. 11.

Formed integrally with the rims **25** are circumferentially spaced rib-like members **26** which extend into the recesses **20** and form stops for labels disposed upon the outer surfaces of the walls **18**. The rims **25** also include outwardly projecting annular flange portions **27** which, in attachment of labels, are formed inwardly upon the periphery of the labels to support the same in engagement with the walls **18**.

My present machine deals with the delivery of spool bodies, such as at **15** or other types of workpieces from a hopper fed station, diagrammatically shown at **28** in Figs. 6 and 8 of the drawing.

Turning now to the illustrations in Figs. 1, 1*a* and 2, **29** represents a drive shaft driven from a motor **30** by a dual belt and pulley drive, shown collectively at **31** in Fig. 1 of the drawing. At one end of the shaft **29** is a gear **32** arranged in a suitable housing. Also in this housing and meshing with the gear **32** is a gear **33** on an intermediate shaft **34** having, at its left end, a pinion, diagrammatically shown at **35**.

The pinion **35** meshes with a gear **36** upon a clutch shaft **37**, part of the clutch being diagrammatically seen at **38** in Fig. 1 of the drawing, the shaft **37** having, at its outer end, a handwheel **39**, note Fig. 1, for manual rotation of the shafts of the machine.

On the shaft **37** to the right of the gear **36** is a pinion **40**, note Fig. 1, which meshes with a gear **41** on an intermediate shaft **42**, note Fig. 1. On the shaft **42** is a gear **43** which meshes with a gear **44** on a main cam shaft **45**. A gear **46**, on a supplemental cam shaft **47**,

meshes with the gear 41, the latter gear 46 and shaft being illustrated in Fig. 1a of the drawing.

On the shaft 42 is a brake drum 48, with which an automatically actuated brake mechanism 49 operates in stopping the drive of the machine as and when any of the automatically actuating mechanism of the machine fail to properly function. At this time, it will be pointed out that various types of controls and switches are provided for the various mechanisms of the machine and these control or are in operative engagement with the brake mechanism for stopping the machine, but no effort will be made to describe in detail these various controls, although a diagrammatic showing of some of the controls is illustrated in Fig. 1a and later described.

Turning now to Fig. 1a of the drawing, I have illustrated, at 50, the casing or housing for the injection cylinder for the pressure discharge of plastic material into the dies, as later described, the charge being actuated through a hydraulic cylinder, diagrammatically seen at 51, and operated by a cam 52 on the shaft 47.

At 50' is illustrated the pivot axis of the casing 50 and at 53 is indicated, by dot-dash lines, the center line or parting line of the dies. Normally, the casing is positioned to the right of the center line 53 with the nozzle 54 offset with respect to the die center. However, in the injection charge, the nozzle 54 is brought into alinement with the center line 53, in other words, to a position shown in Fig. 3 of the drawing, by operation of a cam 55 on the shaft 47, the cam actuating a lever 56, pivoted as seen at 57, with a connecting rod 58 joining the free end of the lever 56 with the casing 50, as is diagrammatically shown in Fig. 1a of the drawing.

While considering Fig. 1a of the drawing, two other cams 59 and 60 are on the shaft 47, the cam 59 actuating a hydraulic valve or mechanism 61 for applying the pressure squeeze action in firmly closing the dies through mechanism shown, in part, in Fig. 10 of the drawing and later described. The cam 60 actuates a hydraulic valve or control 62 for actuating the upper and lower cores 63 and 64, shown, in part, in section in Fig. 3 of the drawing.

At the righthand end of the shaft 47 is a bevelled gear 65, driving another bevelled gear 66 on a multiple air valve actuating cam shaft 67, having a plurality of cams 68 thereon, operating a plurality of valves 69. These several valves are part of the controls for die and core safety operation, as well as for other mechanisms of the machine and, particularly, in actuating the spool or workpiece grippers 70 of the transfer and delivery unit 71 for picking up the spools from the station 28 for delivery to the die, as well as similar grippers 70' of a unit 72 for picking up the finished cast or molded product at the dies and transferring the same to a trimming station, diagrammatically seen at 73 in Figs. 6 and 8 of the drawing.

In Fig. 3 of the drawing, I have shown, at 74, a face view of one of the dies and the companion die 74' is shown diagrammatically in Figs. 6 and 8 of the drawing. These dies are actuated through cams 75, 75' on the cam shaft 45, note Fig. 1, the cams actuating levers, one of which is indicated, in part, at 76 in Fig. 10 of the drawing for actuating the dies through yieldable means, as at 77, connected to a lever 78, pivoted, as seen at 79, to the lower end of a long lever 80, the latter being actuated through the hydraulic valve 61 in final squeeze pressure to the die after the die has been moved into closed position by operation of the lever 78 upon a link 81 pivoted to the end portion of the die, as seen at 82. The brief description of the diagrammatic showing in Fig. 10 is applied only to the lefthand end portion, or for operating the left die of the machine. The position of the parts shown in full lines in Fig. 10 would be the closed position of the die; whereas, in the open position of the die, the parts assume the position indicated in dot-dash lines.

Considering Fig. 3 of the drawing, it will appear that the die has a cavity to receive the spool body 15 delivered to it and the dies have cutout portions, as at 83, to receive the grippers 70, 70', so as to support the spool in position to seat properly in the cavity of the dies, as well as to permit the grippers 70' to enter the dies to grab the finished cast product, preparatory to transferring the product from the dies, when opened, to the trimming station 73. Thus, one of the grippers 70' is illustrated in Fig. 3 positioned freely within the cutout or opening 83.

Also considering Fig. 3, it will appear that the cores 63, 64 have projecting portions 84, 84' which extend into the recesses 20 of the spool body and these projections are fashioned so as to form the spaced ribs 26 on the resulting cast-on rims 25. It will also appear that inner ends of the cores 63 abut the end walls 18 of the spool body and the cavity of the dies is fashioned to form the contour of the cast-on rims, as is clearly illustrated in the face view of the die 74 shown in Fig. 3 of the drawing. It might be said, at this time, that, after the casting operation, as noted in Fig. 3, the cores 63, 64 are first moved out of engagement with the formed product, after which the dies are opened and the gripper unit 72 is actuated to move the cast product from position between the dies to the trimming station 73, whereupon, the trimming tools 73', 73'', at said station, are moved toward each other by action of cams 85, 85' on the shaft 45, note Fig. 1. The tools 73', 73'' trim the gate 86 which extends to each of the rims, note Fig. 3, from the rims; whereupon, the grippers 70' are actuated to free the cast product for delivery from the machine, these grippers being actuated similarly to the grippers 70, actuation of which will be later described, but both of these actuations are through two of the air valves 69, diagrammatically shown in Fig. 1a.

The rough schematic showings of Figs. 6 and 8 are, by no means, to be considered accurate, but simply to portray schematically an easy to understand picture of actuation of the units 71 and 72 of the machine. In Figs. 6 and 8, 87 shows the cam for actuating the unit 71 and 88 shows the cam for actuating the unit 72, both cams being mounted on the cam shaft 45.

The cam 87 operates a lever mechanism 89 for actuating a rack 90 which, in turn, operates a pinion 91 on a shaft 92, which passes through a fixedly supported cam segment 93. The rack 90 is spring tensioned to maintain the lever 89 in constant engagement with the cam 87. Coupled with the upper end of the shaft 92 is one end 94 of a lever 95, the other end of which supports a shaft 96.

Supported centrally of the lever 95 is a shaft 97, to which is fixed a gear segment 98, having a roller 99 operating upon the cam surface 93' of the cam 93 in controlling rotation of the grippers 70 by the segment 98 driving a pinion 100 fixed to the shaft 96.

The shaft 96 supports, at its upper end, a casing 101, note Fig. 4, in which is supported a pair of air actuated plungers 102, air being directed to inner adjacent surfaces of the plungers from an air admission nozzle 103 at the upper portion of the casing, note Fig. 4, the passage from said nozzle being indicated in dotted lines at 104 in Fig. 5. In other words, when air, under pressure, is injected into the casing, the plungers 102 are moved outwardly and spread the ends 105 of the grippers 70 to swing about pivots 106 on the casing 101.

Adjacent surfaces of the grippers have gear meshing surfaces 107 for simultaneous operation thereof to move the grippers in engagement with the workpiece or spool body 15, as diagrammatically seen in Fig. 5 of the drawing. A spring 108 joins the ends 105 of the grippers and serves to move the grippers 70 into open position in engaging and disengaging the workpiece 15. In other words, as the gripper unit approaches the delivery station 28, the gripper jaws 70 will be opened and then closed by actuation of the plungers 102 in transferring

the spool or workpiece **15** from the station **28** to the position centrally between the cavity of the dies. The position of the parts, as shown in Fig. 4 of the drawing, is the workpiece gripping position at the station **28**; whereas, Fig. 6 schematically shows an intermediate position of the unit **71** and Fig. 8 illustrates a position, preparatory for engagement between the dies when moved into closed position.

In the aforesaid operation, it will be apparent that the rack **90** operates to swing the lever **94** on the shaft **92** to move the roller **99** over the surface **93'** of the cam **93**, in which operation, the cam surface **93'** controls swinging movement of the segment **98**, which, in turn, controls the independent swinging movement of the gripper casing **101** and the grippers **70** operating therewith.

As the gripper mechanism **70'** of the unit **72**, insofar as the casing structure **101** is concerned, is substantially the same as the structure shown in conjunction with the unit **71**, no further detail description or showing of the operation of the gripper **70'** will be given. This gripper or the unit **71** is supported at the free end portion of an offset arm **109**, note Figs. 6 and 8, supported on a shaft **110** having, at its right end portion, a pinion **111** actuated by a rack **112**, the inner end **113** of which has an elongated aperture **114** movable over the shaft **45**, suitable spring means being employed, which is not shown, to all the time maintain a roller **115**, supported on the rack, in engagement with the cam **88**.

The cam **88** operates the unit **72** in swinging the gripper **70'** from a raised position between the dies, as noted, in part, in Fig. 3, then to an intermediate position, as diagrammatically illustrated in Fig. 6, then into position of Fig. 8 between the trimming tools **73'**, **73''** and, after trimming the workpiece to remove the gate **86**, the arm **109** swings downwardly a further degree to free the cast product from the trimming station; whereupon, the air is released, allowing the grippers to move into open position, thus freeing the cast workpiece or spool for discharge from the machine.

Considering the various illustrations in Figs. 6 to 9, inclusive, taken with the showing in Fig. 4, where the various parts are in the position to grasp a workpiece at the delivery station **28**, it will appear that, while a precast product is at the trimming station **73**, another spool body has been picked up and is in the course of being delivered to the position between the dies; whereupon, the dies and cores close in upon and engage the spool body, assuming a position similar to that illustrated in Fig. 3; whereupon, the unit **71** is actuated to again swing into the position shown in Fig. 4 and, during this operation, the arm **109** repeatedly swings the unit **72** upwardly with the grippers **70'** open to engage and, then, grip the workpiece. During this latter operation, the injection shot has taken place to cast or form the rims **25** on the ends of the spool body **15**, as shown in Fig. 3, so that, promptly after this forming operation, the cores and dies are separated, so that the arm **109** can be swung downwardly to bring the product to the trimming station and, as soon as the unit **72** clears the path of movement of the unit **71**, this unit delivers the next successive spool body to the dies and these operations continue in the successive intermittent formation of the rimmed spool products.

As previously stated, the nozzle **54** of the injection cylinder **54'**, note Fig. 3, moves back and forth on the axis diagrammatically shown by the dot-dash line **50'** in Fig. 1*a* of the drawing. This operation serves to maintain the nozzle **54** in engagement with the righthand die as it moves into open position while, at the same time, bringing the nozzle **54** into the proper registering injection position shown in Fig. 3 for pressure injection of plastic material into the die cavities forming the rims **25** at the ends of the spool body **15**.

Considering Fig. 4 of the drawing, it will appear that fixed to the axis **97** of the segment **98** is a lever **116**, to the free end of which is pivoted a rod **117**, on which is adjustably mounted a spring **118**, which bears against an apertured extension **119** on the lever **95**. The spring **118** serves to maintain the roller **99** in constant engagement with the surface **93'** of the cam **93**. In this connection, it will be apparent that the showing of Fig. 4 is a more complete showing; whereas, all of these details, namely the parts **16**, **17**, **18** and **19** are omitted from the rough schematic showings in Figs. 6 and 8 of the drawing.

It will be apparent that the showing in Fig. 1*a* will illustrate the parts with the nozzle **54** partially moved to the die centers at **53**, in other words, the dies are partially closing around a workpiece or spool body, then positioned between the dies.

By changing the ratio of drive between the gears **32** and **33**, the speed of operation of the machine can be changed to increase or decrease the production of the resulting end product.

While I have shown, in the accompanying drawings, the formation of two similar cast or molded parts on a body or workpiece supported within the dies, it will be understood that the same operation can be performed for forming a single cast or molded portion. In fact, with the present structure, by plugging one side of the gate passage **86'**, note Fig. 3, a single rim would be cast on one end only of the body **15**. Then by removing this plug, and again passing the spool body with the single rim cast thereon through the machine, a second rim can be formed on the body and this would be desirable, particularly when a rim of one color plastic is formed at one end of the body **15** and of a contrasting color plastic at the opposed end thereof.

In producing spools of the kind under consideration, the body **15**, as delivered to the dies, is usually molded from an inexpensive plastic; whereas, the rims are formed by a more durable or harder plastic, thus economizing on the production of the resulting end product in minimizing the use of the more expensive materials. This would be desirable in the production of end products of various types and kinds, particularly where the better grade of plastics are used to care for wear factor in the resulting end product.

For purposes of description, the unit **71** can be regarded as a dual swinging pickup and delivery to die or forming station unit; whereas, the unit **72** can be regarded as a pickup and delivery to trimming station and discharge unit.

As previously pointed out, it is proposed to use a less expensive plastic in the initial formation of the body **15** and casting the more expensive material in the rims **25**. In addition to this, it will be apparent that, in winding the thread upon the body **15** and part of the rims **25**, the rims only will be exposed.

Having fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A machine for forming a cast portion on a preformed body, means for delivering bodies to a station in predetermined position in the machine, a rotatable and swinging gripper unit, means for actuating said unit for picking up bodies one at a time at said station and delivering the same in position between a pair of forming dies, when in open position, said dies, when closed upon the body positioned therebetween by said unit, forming a cavity around the body of the contour of the cast portion to be formed on said body, means to then release the grippers of said unit from said body and remove the same from position between the dies, another swinging pickup unit having grippers movable into the dies to engage said body positioned in the dies, means to pressure inject material into the die cavity to form the portion cast on said body, means for actuating the second named gripper unit upon movement of the dies into open position to deliver the product, thus formed, to a trimming station, means for actuating trimming tools at said trimming station to trim the cast-on portion, and means to

then release the grippers of the second named unit from said body to discharge the body with the trimmed cast portion thereon from the machine.

2. A structure as defined in claim 1, wherein said second named means comprises a swinging lever, and a pair of air actuated grippers rotatably mounted in one end portion of said lever.

3. A structure as defined in claim 2, wherein the means for swinging the lever comprises a cam and lever actuated rack bar engaging a pinion on the axis of rotation of said lever.

4. A structure as defined in claim 3, wherein the means for rotating the grippers in the lever comprises a cam actuated gear segment operatively engaging a pinion on the axis of rotation of said grippers.

5. A structure as defined in claim 4, wherein the second named unit comprises a lever supporting the grippers to swing between the dies and tools of the trimming station and beyond the trimming station in discharge of the finished product from the machine, and means comprising a cam actuated rack operatively engaging a pinion on the axis of said last named lever for actuating the second named unit.

6. A structure as defined in claim 5, wherein the timing of operation of the two units is such that the first

named unit has picked up and is delivering a body to the dies, while a body, with a cast-on portion, is being trimmed at the trimming station.

7. A structure as defined in claim 1, wherein the body is in the form of a spool having rim receiving end portions, and the cast portion comprising rims formed upon the ends of said body, the rims being joined by a gate portion later removed by said trimming tools.

8. A structure as defined in claim 7, wherein a pair of cores are movable with respect to said dies and operatively engage said ends of the spool body positioned in the dies, and said cores partially forming the rims cast on the spool ends.

9. A structure as defined in claim 8, wherein independent hydraulically actuated means is employed for applying squeeze pressure to the dies, for actuating the cores and for pressure discharge of the material into the die cavities and around said cores in forming the rim ends on said spool body.

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