

May 12, 1953

R. J. NEBEL
SEALING MEANS

2,638,147

Filed Feb. 2, 1950

3 Sheets-Sheet 1

Fig 1

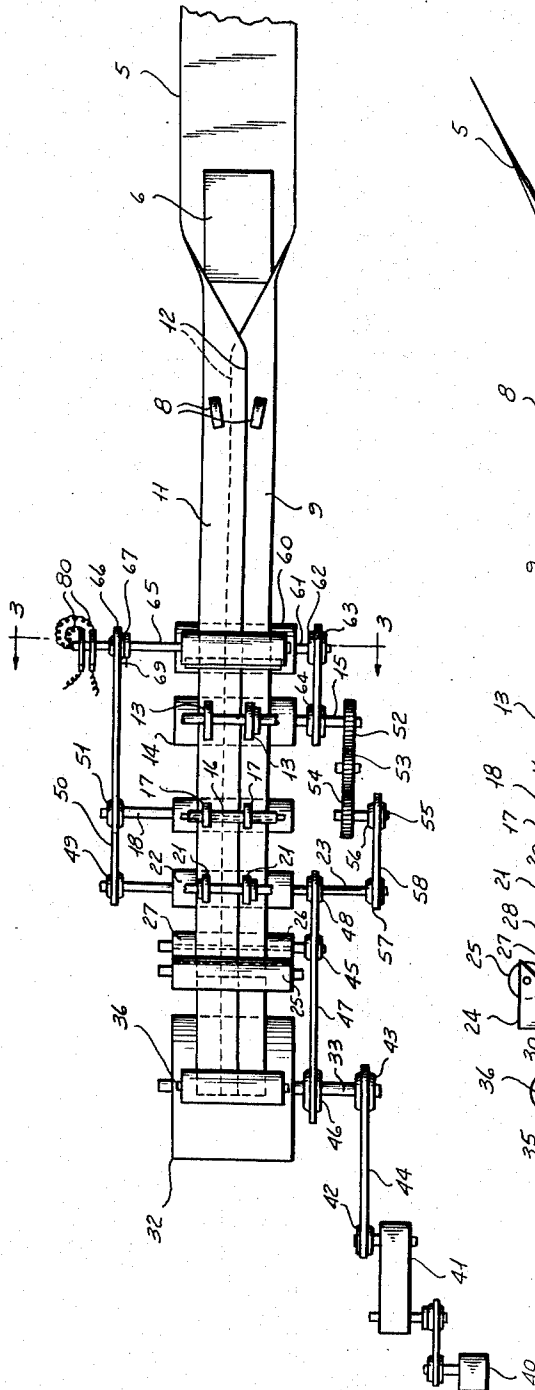
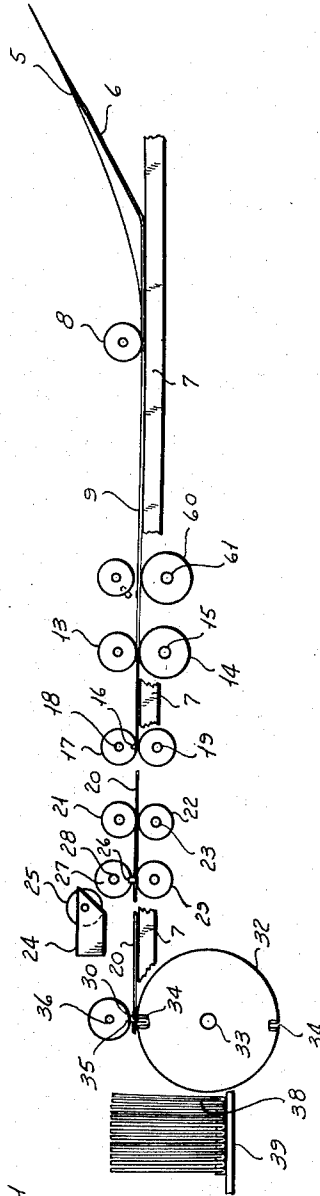


Fig 2



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3 Sheets-Sheet 3

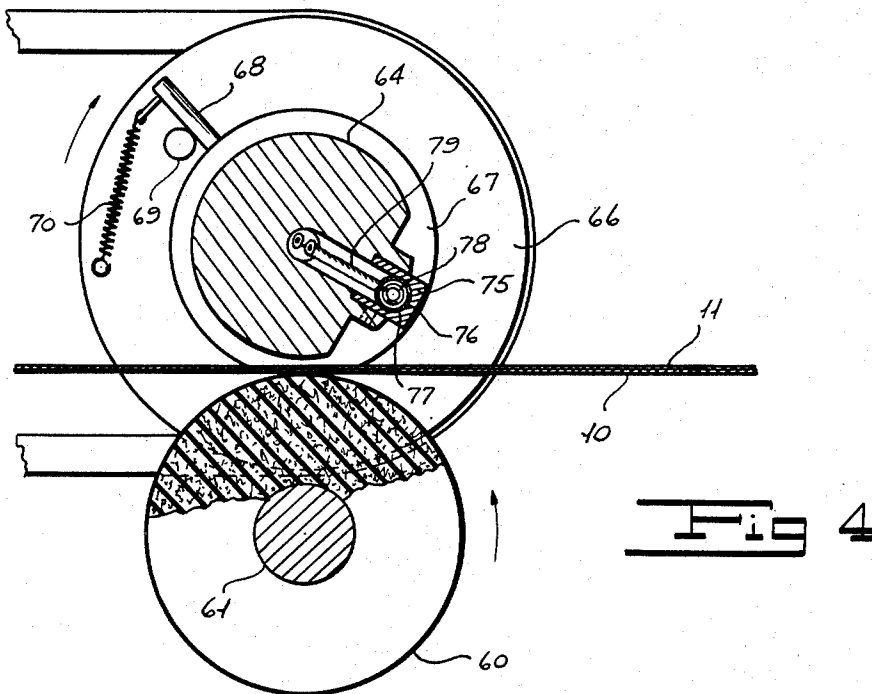


Fig 4

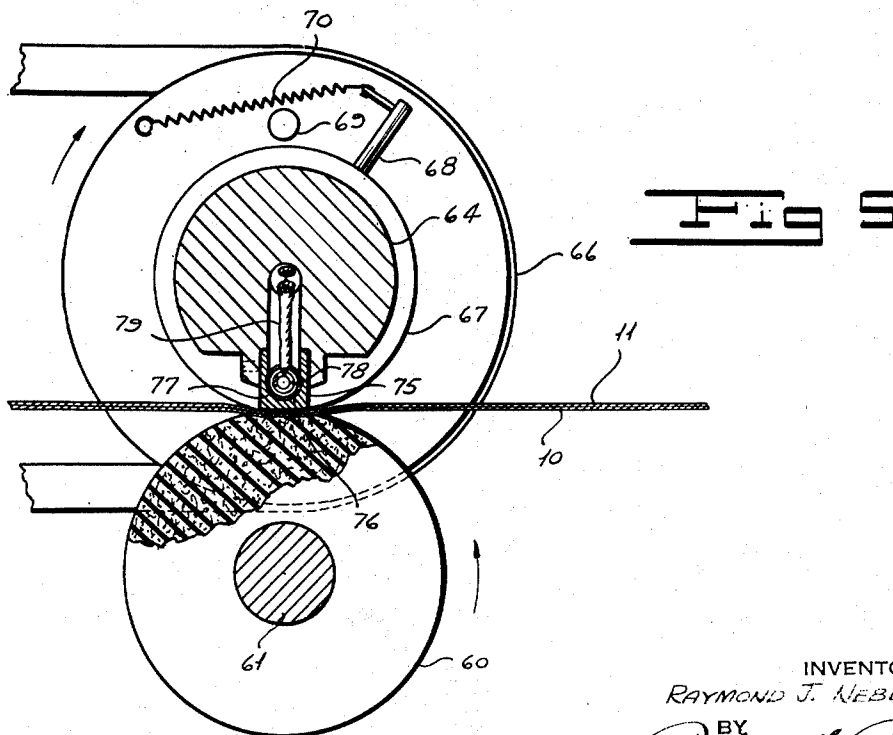


Fig 5

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2,638,147

SEALING MEANS

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Application February 2, 1950, Serial No. 141,952

4 Claims. (Cl. 154—42)

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My invention relates to the fabrication of bags and more particularly to bags constructed of cellulose or other similar diaphanous material.

Machines for fabricating bags and the like usually operate to fold a relatively narrow and lengthwise traveling web or sheet of paper in a manner to provide a substantially flat casing formed on one of its opposed side walls with overlapped side portions or margins secured together by adhesive to define a longitudinal adhesive seam, and which casing is then transversely severed, as it travels or advances through the machine, into sections of predetermined and uniform lengths with the leading end portion of each section being folded over the immediate adjacent portion and secured thereto, by adhesive previously applied to a transversely extending zone of the adjacent portion, to define a transverse adhesive seam which closes one end of the section and thus forms the bottom of a bag. Machines of this type are usually each equipped with a feeding mechanism for effecting travel of the casing at a speed to accord with the length of the bags desired and which mechanism is capable of modification to vary the speed to obtain bags of other desired lengths, the mechanism generally including a set of change gears replaceable with others of different sizes and ratio to change the speed and bag length. In instances where the bags are constructed of cellulose or other fusible material, for example "Pliofilm," (to provide an attractive package, to render the contents visible, receive finely comminuted material and/or protect the contents from atmospheric moisture entering the bags), the machine is equipped with a heat sealing unit or means effective for sealing or fusing the walls of the casing together to provide transverse fused or heat seals at the bottoms of the bags, the construction of the longitudinal adhesive seam of the casing usually being sufficient without the aid of a longitudinal fused seal for reasons well-known in the art. Inasmuch as the heat sealing unit or means is operated in a definite synchronized relationship with the feeding mechanism to form the heat seals at proper locations on the casing during travel of the latter, it follows that an alteration or adjustment of the unit becomes necessary to vary its speed when the speed of the feeding mechanism is varied, to form bags of a new or different length, in order to properly relocate the heat seals on the casing and at the bottom of bags and thus re-establish the aforementioned relationship. Available sealing units of the aforementioned character have been found unsatisfactory in certain

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respects and contain many undesirable features and disadvantages, for instance, a precisional as well as manual alteration or adjustment of the unit which is not only highly vexatious, but entails considerable time and labor on the part of the operator, and, in instances where immediate bag length changes are necessary, contributes to an appreciable or large loss in production.

My invention overcomes the foregoing described disadvantages and eliminates numerous undesirable features, it being one of the objects thereof to provide a heat sealing unit or means for fusing walls of plastic bags or the like together to form transverse fused seals at desired locations on the bags and which unit functions in connection with various bag lengths without the aforementioned adjustment or alteration, thereby effecting a savings in time and labor and often an increase in production.

Another object of my invention is to provide a heat sealing unit or means of the foregoing described character which operates, in response to the speed of the casing, to effect heat sealing or fusing of the casing at predetermined locations.

An important object of my invention is to provide sealing means of the foregoing described character which is equipped with a sealing element or means normally operable at a speed proportional to the linear speed of the casing and which operates during engagement with the casing at a speed commensurate with the linear speed of the casing.

Another important object of my invention is to provide a sealing unit of the foregoing described character which is simple in construction, durable in use, efficient in operation, economical in manufacture and capable of being incorporated within bag fabricating machines already in use without substantial modification thereof.

A further important object of my invention is to provide a sealing unit of the foregoing described character which is capable of being operated in synchronism with one or more like or similar units to insure effective fusing or sealing of the casing walls.

With the above and other objects in view, as will hereinafter appear, the invention consists in the combination and arrangement of parts hereinafter set forth and illustrated in the accompanying drawings from which the several features of the invention and the advantages attained thereby will be readily understood by those skilled in the art.

Referring to the drawings wherein like refer-

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ence characters designate like parts throughout the several views:

Figures 1 and 2 are diagrammatic plan and side views, respectively, of a bag fabricating machine having my invention incorporated therein, various parts or components being sectionalized and others omitted for clarification.

Figure 3 is an elevation, partly in section, of my novel heat sealing means or fusing unit, certain of the parts being broken away and removed.

Figure 4 is a sectional view taken on the line 4-4 of Figure 3.

Figure 5 is a view similar to Figure 4 illustrating the sealing element in fusing engagement with the casing.

Figure 6 is a diagrammatic side elevation of the machine, on an enlarged scale, illustrating the various progressive steps in forming bags from the casing.

In practicing my invention, as illustrated in the drawings, a web or sheet 5 of cellulose material, for instance, "Pliofilm," of a desired width is drawn, from a supply source, under and around a forming plate or device 6, of a conventional design, mounted on the bed or table 7 of a bag forming machine at the web-receiving end thereof. A pair of tucker rolls 8 are disposed above the plate 6 and coact with the latter to effect longitudinal folding of the web 5 in a manner to form a relatively flat tube or casing 9 having lower and upper walls 10 and 11, respectively, and with its upper wall 11 being provided with overlapping side portions or margins 12 disposed centrally of the side edges of the casing and extending longitudinally throughout the length thereof, it being understood that the margins are sealed together and thereby form a longitudinal seam. Prejacent the plate 6, a pair of upper draw rolls 13 are mounted above and transversely of the table while a single draw roll 14 is disposed subjacent the rolls 13 and coacts with the latter to draw the casing 9 therebetween, from the plate 6, and feed the casing towards the delivery end of the machine, the roll 14 being provided with a driven shaft 15. As the casing is fed from the draw rolls 13 and 14, it passes through severing mechanism comprising a rotatable knife 16 fixed to a pair of discs 17 mounted on a shaft 18 disposed transversely above the casing and a roll 19 mounted subjacent the discs 17 and provided with a shaft. The roll 19 cooperates with the knife 16 to effect transverse severing of the casing 9 into sections 20 as the casing travels through the severing mechanism and towards the delivery end of the machine. A pair of upper pick-up rolls 21 are mounted above and transversely of the table while a single pick-up roll 22 is disposed subjacent the rolls 21 and cooperate with the latter to receive the sections 20 therebetween and feed the latter towards an adhesive applying device, the lower pick-up roll 22 being provided with a power transmitting shaft 23. The adhesive applying device comprises an adhesive reservoir 24 containing a suitable adhesive and is equipped with a distributing roller 25 engaged by an applicator 26 carried by a cylinder 27 mounted on a shaft 28 disposed above and transversely of the table and which applicator cooperates with a roll 29 over which the sections 20 are fed to apply adhesive A to a relatively narrow transverse zone on a portion 30 of the upper wall 11 of each of the casings immediately adjacent the leading end portion 31 of the section. As the adhesive is applied to the portion

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30, the sections are advanced towards and pass through creasing mechanism comprising a creaser drum 32 mounted on a drive shaft 33 and provided with a plurality of slots 34 in which is received a creasing blade 35. The blade 35 is mounted on a cylinder fixed to a shaft 36 superjacent the drum and which blades serve to tuck the leading end portions 31 of the sections into the slots 34 and thus effect folding of the end portions 31 over the immediate adjacent portions 30 to secure the portions 30 and 31 together by the adhesive to form the closed ends or bottoms of the bags 38. When the portions 30 and 31 are thus secured, the bags 38 are discharged in upright positions onto a deck 39, one after the other, from whence they are removed in any suitable manner. In order to power the machine, an electric motor 40 is provided which is operatively connected to a variable speed unit 41, the latter being equipped with a drive shaft provided with a pulley 42 connected to a pulley 43 mounted on the shaft 33 by means of a belt 44, the shaft 36 of the tucker blade cylinder being driven by the shaft 33 by suitable gearing or the like. The cylinder 27 of the applicator 26 is driven by means of a pulley 45 fixed on the shaft 28 and connected to a pulley 46 on the shaft 33 by means of a belt 47 and which belt 47 is also trained about a pulley 48 mounted on the shaft 23 of the draw roll 22 for effecting rotation of the pick-up rolls. The opposite end of the shaft 23 has fixed thereto a pulley 49 which drives the shaft 18 by a belt 50 leading to a pulley 51 on the shaft 18 for effecting rotation of the blade 16 and thus operating the severing mechanism. For driving the draw rolls and regulating the speed thereof, I provide a change gear assembly comprising a gear 52 meshing with an intermediate gear 53 which in turn meshes with a gear 54 mounted on a jack shaft 55 having fixed thereto a pulley 56 driven by and connected to a pulley 57, fixed to the shaft 23, by means of a belt 58, the shaft 23 thus serving to drive the shaft 15. By replacing the change gears with others of various sizes, the linear speed of the casing 10 may be regulated to form bags of different lengths or sizes. Inasmuch as the machine disclosed in the drawings and heretofore described is of an ordinary construction and forms no part of the present invention per se, a more detailed disclosure thereof is not deemed necessary, it being understood that the machine constitutes but one type in which my invention may be incorporated therein as a combinative component thereof, and that my invention may be employed in conjunction with other similar types of machines.

In order to effect the aforementioned and objective heat sealing or fusing of the bag walls together and over a desired transverse zone, I provide a heat sealing or fusing unit which is disposed on the machine between the forming plate 6 and the draw rolls and which unit comprises a roller 60 constructed of a material having a relatively soft or yieldable surface, for instance, rubber, and provided with a driven shaft 61 on which is mounted a pulley 62 driven by a belt 63 trained about a similar pulley 64 fixed to the shaft 15. The roller 60 is rotated at a speed coincident with that of the roll 14 and commensurate with the linear speed of the casing 10 passing thereover. The ends of the shaft 61 are rotatably journaled in suitable bearings attached to the machine and which bearings serve to support the roller 60 below and in tangential relation with the casing 10.

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A cylinder 64 is disposed above the roller and is provided with trunnions rotatably mounted in suitable bearings carried by the machine and with one of the trunnions being elongated and constituting a hollow shaft 65 on which is loosely mounted a pulley 66 driven by the belt 50. Adjacent the pulley 66, the shaft 65 has fixed there-to a collar 67 provided with a radially extending clutch pin 68 normally engaged by a similar pin 69 extending axially from the adjacent radial face of the pulley 66 and which pin 69, by engagement with the pin 68, serves to effect rotation of the cylinder, the pulleys 66 and 68 being of a diameter to insure rotation of the cylinder at a speed considerably slower than that of the roller 60 and disproportionately with respect to the linear speed of the casing 10. A coil spring 70 has its ends connected to the pulley 66 and pin 68, respectively, and normally functions to maintain the pin 68 in driving engagement with the pin 69 whereby the cylinder 64 is rotated in unison with the pulley 66.

A fusing or heat sealing element comprising an elongated block 75 is inset within the cylinder 64 and extends throughout the length of said cylinder with a portion extending radially outwardly beyond the periphery of the cylinder 64 for engaging the casing 10 as hereinafter made apparent. The block is formed with a longitudinally extending bore 76 provided with a mica lining 77 and in which is disposed an electric heating coil 78 having its terminals connected to the inner ends of a pair of insulated electric wires 79 leading into the cylinder and outwardly therefrom through the hollow shaft 65 with the outer ends of the wires being connected to a pair of commutator discs 80, respectively, mounted on the shaft 65 and insulated from the shaft 65 and relative to each other. A pair of brushes 81 have wiping engagement with the discs 80 and are connected by wires 82, respectively, to an electrical source of energy whereby the heating coil is energized for heating the block.

In operation—assuming the casing 10 is being drawn from the forming plate 6 by the draw rolls 13 and 14 between the roller 6 and cylinder 64—the block 75 is rotated about the axis of the cylinder 64 and engages the casing 10 and thereby compresses the casing and the face of the roll 60 as illustrated in Figure 5. As a result of the block thus engaging and compressing the casing and roll 60, a driving connection is established between the roll 60 and the block whereupon the block is rotated at a speed coincident with the roller 60 and commensurate with the linear speed of the casing, it being understood that as the rotation of the block is thus accelerated, the pin 68 moves away from the pin 69 and against the tension of the spring 70 to permit the block to assume the speed of the casing 10. As the block is rotated out of engagement with the casing, the spring 70 functions to again effect driving engagement of the pin 68 with the pin 69, the foregoing operation being repeated upon each revolution of the roller 60. During engagement of the block with the casing, the upper and lower walls of the casing are fused or sealed together by reason of the heated condition of the block, it being understood that the location of the sealing or fusing unit is such that the fusing of the walls occurs on a zone of the casing that is subsequently disposed within the confines of the leading end portion 31 of the section 20 and thereby form a fused seal at the bottom of the bag, the length

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and width of the seal being defined by the engaging face of the block.

The present invention is applicable and wholly effective with respect to the heat sealing or fusing of both single and multi-ply bags and those formed with reentrant or bellows-folded side walls as well as the so-called flat type. In some instances, for instance, when the machine is operated at relatively high speed, the period of engagement of the sealing element 75 is not always sufficient to provide an effective fusing of the casing walls together and in these instances, the machine may be equipped with a plurality of my sealing units arranged in adjacent relation and so synchronized that their various sealing elements function in progressive order to render the fused seal fully effective.

Without further elaboration, the foregoing will so fully explain the invention that others may, by applying current knowledge, readily adapt the same for use under various conditions of service. Moreover, it is not indispensable that all the features of the invention be used conjointly since they may be employed advantageously in various combinations and subcombinations.

It is obvious that the invention is not confined to the herein described use therefore as it may be utilized for any purpose to which it is adaptable. It is therefore to be understood that the invention is not limited to the specific construction as illustrated and described, as the same is only illustrative of the principles involved which are capable of extended application in various forms, and the invention comprehends all construction within the scope of the appended claims.

What I claim is:

1. In a machine for forming bags from a traveling casing of fusible material having opposed walls fusible together over transverse zones adjacent the ends of the bags to form heat seals through said zones with the lengths of the bags being controlled by the casing speed; powered means for causing travel of said casing at a preselected casing speed within a preestablished range to define said lengths; sealing mechanism for effecting said seals during said travel and comprising a rotatable member adapted to be engaged by said casing throughout its travel and connected to and rotated by said powered means at a speed commensurate with said casing speed, a clutch device connected to and operated by said powered means, a fusing member normally connected to said powered means by said device and rotatably by the latter into engagement with said casing at a speed out of said range to establish fusing relation with said zones, said fusing member being releasable from said powered means by said device in response to the speed of said rotatable member upon engagement of said fusing member with said casing whereby said fusing member accords with the speed of said casing to effect dwells with said zones during said engagement to thus form heat seals through said zones at any speed of said casing within said range.

2. In a machine for forming bags from a traveling casing of fusible material having opposed walls fusible together over transverse zones adjacent the ends of the bags to form heat seals through said zones with the lengths of the bags being controlled by the casing speed; powered means for causing travel of said casing at a preselected casing speed within a preestablished range to define said lengths; sealing mechanism for effecting said seals during said travel and

comprising a rotatable fusing bar extending transversely of said casing, a roller adapted to be engaged by said casing throughout its travel and connected to and rotated by said powered means at a speed commensurate with said casing speed, an overdrive clutch connected to and operated by said powered means, said bar being normally connected to said powered means by said clutch and rotatably by the latter into simultaneous engagement with said casing and driving relation with said roller at a speed out of said range to establish fusing relation with said zones, said bar being releasable from said powered means by said clutch in response to the speed of said roller upon engagement of said bar with said casing whereby said bar accords with the speed of said roller to effect dwells with said zones during said engagement to thus form heat seals through said zones at any speed of said casing within said range.

3. In a machine for forming bags from a traveling casing of fusible material having opposed walls fusible together over transverse zones adjacent the ends of the bags to form heat seals through said zones with the lengths of the bags being controlled by the casing speed; powered means for causing travel of said casing at a preselected casing speed within a preestablished range to define said lengths; heat sealing mechanism for effecting said seals during said travel and comprising a compressible roller adapted to be disposed on one side of and engaged by said casing throughout its travel, a rotatable shaft adapted to be disposed transversely of the opposite side of said casing and adjacent said roller, a collar fixed to said shaft, a pin carried by said

collar, a member rotatably mounted on said shaft and provided with a pin engageable with said first mentioned pin for rotating said shaft in unison with said member, a fusing bar fixed to said shaft and rotatable into simultaneous engagement with said casing and compressing relation with said roller, driving means connecting said powered means to said roller and said shaft and effective for rotating said roller at a speed commensurate with said casing speed and for rotating said bar at a speed out of said range during engagement of said pins, said bar being effective for separating said pins upon engagement of said bar with said casing whereby said bar assumes the speed of said roller to effect dwells with said zones during said engagement to form heat seals through said zones at any speed of said casing within said range.

4. The structure as set forth and defined in claim 3 including, a spring connected between said member and said collar to maintain said pins in engagement with each other during rotation of said bar while out of engagement with said casing.

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