

June 10, 1969

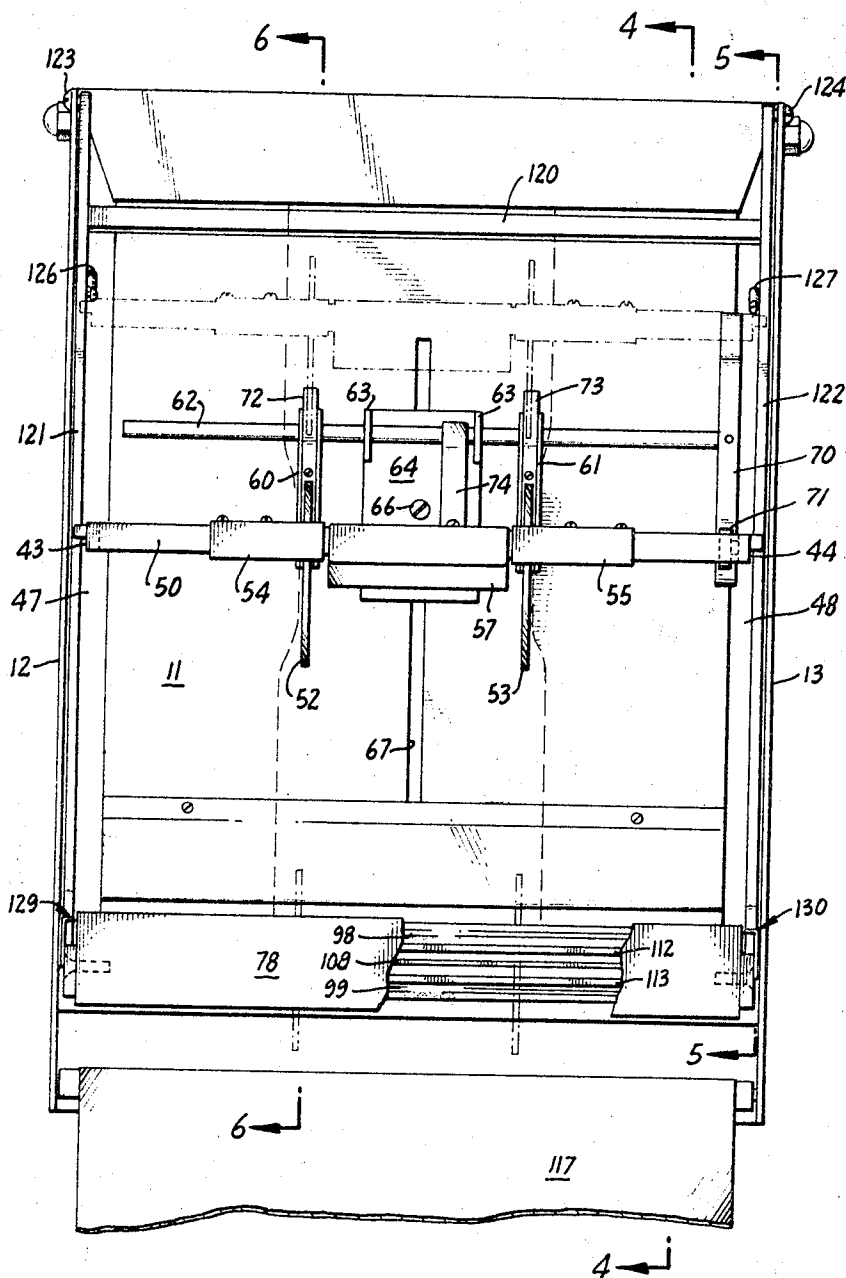
L. F. SHABRAM

3,448,555

METHOD AND APPARATUS FOR BAGGING ARTICLES

Filed Aug. 31, 1966

Sheet 2 of 6



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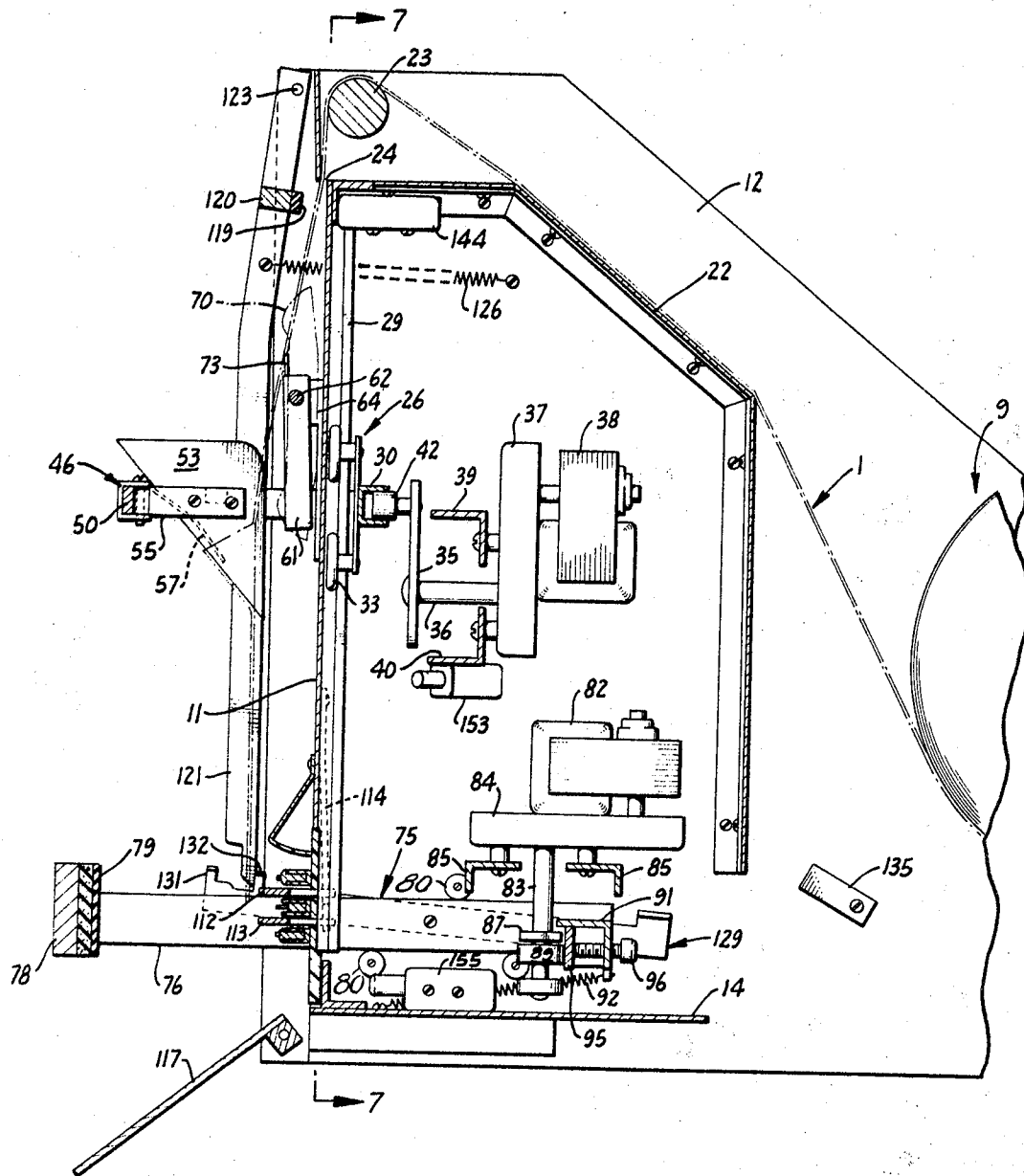
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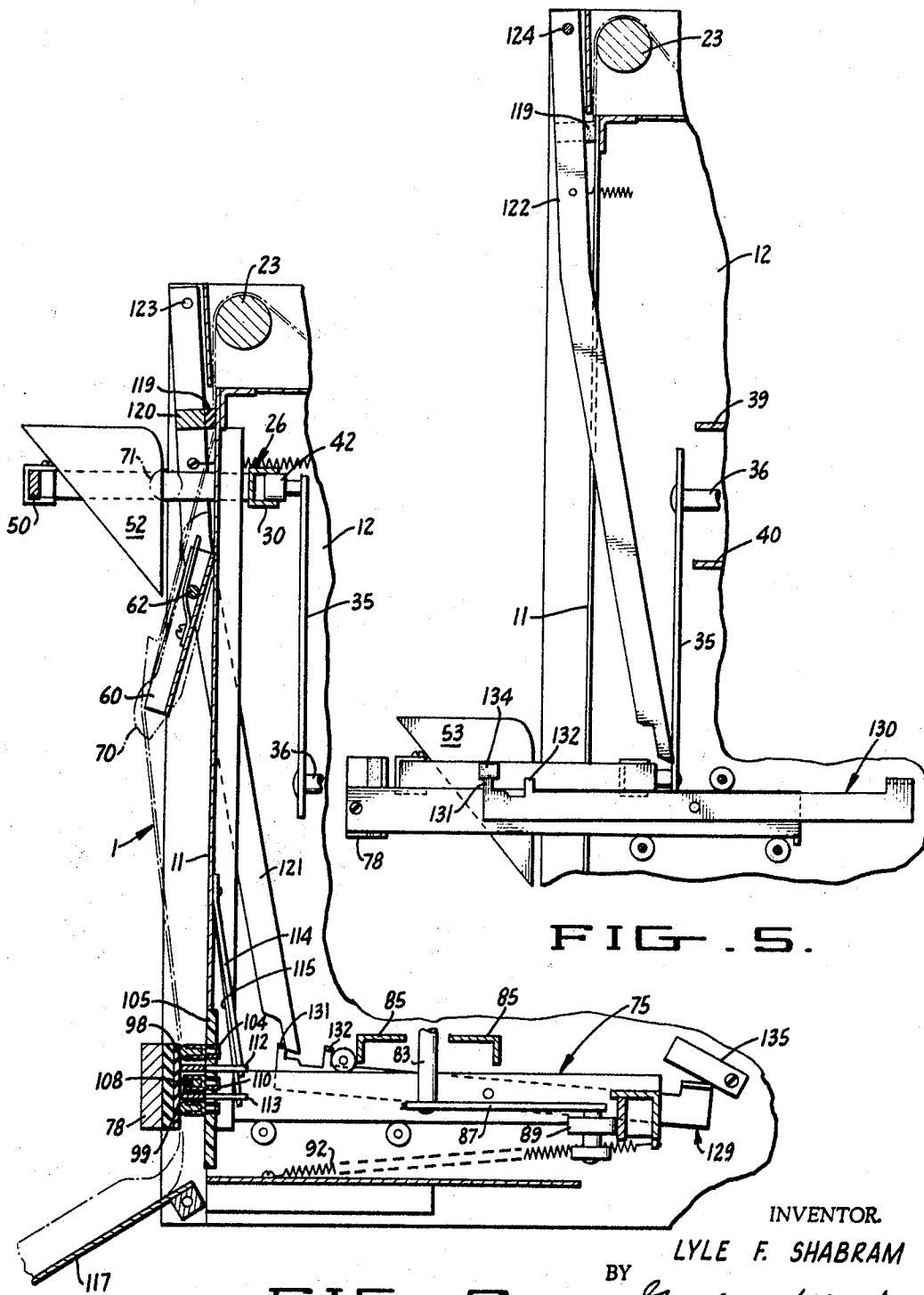


FIG. 5.

FIG. 6.

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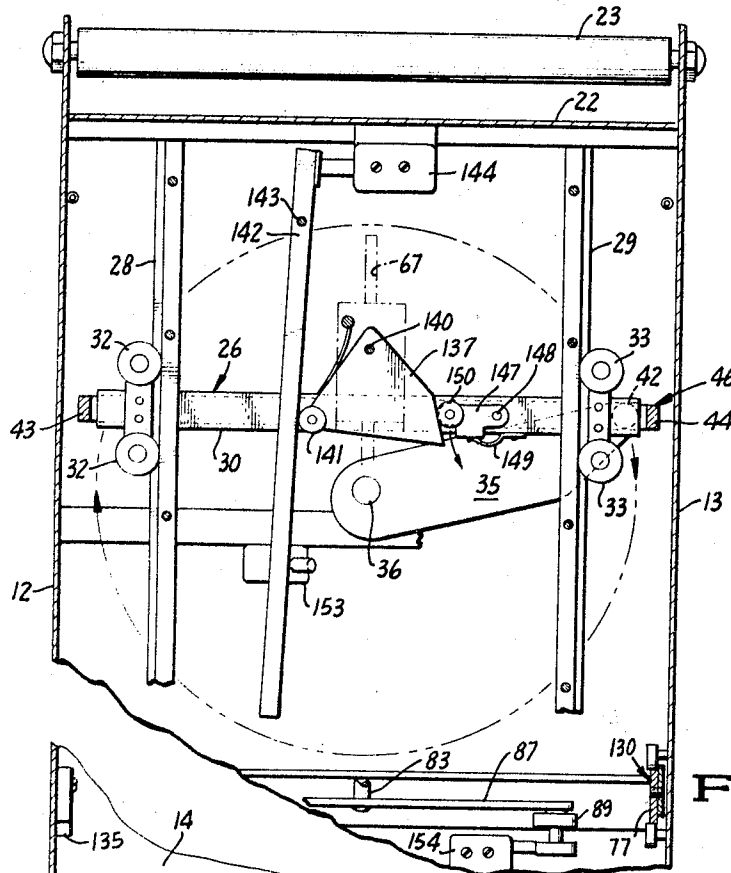


FIG. 7.

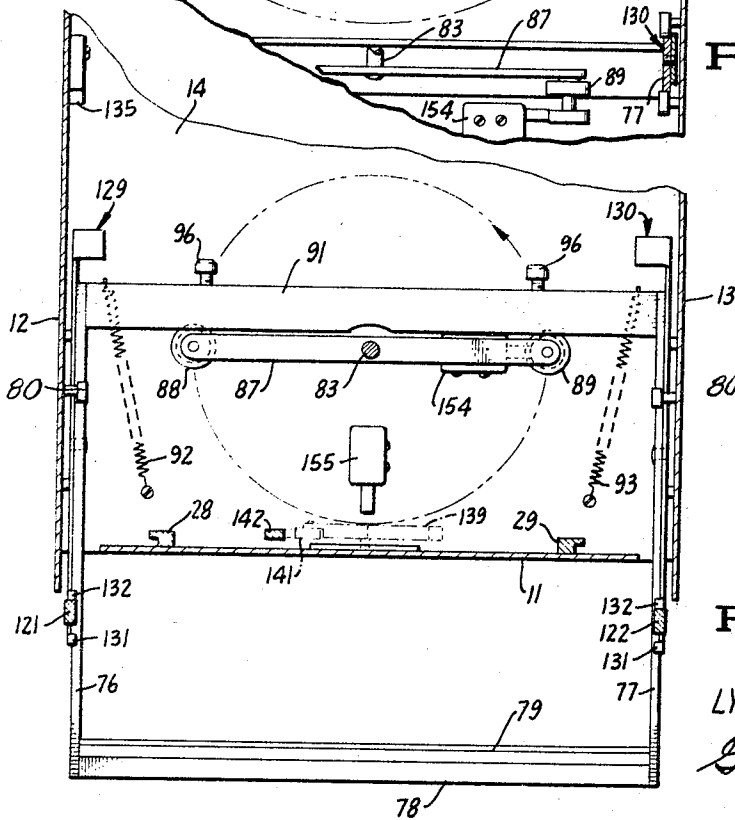


FIG. 8.

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Sheet 6 of 6

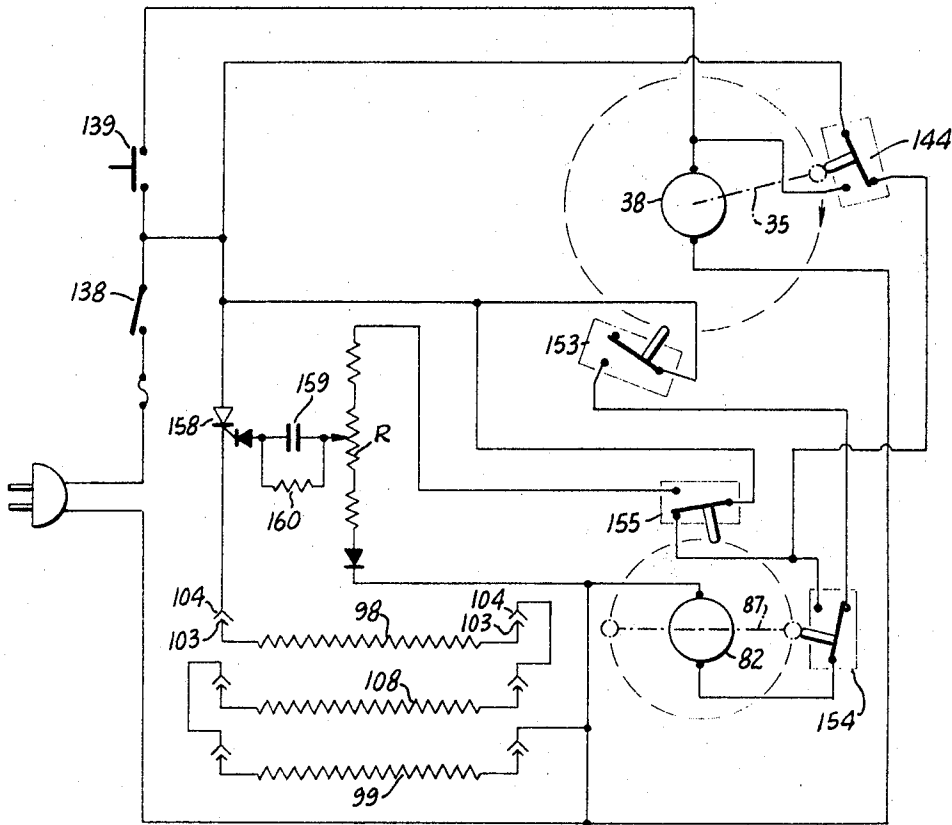


FIG. 9.

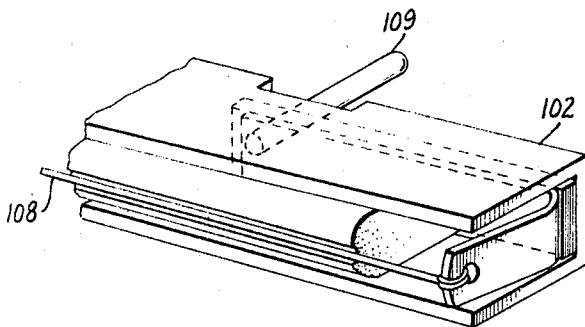


FIG. 10.

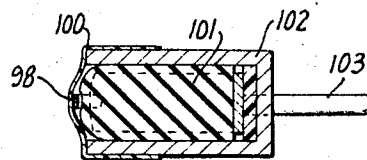


FIG. 11.

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METHOD AND APPARATUS FOR BAGGING ARTICLES

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U.S. Cl. 53—29

9 Claims

ABSTRACT OF THE DISCLOSURE

Method and apparatus for bagging articles by means of an elongated ribbon of flattened tubular material that is provided on one of its opposed sides with longitudinally spaced apart slots. The slots are successively opened and the packaged article inserted through the slots and into the spaces between the opposed sides. In one operation the continuous side of the ribbon is then cut between the spaced apart side edges of the slot and the opposed sides are sealed together on both sides of each slot.

This invention relates to a method and apparatus for forming a bag of plastic film and permitting an operator to place an article or articles in such bag in a speedy and inexpensive manner.

The main object of the present invention is the provision of a method by which bags may be automatically formed from an elongated ribbon of flattened tubular plastic and by which method an operator is permitted to insert the contents of the bag so as to provide high operating speeds.

Another object of the invention is the provision of an automatic bagging machine incorporating the above noted method and providing at a relatively low cost and in a small space means for bagging articles at relatively high speeds.

Still another object of the invention is the provision of a novel form of bagging material lending itself to the operation of an automatic machine.

Yet another object of the invention is the provision of a method and apparatus for bagging articles by which material costs are minimized without increasing the cost of the apparatus beyond a point at which commercial use is feasible.

Other objects and advantages will be apparent from the following specification and from the drawings.

FIG. 1 is a perspective showing the front and one side of the apparatus of the present invention in its "at rest" position and showing a completed package being discharged.

FIG. 2 is a fragmentary side view of a portion of the ribbon of flattened tubular material from which the bags are formed.

FIG. 3 is a front elevation of the device of FIG. 1 in the "at rest" position.

FIG. 4 is a vertical cross section of the apparatus as taken in a plane indicated by lines 4—4 of FIG. 3.

FIG. 5 is a fragmentary vertical cross section through the apparatus as taken in a plane indicated by lines 5—5 of FIG. 3 and showing the feed carriage in its lower position.

FIG. 6 is a vertical cross sectional view of the machine taken in a plane indicated by lines 6—6 of FIG. 3 and showing the feed carriage in its upper position.

FIG. 7 is a fragmentary vertical sectional view of the machine taken in a plane indicated by lines 7—7 of FIG. 4.

FIG. 8 is a fragmentary plan view of the front portion of the machine showing the sealing carriage in its outer position.

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FIG. 9 is a semischematic wiring diagram of the apparatus.

FIG. 10 is a fragmentary perspective of one end of the bag cutting means.

FIG. 11 is a typical cross sectional view of one of the bag sealing bars.

In detail, and first with reference to FIG. 2, the method and apparatus of the present invention employ, as a bag forming material, an elongated ribbon, generally designated 1, of flattened tubular material having a pair of opposed sides 2, 3 with the front side 3 of the ribbon being provided with transversely extending slots 4 at spaced points along the length of the ribbon corresponding to the ends of the bags to be formed. In FIG. 2 the front 3 of a portion of the ribbon is shown pulled away from the rear side 2 so that the slot 4 becomes an enlarged mouth through which the contents of the bag may be inserted. As will be seen more clearly later on, the apparatus of the present invention forms such a mouth automatically to permit the insertion of the contents.

FIG. 2 also shows schematically a first seal along the transverse line 5 and a second seal along the transverse line 6. As will be explained later on in greater detail, the first seal 5 seals the top of each bag, the second seal 6 seals the bottom of each bag and the ribbon is cut intermediate said two seals to form an upper edge 7 and a lower edge 8 for each bag. As indicated in FIG. 4 the ribbon 1 is adapted to be provided to the user in the form of a roll 9.

The device of the present invention comprises a housing generally designated 10 and including a front wall 11 and a pair of opposed side walls 12 and 13. As best seen in FIGS. 1 and 4, the roll 9 may be supported on a shaft 21 (FIG. 1) extending between side walls 12 and 13 and the ribbon 1 may be removed from the roll 9 and passed upwardly over a guide plate 22 extending between and secured at its opposite ends to the side walls 12, 13. The ribbon 1 is passed over a roller 23 and downwardly through a slot 24 formed in the front wall 11 and then downwardly alongside said front wall.

Supported for vertical movement along the front wall 11 is a feed carriage generally designated 26 which is mounted on a pair of parallel vertically extending tracks 28, 29 (FIG. 7).

Carriage 26 comprises a horizontally extending channel shaped bar 30 to which is secured adjacent one end thereof a pair of rollers 32 cooperating with track 28 and a similar pair of rollers 33 is provided adjacent the opposite end and cooperating with track 29. Vertical movement of carriage 26 is obtained by means of a crank arm 35 swingably supported on a shaft 36 of a reducer 37. Shaft 36 is driven through reducer 37 by a shaded pole magnetic braking motor 38 and the motor reducer assembly is fixedly secured relative to housing 10 by a pair of horizontally extending angle bars 39, 40 which are secured at their opposite ends to the side walls 12, 13 (FIG. 4). Crank arm 35 is provided at its outer end with a roller 42 which is received within channel bar 30 so that upon rotation of crank 35 the carriage 26 is reciprocated vertically.

Secured to the opposite ends of channel bar 30 are the opposed legs 43, 44 of a U-shaped member generally designated 46. The legs 43, 44 extend through vertically extending slots 47, 48 respectively formed between the front wall 11 of the housing 10 and the side walls 12, 13 (FIG. 3) and said legs are joined together along the front of the machine by cross piece 50.

Secured to cross piece 50 of the U-shaped member 46 are a pair of triangular shaped plates 52, 53 fixedly but adjustably secured to cross piece 50 by means of brackets 54, 55. These plates 52, 53 converge downwardly to a

point and, as will be explained later on in greater detail, the function of the plates 52, 53 is to enter the slots 4 (FIG. 2) of the ribbon 1 so that upon downward movement of the carriage 26 the ribbon 1 will be fed downwardly a distance equal to the vertical travel of the carriage 26 from the position shown in FIG. 4. In FIGS. 1, 3 and 4 the machine is shown in its "at rest" position at which position an operator may insert the contents of the bag through the slot 4 and then initiate a cycle of the machine in a manner to be described. To facilitate loading the bag a guide plate 57 is secured at its upper end to cross bar 50 of U-shaped member 46 and extends slantingly downwardly and inwardly relative to the machine as best seen in FIGS. 1 and 4. In operation, when the triangular feed plates 52, 53 have extended the mouth of the bag by enlarging the slot 4 in ribbon 1 the guide plate 57 is disposed slightly upwardly from the outer edge of the mouth of the bag thereby facilitating insertion of the contents.

Referring to FIG. 7, which also shows the device in the "at rest" position it will be seen that at said position the crank 35 has brought the carriage 26 to an intermediate position between its extreme upper and lower positions. Before reaching such intermediate "at rest" position the carriage 26 travels to its upper position shown in FIG. 6 in which upper position crank 35 is vertical. Upon downward travel of the carriage 26 the triangular feed plates 52, 53 enter the slot 4 in the ribbon and upon further movement to the loading position of FIGS. 1, 3, 4 and 7 the mouth of the bag is opened although the ribbon 1 remains stationary. As will be seen later on the machine automatically stops at said loading position and does not go through another cycle until reactivated by the operator.

In order to insure that the feed plates 52, 53 enter the slot 4 means is provided for urging the front side of the slot outwardly before the feed plates 52, 53 engage the same. Said means comprises a pair of channel shaped elongated fingers 60, 61 supported at their upper ends on a horizontally extending rod 62 which in turn is supported adjacent its center in a pair of lugs 63 formed integral with a support bracket 64 which in turn is secured by means of a bolt 66 (FIG. 3) passing through bracket 64 and through a vertically extending slot 67 in front wall 11 and fixedly but releasably secured to said front wall by a suitable nut. By this structure vertical adjustment of the rod 62 and the fingers 60, 61 is made possible.

At one end of rod 62 the same is provided with a cam 70 which cooperates with a follower roller 71 rotatably supported on U-shaped member 46 (FIG. 1).

The relative positions of channel-shaped fingers 60, 61, rod 62 and cam 70 are adjustably determined by applying friction to rod 62 by means of a pair of leaf springs 72, 73 fixed to fingers 60, 61 respectively and a leaf spring 74 secured to bracket 64 and frictionally engaging rod 62.

Upon upward movement of carriage 26 the cooperation between roller 71 and cam 70 causes the channel-shaped fingers 60, 61 to swing outwardly at their lower ends so that as the feed plates 52, 53 move downwardly after achieving their uppermost positions said feed plates enter the channel-shaped fingers and the slot 4 of ribbon 1 which is held open by said fingers. Upon movement of the carriage 26 downwardly from its loading position the cam follower 71 cooperates with the cam 70 to swing the fingers 60, 61 inwardly and out of the way of the downwardly advancing ribbon 1.

When the ribbon 1 has been advanced to its lowermost position by carriage 26 the bag structure is sealed and cut in a manner that will now be described.

At the lower end of the housing there is provided a sealing carriage generally designated 75 which comprises a pair of opposed horizontally extending arms 76, 77 to the outer ends of which is secured a cross bar 78. Carriage 75 is reciprocally supported by rollers 80 mounted on side walls 12, 13 and cooperating with arms 76, 77.

To the inwardly facing side of cross bar 78 there is secured a silicon rubber sealing strip 79 which is adapted to engage the ribbon 1 upon inward movement of the sealing carriage from the outer position shown in FIGS. 1 and 4 to the inner position of FIG. 6.

The sealing carriage 75 is driven by a shaded pole magnetic braking motor 82 which drives an output shaft 83 through a reducer 84. Reducer 84 and motor 82 are mounted on a pair of transversely extending angle bars 85 fixed at their ends to the side walls 12, 13 of the housing.

As best seen in FIG. 8 the shaft 83 of reducer 84 is secured to the center of an elongated crank 87 at the opposite ends of which are rotatably supported rollers 88, 89 respectively. These rollers are adapted to cooperate with an inner cross bar 91 extending between and secured to the inner ends of arms 76, 77. Upon rotation of shaft 83 it will be apparent that the rollers 88, 89 will cause the sealing carriage 75 to reciprocate horizontally. In order to maintain contact between the rollers and the cross bar 91 a pair of tension springs 92, 93 extend from the bottom wall 14 of the housing 10 to the opposite ends respectively of cross bar 91. In order to provide adjustability of the pressure between the silicon rubber strip 79 and the ribbon 1 it is preferable to provide on cross bar 91 an adjustable flat bar 95 which may be adjusted relative to the rollers 88, 89 by means of adjusting screws 96 (FIG. 4).

Upon movement of the sealing cross bar 78 from the outer position of FIG. 4 to the inner position of FIG. 6 the ribbon 1 is pressed between the silicon rubber strip 79 and a pair of upper and lower nickel chrome ribbons 98, 99 respectively (FIGS. 3, 6, 11). Each of said ribbons 98, 99 is covered with a Teflon tape 100 (FIG. 11) and backed with an asbestos cement material 101. Said ribbon covering and backing material may be housed on an elongated channel-shaped support 102 and said ribbons may be connected by means of insulated prongs 103 to electrical terminals 104 (FIG. 6). By this structure the support bar 102 may be secured to a backing plate 105 by press-fitting the prongs 103 within the terminals 104, as best seen in FIG. 6.

Interposed between the sealing ribbons 98, 99 is a cut-off wire 108 which may be housed in a similar manner as the above described ribbons and may be provided with prongs 109 adapted to be received in terminals 110. The cut-off wire 108 is uncovered so that when an impulse of current is fed through the wire it becomes sufficiently hot to cut the ribbon 1. However the Teflon covered ribbons 98 do not become sufficiently hot to cut the wire but merely to heat-seal the front and rear sides 2, 3 of the ribbon. Thus referring to FIG. 2 it will be seen that the upper sealing ribbon 98 forms the seal 6, the lower ribbon 99 forms the seal 5 and the cutting wire 108 cuts the ribbon transversely to provide separate packages having upper and lower edges 7, 8 respectively.

In order to insure release of the ribbon 1 from the hot elements 98, 99 and 108 a pair of spring loaded bars 112, 113 are interposed between said elements (FIG. 6). These bars 112, 113 are slidably supported within slots in backing plate 105 and are spring-urged outwardly by elongated springs 114, 115. By this structure when the sealing bar moves inwardly toward the inner position of FIG. 6 it does so against the urgency of springs 114, 115 so that upon movement of the bar outwardly to the position of FIG. 4 the bars 112, 113 which are in engagement with the ribbon 1 urge the adjacent ends of the cut ribbon outwardly thereby releasing the same and permitting the bag already cut by wire 108 to fall downwardly. If desired a deflector plate such as indicated at 117 may be provided for directing the package 118 (FIG. 1) outwardly.

Upon movement of the vertically reciprocating carriage 26 to its lowermost position the ribbon 1 is automatically clamped against movement at the upper end of the housing by means of a clamping bar 120 to which is secured

a strip 119 of rubber or the like adapted to engage the ribbon 1 and press it against the front wall 11 of the housing. The clamping bar 120 is secured at its opposite ends to a pair of vertically extending trigger arms 121, 122 which are swingably supported at their upper ends by means of pivots 123 124 respectively. The arms 121, 122 are urged inwardly by means of a pair of tension springs 126, 127 which extend from said arms 121, 122 to the side walls 12, 13 of the housing.

The lower ends of arms 121, 122 are adapted to engage the corresponding ends of a pair of pivoted bars generally designated 129, 130 which are swingably supported intermediate their ends on arms 76, 77 of the sealing carriage 75. The outer ends of arms 129, 130 are each provided with a pair of upwardly extending projections 131, 132. When the vertically reciprocating carriage 26 is in its upper position and the sealing carriage is in its outer position it can be seen from FIG. 4 that projection 132 on arms 129, 130 hold the vertically extending arms 121, 122 outwardly away from the housing against the urgency of springs 126, 127. When the carriage 26 reaches the bottom of its stroke a pair of projections 133, 134 on the U-shaped member 46 of the carriage 26 engage the projections 131 of arms 129, 130 urging said arms downwardly at their outer ends and releasing the vertically extending trigger arms 121, 122 to permit the latter to swing inwardly and clamp the ribbon 1. When the sealing bar 78 and its associated carriage 75 moves inwardly to the position of FIG. 6 the inner ends of arms 129, 130 engage slantingly disposed stops 135 secured to the side walls of the housing. Upon such engagement the arms 129, 130 are swung upwardly at their outer ends so that the projections 132 can engage the lower ends of the trigger arms 121, 122 and urge the same outwardly upon outward movement of the sealing carriage to the position of FIG. 4. In this manner the ribbon is released before the vertically moving carriage 26 starts its feeding stroke in engagement with the ribbon 1. By this structure the ribbon 1 is held in a fixed position relative to the housing except when the carriage 26 is moving downwardly.

Referring now to the wiring diagram of FIG. 9 the electrical circuit includes a toggle switch 138 which may be positioned on one of the side walls of the housing as indicated in FIG. 1 and also a push button 139 which closes the circuit when pressed inwardly and opens when released. With the switch 138 closed a cycle is initiated by the operator by pressing inwardly on push button 139 which completes the circuit through motor 38 thereby rotating the crank arm 35. In the "at rest" position of the device the crank arm 35 is in the position of FIG. 7. Referring to FIG. 7 a generally triangular-shaped cam plate 137 is supported on a pivot 140 adjacent the upper edge of said plate and a roller 141 is rotatably supported at one of the lower corners of the plate. This roller is in engagement with an elongated vertically extending lever arm 142 which is pivotally supported on the housing by means of pivot 143 at a point spaced downwardly from the upper end of said arm. In the position of FIG. 7 the upper extremity of arm 142 is in engagement with and is depressing the plunger of a normally closed switch 144 which closes the circuit through motor 38. However, in the "at rest" position of FIGS. 7 and 9 the position of the crank arm 35 is such that motor 38 is not energized through switch 144 but through push button switch 139. When motor 38 starts to rotate switch 144 is actuated by movement of the carriage 26 downwardly which releases arm 142 from the effect of roller 141 (FIG. 7). Referring back to FIG. 7 a short crank arm 147 is pivotally supported on channel bar 30 by means of pivot 148 and is urged into an upper position shown by means of a leaf spring 149. Crank 147 is provided with a roller 150 which engages the adjacent edge of cam plate 137 in the "at rest" position of the apparatus and urges roller 141 against arm 142. However, when the carriage 26 moves downwardly roller 150 is released from the plate 137 thus per-

mitting the arm 142 to swing in a counterclockwise direction allowing the switch 144 to assume its normally closed position wherein it completes the circuit through motor 38. By this time the push button 139 will of course have been released by the operator and the motor 38 will continue to rotate to move the apparatus through one cycle.

Just after the carriage 26 reaches the bottom of its stroke and starts upwardly the crank arm 35 of motor 38 depresses the plunger of a switch 153 (FIG. 4) which, as best seen in FIG. 9, completes the circuit through motor 82 thereby initiating the movement of the sealing carriage 75 inwardly for the sealing operation. As best seen in FIG. 8 a switch 154 is released upon the initial movement of motor 82 so as to complete the motor circuit through the normally closed contacts of switch 154 and a similar switch 155. When crank arm 87 undergoes a quarter of a revolution it shuts itself off by opening the normally closed contacts of switch 153 (FIG. 8). It will be noted that such quarter of a revolution of crank 87 is effective to bring the sealing bar 78 from its outer position of FIG. 4 to its inner position of FIG. 6. At this same time the gate circuit of a silicon controlled rectifier 158 is engaged through the normally open contacts of switch 155 and a capacitor 159. This causes the silicon controlled rectifier to conduct thus feeding power to the sealing ribbons 98, 99 and the cutting wire 108. After a short interval the capacitor 159 becomes charged thus blocking the flow of direct current into the gate and the rectifier ceases to conduct. The length of the impulse which heats the sealing and cutting wires is controlled by the setting of the resistor indicated at R. Meanwhile the motor 38 drives the carriage 26 upwardly to its upper position and then downwardly to the position of FIG. 7 at which time switch 144 is depressed to shut off the motor 38. This also results in power being fed to motor 82 through the normally open contacts of switch 144 and the normally closed contacts of switch 154. Motor 82 thus rotates to turn crank arm 87 through another quarter cycle until it shuts itself off by opening the normally closed contacts of switch 154.

At this time the gate circuit is open and the capacitor 159 discharges through the resistance 160. The machine is now ready for its next cycle which will be initiated by pushing push button 139.

The above-described machine may be employed for bagging articles of various sizes and may be adjusted to operate on ribbons of different sizes than that indicated in the drawing. In this connection the adjustability of bracket 64 which supports the rod 62 and cam 70 provides for a vertical adjustment in length of the bag and the adjustability of feed plates 52, 53 in a transverse direction permits adjustability in the width of the bag.

The flexibility of the apparatus of the present invention makes it suitable for use in moderate size operations where production does not warrant a large expenditure of money for equipment.

I claim:

1. The method of bagging articles comprising the steps of:

providing a continuous elongated flattened tubular ribbon of sheet material formed in one of the opposed sides thereof with transversely extending slots at spaced points along the length of said ribbon,

supporting said ribbon for movement along a path of travel and successively feeding said ribbon along said path a distance equal to the spacing between said slots, successively applying a laterally directed force to said ribbon adjacent each slot during said movement to spread said opposed sides apart at such slot,

inserting contents through said slots successively to positions between said opposed sides and intermediate a pair of adjacent slots,

successively severing the other of said opposed sides

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along a line extending the width of said ribbon at one of said slots, and
sealing said opposed sides at points on opposite sides of said line.

2. The method of claim 1 wherein said severing and sealing steps are performed simultaneously.

3. The method of claim 1 wherein said ribbon is intermittently fed along a path of travel extending longitudinally thereof and said contents are inserted at a point in said path.

4. Bagging apparatus for use with a continuous flattened tubular ribbon of plastic sheet provided with transversely extending slots at spaced points along the length of said ribbon and in one side thereof, comprising:

means for spreading the opposed sides of said ribbon apart adjacent one of said slots to permit insertion of contents to a position between the opposed sides of said ribbon and intermediate a pair of adjacent slots,

feed means for translating said spreading means along a path of travel extending longitudinally of said ribbon for feeding the latter,

sealing means for successively sealing said opposed sides adjacent each of said slots, and

cutting means for successively cutting said one side transversely of said ribbon for separating successive filled bags.

5. Apparatus according to claim 4 wherein said spreading means and said sealing means engage said ribbon at longitudinally spaced points along said path.

6. Apparatus according to claim 4 wherein said sealing and cutting steps are performed simultaneously at a

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station spaced longitudinally from the point at which said spreading means engages said ribbon.

7. Apparatus according to claim 4 wherein clamping means is provided for holding said ribbon against movement after said ribbon has been fed by said feed means.

8. Apparatus according to claim 4 wherein said feed means includes a vertically reciprocable carriage and motor means for driving the same, and said sealing means includes a horizontally reciprocable carriage and motor means for driving the same.

9. Apparatus according to claim 8 wherein holding means is provided for holding said ribbon against movement during upward movement of said vertically reciprocable carriage.

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U.S. Cl. X.R.

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