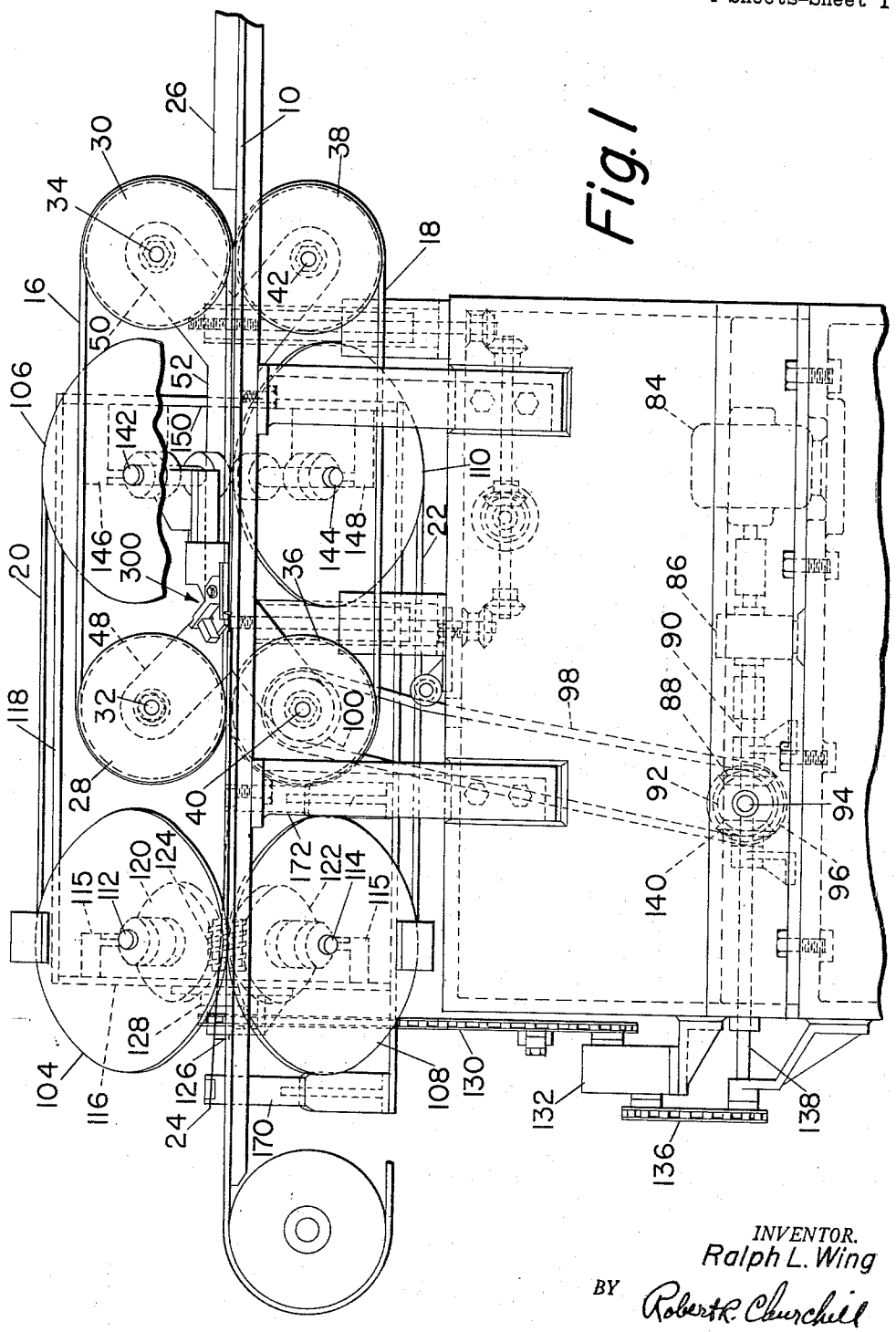
Sept. 26, 1961 R. L. WING 3,001,341

BAG CLOSING MACHINE AND CONTROL MEANS THEREFOR

Filed Dec. 17, 1959

4 Sheets-Sheet 1

Fig. 1



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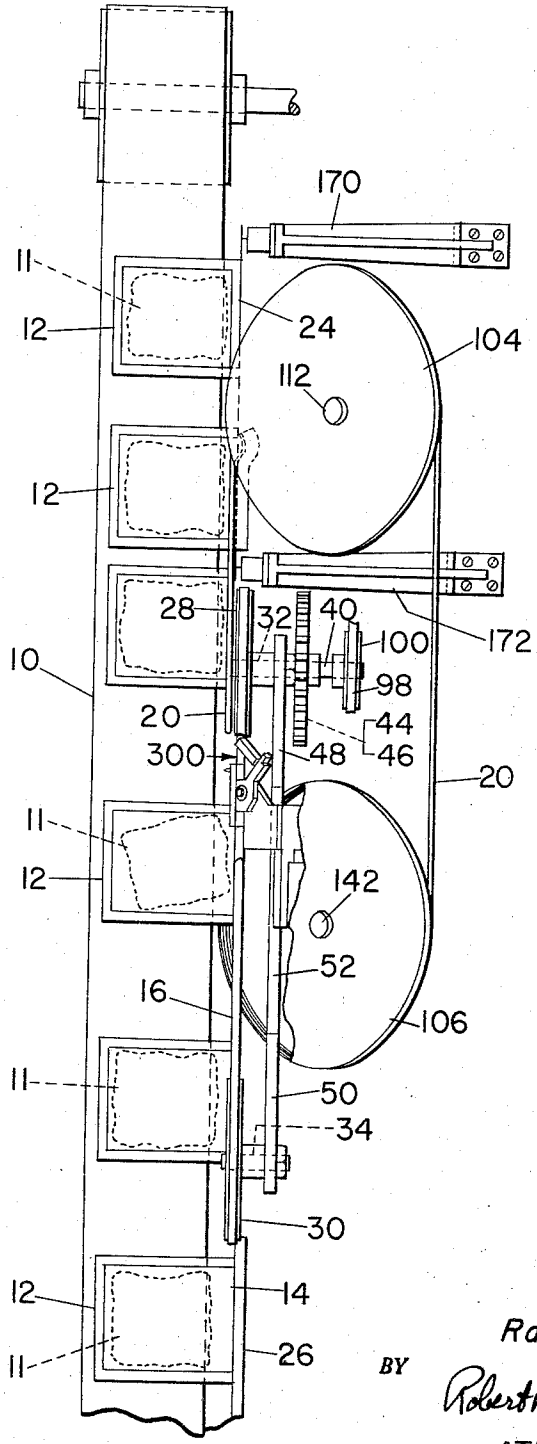
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BAG CLOSING MACHINE AND CONTROL MEANS THEREFOR

Filed Dec. 17, 1959

4 Sheets-Sheet 2

Fig. 2



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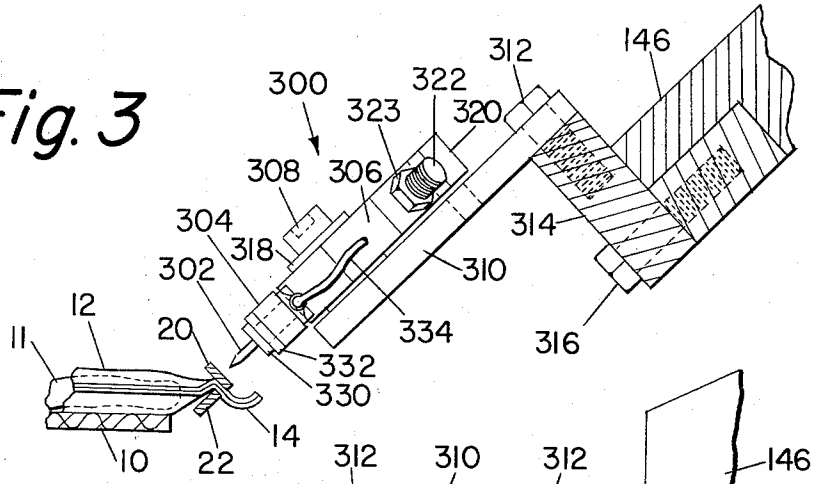
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BAG CLOSING MACHINE AND CONTROL MEANS THEREFOR

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Fig. 3



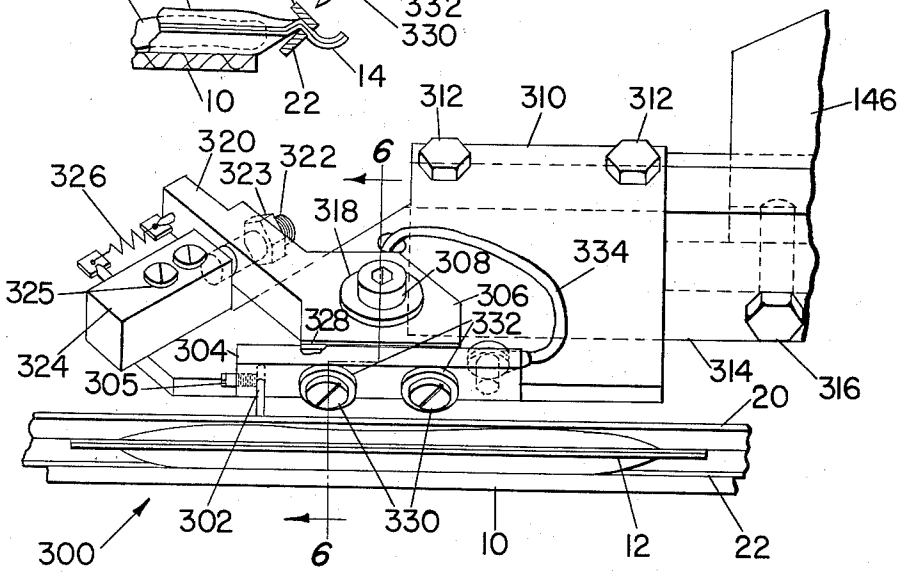


Fig. 5

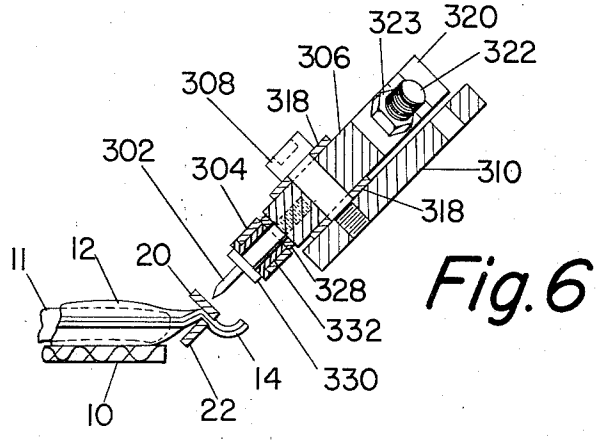


Fig. 6

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BAG CLOSING MACHINE AND CONTROL MEANS THEREFOR

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4 Sheets-Sheet 4

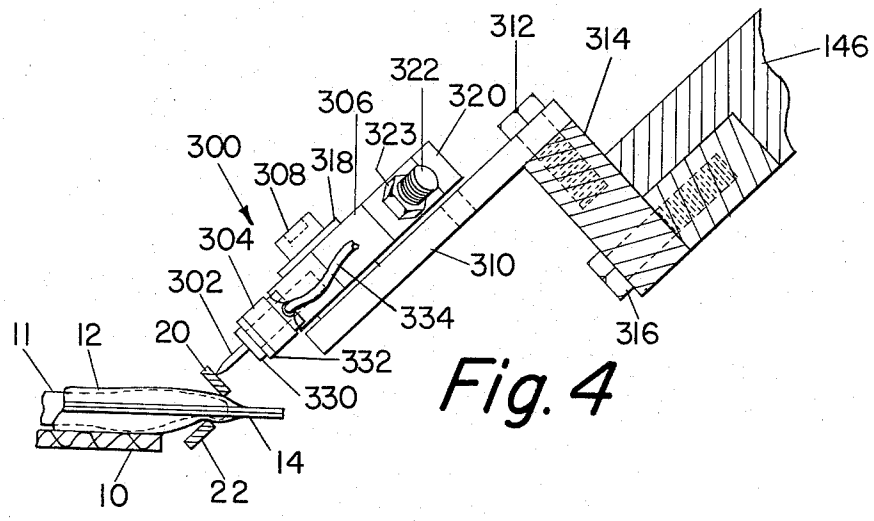


Fig. 4

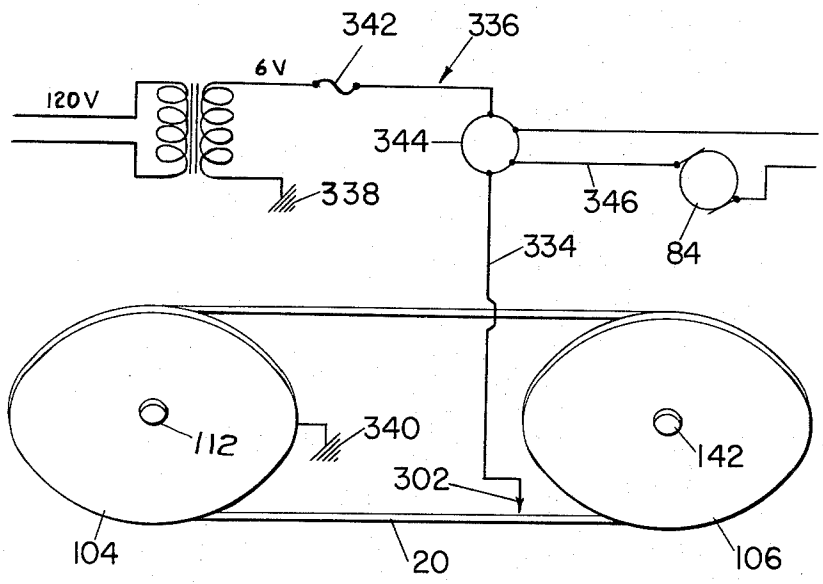


Fig. 7

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United States Patent Office 3,001,341 Patented Sept. 26, 1961

3,001,341
BAG CLOSING MACHINE AND CONTROL MEANS THEREFOR

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Filed Dec. 17, 1959, Ser. No. 860,116
14 Claims. (Cl. 53—76)

This invention relates to a bag closing machine.

The invention has for an object to provide a novel and improved machine having provision for closing the extended mouth portion of a bag containing an article and which is characterized by novel control means adapted to discontinue operation of the machine in the event that the article is improperly positioned within the bag or the filled bag misaligned with respect to the bag closing mechanism to prevent damage to the article during the mouth closing and sealing operation and to enable an attractive, efficient mouth closure to be made.

The invention has for another object to provide a novel and improved control means particularly adapted for use in a machine wherein a flat bag containing an article of merchandise is engaged at its mouth portion between opposed belts to be gripped and advanced into operative relation to mouth closing mechanism and which is characterized by its ability to detect relatively small abnormal separation of the belts and to discontinue operation of the machine in the event that a relatively thin misaligned portion of the merchandise is received between the belts.

With these general objects in view and such others as may hereinafter appear, the invention consists in the bag closing machine and in the control means as hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention:

FIG. 1 is a front elevation of a bag closing machine herein shown as a bag trimming and sealing machine embodying the present invention;

FIG. 2 is a plan view of a portion of the machine shown in FIG. 1;

FIG. 3 is a side elevation detail view of the detecting mechanism forming a part of the control means, some of the parts being shown in cross section;

FIG. 4 is a view similar to FIG. 3 showing the parts in a different position of operation;

FIG. 5 is a front elevation detail view of the detecting mechanism;

FIG. 6 is a vertical cross section of the detecting mechanism taken on the line 6—6 of FIG. 5; and

FIG. 7 is a wiring diagram illustrating the control circuit for discontinuing operation of the machine in response to the detecting mechanism.

In general the present invention comprises an improvement in the bag trimming and sealing machine illustrated and described in a copending application, Serial No. 699,630, by Robert W. Saumsiegle, for Method and Apparatus for Trimming and Sealing Plastic Bags, filed November 29, 1957, and asigned to applicant's assignee.

In the operation of the trimming and sealing machine disclosed in the Saumsiegle application, above referred to, a flat bag of thermoplastic material open at the mouth and containing an article of merchandise is placed on a conveyer with the open mouth portion extended laterally over one side thereof. The mouth portion is then engaged by opposed continuously moving gripping elements in the form of upper and lower metal belts or bands arranged to clamp the walls of the mouth portion together along a line spaced a relatively short distance from the edge of the merchandise contained in the bag, leaving a substantial portion of the mouth extended beyond the line of contact of the metal belts. Thereafter, a stationary hot wire arranged in the path of the extended mouth portion effects melting of the extended mouth portion to trim and seal the same along a line spaced a short distance from the metal belts.

In practice it was found that through inadvertence the article might be improperly positioned within the bag and a portion of the merchandise might extend into the mouth portion of the bag, or the bag might be misaligned in a manner such that the opposed belts would grip a portion of the merchandise therebetween and as a result when the bag was advanced to the hot wire the latter would effect burning of the merchandise or an improper closure effected.

In accordance with the present invention provision is made for detecting misalignment of the merchandise in the bag or of the bag relative to the opposed belts carrying the bags to the trimming and sealing mechanism and for discontinuing operation of the machine in the event that a portion of the merchandise contained in the bag is received between the belts so that the operator may realign and properly position the bag and the merchandise whereby to avoid damage thereto or to the trimming and sealing mechanism. In practice the present control means is capable of detecting a relatively minute separation of the belts beyond the normal separation, as dictated by the thickness of the mouth portion of the bag, whereby to detect even relatively thin portions of the merchandise within the bag which are inadvertently presented between the belts, the control means including means responsive to the detecting means for discontinuing operation of the machine.

Referring now to the drawings, in general the bag trimming and sealing machine embodying the present invention may comprise the machine illustrated and described in the Saumsiegle application, above referred to, and only such portions of the machine essential to an understanding of the present invention will be herein described. As herein illustrated, in the operation of the bag trimming and sealing machine a flat bag **12** of thermoplastic material containing an article of merchandise **11** is placed horizontally on a conveyer belt **10** with the open mouth portion **14** extended laterally beyond one edge of the belt to present the extended mouth portion in alignment with the trimming and sealing mechanism. The conveyer belt **10** may be continuously driven in any usual or preferred manner, not shown, and the mouth portion **14** of each bag is first engaged by opposed upper and lower flat belts **16, 18** for the purpose of bringing the opposed walls of the mouth together in substantially flat face-to-face contacting engagement. The flattened mouth portion is then presented between opposed upper and lower metal belts **20, 22** which are preferably arranged at an angle with relation to each other and with relation to the horizontal plane of the mouth portion of the bag so that the contacting edges of the belts **20, 22** cooperate to engage the mouth along a relatively narrow line of contact. While thus gripped between the metal belts, the mouth portion is advanced into engagement with a heated wire **24** to effect trimming of the extended portion of the mouth and sealing of the mouth by liquefication and fusion of the plastic bag material. As illustrated in FIG. 1, the wire **24** may extend longitudinally between spaced, upright posts **170, 172** and is preferably arranged at a small angle relative to the horizontal plane of the mouth portion gripped between the metal belts or bands. The mouths of the bags may be initially aligned against an adjustable stop or guide member **26** to present the mouth portion between the mouth engaging belts and to present the extended portion of the mouth in the path of the heated wire **24**.

The opposed upper and lower belts **16, 18** may comprise relatively narrow, flat and longitudinally extended

endless belts, the upper belt **16** being arranged to run over end pulleys **28, 30** carried on shafts **32, 34**, and the lower belt **18** being arranged to run over end pulleys **36, 38** carried by shafts **40, 42**. The pulleys **28, 36** may comprise drive pulleys fast on their respective shafts **32, 40** and connected to rotate in opposite directions by spur gears **44, 46**, the idler pulleys **30, 38** being mounted to rotate on their respective shafts **34, 42**. The shafts **32, 34** and **40, 42** are carried by and extended from diverging arms **48, 50** at each end of a horizontally extended bracket **52**.

The belts **16, 18** may comprise leather or like material possessing sufficient rigidity to press the opposed walls of the mouth portion of the bag or container in flat contacting relation, as described, and provision is made for driving the belts at a linear speed equal to the speed of advance of the bags on the conveyor **10** through driving mechanism shown in FIG. 1. The driving mechanism includes a driving motor **84** connected through a speed reducer **86** to a bevel gear **88** on a shaft **90** in mesh with a bevel gear **92** on a shaft **94**. The shaft **94** is provided with a pulley **96** connected by a belt **98** to a pulley **100** fast on the lower drive pulley shaft **40** which is connected to the upper drive shaft **32** by the spur gears **44, 46** as described.

After the mouth portion **14** of the container is closed by the belts **16, 18**, the flattened mouth is received between the angularly arranged upper and lower metal belts **20, 22**. As illustrated in FIG. 1, the metal belts initially engage the mouth portion at a point intermediate the length of the engaging run of the mouth flattening belts **16, 18** so that both sets of belts are in engagement with the mouth portion for the remaining length of the run of the belts **16, 18**. The metal belts **20, 22** extend beyond the flattening belts, as shown, so that when the bag mouth is subsequently engaged by the heated wire **24** it will be gripped between the metal belts only.

As herein illustrated, each metal belt is disposed at an angle of about 45° with respect to the horizontal plane of the mouth portion of the bag and at an angle of about 90° with respect to each other, so that the upper and lower faces of the mouth portion are engaged by the cooperating edges of the upper and lower metal belts **20, 22**, respectively, the upper and lower belts being preferably offset relative to each other so that the thin or narrow edge of one belt may engage the marginal edge of the wide face of its cooperating belt. The metal belts **20, 22**, are arranged to run over upper and lower pulleys **104, 106** and **108, 110**, respectively, which are mounted on axes arranged at an angle of 45° as shown. The belts **20, 22** are also arranged to travel at a linear speed equal to the advance of the containers on the belt **10** and, as herein shown, the drive pulleys **104, 108** are mounted fast on shafts **112, 114**, respectively, journaled in brackets **115** carried by the wall **116** of a frame member **118**. Each shaft **112, 114** is provided with a worm gear **120, 122**, each of which is in mesh with a worm **124** fast on a shaft **126** journaled in a bearing member **128** secured to the wall **116** of the frame. The worm **124** is arranged to be rotated through connections including a chain and sprocket drive **130** between the shaft **126** and the output shaft of a speed increasing unit **132**. A second chain and sprocket drive **136** connects the input shaft of the speed increasing unit to a drive shaft **138**. The drive shaft **138** is provided with a bevel gear **140** in mesh with the bevel gear **92** forming a part of the main drive mechanism as described. The upper and lower pulleys **106, 110** which are also mounted on axes arranged at an angle of 45°, as shown, are arranged to rotate on shafts **142, 144**, respectively, which are journaled in brackets **146, 148** attached to a second wall **150** of the frame member **118**.

From the description thus far it will be observed that successive bags placed on the conveyor **10** and aligned with the guide member **26** are advanced to present the unsealed mouth portions thereof between the opposed upper and lower mouth flattening and closing belts **16, 18**, and while thus held and advanced the mouth portions are engaged between opposed upper and lower angularly arranged metal belts **20, 22** along a line spaced a short distance inwardly of the outer margin of the mouth portion and inwardly relative to the line of engagement of the flattening belts. Thereafter, when the bag mouth leaves the belts **16, 18** and is only gripped between the extended portions of the metal belts **20, 22**, the leading edge of the bag mouth is advanced into intersecting engagement with the heated wire **24** to effect the trimming and sealing operation.

As illustrated in FIGS. 1 and 2, the present control means includes detecting mechanism indicated generally at **300** which is disposed adjacent the receiving end of the metal belts **20, 22** at a point spaced a short distance forwardly from the vertical center line of the pulleys **106, 110**. As shown in detail in FIGS. 3 and 4, the detecting mechanism **300** is mounted at an angle of about 45° from the vertical and at right angles to the upper angularly arranged metal belt **20** with which the detecting mechanism is designed to cooperate. The detecting mechanism includes a contact member in the form of a pointed metal member or needle **302** carried by and replaceably secured in a conducting bar **304** by a set screw **305** as shown in FIG. 5. The conducting bar **304** is attached to and insulated from a holder **306** pivotally mounted on a shoulder stud **308** secured to a supporting plate **310**. The plate **310** is attached by bolts **312** to a block **314** extended from and secured to a portion of the pulley bracket **146** by bolts **316**.

As illustrated in cross section in FIG. 6, the shoulder stud **308** is provided with upper and lower bronze washers **318** to assure free pivotal movement of the holder **306**, and an angularly extended arm **320** of the holder is provided with an adjustable set screw **322** for cooperation with a stop block **324** secured to the supporting plate by bolts **325**. A coil spring **326** connected between the arm **320** and the block is arranged to rock the holder in a counterclockwise direction to present the end of the contact needle **302** in spaced relation to the upper metal belt **20**, the set screw **322** being adjusted to vary the spacing between the contact needle and the belt. The set screw **322** may be locked in its adjusted position by a nut **323**.

As illustrated in FIG. 6, the conducting bar **304** which carries the contact needle **302** at one end is insulated from the holder **306** by an intervening insulating strip **328**, and the metal screws **330** securing the bar to the holder extend through insulating bushings **332**. As shown in FIG. 5, the other end of the conducting bar **304** is provided with a lead **334** forming a part of a 6-volt circuit **336** grounded through the machine frame as indicated at **338, 340** in FIG. 7. The circuit **336** includes a fuse **342** and a control relay **344** arranged to open the motor circuit **346** when the relay circuit **336** is closed by engagement of the metal belt **20** with the contact needle **302**.

In the normal operation of the machine when the mouth portions of the flat thermoplastic bags or containers **12** containing mechandise, such as a cloth garment, are received between the metal belts **20, 22**, normal separation of the belts equal to the thickness of opposed walls of the bag is not sufficient to effect movement of the upper belt **20** into engagement with the contact needle **302**, the spacing of the needle being illustrated in FIG. 3. However, in the event that the bag is misaligned or the mechandise in the bag is not properly positioned therein such that an edge of the mechandise is received between the belts, as shown in FIG. 4, the belts will be abnormally spread apart and the upper belt **20** moved into engagement with the contact needle **302**, thus closing the circuit to the relay **344** and opening the motor circuit **346** to discontinue operation of the machine. Engagement of the belt **20** with the contact needle may

effect rocking of the contact unit in a clockwise direction, the extent of such movement depending on the thickness of the mechandise engaged between the belts. Upon removal of the abnormally or improperly positioned bag, or proper positioning thereof, the belts return to their normal position, and the contact unit is returned to its initially adjusted position by virtue of the spring **326** to again permit the continuous operation of the machine, the motor circuit **346** being closed upon removal of the contact **302** from contact with the belt **20**.

In operation the contact needle **302** is preferably adjusted relative to the metal belt **20** by movement of the set screw **322** such as to provide a minimum clearance space between the belt **20** and the end of the needle **302** when the mouth portion of a properly filled and positioned container is aligned between the belts **20, 22**. In practice the amount of clearance for normal operation of the machine may be in the order of four thousandths of an inch, such that the end of needle **302** just aviods contact with the belt whereby a minute increase in the spacing of the belts **20, 22** causes the needle to contact the belt **20** and discontinue operation of the machine.

From the above description of the bag closing machine, herein shown as a bag mouth trimming and sealing machine, it will be seen that the present control means provides a safety device having an extremely sensitive detecting mechanism adapted to discontinue operation of the machine in the event that a slightly greater than normal separation of the metal gripping and conveying belts **20, 22** occurs, whereby to prevent advancement of a misaligned or improperly filled bag into operative relation to the trimming and sealing mechanism and to thus avoid damage to the merchandise, such as burning the same by its engagement with the hot sealing wire or to the trimming and sealing mechanism, and also to prevent the formation of unattractive or defective seals.

While the illustrated embodiment of the invention contemplates closing of a grounded relay circuit upon detection of abnormal separation of the belts to open the driving motor circuit, it will be apparent that the present control means may be used with advantage in a machine wherein the gripping and conveying belts are of a nonconductive material and wherein abnormal separation of the belts may rock the contact unit to actuate a switch to effect closing of a conventional non-grounded relay circuit whereby to open the motor circuit and discontinue operation of the machine. It will also be understood that the gripping belts need not be angularly disposed, as illustrated herein, but may be arranged in parallel planes and in face-to-face engagement.

While the preferred embodiment of the invention has been herein illustrated and described as being embodied in a bag closing machine adapted for closing, sealing and trimming the mouth portions of containers formed of a thermoplastic material, it will be understood that the invention may be embodied in other types of machines for closing the mouth portions of various types of containers and for detecting the position of the container and/or the articles within the container relative to the closing mechanism whereby to avoid damage to the articles during the sealing operation and to assure the formation of attractive, efficient closures or seals.

Having thus defined the invention, what is claimed is:

1. In a machine of the character described, in combination, means for closing the mouth portion of a container containing an article of merchandise, means engageable with the mouth portion for gripping and advancing containers into operative relation to said closing means, and control means cooperating with said mouth gripping and advancing means adapted to discontinue the operation of the machine in the event that a portion of the container and merchandise is engaged by said gripping and advancing means.

2. In a machine of the character described, in combination, means for closing the mouth portion of a container containing an article of merchandise, a pair of opposed driven belts engageable with the mouth portion of the container for gripping and advancing the container into operative relation to said closing means, and control means cooperating with said mouth engaging belts adapted to discontinue the operation of the machine in the event that a portion of the merchandise is gripped between said belts.

3. In a machine of the character described, in combination, means for advancing a container having an article of merchandise therein through a predetermined path, said means including a pair of opposed driven belts between which a portion of the container is gripped, and control means actuated by abnormal separation of the opposed driven belts adapted to discontinue operation of the machine when a portion of the article in the container is received between the belts.

4. Control means as defined in claim 3 including the detecting means normally spaced a minute distance from one of said belts whereby to discontinue operation of the machine upon relatively slight movement of one of the belts into engagement with the detecting means.

5. In a machine of the character described, in combination, means for closing the extended mouth portion of a bag containing an article of merchandise, means for supporting and advancing the bag into operative relation to said closing means including a pair of opposed driven belts between which the extended mouth portion of the bag is gripped, and control means including detecting means cooperating with said belts arranged to detect abnormal separation thereof, and means responsive to said detecting means for discontinuing operation of the machine when a portion of the merchandise in the bag is received between the belts.

6. In a machine of the character described, means for supporting and advancing a bag having an open mouth portion and containing an article, said means including a pair of opposed driven members between which the mouth portion is gripped, and electrical control means including a contact member cooperating with and normally spaced from said opposed driven members arranged to detect abnormal separation thereof, and means responsive to engagement of said contact member by at least one of said driven members for discontinuing operation of the machine when a portion of the bag containing the article is received between said driven members separating the same abnormally.

7. Control means as defined in claim 6 wherein the opposed driven members comprise electrically conductive belts and form part of a relay circuit arranged to be closed when at least one of the belts engages the contact member to discontinue operation of the machine.

8. In a machine of the character described, in combination, means for supporting and advancing a flat bag of relatively thin material having an open mouth portion and containing at least one article of merchandise, said means including a pair of opposed, relatively thin metal bands between which the mouth portion of the bag is gripped, and control means comprising detecting means including a contact member arranged to be engaged upon abnormal separation of the gripping bands, and means responsive to said detecting means adapted to discontinue operation of the machine when any portion of the merchandise in the bag is received between the bands, said contact member being normally spaced from the bands a relatively small distance in the order of a few thousandths of an inch whereby to assure detection of a minute abnormal separation of the belts due to the reception of any portion of the article of merchandise in the bag between the bands.

9. In a machine of the character described, a frame, means supported in the frame for advancing a bag having an open mouth portion and containing an article of merchandise, said means including a pair of opposed, electrically conductive metal belts between which the

mouth portion is gripped, means for driving said belts including a motor having a circuit, and electrical control means including a relay circuit grounded through said frame and said belts and arranged to control said motor circuit, said relay circuit having a contact member insulated from the frame, said contact member being normally spaced from and arranged to be engaged by one of said belts to close said relay circuit to effect opening of said motor circuit and discontinue operation of the machine upon abnormal separation of the belts by the merchandise and engagement of the contact by at least one of the belts.

10. Control means as defined in claim 9 wherein the contact member is mounted for pivotal movement when engaged by said one belt to compensate for the amount of separation of the belts caused by the thickness of the merchandise between the belts.

11. Control means as defined in claim 9 wherein the relay circuit comprises a low voltage circuit and the contact member includes a contact needle arranged to engage said one belt.

12. Control means as defined in claim 9 wherein the contact member includes a contact needle mounted for pivotal movement when engaged by said one belt, and means for adjusting the normal spacing between the belt and the needle.

13. In a machine of the character described, container advancing means engageable with a normally article free

portion of a container provided with an article of merchandise, said advancing means being adapted to advance the container through a predetermined path to be sealed, and control means adapted to discontinue operation of the machine to avoid damage to the article in the container by the sealing means, said control means being actuated by the engagement of the container advancing means with the control means when a portion of the article extends into the normally article free portion of the container containing the article of merchandise.

14. In a machine of the character described, in combination, means engageable with an article free portion of a container for advancing a container containing an article of merchandise through a predetermined path, and control means including detecting means adapted to cooperate with said advancing means to detect the position of an article of merchandise improperly positioned within the normally article free portion of the container and adapted to discontinue operation of the machine in the event the article of merchandise is detected to be improperly positioned within the container.

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