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D. C. LINDLEY

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METHOD AND APPARATUS FOR APPLYING HANDLES TO PLASTIC BAGS

Filed July 5, 1966

3 Sheets-Sheet 2

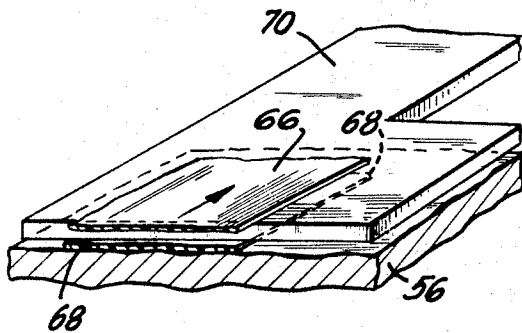


FIG. 5

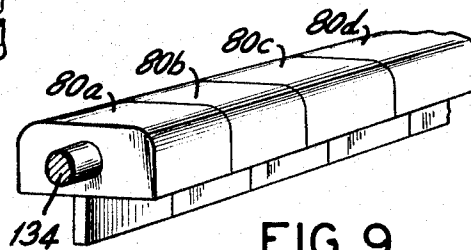


FIG. 9

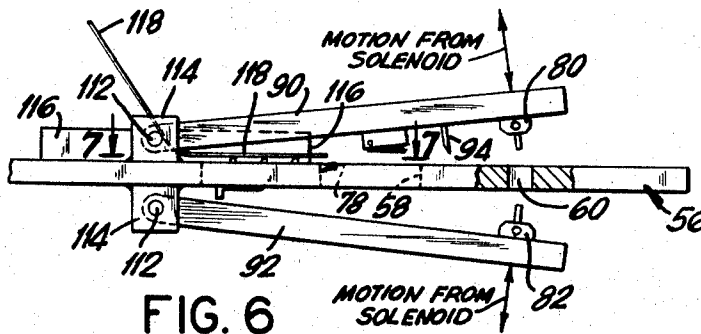


FIG. 6

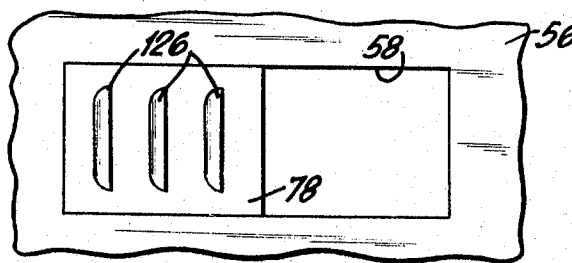


FIG. 7

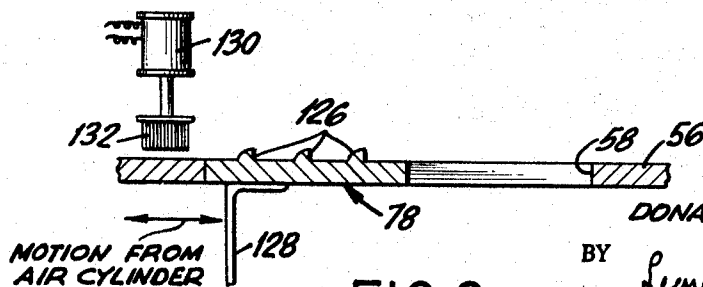


FIG. 8

INVENTOR.
DONALD C. LINDLEY

BY Leonard H. King

ATTORNEY.

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D. C. LINDLEY

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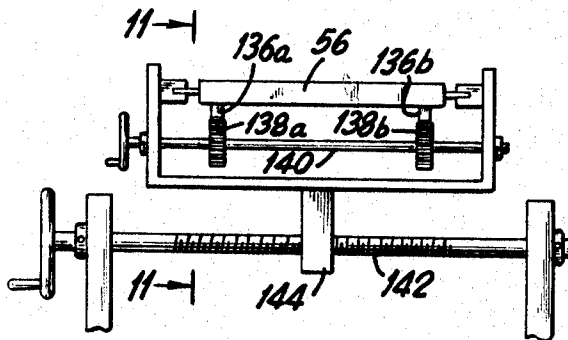


FIG. 10

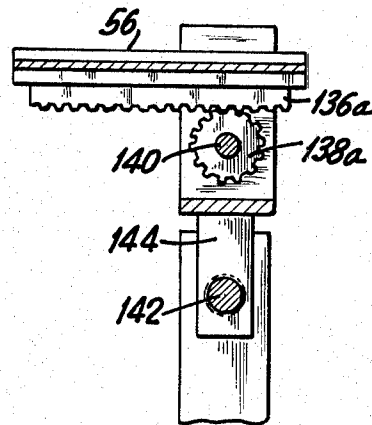


FIG. 11

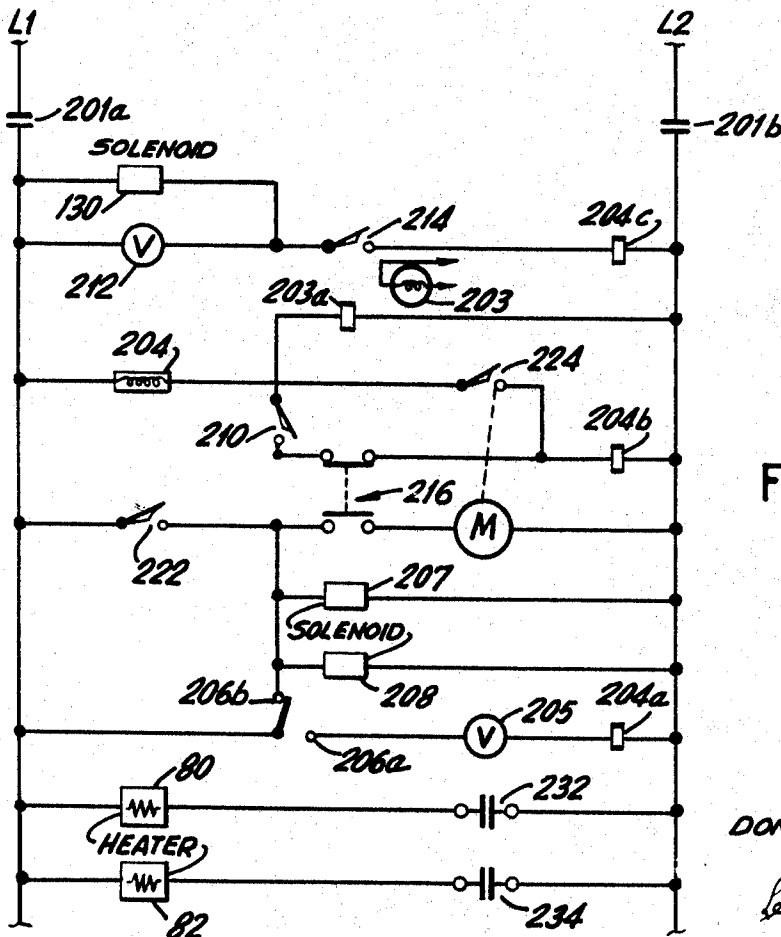


FIG. 12

INVENTOR
DONALD C. LINDLEY

Leonard H. King
ATTORNEY.

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METHOD AND APPARATUS FOR APPLYING HANDLES TO PLASTIC BAGS

Donald C. Lindley, Greenlawn, N.Y., assignor to Cellu-Craft Products Corp., New Hyde Park, N.Y.
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28 Claims. (Cl. 93—8)

This invention relates to bags provided with handles and more particularly to a method and apparatus for automatically and continually heat sealing handles to plastic bags.

Thin film plastic bags are presently popular as a packaging medium and as a premium item. The outer surface of the bag may be provided with an advertising message and they may be made colorful by suitable design and printing. The bags may be made reusable thus offering a convenience to the purchaser of the product contained therein. Additionally, when the bag is reused the producer of the merchandise benefits from the additional advertising. The bags are foldable and may be stored without deterioration and in a minimum of space.

In order to be practical as a premium item and have utility in the merchandising art, the bags must be fabricated inexpensively. Preferably the bag and the handle therefor should be assembled automatically and continually. The present invention is directed towards an improved method and apparatus for doing this. In one embodiment the present apparatus is an adjunct to a bag making machine, although it is to be understood that the invention, with the addition of input and takeoff mechanism, will function as a complete, self-sufficient machine. The handles are fed and heat sealed to a moving web of plastic film that is then formed into a bag.

Essentially the present invention comprises a work-piece supporting station in the form of a horizontal table across which a continuous web of double thickness polyethylene film is passed. Preformed polyethylene coated paper handles in the form of a pair of severable back-to-back webs are also continually directed across the work-piece supporting station at right angles to and in the same plane as the movement of the film web. Suitably positioned opening means separate the edges of the moving film and maintain the bag web in this condition while it traverses the table. Timed advance means feed in a pair of handles and then the handles are severed from their respective webs while substantially simultaneously, heat sealing means secure one handle to each of the layers of the plastic film. The present invention, to be more fully described hereinafter, has a capacity in the order of 100 assembled bags per minute. Further, the present invention is provided with adjustment means to accommodate a wide range of bag sizes and to time or synchronize the handle-to-bag assembly rate with the rate of work of the preceding and succeeding equipment.

Accordingly, it is an object of the present invention to provide improved, automatic and continual means to heat seal a pair of handles to plastic bags.

It is another object to provide high speed apparatus to heat seal a pair of handles to plastic bags.

An additional object is to provide an improved, heat sealable plastic bag and handle assembly apparatus that may be utilized with existing plastic bag making machinery.

A particular object is to provide combined handle cutoff and sealing means.

Still another object is to provide handle feed means synchronized with the motion of the handle cutoff and sealing means.

A further object is to provide means that will permit

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the apparatus of the present invention to assemble a pair of handles to bags in a range of different sizes.

An additional object is to provide an improved high speed method for assembling plastic coated handles to plastic bags.

Another object is to provide an automatic and continual method for assembling heat sealable handles to plastic bags.

These and other features, objects and advantages of the invention will, in part, be pointed out with particularity and will, in part, become obvious from the following more detailed description of the invention taken in conjunction with the accompanying drawing which forms an integral part thereof.

In the various figures of the drawing like reference characters designate like parts.

In the drawing:

FIG. 1 is a pictorial view partially broken away of a plastic bag and a pair of handles assembled in accordance with the present method and by the present apparatus;

FIG. 2 is a schematic plan view of the handle-attaching apparatus comprising the present invention;

FIG. 3 is a schematic elevational view taken along line 3—3 of FIG. 2;

FIG. 4 is another schematic elevational view taken along line 4—4 of FIG. 2;

FIG. 5 pictorially illustrates the relationship of a pair of longitudinal bag web edges and the spacing means therefor;

FIGS. 6—11 are enlarged detail views of various components and subassemblies of the instant invention; and

FIG. 12 is a schematic diagram of the circuitry used in conjunction with the present invention.

In the following description the handles are of the heat sealable type and may comprise a paper base with a polyethylene coating, or may be a polyethylene handle. While polyethylene is a currently preferred material, other suitable heat sealable materials may be employed.

Referring now to the drawing and in particular to FIG. 1, it will be seen that a typical bag and handle assembly 20 is comprised, in part, of a bag 22, defined by confronting plastic film layers 24 and 26, closed side edges 28 and 30, a closed bottom end 32 and an open top end 34. Assembly 20 is completed by a pair of handles 36, each one of which is secured proximate open end 34 of bag 22. The generally rectangular plastic coated handles 36 are each provided with an elongated aperture 38 parallel to both the lower or leading edge portion 40 and the upper or trailing edge portion 42.

The bag is polyethylene, as is at least a portion of one planar surface of each of the handles. As will be described more fully hereinafter, these similarly surfaced areas are heat sealed to each other. That is, the plastic coated leading edge portion 40 of one handle is secured to layer 24 proximate the open end of the bag and the plastic coated leading edge portion of the other handle is secured to layer 26 proximate the open end of the bag. Elongated aperture 36 in both handles serves as means to grip the assembly and also cooperates in the feeding of the handle web. In the embodiment of the invention to be described hereinafter, the bag web is in the form of a continuous, center folded length of polyethylene sheet. The handle may be cardboard and only the surface thereof that is in contact with the layer forming the wall thickness of the bag need be plastic coated.

The structure comprising the apparatus of the present invention is schematically illustrated in FIGS. 2-4. For purposes of explanation, a length of centerfolded, double thickness polyethylene film 50 is shown disposed about supply roller 52 although other delivery means may be employed.

Film 50 travels in a serpentine path and traverses a plurality of dancer rollers 54 which maintain the proper tension on the film before crossing a workpiece supporting station in the form of a flat, horizontal surface or table 56. A pair of slots 58 and 60 (FIG. 4), the lengthwise dimensions of which are parallel to the direction of travel of film web 50, are provided in the table for purposes to be explained in connection with the operation of the apparatus and the method of applying the handles.

A pair of parallel supply rolls 62 and 64 support upper and lower webs of severable handles 66 and 68, respectively. Flanges 62a and 64a, respectively, provide means for maintaining the supply rolls centered. The handles are adapted to be fed onto table 56 in the same plane as the bag web but in a transverse direction thereto. When the pair of handle webs reach table 56 the polyethylene coated surface of upper web 66 is facing upwardly while the comparable surface of lower web 68 is facing downwardly. Both webs are fed onto the table incrementally and in timed relation to the movement of the bag web.

Referring once again to the movement of the bag web, a separator 70 is positioned on table 56 in the path of one longitudinal edge of the bag web. As noted hereinabove, the bag web is initially either in tubular form or in center folded, bilayer form. If the web is tubular, it must be slit along a line parallel to its length before it can be fed across the work table. Of course, if it is center folded, it may be utilized as it comes from the supply source. L-shaped separator 70 is spacedly positioned over the table 56 proximate the point where the slit or open edge of the web starts its travel across the table and is continuous to a point where the web leaves the table. Thus when a portion of the bag web is on the table, the longitudinal, free edges thereof will be spaced from each other by a dimension sufficient to receive the leading pair of handles. FIG. 5 schematically and pictorially illustrates the action of the separator. With the two layers of the bag web separated as shown, the handle web may be transversely fed into juxtaposition therewith. Rollers 72 and 74, one of which is driven, are positioned proximate the level of the table in order to deliver the handle web to the bag web. It will be seen that a loop is provided in the handle web just subsequent to the drive roller station. The timing of actuator 76 is dependent upon other manufacturing considerations such as the width of the bag and handle, the speed of the bag web and the production rate of the succeeding machine that works on the bag and handle assembly. Means to time actuator 76 will be discussed more fully hereinafter in conjunction with the circuitry of the apparatus.

Immediately subsequent to the incremental feed of the handle webs, the spacedly opposed longitudinal edges of the bag web are secured by heat sealing to the leading handle and substantially simultaneously the leading handle is severed from the remainder of the web. When in web form, edges 40 and 42 are abutting. It is along this common line that the severing is done. Upper and lower heaters 80 and 82 are employed to secure the handles to the web. The heaters are suitably timed with relation to the movement of handle actuator 76 and are disposed above and below slot 60 in table 56. The lower heater projects through the table in order to contact the lower layer of the bag web. Solenoids 86 and 88 may advantageously be used to move heaters 80 and 82, respectively, into contact with the abutting surface of the bag web and the handles. As in the case of the actuator moving means, mechanical or hydraulic means may be employed to bring the heaters into contact with the bag web. Further, the type of motion of the heaters may be either arcuate or linear. Either motion may be utilized with good effect although, for purposes of illustration, arcuate motion is shown with heaters 80 and 82 mounted on pivotal brackets 90 and 92, respectively. Means to time the motion of the heaters will be discussed more fully hereinafter in connection with the circuitry of the apparatus.

In order to facilitate continual production, the handle cutoff is performed substantially simultaneously with the heat sealing of the handles and the plastic film web. For convenience of illustration, cutting means 94 is shown depending from the underside of pivotally mounted, upper heater support bracket 90. Cutting means 94 may be sized to sever the entire width of the handle web, or alternatively the handles which could be preperforated by conventional rotary cutting dies could be severed by a notched knife having cutting edges aligned with the lands between the perforations.

After the handles have been severed from their web and heat sealed to the bag web, the assembly then passes between an adjustably positionable photocell 98 and light source 100. Action of the knife assembly 104 is controlled by the photocell which senses a portion of the bag and is timed to sever each bag assembly from the moving web. At substantially the same time, heating means 106, disposed parallel to knife assembly 104, heat seals the bags to form the closed side edges 28 and 30. Conveyor system 108 delivers the cut assemblies to suitable stacking and storage means 110.

The foregoing rather generalized description pertains particularly to the method of incrementally feeding and applying polyethylene coated handles to a discontinuously moving web of polyethylene film. Now, in conjunction with FIGS. 6-11, various structural features of the apparatus will be discussed. Referring to FIGS. 6, 7 and 8, it will be seen that upper and lower heater support brackets are pivotally mounted on stub shafts 112 journaled in bearing blocks 114. Table 56 rigidly supports the bearing blocks as well as a pair of parallel handle guide means 116 and a pair of handle hold down bars 118. In combination, guide means 116 and hold down bars 118 define a channel through which the handle webs slide when they travel between their respective supply rolls and the workpiece support station where heat is applied.

The blade portion of the upper and lower heating means 80 and 82 are each provided with a Teflon fluorocarbon coated glass fibre cloth covering 120 which prevents the heating bars from burning through the polyethylene film and becoming contaminated from the polyethylene.

Referring particularly to FIG. 7 and FIG. 8, the means to incrementally advance the opposed handle webs into juxtaposition with the bag web is shown. Opening 58 in table 56 is substantially larger than opening 60 so that sliding indexing member 78 may be accommodated. On the upper surface of member 78, there is provided at least one but preferably three claws 126 adapted to engage slot 38 in the body of each of the handle pairs. The purpose of the claws is to advance the handle webs in timed relation to the bag web movement. Provision of more than one claw also assures that upper and lower webs 66 and 68 will be accurately superimposed one above the other. Flanges 62a and 64a prevent any lateral straying of the handle webs. The leading or pushing edge of each claw is substantially perpendicular to the plane of the table and member 78 while the top surface is sloped. In operation, the first three sets of handles are engaged by the claws and properly aligned with each other. They are then advanced between a pair of transversely spaced side guide means 116 and centrally located hold down means 118 so that the leading handles are positioned between the opposed layers of the film web. When member 78 retracts it slides rearwardly with respect to the handles in order to reengage the handle web for the next cycle.

Member 78 is connected to and actuated by the piston of air cylinder 76 by means of a simple bracket 128. FIG. 8 also illustrates the utilization of a solenoid 130 to hold down the web of handles. After the leading pair of handles is severed by knife 94 and secured to the bag web by heating members 82 and 84, solenoid 130, having a brush-like member 132 at the lower end of its armature, is activated. The brush bears against the handle web so that

indexing member 78 may be retracted without displacing the handle web.

FIG. 9 pictorially illustrates the ganged heat sealing members and is to be considered typical of both the upper and lower heaters. However, for the purposes of this description, reference will only be made to upper heating member 80. The heater may be made in several sections 80a, 80b, 80c, 80d, etc. each of which is approximately one inch long. Where multi-sectioned heater is used, it has been found convenient to have a solid center section approximately four inches long and each of the elements on either side thereof is made pivotable about support bar 134. Thus, for the smallest size bag likely to be made on the machine only the center element is used and the others are swung out of the way. To fabricate, say, a six-inch wide bag, one element on each side of the center group will be pivoted downward. In a like manner, the heating elements may be enlarged for other bags. Alternatively, a single length heater element could be used for all size bags.

FIG. 10 and FIG. 11 illustrate means to vary the position of the table 56 so that bags of different sizes may be fabricated in timed relation to the complementary bag web feeding and takeoff machinery. Table 56 is provided with rack members 136a and 136b integral with each side thereof and parallel to the direction of movement of the bag web. Gears 138a and 138b are rotatably journaled in frame members and mate with the racks whereby rotation of connecting rod 140 will displace the table parallel to the movement of the bag web. Transverse movement of the table that is parallel to the handle web feed or perpendicular to the bag web feed is accomplished by rotation of a lead screw 142 which mates with a nut 144 secured beneath the table.

Electrical operation of the machine

(a) Operation is initiated by the closing of main switch contacts 201a, 201b.

(b) A signal from the bag machine applied to relay coil 203 causes contacts 203a to close, thereby energizing main relay coil 204. In turn, contacts 204a and 204b close while contact 204c opens.

(c) The closing of contacts 204a energizes solenoid valve 205 causing air cylinder 76 to extend so as to feed a handle into the bag. At the end of the stroke switch 206 is moved from position (a) to position (b) opening the circuit to solenoid valve 205.

(d) In position (b) switch 206 completes a circuit to energize the upper and lower heat sealer solenoids 207 and 208, respectively, to bring heat sealing bars 82 and 84 into heat position against the handle and bag.

(e) As the heat sealing bars move into position, micro-switch 210 is opened deenergizing solenoid coil 204 opening contacts 204a and 204b and closing contacts 204c to energize hold down solenoid 130 and air cylinder solenoid valve 212 to cause the insert bar to retract. Upon retraction, limit switch 214 is opened to deenergize the line. When the insert bar is advanced in the subsequent cycle limit switch 214 closes but at this time the contacts 204c are open.

(f) If extended heating time is required for a given set of materials then the operator places switch 216 in position (b) to energize time delay motor 220 when limit switch 222 is closed by the insert bar when the latter reaches the extreme forward position. After the preset time a conventional cam driven by the time delay motor 220 opens limit switch 224.

(g) The heaters 82 and 84 are controlled by thermostats 232 and 234, respectively.

Having thus disclosed the best embodiment of the invention presently contemplated, it is to be understood that various changes and modifications may be made by those skilled in the art without departing from the spirit of the invention.

What is claimed is:

1. Apparatus for heat sealing a pair of handles from continuous webs to a bag from a continuous web, said apparatus comprising:

- (a) first advancing means arranged to move a bag web having two opposed layers;
- (b) a support table having an upper surface positioned in the plane of the bag web path;
- (c) spacing means positioned proximate said table in the path of the bag, said spacing means being interposed between the bag layers during their travel across said table;
- (d) second advancing means arranged to move a pair of vertically superimposed handle webs into a position between the layers of the bag web, the direction of movement of the handle webs being substantially perpendicular to and in substantially the same plane as the bag web movement;
- (e) first severing means positioned proximate said table to remove said leading pair of handles from its web;
- (f) heating means mounted proximate said table, said heating means being adapted to contact the outside surfaces of the bag web edges proximate the portions thereof that are adjacent the leading handle; and
- (g) second severing means positioned in the path of the bag web at a point past said table in the direction of bag web movement, said second severing means being arranged to cut the bag web in a plane perpendicular to the longitudinal dimension thereof.

2. The apparatus of claim 1 including means to vary the timed relationship of the movement of said first and second advancing means, said first and second heating means and said first and second severing means.

3. The apparatus of claim 1 wherein said second advancing means comprises:

- (a) a handle-advancing member having an upper surface extending slightly above the top of said table, said handle advancing member being adapted to intermittently engage the leading pair of handles; and
- (b) drive means secured to said handle advancing member, said drive means being arranged to reciprocally move said handle advancing member whereby the leading pair of handles are moved from a first position into a second position to thereby dispose the leading pair of handles between the opposed spaced layers of the bag web.

4. The apparatus in accordance with claim 3 wherein the upper surface of said handle advancing member is provided with a pusher bar adapted to engage and align at least the first pair of handles in the handle web whereby the individual handles in each pair of handles are in accurate registry with each other.

5. The apparatus in accordance with claim 3 wherein the upper surface of said handle-advancing member is provided with a plurality of pusher bars adapted to engage and align at least the two forwardmost pairs of handles in the handle web whereby the undivided handles in each pair of handles are in accurate registry with each other.

6. The apparatus in accordance with claim 1 including means to momentarily impede the movement of the handle webs immediately subsequent to the heat sealing and severance of the leading pair of handles.

7. The apparatus in accordance with claim 1 wherein said heating means comprises a first heating element disposed above said table transversely to the direction of the handle web movement and a second heating element disposed below said table transversely to the direction of the handle web movement, said heating means being mounted whereby said first and second heating elements may be brought into contact with and removed from the opposed layers of the bag web.

8. The apparatus in accordance with claim 7 wherein

said first and second heating elements are pivotally mounted.

9. The apparatus in accordance with claim 7 wherein the length of said first and second heating elements is variable, said apparatus thereby being adaptable to accommodate a range of handle sizes.

10. The apparatus in accordance with claim 1 including means to drive the pair of handle webs independently of said second advancing means.

11. The apparatus in accordance with claim 1 including guide means to prevent side-to-side movement of the handle webs.

12. The apparatus in accordance with claim 1 wherein said second advancing means moves towards and away from the open longitudinal edge of the bag web and wherein there is further included holding means arranged to bear against the handle web when said second advancing means moves away from the bag web.

13. The apparatus in accordance with claim 1 wherein said holding means is a brush.

14. Apparatus for heat sealing pairs of elongated handles to a moving bag web, each of the handles having an elongated hand-gripping slot disposed parallel to the elongated ends thereof, the handles being severably attached to each other in end-to-end relationship to define a pair of parallel continuous webs, the bag web being characterized by one closed longitudinal edge and one open longitudinal edge to define a continuous web, the aforementioned edges extending in the direction of bag web movement, said apparatus comprising:

- (a) a workpiece supporting table positioned in the path of the bag web and the handle webs;
- (b) spacing means positioned proximate said table, said spacing means being arranged to separate the open, longitudinal edges of the bag web when it is positioned on said table, said spacing means being arranged to keep the bag web edges open during its travel across said table;
- (c) advancing means arranged to direct the pair of handle webs transversely to the direction of the bag web movement;
- (d) reciprocally movable claw means arranged to position the leading edge of the leading pair of handles between the opened edges of the bag web, said claw means being slidably disposed within said table of the bag web;
- (e) first and second heating means adapted to contact the opened edges of the bag web between which is disposed the leading pair of handles;
- (f) means to sever the leading pair of handles from the remainder of the web; and
- (g) means to sever the assembled bag and handles from the bag web.

15. The apparatus in accordance with claim 14 including means to momentarily impede the movement of the handle webs immediately subsequent to the heat sealing and severance of the leading pair of handles.

16. The apparatus in accordance with claim 14 wherein the upper surface of said reciprocally movable claw means is provided with a pusher bar adapted to engage and align at least the first pair of handles in the handle web whereby the individual handles in each pair of handles are in accurate registry with each other.

17. The apparatus in accordance with claim 14 wherein the upper surface of said reciprocally movable claw means is provided with a plurality of pusher bars adapted to engage and align at least the two forwardmost pairs of handles in the handle web whereby the undivided handles

in each pair of handles are in accurate registry with each other.

18. The apparatus in accordance with claim 14 including means to vary the timed relationship of the movement of said means to advance the handle webs, said first and second heating means and said means to sever the handle webs and the bag web.

19. The apparatus in accordance with claim 14 wherein said heating means comprises a first heating element disposed above said table transversely to the direction of the handle web movement and a second heating element disposed below said table transversely to the direction of the handle web movement, said heating means being mounted whereby said first and second heating elements may be brought into contact with and removed from the longitudinal edges of the bag web.

20. The apparatus in accordance with claim 19 wherein said first and second heating elements are pivotally mounted.

21. The apparatus in accordance with claim 19 wherein the length of said first and second heating elements is variable, said apparatus thereby being adaptable to accommodate a range of handle sizes.

22. The apparatus in accordance with claim 14 including means to drive the pair of handle webs independently of said second advancing means.

23. The apparatus in accordance with claim 14 including guide means to prevent side-to-side movement of the handle web.

24. The apparatus in accordance with claim 14 wherein said second advancing means moves towards and away from the open longitudinal edge of the bag web and wherein there is further included holding means arranged to bear against the handle web when said second advancing means moves away from the bag web.

25. The apparatus in accordance with claim 14 wherein said holding means is a brush.

26. The method of securing pairs of handles to a double thickness bag web moving across a workpiece supporting table, said method comprising the steps of:

- (a) separating two opposed longitudinal edges of the bag web during its travel across the workpiece supporting table;
- (b) feeding the first pair of a plurality of handles between the spaced edges of the bag web, said handles being severably connected to each other in an end-to-end relation to define a continuous web, said feeding of the handle web being in a direction transverse to said feeding of the bag web;
- (c) heat sealing the first pair of handles from the handle web between the spaced edges of the bag web; and
- (d) severing the secured first pair of handles from the remainder of the handle web.

27. The method in accordance with claim 26 including the step of momentarily impeding the feeding of the handle web immediately subsequent to the severance of the first pair of handles.

28. The method in accordance with claim 26 including the step of severing the bag having a handle secured thereto from the remainder of the bag web.

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BERNARD STICKNEY, *Primary Examiner*.