Jan. 20, 1948. H. O. IRMSCHER 2,434,657

MECHANISM FOR HEAT SEALING PACKAGE SEAM JOINTS

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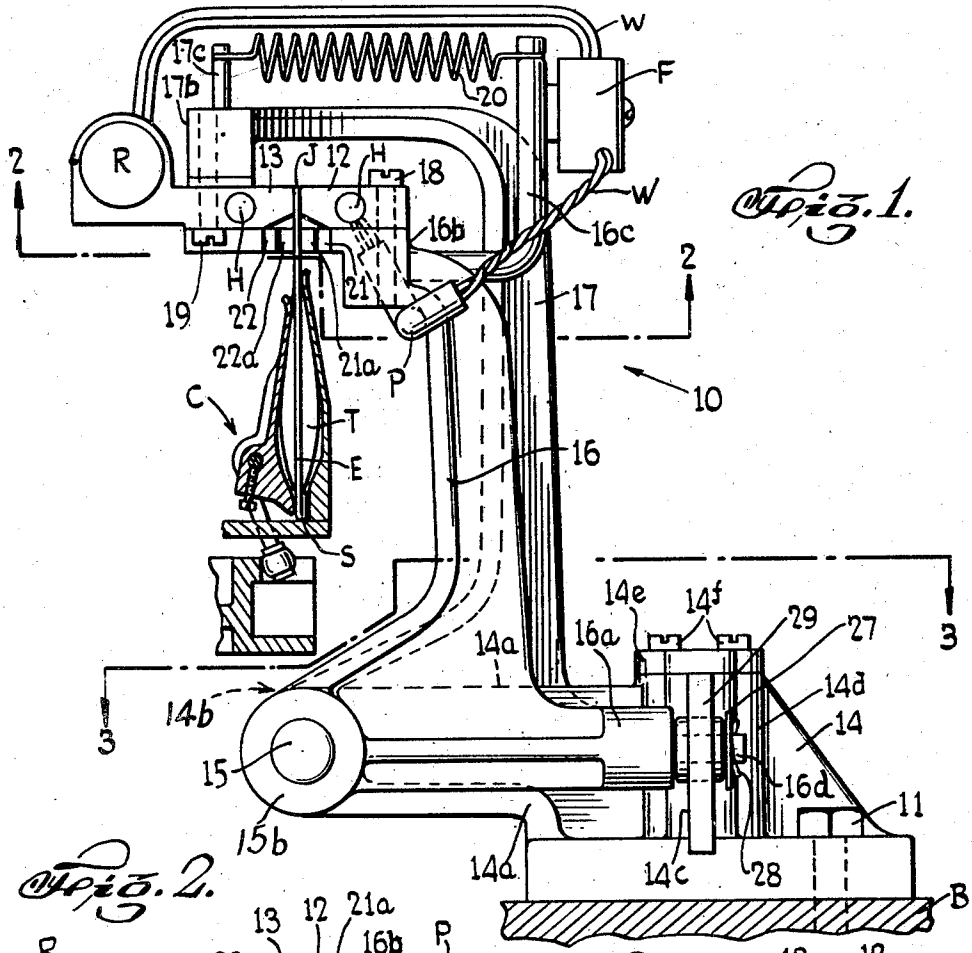


Fig. 1.

Fig. 2.

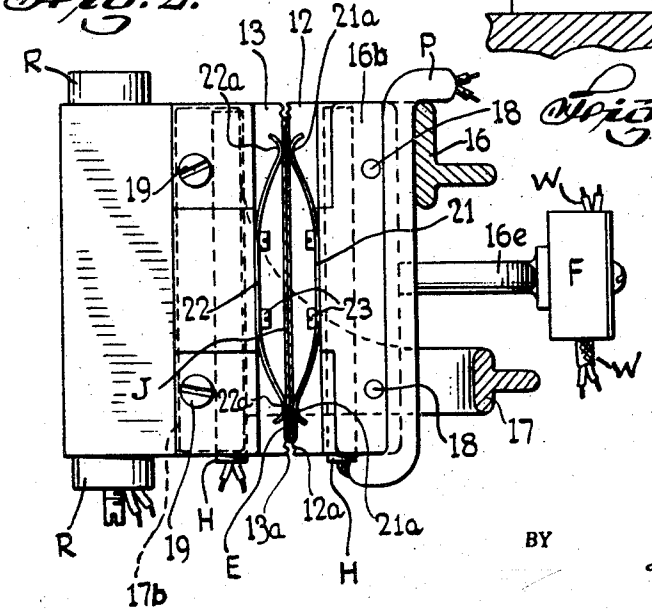
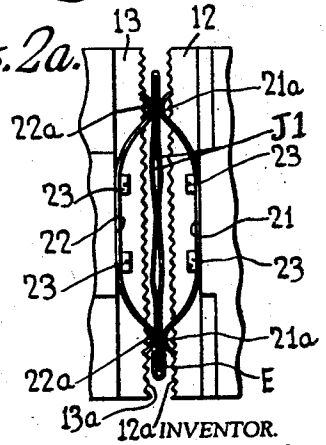


Fig. 2a.



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Fig. 3.

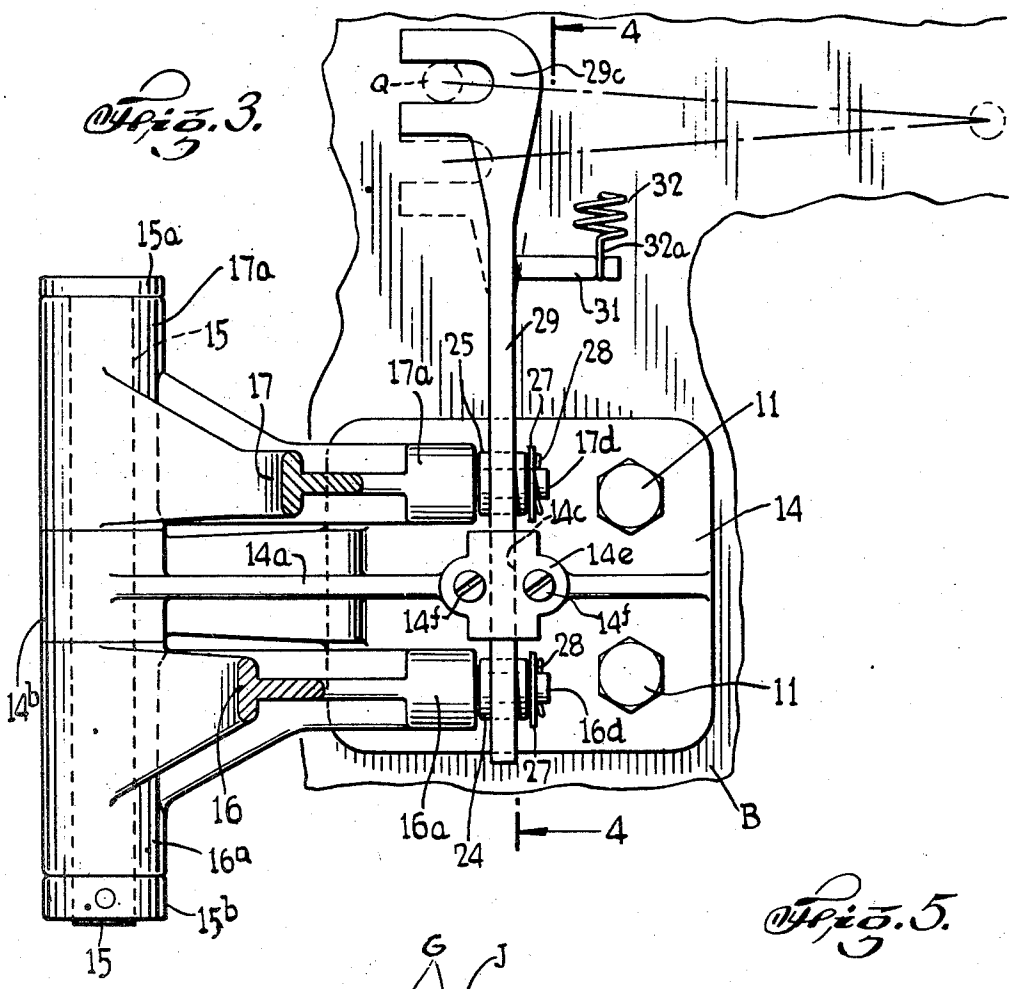


Fig. 5.

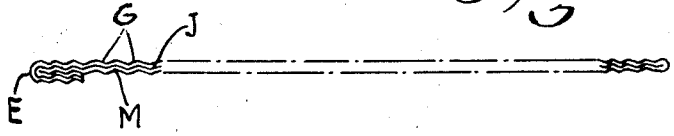
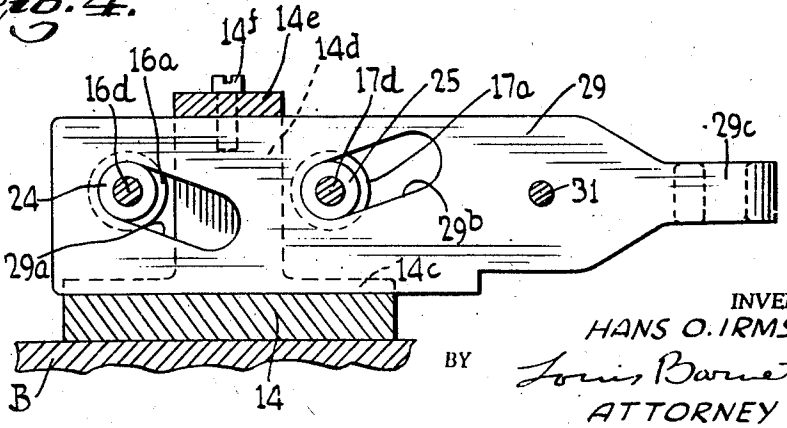


Fig. 4.



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MECHANISM FOR HEAT SEALING PACKAGE SEAM JOINTS

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Application July 16, 1941, Serial No. 402,635

11 Claims. (Cl. 154—42)

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This invention relates to the manufacture of filled containers or bags and more particularly is directed to portions or mechanisms of machines such as used for making filled bags, tea-balls or similar infusion packages in which the bag seams are formed with heat sealed closure joints.

Among the objects of the invention is to generally improve portions of a mechanism of bag packaging and tea-ball making machines of the character described, which shall comprise few and simple parts that are easy to assemble, which shall be readily incorporated in various types of partly and fully automatic existing packaging machines producing filled bags, tea-balls and the like articles for replacing the usual seam joint sewing and stapling devices, which shall also be adapted to incorporation as part of newly constructed high-speed packaging machines and when so incorporated in either existing or newly constructed machines permitting an increase in the normal output capacity thereof, and which shall be practical and efficient to a high degree in operation.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter described and of which the scope of application will be indicated in the following claims.

In the accompanying drawing in which is shown a possible illustrative embodiment of the invention,

Fig. 1 is a side elevational view of part of an automatic tea-ball manufacturing machine showing a top closure heat sealing mechanism incorporated therein to embody the invention;

Figs. 2 and 3 are sectional views taken on lines 2—2 and 3—3, respectively, in Fig. 1, the heat sealing clamping means of said mechanism being shown in Fig. 2 in effective closed position;

Fig. 2a is a fragmentary view of the clamping means shown in Fig. 2 in an operative open position prior to or following that shown in Fig. 2;

Fig. 4 is a cross-sectional view taken on line 4—4 in Fig. 3; and

Fig. 5 is an enlarged detailed top plan view showing the top closure heat sealed seam joint of the tea-ball formed by the improved mechanism shown in Figs. 1 to 4, inclusive.

In my co-pending application, Serial No. 402,634, filed simultaneously herewith, now Patent No. 2,376,360, dated May 22, 1945, there is disclosed an improvement in the manufacture of

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filled containers or packages and more particularly a novel mechanism for making folded heat sealed bottom seam joints of package bags for infusion packages, such as tea-balls or the like. The present invention is directed more particularly to an improved mechanism incorporated in such machines for forming a heat sealed top closure joint. Since successful and practical commercial utility for the latter improvements depends on its adaptability to large scale quantity production of such packages on automatic machines, the present invention contemplates the incorporation of the improved heat sealed top closure seam joint mechanism in automatic machines of any of the various existing types. To this end there is shown in the drawing and described hereinafter the incorporation of the present invention in a high-speed fully automatic tea-ball machine constructed, for example, like that of the co-pending application of Mervin Allatt, Serial No. 37,257, filed August 21, 1935, now Patent No. 2,290,158. Only fragmentary portions of the Allatt machine are included herein as will enable the different features of the invention to be understood and except as to the details of the construction and the mode of operation to be pointed out, the portions of the bag forming machine may be as shown in the machine illustrated in said Allatt patent, to which reference may be had for a complete description thereof. It is to be understood, however, that the invention is equally applicable to incorporation in other and various types of packaging machines.

Referring now to the drawing 10 denotes a mechanism for heat sealing the top closure joint J of a partially filled bag, as for example, the tea bag T which previously on another part of the machine (not shown) has been formed from a tubular sheet material M having a heat sealed edge joint E and a heat sealed upfolded bottom closure joint S, said mechanism 10 being mounted on a stationary portion of the machine B by fastening bolts 11 and being supplied with top open ended filled bags by a suitable transfer carrier portion C, a fragmentary portion of which is shown in Fig. 1. Full details of the construction and a complete description of the operation of such carrier C are given in the above-mentioned Allatt patent.

The tubular sheet material M of which the tea bag is formed may be of foraminous construction, such as filter paper, perforated parchment paper or Cellophane, cotton gauze or the like. That used in the practice of the invention here de-

scribed is a filter paper base layer coated on one side with a thermosetting "partially fused" plastic lamina for forming the heat sealed border joint of the package bag being manufactured. If desired, the tubular sheet material M may be made from a continuous web of filter paper of suitable dimensions folded over on itself, said web having the "partially fused" plastic lamina coating on the inner surface with the marginal edges thereof in contact and folded over and creased to form a seam joint. On heat sealing, the entire length of said folded creased seam joint of the tubular sheet material M may be sealed as at E, as shown in Figs. 1 and 4.

The carrier C may be constructed to have a step by step movement, the operation taking place in timed relation with the mechanism 10 so that the open ended filled bag M is brought to rest during the intermittent movement of the machine operations between a pair of heated pressure jaws 12 and 13. Heat is supplied to each of said jaws by suitable means embedded therein, such as electric heater H, the temperature of said heaters H being controlled and regulated by a suitable thermostat regulator R. Said heaters H and regulator R may be of any well understood construction and may be interconnected through a wiring installation in the well understood manner comprising conduit fitting P, wires W and a junction box F, as shown in Figs. 1 and 2.

The mechanism 10 comprises, besides the jaws 12 and 13, a base fitting 14, which is secured by said bolts 11 to the machine frame B and has a horizontally disposed integrally ribbed extension 14a which terminates in a bearing support 14b located as seen in Figs. 1 and 3 just below the end of the carrier C. Through said bearing support 14b extends a horizontally disposed shaft 15 on the opposite end portions of which and separated by the intermediate bearing support 14b are mounted for swinging movement upstanding arms 16 and 17 by lower or bearing ends 16a and 17a, respectively. The lower arm ends 16a and 17a may be retained against displacement from off their respective ends of shaft 15 by providing a headed portion 15a for confining the arm end 17a and a pinned collar 15b for the arm end 16a as shown in Fig. 3. The arm 16 at its upper or free end 16b carries the jaw 12 which is secured in place by suitable fastening means, such as screws 18. The arm 17 at its upper or free end 17b extends outwardly over said carrier C and has secured by screws 19, the jaw 13 in cooperative alignment with the jaw 12. There is also provided posts 16c and 17c upstanding from upper arm ends 16b and 17b, respectively, to which the opposite ends of a coil tension spring 20 are anchored to extend the latter horizontally above the arm end 17b. Said spring 20 serves to constantly urge the jaws 12 and 13 on arms 16 and 17 to coact toward each other.

As seen from Figs. 1, 2 and 2a, the jaws 12 and 13 may be formed with corrugated mating surfaces 12a and 13a, respectively, so as to impress corresponding corrugations G in forming the top closure seam joint J shown in Fig. 5. The jaws 12 and 13 may be cut back or recessed at the edge portion of each under surface 12a and 13a, respectively, so as to provide sufficient space for mounting a pair of bowed springs 21 and 22. These springs 21 and 22, may be firmly secured at a mid-portion of each to arm ends 16b and 17b, respectively, inwardly of jaw surfaces 12a and 13a, respectively, by suitable fastening means such as spaced screws 23.

The bowed springs 21 and 22 as shown in Fig. 2a are symmetrically curved and have their rounded contacting spaced ends 21a and 22a, respectively, extended outwardly beyond the surfaces 12a and 13a, respectively. Said spring ends 21a and 22a, however, are normally spaced apart when the jaws 12 and 13 are in fully open position to allow free passage of the open end portion of the tea-ball bag to be advanced and aligned by the carrier C between the jaws 12 and 13.

The lower arm ends 16a and 17a each carry stub shafts 16d and 17d, respectively, projecting therefrom over the base fitting 14. Rollers 24 and 25 are mounted for rotation on, and are retained against displacement from said shafts 16d and 17d, respectively, by washers 27 and cotter pins 28. Said rollers 24 and 25 engage in spaced angularly disposed slots 29a and 29b, respectively, of reciprocably mounted rack bar 29 in a slideway 14c which may extend at right angles to the axis of base fitting extension 14a, the fitting 14 being provided with an enlarged integral portion 14d in which said slideway 14c is formed, a cover plate 14e fastened by screws 14f confining the rack bar 29 in said slideway 14c, as shown in Figs. 1, 3 and 4.

The rack bar 29 may terminate at a spaced distance from said slots 29a and 29b in a forked connection 29c which is adapted to engage with an actuating shift rod Q, the latter being operated in timed relation with the advancing movement through the machine of the tea-balls T on the carrier C, such actuation of rack bar 29 by said shift rod Q being shown and indicated in dotted lines in Fig. 3. To further assist in urging the jaws 12 and 13 to be in effective pressure position, said rack bar 29 may be provided with an extending post 31 on which one end 32a of a tension spring 32 is anchored, the other end being secured to a relatively stationary part of the machine (not shown) in the well understood manner. Said spring 32 is constructed and arranged to urge the rack bar 29 into its extended slidable position, shown in full lines in Fig. 3, and counteracts the movement of the shift rod R to swing the jaws 12 and 13 open.

With the parts constructed, assembled and incorporated in a package machine as described above and shown in the drawing, the operation thereof will now be readily understood. The carrier C which is supplied with a succession of open ended partially filled tea bags bring by a step by step advance movement an open ended portion J1 of the tea bag between the spread apart jaws 12 and 13 as shown in Fig. 2a. The springs 21 and 22 are then separated sufficiently to permit said bag end portion J1 to pass therebetween. When said bag end portion J1 on the carrier C is brought to rest in alignment with the jaws 12 and 13, the rack bar 29 is shifted by the rod Q from the dotted line to the full line position shown in Fig. 3. This shifting movement swings arms 16 and 17 toward each other to close the jaws 12 and 13 for clamping bag end portion J1 and when electric power is supplied to heaters H, a heat sealed top closure joint J is provided. It will be noted from Figs. 2 and 2a that in the closing movement of the jaws 12 and 13, the springs 21 and 22 are first to contact the spaced rounded cooperative ends 21a and 22a against the sides of the open end portion J1 to stretch said bag end portion J1 smooth forming a temporary closure and retaining same for the heat sealing action by jaws 12 and 13, thus eliminating possible crumpling or creasing of the material

at said bag closure end portion and assuring a perfectly formed heat sealed joint J. After the jaws 12 and 13 have heat sealed the joint J they are again separated by shifting of the rack bar 29 to the dotted line position shown in Fig. 3 against the action of spring 32 for swinging the arms 16 and 17 away from each other against the action of the spring 20 to open the jaws 12 and 13. The jaws 12 and 13 on being again separated, carry the springs 21 and 22 to clear the passage for the finished tea-ball T permitting the carrier C and said finished tea-ball T with the closure joint J to be discharged from the machine, if desired, or to pass to a string handle applying mechanism (not shown) as provided in said Allatt patent. On advancing said finished tea-ball T beyond mechanism 10, the carrier C positions another open end portion J1 of a partially filled tea bag between the jaws 12 and 13 and the heat sealing operations above described are repeated as a continuous cycle of operations.

It will thus be seen that there is provided a mechanism in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

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

1. A mechanism of the character described comprising a base fitting, a pair of spring pressed arms pivotally mounted on said fitting for swinging movement to and away from each other, a pair of pressure jaws carried by said arms, heating means for said jaws, spring means carried with said jaws by the arms for stretching smooth open ends of package bags inserted therebetween to temporarily retain said open ends as closures, and means for mounting said spring means and pressure jaws on the arms whereby said spring means and pressure jaws are effective in succession to form a heat sealing joint at said open ends upon actuation of said arms.

2. A mechanism of the character described comprising a base fitting, a pair of spring pressed arms pivotally mounted on said fitting for swinging movement, a pair of pressure jaws carried by said arms, heating means for said jaws, a rack movably mounted on said fitting and connecting with said arms for swinging said jaws to and away from each other, spring means having cooperating spaced apart effective portions carried with said jaws by the arms for stretching smooth open ended portions of package bags inserted in a path between said jaws and spring means when swung to an open position, said spring means in said open position being extended into said path beyond the jaws to effect a temporary closure for said open ended portions prior to heat sealing thereof by the jaws.

3. The mechanism defined in claim 2 in combination with a carrier for advancing package bags with said open ended portions through a machine in timed relation with respect to the operation of said mechanism.

4. In a packaging machine of the character described, a carrier for advancing through the machine in succession filled package bags having open ended portions coated on the inner facing side with a thermosetting "partially fused" plastic lamina, a mechanism comprising means cooperating with the advancing movement of the carrier with said bags for stretching portions of each of said bags inwardly of said open ended portions to form a smooth completely tight closure with the lamina on said inner facing sides in face to face contact relation throughout the width of the bag, and means for pressure heating said open ended portions of each bag beyond said closure while retaining said stretching means effective during the formation of a heat sealed border edge joint on each bag beyond said closure.

5. In the combination defined in claim 4 in which both of said means are incorporated into the mechanism to operate together by a single actuating means.

6. In the packaging machine defined in claim 4 in which said pressure sealing means has mounted for movement therewith the stretching means, the latter being positioned for effective operation prior to forming the heat sealed edge joint.

7. In a package machine of the character described, a carrier for advancing through the machine in succession filled package bags having open ended portions coated on the inner surface side thereof a thermosetting plastic lamina, a mechanism comprising means having effective spaced apart portions for stretching each of said bags to form a smooth tight temporary closure with the lamina on said inner side in face to face contact relation inwardly of said open ended portions, means for pressure heat sealing said open ended portions beyond said temporary closure while retaining said stretching means effective during the formation of a heat sealed edge joint, and means for actuating said stretching and pressure heat sealing means connected to operate in timed relation with the carrier advancing movement, the stretching means being positioned to be effective during the actuation of the sealing means and before the final operation thereof.

8. In combination with a carrier of a packaging machine for advancing filled package bags having heat sealable open ended portions, of a pair of pressure jaws, arms pivotally mounting said jaws for swinging movement to and away from each other positioned along the path of travel of said bag open ended portions, heating means incorporated in said jaws, and a pair of springs mounted for swinging by the arms with said jaws, said springs having cooperating spaced apart effective portions normally extending closer to the path of travel of said open ended portions than said jaws when in open position for forming smooth closures on said open end portions inwardly of outer edges thereof preparatory to and during the pressure heat sealing action by said jaws at said edges and beyond said closures.

9. A mechanism of the character described comprising a base fitting, a pair of pivoted spring pressed arms carried by said fitting, cooperating separable pressure jaws terminating said arms mounted for swinging movement to and away from each other, heating means for said jaws, a pair of springs carried by said arms adjacent the jaws, said springs having spaced apart contacting ends for gripping and smooth stretching open ends of package bags inserted between said separable jaws to retain said ends as temporary complete closures across the entire width of the bags, and means for mounting said springs and said jaws on the arms whereby said springs and jaws are effective in succession for forming heat sealed

joints at the edges of said open ends upon actuation of said arms.

10. A mechanism of the character described comprising a pair of pressure jaws pivotally mounted for swinging movement to and away from each other, heating means for the jaws to provide a heat sealed joint at an open end portion of a package bag when inserted between and clamped by said jaws, and spring means having spaced cooperating portions carried with the jaws and normally positioned to partially project into a path of movement of said bag open end portion to form a smooth temporary closure prior to and during the clamped heat sealing action of said jaws.

11. The mechanism defined in claim 1 in combination with a carrier means for advancing package bags with top open ends in unrestricted positions and in timed relation with respect to the swinging movement of said arms and jaws, and the forming of a smooth temporary closure prior to and during the clamped heat sealing action of said jaws by said spring means.

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