May 22, 1945. H. O. IRMSCHER 2,376,360

MECHANISM FOR HEAT SEALING PACKAGE SEAM JOINTS

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Fig. 1.

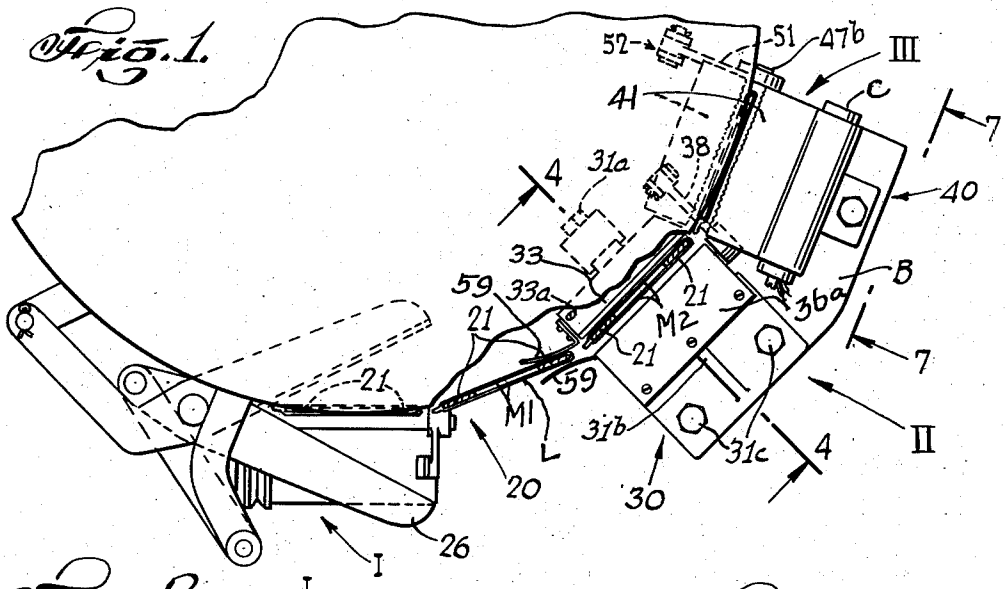


Fig. 2.

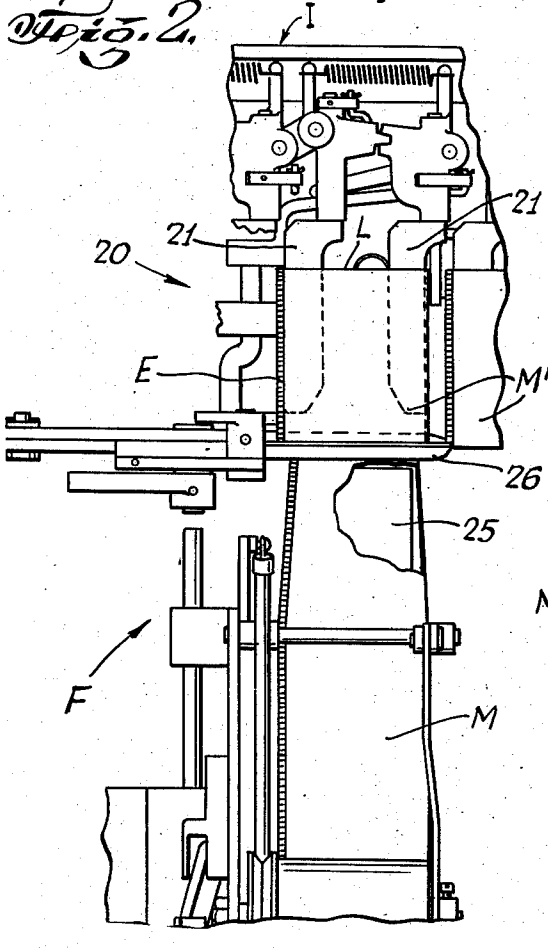
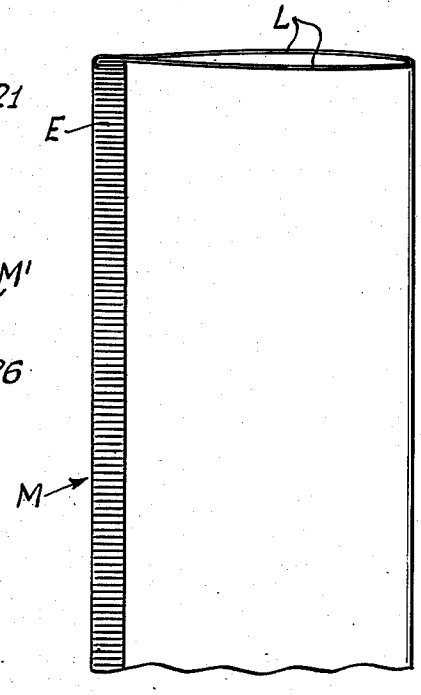


Fig. 3.



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Fig. 6.

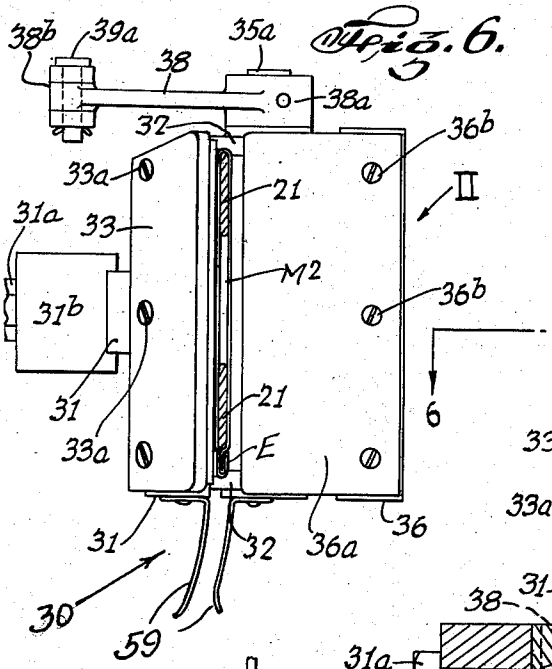


Fig. 4.

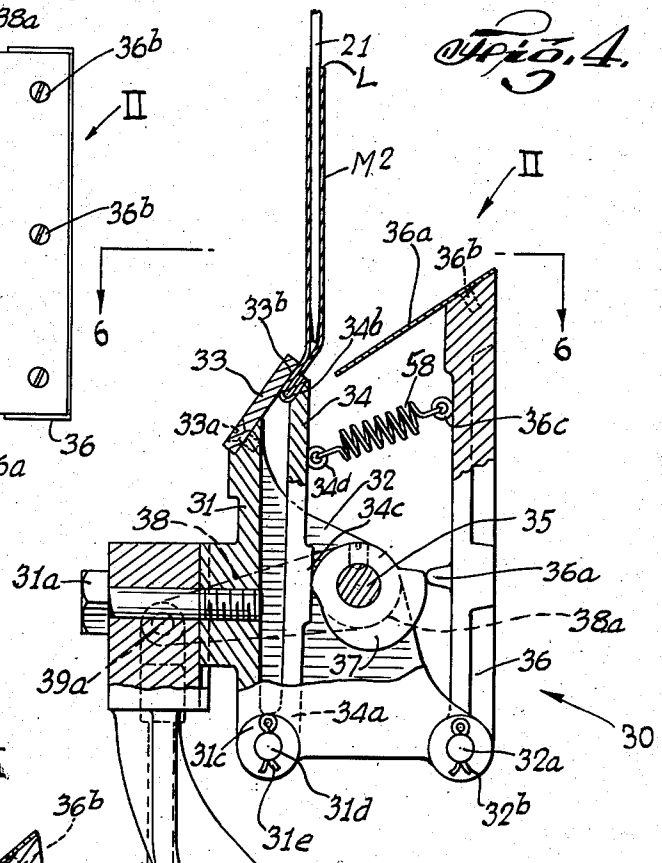
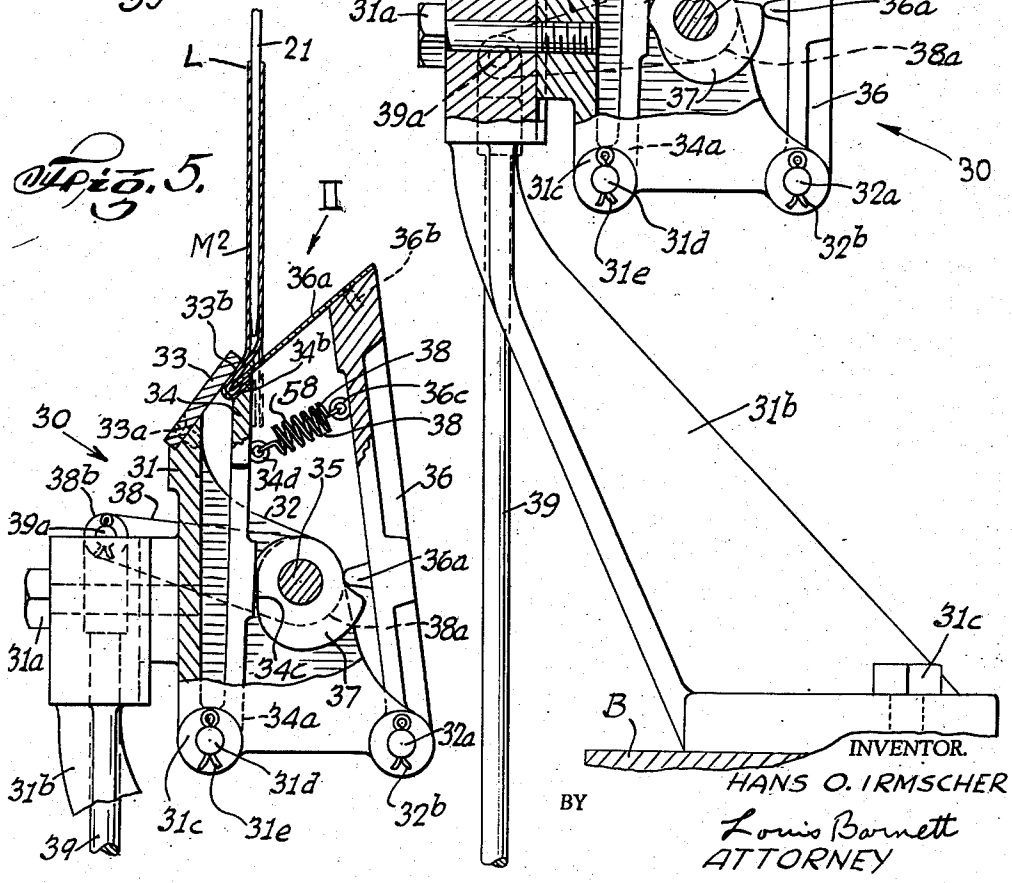


Fig. 5.



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Fig. 7.

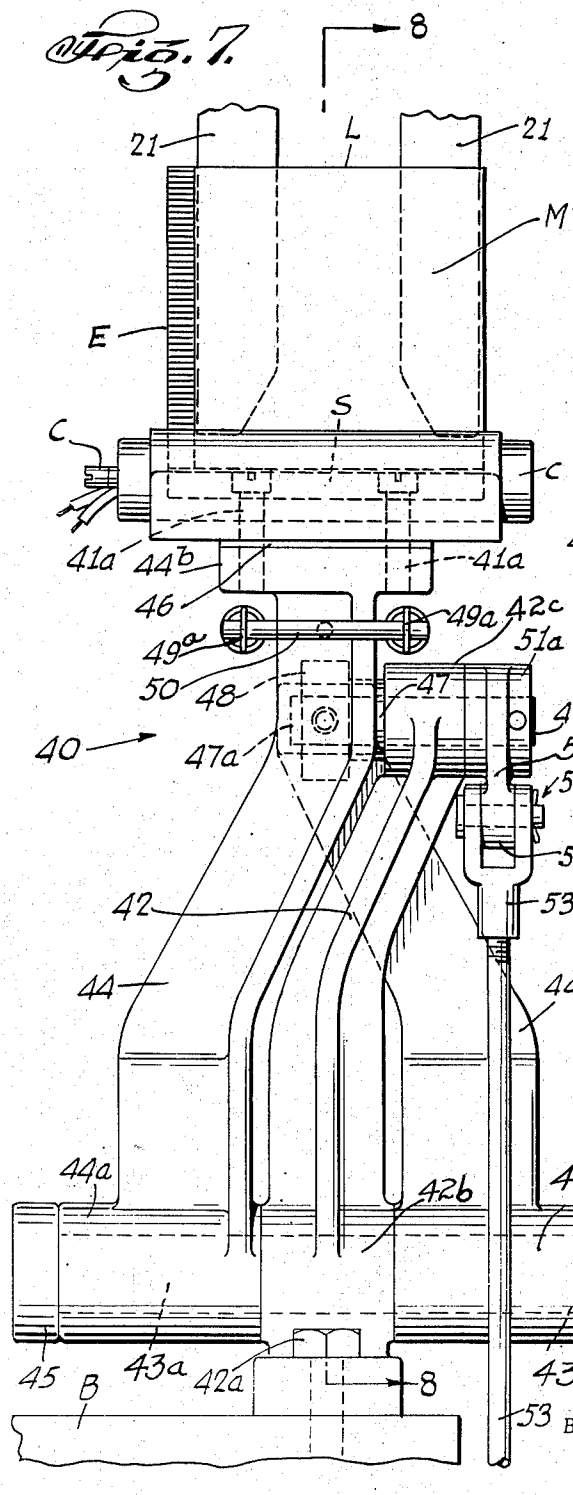
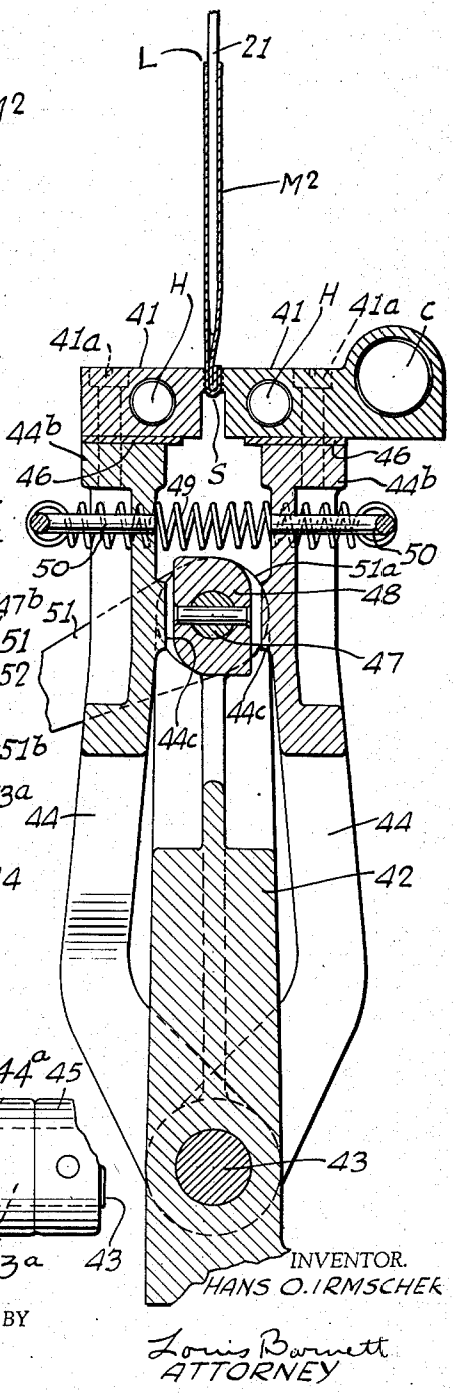


Fig. 8.



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UNITED STATES PATENT OFFICE

2,376,360

MECHANISM FOR HEAT SEALING PACKAGE SEAM JOINTS

Hans O. Irmscher, Roslyn, N. Y., assignor to National Urn Bag Company, Inc., a corporation of New York

Application July 16, 1941, Serial No. 402,634

9 Claims. (Cl. 93—27)

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 joints.

Among the objects of the invention is to generally improve portions of a mechanism of bag packaging and tea-ball making machines or the like which shall comprise few and simple parts, which shall be easy to assemble, which shall be readily incorporated in various types of partly and fully automatic existing packaging machines producing filled bags, tea-balls or the like articles for replacing the usual seam joint sewing or stapling devices, which shall also be adapted for incorporation as part of newly constructed high-speed packaging machines and when 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.

This case is a continuation in part of my application, Serial No. 367,051, filed November 25, 1940, for Manufacture of essence containing packages for brewing beverages.

In the accompanying drawings, in which is shown one possible illustrative embodiment of this invention,

Fig. 1 is a top plan view of part of the automatic tea-ball manufacturing machine with portions broken away to expose portions of the folding and heat sealing devices embodying the invention;

Fig. 2 is a detailed front elevational view of the bag material feeding mechanism indicated as the "first station," I, and also shown in plan view as part of Fig. 1;

Fig. 3 is a detailed perspective view of the tubular bag sheet material fed into the machine by the mechanism shown in Fig. 2;

Fig. 4 is a cross-sectional view taken on line 4—4 in Fig. 1 showing the bottom closure folded and creased;

Fig. 5 is a cross-sectional view similar to Fig. 4 with the pusher shown in effective position during the folding operation and before being retracted;

Fig. 6 is a cross-sectional view taken on line 6—6 in Fig. 4;

Fig. 7 is a front elevational view of the heat sealer as seen from line 7—7 in Fig. 1;

Fig. 8 is a cross-sectional view taken along line 8—8 in Fig. 7.

In my co-pending application above referred to, there is disclosed an improvement in the manufacture of filled containers or packages including a novel method of packaging tea, coffee and similar essence containing products. Since the successful and practical commercial utility of such improvements depends on its adaptability to large scale quantity production of such packages on automatic machines, the invention contemplates the incorporation of an improved mechanism in automatic machines of any of the various existing operating types. To this end, there is shown in the drawings 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 issued July 21, 1942. Ony sufficient portions of the Allatt machine are included herein as will enable the different features of the present invention to be understood, and except as to the detail of construction and modes of operation to be pointed out, the bag forming apparatus may be as shown in the machine illustrated in said Allatt patent to which reference may be made 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 Figs. 1 and 2, 20 denotes a depending bag forming and carrier portion of such Allatt fully automatic machine which is supplied from a suitable source (not shown) with tubular sheet material M in the form of a folded strip by feeding mechanism F, full details of the construction and a complete description of the operation of said carrier and feeding mechanism F being given in the above-mentioned Allatt application.

Said tubular sheet material M may be of foraminous construction, as for example, filter paper, perforated parchment paper or Cellophane, cotton gauze and the like. That used in the practice of the invention here described is a filter paper base layer coated on one side with a thermo-setting "partially fused" plastic lamina for form-

ing the heat sealed border joint seams of the package bags being manufacteured. The tubular sheet material M may be made from a continuous web of filter paper sheet material of suitable dimension folded over on itself, said web having the "partially fused" plastic lamina coating on the inner surface with the marginal edge portions thereof in contact, and folded over and creased to form a seam joint. On heat sealing, the entire length of said folded and creased seam joint of said tubular sheet material M may be sealed as at E shown in Figs. 2 and 3.

The tubular material M fed by mechanism F is adapted to have its upper or leading end L mounted on a spaced pair of fingers 21 of the depending bag forming carrier portion 20 as shown in Fig. 2. To facilitate said mounting, the feed mechanism F includes a wedge shaped tongue 25 which extends down within the leading end portion of the tubular material M and serves as a means for spreading said leading end L whereby the fingers 21 may readily enter and engage therein. Said mechanism F intermittently raises the tubular structure M onto the fingers 21 by suitable interconnecting devices (not shown) a predetermined distance corresponding to the desired length of a bag, and then releases the material M permitting the tongue 25 to drop down within said material M a sufficient distance to clear a scissors 26 which completely cuts off a unit section M1 leaving the same on said carrier portion 20 to be advanced through the machine. The mechanism F after an advance movement of the carrier portion 20 with the unit section M1 then operates to feed said material M to another pair of fingers 21 for forming a succeeding bag unit M1. The step of the manufacturing operation performed by mechanism F where the tubular material M is mounted on the fingers 21 and cut into unit section M1 will hereinafter be referred to as the "first station" and denoted by I in the drawings.

The depending bag forming and carrier portion 20 may be constructed to have a step by step movement, the operations at the "first station" I, taking place in timed relation with operations at other stations, so that the bag section M1 as it leaves the "first station" I, passes to mechanism 30 for folding and creasing the bottom closure of bag unit section M1 at a "second station" II, prior to heat sealing at a "third station" III, said mechanism 30 being shown in Figs. 1, 4, 5 and 6.

Bottom closure folding and creasing mechanism

As seen from Figs. 4 and 5, mechanism 30 comprises a vertically extending relatively stationary jaw holder member 31 having spaced integral lugs 32 projecting from opposite sides thereof, said lugs 32 serving as bearing supports for a horizontally extending shaft 35. The jaw holder member 31 is rigidly mounted by suitable means, such as an upright arm or bracket 31*b* through a bolt 31*a*, said bracket 31*b* in turn being firmly secured by suitable bolt 31*c* to a rigid part of the frame B of the packaging machine. Terminating the upper end of the jaw holder member 31 there is fixedly secured by screws 33*a*, stationary jaw piece 33. A movable jaw member 34 is hinged by its lower end 34*a* to the lower end 31*c* of the jaw holder member 31 by suitable means, such as a pivoting pintle 31*d* secured in place by cotter pins 31*e*. Fixed jaw 33 and the upper end of movable jaw 34 have clamping surface portions 33*b* and 34*b*, respectively, which are adapted to receive and cooperate in folding and creasing the bottom edge of the bag M1 to form a closure seam in the manner to be hereinafter described.

The side lugs 32 extend out and down to the level of the pivot pintle 31*d* and there terminate in a suitable hinged means including another pivot pintle 32*a* secured in place therein by cotter pins 32*b* for connecting with the lower end of lever arm 36, the upper free or swinging end of which carries a pusher plate 36*a* fastened by screws 36*b*.

Mounted to rotate with shaft 35 midway between the movable jaw 34 and the lever arm 36 is roller cam 37. Said shaft 35 as shown in Fig. 6 extends to overhang one of the lugs 32 a sufficient length as at 35*a* to have mounted fixedly thereon one end 38*a* of a rocker arm 38, the other end 38*b* of which is pivotally attached as at 39*a* to an actuating rod 39. The latter may be connected through suitable operating timing means to the power drive of the machine (not shown). The action of said rod 39 is to rock said arm 38 from a lowered position shown in Fig. 4 to a raised position shown in Fig. 5 which in turn through the shaft 35 rocks the roller cam 37. This rocking action is in timed relation with the intermittent operation of depending bag carrier 20 and takes place when movement of the unit carrier 20 has come to rest. The cam roller 37 is so constructed and arranged so as to simultaneously coact with a projecting protuberance 36*a* extending from a mid-portion of the lever arm 36 and with a raised portion or boss 34*c* provided on the movable jaw 34. A tension spring 58 is attached above said cam roller 37, one end to the movable jaw 34 and the other to the lever arm 36 by suitable means such as eyelet anchors 34*d* and 36*c*, respectively, said spring 58 serving to urge the boss 34*c* on the movable jaw 34 and the protuberance 36*c* on lever arm 36 against the cam surface of roller cam 37 for riding thereagainst.

The mechanism 30 as seen from Figs. 1 and 2 is incorporated in the packaging machine in the path of movement of the bottom portion of unit section M1 so that after the latter supported by the fingers 21 of the depending bag carrier 20 leaves the "first station," I, it is carried to the "second station," II, where the bottom of said bag unit section M1 passes between guides 59 and the jaw member 34 and pusher plate 36*a* to a position as shown in the dotted line position in Fig. 5, the pusher plate 36, however, then being in a retracted position and the jaws 33 and 34 retained in an open medial position between that shown in Fig. 4 and that shown in Fig. 5 by the action of the spring 49 and roller cam 37.

At the "second station," II, the bag carrier 20 comes to rest, and lever end 38*b* is raised to the position shown in Fig. 5 for turning the cam 37 to actuate the spring pressed lever arm 36 thereby moving the pusher plate 36*a* against the bottom edge portion of the bag material M1 to smoothly tuck in and fold the same between the open jaws 33 and 34 from the dotted line to the full line position shown in Fig. 5. The lever end 38*b* is then lowered to the position shown in Fig. 4 for again turning the cam 37 to successively retract the pusher plate 36*a* from between the jaws 33 and 34, and then to pinch crease the folded bottom portion of unit section M1 by pressure between the stationary jaw 33 and the movable jaw 34, thus forming a creased seam closure without a wrinkle on bag M2. The lever end 38*b* on returning to said medial position releases the pressure of movable jaw 34 permitting the folded and creased seam closure of bag M2 to

pass from between the jaws 33 and 34 on the resumption of the advancing movement of the bag carrier 20. As the latter continues its advancing movement, another bag unit section M1 is slipped in between the jaws 33 and pusher 36 as the bag M2 is moved out from between said jaws 33 and 34 to a heat sealing mechanism 40 at a "third station," III.

Heat sealing mechanism

As seen from Figs. 1, 7 and 8, mechanism 40 preferably is positioned in close proximity to the folding and creasing mechanism 30 where the bag M2 with the folded and creased bottom closure at the "third station," III, is heat sealed to form a seam joint S, said bottom closure being brought to rest during the intermittent movement of the machine operation between a pair of pressure jaws 41. Said jaws 41 may be heated by suitable means embedded therein, such as electric heaters H, the temperature of said heaters H being controlled and regulated by a suitable thermostat regulator C. Said heater H and regulator C may be of any well understood construction and incorporated in the heat sealing mechanism 40 as shown in Figs. 7 and 8.

Mechanism 40 comprises, besides jaws 41, an upstanding stanchion 42 which is rigidly mounted upon the frame B of the machine by suitable bolts 42*a*. Through the lower end portion 42*b* of the stanchion 42, a horizontally extending stud shaft 43 may be fixedly mounted by a mid-portion thereof, and have pivoted by one end 44*a* of each, as at 43*a*, on opposite ends of said shaft 43 a pair of vertically extending arms 44, suitable end collars 45 being provided to retain the arms 44 on said ends of the shaft 43. The upper or free ends 44*b* of said arms 44 carry said pressure jaws 41 which are firmly secured in place by screws 41*a* and may be insulated by suitable interposed shims 46.

The upper end 42*c* of the stanchion 42 may be formed with a bearing in which is journalled a shaft 47 having an overhanging end 47*a* which extends between the arms 44 below the free end 44*b* thereof. Said shaft end 47*a* has pinned thereon a wedge cam 48 which is adapted to contact bosses 44*c* on the arms 44 when swinging said arms 44 apart against the action of a tension coil spring 49 which embraces said arms 44 just above wedge cam 48. Said spring 49 may have its opposite ends 49*a* secured to an anchorage fitting 50 fastened to one of said arms 44 as shown in Fig. 7. The overhanging end 47*b* of the shaft 47 opposite said shaft end 47*a* may have pinned to turn therewith one end 51*a* of a rocker arm 51, the free end 51*b* of which pivotally connects, as at 52, to the upper yoke end 53*a* of an actuating rod 53.

With the mechanism 40 constructed and assembled as described above and shown in Figs. 7 and 8 and the rod 53 operated in timed relation, the carrier 20 advanced the bag M2 with the folded and creased bottom closure to a position between the spread apart pair of pressure jaws 41, the latter having been previously actuated through the rod 53 in raising the rock arm end 53*b* for causing the wedge cam 48 to turn and push against bosses 44*c* to spread the arms 44 apart by pivoting on shaft 43 against the action of the spring 49. After the folded and creased bottom closure of bag M2 has aligned with the pressure jaws 41 at the 'third station," III, the rod 53 is lowered turning the wedge cam 48 to the position shown in Fig. 8 releasing the arms 44 for pressure heating the folded and creased closure to form the heat sealed seam joint S for the bag M2.

On again raising of the rod 53 the bag M2 with the heat sealed closure seam joint S is released from between jaws 41 of the mechanism 40, it may be advanced to a filler and top sealing stations, successive bags M2 being continuously advanced by the carrier 20 from the "second station," II, to the "third station," III, in timed relation.

While in the above description and the drawings the mechanisms 30 and 40 are illustrated as operating at spaced apart stations, it is to be understood that the invention is applicable to mechanism 30 modified to utilize heat sealing jaws so that complete folding, creasing and heat sealing can be accomplished in a single station as shown in my aforesaid co-pending application. The installation here described and shown, however, is seen to be adaptable where heat sealing closure means of package bags embodying the invention replaces sewn seam joint closure means such as in said Allatt application, cooperative mechanisms 30 and 40 having been found most satisfactory and practical for such purposes.

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

As various possible embodiments may be made in the above invention for use for different purposes and as various changes might be made in the embodiments above set forth, it is understood that all the above matters here set forth or shown in the accompanying drawings are 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. In a packaging machine of the character described, means for supplying bag section units of tubular sheet material coated on the inner side with a thermosetting plastic lamina to the machine, a carrier extending into a top open end of each of such units for advancing said units in succession from said supplying means through the machine in a depending position with bottom open ends of such units extending down below said carrier, a mechanism cooperating with the advancing movement of the carrier and said section units on said carrier for folding and creasing said bottom open ends of the units to form temporary closure seams, said mechanism including means for deflecting the bottom open ends out of the path of movement thereof during the folding and creasing of said closure seams and means cooperating with the both said carrier and mechanism for pressure heat-sealing said closure seams to form a permanently fused joint along the inner sides of each bag unit.

2. In a bottom closure forming device of a packaging machine, in combination a carrier for advancing successive dependingly supported unit sections of tubular bag material coated on the inner side with a thermosetting plastic lamina, means free from the application of heat for overfolding and creasing open end portions of said unit sections extending down below said carrier to form temporary bottom closure seams, and means constructed and arranged in cooperative relation with respect to the operation of said closure seam forming means for pressure-heating said closure seams to form permanently heat-sealed bottom joints by the lamina on said inner side at the seams, said first mentioned means

includes a pair of pincer jaws located when in effective position along one side adjacent the path of travel of said unit sections on said carrier, and a pusher member mounted in position for movement across said path of travel to cooperate with said jaws for displacing said bottom open end portions of the bag unit sections from said path of travel and for inserting between said jaws the displaced bag end portions to form said temporary bottom closure.

3. In a packaging machine of the character described, means for supplying bag section units of tubular sheet material coated on the inner side with a thermosetting plastic lamina to the machine, a carrier extending into a top open end of each of said section units for advancing said units in succession from said supplying means through the machine in a depending position with a bottom open end of such unit extending down below the carrier, means for tightly overfolding with a retaining crease each of said bottom open ends to form a temporary closure seam located to operate out of the path of movement of the open ends of said units including a single pair of pincer jaws and a pusher member swingably mounted independent of said jaws to cooperate with the advancing movement of the carrier and said section units on said carrier, and means cooperating with the operation of said carrier after creasing each of said bottom ends for pressure heat-sealing the temporary closure seam formed to permanently fuse the lamina on said inner side forming the joint at said seam.

4. In a bottom closure forming device of a packaging machine, in combination a carrier for advancing through the machine successive dependingly supported unit sections of tubular bag material coated on the inner side with a thermosetting plastic lamina, means free from the application of heat for overfolding and creasing open end portions of said unit sections extending down below said carrier and out of the path of movement thereof to form temporary bottom closure seams, and means constructed and arranged in cooperative relation with respect to the operation of said temporary bottom closure seam forming means for pressure-heating said closure seams to form permanently heat-sealed bottom joints by the lamina on said inner side at the seams, said folding and creasing means being located at one station of a step by step operation with respect to the travel of said carrier and out of the path of movement thereof and said pressure heat-sealing means positioned on an adjoining station thereto.

5. The combination defined in claim 3 in which means are provided for said pincer jaws when in an open position to permit the passage therebetween said bottom open end portions of the bag unit sections along a path of travel on the carrier and when in closed position to clamp said bottom end portions deflected from said path of travel by the pusher member for forming said temporary seam.

6. A bottom closure mechanism for packaging machine of the character described comprising a carrier for dependingly supporting for movement in a predetermined path of travel bag unit sections having bottom open end portions extending down below said carrier, clamping means when in effective position located wholly on one side of the plane of the path of travel of said bag unit section open end portions, and means located for movement across said path of travel to deflect said open end portions from said plane for inserting said portions between said clamping means to provide folded and creased seam closures.

7. In combination, a folding and creasing mechanism comprising a pair of clamping jaws, a pusher member, separately pivoted arms for swingably mounting said pusher member and one of said jaws, a first cam device interposed between and acting on said swingable arms and pusher member for moving said pusher member to tuck open end portions of bag unit section between said jaws for folding said end portion back on itself and for pinching the fold formed to provide a crease retained seam joint temporary closure, and a heat-sealing mechanism associated in timed relation to said folding and creasing by the jaws and pusher member, said mechanism including a pair of spring pressed jaws, and a second cam device interposed between said last mentioned arms for intermittently moving the spring pressed jaws to and away from each other for permanently heat-sealing said temporary closure when the heated jaws are closed and for permitting free passage of the permanently heat-sealed closure when the jaws are open in timed relation with respect to the opening and closing of said clamping jaws.

8. In a packaging machine of the character described, a carrier for advancing successive unit sections of tubular bag material, a mechanism comprising a pair of clamping jaws and an intermediately operating pusher member located along the path of movement of open end portions of said unit sections on said carrier, interconnecting means including a roller cam for actuating one of said jaws and said pusher member each independently with respect to the other of said jaws, said roller cam being positioned between said actual jaw and said member, the latter being located for movement to deflect said open end portion from the path of travel and to tuck in same between the jaws for folding the end portion back on itself and to pinch the fold formed between said jaws with a retained crease to serve as a temporary seam joint.

9. A mechanism of the character described for making folded and creased temporary closure seams on bag unit section comprising a pair of clamping jaws, a pusher member, a first arm for swingably mounting said pusher member, a second arm for swingably mounting one of said jaws, and means acting on said arms for actuating said pusher member to tuck in an open end portion of said unit section between said jaws and for swinging the second arm to fold said end portion back on itself and to pinch the fold for providing a retained crease of the temporary closure seam, said arms being pivoted a spaced distance apart, and said means including a cam device interposed between said pivoted arms for moving same.

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