APPROXIMATELY FOR CLOSING BAGS OF LILT SEALABLE PACKAGING MATERIAL

FIG. 1

FIG. 2
APPARATUS FOR CLOSING BAGS OF HEAT SEALABLE PACKAGING MATERIAL
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2 Claims. (Cl. 53—373)

This invention relates to apparatus for closing bags of heat sealable packaging material in which the bags are supplied in succession to a closing fold device and then to a heat sealing device.

To increase the output of packaging machines it is commonplace, as a general principle, to separate the operating steps and perform them at different work stations of the machine, the packages being fed to these various stations in turn. Thus it is known in connection with machines for closing bags of paper or relatively stiff packaging material to fold the closure at one work station, to apply adhesive at a subsequent work station, and then to adhesively secure the closure at a further station. To ensure that a bag closure, once made, shall not open during the transit between stations, guide rails have been arranged along the path of travel in the machine at appropriate parts.

In forming closures in bags of polythene or similar limp plastic sheet material and, where for example the material is heat-sealable, using a pair of heat sealing jaws at the closing station it has, however, been found that the closure folds have a tendency to open along the path of travel of the bag from the folding to the closing stations or at least to be so deformed as to forfeit a tightly sealed bag closure with a neat appearance.

An object of the invention is to eliminate the above-stated disadvantage. A further object is to afford effective and dependable means for conserving the folds during the transit from the folding to the sealing stations.

Another object is to associate with the folding device a tacking means which will fasten the temporary closure immediately after it has been formed by folding and keep it intact until the subsequent heat sealing takes place.

A still further object of the invention is to provide an assembly of machine parts which will act so as to relieve the bag material of stress and strain effects which could arise from heating of the bag area during the tacking.

Experience has shown that it is possible, using the apparatus according to this invention, to close bags of polythene or similar thermoplastic materials, which are normally handled only with extreme difficulty, in tight fashion and at a high output rate.

An embodiment of the bag closing apparatus according to the present invention is illustrated in the accompanying drawings, in which:

FIGURE 1 is a diagrammatic representation of the steps of forming and sealing a bag closure in a bag closing machine equipped with apparatus according to the invention.
FIGURE 2 is a plan view, with parts in section, of the bag closing machine as illustrated in FIGURE 1.
FIGURE 3 is a side view of the folding device and tacking means of this apparatus.
FIGURE 4 shows a part of the folding device and tacking means of FIGURE 3 in another working position.
FIGURE 5 is a front view of the arrangement seen in FIGURE 3, and FIGURE 6 is a side view of the heat sealing device, at another station in the machine.

General arrangement

The apparatus which is disclosed in this embodiment is part of a bag closing machine with work stations arranged in a circle and having a feed drum 1 (see FIGURE 2) which is intermittently rotated to conduct the filled bags B in receptacles 13 to the operating tools at the various stations of the machine. As can be seen from FIGURE 1, the bag B is first brought to a station F at which is arranged a folding device comprising pairs of folding tools 41, 42 which shape the mouth of the bag into a flat closure with tacked-in gussets, in known fashion.

To enable the use of limp or less stiff, heat-sealable bag material and to ensure that in such cases the closure folding is retained until sealing takes place, the device at station F is also equipped with a tacking means which may, for example, be in the form of two heated jaws 101. These jaws 101 are brought into contact for a short period with the closure folds directly after the latter have been made so that the folds are smoothed and tacked by pressure and heat.

The closure made in this way is tightly sealed by a weld seam, in known fashion by means of a pair of heat sealing jaws 70, after the bag B has been advanced from this folding and tacking station F to the sealing station S. Details of these mechanisms are seen in FIGURES 2 to 6 of the drawings.

Folding device

As indicated, the folding device basically comprises folding tools 41, 42 arranged at station F. These are mounted by an appliance carrier 2 disposed radially of the machine at this station, of a construction and with an operating assembly which will be described in more detail below.

The tools 41, 42 are operable by the assembly on the relevant carrier 2 in such a way that the tools 42 are inserted into the open mouth of a bag presented thereto in a receptacle 13, and are moved towards one another while the folding tools 41 tuck the narrow sides inwards to form gussets in the bag.

The tools 42 are suspended from parallel linkage systems 43 and 44 which have toothed segments, 45 and 46 respectively, which are in mesh with one another. The movement of these linkage systems— in opposite directions—is brought about by a cam plate 47, on a rotary shaft 3 in the aforesaid carrier 2, through a bellcrank 48 which bears against a roller 49 provided on the parallelogram linkage 43. In similar fashion the side folding tools 41 are suspended on parallelogram linkages 50 and 51 which are coupled together by toothed segments 52 and 53. These are operated by a face cam 54 on shaft 3 through a lever 55, a spindle 56 and a further lever 57, against which bears a roller 59 arranged on a lever 58. The lever 58 is firmly connected to a bolt 60 on which is also arranged a lever of the parallelogram linkage 51.

To ensure that the folding tools 41, 42 descend in the correct zone of the bag mouth, and are raised again after the folding operation, the parallelogram linkages 43, 44 and 50, 51 thereof are mounted on a head 61 which is secured to two vertically-displaceable rods 62, 63, guided in a bearing 64. The descent and ascent of head 61 is produced by a cylindrical cam 65 on the shaft 3 through a lever 66, the pin 67 and a linkage system 68, 69, of which the link 69 is pivoted to the head 61.

Appliance carriers

The appliance carrier 2 referred to above is one of three such carriers which are arranged radially in the
machine at the folding and tacking station F, at a station preceding F, and at the sealing station S, these carriers are of similar basic construction but carrying vertical conveying assemblies appropriate to the tools they are to operate. These latter are respectively the folding tools, the tacking tools, and the sealing tools, taken in the carrier order given immediately above.

Thus, each carrier 2 includes a baseplate 20, a headplate 21, a baseplate 26 of the carrier 2 at the station preceding F. Levers 108 and 109 thus form a parallelogram linkage with this base plate and jaw 101. To produce the required swinging motion, the outer arm of each lever 108 is articulated to a link 110, and the two links 110, at the other end, pivoted in common to a bar 111. A cam is pivotally connected to one arm of a bellcrank lever 112, the other arm of which carries a roller 113 which bears against the periphery of an edge cam 114 on the operating shaft 3 of the carrier at said preceding station. To ensure correct relative movement between the jaws 101, a roller 115 is provided on the pivot coupling the two links 110 to the bar 111, and this roller runs in a guide slot 116 in the offset base plate extension.

To relieve the bag material of stress when in the heated condition during the tacking, a pair of cooled clamping jaws 102 is arranged beneath the heated jaws 101. These clamping jaws 102 are hollow and a coolant, for example water, introduced and discharged through tubes 103 and 104, flows through them.

The clamping jaws 102 are mounted on the tacking jaws 101 for resilient displacement in the direction of movement of the latter, and the coupling is such that when the jaws 101 move together, the clamping jaws 102 are the first to make contact with the bag closure folds. When the jaws 101 part, the clamping jaws 102 do not break contact with these folds until jaws 101 are clear. For this purpose the clamping jaws 102 are secured to rods 105 which are mounted in bearing brackets 106 fastened to the jaws 101 and are longitudinally displaceable against the action of a spring 107.

If air is used as the cooling medium for the clamping jaws 102, it may be advantageous to provide these jaws with openings which are directed towards the sheet material of the bag so that additional cooling air will flow against the material being tackled.

Sealing device

The mouth of a bag, folded and tackled as described, is tightly closed at station S by heat sealing. The tools provided for this purpose at station S comprises a pair of heat sealing jaws 70 which are secured to pivotable levers 72, 73 (FIGURE 6). The pivoting together of the heat sealing jaws 70 is effected from a camplate 74 on the shaft 3 of a further appliance carrier 2 at station S.

A roller 76 mounted on a lever 75 bears against the periphery of this camplate 74. The lever 75 is pivotally mounted on the stay 22 of the carrier 2 and projects through an aperture 77 in this stay. In addition a rod 78 is linked to the freely pivotable end of the lever 75, and this rod is connected through a spring 79 to a block 80. Coupled to the block 80 are two links 81, 82 which are also connected to the levers 72, 73, so that when the rod 78 is pushed back by the action of the camplate 74, the heat sealing jaws are pressed together under the force of the interposed spring 79, and thereby weld the mouth of the bag.

If desired, clamping jaws 102, preferably cooled and similar to those used at station F may also be associated with the jaws 70 and mounted on the latter, and directly below them, in the manner prescribed above for jaws 101. The closure folds of a bag, welded in this way at station S to produce a firm and tightly sealed joint, are formed into a rolled closure or are simply turned over to the top of the bag package at further stations of the machine, depending on requirements.

We claim:

1. In a bag closing machine, bag closing and sealing apparatus comprising a mounting frame, a first tool carrier supporting a plurality of folding tools on said frame, and links and operating said folding tools also supported on said carrier, a second tool carrier on said frame adjacent said first tool carrier, heated tacking tools supported by said second carrier adjacent said folding tools, cooling jaws suspended from said tacking tools and movable therewith, cam and linkage means for operating said tacking and cooling jaws mounted on the front of the carrier, toothed drive means for actuating the folding tool and the tacking tool operating means, a third tool carrier mounted on said frame and carrying heat sealing tools, said third tool carrier supporting operating means for said sealing tools and also being drivable by said toothed drive means, and a conveyor device for transporting bags mouth upwards to the folding and tacking tools and thence to the sealing tools.

2. A bag closing machine including a mounting frame, a first tool carrier having folding tools mounted thereon, a second tool carrier having heated tacking tools mounted thereon to temporarily and provisionally tack folds of the bag after such folds are produced by said folding tools, drive means for the coordinated operation of the folding and tacking tools, a sealing device reached by a folded and tacked bag in a subsequent step of the operation of the machine to finally seal the bag by sealing the folds provisionally tack by said tacking tools, to thereby completely close the bag, at least one pair of cooling jaws carried by said tacking tools, and brackets including spring means attaching at least one cooling jaw below each tacking tool to bias said cooling jaws into engagement with said bag for a predetermined time both prior to an engagement of the tacking tools and after release of the bag by the tacking tools.

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