A machine for producing bags from two parallel strips of material and for filling a solid or liquid product into the bags. The strips are welded together to form individual bags which are carried through subsequent stations, including filling and closing stations, suspended on two flexible blades engaging below folded edge zones of the strips. The blades are pulled apart to open the bag mouth in the filling station in which a two-part funnel is introduced into the bag mouth and opened to clamp the mouth against the flexible blades while the bag is being filled through the funnel. The bags are fed to the closing station with their mouths slightly open so that a rotatable tube may be inserted therein and rotated to twist the bag mouth together while it is held to the tube by suction and the body of the bag is held against rotation.

8 Claims, 12 Drawing Figures
MACHINE FOR PRODUCING AND FILLING BAGS

BACKGROUND OF THE INVENTION

The present invention relates to a machine for producing and filling bags. The invention was specially developed with the idea of packaging poultry in view, it may, however, be also used for other piece goods and for powdered and liquid products to be filled into bags.

BRIEF SUMMARY OF THE INVENTION

The machine according to the invention comprises means for advancing a continuous sheet material comprising two parallel strips, means for joining the two strips together along the desired outline of a bag, means for separating the bag formed thereby from the sheet material, holding means for gripping the two strips from the outside adjacent the mouth of the bag and for transporting the bag to a filling station, means associated with the filling station for moving the bag means from each other, means for inserting a product into the opened bag, means for subsequently moving the holding means towards each other, and means for transporting the filled bag to a closing station.

The invention provides a simple and reliable solution of the problem of holding and transferring the bag between those stations where it is first made from the sheet material, whereupon it is opened at its mouth and filled and finally closed in such a way that the bag is effectively held during the entire process without the risk that the holding means may interfere with the bag making or filling and closing operations.

The machine may have means for outwardly folding an edge zone at the mouth region of each strip when the strips are advanced in a horizontal direction and the holding means may consist of thin, flexible blades which, subsequent to the folding, are introduced or inserted into the two folds formed. In this way, the bag is suspended on the two blades, the leading ends of which, after the joining together of the vertical bag edges including the two folds, act as drivers for advancing the bag through the stations of the machine.

The blades may be secured to arms which, at their extremities may be disposed along two shafts which can be raised and lowered relative to the path of advance of the strips through the machine. In that case the insertion of the blades into the carrying folds is obtained by simple movements.

The two shafts may be parts of a frame which is pivotable around an axis parallel to the direction of advance of the strips and which has a cam follower engaging with a stationary cam track. The bag may then additionally be pivoted in a vertical plane into a sloping position with its mouth facing outwards which, in the filling station, provides an excellent possibility for introducing the goods to be filled into the bags unhindered by the component parts of the machine.

At their ends, the arms may be provided with cam followers for interaction with two cam means having converging cam tracks which are mounted in the filling station and are displaceable transversely of the direction of advance of the bag.

By means of said cam means, it is possible to move the carrying blades, and with them, the two sides of the bag from each other prior to the filling and immediately thereafter to move them towards each other into the mutual position, in which the bag is closed in the following closing station.

In the last-mentioned position, the bag may expediently be partly open, and in the closing station there may be provided gripping means for temporarily holding the bag, a rotatable and axially displaceable tube, one end of which may be inserted into the bag and which surrounds an inner tube which is axially displaceable relative thereto. The end of the inner tube remote from the bag may be connected to a vacuum source, and there may be provided one or more apertures in the walls of the two tubes opening into a region between the tubes which is sealed at both ends.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a plan view showing the main components of the machine viewed from above,
the two stations I and II in the machine, a bag 3 has been separated from the sheet material when it arrives at station II. At the same time it has been suspended on carrying means in the machine that move it forward for further processing, which will be described in detail below. The waste 4 produced at the bottom of the sheet material by the cutting operation is pulled out of the machine via two driven discharge rollers 21.

The devices described in the following are mounted on a turret plate 23 which is secured to the vertical main shaft 22 of the machine. In the embodiment shown, there are six gripping or carrying units for the bags mounted on the turret plate 23 and each carrying unit is mounted on a holder 24 which is pivotably connected to the turret plate 23 by means of a vertically bearing pin 46, vide FIGS. 1 and 10. On each holder 24, there are two gripping arms 25 rotatably supported on horizontal bearing pins 47.

In the extremities of each carrying arm 25, which extends parallel to the bearing pin 47, two transverse shafts 26 are secured, which thus extend parallel to the holder 24. To the free ends of each pair of connected shafts 26, a bracket 27 is secured which, at its center, carries an outwardly located guide roller 28. The roller 28 runs in a guiding track 29 extending along the circumference of the turret plate, and in the embodiment shown the track 29 has a U-shaped section. As appears from the figures of the drawings, the guiding track 29, at certain places of the machine, is effective to raise or lower the carrying units and to pivot each unit about the associated vertical bearing pin 46.

The last-mentioned pivoting movement is guided additionally by a similar guiding track which, for the sake of clearness, is not shown in the drawing, but which is mounted above the turret plate 23. This latter guiding track engages with a guide roller similar to the roller 28 and secured to an arm 53 which, together with the holder 24 mentioned earlier, is fixed to the bearing pin 46 of each carrying unit, vide FIG. 10.

Two transverse arms 30 are slidably displaceable on the shafts 26 of each carrying unit. Each arm 30 carries two thin flexible bag carrying blades 31, vide FIGS. 1 and 2, which normally extend parallel to each other and whose length is slightly less than the internal width of a flattened bag 3, vide FIG. 2. The carrying blades 31 may be made of steel strip which tolerates repeated bending and which, due to its elasticity, assumes its rectilinear shape when the blades are relieved of outer forces.

In station I, the sheet material 1, 2 is transferred to the carrying blades 31, cf. FIG. 1 and FIGS. 3-5. When, due to the rotation of the main shaft 22, a carrying unit arrives at station I, the arm 25 and the shafts 26 assume the positions shown in full lines in FIG. 3 since the guiding track 29 is lifted in this station. Actually the track is interrupted here and between its two ends there is inserted a vertically displaceable lifting fork 32 which, by means of driving members, not shown, can be moved up and down along a vertical guide shaft 54. One end of the guiding track 29 is in line with the fork 32 in its lifted position as shown in full lines in FIG. 3, and it is seen that in this position the arms 30 and the carrying blades are raised above and consequently clear of the edge of the sheet material.

From this position, the fork 32 is lowered to the position shown with dotted lines, whereby the topmost edges of the carrying blades 31 come to lie below the two folded edge zones 5 and 6 of the strips 1 and 2. By means of two fingers 33 fitted to rocking arms that are not shown in greater detail and which are connected by means of toothed sectors in such a way that they simultaneously move towards and away from each other, the two carrying blades 31 are brought into engagement with the strips 1 and 2 when the fingers 33 press upon rollers 48, vide FIGS. 1 and 3, provided on the ends of the transverse arms 30. It is possible, at the same time, to inject air upwardly from nozzles, not shown, into the folds of the strips below the bent edge zones 5 and 6, which thus may be separated from each other as shown in FIG. 3.

When the carrying blades have been brought together in this manner, cf. FIG. 4, the fork 32 is slightly raised until its recess, in which the roller 28 rests, comes into line with the other end or beginning of the guiding track 29, which in FIG. 3 is shown in full lines. Hereby the strips 1 and 2, which at that moment have been welded together along the lines 18, 19 and separated from the preceding bag 3 by means of the welding unit 51, 52, come to hang by the edge zones 5 and 6 on the two carrying blades 31, which serve to transport the bag further through the following stations II—VI. FIG. 5 illustrates the suspension of the bag on the carrying blades in station II, in which the carrying unit has been pivoted about the pin 46 due to the shape of the guiding track, not shown, which interacts with the roller on the arm 53. During the movement of the carrying unit from station I to station II, the carrying blades 31 are simultaneously displaced forwards relative to the sheet material, cf. FIG. 2, whereby they have been brought into engagement with the leading bag edge 18 already welded, so that the welding of the trailing edge 17 of the bag takes place immediately behind the rearmost end of the blades 31.

In station III, no operation on the bag does take place, but the carrying unit is pivoted downwards so that it comes into contact between the roller 28 and the guiding track 29, which, at this spot, is lowered and, moreover, the entire carrying unit is pivoted around the pin 46 in such a way that in station IV the mouth of the bag 3 faces obliquely upwards and outwards while, at the same time, it extends essentially in a tangential plane. The introduction of the goods to be filled into the bags takes place in station IV.

To this end, there are two cam means in station IV in the form of wedge blocks 40, vide FIGS. 1 and 6, which are displaceable parallel to the obliquely suspended bag. Each wedge block 40 has two guiding tracks 55 which are formed between a centrally projecting part 56 of the block and two projecting edge parts 75. As shown in FIG. 6, the sides of the tracks 55 have different slopes, so that each track diverges downwards towards the bag. When the wedge block 40 is displaced obliquely downwards and outwards, the active edges of the central part 56 engage with the rollers 48 on the ends of the two carrying arms 30, whereby these arms and the blades 31 are forced away from each other. The mouth of the bag is opened thereby, so that a funnel 34 can be swung into the mouth of the bag.

The funnel 34 is slotted in a longitudinal median plane and thus comprises two parts 34a and 34b, which, at the mouth of the funnel, are connected to each other by means of a tooth-like projection 58 on the part 34a and a matching recess 59 in the part 34b. Each of the two parts 34 of the funnel arms 38, rotatably connected with an arm 59 that is pivotable in a vertical plane about a shaft 60. Furthermore, an arm 35 is fixed to the funnel part 34b, which arm carries a roller 36, running in a stationary guiding track 37, vide FIGS. 6-8. The track 37 has such an outline that the two funnel parts 34a and 34b, in a swivel-out position, which is shown in dotted lines in FIG. 6 are held against each other, whereas they are slightly separated when the funnel is inserted into the bag as shown in full lines in FIG. 6. The projection 58 mentioned above and the recess 59 ensure the synchronous movement of the two funnel parts. When the funnel parts are thus moved away from each other after their insertion into the bag, the bag is effectively clamped between the funnel and the two external carrying blades 31.

The goods to be filled into the bag can now be placed in the bag and, if poultry or other piece goods are to be packaged, the goods in question may be placed in the funnel 34 already when it assumes the horizontal position outside the bag, cf. FIG. 6, so that all the operator has to do after the funnel has been swung in, is to push the goods through the funnel into the bag.

When the filling operation has been concluded, the operator actuates a switch which starts the intermittent rotation of the turret plate 23, and, thereby, also the other program for moving the components of the machine including the advance
of the sheet material 1, 2. Before the turret plate is rotated, the funnel 34 is swung out of the bag and the wedge blocks 40 are raised, whereby the rollers 48 are moved towards one another by the active edge surfaces on the outer parts 57 of the blocks. Due to the above-mentioned divergence of the wedge tracks 55, the rollers 48 and hence the arms 30 are not brought quite together, so that the mouth of the bag is slightly open now. The position of the arms 30 may be fixed by means of ball catches, not shown, in the arms, which interact with circumferential locking grooves in the shafts 26.

The turret plate with the carrying unit is now rotated to station V, where no operation takes place, and further to the closing station VI. During the course of this rotation, the carrying unit is again pivoted up into a horizontal position due to the upward gradient of the guiding track 29 between the stations IV and VI. In the closing station VI there are two very diagrammatically shown grippers 41, vide FIG. 10, which are swung in to engage the filled bag and to hold same. When the grippers 41 have, in this manner, relieved the carrying blades 31, the grippers are slightly raised and a unit consisting of two coaxial tubes 42 and 43 are inserted from above into a partially open mouth of the bag in order to twist it together.

The tube unit, which is seen on a larger scale in FIG. 12, consists of an outer tube 42, which is rotatable about a vertical axis, and a non-rotatable inner tube 43, which may be axially displaceable in relation to the outer tube 42. The inner tube 43 is, at its upper end, not shown, connected to a vacuum source, and in the vicinity of the lowermost end of the tube 42, two seals 61 are fitted between the two tubes, which seals delimit an annular space, within which radial apertures 62 and 63, respectively, are provided in the walls of the two tubes. The apertures 62 in the outer tube may, along their external edges, be provided with a rubber coating. In the closing station VI, there are, moreover, two heating elements 44, vide FIGS. 1 and 11, which may be swung from the position shown in full lines in FIG. 11 into the position shown in dotted lines, in which latter position the heating elements are in contact with the ends of the mouth of the bag, so that the weld between the two strips and the folded edge zones 5 and 6 is melted at these points whereby the bag is released from the blades 31. By connecting the vacuum source, not shown, to the tube 43, the bag is evacuated and its neck portion is drawn, by suction, hard against the outer tube 42 due to the communication through the apertures 62 and 63. When the tube 42 is now rotated, while the bag is held by the grippers 41, the neck of the bag is twisted together around the tube 42. During this twisting of the neck of the bag, the inner tube 43 may be pulled out axially through the tube 42. Subsequent to the twisting of the neck of the bag, a sealing strip is applied, which may be done in a manner not shown in detail, by means of a diagrammatically shown closing device 45, FIG. 1, which comprises a supply roll 64 of sealing material and a knife 49 for cutting off excess material from the neck of the bag. When the act has been closed in this manner, the rotating tube 42 is raised into the position shown in dotted lines in FIG. 10 and the grippers 41 are swung back whereupon the filled and closed bag drops out of the machine, for example, down onto a conveyor chute, not shown, or a conveyor belt. The carrying unit is rotated further forward to station I, whereby the roller 28 moves upwards on the rising track 29, in a way which will already appear from the aforesaid description of station I.

What I claim is:

1. A machine for producing and filling bags, comprising means for horizontally advancing a continuous sheet material comprising two parallel strips, means for outwardly folding a marginal edge portion of each of the strips when said strips are advanced, folded edge portions being disposed adjacent a mouth of a bag subsequently formed from said strips, means for joining together said strips along a desired outline of a bag, means for separating the bag thus formed from said sheet material, holding means for gripping the two strips from the outside adjacent the mouth of the bag and for transporting the bag to a filling station, said holding means comprising two thin, flexible blades which, subsequent to the folding, are introduced into the two folds formed and means for introducing the blades into said folds, means associated with said filling station for spacing said flexible blades apart from one another to open the mouth of said bag, means for inserting a product into the opened bag, means for subsequently moving the blades towards one another, and means for transporting the filled bag to a closing station.

2. A machine according to claim 1 in which said filling station comprises a funnel which is slitt lengthwise into two parts, means to swing said funnel into the open bag from an essentially horizontal position outside said bag, and means for effecting a controlled swinging of the two funnel parts towards and away from each other about individual transverse axes at the wide end of the funnel.

3. A machine according to claim 1, including arms mounting said blades displaceable relative to each other, and means to raise and lower said arms relative to the path of advance of said strips.

4. A machine according to claim 3, including frame comprising said arms, means to raise and lower said arms comprising means to drive the frame along a path parallel to the path of advance of said strips, and means defining said path for the frame with positions thereon in which the frame is lowered and raised.

5. A machine according to claim 4, in which said means defining said path comprises a guide track.

6. A machine according to claim 5, in which each of said frames has a roller guide on said track for effecting lowering and raising thereof.

7. A machine according to claim 4, in which said arms are each provided with a cam follower, and in which said means to space apart said blades for opening said bag comprises means coextensive with each cam follower on said arms displacing said blades.

8. A machine according to claim 1, in which said joining means comprises means to form in one operation the trailing longitudinal seam of a leading bag and a leading longitudinal seam of a next successive trailing bag, and means to join bottoms thereto.