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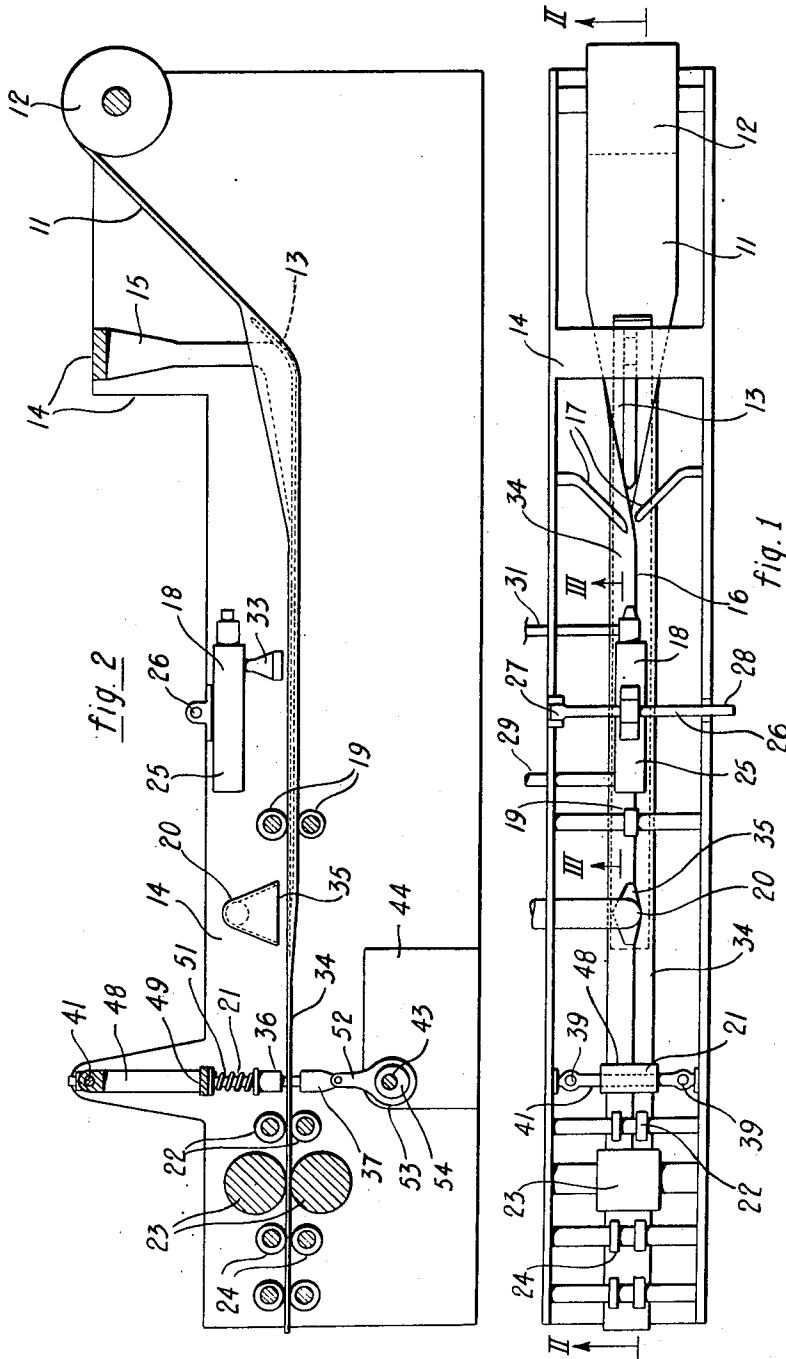
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2,587,422

MACHINE FOR THE MANUFACTURE OF PAPER BAGS

Filed May 21, 1949

3 Sheets-Sheet 1



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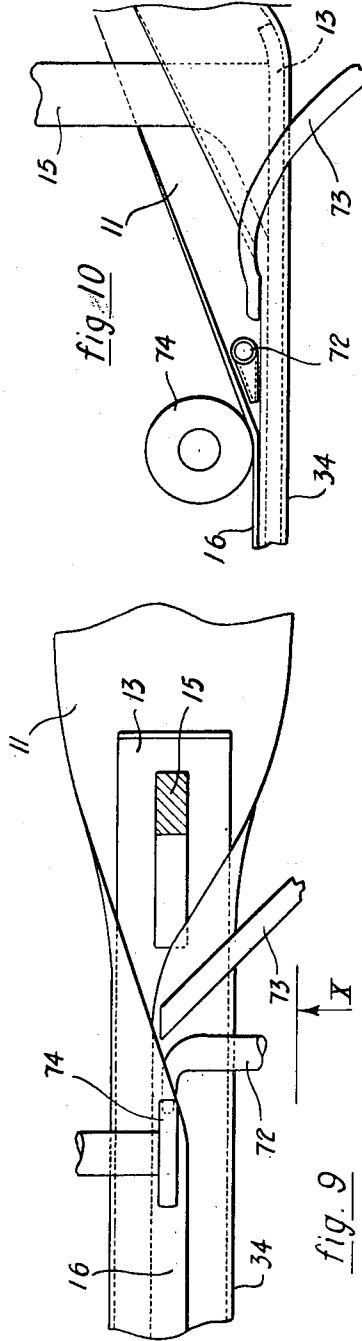
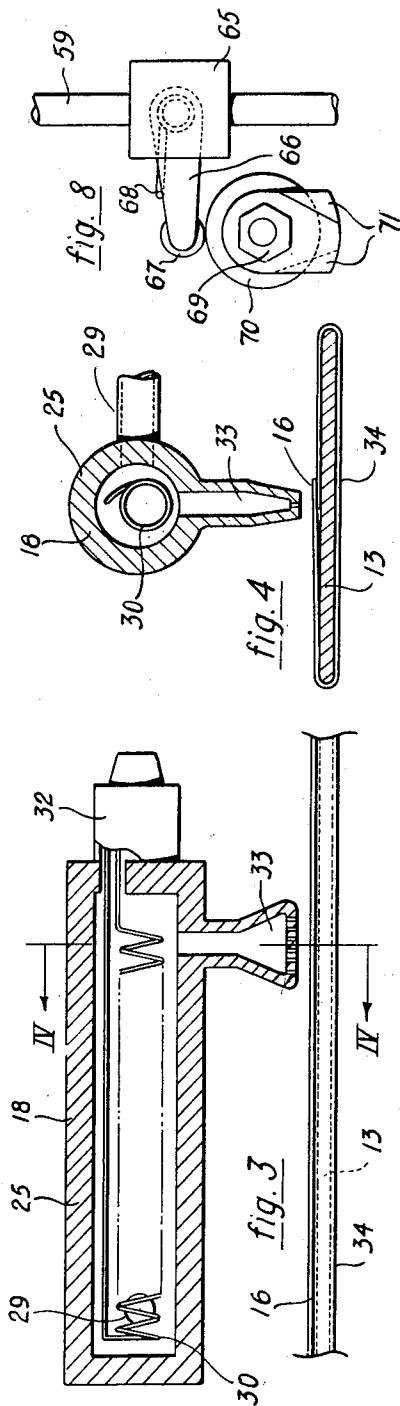
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MACHINE FOR THE MANUFACTURE OF PAPER BAGS

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3 Sheets-Sheet 2



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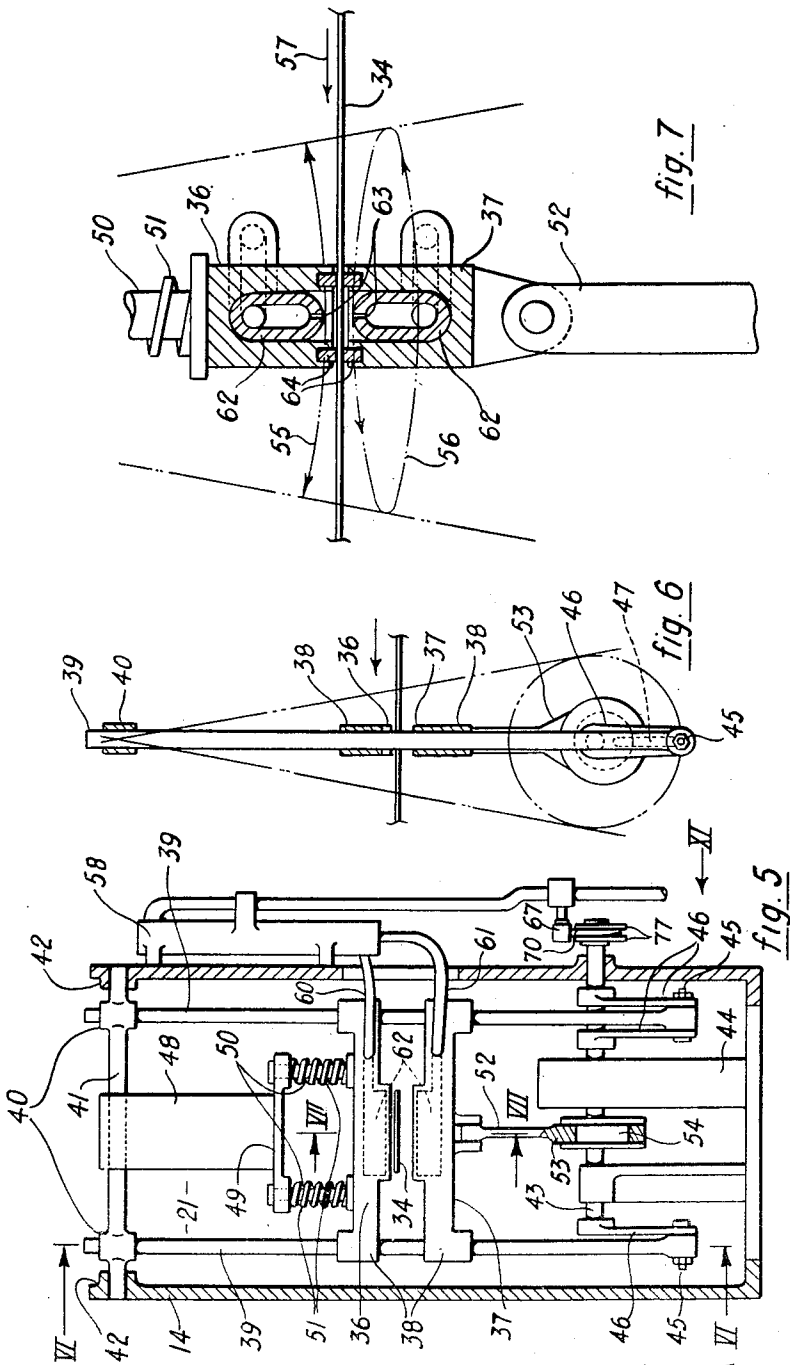
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MACHINE FOR THE MANUFACTURE OF PAPER BAGS

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3 Sheets-Sheet 3



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# UNITED STATES PATENT OFFICE

2,587,422

## MACHINE FOR THE MANUFACTURE OF PAPER BAGS

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2 Claims. (Cl. 154-42)

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This invention relates to the manufacture of paper and like bags, and, in particular, to those bags of which the seams are sealed by the application of heat or heat and pressure.

In this specification the term "paper" refers to any material of which paper or like bags are made.

In sealing the seams of bags of paper or other material by the usual means of hot rolls or platens, difficulties are experienced in maintaining the correct working temperature of such rolls or platens, particularly when the latter are attached to or associated with reciprocating parts of a machine. Furthermore, a certain lapse of time is necessary for heat transfer from hot rolls or platens to the material being heated, and this time lag frequently is the factor limiting the speed of the sealing operation.

A further difficulty may arise when the seam being heated comprises folds or plies of paper or other material of varying thicknesses such as is usually encountered when sealing the bottoms of all types of bag.

The object of the present invention is to provide improvements in the manufacture of bags of paper or other materials which require heat or heat and pressure to effect the closure of the seams, so that the difficulties referred to may be eliminated or substantially reduced.

According to the present invention, sealing of heat-sealing material comprised in paper and like bags is effected by the application thereto of one or more jets or streams of hot air or other gas.

The jet or stream of hot air or other gas, hereinafter referred to throughout the specification as hot air, may be applied along or over the whole length or area required to be sealed or it may be caused to pass relatively in a path along or over said length or area.

The stream of hot air may be applied to the outside of the fold to be sealed, thus heating the contacting surfaces of the seal by conduction through the plies of material being sealed; alternatively, the stream of hot air may be directed at the surfaces to be sealed before they are brought into contact with one another.

After the jet or stream of hot air has been applied to the parts destined to be sealed, the parts may be passed under or between platens, rollers or other devices to enable pressure to be applied to said parts to complete the adhesion.

The said sealing may be effected in two stages, comprising a first stage at a comparatively low temperature in order to cause the several plies in

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the seam to become tacky, and a second stage at a higher temperature to complete the sealing.

This latter method is advantageous when the material to be heated shrinks on the application of heat and so causes a distortion, which may make an unsatisfactory seal, which may be particularly undesirable if an air-tight closure is required. The application of heat at a low temperature followed by the application of pressure causes the contacting surfaces of the material to adhere slightly or tack. A further application of heat at a higher temperature followed by pressure may then be made to complete the seal without distortion.

In the accompanying drawings:

Fig. 1 is a diagrammatic plan view of one form of apparatus for effecting the manufacture of bags according to this invention,

Fig. 2 is a corresponding sectional elevation taken on line II—II of Fig. 1,

Fig. 3 is an enlarged sectional elevation of a detail; taken on line III—III of Fig. 1,

Fig. 4 is a transverse sectional elevation, taken on line IV—IV of Fig. 3,

Fig. 5 is an enlarged transverse sectional elevation of another detail, taken on line V—V of Fig. 2,

Fig. 6 is a sectional side elevation taken on line VI—VI of Fig. 5,

Fig. 7 is a further enlarged transverse sectional elevation, taken on line VII—VII of Fig. 5,

Fig. 8 is an enlarged side elevation of another detail, looking in the direction of arrow VIII, Fig. 5.

Fig. 9 is a diagrammatic plan of a modified form of apparatus, and

Fig. 10 is a corresponding side elevation looking in the direction of arrow X, Fig. 9.

Referring to Figs. 1 and 2 the web 11 passes from a feed roll 12 and under a longitudinal former plate 13 suspended from the machine frame 14 by a leg 15. The web is folded over the plate 13 to form a flat tube 34 with the edges of the web overlapped to form a longitudinal seam 16; arms 17, projecting from each side of the machine assist in holding the folded edges of the web down on to former plate. The tube 34 passes under a longitudinal heat-sealing device 18, hereinafter described in detail, between pressure rolls 19, under a cooling device 20, thence to a transverse heat-sealing device 21, and between forwarding rolls 22. The sealed tube then passes between cutting rolls 23, which cut the tube

into bag lengths which then pass between further forwarding rolls 24.

The longitudinal heat-sealing device 18 comprises a casing 25 suspended from a transverse rail 26 hingedly connected at 27 to one side of the machine frame 14 and supported at 28 at the other side of the frame. Cold air is introduced into the casing 25 through a pipe 29 (Figs. 3 and 4). An electric heating element 30 is disposed within the casing 25, connected to current supply leads 31 and temperature controlled by a thermostat 32. The casing is provided with a nozzle 33 located immediately above the longitudinal seam 16 of the bag tube 34 whereby air supplied to the casing 25 by pipe 29 and heated by element 30 is directed on to the said seam. The hot air causes the heat sealing material forming the seam 16 to become tacky and the seam then passes below the top pressure roll 19 and above the former plate 13 and the bottom pressure roll 19 whereby pressure is applied thereto to complete the seal. The seam then passes under the nozzle 35 of the cooling device 20 whereby cool or cold air is directed on to the seam.

The longitudinally sealed bag tube then passes through the transverse sealing device 21 whereby the tube is transversely sealed, preferably at bag length intervals so that when the tube is later transversely severed by the cutting rolls 23 to one side of each transverse seal the tube is cut into bag length. The device 21 (Figs. 5, 6, 7 and 8) comprises upper and lower sealing elements, 36, 37 mounted by means of sleeves 38 on connecting rods 39 so as to slide substantially vertically thereon. The upper ends of the connecting rods 39 are slidably mounted in sleeves 40 formed on a transverse rod 41 which is pivotally mounted in bearings 42 in the machine frame 14. A transverse drive shaft 43 is mounted in the frame, being rotatably driven through a variable speed gear device 44. The lower ends of the connecting rods 39 are connected by crank pins 45 to cranks 46 on the shaft 43, the throw of the cranks being adjustable by moving the pins 45 along slots 47 in the cranks and then locking them in the selected positions. When the shaft 43 is rotated the connecting rods 39 are angularly oscillated and the heating elements 36, 37 are reciprocated substantially horizontally and longitudinally of the machine, the extent of such reciprocation being regulated by adjusting the throw of the cranks 46. The upper heating element 36 is also suspended from the pivot rod 41 by a pivoted carrier 48, saddle 49 and rods 50, the rods 50 being slidably mounted in the saddle 49, and helical compression springs 51 being disposed between the element 36 and the saddle 49 whereby the element may slide vertically slightly on upward pressure being applied thereto by the lower element 37. The lower element 37 is connected by rod 52 to an eccentric collar 53 mounted on an eccentric sheave 54 on the shaft 43; as the shaft 43 rotates, the eccentric causes the element 37 to be vertically reciprocated and pressure is applied to a bag tube disposed between the elements 36, 37. The arrangement is such that rotation of the drive shaft 43 causes the upper element 36 to be reciprocated substantially along the path indicated at 55 (Fig. 7), whilst the lower element 37 follows the substantially elliptical path 56; thereby, as the bag tube 34 travels through the machine in the direction of arrow 57 (Fig. 7) it is gripped between the two elements 36, 37 as said elements

also move in said direction, and is released from gripping contact with said elements when the elements move in the opposite direction.

An air heating element 58 is mounted on the machine frame 14 and is supplied with cold air through pipe 59, flexible outlet pipes 60 and 61 being connected to the elements 36, 37, respectively, to supply heated air thereto. The elements 36, 37 carry opposed air nozzle devices 62, each having a row of nozzles 63 disposed transversely of the machine; when the bag tube 34 is between the elements 36, 37 and is gripped thereby, a stream of hot air is applied in a transverse strip to the bag tube through the nozzles 63 and the material is caused to become tacky. The transverse seal is completed by pressure applied to the bag by resilient strips 64 inserted in the operative faces of the elements and/or by pressure applied by the forwarding rolls 22; the resilient strips 64 also operate to prevent undue dispersion of hot air applied to the bag tube through the nozzles 63.

The cold air supply to the heating element 58 is controlled by a valve 65 (Figs. 5 and 8) in the pipe 59, the valve being operated by a lever 66 provided at its outer end with a cam follower 67 which is urged, by a spring 68, into contact with a cam 69 mounted on the drive shaft 43. The cam 69 comprises a medial concentric disc 70 and two outer cam members 71, the axial length of the cam follower 67 being such as to extend across all of said disc and members and be contacted by any of them. The cam members 71 are relatively angularly adjustable so that the angular length of the combined operative cam surface provided by the two cam members may be varied as required; in this manner the duration of the opening of the valve 65 may be adjusted.

The speed of the shaft 43 is so adjusted by means of the variable speed gear device 44 as to make the speed of longitudinal movement of the elements 36, 37 equal to the speed of travel of the bag tube during that period when the two elements grip the bag tube (shown in Fig. 7). The throw of the cranks 46 is adjusted by varying the positions of the crank pins 45 in accordance with the required duration of grip during which the sealing is to take place. Cam 69 is adjusted so as to open the valve 65 for the required duration to allow the hot air blast to effect a seal.

Each nozzle device 62 may be provided with one or more transverse rows of nozzles 63 so that the bag tube may be provided with one or more transverse sealing strips at a location; for example, there may be two rows of nozzles so that two parallel closely spaced transverse sealing strips may be made in the bag tube, and the tube may subsequently be cut, by the rolls 23, between said two strips whereby each bag length may be sealed at both ends.

In the modified arrangement of apparatus shown in Figs. 9 and 10 two hot air pipes 72, 73 are disposed with their nozzle ends directed between the overlapping edge portions of the web 11 so that hot air is directed on to said edge portions to make them tacky before the seam 16 reaches a pressure roll 74 and is pressed between said roll and the former plate 13 to complete the seal.

What I claim and desire to secure by Letters Patent is:

1. Apparatus for the manufacture of paper bags, comprising two clamping elements between

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which a moving paper bag tube may be passed, means for supplying hot air to the opposed operative clamping faces of the said clamping elements whereby said hot air may be applied to the bag tube when disposed therebetween, an oscillatory device on which said clamping elements are mounted, means adapted to close said clamping elements on to each other whilst the said oscillatory device moves in one direction whereby the said clamping elements grip a bag tube therebetween and travel with the bag tube, and means adapted to move and hold said clamping elements apart whilst the oscillatory device moves in the opposite direction whereby to release said bag tube.

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2. Apparatus according to claim 1 wherein said oscillatory device is pivotally mounted so as to oscillate angularly.

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