May 9, 1939. T. E. PIAZZE 2,157,732

METHOD OF JOINING SHEETS

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Fig. 1.

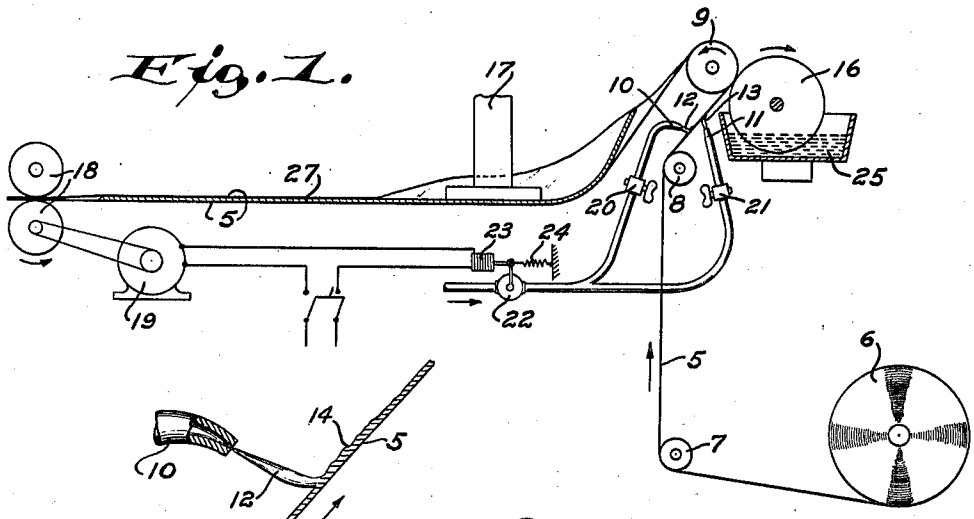

Fig. 3.

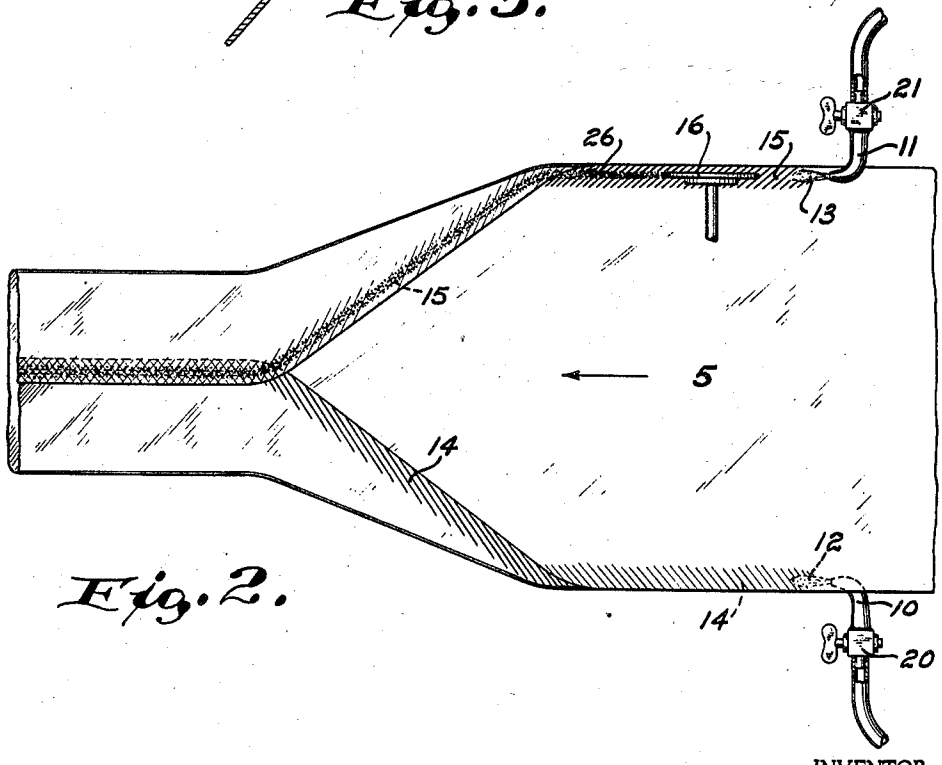

Fig. 2.

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METHOD OF JOINING SHEETS

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2 Claims. (Cl. 154—42)

This invention relates in general to improvements in the art of uniting sheets of material which has been treated at the joining zone with substance having a relatively low melting point, and relates more particularly to an improved method of and apparatus for joining coacting portions of two sheets or remote portions of the same sheet of fabric such as cloth or paper, which have been coated or impregnated at the zone of coaction with substance such as paraffin wax or the like.

In general, an object of the present invention is to provide an improved process of and apparatus for joining wax coated fabric sheets, webs or the like, which is extremely simple but highly efficient.

It has heretofore been proposed in connection with the manufacture of paper bags and the like, from ribbon or web stock such as wax coated glassine paper, to improve the adhesive quality of the gum or glue and the cohesive action of the wax at the seams, by applying to the zones of coaction sufficient heat to melt the wax while the union is being effected. Because of the inflammable nature of the wax coated paper, it has heretofore been customary to avoid the use of direct contact flames by utilizing either an electric heater having a hot plate engageable directly with the wax coated overlapping edge portions of the advancing ribbon or web of stock, or a metallic rotary disk heated by a flame remote from the zone of direct engagement between the disk and the moving ribbon. In addition to these indirect heaters, it has also been proposed to remove the wax by applying a solvent thereto, and while these prior methods may melt or remove a wax coating sufficiently to produce a joint, if the ribbon is advanced very slowly, they will not melt or remove the wax sufficiently when the stock is traveling at speeds such as are desirable and necessary for commercial production, and the prior methods of heating and removal of wax are therefore unsatisfactory for normal commercial use. I have discovered that hot flames projected directly against the wax coated edge portions of a sheet or web prior to overlapping thereof, and preferably before the adhesive is applied, will most effectively melt the wax even when the ribbon of stock is traveling at a high rate of speed, and that the prompt application of fluent gum to the molten wax insures effective intermingling of the wax and adhesive at the zone of overlapping, and thus produces a perfect joint.

It is therefore a more specific object of my present invention to provide an improved method of joining coacting portions of a wax or similarly coated sheet of paper or the like with the aid of flames projected directly against said portions while in motion and prior to application of the adhesive, whereby most effective and durable seams are produced.

Another specific object of my invention is to provide simple and efficient apparatus for effecting commercial exploitation of my improved process, so that the seam or seams may be produced automatically and continuously at a high rate of speed.

A further specific object of this invention is the provision of an improved process of and apparatus for quickly and effectively joining the opposite edges of a continuous ribbon or web of stock such as wax coated glassine paper or the like, in order to convert the ribbon into tubular form preparatory to the production of bags or envelopes therefrom.

Still another specific object of my invention is the provision of a new and useful mode of uniting by combined adhesion and cohesion, predetermined portions of either the same or different sheets of fabric, the coacting portions of which have been coated or impregnated with substance having a low melting point.

These and other specific objects and advantages of my present invention will be apparent from the following detailed description.

A clear conception of the several steps constituting my new process and of the construction and operation of the improved apparatus for effecting commercial exploitation of the process, may be had by referring to the drawing accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the several views.

Fig. 1 is a diagrammatic part sectional side elevation of one assemblage for continuously joining the opposite edges of a ribbon of wax coated sheet material so as to convert the same into tubular form;

Fig. 2 is a diagrammatic, somewhat enlarged development of the portion of the ribbon being converted, showing the relative points of application of the heat and of the adhesive thereto; and

Fig. 3 is a further enlarged diagram depicting the mode of application of a flame to the wax coating, and the effect thereof.

Although I have shown my invention as being especially applicable for the purposes of joining or uniting the opposite edge portions of a single ribbon or web of wax coated paper with the aid

of both heat and glue so as to produce a continuous tubular structure, it is not intended to thereby unnecessarily restrict the scope, since some of the improved features may obviously be used advantageously in the production of seams between independent sheets of the same or of different materials coated or impregnated with other substances.

Referring to the drawing, the improved seaming or joining apparatus shown therein comprises in general, a continuous relatively wide ribbon 5 of wax coated sheet material such as paper adapted to be delivered constantly and at a high rate of speed from a supply roll 6 by means of a succession of guiding rollers 7, 8, 9; a pair of laterally separated gas jets 10, 11 formed and disposed to continuously project small gas flames 12, 13 respectively, directly against the opposite sides of the adjacent rapidly advancing opposite edge portions 14, 15 of the ribbon 5; an ordinary gum or adhesive applying rotor or disk 16 coacting with the edge portion 15 of the ribbon immediately beyond the zone of application of the flame 13 and adjacent to the uppermost roller 9; a stationary former or folding mechanism 17 for automatically overlapping the edge portions 14, 15 over each other; and a set of pressing and pull rollers 18 cooperable with the tubular ribbon 5 beyond the mechanism 17.

The roll 6 should ordinarily contain an abundant supply of the ribbon 5 which is usually composed of thin paper wax coated on both sides with substance such as paraffin wax or other wax-like material having similar characteristics and especially having a relatively low melting point. The transporting rollers 18 may be simultaneously driven in any well known manner as by a common propelling motor 19, and the gas supply jets 10, 11 may be provided with manually operable control valves 20, 21 respectively and with an automatic control valve 22 which should preferably be connected with the roller system in such a way that when one of the rollers 7, 8, 9, 18 stops, the gas supply will be automatically cut off by closure of the automatic valve 22 slightly in advance of the final stoppage of the machine. This automatic interruption of the gas supply and consequent elimination of the flames 12, 13 may be effected either mechanically or electrically when the speed of travel of the ribbon 5 becomes dangerously low, and while I have shown diagrammatically one type of automatic cut-off, other types may be employed. As illustrated in Fig. 1, the automatic valve 22 is operable to open the same, by a magnet 23 which may be energized only when the motor 19 is operating to rotate the rollers 18 direct and the rollers 7, 8, 9, through the web, and the valve 22 will be closed immediately to shut off the gas supply to both jets 10, 11 by a spring 24 whenever the circuit of the driving motor 19 and of the magnet 23, is interrupted; but the jets 10, 11 may also be shut off manually by manipulation of the valves 20, 21.

The flames 12, 13 are preferably of limited size as shown in Fig. 3, in order to produce molten wax areas confined in width to the ultimate overlap, and the adhesive should preferably be applied quickly after melting of the wax has been effected. The adhesive applying disk 16 which coacts with the edge portion of the ribbon 5 adjacent to the roller 9, is of relatively well-known construction, being constantly rotatable and dipping into a basin 25 of relatively fluent glue or gum so as to constantly deposit a stream or band 26 of the adhesive onto the adjacent edge portion 15 of the advancing ribbon 5 directly beyond the zone of application of the flame 13 as clearly shown in Fig. 2. The stationary forming mechanism 17 which is also of well known construction, consists of a thin plate 27 beneath which the body of the ribbon 5 is adapted to travel as it proceeds toward the pull rollers 18, and over the top of which the edge portions of the ribbon are continuously folded to overlapping position and to form a tubular structure by the forming mechanism 17, prior to the advancement of the ribbon between the rollers 18. It is to be understood that the above described mechanisms are shown diagrammatically and that the structure thereof is subject to considerable variation in actual commercial practice.

During the normal operation of my improved apparatus, when carrying on my improved method, the motor 19 is operating to drive the rollers 18 and to actuate the rollers 7, 8, 9, through the ribbon 5, and to thereby constantly withdraw the ribbon 5 of wax coated material from the supply roll 6, and to rapidly advance the ribbon past the heating flames 12, 13, and the adhesive applying disk 16, and beneath the forming plate 27. As the ribbon 5 is advanced between the jets 10, 11, the flames 12, 13 are constantly projected against the opposite sides of the ribbon adjacent the opposite edge portions 14, 15 thereof, and the wax near the opposite edges of the ribbon is thus quickly converted to molten condition as indicated by the cross hatched areas of Fig. 2. Immediately thereafter, the constantly revolving disk 16 applies a band 26 of fluent adhesive to the molten wax along the edge portion 15 of the ribbon 5, and this fluent adhesive quickly mixes or intermingles with the molten wax along the ribbon edge 15. The ribbon 5 with the wax at the edge portions 14, 15 still in highly molten condition, is thereafter advanced along the forming mechanism 17, and the edge portions 14, 15 are reversed and caused to overlap as clearly indicated in Fig. 2. The molten wax of the edge portion 14 is thus brought into contact with the mixture of molten wax and adhesive on the edge portion 15, thus forming a tubular ribbon which is subsequently passed between the pull rollers 18, which apply the final pressure to complete the joint. It will thus be noted that the melting of the wax along the edge portions 14, 15 of the ribbon 5, the application of the adhesive band 26, and the subsequent completion of the joint by overlapping of the edge portions 14, 15, is effected automatically and continuously, and the rapid advancement of the ribbon 5 will positively prevent ignition of the inflammable ribbon 5 because the ribbon is not subjected to the flames 12, 13 for a sufficient length of time to effect ignition of the material.

If, for any reason, one or more of the guiding and advancing rollers should stop, the flames 12, 13 will be automatically extinguished by virtue of the closing of the supply valve 22. Upon stoppage of the machine, and extinguishing of the flames 12, 13, the valves 20, 21 should also preferably be closed until after the machine has been re-started. The valve 22 will then open automatically, whereupon the valves 20, 21 may be opened and the jets 10, 11 may be re-ignited. While it is preferable to utilize adhesive in conjunction with the molten wax coatings, a joint may be formed by utilizing the molten wax coatings alone, and when the adhesive is employed, it is preferable to apply the gum or glue in relatively fluent condition to one of

the molten wax surfaces rather promptly after the melting has taken place.

From the foregoing description of the present invention, it will be apparent that I have provided a simple and highly efficient method of producing joints with the aid of flames which may be projected directly against the surfaces of inflammable sheet material. The improved method may be utilized to join either remote parts of the same sheet or ribbon, or portions of separate sheets or ribbons, and while it may be preferable to melt the wax on both of the sheet portions which are subsequently brought together, it may also be possible to obviate one of the melting operations. By applying the adhesive to the molten wax as quickly as possible, thorough mixing and intermingling of the wax and adhesive will be assured, thereby improving the final joint, and while the final pressing operation may be dispensed with, this pressing will serve to more effectively distribute the adhesive, and will thereby also improve the joint. The feature of extinguishing the flames when the advancing movement of the ribbon 5 ceases, insures protection against possible fire, and permits safe use of the present process in conjunction with rather highly inflammable materials, and my improved process has proven highly practical, efficient, and safe in actual use. I have found that the use of the flames 12, 13 projected directly against the wax coatings, permits advancement of the ribbon 5 at relatively high speed and with sufficient rapidity so as to make commercial production possible, and this result has never heretofore been attained with the use of indirect heaters of the electrical and mechanical types which depend upon a heated surface contacting with and melting the wax coatings.

It should be understood that it is not desired to limit this invention to the exact details of construction of the apparatus, and to the precise steps of the process herein shown and described, for various modifications within the scope of the claims may occur to persons skilled in the art.

I claim:

1. The method of continuously forming a tube from a web of thin wax coated paper sheet material for the subsequent manufacture of bags, which consists in feeding the web at high speed along a longitudinal path of travel, projecting a flame of high heat intensity and limited size against the side edges of the web and respectively on opposite surfaces thereof to melt the wax and produce a narrow molten wax area parallel with the side margins of and on opposite surfaces of the web, there being no wax removed from said area by reason of the high speed of the web travel, immediately thereafter applying a narrow strip of fluent adhesive to the advancing molten wax area at one edge portion of the web to cause the adhesive to mingle with the molten wax, overlapping said opposite marginal portions of the web to bring the molten wax area of one surface into direct engagement with the mixture of molten wax and adhesive on the opposite surface, pressing the overlapped surfaces into intimate contact with each other before the adhesive and wax have set to produce an adhesively secured and wax protected joint after the adhesive and wax have set.

2. The method of continuously forming a tube from a web of thin wax coated paper sheet material for the subsequent manufacture of bags, which consists in feeding the web at high speed along a longitudinal path of travel, projecting a flame of high heat intensity and limited size against the side edges of the web and respectively on opposite surfaces thereof to melt the wax and produce a narrow molten wax area parallel with the side margins of and on opposite surfaces of the web, there being no wax removed from said area by reason of the high speed of the web travel, immediately thereafter applying a narrow strip of fluent adhesive to the advancing molten wax area at one edge portion of the web to cause the adhesive to mingle with the molten wax, overlapping said opposite marginal portions of the web to bring the molten wax area of one surface into direct engagement with the mixture of molten wax and adhesive on the opposite surface, pressing the overlapped surfaces into intimate contact with each other before the adhesive and wax have set to produce an adhesively secured and wax protected joint after the adhesive and wax have set, and controlling the application of said flame in synchronism with the speed of travel of the advancing web so that when the movement of the web is reduced to a speed whereby ignition would occur, the flame is automatically extinguished.

THOMAS E. PIAZZE.