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[54] MACHINE FOR ASSEMBLING LAMINA WORKPIECES

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[56] References Cited

UNITED STATES PATENTS

2,708,278 5/1955 Kamborian156/380 X

2,862,543 12/1958 Kaminsky156/306 X
3,111,440 11/1963 Prentice.....156/166 X
3,377,223 4/1968 Clausen et al.156/166
3,490,974 1/1970 Jacobson156/304 X

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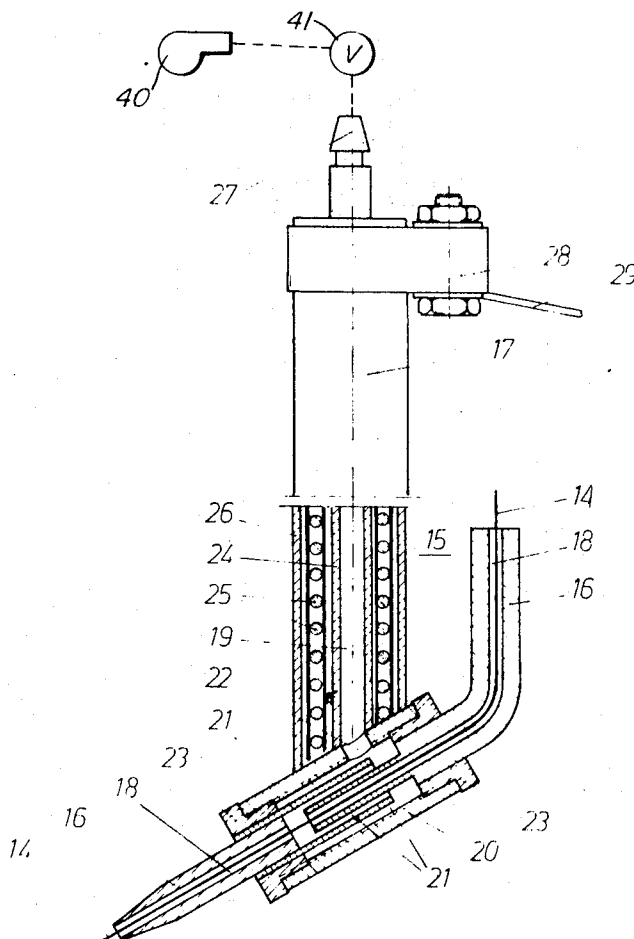
Assistant Examiner—J. M. Hanley

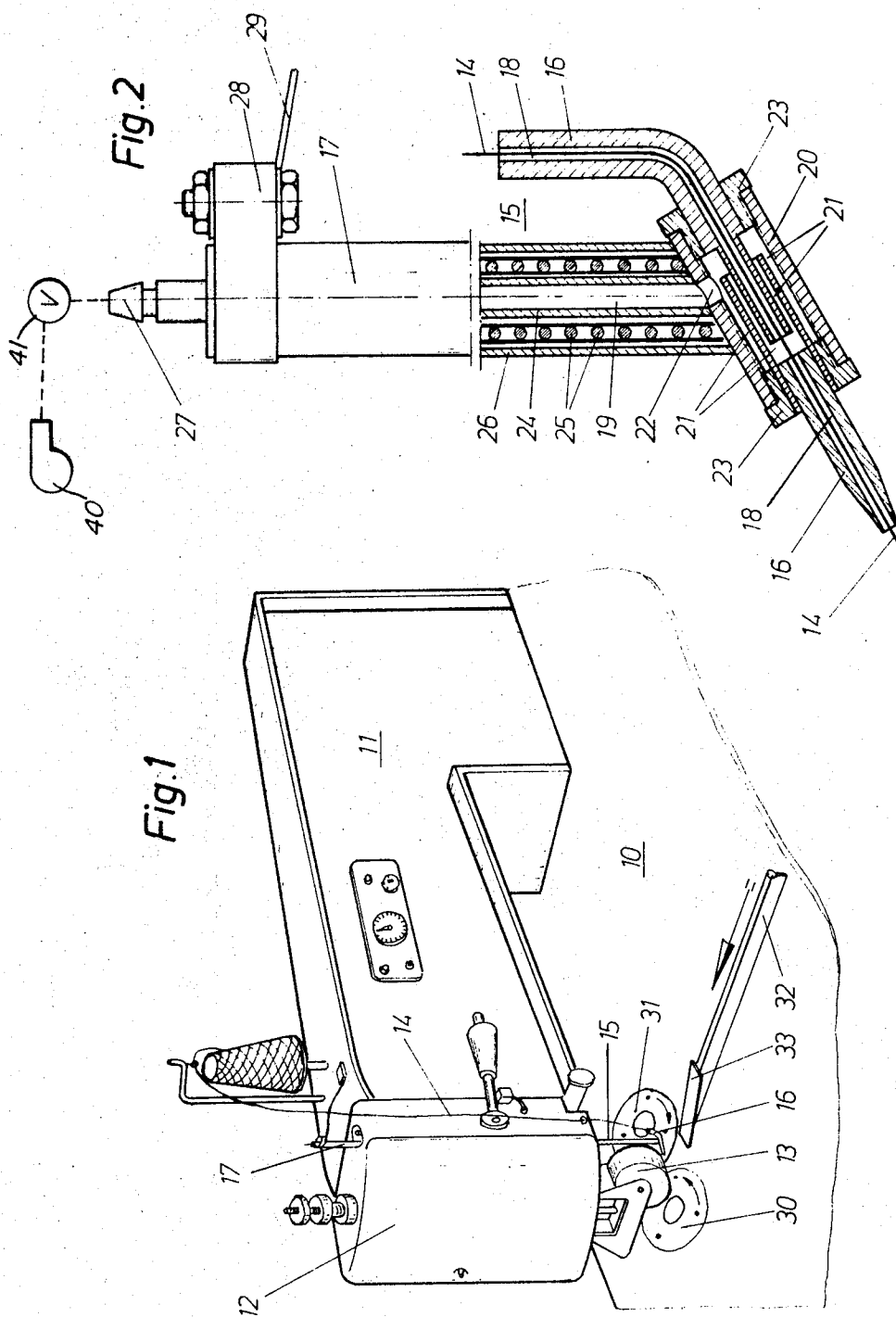
Attorney—Sughrue, Rothwell, Mion, Zinn & Macpeak

[57] ABSTRACT

A machine for assembling lamina workpieces has a workpiece table and at least one pressure roller located over the table for pressing an adhesively coated thread in position on the workpiece surfaces. The thread being located by means of a guide device comprising a guide tube and a heating tube, the guide passage of the guide tube receiving the thread communicates with a hot air passage of a heating tube adapted to heat air passing under pressure therethrough into the guide passage via passages defined by edge regions of the guide tube and the heating tube.

8 Claims, 2 Drawing Figures





MACHINE FOR ASSEMBLING LAMINA WORKPIECES

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a machine for assembling flat, thin workpieces such as veneers or paper sheets, having a pressure roller or the like pressure means located above the workpiece plane for pressing an adhesively coated thread in position when laid on the workpiece surfaces by means of a guide device.

2. Description of the Prior Art

In such known machines a thread guide device is fitted with a heating tube in which the adhesive is reactivated during its passage. To attain a rational and hence high throughput of the machine it is necessary for the heating tube to be made relatively long and also for the heating temperature to be kept higher than is necessary for reactivating the adhesive. These two factors result in an adverse manner in overheating and hence destroying the adhesive. Furthermore, adhesive residues are deposited on the capillary heating pipe wall causing constriction and finally complete closing thereof.

Even under normal conditions, particles are deposited on the wall surface of the heating pipe due to the long thread guidance and contact friction adhesive and result in constriction of the heating tube and thread breakage. The adhesive residues often carried along by the thread are precipitated in pools on the workpiece surfaces and have a disturbing effect on the further processing of the assembled workpieces. Known machines hence have an unfavorable method of thread guidance and a breakdown prone method of operation.

SUMMARY OF THE INVENTION

It is an object of the invention to provide a machine for assembling flat, thin workpieces which is provided with a thread guide device of simple structure operating without breakdowns and which makes possible a rational method of operation whilst avoiding the hitherto existing disadvantages.

According to the present invention there is provided a machine for assembling flat, thin workpieces having pressure means located over a workpiece plane for pressing an adhesively coated thread in position on the workpiece surfaces after being located thereon by means of a guide device having a guide tube and a heating tube characterized by the feature that a guide passage of the guide tube receiving the thread communicates with a hot air passage of a heating tube from which heating air is adapted to pass under pressure.

In a preferred embodiment of the invention, the guide passage may be connected to the hot air passage of the heating tube by means of apertures in the form of bores or other passages. The heating tube may assume an acute angle to the guide tube and the connection between hot air and guide passage may be provided in the butt region of the heating tube.

A further preferred feature is for the guide tube to be detachably arranged as a single guide tube provided with apertures or as a two-part guide tube providing a connecting passage between two tube sections and between hot air and the guide passage in a receiving sleeve firmly connected to the heating tube. The hot air passage of the heating tube may be formed by a convactor tube around which a heating device is arranged and the heating tube may be provided with a connecting member for a compressed air pipe.

In a still further embodiment of the invention, the thread guide device may be arranged to be pivotal about the longitudinal axis of the preferably vertically arranged heating tube or located in a machine head of the machine, so that the adhesive thread may be placed in undulations or zig-zag-like manner on the workpieces in the region of the joints.

A particularly favorable feature resides in the preferable construction of the thread guide device, whereby, on account of the connection between the heating tube and the guide tube, the adhesive of the thread passing through is reactivated by means of hot air within a very short period of time.

This method of reactivation of the adhesive permits the guide tube to be of short construction so that the contact friction between thread and guide tube is very low. Furthermore, the hot air is charged under pressure into the region of the guide tube and prevents particles of adhesive from settling. By surrounding the adhesive thread with hot air, the adhesive of the thread is reactivated in a very short time and overheating or destruction of the adhesive prevented.

The thread guide device in accordance with the invention is distinguished by its simple structure, its low cost of manufacture on account of the few individual components and a reliable and breakdown-free method of operation. Consequently, a high hourly output may be attained with automatic method of operation.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described further, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view of a machine for assembling flat, thin workpieces having a pressing roller and a thread guide device connected in series thereto and located over the plane of passage of the workpiece;

FIG. 2 is a partial section through the thread guide device suitable for a coated thread having a guide tube located on a heating tube.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A machine for assembling flat, thin workpieces such as veneers or sheets or paper is provided with a work table 10 which may have a conveyor device for the workpieces associated therewith, and a machine head 12 located over the work table 10 and supported by a projecting supporting arm 11.

A pressing roller 13 is mounted on the underside of the machine head 12 and is resiliently located and rotatable in the direction of passage of the workpiece, the outer surface of the roller extending above the plane of passage of the workpiece and presses a thread 14 having an adhesive coating such as a glass or silk thread covered with a thermoplastic adhesive on to the workpiece surfaces so as to connect the individual workpieces.

The thread 14 is placed on the surfaces of the workpieces to be joined together by means of a thread guide device 15 provided on the machine head 12. The thread guide device 15 comprises a guide tube 16, a heating tube 17 and a guide passage 18 of the guide tube 16 receiving the thread 14 and communicating with a passage 19 of the guide tube 16 so as to be heated by air passing under pressure therethrough. The guide passage 18 of the guide tube 16 may thus be connected to the hot air passage 19 of the heating tube 17 by means of apertures, such as bores or by at least one passage.

The heating tube 17 preferably assumes an acute angle with the guide tube 16 and the apertures or passages communicating with the hot air passage 19 extend in the joint region of heating and guide tube 16, 17.

A receiving sleeve 20 is provided on one end face of heating tube 17 and has guide tube 16 arranged therein in a preferred embodiment and interrupted by tubular wall sections to form a connecting passage 21 with the hot air passage 19. The guide tube 16 may thus be arranged in the receiving sleeve 20 with two tube sections assuming a spaced relationship at their end faces and producing the connecting passage 21 between hot air and guide passage 19 and 18. The diameter of the guide passage 18 is constant either side of the interruption. The connecting passage 21 is formed by two annular spaces of different diameter provided by the overlapping guide tubular wall sections and are interconnected at an end region and also connected to the hot air passage 19 by a bore 22 in the receiving sleeve 20. The overlapping tubular wall sections are arranged so that the connecting passage 21 merges into the guide passage 18 and the thread 14 passing through the guide tube 16 is freely exposed in the connecting passage 21 to the hot air.

The two parts of the guide tube 16 are detachably mounted in or on the receiving sleeve 20 by means of socket and/or screw elements. In a preferred embodiment the guide tube sections are each provided with a threaded sleeve 23 by welding or pressing which sleeve is adapted to be screwed into the receiving sleeve 20 having an internal thread. The receiving sleeve 20 may be firmly connected to the heating tube 17 by welding.

The heating tube 17 is preferably located with its longitudinal axis at right angles and the guide tube 16 with its longitudinal axis preferably at an acute angle to the plane of the workpiece movement; the end of the guide tube remote from the workpiece being bent upwards and extending parallel to the heating tube 17. The guide tube 16 may also be detachably mounted in the receiving sleeve 20 in the form of a tube provided with apertures.

The hot air passage 19 is preferably formed by a convection tube 24 about which a heating device 25, e.g. a heating coil, is arranged. The heating device 25 is provided at least over part of the length of the heating tube and is enclosed by an external tube 26. The heating device 25 is preferably provided with its end adjacent to the guide tube 16 with spaced relationship to the guide passage 18, so that a direct heat action of the heating device 25 does not occur on the thread 14, but only the heated air and the metal heat radiation of the guide tube 16 comes into contact with the thread 14; the heat radiation of the heating device 25 is transmitted to the guide tube 16, so that the heat radiation of the guide tube 16 assists the plasticizing of the adhesive.

The upper end of the heating tube 17 remote from the guide tube 16 may be provided with a connecting member 27 for an air pipe, preferably for a compressed air source 40, and a connecting terminal for a current lead-in wire 29.

The adhesive coated thread 14 passes through the guide tube 16 and is placed thereby on the workpiece surfaces. During the passage of the thread, the adhesive is reactivated by the hot air issuing from the heating tube 17 and coming into contact therewith. The air entering under pressure into the heating tube 17 via the coupling member 27 is heated by radiation from the convector tube 24 on passing through the passage 19 and enters via the bore 22 into the connecting passage 21 which communicates with the guide passage 21, so that the hot air surrounds the thread 14 passing through.

The adhesive of the thread 14 is plasticized by the hot air and without damaging or destroying the adhesive or the thread 14, is brought to the required temperature. The intensive envelopment of the adhesive thread 14 with hot air allows the adhesive to be reactivated at such a speed that only an extremely short thread guide tube 16 is required. The thread 14 and plasticized adhesive emitted from the guide tube 16 and placed thereby on the workpiece surface is pressed on by the subsequent pressing roller 13 for assembling workpieces strung together.

A magnetic valve 41 or the like releases the air supply into the heating tube 17 only during the passage of the workpiece so that the adhesive of the thread 14 is not overheated. The air passing under pressure through the thread guide device 15 keeps the thread guide tube 16 constantly open, so that interferences within the thread guide tube 16 by residual adhesive particles deposited are prevented. The thread guide tube 16 is readily replaced by virtue of the detachable connection with the heating tube 17.

The thread guide device 15 may be located so as to be pivotal about the longitudinal axis of the heating tube 17 on or in the machine head 12, so that the thread 14 may be placed in undulations, coils or zig-zags from adjacent workpieces in the joint region. Furthermore, the machine may be provided in the region of the work table 10 with two circular disc plates 30, 31 which rotate in opposite directions and press the workpieces passing therebetween tightly together.

A guide ledge 32 with a holding down device 33 is provided which on the one hand fixes the direction of movement of the workpiece and on the other hand retains the workpieces by means of the holding down device 33, on the same plane while

avoiding any tilting on the work table 10 and may be connected in series with the circular disc plates 30, 31.

The machine in accordance with the invention for assembling flat, thin workpieces is of simple structure, operates reliably without breakdowns and has a large hourly output. A particularly favorable feature is the thread guide device of simple structure by means of which a thread enveloped with an adhesive is placed on the workpieces, the adhesive of the thread being plasticized during passage. The adhesive is softened by hot air surrounding the adhesive thread which effects a quick and accurate reactivating of the adhesive. The thread guide device on account of its structure and the connection of a hot air passage with a guide passage, operates without interference and enables the use of a very short guide tube. Furthermore, the thread guide device comprises few, readily producible individual parts which may be fabricated at an economical price. It is within the scope of the invention to modify this machine structurally optionally and adapt it to prevailing requirements.

I claim:

1. A machine for assembling lamina workpieces with adhesive coated thread including a workpiece table having at least one pressure roller located over the table for pressing the adhesively coated thread onto the workpiece surface comprising:

a guide means for locating and passing the thread including a guide tube having an aperture;

heating tube means including an electric heat convection device, a source of compressed air and an air duct connecting the compressed air source to the aperture of the guide tube, the heat convection device surrounding the air duct, and

a connecting sleeve tube joining the heating tube means air duct with the guide tube adjacent the workpiece end of the tube, said connecting sleeve tube surrounding said guide tube and permitting convection heating of said guide tube circumference, the axis of the heating tube means being at an angle to the axis of the guide tube and the guide tube assuming an acute angle relative to the plane of the workpiece table whereby the thread is heated prior to connecting the workpiece.

2. A machine as in claim 1 where the guide tube includes a pair of tubes with the first tube concentrically surrounding the second tube to provide a ring clearance for receiving hot air and introducing it to the adhesive coated thread.

3. A machine as in claim 2 where the first and second tube of the guide tube and the connecting sleeve tube form a labyrinth passage for the hot air.

4. A machine as in claim 2 where the first tube terminates in a nozzle portion where the internal diameter of the nozzle portion and the second tube are the same.

5. A machine for assembling workpieces with adhesive coated thread including a workpiece table comprising;

a heating tube located above the workpiece table;

a source of compressed air connected to the heating tube and heated by heat connection from the heating tube;

guide means including a first and second guide tube, a first guide tube arranged about and along a portion of the second guide tube to provide an aperture and conduit therebetween;

a nozzle attached to the first guide tube; and

a connecting sleeve connecting the heating tube to the guide means and passing the hot air to the aperture and conduit, the connecting sleeve further conducting heat to the nozzle from the heating tube, whereby the adhesive thread is heated by both the hot air passing through the aperture and conduit and the nozzle prior to contacting the workpiece.

6. A machine as in claim 5 further including control means for introducing compressed air to the heating tube only when a workpiece is passing the nozzle.

7. A machine as in claim 6 where the control means includes a magnetic valve.

8. A machine as in claim 7 where the first and second guide tubes are detachably mounted by threaded sleeves with the connecting sleeve.

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