June 18, 1968 C. D. ROBISON, JR 3,389,038

PRESS FEEDING APPARATUS

Filed July 30, 1964 3 Sheets-Sheet 1

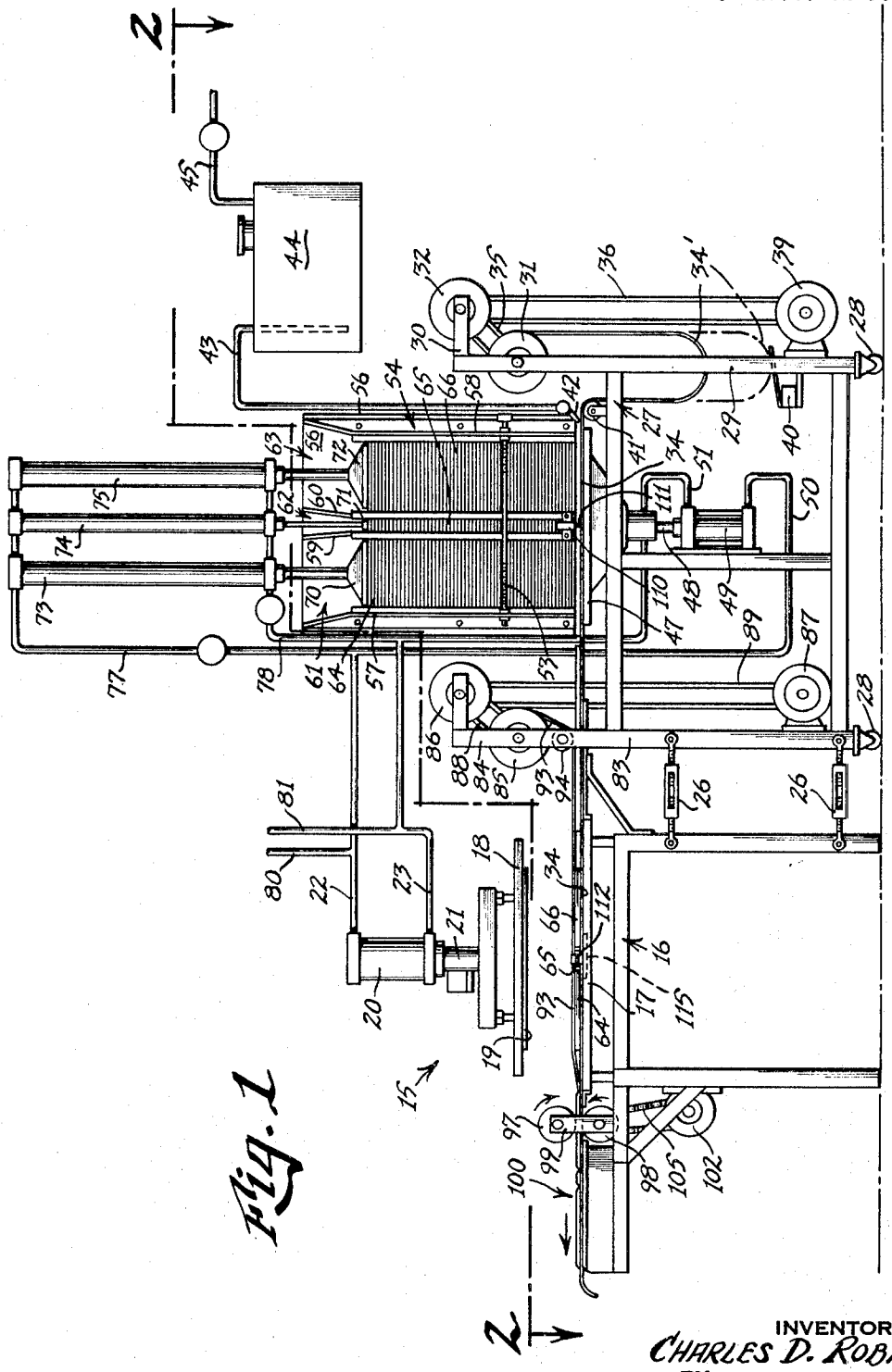


Fig. 1

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PRESS FEEDING APPARATUS

Filed July 30, 1964 3 Sheets-Sheet 2

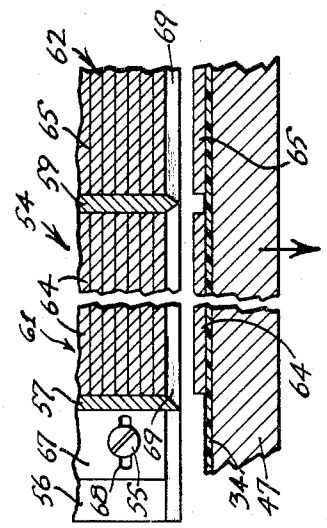


Fig. 5

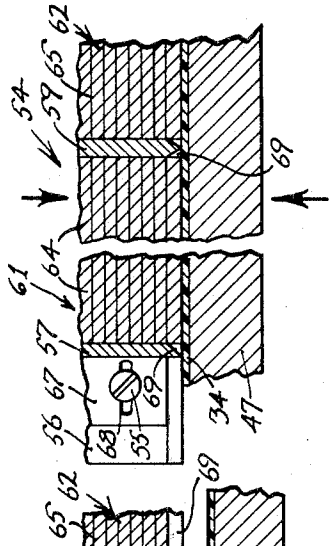


Fig. 4

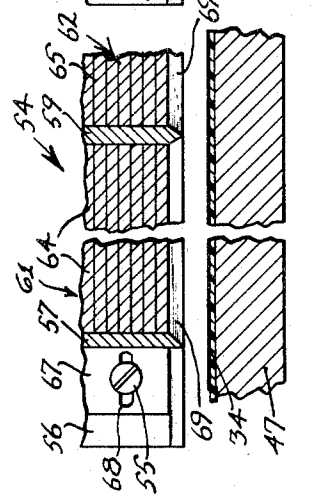


Fig. 3

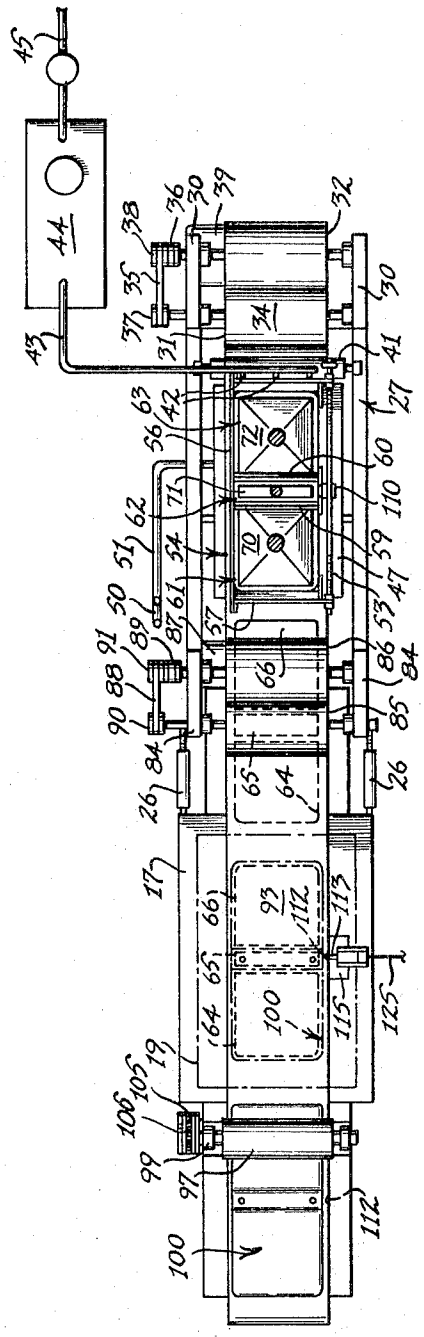


Fig. 2

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PRESS FEEDING APPARATUS

Filed July 30, 1964 3 Sheets-Sheet 3

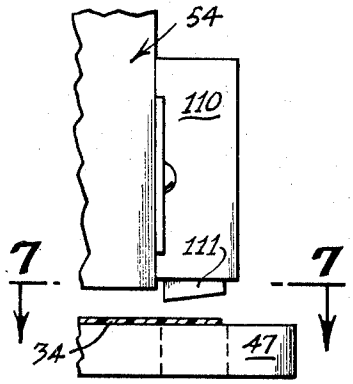


Fig. 6

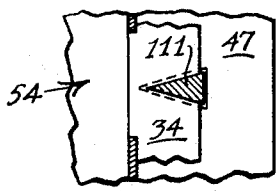


Fig. 7

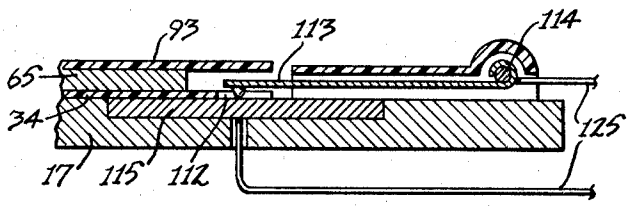


Fig. 9

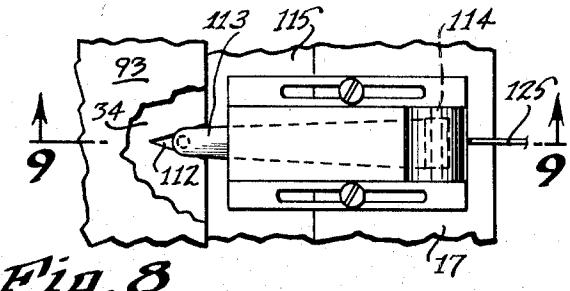


Fig. 8

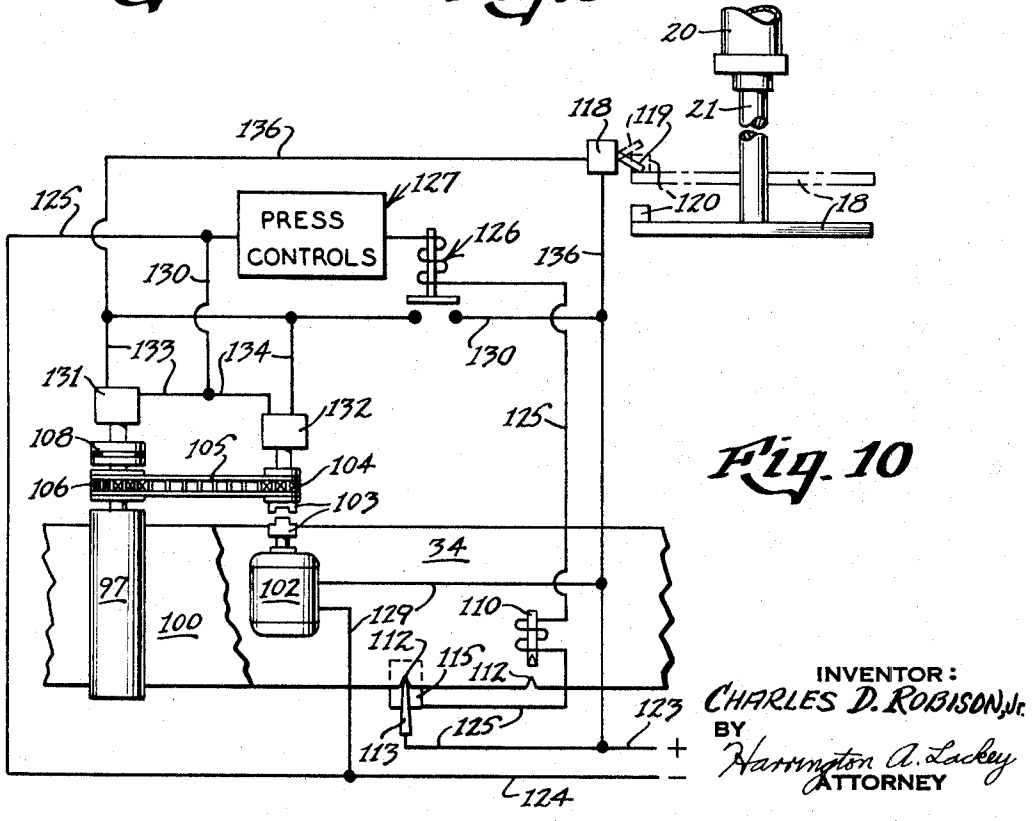


Fig. 10

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3,389,038

PRESS FEEDING APPARATUS

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Filed July 30, 1964, Ser. No. 386,293
12 Claims. (Cl. 156—361)

ABSTRACT OF THE DISCLOSURE

An apparatus for feeding sheet material to a press for laminating the layers of material into a composite product, including a roller remote from the press for feeding a lower web toward the press, a second roller between the remote roller and the press for feeding an upper web above and along the lower web toward the press, means between the two rollers for depositing adhesive upon the the top surface of the lower web, and a vertically disposed magazine for depositing one board at a time upon the top of the lower web to which the adhesive has been applied, but prior to the passage of the lower web beneath the upper web.

This invention relates to a press feeding apparatus, and more particularly to an apparatus for automatically and continuously feeding materials to a press for forming laminated products, such as looseleaf binders.

Heretofore, the formation of many laminated products, and particularly looseleaf binders, has been accomplished by hand feeding or loading a dielectric press with the different layers of materials for operation of the press upon the materials.

In the art of making looseleaf binders, a dielectric press is employed having a stationary lower platen and a reciprocable upper platen having a sealing die or dies fastened to the bottom surface of the upper platen. The operator of the press lays a bottom sheet of fusible plastic, such as vinyl, slightly larger than the die, flat upon the lower platen. The operator then places one or more pieces of pasted, chip board or other filler in a predetermined location on top of the bottom sheet of plastic. Then a top sheet of plastic, substantially the same size as the bottom sheet, is placed on top of the chip board. The operator then presses the start button on the press to thrust the upper platen down upon the layers of material. When the upper platen and die are properly seated upon the lower platen, timing mechanisms control the press to hold the upper platen in this position while radio frequency waves are transmitted through the material for about two to six seconds to fuse the top and bottom plastic sheets together, completely enclosing the boards or filler. The upper platen is then automatically raised and the completed binder removed by hand. The cycle is then repeated.

It is therefore an object of this invention to overcome the laborious and time-consuming manual feeding of the layers of material to a dielectric press for making laminated products, by providing a novel method and apparatus for automatically and continuously feeding the materials to the press.

One object of this invention is to provide a method of automatically feeding a press with layers of material so that each layer is introduced at a different station and pre-assembled for fusing when they enter the press.

Another object of this invention is to continuously feed first and second webs of sheet material to the press, beginning at different stations, and depositing the filler material upon the bottom web before it reaches the second web feeding station.

Another object of this invention is to provide novel means for automatically inserting fillers or boards between continuous webs of sheet materials for the formation of laminated products.

A further object of this invention is to provide means for assembling and feeding web sheet material and fillers to a press, and for automatically indexing the materials to register with the press platen.

Another object of this invention is to provide a novel and economical method of mass producing heat-sealed, looseleaf and other type book binders more rapidly than heretofore known.

Another object of this invention is to provide adjustable means for feeding layers of material of different sizes to a press to form laminated products of correspondingly different sizes.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings, wherein:

FIG. 1 is a side elevation of the invention in inoperative position;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is a fragmentary sectional elevational view of the magazine and reciprocable support table in an inoperative position;

FIG. 4 is a view similar to FIG. 3 of the magazine and table in a first operative position;

FIG. 5 is a view similar to FIG. 3 with the magazine and table in a second operative position;

FIG. 6 is an enlarged fragmentary side elevational view of the notch forming mechanism;

FIG. 7 is a section taken along the line 7—7 of FIG. 6;

FIG. 8 is an enlarged fragmentary top plan view with the top web broken away showing the indexing switch finger engaging the notch;

FIG. 9 is a section taken along the line 9—9 of FIG. 8; and

FIG. 10 is a schematic diagram disclosing the electrical circuit for automatically controlling the invention.

Referring now to the drawings in more detail, and particularly FIG. 1, a dielectric press **15** is mounted on a supporting frame **16** and includes a stationary lower platen **17** and a vertically reciprocable upper platen **18**. The type of press illustrated is a "Thermatron" dielectric press of the Willcox and Gibb Sewing Machine Company, such as their models K100S and B–16–B (generator and press combination). Such a press **15** includes its own control mechanism for raising and lowering the upper platen **18**, for causing the upper platen **18** to dwell in its down, sealed position upon the lower platen **17**, and for generating and transmitting radio frequency energy across the platens **17** and **18** to fuse the laminated materials. Since the apparatus disclosed in the drawings is particularly designed for forming looseleaf binders, a die **19** of the required shape, is attached to the bottom surface of the upper platen **18**. The upper platen **18** is adapted to be reciprocated by a hydraulic cylinder **20** and piston **21**, and the cylinder **20** is double-acting so that the high pressure air conduits **22** and **23** alternate as inlet and exhaust conduits, respectively.

Mounted adjacent and adjustably connected to the frame **16** by means of adjustable turnbuckles **26** is the feed apparatus support frame **27**, mounted on rollers **28** for movement toward and away from the press frame **16**. The upper ends of the right legs **29** (FIG. 1) comprise a bracket **30** in which power driven rolls **31** and **32** are rotatably journaled for alternately supplying a first or bottom web **34** of sheet material of fusible plastic, such as vinyl. The rolls **31** and **32** may be driven by any convenient means, such as the belts **35** and **36** engaging corresponding pulleys **37** and **38** and driven from a motor **39**, mounted on the frame **27**. In order to eliminate excessive tension in the bottom web **34**, the rolls **31** and **32** are driven continuously until the web loop **34'** descends to its dashed-line position disclosed in FIG. 1, where it engages a micro-switch **40** for automatically

stopping the motor 39. When the loop 34' rises, it releases the micro-switch 38 to re-start the motor 39.

After the web 34 passes over the supporting idler roll 41, adhesive is applied to the top surface of the web 34, by any convenient means, such as the spray nozzle 42. The liquid adhesive is fed to the nozzle 42 through a pipe 43 from a tank 44 supplied with air at low pressure through pipe 45. Another method of applying adhesive to the top surface of the web 34 is to run the web in contact with an adhesive or glue applying roller to apply the adhesive in narrow longitudinal strips on the web 34. Another method of applying adhesive to the web 34 is to roll onto the top surface continuous narrow bands of plastic tape having pressure-sensitive surfaces on both sides of the tape.

After the bottom web 34 passes over the idler roll 41 it is fed across a vertically reciprocable table or plate 47 supported on a piston rod 48 reciprocable within the pneumatic cylinder 49 fixed to the frame 27. The cylinder 49 is also double-acting, having air conduits 50 and 51 alternately acting as inlet and exhaust pipes.

Mounted above the table 47 in a fixed position, is the magazine 54, having a rear wall 56 and side walls 57 and 58. Interior walls 59 and 60 separate the magazine 54 into three vertical compartments, 61, 62 and 63. The vertical walls of each of the compartments 61, 62, and 63 are so arranged that they will engage respectively three stacks of fillers, such as the side boards 64, the narrower end boards 65 and the opposite side boards 66. The side walls 57 and 58 and interior walls 59 and 60 are provided with flanges, such as flange 67 of side wall 57 (FIGS. 3–5), having elongated slots 68 through which pass bolts 55 fastened into the rear wall 56. An elongated screw or threaded bolt 53 is secured to the portions of the side walls 57 and 58 in front of the boards 64–66 to move the side walls 57 and 58 toward and away from each other. This construction permits limited adjustment of the walls 57–60 longitudinally of the rear wall 56 to accommodate boards 64, 65 and 66 of different sizes.

As disclosed in FIG. 1, the upper portions of the vertical walls may be flared outwardly slightly in order to easily insert the respective boards 64, 65 and 66 into the tops of their corresponding compartments, 61, 62 and 63. As best disclosed in FIGS. 3, 4 and 5, the bottom edges of the magazine 54 have an inner surface chamfered upward and inwardly for a vertical distance approximately equal to the thickness of one of the boards 64–66 to form the gradually enlarged area 69 to facilitate the removal of the bottom board in each stack when the stacks are thrust to the position shown in FIG. 4. In this manner, only one board at a time is discharged from each column 64, 65 and 66.

In order to thrust the stacks 64, 65 and 66 downward, plungers 70, 71 and 72 depend into the open top portions of each of the corresponding compartments 64–66. Each plunger 70–72 is mounted to reciprocate in the stationarily mounted pneumatic cylinders 73, 74 and 75, all of which are double-acting and controlled by the alternately reversible air conduits 77 and 78.

If desired, all the pneumatic cylinders 20, 49, 73, 74 and 75 may be supplied from a common source of air pressure, disclosed in FIG. 1. The common air pressure pipe 80 supplies branch pipes 22, 50 and 77, while common air pressure pipe 81 supplies the other branch pipes 23, 51 and 78.

The left legs 83 of the feeder frame 27 (FIG. 1) also support a bracket 84 above the path of the web feed for mounting a pair of power driven rolls 85 and 86, similar to the rolls 31 and 32. The rolls 85 and 86 may be drivingly connected to each other and the motor 87 by means of the belts 88 and 89, the pulleys 90 and 91, as disclosed in FIGS. 1 and 2. The motor 87 is fixedly mounted on the feeder frame 27. The feed rolls 85 and 86 are adapted to alternately feed the top web 93 of sheet material of fusible plastic, such as vinyl, beneath the idler roll 94, so that the top web 93 will be fed at the same speed and in an adjacent parallel path above the bottom web 34. The spacing of the roller 94 is such that the top web 93 will be fed toward the press and lying on top of the boards 64, 65 and 66.

In order to pull the assembled webs 34 and 93, and the boards 64, 65 and 66 between the webs, a pair of pulling rolls 97 and 98 are journaled in a bracket 99 at the left end of the press 15 (FIG. 1) so that the upper roll 97 engages the top of the finished laminated product 100, while the bottom roll 98 engages the bottom surface of the product 100. The pulley rolls 97 and 98 may both be positively driven from the motor 102 mounted on the press frame 16, through the clutch mechanism 103, sprocket 104, chain 105, and sprocket 106, as best disclosed in FIG. 10. Either or both the rolls 97 and 98 are preferably provided with a brake mechanism 108.

In order to control the feeding apparatus, so that it is continuously feeding while the press 15 is inoperative, and so that the feeding will stop to accurately register the webs 34 and 93 and the boards 64, 65 and 66 on the lower platen 17 with the die 19 for pressing the same, a novel indexing means is provided. Mounted on the front of the magazine 54 is a solenoid 110 adapted, when energized, to thrust a wedge-shaped punch 111 downward below the bottom edge of the magazine 54 to cut a notch 112 in the margin of the bottom web 34 when the support plate 47 is thrust upward to the position disclosed in FIG. 4. Although the punch 111 may be located at any pre-determined position, it is disclosed in FIG. 1 as substantially aligned with the center line of the end board 65, and consequently the center line of the looseleaf binder 100. When the web 34 is fed into the press 15 and the notch 112 is in vertical alignment with the center line of the die 19, a biased switch finger 113 pivotally mounted at 114, will drop into the notch 112 and contact the copper plate 115, mounted in the lower platen 17, to close the electrical circuit 125. When the bottom web 34 moves the slot 112 out of registry with the switch finger 113, the switch finger 113 will be raised or cammed upward to again ride on the upper surface of the bottom web 34.

Another switch 118 is stationarily mounted adjacent one side of the vertical path of the upper platen 18, as best disclosed in FIG. 10. This switch 118 is provided with a switch arm 119 which is momentarily engaged by a lug 120 on the platen 18 as the platen passes the switch 118 on its upward stroke. During the engagement of lug 120 with switch arm 119, the switch 118 is momentarily closed. After the platen 18 has passed the switch arm 119 and throughout the descent of the platen 18, the switch 118 remains open.

The circuit for connecting all the above described switches in order to control the feeding and indexing means for the apparatus is disclosed in FIG. 10. Electric power is supplied to the circuit through the leads 123 and 124. The power circuits 123 and 124 supply four parallel circuits. One of the parallel circuits is the index circuit 125 including in series, the switch 113–115, solenoid 110, the coil of electromagnetic switch 126 and the controls 127 for the press 15. The second parallel circuit is the motor circuit 129. The third parallel circuit is the brake-clutch control circuit 130, which includes the electromagnetic switch 126, and the solenoid 131 for actuating the brake mechanism 108 and the solenoid 132 for actuating the clutch mechanism 103 in parallel circuits 133 and 134, respectively. The fourth parallel circuit is the starting circuit 136, including starting switch 118, which also controls the solenoids 131 and 132.

The operation of the invention will now be described:

With all of the elements of the apparatus initially in their inoperative positions disclosed in FIG. 1, power is supplied to the circuits 123 and 124 to start the motor 102 through the circuit 129. While the switch finger 113

is not engaging a notch **112**, the circuit **125** is open. However, when the coil on the electro-magnetic switch **126** is de-energized, the switch **126** will close the circuit **130** to energize solenoids **131** and **132**, and thereby de-actuate the brake mechanism **108** and actuate the clutch mechanism **103** to drive pulling rolls **97** and **98**. With the circuit **125** open, the press controls **127** will maintain the press **15** inoperative. Therefore, the press **15** must be manually actuated until notches **112** are formed to automatically control the press and feeding cycles. Power may also be supplied from the power supply circuits **123** and **124** to the feed roll motors **39** and **87**, if desired.

In order to initiate the formation of laminated products **100**, the operator pushes the starter button, not shown, on the press **15** to feed compressed air from the supply pipe **80** simultaneously to the pipes **22**, **50** and **77** to simultaneously actuate the cylinders **20**, **49**, **73**, **74** and **75**. The push button starter switch must also be synchronized with solenoids **131** and **132** to bring the pulling rollers **97** and **98** to a full stop while all the pneumatic cylinders are being actuated. The cylinder **49** thrusts the table **47** upwardly to carry the supported portion of the bottom web **34** upward against the bottom of the magazine **54**, as disclosed in FIG. 4. Simultaneously, the plungers **70**, **71** and **72** are thrusting the stacks **64**, **65** and **66** downward to register the corresponding bottom boards in the chamfered areas **69** to facilitate release of these boards upon the top surface of the bottom web **34**. Since adhesive is applied to the top surface of the web **34** by the adhesive applicators **42**, the bottom boards **64**, **65** and **66** will adhere to the top surface of the bottom web **34**. Simultaneously the cylinder **20** thrusts the upper platen **18** to seal the die **19** against the bottom platen **17**, and the dielectric heating of the platens will fuse the top web **93** to the bottom web **34** to form pockets completely surrounding the individual boards **64**, **65** and **66**. Also in the initial operation, the solenoid **110** will have to be separately energized in order for the punch **111** to form a notch **112** in the margin of the bottom web **34**.

It is also within the scope of this invention to entirely eliminate the solenoid **110** and merely mount a punch **111** fixed against the front of the magazine **54** with the punch **111** extended below the bottom edge of the magazine **54**. Thus, when the table **45** is thrust upwardly to force the bottom web **34** against the bottom margin of the magazine **54**, then the punch **111** will automatically cut the notch **112** in the web **34**.

After the heating cycle has been completed in the press **15**, timing mechanisms, not shown, will automatically force compressed air through the supply pipe **81** to reverse the flow of air through the cylinders **20**, **49**, **73**, **74** and **75** to retract the upper platen **18**, support plate **47** and plungers **70**, **71** and **72** to their original inoperative positions. However, as the platen **18** rises, the lug **120** will engage the switch arm **119** to momentarily close the switch **118** and energize the solenoids **131** and **132** to de-actuate the brake mechanism **108** and actuate the clutch mechanism **103** to resume driving the pulling rolls **97** and **98**.

The automatic operation of the apparatus will begin when the first notch **112** registers with the switch finger **113**. This time the registry of the switch finger **113** with the notch **112** will close the circuit **125** and thereby energize the solenoid **110** to actuate the punch **111** to form a subsequent notch **112**. The closed circuit **125** will also energize the coil of the electro-magnetic switch **126** to open this switch in the circuit **130** thereby de-energizing the solenoids **131** and **132** to immediately stop the rotation of the pulling rolls **97** and **98**, to precisely register the boards **64**, **65** and **66** with the die **19**. Energization of circuit **125** will again automatically operate the press controls **127** to repeat the air cycle in the cylinders **20**, **49**, **73**, **74** and **75**. After the pressing cycle is completed, the web feeding is resumed when the upper platen **18** momentarily closes the switch **118** to energize the circuit **136**.

It will be noted that the switch **118** only has to be closed long enough to start the pulling rolls **97** and **98** which pull the bottom web **34** forward, drawing the notch **112** out of registry with the switch finger **113**. Thus, by the time the upper platen **18** has risen above switch arm **119** to open the switch **118**, the circuit **130** has taken over the controls of operating the pulling rolls **97** and **98**.

It will be understood that when the walls **57–60** of the magazine **54** are adjusted to accommodate a particular size of boards **64–66**, a die **19** of corresponding size is also substituted on the upper platen **18**.

By adjusting the turnbuckles **26**, the feeder frame **27** may be longitudinally adjusted with the press frame **16** in order to regulate the formation of the index notch **112** so that the assembled webs and boards will accurately align vertically with the die **19**. Moreover, the turnbuckles **26** are adjusted to align the axes of the rollers **31**, **32**, **85** and **86** at right angles to the feeding axis of the webs **34** and **93**. The turnbuckles **26** are also provided to minimize the web spacing between the laminated products **100**, and therefore reduce waste.

It will be apparent to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof, and therefore the invention is not limited by that which is shown in the drawings and described in the specification, but only as indicated in the appended claims.

What is claimed is:

1. An apparatus for feeding materials to a press comprising:

(a) first, second, third and fourth stations spaced progressively toward said press, said first station being remote from said press,

(b) a first feed roll mounted at said first station for feeding a first web having top and bottom surfaces longitudinally toward said press,

(c) means at said second station for applying adhesive to said top surface,

(d) a vertically disposed magazine for supporting a stack of boards above said top surface at said third station, and for depositing one board at a time upon said top surface before said first web passes through said fourth station,

(e) a second feed roll at said fourth station for feeding a second web toward said press in an adjacent parallel path to said first web and on top of said boards adhered to said first web, and

(f) means moving said assembled first and second webs and boards through said press.

2. The invention according to claim **1** in which said magazine comprises vertical walls adapted to snugly engage the edges of said boards, a plunger mounted for vertical reciprocation above said magazine, and means for actuating said plunger to force said stack of boards downward to deposit one board at a time upon the top surface of said first web.

3. An apparatus for feeding materials to a press comprising:

(a) first, second, third and fourth stations longitudinally spaced progressively toward said press,

(b) a first feed roll mounted at said first station for feeding a first web having top and bottom surfaces longitudinally toward said press,

(c) means at said second station for applying adhesive to said top surface,

(d) a vertically disposed magazine for supporting a stack of boards above said top surface at said third station,

(e) a second feed roll at said fourth station for feeding a second web toward said press in an adjacent parallel path to said first web and on top of said boards adhered to said first web,

(f) means on the opposite side of said press from said

stations for pulling said assembled webs and boards periodically through said press, and

(g) means for rendering said pulling means inoperative when said press is operative upon said webs and said boards to form a laminated product.

4. The invention according to claim 3 in which said magazine comprises vertical walls adapted to snugly engage the edges of said boards, and a plunger for forcing said stack downward between said walls, and means for operating said plunger periodically to force one board at a time upon the top surface of said first web.

5. The invention according to claim 4 in which the bottom edges of said vertical walls are spaced proximate to and above the path of said first web in said third station, said bottom portions of said vertical walls being substantially equal to the thickness of a single board and tapering downwardly and outwardly to facilitate releasing one board at a time from said magazine.

6. The invention according to claim 4 in which said magazine comprises first, second and third vertical compartments, a first stack of side boards in said first compartment, a second stack of narrower edge boards in said second compartment, and a third stack of opposite side boards in said third compartment, a plunger for each stack adapted to be operated simultaneously to deposit a board from each compartment simultaneously upon the top surface of said first web, said press having a die conforming to said first, second and third boards in order to shape said webs and boards into looseleaf binders.

7. The invention according to claim 4 further providing means for synchronously operating said pulling means, said press and said plunger to pull said webs and boards through said press when said press and said plunger are inoperative, and to stop said pulling means when said press and said plunger are operative.

8. The invention according to claim 7 further providing a substantially horizontal table mounted for vertical reciprocation beneath said first web at said third station, and operative means connected to said synchronous means for moving said table upward to carry said first web upward against the bottom of said magazine when said plunger is operative to force said stack downward.

9. The invention according to claim 7 in which said synchronous means include means for indexing said first web, and means cooperative with said indexing means for stopping said pulling means so that said press may form successive, laminated products.

10. The invention according to claim 9 in which said pulling means comprises a pair of rolls for engaging opposite sides of said laminated products, a motor for driving one of said rolls, a clutch coupling said motor to said roll, brake means on said roll, and means synchronous with said indexing means for simultaneously disengaging said clutch and engaging said brake means to said roll when said indexing means is operative to stop said pulling means, and for simultaneously engaging said clutch and disengaging said brake means from said roll when said indexing means is inoperative.

11. The invention according to claim 9 in which said indexing means comprises means between said first station and said press for forming an index mark on said web when said pulling means is stopped, means adapted to sense said index mark when said sensing means registers with said index mark, and electrical means connecting said sensing means with said pulling means to stop said pulling means when said sensing means registers with said index mark.

12. The invention according to claim 11 in which said index mark comprises a notch, and said sensing means comprises an electrical switch having a make and break contact finger for engaging said notch when said notch moves in registry with said finger.

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