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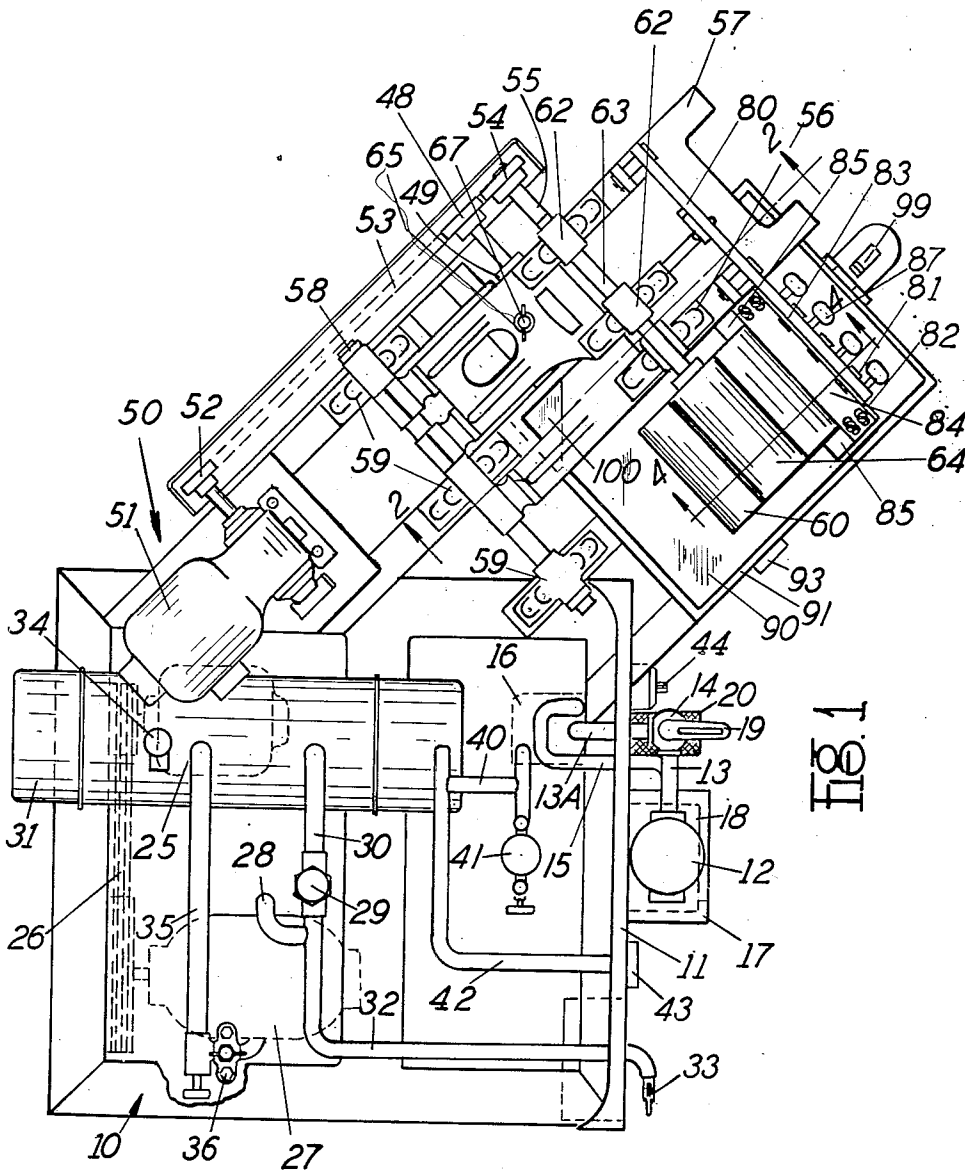
W. E. POPE

2,236,835

BOX FORMING MACHINE

Filed Aug. 21, 1939

3 Sheets-Sheet 1



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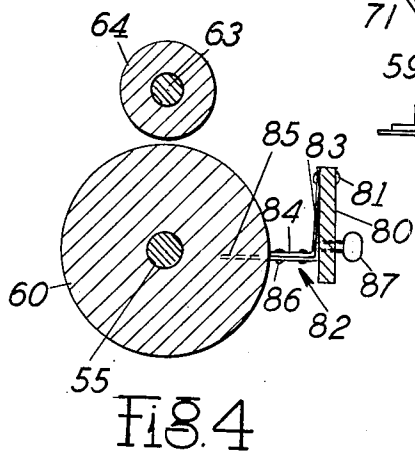
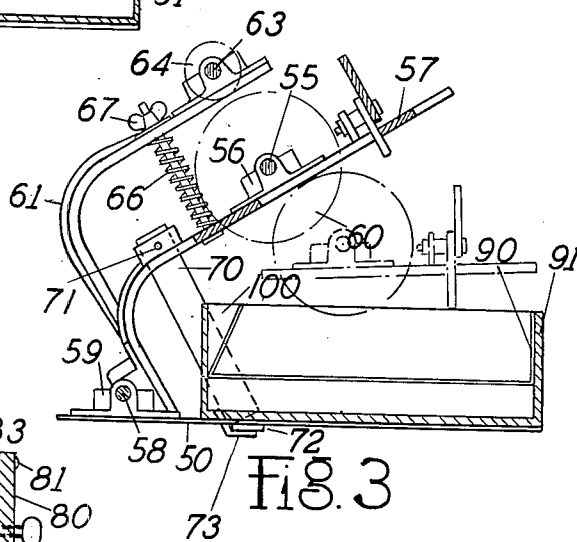
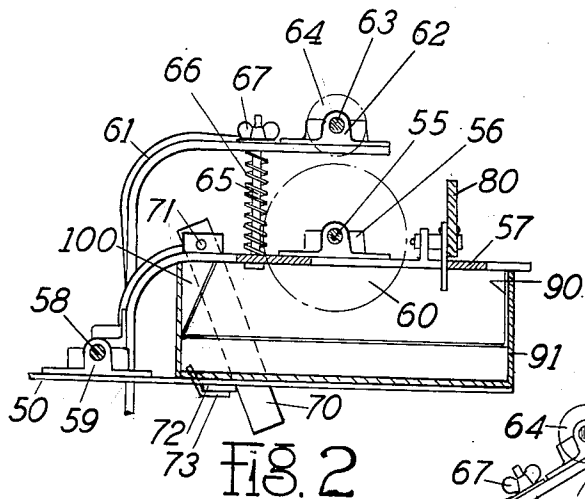
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

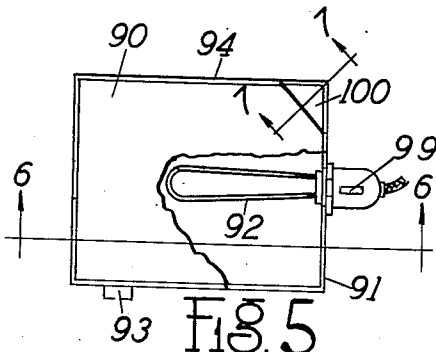


Fig. 5

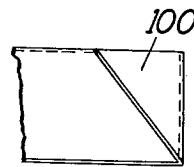


Fig. 7

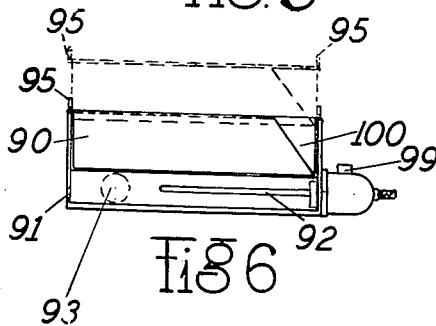


Fig 6

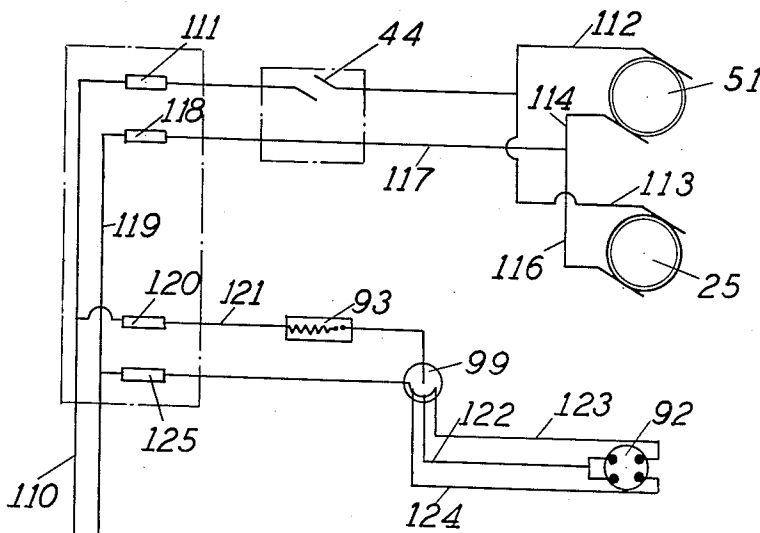


Fig. 8

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UNITED STATES PATENT OFFICE

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BOX FORMING MACHINE

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8 Claims. (Cl. 93—36.4)

This invention relates to box forming machines and more particularly to a mechanism for applying glue or similar adhesive material to desired portions of a box blank, in association with mechanism for sealing the adhesively treated parts.

A primary object of this invention is the provision of a single relatively compact unit, occupying a relatively small amount of space, whereby a blank may be completely treated to form a finished box.

An additional object is the provision of an improved adhesive applying means in association with such a structure.

A further object is the provision of an improved heated tray for holding glue or other adhesive.

A more specific object is the provision of such a tray which may be readily removed from its associated heating means for cleaning when desired.

An additional specific object is the provision of an improved scraper means associated with the adhesive applying means which may be readily varied to provide for the application of a given amount of adhesive to the blank to be formed into a box.

A still further specific object is the provision of an improved means whereby the quantity of fluid used in association with the adhesive heating means may be readily determined at a glance.

A still further specific object is the provision of an improved electrical circuit whereby the entire mechanism may be controlled with a minimum of operations.

Additional objects will in part be obvious and in part pointed out hereinafter.

The invention accordingly consists in the combinations of elements, arrangements of parts and features of construction all as will be more fully pointed out hereinafter and disclosed in the accompanying drawings wherein:

Figure 1 is a top plan view of one form of mechanism embodying this inventive concept,

Figure 2 is a side sectional elevation taken along the line 2—2 of Figure 1 as viewed at an angle from the lower right,

Figure 3 is a view similar to Figure 2 but showing certain parts in a different position of adjustment,

Figure 4 is a sectional view taken along the line 4—4 of Figure 1 as viewed at an angle from the lower right,

Figure 5 is a top plan view of one portion of

the apparatus, certain parts thereof being broken away for the sake of clarity,

Figure 6 is a sectional view taken along the line 6—6 of Figure 5 as viewed from the bottom, certain parts thereof being shown in dotted lines in a different position of adjustment,

Figure 7 is an enlarged fragmentary view taken along the line 7—7 of Figure 5 as viewed from an angle at the lower right, and

Figure 8 is a schematic view of the wiring diagram by which this form of inventive concept is controlled.

Similar reference characters refer to similar parts throughout the several views of the drawings.

Referring now to Figure 1 there is generally indicated at 10 a suitable framework supporting a front panel 11 upon which is mounted, in a vertical position, a cylinder 12 communicating at its upper end through a pipe 13 with a valve housing 14 from which a pipe 13a leads to a valve housing 16, and at its lower end through a pipe 15 with valve housing 16. A suitable piston, not shown, is positioned for reciprocation within cylinder 12 and carries at its lower end a presser pad 17 positioned for engagement with an anvil or block 18 which may carry a suitable removable die or template. A valve control handle 19 actuates the valve contained within valve housing 14 and a foot treadle 20 actuates the valve arrangement contained in valve housing 16.

A suitable motor 25 drives, through a belt and pulley arrangement 26, a compressor 27 which forces air through a pipe 28, a check valve 29, and a second pipe 30 to a storage tank 31. A pipe 32 leads from pipe 30 and check valve 29 to an escape valve 33 to permit escape of air in tank 31 to the atmosphere when desired. Tank 31 is also provided with a safety valve 34.

A pipe 35 leads from tank 31 to an automatic valve 36 adapted, when the pressure in tank 31 reaches a predetermined point to cut out compressor 27 until such time as such pressure recedes to a predetermined minimum when compressor 27 is again automatically cut in.

A pipe 40 leads from tank 31 to valve housing 16, a lubricator 41 being provided to operate in conjunction with pipe 40, and an additional pipe 42 leads from tank 31 to a pressure gauge 43 mounted on panel 11. An electric switch 44 is also provided to energize motor 25 in a manner to be more fully described hereinafter.

The operation of this portion of the mechanism should now be readily understood. Motor 25 is started by switch 44, valve 33 being closed.

Compressor 27 compresses air within tank 31 until a desired pressure is achieved, whereupon compressor 27 is cut out by automatic control 36. A box blank suitably treated with adhesive, in a manner to be described hereinafter, is then placed on anvil 18. The valve in housing 14 is then opened by means of handle 19. Depression of foot treadle 20 now causes operation of the valve arrangement in housing 16 to admit air through pipes 13 and 13a to the upper portion of cylinder 12 simultaneously exhausting the air from the lower portion thereof, or that portion below the piston contained therein, whereupon presser pad 17 is forced downwardly at a relatively high pressure to compress the portion of the box blank on anvil 18 and seal the same effectively by means of its previously applied adhesive, against an adjacent portion. When the pressure is released from treadle 20 the air is exhausted from cylinder 12 above the piston and readmitted to the underside thereof allowing the same to return to its normal position. Any suitable number of dies of any desired shape and size may be provided and suitable means are provided permitting the ready substitution of one for another.

The valve in housing 14 should be closed when the apparatus is not in use to prevent inadvertent admission of pressure to the upper end of cylinder 12 precluding accidental depression of presser pad 17, as when changing dies. Likewise when the machine is not in use valve 33 may be opened to the atmosphere so that when the motor 25 is restarted there is no load against which it must start to turn the compressor.

Framework 10 is provided with an extending portion, generally indicated at 50 on which is mounted a motor 51 which drives a sprocket or pulley 52 which in turn drives, through a belt or chain 53, a second sprocket or pulley 54 which in turn rotates an axle 55. An idler 48 mounted on an eccentric cam 49 may be provided to insure proper tautness of chain 53 under all circumstances regardless of the position of adjustment of the mechanism. Axle 55 is secured as by brackets 56 to a frame member 57 pivoted as on a pivot 58 secured by brackets 59 to extending portion 50 of frame 10 (see Figures 2 and 3). Mounted on axle 55 is a roller 60. As best shown in Figures 2 and 3 a portion 61 of frame member 57 extends upwardly therefrom and carries, mounted in brackets 62, a stub axle 63 on which in turn is mounted a roller 64. A pin 65 passes through suitable apertures in portions 57 and 61 and is surrounded by a coil spring 66 biasing portion 61 away from frame member 57 and is surmounted by a nut 67 threadedly engaging a threaded portion thereof in such manner that the distance between rollers 64 and 60 may be varied for a purpose to be hereinafter described. As best shown in Figure 2, a bar or projecting member 70 is pivoted to member 57 as by a pivot 71 and is adapted, when the parts are moved to the position shown in Figure 3, for a purpose to be described hereinafter, to engage in a recess 72 in a member 73 secured to extending portion 50, to hold frame work 57 in raised position.

Secured to member 57 is a transverse bar 80 to which is attached, as by rivets 81, a scraper 82 comprised of an L shaped member having one portion 83 substantially parallel to member 80 and a second portion 84 at right angles thereto and extending to close proximity with roller 60. Member 82 is provided with flanges 85 which extend slightly along the ends of roller 60 (see

Figures 1 and 4) which may be adjustably secured thereto as by screws and slots 86. In addition to preventing the formation of a cake at the respective ends of the adhesive applying roller 60, the end or side scrapers 85 aid in keeping the full width of the roller 60 in an efficient adhesive applying condition. As has been indicated, the clearance between flanges 85 and the ends of roller 60 can be adjusted as may be required. A plurality of set screws 87 extending completely through member 80 permit transverse deflection of scraper 82 to accommodate any slight deflection of roller 60 occasioned by wear or usage or other causes and similarly to provide for an even spacing of the scraper member from the roller to permit the passage thereby of only a limited amount of adhesive.

Roller 60 extends downwardly into a tray or receptacle 90 which contains adhesive, such as glue, of a type which tends to liquefy upon the application of heat. Receptacle 90 is in turn positioned in a second receptacle 91 carried by extending member 50 adapted to contain a suitable fluid such as water which may be heated to heat the glue or other adhesive in tray 90. A heating element 92 is positioned in receptacle 90 for this purpose. Heating element 92 is controlled by a three position switch 99, in the circuit of which is located a thermostat 93 of any desired type, adapted, upon the achievement of a predetermined temperature of the fluid in receptacle 91 to break the circuit to heating element 92. Receptacle 90 is provided with a flange 94 and upwardly extending portions 95, the flange permitting the same to rest upon the edge of tray 91 and the extending portions permitting the same to be readily removed from tray 91 for cleaning or other desired purpose.

One corner of receptacle 90 is cut away as best shown in Figures 5 and 7, the cut away portion, generally indicated at 100, taking the form of a quarter section of an inverted pyramid. Thus when receptacle 90 is inserted in receptacle 91 the operator may tell at a glance just how much water is contained in receptacle 91 by the area of water exposed in space 100. Illustratively, if the area of water is substantially that of the triangle at the top of the cut the operator is aware that receptacle 91 is substantially full, but if such area diminishes to the area of the cross section of the cut at a point adjacent the apex thereof the operator is aware that the danger point is approaching and receptacle 91 should be filled.

Having reference now to Figure 8 there is diagrammatically illustrated an improved form of control circuit provided with a minimum of operating parts designed to control the unit. The power enters the system through hot line 110 and passing through fuse 111 and switch 44 energizes, through wire 112, roller motor 51 and, through wire 113, compressor motor 25, upon closure of the switch, the circuit being completed by wires 114 and 116 respectively to wire 117, fuse 118 and cold line 119. Simultaneously heater 92 is energized, the circuit comprising line 110, fuse 120, wire 121, thermostat 93, three position switch 99, wire 122 or 123, heater 92, wire 124, fuse 125 and line 119. Thus it will be seen that the entire apparatus may be energized or deenergized simply by movement of switch 44 and that heater 92 may be regulated to off, low, or high heat positions by switch 99.

Now from the foregoing the operation of the device should be readily understood. The oper-

ator selects a desired number of box blanks to be treated with adhesive and subsequently folded by hand and sealed in assembled relation. Adjustment of nut 67 varies the distance between rollers 60 and 64 to accommodate varying thicknesses of box blanks. The operator then throws switch 44 which energizes motors 25 and 51 and through sprocket 52, chain 53, sprocket 54 and axle 55 rotates roller 60. Switch 99 is moved to the desired position to heat the glue contained in receptacle 90, thermostat 93 preventing the danger of possible overheating. Release of member 70 from aperture 72, after the glue has reached its desired temperature permits frame member 57 to be moved from the position shown in Figure 3 to that shown in Figure 2 whereupon roller 60 continuously operates in tray 90 in counterclockwise direction, picking up a quantity of glue therefrom, the amount of which is applied to the box-blank being determined by the position of scraper 82. The operator then passes that portion of the box blank to which it is desired to apply the glue between rollers 60 and 64 assuring an even continuous coat of glue to the said portion, then folds the box blank in a predetermined manner and places the same upon anvil 18. Treadle 20 is depressed and the associated parts sealed, by means of the previously applied adhesive, by the operation of the mechanism in the manner previously described.

In the event that the water content of receptacle 91 becomes too low this fact is immediately apparent to the operator as hereinbefore described and additional water may be provided.

When it is desired to clean the glue containing receptacle 90 the roller mechanism may be swung back on pivot 58 and tray 90 removed from tray 91 by means of projections 95 as previously discussed.

The adjustable spacing between the rollers permits the accommodation of a wide range of thicknesses of box blanks and variation in the position of the scraper 82 with respect to roller 60 permits a wide variation in the amount of adhesive applied to any given blank or type of blank. Furthermore the simplified control system permits the entire apparatus to be controlled and energized or de-energized by the operation of a single switch.

Thus from the foregoing it will be seen that there is herein provided an apparatus which accomplishes all the objects of this invention and others including many advantages of great practical and commercial utility.

As many embodiments may be made of this inventive concept and as many modifications may be made in the embodiment herein described and shown in the accompanying drawings, it should be understood that all matter hereinbefore set forth or shown is to be interpreted merely as illustrative and not in a limiting sense.

I claim:

1. In a box forming machine having a support for a box to be formed, a reciprocable plunger having a presser member adapted to engage a box on said support, manually controlled fluid actuated means for forcing said plunger and its presser member into engagement with a box on the support, a power driven rotating roller for applying adhesive to a box blank, an adhesive tray arranged to receive the roller, heating means associated with the tray, and a power driven compressor for supplying pressure fluid to the fluid actuated means: means including a single

manually operable device for simultaneously actuating the tray heating means, the roller for applying adhesive, and the compressor for supplying pressure fluid to the fluid actuated means operating the plunger.

2. Control mechanism for box machines having pressing means and adhesive applying means with separate electric motor drives and electric heating means associated with the adhesive applying means, comprising, electric circuit means operatively connected to the motors and heating means and a single switch arranged for their simultaneous control.

3. In a box forming machine provided with a support for a box to be formed, a reciprocable plunger having a presser member adapted to engage a box on said support, manually controlled fluid operating means for forcing said plunger and its presser member into engagement with a box on the support, a power driven adhesive roller disposed for use by an operator adjacent the support and presser member, an adhesive tray arranged to receive the roller, heating means associated with the tray, and a power driven compressor for supplying pressure fluid to the fluid actuated means: control means including a single manually operable device actuating the tray heating means, the adhesive roller, and the compressor, said manually operable device also being accessible to the operator while using the presser member and the adhesive roller.

4. Adhesive applying means comprising an adhesive tray, a driven roller, pivoted supporting means swingable over the tray and associated with the driven roller for holding it in operative relation to the said tray, a freely rotating roller also associated with the pivoted supporting means in parallel relation to the driven roller, means for adjusting the distance between the rollers, a flexible scraper cooperatively disposed with respect to the driven roller, adjusting means for varying the position of the scraper, and means for holding the pivoted supporting means and rollers in a raised inoperative position.

5. Adhesive applying means comprising an adhesive tray, a substantially complementary receptacle adapted to hold a heat-conveying liquid and arranged to support the adhesive tray therein, a heating element positioned in the receptacle below the tray, a driven roller, pivoted supporting means associated with the driven roller in operative relation to the adhesive tray, a freely rotating roller also associated with the pivoted supporting means and in parallel relation to the driven roller, screw means for adjusting the distance between the rollers, a flexible scraper cooperatively disposed with respect to the driven roller, spaced adjusting members for varying the clearance between the scraper and the corresponding portions of the driven roller, and latch means for holding the pivoted supporting means and rollers in a raised inoperative position.

6. The combination of claim 5 in which the adhesive tray has a lateral portion inclined inwardly so that fluid from the receptacle will rise in the space between it and the tray.

7. The combination which comprises a liquid tank receptacle, means for warming liquid in the tank receptacle, and an adhesive tray fitted in the upper portion and having lateral extensions disposed to engage the tank receptacle to support the tray therein and an extending portion by which the tray may be removed from the tank, the tank receptacle and adhesive tray being com-

plemental except for a lateral portion of the tray which is inclined inwardly so that fluid from the receptacle will rise in the space thus formed between it and the tray.

8. Adhesive applying apparatus comprising a liquid receptacle, a supporting member for the receptacle, an adhesive tray fitted in the upper portion of the liquid receptacle, a framework extending over the receptacle and pivoted to the

supporting member adjacent the receptacle so that it may be raised to permit removal of the tray, a pair of parallel rollers carried by the framework one above the other, said framework including means for adjusting the space between the rollers, and a scraper mounted on the framework for cooperation with the lower roller.

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