March 6, 1962 J. S. KAMBORIAN 3,023,726

ADHESIVE COATING APPARATUS

Filed Nov. 16, 1959 2 Sheets-Sheet 1

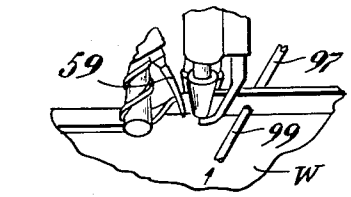


Fig. 2a

Fig. 1

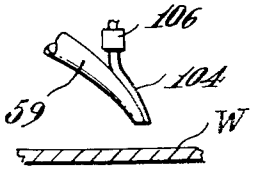


Fig. 5

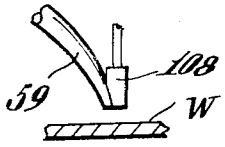


Fig. 6

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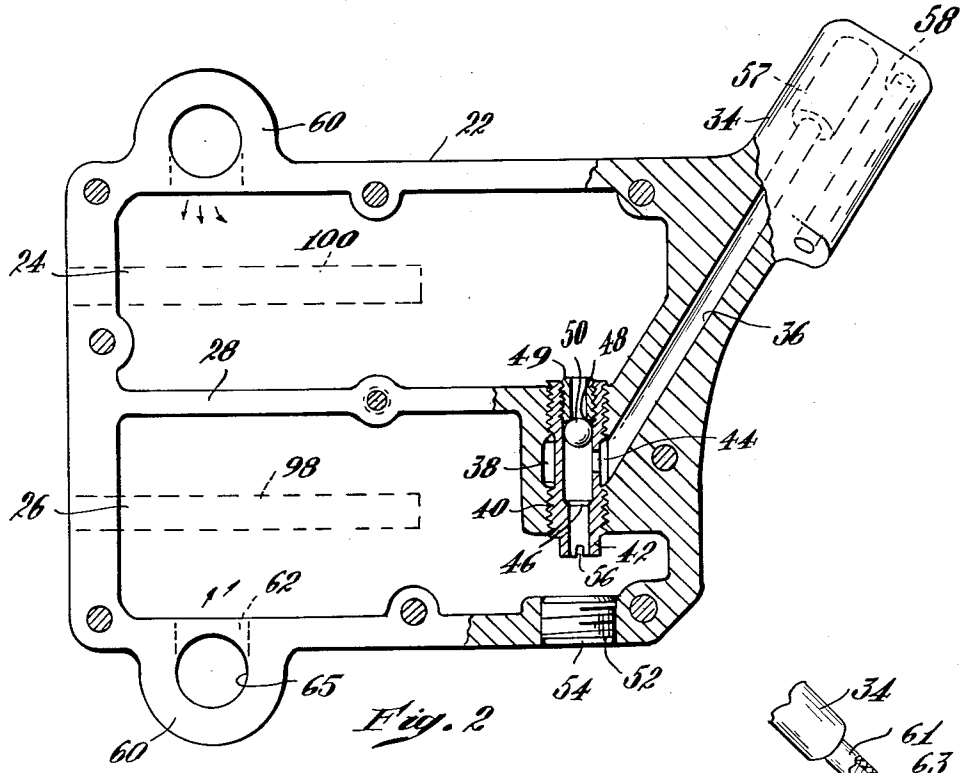


Fig. 2

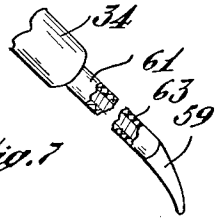


Fig. 7

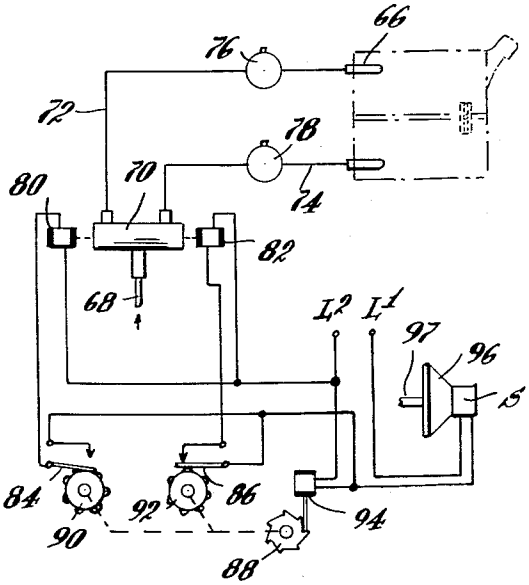


Fig. 3

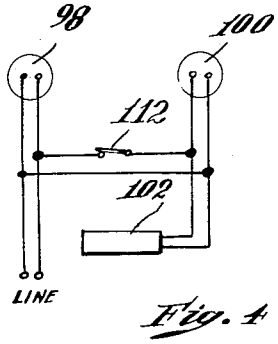


Fig. 4

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ADHESIVE COATING APPARATUS

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17 Claims. (Cl. 118—3)

This invention relates to apparatus to facilitate the application of adhesive to work and, in particular, to manufacturing processes involving intermittent application of adhesive the periods of application being of different length depending upon the character of the work.

Apparatus for applying liquid adhesive comprised of a receptacle to which liquid adhesive is supplied as is needed, the need being determined by a sensing device, for example, a float, and a nozzle through which the adhesive is delivered by an increase in pressure within the container to the work, is shown in application Serial No. 772,998, filed November 10, 1958. The apparatus there shown is designed particularly for applying adhesive to the lasting margin of a shoe upper just as it is being lasted into engagement with the insole or to the marginal edge of flexible covering material as it is being turned over and pressed into engagement with the panel to which it is being applied. In the latter operation, more so than in shoe making, there are times when frequent use and/or application of adhesive continuously for a long period, such as would be necessary to coat the entire margin of a panel of considerable size, would deplete the container faster than adhesive was supplied to it and hence interrupt the application. Such depletion permits the air pressure within the apparatus to blow out the residue of the hot liquid adhesive which damages the finished work and may injure the operator.

It is an object of this invention to provide an apparatus for remedying the above situation, to wit, to insure a constant supply of adhesive regardless of the demands and without increasing the size of the container disproportionally. In accordance with the invention, the apparatus has a pair of discharge chambers which are supplied from a common reservoir, through check valves which are open when the pressure within the discharge chamber is normal. A discharge passage extends from the apparatus to the place of use, for example, to an applicator in the form of a nozzle and at the inner end of the passage there is a valve for connecting it to either one or the other of the discharge chambers. There is means for supplying air pressure to each of the discharge chambers, and the check valves and the discharge valves are so arranged that admission of pressure to one of the discharge chambers shifts the discharge valve to place that discharge chamber in communication with the discharge passage and to shut off communication with the other discharge chamber and close the check valves therein, which are in communication with the reservoir. There are inlet valves in the air pressure lines and there is sensing means operatively associated with the nozzle so that when work is presented thereto, the inlet valves will be alternately actuated to admit air to first one discharge chamber and then to the other. The sensing means may be in the form of an air switch or a proximity switch.

The invention will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 is a vertical section of the apparatus;

FIG. 2 is a plan view partly in section of the lower part of the apparatus shown in FIG. 1;

FIG. 2*a* is a fragmentary perspective illustrating the nozzle arranged next to a pair of feed rolls for applying adhesive to work as the latter is moved relative to the nozzle, with one form of sensing means shown for controlling the delivery of the adhesive;

FIG. 3 is an electrical diagram of the control circuit;

FIG. 4 is an electrical diagram of a portion of the heating circuit;

FIG. 5 is a fragmentary view of the nozzle with an alternative sensing means;

FIG. 6 is a fragmentary view of a nozzle with another kind of sensing means; and

FIG. 7 is a fragmentary view showing a hose connecting the nozzle to the discharge chambers.

The apparatus, shown herein, has an upper chamber of reservoir **10**, to which adhesive is supplied in liquid form from a precast block of adhesive **12** which rests on a pair of spaced parallel rods **14—14**, with its lower end on a heated grate **16**, so that as the lower end of the block is melted and the melted liquid runs off the lower edge of the grate, the block gravitates freely toward the grate, thus providing an automatic self-feeding apparatus. Since the block of adhesive is unenclosed and in plain sight at all times the operator is constantly appraised to the extent that it has been used up and thus will replenish the apparatus in time to prevent complete depletion. The adhesive running from the lower edge of the grate **16** drips through an opening **18** into the receptacle **10**, and a float **20** in this receptacle, controls through suitable means, the heating element in the grate **16**, as appears in the aforesaid application, so that the receptacle **10** is kept filled with adhesive at a predetermined level.

A receptacle **22** is fastened to the underside of the chamber **10** and contains two chambers **24** and **26** (FIG. 2), side by side, separated by a common division wall **28**. Between the receptacles **10** and **22** there is a valve plate **30** containing a plurality of check valves **32**, there being three of these extending from the receptacle **10** into each of the chambers **24** and **26**. These check valves, in the absence of pressure within the chambers **24** and **26**, normally stand open so that adhesive which is delivered to the receptacle **10** flows by gravity into the chambers **24** and **26**.

Near the bottom of the lower receptacle **22**, at one end, there is a protrusion **34** containing a discharge passage **36**. The inner end of the discharge passage **36** is in communication with a valve chamber **38** situated in a portion of the wall **28**. There is an axial passage **40**, through the portion of the wall containing the valve chamber **38**, from one chamber to the other, and a threaded sleeve **42** is screwed into this opening and has in it a port **44** which is situated within the valve chamber **38** and open thereto. The sleeve **42** contains an axial passage within which there is a fixed valve seat **46** and a removable valve seat **48**, the latter being at the inner end of a nipple **49** threaded therein. A ball **50** is disposed in the sleeve **42** between the valve seats and is movable from one to the other by an increase in pressure in one of the chambers over that in the other.

To permit assembly and disassembly for cleaning, a threaded opening **52** is provided in a wall of the chamber **26**, opposite the valve assembly sleeve **42**, which is normally closed with a threaded plug **54**. The end of the valve assembly sleeve **42** contains a kerf **56** for receiving the end of a screw driver and thus may be removed by first removing the plug **54** and then turning it with the screw driver to screw it out of the opening in the wall.

As herein illustrated, the passage **36**, through the protrusion **34** has an enlarged opening **57** near its outer end to receive by a press-fit, or otherwise, a slender nozzle **59** (FIG. 1) of suitable length, which may be bent or otherwise shaped so that its discharge end is close to the work W (FIG. 2*a*), to which adhesive is to be applied. If desired, a flexible hose **61** (FIG. 7) may be pressed into the opening **57** and the nozzle connected to the end of the hose so that the nozzle can be located at a distance from the apparatus and may be moved about

freely. When using a hose connection the latter should be heated by a coil 63 to keep the adhesive liquid as it flows from the discharge chamber along the hose to the nozzle. The protrusion also contains a passage 58 for reception of a heating element to keep the adhesive liquid therein.

At the left end of the lower receptacle 32, as seen in FIG. 2, there are vertically disposed, laterally protruding bosses 60 which extend upwardly along the walls of the receptacle 22, terminating at its upper edge. Each boss contains a vertical passage 65, the lower end of which is connected by a port 62 to the discharge chamber with which it is associated. Standpipes 64 (FIG. 1) are bolted to the upper ends of the bosses 60 and rise upwardly along opposite sides of the upper receptacle 10, to substantially the level of the top of the upper receptacle and have rearwardly extending portions 66 (FIG. 1) for connection to a source of air pressure.

Referring to FIG. 3, the portion 66 of the standpipes are connected to a common source of air pressure 63, through a solenoid-operated, double-acting spring return valve 70, by lines 72 and 74, each of which contains an inlet valve 76, 78, which is self-venting. The double-acting valve 70 is shifted by a pair of solenoids having coils 80 and 82, which are connected through switches 84 and 86 to a source of power L^1—L^2. There is a ratchet wheel 88 mechanically connected to a pair of cams 90 and 92 which respectively operate the switches 84 and 86. The cams are designed so that when one switch is closed the other is open. A solenoid operated ratch 94 effects operation of the ratchet wheel 88 and the solenoid 94 is in turn excited by a sensing device 96 of the same kind that is disclosed in Patent No. 2,843,863. The switch S, as shown in that patent, is air operated, that is, it contains a diaphragm which is deflected by air pressure. A conductor pipe 97 (FIG. 2*a*) is placed adjacent the path along which the work W to which adhesive is to be applied is moved, so as to be located at one side of the work and a second conductor pipe 99 is placed along the same path so as to be at the opposite side of the work. Normally, the second conductor pipe 99 is supplied with air under pressure which streams continuously from it toward the first conductor 97 and so long as there is no work between the two conductor pipes, air leaving the second conductor pipe and entering the first conductor pipe 97, holds the diaphragm in such a position that the switch S is inactive. As soon as work is presented for application of adhesive it intersects the stream of air, cutting off the supply to the first conductor pipe 97, thus allowing the diaphragm to be displaced by a spring to actuate the switch S, which in turn excites the solenoid 94 and thereby steps the ratchet wheel around so as to close one of the switches and open the other. This in turn shifts the double-acting solenoid 70 so as to deliver air to one of the discharge chambers 24 and 26, as the case may be. Delivery of pressure to one of the discharge chambers immediately closes the check valves 32 at the top of that chamber, and at the same time shifts the ball valve 50 toward the other discharge chamber, thereby allowing the pressure within the one chamber to force adhesive through from the protrusion 36 to the nozzle 59. As soon as the operator discontinues the application of adhesive, as by moving the work out of position, the sensing device 96 operates to open the switch S and hence to de-energize one or the other of the coils 80, 82, which then allows the valve 70 to be returned to its neutral position by the spring return therein. The air in the system beyond the valve 70 immediately begins to vent through one of the self-venting valves. At the neutral position of the valve 70 no pressure is supplied to the chambers hence the check valves, to both chambers, are open. When the operator presents the work to the nozzle again its presence actuates the sensing device which in turn actutes the ratchet, to close the other switch, so that pressure is supplied to the opposite discharge chamber.

In lieu of the sensing device 96, as described above, the nozzle 59 may have associated with it pneumatic or electric sensing means which will operate the solenoid 94 when work is brought into the vicinity of the nozzle. Thus, for example (FIG. 5), there may be an air pipe 104 terminating close to the extremity of the nozzle through which air is discharged and a pressure sensitive diaphragm 106 associated with the pipe so that back pressure developed by movement of the work close to the nozzle will deflect the diaphragm. Alternatively, electric means such as a proximity switch 108 (FIG. 6) may be employed for actuating the solenoid 94.

It is thus apparent that as the apparatus is used, first one chamber is used to supply adhesive and then the other, so that while the adhesive is being used up from one chamber the other is receiving a supply of adhesive from the reservoir 10. By constantly shifting from one chamber to the other it is possible to keep the one chamber nearly completely filled at all times, so that under the most severe conditions, such as may be found in panel manufacture where the perimeter of a large panel will take a substantial amount of adhesive during one discharge from the nozzle, adequate adhesive is insured for the next application.

As was pointed out above, the adhesive is melted from the cast block 12 by contact with the heated grate 16, the latter containing a heating element 110. To keep the adhesive suitably liquid, additional heating elements are placed in the bottom of the receptacle 22 in the form of cartridges 98 and 100 (FIGS. 2 and 4) which are inserted in holes in the bottom of the receptacle 22. These are connected with a heating element 102 which is disposed in the opening 58 in the protrusion 34. During the initial use of the apparatus, that is, when for example it is started up in the morning to obtain a quick heat up so that there will not be a protracted delay, all of the elements 98, 100 and 102 are supplied with current from a suitable source which may be the same as that for the circuit in FIG. 3 or a different source. After the apparatus is once heated it is found that a single heating element in the pot is sufficient to keep the adhesive liquid both in the pot and in the nozzle hence a switch 112 is provided for cutting out the elements 100—102 while leaving the elements 98 energized.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. Apparatus for dispensing liquid adhesive to a nozzle for application to work, comprising a pair of discharge chambers, means for supplying adhesive to both chambers, a nozzle, means operable to connect the nozzle to one or the other of the discharge chambers, means responsive to presentation of the work to discharge the adhesive from one chamber into the nozzle, means responsive to withdrawal of the work to stop discharge, and means responsive to presentation of additional work to discharge adhesive from the other chamber into the nozzle.

2. Apparatus for dispensing liquid adhesive comprising a pair of discharge chambers, means for supplying adhesive to the discharge chambers, a nozzle, means operable to connect the nozzle to one or the other of the discharge chambers, separate heating means for heating the adhesive in each of the chambers, heating means for heating the adhesive in the nozzle and means to render the heating means for one of the chambers and for the nozzle inoperative while maintaining the heating means for the other chamber operative.

3. Apparatus for dispensing liquid adhesive to a nozzle for application to work, comprising in combination a reservoir and a pair of discharge chambers, check valves

connecting each discharge chamber to the reservoir, said check valves being operable to admit adhesive to the discharge chambers from the reservoir in the absence of pressure within the discharge chambers, a nozzle, means operable to connect the nozzle to one or the other of the discharge chambers, a source of air under pressure, and means operable to admit air from said source to first one discharge chamber and then the other, operation of said first-named means being effected by admission of air to said discharge chambers.

4. Apparatus according to claim 3, wherein the last-named means is a pneumatically operated switch.

5. Apparatus according to claim 3, wherein the last-named means is an electrically operated switch.

6. Apparatus according to claim 3, wherein there are heating means situated in the nozzle and at the bottoms of the discharge chambers.

7. Apparatus according to claim 3, wherein there are heating elements situated in the nozzle and at the bottoms of the discharge chambers, an electric circuit connecting the elements in series and a switch operable to cut out one of the elements in the bottom of one of the chambers and the one in the nozzle while leaving the other heating element in operation.

8. Apparatus for dispensing liquid adhesive comprising a receptacle having a main reservoir and a pair of discharge chambers, each of which is connected to the main reservoir by check valves, a nozzle, a discharge valve operable to connect one or the other of the chambers to the nozzle, said check valves being so arranged that an increase in pressure in the chambers will close them and said discharge valve being so arranged that an increase in pressure in one or the other chamber will shift the discharge valve to place the chamber under pressure in communication with the nozzle and shut off communication between the other chamber and the nozzle, a source of air pressure, and means operable alternately to supply air pressure to first one and then the other of the chambers.

9. Apparatus for dispensing liquid adhesive onto work comprising a receptacle having a pair of discharge chambers, a nozzle in communication with each of the chambers, inlet valves connecting the discharge chambers to a common source of adhesive supply, a discharge valve connecting the discharge chamber to the nozzle, means operable to supply air under pressure to the discharge chambers, said valves being so arranged that when pressure is supplied to one chamber the inlet valves of that chamber will close and the discharge valve will open, electrically operated means for operating said first-named means and means operable by the presence of the work to which adhesive is to be applied to shift the discharge valve to place first one and then the other of the discharge chambers in communication with the nozzle.

10. Apparatus for applying liquid adhesive comprising a receptacle having a main chamber, a pair of discharge chambers situated below the main chamber with a dividing wall therebetween, said wall containing a threaded opening from one chamber to the other, normally open check valves in the bottom of the main chamber connecting it to each of the discharge chambers, said check valves being adapted to be closed by an increase in pressure in the discharge chambers, a discharge passage connected at one end to said opening intermediate its ends, a valve assembly screwed into the threaded opening, said assembly containing a valve movable relative to said discharge passage and said opening, in one direction to place the passage in communication with one chamber and in the other direction to place it in communication with the other chamber, said receptacle containing a threaded opening in the wall of one of the discharge chambers in alignment with the valve assembly, through which the valve assembly may be inserted or removed, a threaded plug normally closing the threaded opening, air inlet passages in communication with each discharge chamber, inlet valves in each passage and means operable to alternate the operation of said inlet valves, so that when one is opened the other is closed.

11. Apparatus for dispensing liquid adhesive, comprising a receptacle having a main chamber, a pair of discharge chambers situated below the main chamber with a dividing wall therebetween, said dividing wall containing an opening from one chamber to the other, normally open check valves in the bottom of the main chamber connecting it to each of the discharge chambers, said check valves being adapted to be closed by an increase in pressure in the discharge chambers, a discharge conductor having an end in communication with said opening between the walls, a valve assembly disposed in said opening, said valve assembly including a valve movable in one direction to place one of the chambers in communication with the discharge passage and in the other position to place the other of the chambers in communication with the discharge passage, a pipe connected to each discharge chamber, an inlet valve in each pipe including a vent and means operable at the termination of each discharge of adhesive to shut the inlet valve to the chamber from which adhesive was discharged and open the inlet valve to the other chamber.

12. Apparatus for dispensing adhesive comprising a receptacle having a main reservoir, discharge chambers situated below the main reservoir, normally open check valves connecting each discharge chamber to the main chamber so that liquid adhesive in the main chamber gravitates into the discharge chambers so long as the check valves are open, an applicator, a discharge valve movable to connect one or the other of the discharge chambers to the applicator, said check valves being so arranged that an increase in pressure in one discharge chamber will close them and said discharge valve being so arranged that an increase in pressure in said one chamber will shift it in a direction to place that chamber in communication with the applicator, an air inlet port containing a vent valve connected to each chamber, said ports being adapted to be connected to a source of air pressure and means operable to supply air to the inlet ports alternately each time the applicator is used.

13. Apparatus for dispensing adhesive onto work comprising a receptacle having a pair of discharge chambers, a nozzle in communication with each of the chambers, inlets to the respective discharge chambers, discharge valves operable to connect the nozzle alternatively to each of the discharge chambers, a neutrally balanced valve having two positions of operation through which air may be supplied to one or the other of the discharge chambers, electrical means for shifting the valve from its neutral position to one or the other of its two positions, a switch operable by actuation to actuate the electrical means, means operable by the presence of the work to actuate the switch.

14. Apparatus for dispensing liquid adhesive to a nozzle for application to work, comprising a pair of discharge chambers, means for supplying adhesive to both chambers, a nozzle, means operable to connect the nozzle to one or the other of said chambers, control means, means responsive to actuation of the control means to discharge the adhesive from one chamber into the nozzle, means responsive to deactuation of the control means to stop discharge, and means responsive to reactuation of the control means to discharge adhesive from the other chamber into the nozzle.

15. Apparatus for dispensing liquid adhesive for application to work, comprising a pair of discharge chambers, means for supplying adhesive to both chambers, a nozzle, means operable to connect the nozzle to one or the other of said chambers, a port connected to each chamber to admit air under pressure thereto, the admission of air under pressure to a chamber being effective to discharge the adhesive therein through said nozzle, a source of air pressure, a valve interposed between

said ports and said source of air pressure, said valve having a neutral position blocking both ports and being shiftable to open one or the other of said ports to said source of air pressure, and means for actuating said valve to shift it from said neutral position to supply air under pressure to one or the other of said ports.

16. Apparatus for dispensing liquid adhesive for application to work, comprising a pair of discharge chambers, means for supplying adhesive to both chambers, a nozzle, a discharge valve operable to connect one or the other of said chambers to said nozzle, said discharge valve being so arranged that an increase in pressure in one chamber will shift it in a direction to place that chamber in communication with the nozzle and block the communication between the other chamber and the nozzle, a port connected to each chamber to admit air under pressure thereto, the admission of air under pressure being effective to discharge the adhesive therein through said nozzle, a source of air pressure, an inlet valve interposed between said ports and the source of air pressure, said inlet valve having a neutral position blocking both ports and being shiftable to open one or the other of said ports to said source of air pressure, switch means, means responsive to actuation of said

switch means to shift said inlet valve from neutral position to uncover one of said ports, means responsive to deactuation of said switch means to shift said inlet valve back to neutral position, and means responsive to reactuation of said switch means to shift said inlet valve from neutral position to uncover the other of said ports.

17. Apparatus for dispensing liquid adhesive comprising a pair of discharge chambers, means for supplying adhesive to said chambers, a nozzle, means operable to connect the nozzle to one or the other of said chambers, a nozzle heating element situated in the nozzle, a chamber heating element situated adjacent each chamber, an electric circuit connecting all of said heating elements to a source of power, and a switch in said circuit operable to cut out the nozzle heating element and one of said chamber heating elements while leaving the other chamber heating element in operation.

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