

[54] CENTRIFUGAL DISPENSING DEVICE

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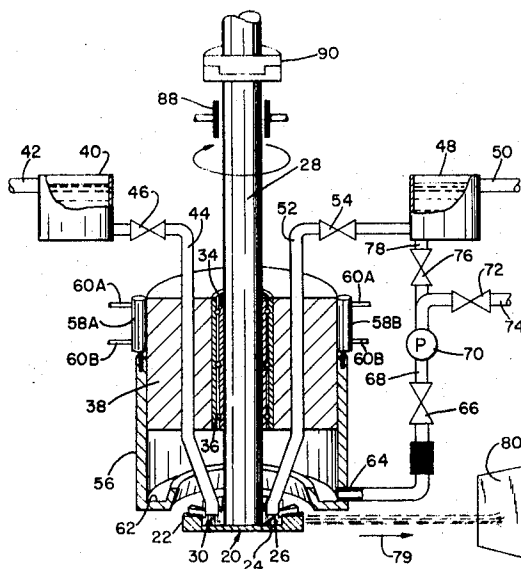
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ABSTRACT

A centrifugal dispensing device particularly adapted to intermittent application of a selected liquid such as glue, paint and the like. The device includes a disc positioned to rotate in a horizontal plane.

Conduits are provided for feeding selectively supplies of the selected liquid and a solvent therefor to the disc. A shield is movably disposed so as to be selectively interposed between the disc and the work. Means are provided for moving the shield to a position between a work piece and the disc when solvent is applied to the disc, and for moving the shield away when the selected liquid is applied to the disc.

9 Claims, 3 Drawing Figures



CENTRIFUGAL DISPENSING DEVICE

This invention relates to liquid dispensing devices, and more particularly to centrifugal applicator particularly adapted for intermittent use, for example, in application of glue, paint and the like.

Various industrial operations require intermittent application of a liquid to a work piece. For example, a typical system for forming cardboard cartons may include means for moving cardboard stock, a shaper for cutting and folding the stock, a glue applicator, apparatus for closing and pressing the glued stock, and means for removing the completed cartons from the machine. Operation of the various means is normally intermittent, i.e., stepwise. Or an industrial operation may include the intermittent application of paint, e.g., to work pieces as one operational step in a series of steps.

A principal problem encountered in the above systems involves the intermittent operation of the glue or paint applicator. This intermittent use frequently results in glue or paint becoming set or partly set in the applicator and tends to contaminate subsequent applications, all which may adversely effect subsequently glued seams, or subsequently painted surfaces. Also, the applicator may become clogged with set or partly set glue or paint. If the entire machine then has to be shut down so that the applicator may be cleaned, it can be tedious, time consuming and costly.

It is thus a principal object of this invention to provide an improved apparatus and method for dispensing of liquids.

A further object is to provide an apparatus of the character described which may be operated intermittently without clogging.

A more specific object is to provide an apparatus for intermittent application of selected liquid such as glue, paint and the like which is self-cleaning between applications.

Still other objects will be obvious from the following detailed description.

Generally, to effect the foregoing and other objects the present invention is embodied in a centrifugal liquid applicator comprising a disc adapted to rotate in a horizontal plane about a substantially vertical shaft. Means are provided for selectively discharging a selected liquid and a solvent for the liquid onto the disc. A shield is disposed outside the disc and is movable so as to be selectively interposed between the disc and the work to thereby block the spray path from the disc when solvent is being discharged thereon, and unblock the spray path when the selected liquid is being discharged thereon. Means are also provided for collecting solvent sprayed onto said shield, and in a preferred embodiment for recycling at least a portion of the solvent to the disc.

Other objects of the invention will in part be obvious and will in part appear hereinafter. The invention accordingly comprises the apparatus possessing the construction, combination of elements, and arrangement of parts which are exemplified in the following detailed disclosure, and the scope of the application of which will be indicated in the claims.

For a fuller understanding of the nature and objects of the present invention, reference should be had to the following detailed description taken in connection with the accompanying drawings wherein:

FIG. 1 is a schematic cross-section through a perspective, of an exemplary device embodying the principals of the present invention, in position for applying a selected liquid;

FIG. 2 is a schematic cross-section through a perspective of the device of FIG. 1 in position for self-cleaning; and

FIG. 3 is an enlarged, plan view of an embodiment of shield for use in the device of FIG. 1.

Referring now to the drawings, there is shown in FIGS. 1 and 2 an embodiment of the invention comprising a disc 20 having a cylindrical periphery or rim 22, and flat solid radial support member 24 rigidly connecting rim 22 to central hub 26. Hub 26 is centrally apertured and preferably keyed so that disc 20 can be fixed to shaft 28 for rotation coaxially with the latter.

Support member 24 is provided with an annular groove 30 formed in one surface of the support member 24 adjacent hub 26 and (as shown in FIG. 3) preferably includes a plurality of generally axially extending outwardly flared, distributor vanes 32 formed on the same surface of the support member 24, disposed outwardly of cavity 30. The vanes, as will be seen direct fluids which are fed into groove 30 radially outward by centrifugal force when the disc is rotated at high speed about a substantially vertical axis. As thus described disc 20 is a centrifugal disperser well known in the art.

Shaft 28 is mounted in internal sleeve 34 of a pre-loaded bearing pair 36, preferably of the doublex-type. The latter is mounted in a cylindrical body 38. Means (not shown) such as an electric motor are provided for rotating shaft 28.

The device includes a liquid supply and supply of solvent therefor. As used herein the terms "liquid" and "solvent therefor" are intended to include true solutions, e.g., an aqueous based glue (in which case the solvent therefor may be water) fluid suspensions of particulate matter in a carrier, e.g., an oil base pigment paint (in which case the solvent therefor may be any commercially available paint thinner), thixotropic gels and solvents therefor, and other like materials. The liquid supply comprises liquid holding tank 40 having inlet tube 42 through which the selected liquid can be introduced thereto, and liquid outlet tube 44 coupled to tank 40 through solenoid valve 46. Outlet tube 44 extends through body 38 and is disposed to discharge liquid into groove 30. The solvent supply comprises solvent holding tank 48 having inlet tube 50 through which liquid solvent can be introduced thereto, and solvent outlet tube 52 coupled to tank 48 through solenoid valve 54. Solvent outlet tube 52 extends through body 38 and has an end positioned to discharge solvent into groove 30.

The device also includes shield 56 which is coupled at one end thereof to body 38. Shield 56 is mounted for movement axially with respect to shaft 28 between a first position wherein the shield is positioned between the disc and the work and thereby blocks the centrifugal spray path from the disc, as will be described in detail hereinafter, and a second position wherein the shield is located out of the centrifugal spray path of the disc. To this end shield 56 is coupled to body 38 by vertically reciprocating piston rods of two double acting pneumatic actuators 58A and 58B which in turn are fixed to body 38. Positive pressure air for causing reciprocating movement of the piston rods of actuators 58A and 58B is provided by air lines 60A and 60B in com-

munication with the top and bottom ends respectively of the cylinder of the actuators. The latter have piston rod strokes long enough to pull shield 56 out of the spray path of the disc as shown in FIG. 1 when the rods are retracted and to provide sufficient clearance for the spray path as shown in FIG. 2 when the rods are extended. Alternatively other means known in the art such as gear and ratchet means or solenoid means may be used for appropriately moving the shield.

Shield 56 also includes means such as an annular trough 62 fixed to, or formed integrally therewith, at or near the lower end thereof on the inner surface of the latter.

Mounted in the bottom of trough 62 is drain 64. The latter in turn is coupled through solenoid valve 66 and flexible hose 68 to the input side of suction pump 70. The output side of pump 70 is connected through solenoid valve 72 to drain line 74. The output side of pump 70 is also connected through solenoid valve 76 to line 78 leading to the solvent holding tank 48.

Exemplary operation of the invention for the intermittent application of glue, e.g., as may be encountered in forming cardboard boxes, can be readily understood with reference to FIGS. 1 and 2 of the drawings. Referring first to FIG. 1, the device is connected so that shaft 28 is substantially vertical. Shaft 28 is rotated at relatively high speed, e.g., 1,800 to 5,000 rpm. A substantially flat cardboard workpiece 80 is moved into gluing position proximate shield 56 and is typically aligned with its surface substantially parallel to the central axis of shaft 28. Valve 60B is opened causing the actuators to raise shield 56 from a first position where it is interposed between the disc 20 and the workpiece 80 as shown in FIG. 2 to a second position as shown in FIG. 1. Valve 46 is opened, a predetermined quantity of liquid glue is discharged through line into groove 30, and valve 46 is then closed. Since the disc is rotated at high speed, the liquid glue in groove 30 will be forced outward by centrifugal force and will be thrown off as a spray from the disc at its periphery or rim onto the workpiece 80 (i.e., along the spray path indicated by line 79). Once substantially all the glue discharged into groove 30 has been thrown off the disc, valve 60A is opened causing the actuators to move shield 56 to its first position, i.e., interposed between disc 20 and workpiece 80, wherein it blocks any liquid which may be sprayed from the rotating disc 20 by centrifugal force. Valve 54 is then opened, a predetermined quantity of glue solvent is discharged through line 52 onto cavity 30, and the valve is closed. The solvent serves to dissolve glue that may still be adhered to the disc. Solvent, with dissolved glue, is thrown off the disc at its periphery by centrifugal force, onto the inner surface of shield 56 (i.e., along the spray path 79) and also thus serves to clean glue from both the disc and the shield. The solvent then drains downward into trough 62. Valves 66 and 76 are then opened and the solvent is drained from trough 62 and pumped via pump 70 through lines 68 and 78 to solvent storage tank 48. Or, if desired, a part or all of the solvent may be passed through valve 72 and line 74 and disposed of. In the meanwhile, the cardboard workpiece 80 is removed from the gluing station and a new workpiece is positioned therein. Makeup glue is applied to the glue holding tank 40 through line 42, and makeup solvent is supplied to tank 48 through line 50. It will be appreciated that the embodiment just described may be operated

intermittently without glue setting or hardening on the disc. Furthermore, the cleaning operation may be accomplished without any solvent being sprayed onto the work pieces, or being sprayed or dripping onto surrounding machinery.

A preferred embodiment of shield for use in the device of the present invention is shown in FIG. 3. In this embodiment the shield comprises a generally cylindrical drum 82 having a wall comprising substantially solid (unbroken) section or area 84, and one or more apertures 86. The shield is adapted to be moved so that only the apertures are selective interposed in the centrifugal spray path from the disc, while keeping the solid sections 84 always in the spray path. As will be appreciated, the embodiment just described has an advantage in limiting spray to selected directions.

If desired the device may include means for stopping rotation of disc 20 when shield 56 is moving between the first and second positions herein described, and for restarting rotation of the disc when the shield is in either the first or second position. Such means may include means (not shown) for alternatively starting and stopping the drive means for shaft 28. Alternatively, the drive means for shaft 28 may rotate continuously, and there may be included brake 88 and clutch 90 means for alternately engaging and disengaging shaft 28 from its drive means.

It will be appreciated that the device herein described may be used for applying a selected liquid to a flat surface such as cardboard sheet, or it may be used to apply a liquid to the inside walls of an erected structure such as a tube or the like.

Since certain changes may be made in the above system without departing from the scope of the invention herein involved, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted in an illustrative and not in a limiting sense.

What is claimed is:

1. A centrifugal dispensing device for intermittent application of a selected liquid onto a workpiece comprising in combination:

a disc adapted for rotation in a substantially horizontal plane;

means for selectively discharging either said selected liquid or a solvent therefor onto said disc so that rotation of the latter sprays said liquid and solvent in a centrifugal spray path, and

a shield adapted to be selectively interposed between said disc and said workpiece when solvent is being discharged onto said disc, and positioned to one side of said centrifugal spray path from said disc when said liquid is being discharged onto said disc.

2. A centrifugal dispensing device as defined in claim 1 including means for collecting solvent sprayed onto said shield.

3. A centrifugal dispensing device as defined in claim 1 wherein said shield comprises:

a cylindrical, hollow hood mounted about said disc for substantially vertical movement relative to the plane of said disc, at least between a first position wherein said hood is located out of the centrifugal spray path of said selected liquid from said disc, and a second position wherein said hood is located in the centrifugal spray path of said solvent.

4. A centrifugal dispensing device as defined in claim 3 including an annular trough formed on the inner sur-

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face of said hood, and including means communicating with said trough for removing solvent collected therein.

5. A centrifugal dispensing device as defined in claim 4 including means for recycling at least a portion of said solvent removed from said trough for discharge onto said disc.

6. A centrifugal dispensing device as defined in claim 1 wherein said disc includes a plurality of generally axially extending, outwardly flared, distributor vanes.

7. A centrifugal dispensing device as defined in claim 1 including means for rotating said disc when said shield is either in a position interposed between said impeller and said workpiece or in a position to one side of said path, and for stopping rotation of said disc when

said shield is between said positions.

8. A centrifugal dispensing device as defined in claim 1 wherein said selected liquid comprises liquid glue and said solvent comprises glue solvent.

9. A centrifugal dispensing device as defined in claim 8 including;

liquid glue supply means for supplying a predetermined quantity of said glue onto said disc when said spray path is unblocked; and
glue solvent supply means for supplying a predetermined quantity of said glue solvent onto said disc when said spray path is blocked.

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