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APPARATUS FOR POSITIVELY FEEDING PASTE
AND OTHER ADHESIVES TO MOVING WORK
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Fig. 1.

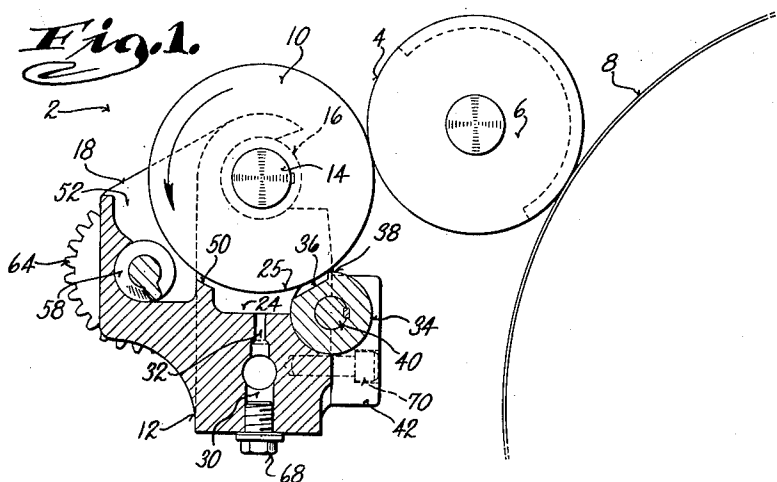


Fig. 2.

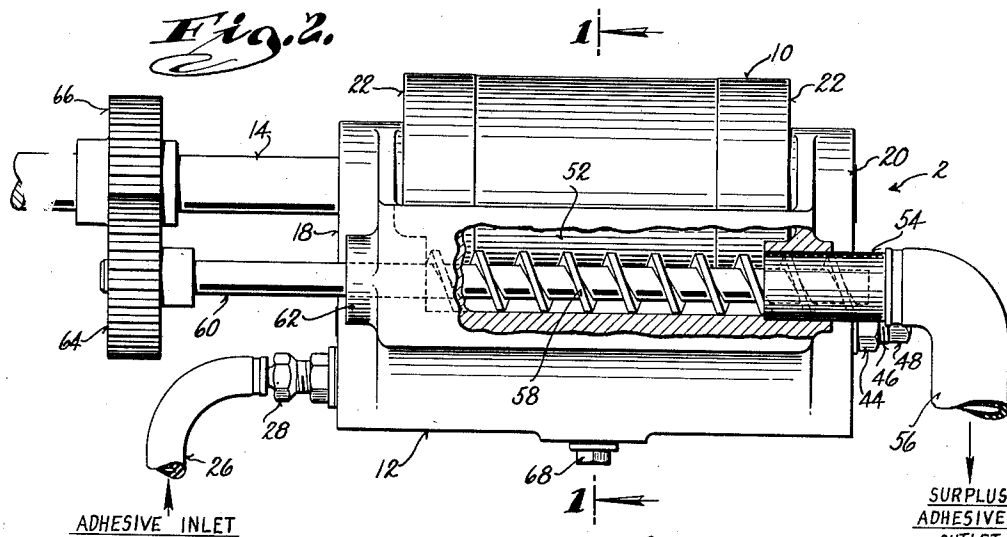
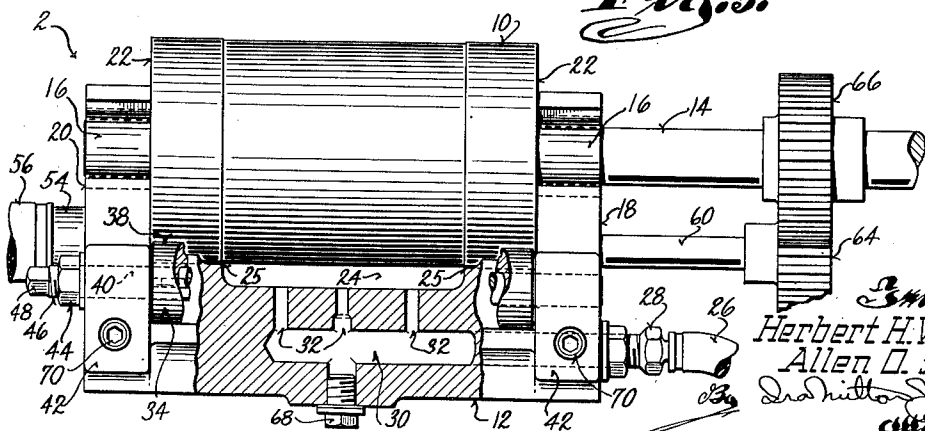


Fig. 3.



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APPARATUS FOR POSITIVELY FEEDING
PASTE AND OTHER ADHESIVES TO
MOVING WORK

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10 Claims. (Cl. 118—259)

1

This invention relates to an apparatus and method for applying paste and, more particularly, to a positive feed arrangement for applying paste to moving work.

The object of the invention is to provide an applicator for dispensing paste neatly and consistently to work moving therepast. While the device has general utility for applying paste, glue, or other semi-liquids, it is especially intended for bag and envelope-making machines in which, traditionally, paste was picked up and supplied to an applicator segment by a roller partially immersed in an open pot. In addition to the inherent messiness of the open paste pot, there were other disadvantages resulting from the lack of positive control over the paste supplied to the pot. The supply of paste was necessarily closely correlated to its consumption lest the pot underfeed or overflow and, in addition, leakage occurred around the doctor which wipes the surface of the roller as it leaves the pot.

The object now is to provide an applicator in the nature of a nozzle having a mouth virtually closed by a paste-receiving roller, the paste at all times being supplied under pressure to the nozzle so as to be forced against that portion of the roller surface momentarily embraced by the nozzle mouth. It is also intended to provide the nozzle mouth, at the trailing edge where the roller leaves, with an adjustable lip wiping against or near the roller to serve as a doctor and also to cooperate with the nozzle structure to form a leak-proof seal. The leading, or roller-entering edge of the nozzle mouth is to be defined by a fixed lip or weir spaced radially from the roller surface to allow controlled leakage of surplus paste from the nozzle in a direction counter to the rotational direction of the roller. The surplus paste is then to be returned to the source of supply by a conveyor operating at a capacity far in excess of the supply of paste to the nozzle so that loss of the overflow to the exterior is impossible.

In accordance with the method concepts, the object of the invention is to deposit a layer of sticky material on a moving surface by feeding an excess of the material under pressure to a confined space bounded on one side by the moving surface while exhausting the excess through a restricted outlet to an open receptacle, and then to convey off the excess from the receptacle at a rate potentially greater than the rate of feed to the confined space.

More specific objectives include the provision of an adjustable doctor along one edge of an applicator nozzle wherein the doctor not only

2

serves as a nozzle edge, or lip, but also cooperates with the associated nozzle structure throughout all adjusted positions of the doctor, and even during its adjustment, to confine liquids or semi-liquids within the nozzle. In other words the construction is such that notwithstanding the maintenance of pressure within the nozzle mouth, or chamber, no leakage occurs around the doctor except the intended amount which passes as a film between the doctor and the roll disposed across the nozzle mouth. As a further feature, the invention provides a manually operable control member extending externally of the nozzle for adjusting the doctor.

With the above and other objects in view, which will appear as the description proceeds, this invention resides in the novel method and apparatus hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

The accompanying drawing illustrates one complete example of the physical embodiment of the invention constructed according to the best mode so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a vertical cross sectional view through the applicator taken along the plane of the line 1—1 in Figure 2, looking in the direction of the arrows, but showing the applicator roller, transfer roller and a portion of the work drum in end elevation;

Figure 2 is a front elevational view of the applicator, with parts broken away and in section; and

Figure 3 is a rear elevational view of the applicator, partially broken away to show the doctor, nozzle and inlet in section.

Referring now to the drawing, in which like reference numerals denote similar elements, the new applicator 2 is shown as it would be seen in a typical environment, such as a bag machine, wherein paste is fed to an applicator segment 4 of a rotating transfer roller 6. Paste or glue, hereinafter generically termed "adhesive" is intermittently applied by segment 4 to bags being made as they pass between transfer roller 6 and a drum 8. Only the pertinent portions of the bag machine are diagrammatically shown. The applicator roller 10, which is a part of the invention, was heretofore conventionally immersed in an open pot.

In this invention, the roller 10 is partially confined within a body 12 rigidly supported with the applicator roller 10 in rolling engagement with

3

the transfer roller 6. Shaft 14, on which the applicator roller is fixed, rotates in bearings 16 in the ends 18, 20 of the body 12, the shaft 14 being driven in any suitable manner so that whenever the work passes over the drum 8, the shaft 14 turns the roller 10 in the direction indicated by the curved arrow in Figure 1.

The lower, inner surfaces of the end walls 18, 20 are in close wiping engagement with the flat ends 22 of the roller 10 so as to militate against leakage from a chamber 24 (upwardly disposed) in the body 12, it being apparent that the cylindrical wall of roller 10 constitutes a moving boundary surface for the chamber 24 and that the chamber is in effect a nozzle. Further assurance against leakage from the chamber 24 is provided by an inwardly stepped formation on the end walls 18 and 20, the top surfaces 25 of which partially embrace the ends of the roller 10 with a close running fit.

Adhesive is pumped under pressure from a suitable source, not shown, via an inlet tube 26 and a fitting 28 to an inlet manifold passage 30, whence it passes through metering ports 32 into chamber 24.

The "trailing" side of chamber 24, as determined by the rotational direction of the applicator roller 10, is substantially closed by a generally cylindrical doctor 34 seated snugly but rotatably in an arcuate recess in the body 12. The doctor has a lengthwise cut-out 36 defining a blade or edge 38 which may be adjusted towards and away from the roller 10 by rocking a shaft 40, on which the doctor 34 is splined, about its axis. While the shaft 40 is rotatably supported at each end of the body 12 by pillow blocks 42, it is normally held against rotation by a lock nut 44 on its threaded exterior end 46, adjustment of the blade 38 being accomplished by applying a wrench to the square end 48 of the shaft 40 after the lock nut 44 has been temporarily loosened. The pillow blocks 42 also snugly bear against the ends of the doctor 34 to prevent leakage around the ends of the doctor.

The "leading" side of the chamber 24, (again with reference to the direction of rotation of the roller 10) is partially closed by a weir 50 the free edge of which is slightly spaced from the cylindrical surface of the roller 10. The slight space between the weir 50 and the roller 10 provides a restricted outlet for the excess adhesive pumped into the chamber 24 and not carried off by the roller.

Exteriorly of the weir 50 there is formed in body 12 an open trough 52 having at one end a nipple connection 54 for a surplus adhesive outlet conduit 56 leading back to the source of supply for the adhesive. A screw conveyor 58 is rotatably mounted in the trough 52 with one end free and fitting in the nipple 54. Its other end has a shaft projecting therefrom rotatably supported by a bearing 62 in the body 12, and driven by gears 64 and 66, splined on shafts 60 and 14 so that whenever the roller 10 is driven in the direction of the curved arrow of Figure 1, the screw conveyor 58 turns to carry the adhesive which enters the trough 52 out through the outlet 55. The capacity of the screw conveyor 58, during normal operation of the device, is such that it can remove excess adhesive from the trough 52 at a rate greater than that at which the adhesive enters the chamber 24 through the metering ports 32. It is, therefore, impossible for the adhesive to overflow the trough 52. A clean-out plug 68 for the bottom of inlet manifold passage 30 and

4

hold-down bolts 70 for the pillow blocks 42 complete the assembly.

In operation, the machine to which the applicator 2 is an adjunct is started, the pump for forcing adhesive through inlet 26 is started, and, along with shaft 14, the applicator roller 10 and screw conveyor rotate. After a brief interval, enough adhesive enters to fill the chamber 24 via the inlet manifold 30 and metering ports 32. When chamber 24 fills, the adhesive is forced against roller 10 and a thin film is carried off on the roller surface for transfer to the segment 4. The thickness of the adhesive film on the roller 10 may be varied by turning the doctor 34 so as to move its blade 38 inwardly towards or outwardly from the roller 10, there being no leakage around the underside or ends of the doctor, even during rotational adjustment, because of the leak-proof seals between it and the body 12.

Upon further accumulation of adhesive in chamber 24 resulting from the flow through metering ports 32 exceeding the amount carried off as a film on the applicator roller 10 for transfer to the segment 4, the excess flows over the weir 50 into trough 52 from which it is returned to the source of supply by the screw conveyor 58 and the surplus outlet 56. The flow of excess adhesive over weir 50 is counter to the turning direction of the roller 10. Pressure is thereby retained in the chamber 24 and squirting leakage is prevented not only by the restricted size of the space between weir 50 and the roller 10, but also to some further extent by the tractive counterforce of the moving roller surface.

From the foregoing description taken in connection with the accompanying drawing and claims, it will be readily apparent that this invention provides a particularly neat and frugal applicator and method of applying adhesive in which the adhesive is positively controlled at all times and by which a film of the adhesive is applied under pressure to the moving surface of the applicator roller.

What we claim as our invention is:

1. A device for applying flowable material of the character described, comprising: a nozzle body having a mouth and a pair of lips on opposite sides thereof; a member having a substantially smooth surface larger than said mouth; means movably supporting said member with said surface disposed across said mouth and virtually closing the same; one of said lips constituting a doctor blade and being adjustable towards and away from said surface; a substantially leak-proof connection between the doctor blade and the nozzle body; the other of said lips having a free edge spaced from said surface and constituting a weir; means for feeding the material to be applied under pressure to the nozzle; means for moving said member so as to pass said surface across the mouth in the direction from the weir to the doctor blade; and means lying externally of said mouth and adjacent to the weir for conveying off the material escaping from said mouth over the weir.

2. In a device for applying flowable material of the character described: a nozzle body having a mouth; first and second substantially parallel straight lips on said nozzle body lying on respectively opposite sides of the mouth; roller means for transferring the material from the mouth to a surface to which the material is to be applied; means rotatably mounting the roller means with respect to the nozzle body for movement of the surface thereof transversely across

5

the mouth and with a portion of the surface of the roller means lying between said lips and virtually closing the mouth; said nozzle body closely engaging the roller means at the ends of the mouth to effect a substantially leak-proof seal therebetween; means for feeding the material to be applied under pressure to the nozzle mouth; means for rotating the roller means so as to pass the surface thereof transversely across the mouth in the direction from the first lip toward the second lip; doctor means on the second lip; the first lip being spaced from the surface of the roller means so as to define an exhaust slot between it and the roller means, leading from the mouth; a trough in position to receive material issuing from the exhaust slot; and means in said trough for conveying off material as it enters the trough.

3. In a device for applying flowable material of the character described: a nozzle body having a mouth; a pair of substantially parallel straight lips disposed on said nozzle body on opposite sides of said mouth, one of said lips being movable; a roller at least as great in diameter as the straight-line distance between said lips; bearing means rotatably mounting the roller on the body for rotation about an axis substantially parallel to said lips with a portion of the cylindrical surface of the roller extending arcuately between said lips and virtually closing the mouth; bearing means rotatably supporting said one lip on the nozzle body for rotation about an axis substantially parallel to the axis of rotation of the roller; a doctor blade extending lengthwise of said one lip and having a working edge thereof eccentric to the axis of rotation of said one lip whereby the doctor blade may be adjusted towards and away from the cylindrical roller surface upon rotation of said one lip; means for rotating the roller across said mouth and blade; and means for feeding material under pressure to said nozzle mouth.

4. In a device for applying flowable material of the character described: a nozzle body having an upwardly-disposed mouth, a pair of upwardly-extending substantially parallel straight lips on opposite sides of said mouth; a pair of bearings extending upwardly from the body at opposite ends of the mouth and in parallel alignment with said lips; a roller shaft rotatably mounted in said bearings; a roller on said shaft, said roller being substantially greater in diameter than the spacing between said lips, and a portion thereof being at all times embraced by the nozzle mouth; means for feeding the material to be applied under pressure to the nozzle mouth; means for rotating the roller; one of said lips having an upper free edge portion spaced radially from the roller surface to provide a restricted outlet for excess material from said mouth; an upwardly-open trough along the side of said nozzle body externally adjacent to the last-named lip for receiving said excess material; a feed screw rotatably disposed in the trough; outlet means at one end of the trough; and means for rotating the feed screw to thereby convey excess material in the trough to the outlet means.

5. In a device for applying flowable adhesive material: roller means for applying the material to a surface to which the material is to be applied; a nozzle having an open mouth facing one side of the roller means and virtually closed thereby; a doctor extending substantially parallel to the length of the roller means and de-

6

fining one edge of said mouth; input means for feeding the material to be applied under constant pressure to said mouth; means for rotating the roller means so as to carry its surface across the mouth and doctor, successively, to thereby transfer material from the nozzle to the roller means in the form of a film of predetermined size and thickness; the input means having a predetermined feed capacity in excess of the amount required to produce said film; restricted outlet means leading from the mouth to the exterior for exhausting excess material therefrom while maintaining pressure within the nozzle; an open receptacle communicating with said outlet means for receiving excess material therefrom; an outlet conduit leading from the open receptacle; and conveyor means for feeding material which enters the receptacle to said outlet conduit, the conveyor means and outlet conduit having an operating capacity in excess of the feed capacity of the input means.

6. A device for applying flowable material, comprising: a nozzle body having an elongated mouth and a pair of lips on opposite longitudinal sides thereof; a roller for transferring flowable material fed into the mouth to a surface to which said material is to be applied, said roller being larger than the mouth; means rotatably mounting the roller and positioning the same in longitudinal alignment with and overlying the mouth with the surface of the roller in juxtaposition to one of the lips of the mouth; doctor means at the outer edge of the other lip and coacting with the adjacent surface of the roller and together therewith virtually closing the mouth; said first designated lip having its outer edge spaced from the adjacent surface of the roller and providing a weir over which excess material escapes from the mouth; means for feeding the material to the nozzle mouth and hence onto the surface of the roller; means for rotating the roller so as to pass the surface thereof transversely across the mouth in the direction from the weir toward the doctor means; and collecting means lying externally of said mouth and adjacent to the weir for receiving the material escaping from said mouth across the weir.

7. In a device for applying flowable material such as paste and the like: a nozzle body having an elongated mouth from which the flowable material is dispensed; means defining a collecting chamber adjacent to one longitudinal side of the mouth to receive excess material therefrom; a pair of parallel straight lips defining the opposite sides of the mouth, one of said lips providing a weir between the mouth and the collecting chamber, and the second lip comprising a blade pivotally mounted on the nozzle body for swinging motion about an axis parallel to said lips; roller means for transferring flowable material from the mouth to a surface to which said material is to be applied, said roller means being of a size to cover the entire mouth of the nozzle; means rotatably mounting the roller means in longitudinal alignment with the lips and with the surface of the roller means spaced from the weir but contiguous to the edge of the blade providing said second lip so that the roller means virtually closes the mouth, swinging motion of said blade on its axis providing for adjustment of said edge thereof toward the adjacent surface of the roller means; said nozzle body closely engaging the roller means at the ends of the mouth to effect a substantially leak-proof seal therebetween; means for rotating the

7

roller means with the surface thereof moving transversely across the mouth in the direction from its first toward the second lip; means for feeding the material to the nozzle mouth and thus onto the surface of the roller means, the excess material escaping across the weir into the collecting chamber; and means in said collecting chamber for conveying off the excess material received therein.

8. The device set forth in claim 7 wherein said second lip comprises a substantially cylindrical body seated snugly but rotatably in the nozzle body with a portion thereof exposed along its length and having a longitudinal cutout to define an edge spaced from the axis of the cylindrical body and which provides the actual edge of the second lip, rotation of said cylindrical body on its axis providing for adjustment of said edge thereon toward or from the adjacent surface of the roller means.

9. A device for applying flowable material, comprising: a nozzle body having a forwardly projecting elongated rib thereon; means defining an elongated collecting chamber closed at its ends and located at one side of said rib; elongated roller means parallel to said rib and overlying the front of the nozzle body; means on the nozzle body at the other side of said rib and cooperating therewith and with the roller means to define an elongated feed chamber into which the material may be fed for application to the surface of the roller means and transfer thereby to a surface to which said material is to be applied, said feed chamber being substantially coextensive in length with the roller means and being closed at its ends, and the forward edge of said rib being spaced from the adjacent surface of the roller means, but the feed chamber being otherwise virtually closed by the roller means so that the rib provides a weir between the feed chamber and said collecting chamber across which excess material in the feed chamber may escape therefrom into said collecting chamber; duct means opening to the feed chamber for feeding the flowable material thereto; and means for rotating the roller means so as to pass the surface thereof in the direction from the weir toward the opposite side of the feed chamber.

10. A device for applying flowable material,

8

comprising: a nozzle body having a forwardly projecting elongated rib thereon; means defining an elongated collecting chamber closed at its ends and located at one side of said rib adjacent to the nozzle body; an elongated roller for transferring flowable material to a surface to which said material is to be applied; means mounting the roller adjacent to the front of the nozzle body and parallel to said rib; doctor means for said roller spaced from said rib and at the side thereof remote from said chamber, said doctor means cooperating with the rib, the nozzle body and with the roller to define an elongated feed chamber into which the material may be fed for application to the surface of the roller and transfer thereby to the surface to which the material is to be applied; said feed chamber being substantially coextensive in length with the roller and being closed at its ends, and the forward edge of said rib being spaced from the adjacent surface of the roller, but the feed chamber being otherwise virtually closed by the roller and doctor means so that the rib provides a weir between the two chambers across which excess material in the feed chamber may escape therefrom into said collecting chamber; duct means opening to the feed chamber for feeding the flowable material thereto; and means for rotating the roller so as to pass the surface thereof transversely across the feed chamber in the direction from the weir toward the doctor means.

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