Oct. 9, 1951 W. A. SCHNEIDER 2,571,065

AUTOMATIC MACHINE FOR METERING AND APPLYING ADHESIVE TO DIAPHRAGMS

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FIG. 1.

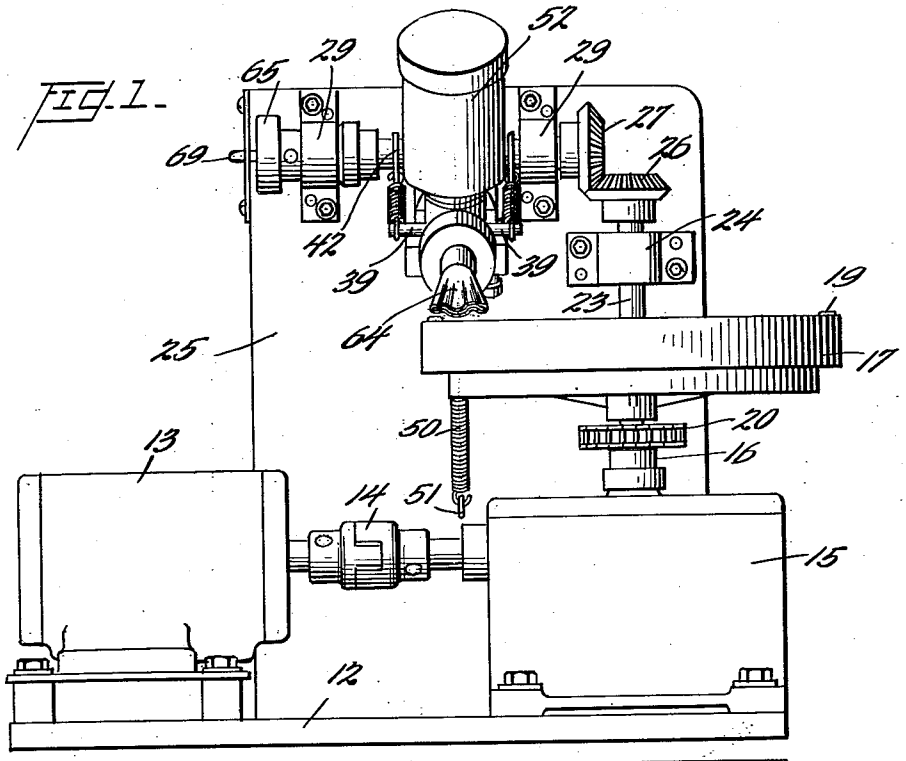
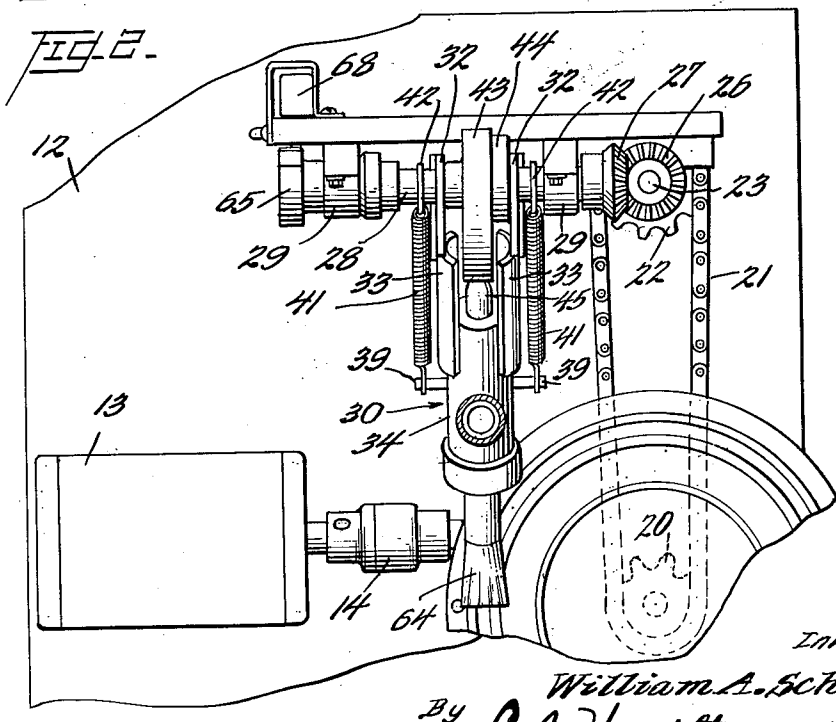


FIG. 2.



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FIG. 3.

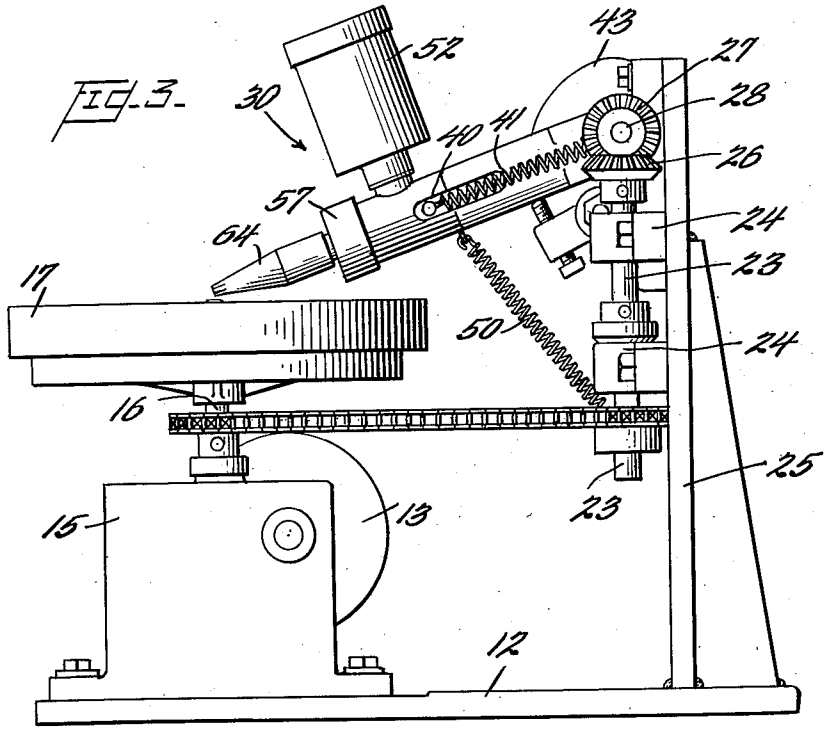


FIG. 11.

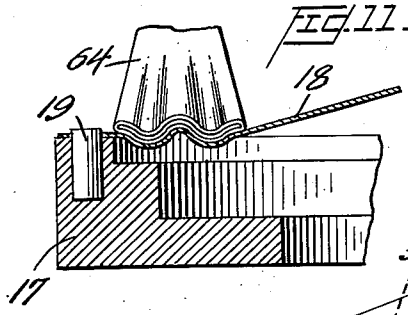
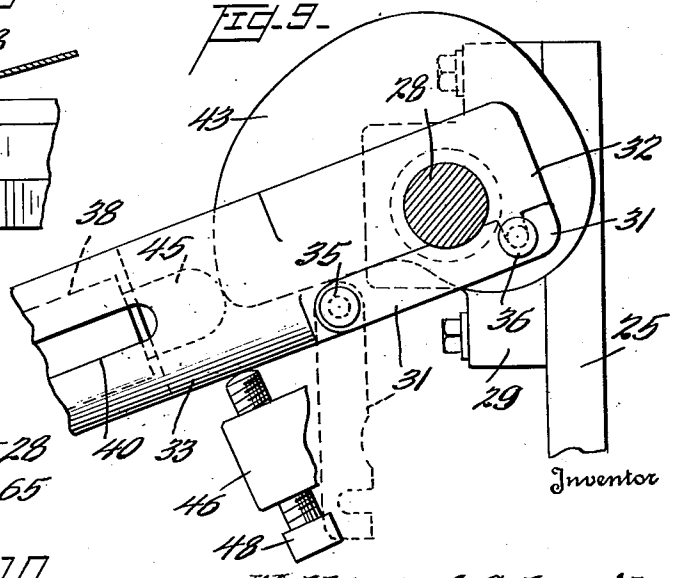


FIG. 9.



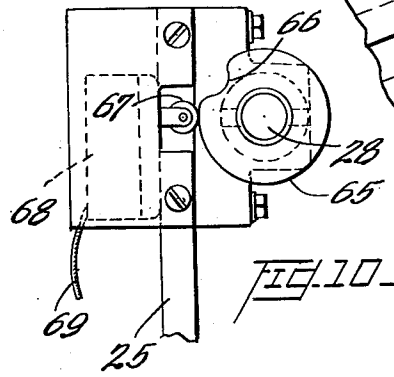


FIG. 10.

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AUTOMATIC MACHINE FOR METERING AND APPLYING ADHESIVE TO DIAPHRAGMS

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FIG. 4.

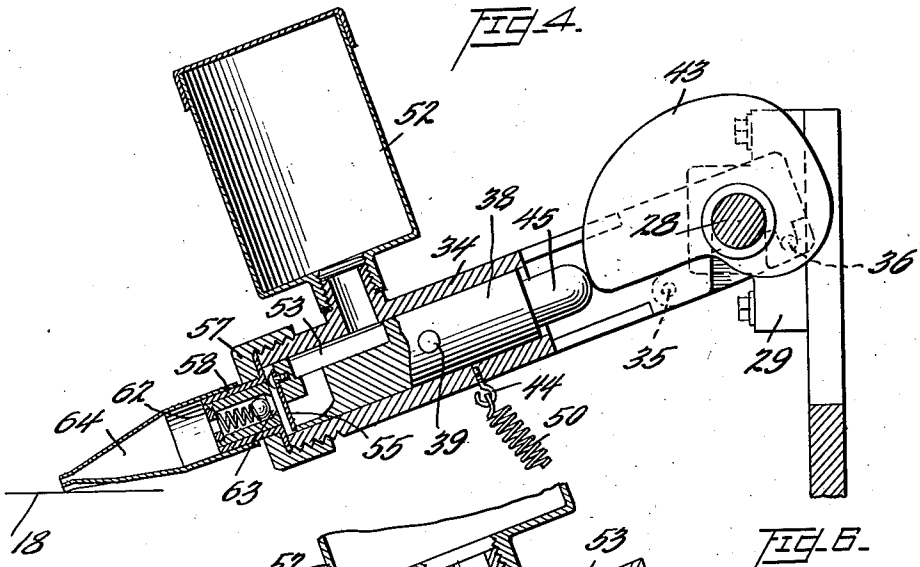


FIG. 5.

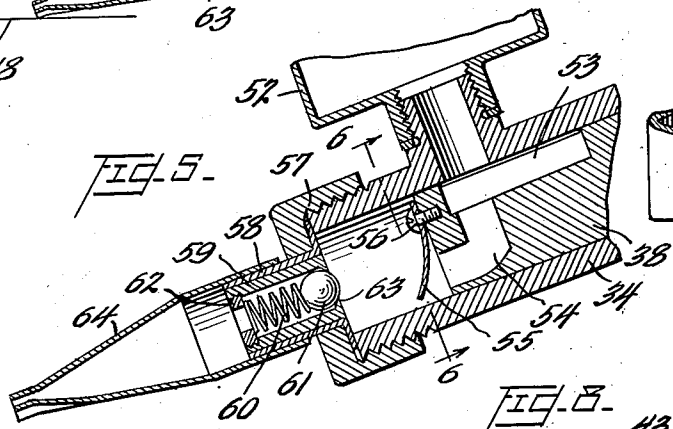


FIG. 6.

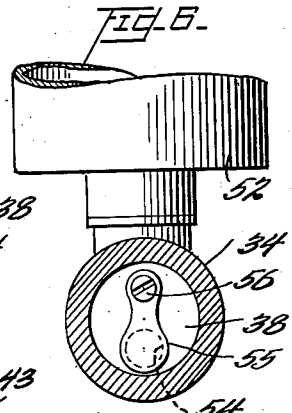


FIG. 7.

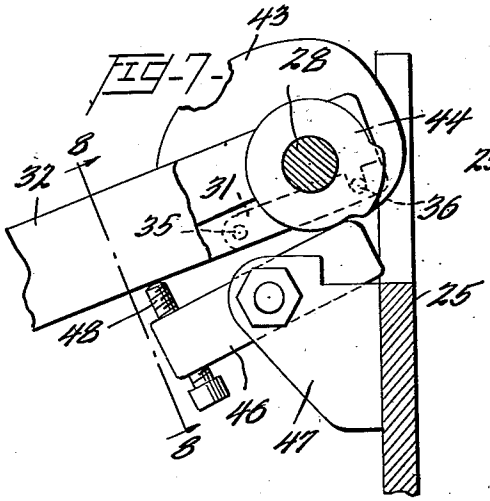
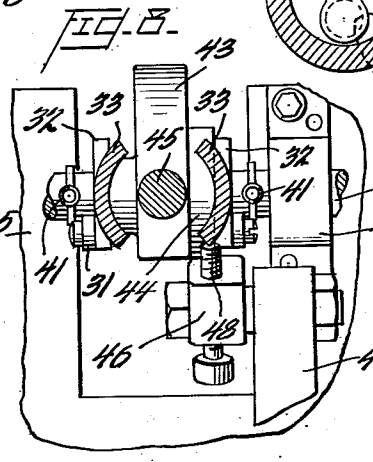


FIG. 8.



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Patented Oct. 9, 1951

2,571,065

UNITED STATES PATENT OFFICE

2,571,065

AUTOMATIC MACHINE FOR METERING AND APPLYING ADHESIVE TO DIAPHRAGMS

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Application July 28, 1948, Serial No. 41,078

10 Claims. (Cl. 91—43)

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This invention relates to apparatus for applying an adhesive to an article, and more particularly, to an automatic machine for metering and applying cement to a diaphragm.

It is an object of the present invention to provide a simple and efficient apparatus for accurately applying a measured charge of adhesive to an article.

In accordance with one embodiment of the invention a power driven cam shaft lowers a cement dispensing nozzle onto a paper diaphragm which is rotated on a turntable. A cam controlled and spring tensioned piston draws in a predetermined charge of cement from a container and extrudes it through the nozzle onto the rotating diaphragm. After a predetermined period of time, a cam raises the nozzle off the diaphragm and the spring pulls the piston back creating a vacuum in the cylinder whereby a check valve closes an opening in the nozzle and another check valve in the piston opens to draw another charge of cement from the container for application to another diaphragm.

A complete understanding of the invention may be obtained from the following detailed description taken in conjunction with the following drawings, in which;

Fig. 1 shows a front elevation of an adhesive applying machine embodying the invention;

Fig. 2 is a fragmentary plan view of the machine, particularly showing the power driven cam shaft;

Fig. 3 is a side elevational view of the machine;

Fig. 4 is an enlarged view of the applicator and associated cam structure showing the nozzle and piston in its discharging position;

Fig. 5 is an enlarged fragmentary view of the applicator showing the nozzle and piston in its reloading position;

Fig. 6 is a fragmentary sectional view taken along line 6—6 of Fig. 5;

Fig. 7 is a fragmentary side elevational view of the power driven cam shaft, partly in section, showing in particular the lifting cam and its associated mechanism;

Fig. 8 is a fragmentary sectional view taken along 8—8 of Fig. 7;

Fig. 9 is an enlarged view of the piston actuating cam structure with the cylinder detaching means;

Fig. 10 is a side view of a circuit controlling micro-switch and associated operating cam; and

Fig. 11 is an enlarged fragmentary view of the turntable and the adhesive applying nozzle in its extruding position.

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Referring now to the drawings, wherein like reference numerals designate the same parts throughout the several views, a base 12 is shown upon which is mounted an electric driving motor 13. The driving shaft of the motor is connected to a gear reduction unit 15 by means of a coupling 14. The unit 15 rotates a spindle 16 at a predetermined speed. The spindle 16 has affixed to its upper end a turntable 17 having four upright, spaced pins 19 (Fig. 11) which fit into four corresponding openings in a diaphragm 18 when it is placed on the turntable to have adhesive applied to it. The spindle 16 besides driving the turntable 17 is also used to rotate a plurality of shafts 23 and 28. A sprocket wheel 20 is secured to the spindle 16 immediately below the turntable 17 and engages a sprocket chain 21 which drives a sprocket 22 (Fig. 2) fixed to the shaft 23. The shaft 23 is mounted in two bearing blocks 24 (Fig. 3) which are bolted to an upright plate 25. The upright plate 25 is welded to the base 12 and supports, in addition to the shaft 23, the shaft 28 (Fig. 1) mounted in two similar bearing blocks 29 (Fig. 1). Secured to the upper end of the shaft 23 is a bevel gear 26 which meshes with and actuates a bevel gear 27 fixed to one end of the shaft 28 to thus cause rotation thereof.

The shaft 28 has freely movable thereon an adhesive applying mechanism or applicator designated generally by the reference numeral 30, which mechanism may be readily detached from the shaft 28 by means of a pair of latches 31 (Fig. 9). The latches 31 are pivotally carried by a pair of arms 32 (Figs. 2 and 9) which are welded to a pair of cylindrically shaped segments 33. Threaded to each of the arms 32 are a pair of machine screws 35 and 36 which engage the latches 31. The latches 31 pivot about the screws 35, while the screws 36 serve to hold the latches against the shaft 28. The segments 33 are welded to a cylinder 34 and are the intermediate structure between the arms 32 and the cylinder 34 (Fig. 2).

A piston 38 having two pins 39 secured to its opposite sides (Figs. 2 and 4) operates in the cylinder 34. The pins 39 project through a pair of slots 40 in the cylinder walls (Fig. 3). Secured to the outer ends of the pins 39 are a pair of coil springs 41 which have their other ends secured in perforations in the periphery of a pair of rings 42 loosely mounted on a shaft 28. In this manner, the springs 41 normally urge the piston 38 toward the shaft 28. The rings 42, being loosely mounted on the shaft 28, do not rotate with the shaft but remain stationary. This con-

struction permits easy removal of the mechanism 30 from the shaft 28.

It may be necessary at times to remove the adhesive applying mechanism or applicator 30 from the shaft 28 in order to clean or adjust the different parts comprising it. This is accomplished by pushing the latches 31 downwardly off of the screws 36 to the position shown in dotted lines in Fig. 9 and then disengaging the ends of the coil springs 41 from the perforations in the periphery of the rings 42, whereby the complete applicator 30 can be easily removed from the machine.

The shaft 28 has a pair of control cams 43 and 44 fixed thereon which operate the adhesive applying mechanism 30. The cam 43 is at all times in constant contact with a rounded projected end 45 of the piston 38 (Figs. 2 and 4). The cam 43 is so constructed that when the high point contacts the rounded projected end 45 the piston 38 will be pushed to its innermost position within the cylinder 34. When the lowest point on the periphery of the cam 43 is reached, the piston 38 will be urged to the extreme rear position by the pull of the coil springs 41. The other control cam 44 contacts one end of a rocker arm 46 (Fig. 7) which is pivotally mounted in a pillow block 47 attached to the upright plate 25. One end of the rocker arm 46 has a threaded stud 48 which may be readily adjusted to engage one of the segments 33 to vary the lower limit of movement of the nozzle 64.

Secured in the lower portion of the cylinder 34 is a threaded hook 49 (Fig. 4), the eye of which holds one end of a coil spring 50. The other end of the coil spring 50 engages a similar hook 51 which is threaded into the upright plate 25 (Fig. 1). The spring 50 thus normally urges the cylinder 34 and attached nozzle 64 toward the base 12. When the control cam 44 is in the position shown in Fig. 7, the spring 50 has pulled the cylinder into operative position with the turntable 17 as shown in Figs. 1 and 4. When the lobe or high part of the cam 44 contacts the rocker arm 46, the cylinder 34 and attached nozzle 64 will be rocked upwardly against the tension of the coil spring 50.

The cylinder 34 carries and has connected to it a storage container 52 which is filled with adhesive of a desirable composition, preferably pyralin cement. The container 52 is used to supply the cement to the cylinder 34 whereby it may eventually be extruded upon the diaphragm 18 in the form of a circumferential ribbon. The cement passes from the container 52 into a longitudinal slot 53 (Figs. 4 and 5) formed in the upper portion of the piston 38. A connecting bore 54 extends from the slot 53 to the head of the piston 38. Covering the mouth of the bore 54 at the head of the piston 38 is a flexible gate member 55 which is secured thereto by a machine screw 56 (Figs. 4 and 5).

When the rounded projected end 45 of the piston 38 rides from the high point to the low point of cam 43, the piston 38 will be drawn back by the springs 41 (Fig. 5) creating a suction in the cylinder 34. This suction draws a metered charge of cement from the container 52 into the slot 53 and then through the mouth of bore 54. In passing through the mouth of bore 54 the cement flexes the gate member 55 outwardly (Fig. 5) to permit the cement to be loaded into the cylinder 34.

An internally threaded cap 57 is secured to the threaded outer end of the cylinder 34 and serves to hold in position a bushing 58 (Figs. 4 and 5). Another bushing 59 is press fitted within the bushing 58 and encloses a coil spring 60, a ball valve member 61 and a spring retainer 62 threaded into the lower end of bushing 58. The ball valve member 61 is forced by the spring 60 to block off an aperture 63 formed in the bushing 59. Thus when the cement is forced through the aperture 63 the force exerted on the ball valve member 61 will push it back and compress the coil spring 60 to allow passage of the cement through a central aperture in the spring retainer 62. A copper nozzle tip 64 is attached to the outer periphery of the bushing 58 and the cement issues therefrom onto the diaphragm 18 in the form of a ribbon.

A cam 65 (Fig. 10) having a slight depression 66 in its periphery is fixed to one end of the shaft 28. A roller follower 67 of a microswitch 68 bears against the cam 65 and upon dropping into the depression 66 will actuate the microswitch to shut off the machine. The microswitch 68 (Figs. 2 and 10) is mounted on the rear side of the upright plate 25 and is connected by suitable conductors 69 (Fig. 10) to a motor control device (not shown).

In applying cement to a diaphragm, the operator first places the diaphragm 18 on the turntable 17 in such a position that the holes in the diaphragm will coincide with and pass over the pins 19. At this time the adhesive applying mechanism is in its upper position to permit the operator to place the diaphragm on the turntable. The follower 67 is manually moved out of the depression 66 in the cam 65 to initiate the starting of the electric motor 13. Rotation of the motor 13 drives the turntable 18 by means of the intermediate mechanism previously described. At the beginning of the cycle of operation, the rounded projected end 45 of piston 38 is in contact with the lowest point on the cam 43 and the piston 38 is in its retracted position in the cylinder 34 (Fig. 5), urged thereto by the springs 41. The high point or lobe of the cam 44 at this time contacts the upper rear end of the rocker arm 46 and consequently the adhesive applying mechanism 30 is pushed upwardly against the tension of the coil spring 50. Upon rotation of the turntable 18, the shaft 28 with its cams 43, 44 and 65 also commence to turn. The rocker arm 46 rides off of the lobe of cam 44 permitting the adhesive applying mechanism 30 to be drawn towards the turntable 17 with the copper nozzle 64 touching the diaphragm 18. Concurrently, the portion 45 of the piston 38 rides on the increasing radius of the cam 43. As the cam 43 rotates, the piston 38 will be moved gradually to its innermost position in the cylinder 34 to force the cement past the ball valve member 61 through the copper nozzle tip 64 onto the rotating diaphragm 18. A complete circumferential ribbon of adhesive is thus extruded onto the diaphragm 18 when the turntable goes through one revolution. At the end of this revolution the shaft 28 has rotated three-fourths of one revolution and the cams 43, 44 and 65 return in the next quarter turn to the positions in which they were at the beginning of the cycle of operation. The follower 67 falls into the depression 66 upon a complete revolution of the shaft 28 and actuates the microswitch 68 to stop rotation of the motor 13. All parts of the machine are now in the positions corresponding to the beginning of a cycle of operation of the

machine, adhesive has been applied to a diaphragm 18 and the machine is now ready to be loaded with a new diaphragm for another cycle of operation.

Although the invention has been described with references to a particular embodiment, it is to be understood that various modifications may be made without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. In a machine for metering and applying adhesive to an article, an applicator for containing a metered charge of adhesive, a control shaft, means on the applicator for detachably mounting said applicator on the control shaft, an article conveying means, means for actuating the conveying means to move the article relative to the applicator, means for pivoting the applicator about the shaft into contact with the moving article, and means including a cam secured to the shaft for forcing the pre-metered charge of adhesive out of the applicator at a predetermined rate onto the moving article.

2. In a machine for metering and applying adhesive to an article, a control shaft, an applicator rotatably mounted on said shaft for containing a pre-metered charge of adhesive, an article conveying means, means for actuating the conveying means to move the article relative to the applicator, means for moving the applicator into contact with the moving article, said applicator comprising a cylinder and a piston, and a cam secured to the control shaft for engaging the piston to reciprocate it within the cylinder to draw in and extrude adhesive onto the article at predetermined times.

3. In a machine for metering and applying adhesive to an article, an applicator for containing a metered charge of adhesive, a cam shaft, hinged means on the applicator for pivotally mounting it on the cam shaft, an article conveying means, and means for actuating the conveying means to move the article relative to the applicator, said applicator comprising a cylinder, an adhesive supply container mounted on the cylinder, and a piston operable within the cylinder, a cam on the shaft for actuating said applicator to contact the moving article at predetermined times, and a second cam to simultaneously actuate the piston to extrude the metered charge of adhesive onto the article.

4. In a machine for metering and applying adhesive to an article, an applicator for containing a metered charge of adhesive, a power shaft, a plurality of cams mounted on the power shaft, hinged means on the applicator for supporting it on the power shaft, an article conveying means, means for actuating the conveying means to move the article relative to the applicator, said applicator comprising a cylinder, an adhesive supply container mounted upon the cylinder, a piston reciprocating within the cylinder to draw in a charge of adhesive from the supply container and extrude adhesive onto the article, valve means controlling the passage of adhesive to and from the cylinder dependent upon the position of the piston, and resilient means normally urging the applicator into engagement with the moving article, said cylinder and piston being controlled in their movements by the cams on the power shaft.

5. In an apparatus for metering and applying adhesive to an article, a shaft having a cam secured thereto, means for rotating the shaft, an adhesive applying means rotatably supported by said shaft, said adhesive applying means comprising a cylinder, a container rigidly secured to said cylinder and interconnected therewith to supply adhesive material to the cylinder, and a reciprocating member within the cylinder and in sliding engagement with the cam to extrude the adhesive material from the cylinder onto the article.

6. In an adhesive applying apparatus, a carrier for holding an article, a shaft, means for simultaneously moving the carrier and the shaft, an adhesive applying means supported by said shaft in a position to apply adhesive material to the article as it is moved relative to the adhesive applying means, means secured to the shaft to operate the applying means, and a second means secured to the shaft for rendering the said moving means ineffective after a predetermined time.

7. In a machine for metering and applying adhesive to an article, a rotatable carrier for holding an article, a shaft having a plurality of cams secured thereto, means to simultaneously drive the rotatable carrier and the shaft, means controlled by one of said cams for stopping the shaft after a predetermined time, a detachable adhesive applying means supported by said shaft for applying adhesive to the article as it is rotated, said adhesive applying means comprising a cylinder having a passageway through its wall, a container secured to the cylinder and opening into said passageway for supplying adhesive to the cylinder, and a reciprocating member positioned within the cylinder and operated by another of said cams to extrude adhesive from the cylinder onto the article.

8. In an applicator for fluid material, a cylinder having an aperture in its wall, a nozzle secured to one end of the cylinder, a reservoir fastened to the cylinder and opening into said aperture, a piston slidably positioned within said cylinder and having a longitudinal slot in alignment with the said aperture, said piston having a passageway running from the slot to the front face of the piston, a valve secured to the front face of the piston to cut off the passageway from the inside of the cylinder, and means to reciprocate the piston to open the valve on the rearward stroke to allow fluid to pass from the reservoir to the cylinder and to close the valve on the forward stroke so that the fluid is extruded through the nozzle by the moving piston.

9. In a fluid applicator, a cylinder having an aperture in its wall, a container secured to the cylinder and opening into the aperture, a nozzle secured to one end of the cylinder, a piston slidably mounted within the cylinder, a valve secured to the front face of the piston, said piston having a passageway therethrough to interconnect the valve with the aperture in the cylinder wall, means to move the piston to open the valve to allow fluid to pass from the container to the inside of the cylinder, and means to maintain the opening formed by the passageway in the piston in alignment with the aperture in the cylinder wall.

10. In a machine for extruding an adhesive, a control shaft, an applicator for containing a metered charge of adhesive and pivotally mounted on said control shaft, conveying means for moving an article relative to the applicator, said applicator comprising a cylinder and a pis-

ton, resilient means normally urging the applicator into contact with the article, a second resilient means for maintaining the piston in a retracted position within said cylinder, a cam mounted on said control shaft for overcoming the second resilient means to move the piston forward to extrude the charge of adhesive out of the cylinder and onto the article, a second cam on said control shaft for raising the applicator from the article against the restraint of the first resilient means after the adhesive has been extruded, and a cam actuated means to halt the operation of said machine after the applicator has been returned to its raised position.

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