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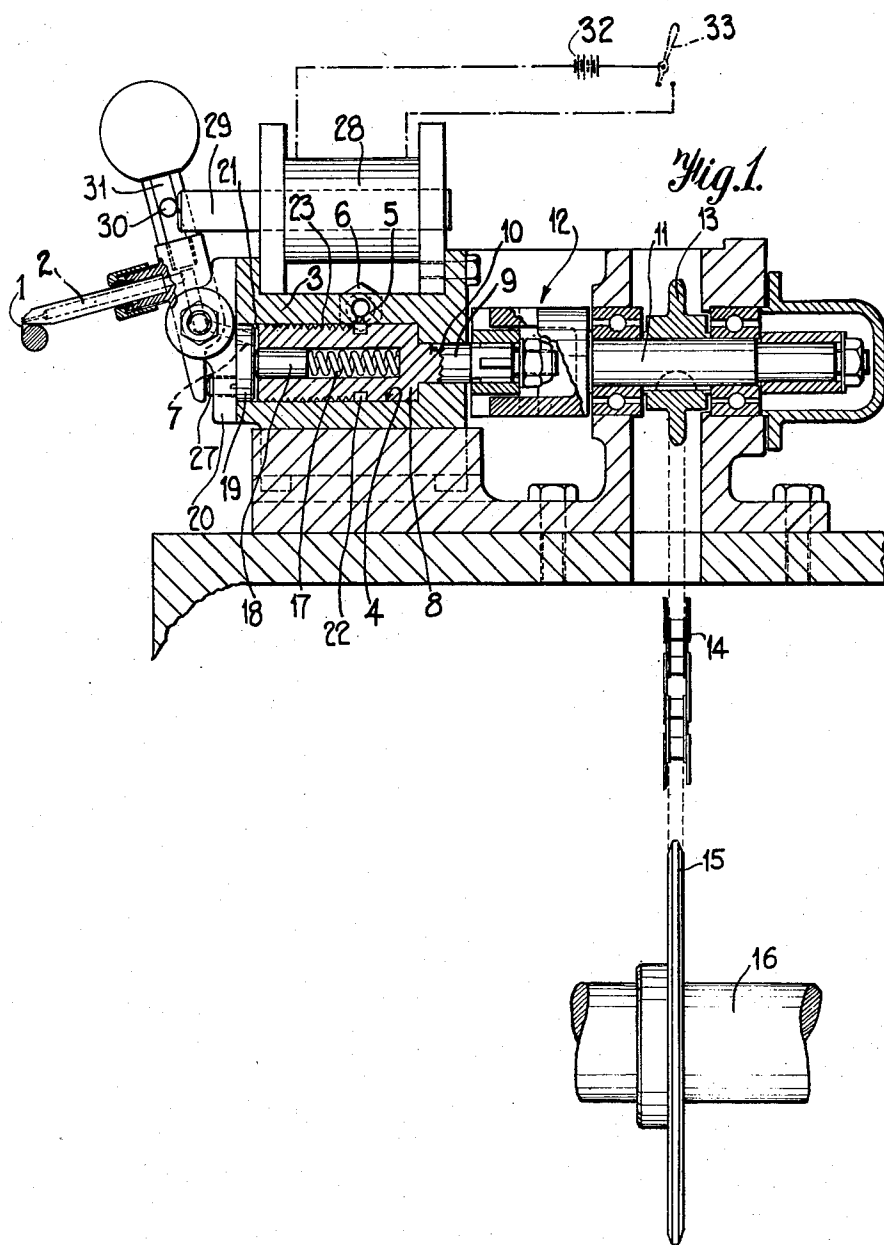
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DEVICE FOR APPLYING ADHESIVE TO A TRAVELING SURFACE

Filed July 15, 1947

2 SHEETS—SHEET 1



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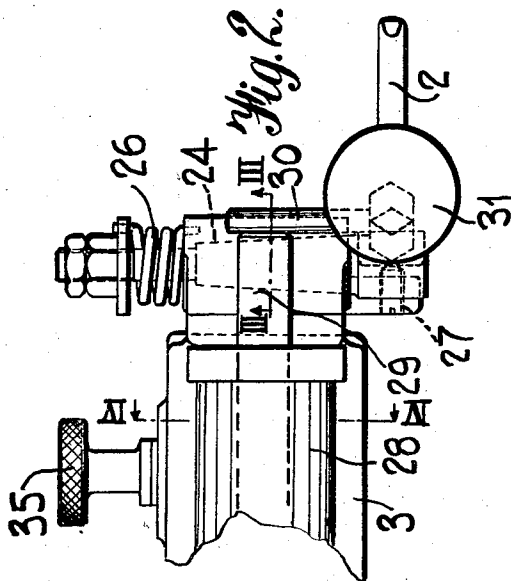
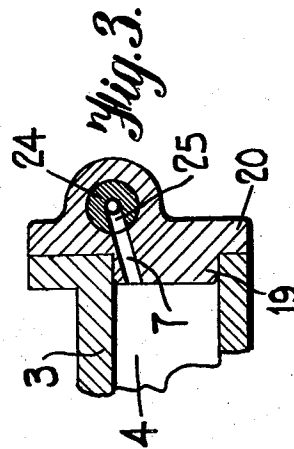
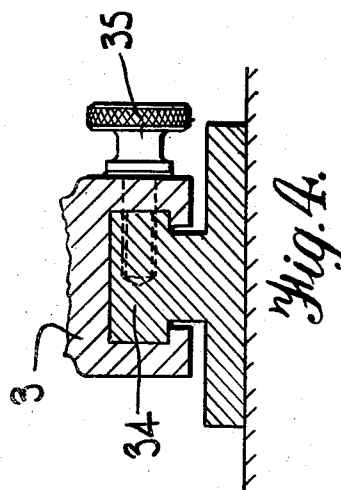
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2 SHEETS—SHEET 2



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DEVICE FOR APPLYING ADHESIVE TO A TRAVELING SURFACE

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14 Claims. (Cl. 91-12)

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This invention concerns improvements in or relating to adhesive-applying devices.

In some automatic machines, for example cigarette-making machines of the continuous rod type, it is necessary to apply adhesive to a traveling surface such as a moving web of paper or the like.

According to the present invention there is provided an adhesive-applying device comprising an enclosed chamber having an inlet and an outlet for adhesive; a rotor rotatable in said chamber and operable between the inlet and outlet for the purpose of milling adhesive passing between the surfaces of said chamber and rotor towards the outlet, a shaft for rotating said rotor and extending through a wall of the chamber; and pressure-means to urge the rotor axially towards that wall of the chamber through which the shaft of the rotor extends to seal the aperture therefor.

The pressure-means may comprise resilient pressure-means (e. g. a spring plunger) and the rotor may be provided with a surface against which adhesive in the chamber can press to urge the rotor in the desired axial direction.

The milling surface of the rotor may be provided with one or more grooves to form channels for the adhesive to facilitate its passage through the device. The groove or grooves may be smaller near the outlet than near the inlet (e. g. tapered) for the purpose of reducing the space for the adhesive as it approaches the outlet, so as progressively to mill the adhesive more thoroughly as it passes through the device.

The rotor may be cut away to provide a space adjacent the inlet to facilitate entry of the adhesive into the cylinder, and the groove or grooves on the rotor may open into said space.

The device may comprise a nozzle, and a movable part having a duct to communicate with the nozzle, said movable part being adapted to be moved so as to put the duct into or out of communication with the outlet to control the supply of adhesive through the nozzle. The nozzle may be movable with the movable part which comprises a conduit having a port and which is movable so as to move said port into and out of communication with the outlet.

The said conduit may be rotatable about its axis to move the port, and the nozzle may be angularly movable about the axis of said rotatable conduit so as to rotate the latter, whereby such angular movement is effective to turn on or cut off the supply of adhesive through the nozzle. The said rotatable conduit and its seating may

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be of tapering form in which case the conduit is resiliently urged toward its smaller end to maintain a close fit. A stop (e. g. an adjustable stop) may be provided to limit the angular movement of said nozzle.

Further according to the present invention there is provided in an adhesive-applying device having a chamber and an outlet therefrom, a nozzle, and a movable part having a duct to communicate with the nozzle, said movable part being adapted to be moved so as to put the duct into or out of communication with the outlet to control the supply of adhesive through the nozzle. The nozzle may be movable with the movable part which comprises a conduit having a port and which is movable so as to move said port into and out of communication with the outlet.

The said conduit may be rotatable about its axis to move the port, and the nozzle may be angularly movable about the axis of said rotatable conduit so as to rotate the latter, whereby such angular movement is effective to turn on or cut off the supply of adhesive through the nozzle. The said rotatable conduit and its seating may be of tapering form in which case the conduit is resiliently urged towards its smaller end to maintain a close fit. A stop (e. g. an adjustable stop) may be provided to limit the angular movement of said nozzle.

An adhesive applying device in accordance with the invention, and adapted for use with a continuous rod cigarette making machine, will now be described by way of example with reference to the accompanying drawings in which.

Figure 1 is a cross-section through the bed of a cigarette machine showing the device partly in section.

Figure 2 is a plan of part of Figure 1.

Figure 3 is a section on III—III Figure 2.

Figure 4 is a section on IV—IV Figure 2.

Referring to the drawings, the device illustrated is employed to apply adhesive, in this case starch paste, to the moving web of cigarette paper 1. The device is located at a part of the machine adjacent the position where the lap of the paper web is turned up for the application of adhesive thereto and the nozzle 2 of the device is positioned so that its orifice can be brought into or substantially into contact with the paper.

The device comprises a casing 3 having a cylindrical inner surface and forming a chamber 4 for the adhesive. Towards the end of the chamber remote from the paper web is an aperture 5 in a side wall forming an inlet for the adhesive. This inlet is provided with an external union 6 where-

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by it may be connected with any suitable kind of pressure-adhesive-feeding device.

Towards the other end of the chamber is a further aperture 7 forming an outlet and leading from the interior of the chamber towards the nozzle 2 which will be described in more detail later.

Within the chamber is fitted a rotor 8 of generally cylindrical form. The part of the rotor which lies between the inlet and the outlet has its curved surface adapted to co-operate with the corresponding inner surface of the chamber to mill adhesive passing through the chamber from the inlet towards the outlet. The rotor is arranged to be rotated for this purpose, and accordingly has a shaft 9 formed integrally with the body of the rotor and extending from one end thereof and passing through a hole 10 in the end wall of the chamber which is remote from the paper web. The shaft is adapted to be connected to any suitable external driving means for rotating the rotor. As shown this means consists of a shaft 11 having half of a coupling 12 at one end which engages with the other half which is fixed on the shaft 9. A small sprocket wheel 13 is fixed on the shaft 11 and connected by a chain 14 to a sprocket wheel 15 on a shaft 16 of the cigarette machine; in practice the tape drum shaft.

The diameter of the rotor is such that it is a fairly close sliding fit in the chamber, the clearance being in neighbourhood of .003 inch.

The length of the rotor is a little less than that of the interior of the chamber, and in the end face of the rotor opposite to the shaft end is bored a hole which accommodates a compression spring 17 and a plunger 18 which presses against the end wall of the chamber which is formed by a spigot 19 on a bracket 20 so as to urge the rotor towards the opposite wall of the chamber. There is thus a space 21 between the end face of the rotor in which the spring plunger is located, and the corresponding end wall of the chamber. The outlet 7 communicates with this space.

Near its other end the operative part of the cylindrical surface of the rotor terminates in a cut-away portion which constitutes an annular trough 22 of square cross-section. This trough provides a space between the rotor and the cylindrical wall of the chamber, and the inlet 5 opens into this space.

A helical groove 23 resembling a screw thread is cut around the cylindrical surface of the rotor, the groove diminishing in depth and width as it leads from the inlet end to the outlet end.

Alternatively a number of longitudinal grooves may be cut along the operative part of the cylindrical surface of the rotor. These grooves, which extend from the space adjacent the inlet to the end of the rotor adjacent the outlet, are tapered so as to be smaller (that is, narrower and shallower) at the outlet end. Or a series of circular grooves joined by one or more longitudinal grooves might be used.

As stated above, the outlet leads from the interior of the chamber towards the nozzle. Intermediate the outlet and the nozzle is a rotatable conduit in the form of a hollow member 24 of circular cross-section which fits closely into an enclosed space of corresponding shape so as to be rotatable therein. The conduit has a port 25 formed in it which can be brought into communication with the outlet 7, which leads from the chamber into said space. The arrangement

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is such that on rotation of the conduit within the said space, the port is moved into and out of communication with the said outlet.

The aforesaid hollow member or conduit is of frusto-conical form as shown in Figure 2, and is arranged to be pressed in the direction of its taper into the corresponding enclosed space by a spring 26. This spring is a torsion spring and serves another purpose as explained later. The purpose of this arrangement is to enable a close fit to be obtained even though the parts may wear, since wear is taken up by the conical conduit moving further inward under spring pressure. At the one end, the conduit has fixed to it the nozzle 2 with which it communicates. As stated above, the device is so positioned that the orifice of the nozzle can be brought into contact with the turned-up lap of the moving paper web as shown in Figure 1. The nozzle is fixed to the conduit, so that the conduit is rotated when the nozzle moves angularly about the axis of the conduit. The parts are so arranged that when the nozzle is, as shown in Figure 1, with its orifice in contact with the paper web, the port 25 in the conduit is in communication with the outlet 7. When the nozzle is swung up to any considerable extent, however, the port is moved away from the said outlet which is thus closed.

An adjustable stop 27 is fixed at a suitable position to limit the downward swinging movement of the nozzle, so as to locate the orifice correctly relative to the paper web. The stop comprises an adjusting screw which enables small adjustments to be made to the position to which the nozzle can be swung, and in order to allow for such adjustments the said outlet and port are of a suitable size to permit the passage of adhesive within the desired limits.

When the device is in operation the rotor is rotated, and adhesive is fed under pressure through the inlet into the chamber, where it enters the space formed by the annular trough 22 on the rotor and then passes between the operative part of the rotating rotor and the chamber walls towards the said outlet and thence through the nozzle. In its passage through the chamber, the adhesive is subjected to considerable mixing and rubbing action between the chamber walls and the surface of the rotating rotor. As the adhesive enters the chamber it tends to pass along the groove or grooves on the rotor surface which are in communication with the trough 22 and which act as channels for the adhesive. The adhesive also exerts a pressure on the opposite wall of the trough to that from which the grooves lead and this tends to press the rotor towards the chamber wall through which the rotor shaft 9 passes. Further, adhesive accumulates in the space 21 at the outlet end of the chamber and, being under pressure, tends to press against the end face of the rotor, urging the rotor in the same direction. The pressure of the paste in the space 21 and in the trough 22 in this way assists the pressure of the spring plunger which urges the rotor against the chamber wall and seals the aperture through which the rotor shaft 9 passes. It is found that this is sufficient to provide an effective seal between the rotor shaft 9 and the chamber and that only a small quantity of adhesive leaks through. This small leakage is in fact desirable to provide lubrication for the shaft 9 and accordingly the shaft is not made too close a fit to prevent such minute leakage.

The groove or grooves on the rotor is or are,

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as stated above, narrowed down from the inlet end towards the outlet end. The purpose of this is to decrease the extent of the passage afforded the adhesive as it moves through the device, so that the space available for the adhesive is progressively reduced as it passes from the inlet towards the outlet, the adhesive thus being subjected to an increasingly thorough milling or grinding action as it passes through the chamber.

When the nozzle is at an appropriate angle to cause the port in the conduit to communicate with the said outlet to the chamber, the milled adhesive passes through the said outlet and port into the conduit and thence into the nozzle and emerges from the orifice on to the paper web.

When it is desired to cut off the supply, the nozzle 2 is swung up away from the paper web, and the rotatable conduit 24 is thereby turned so as to bring it out of communication with the outlet 7, which is thus sealed off. Swinging the nozzle in the opposite direction to its operative position restarts the flow of adhesive.

Suitable mechanism may if desired be provided for automatically swinging the nozzle upwardly to cut off the supply of adhesive, for example whenever the cigarette making machine stops. Such a device is shown in Figure 1 and comprises a solenoid 28 with a plunger 29 which presses against a pin 30 on a hand lever 31 fixed to the conduit. The solenoid is connected to a battery 32 by for example the starting handle 33 of the machine when in the "off" position. The plunger is sucked back and the conduit is rotated to cut off the supply by the torsion spring 26 previously mentioned. Alternatively the device may be operated by the hand lever 31.

It will be seen that the arrangements for pressing the rotor against the chamber-wall provide a very simple means of sealing the aperture and do away with the necessity for glands for this purpose, while the small leakage that does occur is found to provide sufficient lubrication for the rotating shaft.

If desired the nozzle may be made extensible lengthwise in order to enable the orifice to be brought nearer to or further from the paper web.

Alternatively if the nozzle is not made extensible the casing 3 of the device is arranged to be movable bodily for this purpose along a guide 34, Figure 4, on which the device slides and is locked in any desired position by a screw 35.

It will be appreciated that when the supply to the nozzle is cut off the pressure will build up in the space 21. The adhesive supply device may therefore incorporate a clutch or trip in its driving arrangements but since this device forms no part of the present invention it is not necessary to describe or illustrate it in detail.

What I claim as my invention and desire to secure by Letters Patent is:

1. An adhesive applying device comprising an enclosed chamber of circular cross-section and having two end walls and a tubular wall, and having an inlet for adhesive, said inlet being formed in the tubular wall, and an outlet for adhesive, said outlet and inlet being spaced apart axially of the chamber, a rotor of circular cross-section rotatable in the chamber and having a milling surface cooperating with the inner surface of the tubular wall, and operable between the inlet and outlet to mill adhesive passing axially of the chamber and rotor between the two said surfaces toward the outlet, a shaft for rotating said rotor and extending through an end wall of the chamber, and resilient pressure means to

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urge the rotor axially toward that end wall of the chamber through which the shaft of the rotor extends, to seal the aperture for the shaft.

2. A device as claimed in claim 1 wherein the rotor is provided with a surface against which adhesive in the chamber can press to urge the rotor axially in the desired direction to seal the said aperture.

3. A device as claimed in claim 1 wherein the milling surface of the rotor is provided with at least one helical groove forming a channel for the adhesive and leading toward the outlet to facilitate the passage of the adhesive through the device.

4. A device as claimed in claim 3 wherein the groove is smaller near the outlet than near the inlet for the purpose of reducing the space for the adhesive as it approaches the outlet, so as progressively to mill the adhesive more thoroughly as it passes through the device.

5. A device as claimed in claim 1, wherein the rotor is cut away to provide a space adjacent the inlet to facilitate entry of the adhesive into the chamber.

6. A device as claimed in claim 5, wherein the milling surface of the rotor is provided with at least one groove which opens into the said space adjacent the inlet.

7. A device as claimed in claim 1, comprising a movable nozzle, a movable part having a duct to communicate with the nozzle, and means connecting said movable part to the said nozzle for movement therewith, said movable part being adapted to be moved on movement of the nozzle so as to put the duct into or out of communication with the outlet to control the supply of adhesive through the nozzle.

8. A device as claimed in claim 7, wherein the said movable part comprises a conduit having a port and is movable so as to move said port into and out of communication with the outlet.

9. A device as claimed in claim 8, wherein the said conduit is rotatable about its axis to move the port, and wherein the nozzle is swingable about the axis of said rotatable conduit so as to rotate the latter, whereby swinging movement of the nozzle is effective to turn on or cut off the supply of adhesive through the nozzle.

10. A device as claimed in claim 9, wherein the said rotatable conduit and its seating are of tapering form, and wherein the conduit is resiliently urged towards its smaller end to maintain a close fit.

11. A device as claimed in claim 10, wherein a stop is provided to limit the angular movement of said nozzle.

12. In an adhesive-applying device, a chamber for adhesive, a hollow member adjacent said chamber, an outlet for adhesive communicating with said chamber and the interior of said hollow member, a nozzle-device comprising a conduit having an elongated portion contained in said hollow member and rotatable relatively thereto about its longitudinal axis, a nozzle communicating with said conduit and swingable about the said axis so as to rotate the said elongated portion of the conduit, a port in said elongated portion, said port being movable into and out of communication with the outlet by rotation of the conduit, whereby swinging of the nozzle is effective to turn on or cut off the supply of adhesive through the nozzle.

13. A device as claimed in claim 12, wherein the said rotatable conduit and its seating are of tapering form, and wherein the conduit is re-

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silently urged towards its smaller end to maintain a close fit.

14. A device as claimed in claim 13 wherein a stop is provided to limit the angular movement of said nozzle.

FÉLIX FRÉDÉRIC RUAU.

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