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METHOD AND APPARATUS FOR APPLICATION OF PRESSURE SENSITIVE ADHESIVE MATERIAL

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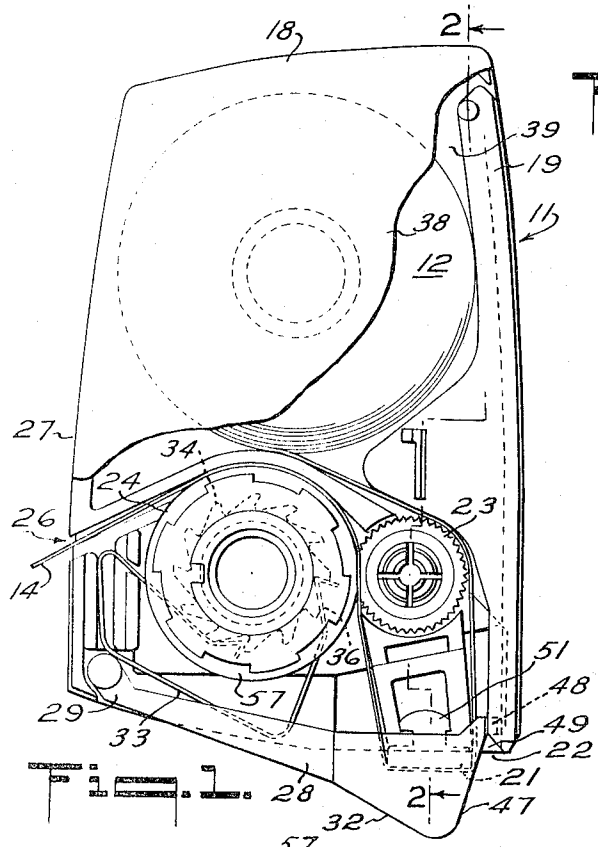


Fig. 1.

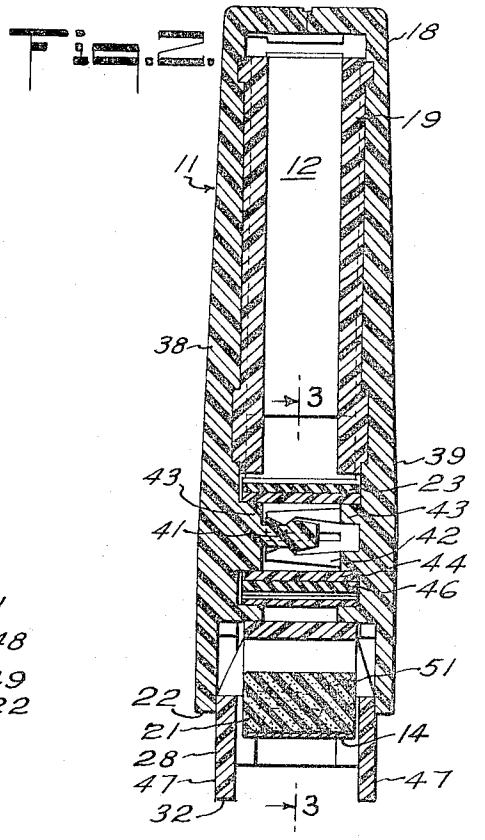


Fig. 2.

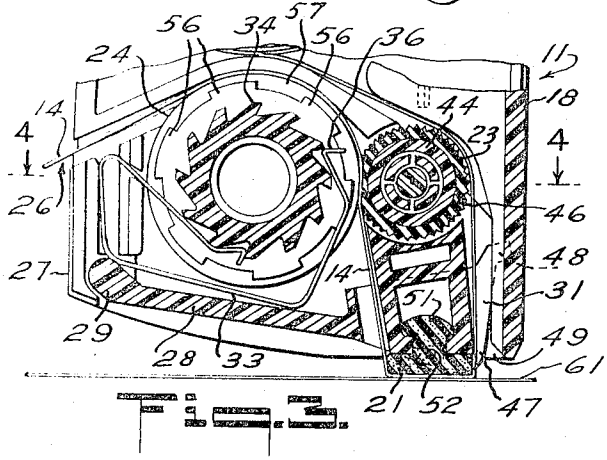


Fig. 3.

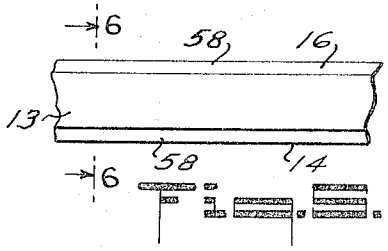


Fig. 4.

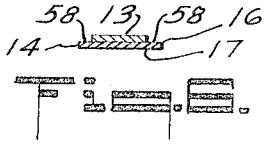


Fig. 5.

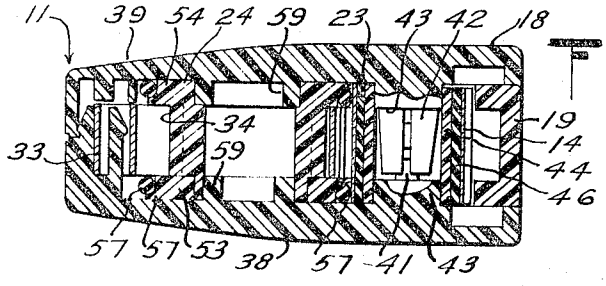


Fig. 6.

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METHOD AND APPARATUS FOR APPLICATION OF PRESSURE SENSITIVE ADHESIVE MATERIAL

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2 Claims. (Cl. 156—577)

This invention relates generally to means for dispensing adhesive, and more particularly to a method and apparatus for applying a quantity of pressure sensitive adhesive material to a sheet or surface for enabling the latter to be secured to another sheet or surface.

Various devices are now known for applying dabs of adhesive material to sheets of paper or the like in order to enable the latter to be secured to various surfaces. Such adhesive applicators now available, have been found dis-advantageous in many respects, as for example, the difficulty encountered in attempting to control the quantity and position of the dispensed adhesive. Also, with liquid adhesives, there is a tendency for the adhesive to crust, and thereby obstruct the dispensing opening of the applicator device, and there is also a general tendency for liquid adhesives to be messy insofar as they smear on the paper and tend to get on one's hands and fingers.

Accordingly, an object of the present invention is to enable the ready application of dabs of a controlled quantity of a pressure sensitive adhesive material to a selected portion or portions of various surfaces, thus providing similar functions and advantage as prior liquid adhesive applicator devices, but without the various undesirable characteristics of the latter.

Another object of the present invention is to provide a novel and improved method and apparatus for removing portions of pressure sensitive adhesive material from a carrier strip to apply such portions to various surfaces, with adjacent portions of the adhesive material being retained on the carrier for subsequent application to other surfaces.

The invention possesses other objects and features of advantage, some of which, with the foregoing, will be set forth in the following description of the preferred form of the invention which is illustrated in the drawing accompanying and forming part of the specification. It is to be understood, however, that variations in the showing made by the said drawing and description may be adopted within the scope of the invention as set forth in the claims.

Referring to said drawing:

FIGURE 1 is a side elevation view of a preferred embodiment of the apparatus of the present invention, with portions being broken away to disclose the interior of the apparatus, and with the apparatus being shown in its unactuated position.

FIGURE 2 is a cross sectional end elevation view taken along the plane of line 2—2 of FIGURE 1.

FIGURE 3 is a fragmentary cross sectional side elevation view similar to FIGURE 1, taken along the plane of line 3—3 of FIGURE 2, but with the apparatus in its actuated position.

FIGURE 4 is a cross sectional top plan view taken along the plane of line 4—4 of FIGURE 3.

FIGURE 5 is a plan view of a portion of an elongated strip of pressure sensitive adhesive material carried on a strip of release paper for use in accordance with the present invention.

FIGURE 6 is a cross sectional view of the adhesive strip taken along the plane of line 6—6 of FIGURE 5.

Considering the invention now in broad terms, there is shown in the drawing a pressure sensitive adhesive applicator 11 adapted to carry a supply of pressure sensitive adhesive material in the form of a roll or web 12. In its preferred form, as shown in FIGURES 5 and 6, the adhesive material comprises a thin elongated strip or layer 13 mounted on a carrier strip 14. The side 16 of the carrier 14 is silicone treated in a conventional manner to enable release therefrom of portions of the adhesive strip 13 in a manner to be described.

The method of the present invention consists basically in disposing a portion or longitudinal segment of the adhesive strip 13 over a surface to which the portion of adhesive is to be transferred and applied. Force is then applied towards the surface on the portion of the side 17 of the carrier 14 corresponding to the aforesaid portion of adhesive material, whereby the adhesive is pressed against and secured to the surface. Upon pulling the carrier strip away from the surface, the segment or portion of adhesive material remains on the surface and is released from the carrier strip and the remainder of the adhesive strip 13, the latter remaining on the carrier strip. In this manner, dabs or portions of the adhesive material 13 can selectively be applied to desired locations on various surfaces.

As regards the construction of the device 11 for applying the adhesive in the manner described, the device includes a housing 18 having a cover 19 pivotally mounted thereon which may be opened to enable loading of the aforesaid roll 12. A hammer member 21 is secured adjacent the lower end 22 of the housing 18, and the adhesive strip is guided over an idler roller 23 and around the hammer 21. The carrier strip is then guided upwardly between the idler roller 23 and around the hammer 21. The carrier strip is then guided upwardly between the idler roller 23 and a drive roller 24, and passes out of the housing 18 through a slit 26 in the back wall 27 thereof. When the hammer 21 is pressed against a surface, the portion of the adhesive strip 13 disposed subjacent the hammer is transferred to the surface in the manner previously described, thus being released from the portion of the carrier strip 14 disposed subjacent the hammer 21.

The device 11 is provided with means for advancing the carrier strip longitudinally relative to the hammer 21, so that as each longitudinal segment or portion the adhesive is released from the carrier strip the latter is advanced to place another portion of adhesive material subjacent the hammer. In this regard, a drive arm 28 is pivotally mounted at one end 29 thereof to the bottom 22 of the housing, with the free end of the drive arm having a contact portion 32 normally spaced below the hammer 21 as shown in FIGURES 1 and 2. A spring member 33 is mounted on the housing for normally urging the drive arm to the position as shown in FIGURES 1 and 2, in addition to which the member 33 serves to rotate the drive roller 24 in response to actuation of the drive arm 28. More particularly, the drive roller 24 includes a plurality of ratchet teeth 34 operably engageable by a pawl portion 36 of the member 33. Upon movement of the drive arm inwardly towards the housing, the drive arm forces the pawl 36 to rotate the drive roller counterclockwise as viewed in FIGURE 1. A second pawl portion 37, also preferably formed as a part of the member 33, is adapted to engage the ratchet teeth 34 to prevent reverse clockwise rotation of the drive roller as the pawl 36 is returned to its normal position under the resilient forces of the spring 33.

The housing 18 is preferably formed of a pair of side plastic castings 38 and 39 secured together for example by the snap interlock members 41 and 42. More specifically, a male member 41 is formed substantially integrally with the casting 38, and fits resiliently into the female member 42 which is formed on the casting 39, thus interlocking to secure the two casting members together.

Similar interlocking connections are made between the two casting members at at least two of three other positions thereon. The idler roller **23** is mounted for rotation on a pair of stub shafts **43** extending inwardly from each of the aforesaid side castings, with the idler roller preferably comprising an inner cylindrical member **44** freely rotatable on the stub shafts **43** and an outer serrated member **46** mounted on the member **44** for engaging the side **17** of the carrier strip **14**. The outer membr **46** rotates with the inner member **44**, and preferably is formed of rubber or similar material of high friction properties.

Regarding the drive arm **28**, the contact portion **32** is seen preferably to include a pair of bifurcated elements **47** aligned relative to the hammer **21** so that the latter passes between the elements **47** as the drive arm is moved inwardly relative to the housing, as indicated in FIGURE 3. A stop portion **48** is provided adjacent the far end of each element **47** to limit the outward movement of the drive arm **21** under the force of the spring member **33** and accordingly engages the portion **49** of the housing as indicated in FIGURE 1 to position the drive arm as shown therein.

The hammer **21** preferably is formed of a resilient flexible piece of material, such as rubber or the like, and has an upper enlarged portion **51** adapted to seat the hammer in a slot **52** in the bottom **22** of the housing.

It is to be noted that the drive roller **24** includes a pair of axially spaced driving portions **53** and **54** which are aligned to engage the respective side edge portions of the carrier strip **14**. Each of the driving portions preferably includes a plurality of axially spaced circumferentially alternating teeth **56** in which is seated a rubber O ring **57**. As indicated in FIGURES 5 and 6, the adhesive strip **13** is narrower than the carrier strip **14**, and a pair of longitudinal exposed portions **58** are thus defined on the side **16** of the carrier **14**, the portions **58** being aligned for engagement by the O rings **57**. The drive roller is journalled for rotation on a pair of stub shafts **59** extending inwardly respectively from each of the side castings **38, 39**.

In order that the carrier strip and adhesive strip mounted thereon may be wound up in the form of the roll **12**, it is important that the back side **17** of the carrier strip **14** has a greater release characteristic than the side **16** of the carrier strip. By thus differentially coating the carrier strip in its release characteristics, the adhesive strip **13** when rolled up with the carrier strip **14** will stick only to the side **16** thereof, since the adhesive releases more readily from the other side **17**. Various conventional silicon compounds can be used to coat the carrier strip **14** to achieve the desired release characteristics. An example of a suitable pressure sensitive adhesive material includes 40 to 50 parts by weight low molecular weight polyvinyl ethyl ether resin; 25 to 35 parts high molecular weight polyvinyl ethyl ether resin; 5 to 10 parts polymeric epoxy plasticizer; and 10 to 20 parts thermoplastic polyterpene tackifying resin.

In operating the device **11** in accord with the present invention, the strip from the roll **12** is fed over the idler roller member **46** and around the hammer **21**. The back side **17** of the carrier strip engages the idler roller and hammer. The carrier strip then is fed through the drive roller for advancement thereby. To apply a portion of adhesive material to a surface **61** as shown in FIGURE 3, the bottom **22** is spaced above the surface with the elements **47** of the contact portion **32** engaging the surface. The device **11** then is pressed downwardly towards the surface **61** until the portion of adhesive material **13** disposed subjacent the hammer **21** engages the surface **61**. The device **11** then is released upwardly from the surface **61**, causing the aforesaid portion or dab of adhesive material to remain secured to the surface and detached from the carrier strip and remaining adhesive strip. After the device **11** has been actuated and returned to the position shown in FIGURE 1, it will be appreciated that there remains no adhesive material subjacent the hammer **21**. However, each time that the device **11** is operated, the movement of the drive arm **28** advances the carrier strip relative to the hammer so that just as the hammer approaches close proximity with the intended surface a portion of adhesive material **13** is moved underneath the hammer.

Successful application of pressure sensitive adhesive material in the foregoing manner of course requires that the surface to which the adhesive is applied has a poorer release characteristic than the side **16** of carrier strip **14**, in order to assure transfer of the adhesive from the carrier to the intended surface. Another important consideration regarding the adhesive layer **13** is that it be sufficiently thin to enable it to break off from the portion of adhesive material remaining on the carrier strip. That is, in addition to releasing from the carrier strip, the dab or portion of adhesive material must also sever or release from the remaining adhesive material. In this regard, it has been found that an adhesive layer be used having a thickness no greater than .0015 inch to assure proper breakoff, and preferably the layer is made of a thickness in the range of 0.0005 inch to 0.001 inch.

On some occasions it is possible that an attempt will be made to apply the adhesive material to a surface having a greater release characteristic than the side **16** of the carrier strip. In such event, of course, the adhesive material will not be released from the carrier strip, but will advance therewith towards the drive roller.

To prevent such adhesive material from coming into contact with the moving parts of the instant applicator, the spaced O ring portions of the drive roller engage only the outer carrier strip portions **58**. Consequently, unreleased adhesive material passes between the O rings without engaging any portion of the drive mechanism, and thus does not gum up or dirty the mechanism. The unreleased adhesive material passes out of the housing through the slit **26** along with the carrier strip with the latter periodically being torn off and discarded by the user of the device.

From the foregoing, it is apparent that the present invention provides a highly useful apparatus and method for applying dabs or portions of pressure sensitive adhesive material in a quick and simple manner.

What is claimed is:

1. Apparatus of the type described comprising, in combination, a housing including means for rotatably retaining a roll of flexible carrier material, a hammer member secured adjacent an outer surface of said housing, a drive arm pivotally mounted on said housing at one end thereof and having a contact portion at its other end disposed adjacent said hammer, said drive arm being normally positioned with said contact portion spaced outwardly away from said face of said housing and said hammer, means resiliently urging said drive arm towards said normal position thereof, a drive roller rotatably mounted on said housing, means interconnecting said drive arm to said drive roller for incremental rotation of the latter upon movement of said drive arm contact portion towards said housing, and an idler roller rotatably mounted on said housing in peripherally adjacent position to said drive roller, said housing including guide means for guiding said carrier material from said retaining means around said hammer and into operational engagement with said drive and idler rollers for incremental advancement past the hammer by said rollers, said contact portion being movable inwardly relative to said housing to a position unobstructing said hammer from forcing said strip against a surface.

2. The combination of claim **1** further defined by said drive roller comprising a pair of axially spaced roller portions; and a roll of carrier material and adhesive com-

prising an elongated carrier strip having edge portions on one side thereof engageable with said spaced drive roller portions, and an elongated strip of pressure sensitive material secured to said side of said carrier strip intermediate said edge portions thereof and aligned to pass between said spaced drive roller portions out of contact therewith.

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