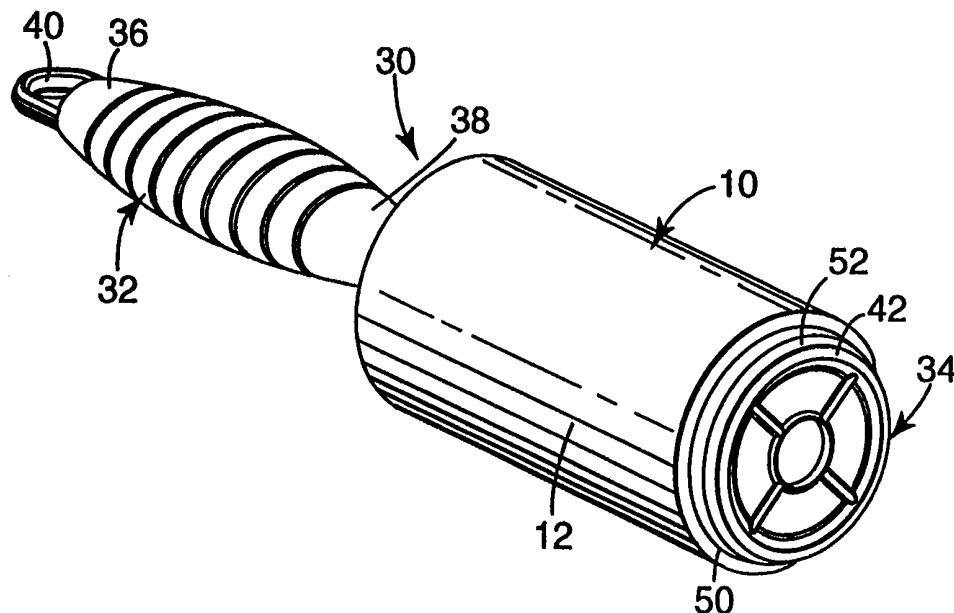




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification<sup>6</sup> : <b>A47L 25/00</b></p>	<p><b>A1</b></p>	<p>(11) International Publication Number: <b>WO 99/40836</b></p> <p>(43) International Publication Date: 19 August 1999 (19.08.99)</p>
<p>(21) International Application Number: PCT/US99/00886</p> <p>(22) International Filing Date: 14 January 1999 (14.01.99)</p> <p>(30) Priority Data: 09/024,064 17 February 1998 (17.02.98) US</p> <p>(71) Applicant: MINNESOTA MINING AND MANUFACTURING COMPANY [US/US]; 3M Center, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(72) Inventors: WOOD, Thomas, L.; P.O. Box 33427, Saint Paul, MN 55133-3427 (US). ZACHRISON, Raymond, D.; P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p> <p>(74) Agents: LEVINE, Charles, D. et al.; Minnesota Mining and Manufacturing Company, Office of Intellectual Property Counsel, P.O. Box 33427, Saint Paul, MN 55133-3427 (US).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report.</i></p>

(54) Title: APPLICATOR FOR A CORELESS TAPE ROLL



## (57) Abstract

An applicator for a lint removal device includes a handle portion connected to a tape-receiving portion. The tape-receiving portion includes a tape-receiving surface, an inner lip, an outer lip, and grooves adjacent the lips. The outer lip is tapered. After a roll of tape traverses over the outer lip it is locked in place on the tape-receiving surface and cannot be removed by sliding it back over the outer lip.

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

APPLICATOR FOR A CORELESS TAPE ROLL

5

TECHNICAL FIELD

The present invention relates to an applicator for tape rolls. More particularly, the present invention relates to an applicator for tape rolls used for lint removal.

10

BACKGROUND OF THE INVENTION

Most rolls of tape are used by first removing a length of tape from the roll before using the tape for its intended purpose. One use for tape while still on a roll is lint removal. Lint removal tape is used to remove lint and other small particles from fabric, such as clothing. Lint removal tape can be used in individual sheets, whether individually packaged or removed from a roll or a pad. Lint removal tape can also be used while in roll form with the tape still on the roll. The tape is removed from the roll only after use, to discard it.

In roll form, lint removal tape is typically wound on a core with the adhesive side of the tape wound outwardly for use. A roll of lint removal tape is placed on an applicator, which typically is formed of a handle portion and a tape-receiving portion. The roll is placed on the tape-receiving portion. Various forms of lint removal tape rolls are known, such as those described in U.S. 5,027,465 and U.S. 5,388,300.

Coreless rolls of tape and methods for their manufacture are known. For example, U.S. Patent Nos. 3,770,542 and 3,899,075 disclose coreless tape rolls. The

tape rolls formed, however, are lined and the liner performs the functions of a core.

U.S. Patent No. 4,297,403 discloses another lined coreless roll of tape. In order to use this roll, the innermost portions of tape are not useable and must be discarded.

U.S. Patent No. 3,823,887 discloses a method of winding thin tissue paper into a roll without a core. However, there is no suggestion of how such a coreless roll of thin paper could be used. Also, this roll is free of adhesive or similar substances.

Also, generally, these known coreless rolls are used by removing a portion of tape from the roll before using the tape for its intended purpose. There are no known coreless rolls of tape in which the tape is used while it is still on the roll, and the tape is removed from the roll only after use, to discard it. There is a need for a linerless, coreless roll of tape in which all of the tape is usable, the tape is used while it is still on the roll, and the tape is removed from the roll only after use, to discard it.

#### SUMMARY OF THE INVENTION

An applicator for use with a lint removal tape includes a handle portion and a tape-receiving portion, each having a free end and a connecting end. The handle portion connecting end is connected to the tape-receiving portion connecting end. The tape-receiving portion includes a cylindrical tape-receiving surface, an inner lip adjacent the handle portion, and an outer lip adjacent the free end. The outer lip extends radially beyond the tape-receiving surface, and is tapered in a direction to facilitate

applying a roll on the applicator. A groove is formed adjacent the outer lip on the side facing the handle portion, and combines with the outer lip to lock a roll of tape on the tape-receiving surface. After a roll of tape  
5 traverses over the outer lip it is locked on the tape-receiving surface and cannot be removed by sliding it back over the outer lip without permanent damage to the tape-receiving portion of the applicator.

The outer lip can be substantially inflexible such that  
10 in order for the tape-receiving surface to receive a roll of tape that is slid over the lip on the free end, the roll of tape would need to be flexible.

The outer lip can be perpendicular to the tape-receiving portion on the side facing the handle portion.  
15 The applicator can be blow molded and formed of a one piece construction and the handle portion can be contoured to ergonomically fit a hand. Also, the handle portion can have an opening at the free end to permit hanging the handle on a hook.

20

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a roll of tape of the present invention.

Figure 2 is a top view of a portion of tape.

25 Figure 3 is a side view of the tape of Figure 2.

Figure 4 is a perspective view of the applicator of the present invention.

Figure 5 is a side view of the applicator of Figure 4.

30 Figure 6 is a perspective view of the roll of tape mounted on the applicator.

Figure 7 is an enlarged side view of a portion of the free end of the tape-receiving portion of the applicator of Figure 4.

5 DETAILED DESCRIPTION

Figures 1-3 shows a linerless, coreless roll 10 of lint removal tape 12. The tape itself is formed of at least two layers, a backing layer 14 and an adhesive layer 16 and can be made from any known materials. The backing layer 14 has a first side 18 and a second side 20 and can be made of, for example, paper or plastic such as polypropylene. The polypropylene can be biaxially oriented polypropylene (BOPP) or simultaneously biaxially oriented polypropylene (SBOPP). The backing material can be compostible or degradable, can be colored, can be printed, and can be of different surface textures or embossed.

As best shown in Figure 3, the adhesive layer 16 is formed on the first side 18 of the backing layer 14. It can be formed on the entire first side or the backing layer can be uncoated by adhesive along one or both side edges. Alternatively, the side edges can be adhesive coated and then detackified by using waxes, lacquers, or inks for example.

The adhesive can include hotmelt-coated formulations, transfer-coated formulations, solvent-coated formulations, and latex formulations. Adhesives useful in the preparation of lint removal tape 12 according to the present invention include all pressure sensitive adhesives. Pressure sensitive adhesives are normally tacky at room temperature and can be adhered to a surface by application of, at most, light finger pressure. Examples of adhesives useful in the

invention include those based on general compositions of polyacrylate; polyvinyl ether; diene-containing rubber such as natural rubber, polyisoprene, and polyisobutylene; polychloroprene; butyl rubber; butadiene-acrylonitrile polymer; thermoplastic elastomer; block copolymers such as 5 styrene-isoprene and styrene-isoprene-styrene block copolymers, ethylene-propylene-diene polymers, and styrene-butadiene polymer; poly-alpha-olefin; amorphous polyolefin; silicone; ethylene-containing copolymer such as ethylene 10 vinyl acetate, ethylacrylate, and ethyl methacrylate; polyurethane; polyamide; epoxy; polyvinylpyrrolidone and vinylpyrrolidone copolymers; polyesters; and mixtures of the above. Additionally, the adhesives can contain additives such as tackifiers, plasticizers, fillers, antioxidants, 15 stabilizers, pigments, diffusing particles, curatives, and solvents.

A general description of useful pressure sensitive adhesives may be found in Encyclopedia of Polymer Science and Engineering, Vol. 13, Wiley-Interscience Publishers (New 20 York, 1988). Additional description of useful pressure sensitive adhesives may be found in Encyclopedia of Polymer Science and Technology, Vol. 1, Interscience Publishers (New York, 1964).

The tape 12 is formed into a roll 10 having a plurality 25 of wraps with the adhesive layer 16 facing outwardly by rolling the tape on only itself. No support material, such as a core, a liner, or any other material that could lend support and provide rigidity and strength to the roll of tape, is necessary. In the illustrated embodiments, none is 30 used.

The roll 10 of lint removal tape can be used by placing the roll 10 on an applicator 30 (see Figures 4-6), which typically is formed of a handle portion 32 and a tape-receiving portion 34. The roll 10 is placed on the tape-receiving portion 34.

When forming a roll 10, the tape 12 is sufficiently firm, stiff, and self-supporting to obviate the need for support material. The entire roll 10, including the last wrap, is completely usable for its intended purpose of lint removal without wasting any tape. The last wrap of tape directly contacts the tape-receiving portion 34 of the applicator 30 such that the last wrap of tape is completely useable. When the last wrap of tape is removed, the applicator 30 can be replenished with another roll 10 of tape. With the roll of tape of this invention, there is no risk that any of the tape could adhere to the applicator 30 and either impair the operation of the applicator or waste tape.

The coreless roll 10 of tape could also include a third layer. A low adhesion backsize layer 24 can be formed on the second side 20 of the backing layer 14 to facilitate removing the outer wrap of tape from the roll 10 after that wrap of tape has been used and is to be discarded. Numerous other layers can be added to the tape such as primers to increase the adhesion of adhesive layer 16 to backing layer 14. Also, printed material can be located on the first side of the backing layer under the adhesive. This printed material can be advertising, instructions, or other information. Also, the tape could contain deodorants, perfumes, antistatic materials, and encapsulated cleaning

chemicals. Also, the backing layer 14 can be modified such as by flame treatment, corona treatment, and roughening.

Another optional feature of the tape can be perforations 26, as shown in Figure 2, to facilitate  
5 removing the outer wrap of tape from the roll 10 after that wrap of tape has been used and is to be discarded. The perforations 26 can be made before the tape 12 is rolled into a roll 10 or after the roll has been formed. Also, the perforations 26 on successive wraps can be located at the  
10 same or different circumferential locations on the roll 10. Alternatively, after the tape 12 is formed into a roll 10, a complete cut (not shown) can be formed through the roll to create discrete sheets and to facilitate removal of the outer wrap of tape. The complete cut could extend across  
15 the roll except for the edges or across the entire roll except for the innermost wraps.

In addition to reducing waste, the coreless feature of this invention provides a performance advantage. By eliminating any core, liner, or other backing support  
20 material, the roll is more compressible (not having any rigid support to compress). The roll is sufficiently compressible to create a plane of contact during use to remove lint. This creates a larger area on the tape to make contact with a substrate from which lint is to be removed.  
25 This compressibility is sufficient even when the tape is used on an applicator.

In making one embodiment of this invention, a master roll of 10 cm (4 in) wide tape has an embossed polypropylene backing, a low adhesion backsize (LAB) coating on one side,  
30 and a hot melt coated adhesive coating across the other side leaving uncoated edges approximately 0.62 cm (.25 in) wide.

The master roll is formed and wound in a conventional manner. The master roll is then rewound, adhesive side out, and is optionally perforated. A vacuum pulls the tape onto a mandrel during this stage and holds it in place while the  
5 appropriate length of tape is wound with the adhesive side out and converted to a coreless roll of the proper length. A turret indexes the finished wound tape. As the turret rotates, the vacuum on the original mandrel is discontinued to allow the coreless roll of tape to be removed. A second  
10 mandrel moves into place, the vacuum connects, and the process is repeated. Additional mandrels can be used, as necessary, to facilitate continuous operation.

The invention is also a lint removal device which includes the coreless roll 10 of tape 12 and the applicator  
15 30. As shown in Figures 4-6, the applicator 30 includes the handle portion 32 and the tape-receiving portion 34. Blow molding, injection molding, and other manufacturing methods can allow for a one piece construction which is simple to make and low in cost. The handle portion 32 can have any  
20 shape and can be contoured to ergonomically fit a hand. The handle portion 32 has a free end 36 and a connecting end 38. The free end 36 can have an opening 40 to permit hanging the applicator 30 on a hook for storage.

The tape-receiving portion 34 also includes a free end  
25 42 and a connecting end 44. The connecting end 38 of the handle portion 32 is connected to the connecting end 44 of the tape-receiving portion 34. The tape-receiving portion 34 also includes a cylindrical tape-receiving surface 46 which extends between the free end 42 and the connecting end  
30 44. The tape-receiving surface 46 extends for the entire width of a tape roll 10 and provides support along

substantially the entire surface of the tape roll.

Preferably, there are no openings, gaps, or notches (such as are found in French Patent No. 1.402.540 or U.S. Patent No.

4,422,201) on which a tape roll could catch or snag to

5 damage the roll. Such damage could render an entire roll unusable, for example, because the roll will not rotate on the tape-receiving portion 34.

An inner lip 48 is adjacent the connecting end 44, and an outer lip 50 adjacent the free end 42 on the tape-

10 receiving portion 34. Both lips 48, 50 extend radially beyond the tape-receiving surface 46.

The outer lip 50 has a tapered portion 52 on the side facing the free end 42 of the tape-receiving portion 34.

The taper is in a direction in which the diameter increases

15 from the free end toward the connecting end. This

facilitates applying a roll on the applicator (and plays no role in removing the tape roll 10). The tapered portion can

be at an angle B of from 5° to 15° with a line parallel to the tape-receiving surface 46 as shown in Figure 7. This

20 taper permits a coreless tape roll 10 to be applied over the outer lip 50 without damaging the inner wraps of tape and

ruining the tape roll. Smaller angles tend to create tape damaging problems. Larger angles will work but very large

angles, for example 25°, will not work. The taper can have

25 a compound angle such as shown in Figure 7 where the first angle encountered by the tape roll upon applying the tape

roll onto the applicator 10 would be a large angle A which serves simply to guide the tape roll onto the applicator 10.

The second angle B, shown as 9.6°, is the angle adjacent the

30 outer lip 50 that should be within 5° to 15°.

The outer lip 50 can be perpendicular to the tape-receiving portion 34 on the side 54 facing the handle portion 32. After a tape roll 10 traverses over the outer lip 50, it is locked in place on the tape-receiving surface 46 and cannot be removed by sliding it back over the outer lip 50, as discussed below.

Because the tape roll 10 is coreless and is stretchable, it can be stretched over the slightly oversized and tapered outer lip 50 which can optionally be compressible and flexible. In one version of the invention, maximum diameter of the outer lip is more than 5% bigger than the diameter of the tape-receiving portion; the inner diameter of the tape roll is bigger than the diameter of the tape-receiving portion (which must not be too big to permit the tape roll 10 to rotate) and smaller than the maximum diameter of the outer lip. Once the roll 10 is in place, the tape recovers to its original size and resides in the recessed area of the tape-receiving surface 46 (between the inner lip 48 and the outer lip 50) which is slightly oversized to allow seating of the roll 10 of tape.

The inner and outer lips have grooves 56, 58 in the tape-receiving surface 46 to hold the tape roll in place so that the tape roll cannot be removed except by dispensing the total roll, that is all of the sheets of a coreless roll (or compressing the outer lip 50). The grooves 56, 58 extend completely around the tape-receiving surface 46 and prevent the tape roll 10 from bending upward over the respective inner and outer lips 48, 50. The grooves cause the tape roll 10 to bend into the groove when forced toward the lips 48, 50 and retains the tape 12 in proper alignment on the tape-receiving surface 46. Typically, up to eight

layers of tape would be retained by the grooves 56, 58. Attempts to remove the tape roll are merely unsuccessful; the tape is not damaged. Without the grooves 56, 58, only about two to three sheets of a coreless roll would be  
5 retained by the inner and outer lips 48, 50. Without the grooves, attempts to remove the tape cause the tape to ball up, damaging the tape roll 10 and preventing it from rotating, rendering it useless. (A typical roll on a fiber core could not be used in this roller design due to its  
10 inflexible core.)

The applicator 30 could be used with a cored tape roll only if the core is compressible. However, the compressible core would remain on the tape-receiving portion 34 after the tape is completely dispensed. The applicator would  
15 consequently not be reusable unless the core was cut off. Combination of the applicator with a coreless tape allows for easy reuse.

Various changes and modifications can be made in the invention without departing from the scope or spirit of the  
20 invention. For example, the tape can be used for purposes other than lint removal. Also, the tape-receiving surface need not be cylindrical. It could be formed of planar or curved sides meeting in edges which assist in holding the tape roll in position.

CLAIMS

1. An applicator 30 for a lint removal device comprising:

5 a handle portion 32 having a free end 36 and a connecting end 38; and

a tape-receiving portion 34 having a free end 42 and a connecting end 44 wherein the handle portion connecting end is connected to the tape-receiving portion connecting end,  
10 wherein the tape-receiving portion further comprises:

a cylindrical tape-receiving surface 46;

an inner lip 48 adjacent the handle portion which extends radially beyond the tape-receiving surface;

an outer lip 50 adjacent the tape-receiving  
15 portion free end and which extends radially beyond the tape-receiving surface, wherein the outer lip is tapered in a direction toward the tape-receiving portion free end to facilitate applying a roll on the applicator; and

20 a groove 58 formed adjacent the outer lip on the side facing the handle portion, wherein after a roll of tape traverses over the outer lip it is locked in place on the tape-receiving surface by the groove and cannot be removed by sliding it back over the outer lip.

25

2. The applicator 35 of claim 1 wherein the outer lip 50 is at least one of: substantially inflexible such that in order for the tape-receiving surface 46 to receive a roll of tape that is slid over the outer lip the inside surface of the roll of tape would need to be compressible;  
5 perpendicular to the tape-receiving portion 34 on the side facing the handle portion; comprising a tapered portion 52 on the side facing the free end 42 of the tape-receiving portion 34 to permit a coreless roll of tape to be applied  
10 over the outer lip 50 without damaging the inner wraps of tape and ruining the tape roll; and flexible to permit a roll of tape to be slide over the outer lip 50 onto the tape-receiving surface 34.

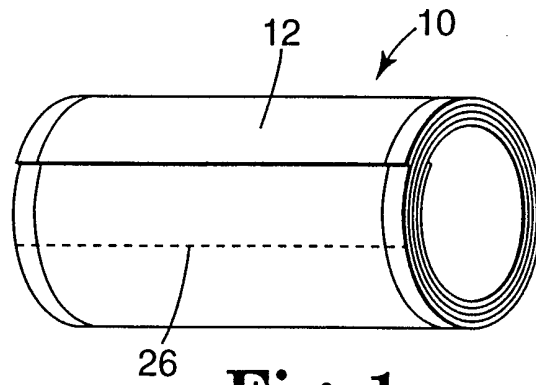
15 3. The applicator 30 of claim 2 wherein the tapered portion 52 is at an angle of from 5° to 15° with a line parallel to the tape-receiving surface 34.

4. The applicator 30 of claim 1 which is blow molded  
20 and formed of a one piece construction.

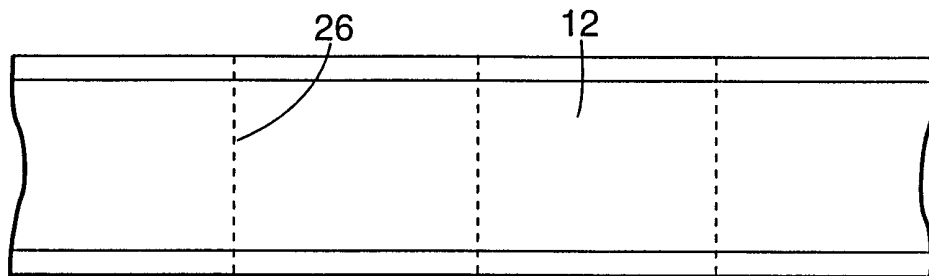
5. The applicator 30 of claim 1 wherein the handle portion 32 is at least one of: contoured to ergonomically fit a hand; and comprising 40 an opening at the free end 36  
25 to permit hanging the handle on a hook for storage.

6. The applicator 30 of claim 1 further comprising a groove 56 formed adjacent the inner lip 48 on the side facing the tape-receiving portion 34 free end 42.

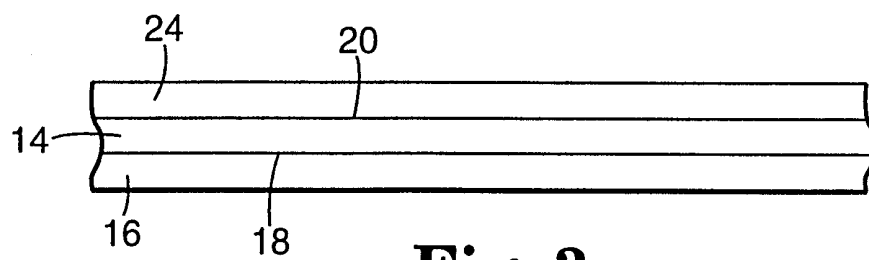
30



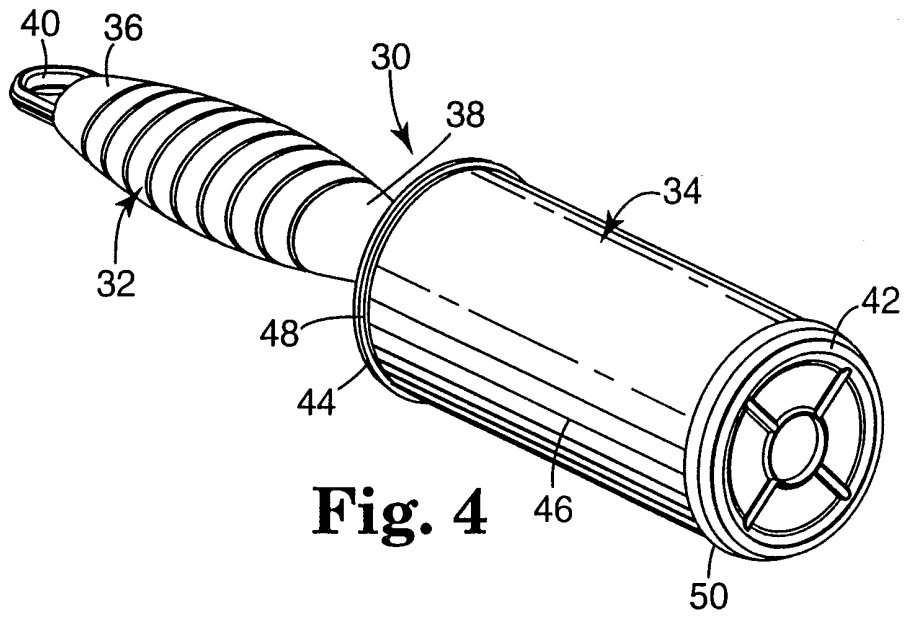
**Fig. 1**



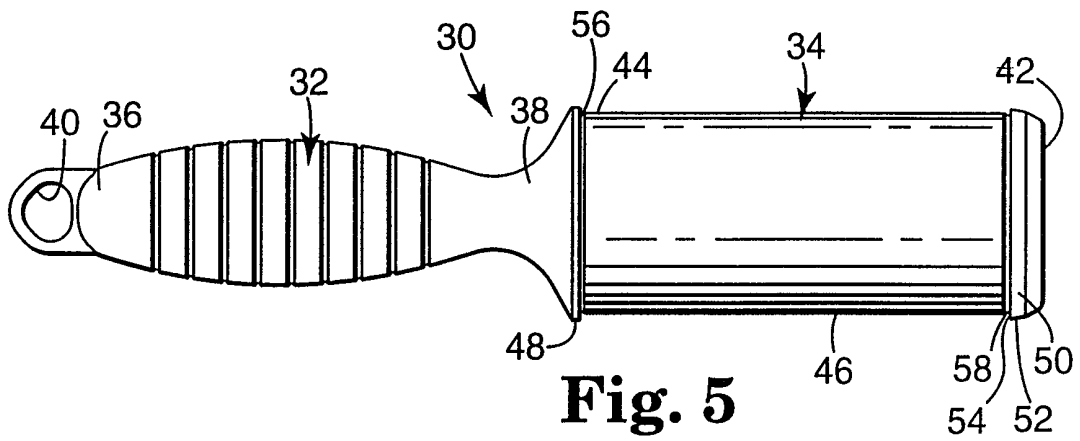
**Fig. 2**



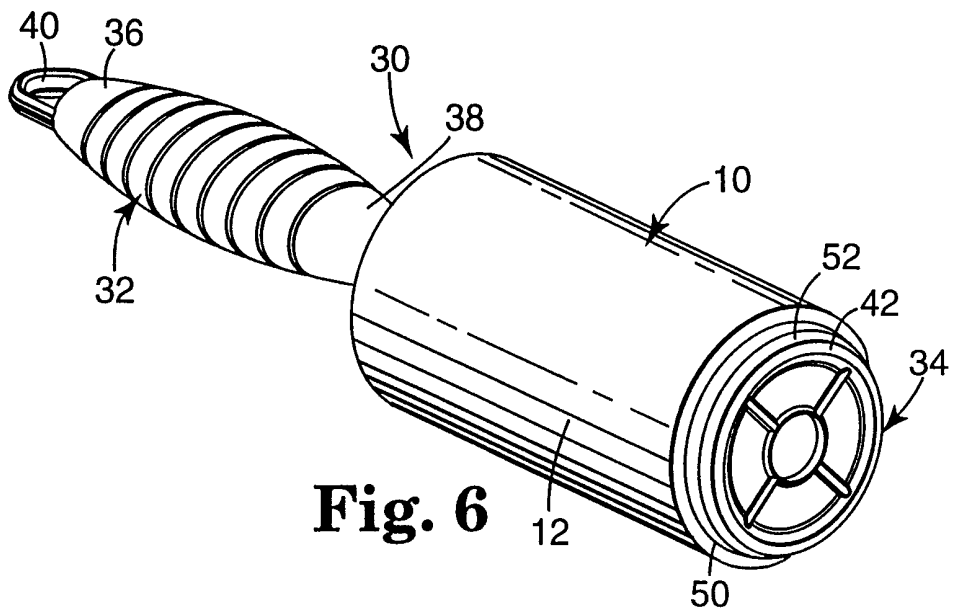
**Fig. 3**



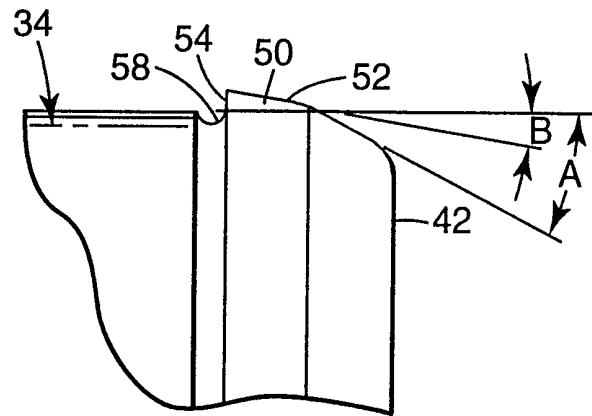
**Fig. 4**



**Fig. 5**



**Fig. 6**



**Fig. 7**

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/00886

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 6 A47L25/00

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4 422 201 A (MCKAY NICHOLAS D) 27 December 1983 see column 3, line 24 - column 4, line 37; figures 1-23 ---	1,3-6
Y	US 4 570 280 A (ROTH ERIC M) 18 February 1986 see column 2, line 18-53 see column 2, line 62 - column 3, line 43 see column 4, line 1-26; figures 1-6 -----	1,3-6

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

6 May 1999

Date of mailing of the international search report

31/05/1999

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Laue, F

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 99/00886

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4422201      A	27-12-1983	CA    1176410 A	23-10-1984
		DE    3212545 A	07-04-1983
		FR    2510911 A	11-02-1983
		GB    2103074 A,B	16-02-1983
		JP    58026751 A	17-02-1983
US 4570280      A	18-02-1986	AU    574894 B	14-07-1988
		AU    5361186 A	20-08-1987
		CA    1251909 A	04-04-1989