ABSTRACT OF THE DISCLOSURE

Apparatus for forming a series of lint removers, by folding to an essentially tubular form two superimposed strips of sheet material, one of which has a coating of pressure sensitive adhesive by which it is adhered to the other sheet, and securing the strips in their tubular form by separating the strips at one edge to expose a portion of the adhesive, and then adhering the opposite edges of the strips to the exposed adhesive in a manner forming a pull tab from the edge which was initially secured to that adhesive.

This invention relates to improved methods and apparatus for manufacturing devices which may be utilized as lint removers, for picking up lint, dust, hairs, or the like from a garment or other item to be cleaned. Certain structural features of the lint removers themselves are covered in my co-pending application S.N. 590,321 filed Oct. 26, 1966, now Patent No. 3,589,416 on “Lint Remover.”

My above identified co-pending application discloses a lint remover which is formed of sheet material carrying an adhesive substance which is adapted to adhere to lint, dust, and the like, to remove it from an article being cleaned. This sheet material is shaped to an essentially tubular or looped configuration, enabling a user to hold the lint remover in very simple fashion by merely slipping his hand into the loop. The present invention is particularly concerned with the manner in which such an element may be shaped to the desired loop form configuration, and then retained in that shape, and at the same time be provided with a sheet of protective paper or the like which covers the adhesive material but is strippable therefrom to expose the adhesive for a cleaning operation.

In accordance with the invention, I preferably commence with at least a portion of the sheet material which is to form the lint remover being in a preassembled laminated form, and specifically including two layers of sheet material which are pre-adhered together in superimposed relation. One of these sheets has a coating of adhesive, while the other sheet or layer is in contact with and adhered to that adhesive coating, but is strippable from the adhesive to expose it for lint removing use. During the process of the invention, this latter protective sheet is locally stripped away from the adhesive, in unique manner, along only a predetermined edge of the sheets, while leaving the sheets adhered together at other locations. This locally exposed portion of the adhesive is then contacted with another edge of the sheet material forming the loop, to retain the assembly in the desired loop configuration. In addition to retaining the material in loop form, such adherence of the opposite end of the sheet material to the exposed edge of the adhesive acts to prevent recontacting with that adhesive of the edge portion of the protective sheet which has been stripped therefrom, thus causing that locally stripped edge portion to form a pull tab, for initiating ultimate complete stripping of the protective sheet from the adhesive at the time of use of the manufactured lint remover. Thus, I simultaneously achieve in an extremely simple but highly effective manner the dual purposes of retaining the sheet material in loop form and also forming a pull tab on the device.

Preferably, the two pre-adhered sheets or layers referred to above act to form the complete loop of the lint remover, with first edges of these materials being located at the locally exposed portion of the adhesive coating, and with opposite edges of the same sheets being ultimately connected to the exposed adhesive to form the circularly continuous loop and the mentioned pull tab.

During formation of the described loops by the methods and apparatus of the invention, the pre-adhered laminated sheet material is preferably advanced progressively along a predetermined path, so that its edges may be progressively deflected transversely of the path of movement in a manner forming the sheet material into the desired essentially tubular form. The apparatus may include means for locally stripping two of the edges of the sheet material apart as the material advances, and then moving another opposite edge into contact with the exposed adhesive to complete the tubular form. Finally, the tubular laminated sheet material may be cut into a series of short lengths, to form a number of the individual lint removers. Alternatively, a series of the lint removers may be left connected together and be wound into a roll form, to be eventually torn separately from the roll for individual use.

The above and other features and objects of the invention will be better understood from the following detailed description of the typical embodiments illustrated in the accompanying drawings, in which:

FIG. 1 is a side view of a machine constructed in accordance with the invention for manufacturing a series of lint remover devices;

FIG. 2 is a perspective view of the shaping portion of the machine;

FIG. 3 is a plan view taken on line 3—3 of FIG. 1;

FIG. 3a is a vertical central section taken on line 3a—3a of FIG. 3;

FIG. 4 is an enlarged section taken on line 4—4 of FIG. 2;

FIGS. 5, 6, 7 and 8 are enlarged vertical transverse sections taken on lines 5—5, 6—6, 7—7 and 8—8 respectively of FIG. 2;

FIG. 9 is a vertical transverse section taken on line 9—9 of FIG. 1;

FIG. 10 is a perspective view of a lint remover formed in accordance with the invention;

FIG. 11 shows the manner in which the protective sheet of the lint remover may be stripped from the adhesive in preparing the device of FIG. 10 for use; and

FIG. 12 is a view similar to a portion of FIG. 1, but showing the manner in which the lint removers may be produced in roll form.

Referring first to FIG. 10, I have shown in that figure at 10 a lint remover of the type manufactured by the present apparatus, and including a first layer of sheet material 11 (see especially FIG. 11), and a second layer of sheet material 12. These two sheets 11 and 12 may typically be formed of paper, with the first sheet 11 being continuously covered on its outer surface 13 with a coating of waterproof permanently tacky pressure sensitive adhesive material 14. Adjacent one end or edge 15 of sheet 11, the adhesive material contacts the undersurface 16 of an opposite end portion 17 of sheet 11, to permanently retain the sheet 11 in the form of a closed endless loop, as seen. Outer sheet 12 is co-extensive with sheet 11, and continuously adhered to that sheet except at the location of a pull tab 18 which is formed by the end portion of sheet 12.

With reference now to FIG. 1, I have shown somewhat diagrammatically at 19 a machine constructed in accordance with the invention and adapted to manufacture lint removers of the type shown in FIGS. 10 and 11. This machine 19 includes a frame 20 which may have legs 21 for supporting the frame stationarily on a floor surface.
The stock for manufacturing the lint removers is supplied to machine 19 in the form of a roll 23 of pre-adhered two layer sheet material 24 wound about a core 25 which may be mounted rotatably on a horizontal shaft 26 mounted stationarily on a portion of frame 27. The sheet material 24 is advanced about appropriate guide rollers to first pass a printing unit 28, following which it passes and is acted on by tube forming apparatus 29, creasing rollers 30, and a cutoff mechanism 31. More specifically, the sheet material 24 after passing through a creasing and/or cutting mechanism 29, is delivered to a set of rollers 32 and 33, which may be spring urged to maintain a desired tension on the sheet material 24. From the tension compensator rollers 32 and 33, the sheet material may pass about an additional roller 34 mounted rotatably to a stationary frame 20, as is roller 35 beyond the printing unit 28.

As seen best in FIG. 4, the sheet material 24 includes two co-extensive sheets 11a and 12a which ultimately become the layers 11 and 12 illustrated in FIGS. 10 and 11. Sheets 11a and 12a are preferably formed of paper, but may if desired be formed of other sheet materials, such as a resinous plastic film of vinyl or the like. Sheets 11a and 12a have first edges 15a and 115a extending along one of their sides, and have second edges 42a and 43a extending along their opposite sides and parallel to edges 15a and 115a, as well as will be apparent, edges 15a, 115a, 42a, and 43a correspond to edges 15, 115, 42, and 43 of FIGS. 10 and 11 in the ultimate product. Sheet 11a of FIG. 4 carries on its undersurface 13a a coating of adhesive material 14a, which completely covers surface 13a of sheet 11a, and adheres permanently thereto. The sheet 12a has at its upper side a release surface 44, appropriately treated with silicone or another release agent to enable sheet 12a to be stripped from adhesive 14a without damage to the adhesive. At the same time, the release surface 44 adheres sufficiently to adhesive 14a to retain the two sheets 11a and 12a in the pre-assembled laminated condition illustrated in FIG. 4 until portions of the sheets are purposely separated from one another.

The printing unit 28 acts to print on outer surface 45 of sheet 12a appropriate subject matter for indicating the manner of use of the final product 10 of FIGS. 10 and 11, or may carry suitable advertising material. In any event, the printing unit 28 is desirably driven in timed relation to the advancement of sheet material 24, as through a timed drive illustrated diagrammatically at 46, to repeat the same printed subject matter on portions which are to ultimately form different ones of the lint removers 10. The printing unit 28 includes a conventional printing roller 47, backed up by an impression cylinder 48, with ink being fed to the type carried on roller 47 by inking rollers 49 from an ink supply pan 50.

As sheet material 24 leaves roller 35 of FIG. 1, the sheet material advances downwardly and rightwardly at an inclination, as indicated at 51, to pass along the underside of a forming shoe 52. This shoe has a first downwardly inclined planar portion 53, which in longitudinal section may have the appearance illustrated best in FIG. 3a, and an element extending at an inclination to the location 54 of FIG. 3a. Beyond location 54, shoe 52 extends horizontally to form a planar horizontal portion 55 of the shoe having parallel opposite side edges 56 and 57 forming continuations of similar side edges 58 and 59 of portion 53 of the shoe. As will be apparent, edge 56, 57, and 58 will desirably extend parallel to the corresponding portions of the path of advancement 60 of sheet material 24 (FIGS. 2 and 3). Shoe 52 may be formed of an appropriate rigid metal, or other material, and is mounted to frame 20 by any suitable means, as represented typically by the showing of a vertical mounting rod 61 (FIGS. 2, 3 and 3a) connected to its lower end to the center of the shoe and adjustably connected at its upper end to a cross piece 61c supported by two spaced columns 261. These columns 261 may in turn be rigidly attached to a horizontally extending plate 63 mounted to the underside of shoe 52, this material is progressively wrapped about the shoe to the essentially tubular condition illustrated in FIG. 8. For this purpose, the table top member 361 carries a series of deflector elements which include an initial pair of deflectors 76 located in essentially the transverse plane in which FIG. 5 is taken. These deflectors 76 are located at opposite sides of shoe 52, and take the form of two circular discs mounted eccentrically to the upper horizontal surface 77 of table top element 361. More particularly, as seen in FIG. 5, each element 76 has a horizontal bottom surface 78 engaging surface 77 of the table top, and has a cylindrical vertically extending side surface 79 disposed about a vertical axis 80 and terminating upwardly in an enlarged diameter annular flange portion 81. Cylindrical surface 79 is laterally opposite one side edge of shoe 52, while flange 81 is located above the level in which shoe 52 is disposed. As illustrated in FIG. 5, with the latter element 76 being received in such close proximity to the shoe to progressively deflect the outwardly projecting edge portions of sheets 11a and 12a inwardly to the position illustrated in FIG. 5. This same deflection occurs at each side of the shoe, so that the two opposite side edges of portions of the laminated sheet material are deflected inwardly as shown. If desired, elements 76 may be mounted to table top member 361 by vertically extending screws 82 which pass through eccentric vertical passages in elements 76 in a manner enabling elements 76 to be adjusted inwardly and outwardly relative to the shoe, and then fastened and retained in a set position by tightening of screws 82.

After the sheet material has been deflected as illustrated in FIG. 5, it next passes the FIG. 6 location, at which a separator blade 83 is received between the two layers 11a and 12a of sheet material, at one of their edge areas, to progressively separate these two edges of the sheet material as seen. This separator blade may taper to a relatively sharp point 84, as shown, and may be mounted by a stationarily located cross member 85 (FIGS. 2 and 3) supported by two vertical columns 86 projecting upwardly from table top member 361.

As the sheets advance from the plane of FIG. 6 toward the plane of FIG. 7, their opposite edge portions pass beneath two deflecting rollers 87, which are mounted to turn about individual horizontal axes 88 disposed at an oblique angle to the direction of advancement of the paper. More particularly, the two rollers 87 and 88 are directed inwardly of the path of advancement of the paper, and act by virtue of this angular disposition to progressively force the edges of the sheet material inwardly to the FIG. 7 condition, and tightly about the opposite side edges of the shoe. This action is enhanced by providing about the two rollers 87 rubber tires 89, which may take the form of rubber O-rings partially received within grooves formed in the outer surface of the rollers. Each roller may be mounted rotatably to the end of a mounting arm 90, which may have notches 91 at its underside, any one of which may be positioned over and in interfering engagement with a mounting rod 92 supported by a support column 262, to provide a downward force against the paper by virtue of the weight of the roller and the arm by which it is carried. Further, this downward force is preferably enhanced by the connection of appropriate weights 94 to the arms. The illustrated mounting of the wheels enables their adjustment to any of numerous different positions, to attain an optimum paper deflecting action.
Just beyond rollers 87, the sheet material is contacted by another deflecting element 95, which as best seen in FIG. 7 may take the form of a rigid rod having a vertically extending downwardly projecting first portion 96 termed the deflecting portion and a second portion 97 which also extend vertically to contact and hold down the separated adhesive carrying edge portion of sheet 11a. The vertical portion 96 of rod 95 extends vertically alongside the corresponding edge portion of sheet 12a (FIG. 7), to hold that edge in a vertically extending position, while portion 97 holds the edge horizontally thereby preventing any of the other lateral edges of the same two sheets may then move downwardly into contact with the exposed adhesive on sheet 11a as seen in FIG. 8. Rod 95 may be mounted in any appropriate manner, as by providing it with an elongated portion which extends upwardly and rearwardly at 195 and connects to the previously mentioned stationary cross piece 85 which carries separator blade 83.

As the paper advances beyond the location of deflector 95, the opposite edges of the sheet material move into the interfitting relation illustrated in FIG. 8, and at the plane of FIG. 8 pushes beneath a second pair of weighted rubber tired rollers 98, constructed the same as rollers 87 of FIG. 2. These rollers act to further urge the opposite edges of the sheet material downwardly and also inwardly about the shoe in taut condition. In the FIG. 8 position, the engagement of the adhesive on the upper surface of one edge of sheet 11a with the underside of the opposite edge of the same sheet acts to permanently retain the sheet material in tubular form, with one edge of sheet 12a left free as shown to form a pull tab.

Beyond the location of FIG. 8, shoe 52 terminates at 152 (FIG. 3), so that the tubular sheet material may then pass between two sets of upper and lower creasing rollers 30 (FIGS. 1 and 9), which may be appropriately mounted to frame 20 by spaced supporting plates 70 or the like for rotation about horizontal axes 130 disposed transversely of the direction of movement of the sheet material. As seen best in FIG. 9, these rollers act to crease the sheet material to a flattened configuration, with sharp folds or creases being formed at the opposite edges 10' of the tube. The upper one of these rollers may be spring urged downwardly by springs represented at 30' in FIG. 9. Also, rollers 30 are driven rotatably to serve as the primary advancing means for pulling sheet material 24 through the apparatus, from supply roll 23 about the variously described previously, past inking unit 28, and past the tube forming unit 29. Rollers 30 may be driven by a chain driven motor 72, with frame 71 typically engaging and driving a sprocket wheel 71' connected to one of the rollers 30 (FIG. 9), and with the other three rollers 30 being appropriately powered from the first roller 30 by drive representated diagramsatically at 71' (FIG. 1). Motor 72 may also function to drive the inking unit 28 in timed relation to rollers 30 through the previously mentioned drive connection 46.

Beyond the creasing and driving rollers 30, there is provided a conventional cutoff unit 31, of any known type, and having a cutoff blade 73 which functions intermittently to form a transverse cut completely across and completely through the tube form sheet material, to thereby cut the material into short lengths each forming an endless loop of the type shown in FIG. 10. The cutoff mechanism is driven in timed relation to the rest of the apparatus by an appropriate timed drive represented diagrammatically at 74. The final products 10 slide downwardly through a chute 74 for reception in stacked relation within an appropriate storage or shipping container represented at 75.

In using one of the lint removers 10, a person may slip the fingers of one of his hands into the loop formed by the unit 10, as to the position represented in broken lines in FIG. 11, and may then grasp the pull tab 18 with the opposite hand to strip sheet 12 completely from sheet 11, leaving the adhesive 14 on sheet 11 exposed entirely about the outer side of the loop. The user may then manipulate the sheet 11 and its carried adhesive to bring the adhesive into contact with a garment, and thus remove lint or other substances from the surface of the garment portion 97 which adhered to the sheet.

FIG. 12 represents diagrammatically a variational type of machine which may be considered the same as that of FIGS. 1 to 9 except for the manner of treatment of the tube-form material beyond creasing rollers 30 corresponding to rollers 30 of FIG. 1. In FIG. 12, there is substituted for the cutoff unit 31 a perforating unit 31b, which may have a perforating blade 73b acting to form perforations through the two sheets of sheet material 24b, so that the successive units 10b (corresponding to unit 10 of FIG. 10) are still connected together but are separable from one another by being at the adhesive 14 and perforation lines 90. This continuous but perforated strip of tube-form material is then wound upon an appropriate core 91, which is mounted about and driven rotatably by a shaft 92 driven in timed relation to the rest of the apparatus (by a drive represented at 93'), to form a roll 93 of the separable lint removers 10b. This roll may then be placed within an appropriate dispenser or the like, so that the successive lint removers may be torn from the roll individually for use in cleaning the garment.

I claim:

1. Apparatus for forming a lint remover from sheet material which is adapted to form a closed loop and which includes two pre-adhered superimposed layers for forming together at least a portion of the loop, a first of said layers having an adhesive coating on one side thereof and the second layer being adhered to said adhesive and adapted to be stripped therefrom to expose the adhesive for use in removing lint; said apparatus including means for locally stripping a predetermined edge portion of said second layer from said adhesive and away from an edge portion of said first layer to expose a corresponding edge portion of the adhesive, while leaving the major portion of said second layer adhered to the adhesive, and means then operable to adhere an opposite edge of said sheet material to said exposed portion of the adhesive in a relation forming a closed loop and preventing recontacting of said edge portion of the second layer with said adhesive, to thereby form a pull tab for stripping the second layer from the first.

2. Apparatus as recited in claim 1, in which said last mentioned means is operable to adhere two opposite edges of said first layer together to form said closed loop having said pull tab.

3. Apparatus for forming a series of lint removers, comprising means for advancing along a path two pre-adhered superimposed sheets of material, a first of said sheets having a coating of adhesive formed thereon which the second sheet is adhered to but is strippable from, means along the path for progressively stripping first edges of said two sheets apart to expose an edge of said adhesive on the first sheet while leaving the remainder of the sheets adhered together, and means along the path for progressively deflecting portions of said sheets to a generally tubular form in which said exposed edge of the adhesive is positioned to contact and adhere to opposite second edges of said sheets, and thereby retain the sheets in tubular form and prevent recontacting of said first edge of said second sheet with the adhesive from which it has been stripped to form a pull tab.

4. Apparatus as recited in claim 3, including means operable to cut off successive portions of said sheets to form said series of lint removers therefrom.

5. Apparatus as recited in claim 3, in which said deflecting means include a forming shoe extending along said path and contacting a transversely central portion of said sheets, and deflector elements positioned to engage opposite sides of the sheets and fold them about the shoe to essentially tubular form.

6. Apparatus as recited in claim 3, in which said stripping means includes an element positioned along said path...
at a location to be received between and progressively separate said first edges.

7. Apparatus as recited in claim 3, in which said stripping means include a thin element positioned along said path at a location to be received between and separate said first edges of the sheets.

8. Apparatus as recited in claim 3, in which said means for advancing said sheets include roller means engaging the sheets beyond said stripping means and said deflecting means and operable to press the tubular sheets to flattened form.

9. Apparatus as recited in claim 3, in which said deflecting means include a shoe extending along said path and contacting a transversely central portion of said sheets, elements at opposite sides of the shoe having flanges projecting inwardly toward the shoe and above the level thereof and acting to deflect opposite edges of said sheet material about the shoe.

10. Apparatus as recited in claim 3, in which said deflecting means include a shoe extending along said path and contacting a transversely central portion of said sheets, elements at opposite sides of the shoe having flanges projecting inwardly toward the shoe and above the level thereof and acting to deflect opposite edges of said sheet material about the shoe.

11. Apparatus as recited in claim 3, including a hold down element beyond said stripping means having a portion above the shoe positioned to hold downwardly the sheet edges which carry said exposed adhesive, and having a second portion extending upwardly and engaging laterally against the edge which was stripped from said adhesive.

12. Apparatus as recited in claim 3, including means for perforating said tubular form sheets at spaced locations for separation into a series of short tubular units, and means for winding said perforated tubular sheets in roll form.

13. Apparatus as recited in claim 3, in which said deflecting means include a shoe extending along said path and contacting a transversely central portion of said sheets, elements at opposite sides of the shoe having flanges projecting inwardly toward the shoe and above the level thereof and acting to deflect opposite edges of said sheet material about the shoe, and angularly disposed rollers engaging said sheets and yielding to bearing against and urging said sheets about the shoe, said stripping means including a thin element received between and progressively separating said first edges, there being a hold down element for holding said first edges separated as said second edges move into contact with said adhesive.

14. Apparatus for forming a series of lint removers, comprising means for advancing longitudinally along a path two elongated preadhered superimposed sheets of material, a first of said sheets having a coating of pressure sensitive adhesive formed thereon which the second sheet is adhered to but is strippable from, a forming shoe extending along the path above a transversely central portion of said sheets, elements at opposite sides of the shoe having flanges projecting inwardly toward the shoe and above the level thereof and acting to deflect opposite edges of said superimposed sheets inwardly at the top of the shoe, angularly disposed rollers engaging said opposite edges of said sheets above the shoe and yieldingly bearing downwardly thereagainst and coacting with said elements to deflect said sheets to essentially tubular form about the shoe, a thin blade-like structure positioned along said path at a location to project between said first edges of said sheets and progressively strip them apart to expose an edge of said adhesive on the first sheet while leaving the remainder of said sheets adhered together, and a hold down element engaging said exposed edge of said adhesive and holding it downwardly while holding said stripped first edge of the second sheet in upwardly projecting stripped condition, said rollers being constructed and positioned to deflect said second edges of the sheets downwardly against said exposed adhesive for adherence thereto to retain the sheets in tubular form, and to prevent recontacting of said first edge of said second sheet with the adhesive from which it has been stripped and thereby form said first edge of the second sheet into a pull tab accessible for separating the two sheets, said means for advancing said sheets including roller means engaging the sheets beyond said stripping means and said deflecting means and operable to press the tubular sheets to flattened form.

15. Apparatus as recited in claim 14, including means operable to cut off successive portions of said sheets to form said series of lint removers therefrom.