

Aug. 13, 1974

R. P. HONEA

3,829,347

INSTRUMENT FOR APPLYING TAPE TO A PLANAR SURFACE

Filed Feb. 14, 1973

2 Sheets-Sheet 1

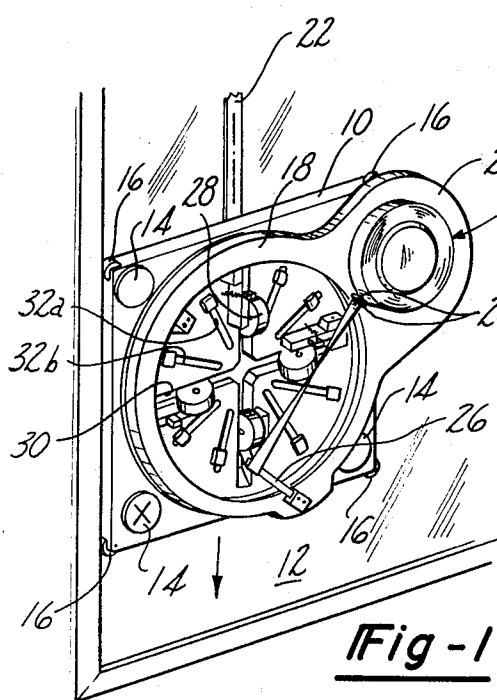


Fig-1

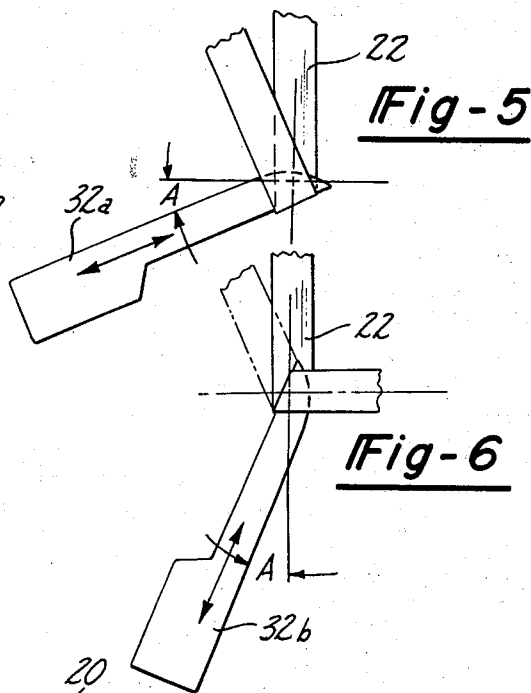


Fig-5

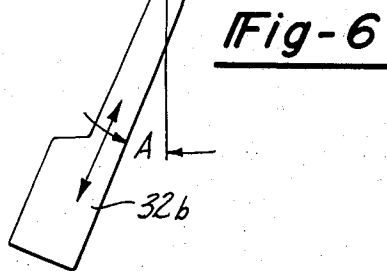


Fig-6

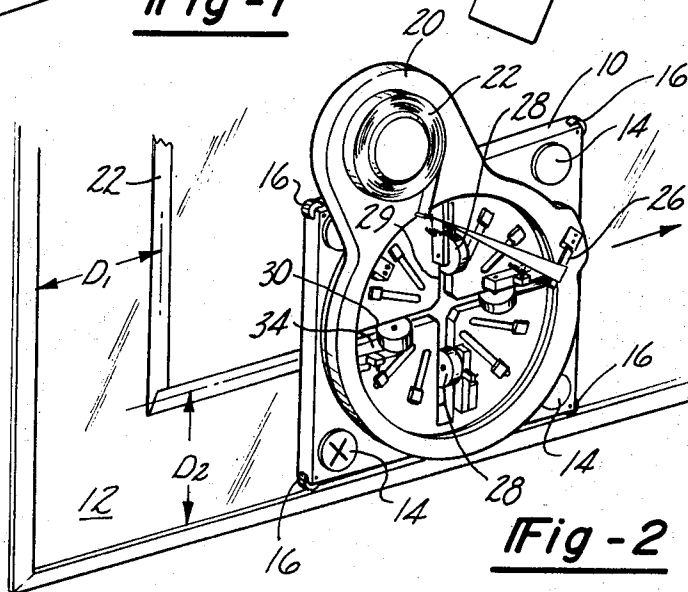


Fig-2

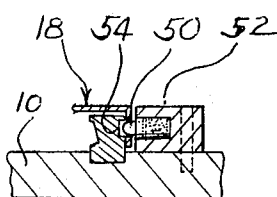


Fig-9

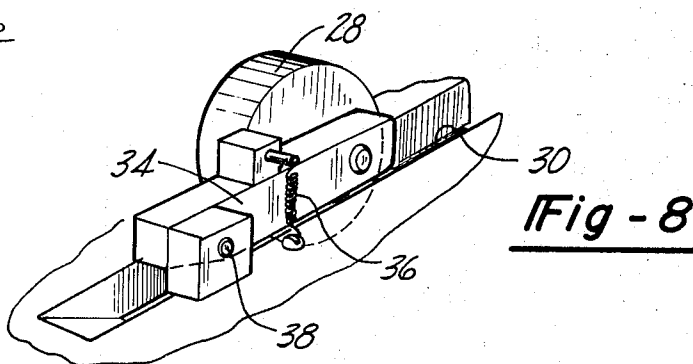


Fig-8

Aug. 13, 1974

R. P. HONEA

3,829,347

INSTRUMENT FOR APPLYING TAPE TO A PLANAR SURFACE

Filed Feb. 14, 1973

2 Sheets-Sheet 2

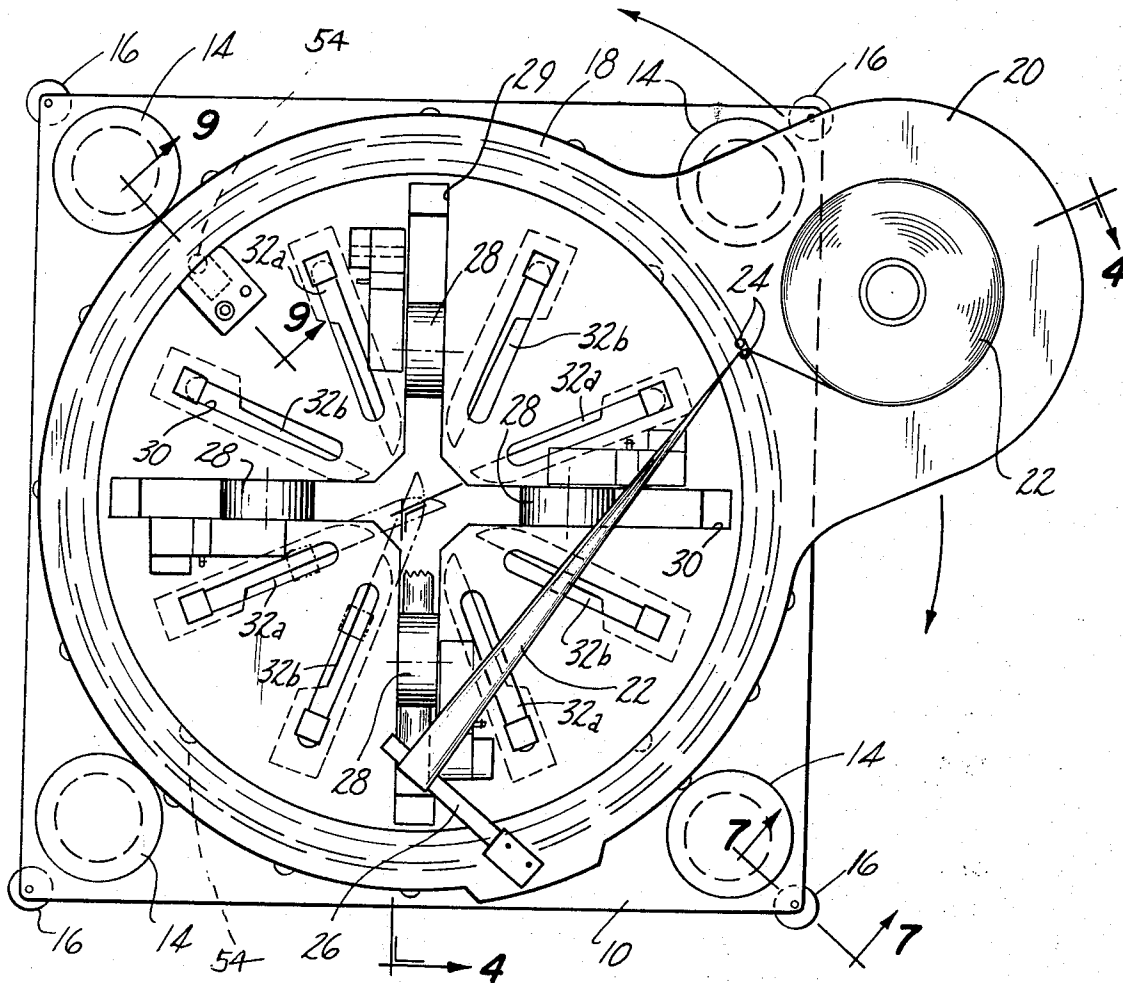


Fig-3

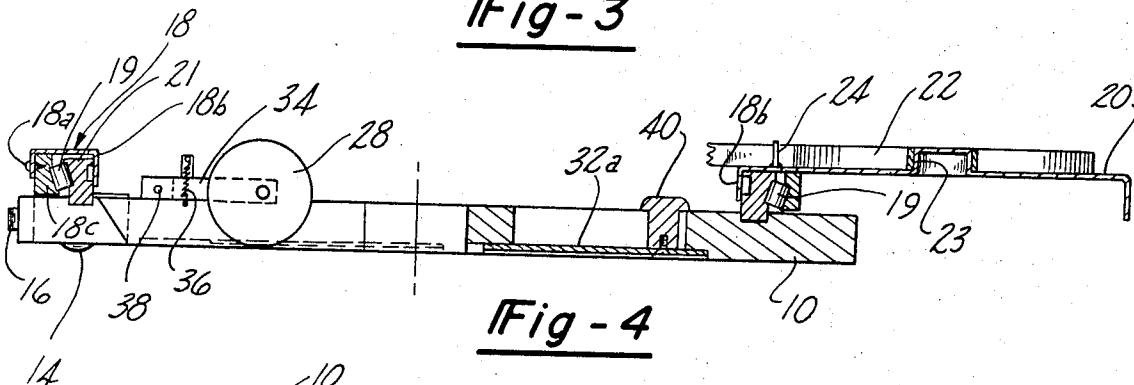


Fig - 4

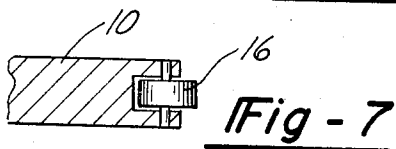


Fig - 7

1

3,829,347

INSTRUMENT FOR APPLYING TAPE TO A PLANAR SURFACE

Richard P. Honea, Flint, Mich.
(4416 Wheatland Drive, Swartz Creek, Mich. 48473)

Filed Feb. 14, 1973, Ser. No. 332,358

Int. Cl. B44c 7/00; E04d 15/00

U.S. Cl. 156—577

12 Claims

ABSTRACT OF THE DISCLOSURE

A plate is movable in registration with a guide edge and carries a tape roll. The tape is applied to a planar surface through a slotted portion of the plate in a uniformly spaced pattern relative to the guide edges. Included is a device for making right-angle turns, such as in the case of window frames, in which the tape is of the electrically conductive type and forms a part of an electrical alarm system actuable responsive to breaking of the window and the tape. The device for making the right-angle turns includes a pair of slidable knife-edge members, each movable into a successive engagement with the tape to make a pair of bends, thus providing a composite 90° turn.

BACKGROUND OF THE INVENTION

The present invention relates to an instrument particularly useful for the application of electrically conductive tape about the edges of windows as part of an electrical alarm system. Most applications of electrically conductive tape to windows are made manually and in a manner which requires a fair amount of skill and dexterity on the part of the person installing the tape. If the tape is not applied in straight lines, that is, parallel to the window edges, it gives an unpleasing appearance. A special problem exists in making a corner turn because the tape itself should not be severed or broken in any manner during the making of the turn in such manner that might impair the conductivity of the strip. When the corner turns are made by hand, it is almost impossible to make them uniform and in conformance with the 90° turn at each corner.

The present invention relates to an instrument which may be placed in registration with the planar surface of the window, moved about the window edges and providing a turn by simple manipulation of a pair of knife-edge members at each corner, making it possible to continuously apply the strip without removing the instrument from its exact position on the window. To provide for all four corners, there is included in the mechanism a plate which carries four separate, double knife-edge members for providing the turn at each quadrant. Likewise, the roll of tape is carried on the rotatable member so that it is appropriately positioned and registered in accordance with each right-angle turn.

While the present invention solves the problems inherent in applying electrically conductive tape for electrical alarm systems, the invention is not so limited, but indeed may be used in any application in which the tape is being applied equally spaced from the edges of a rectangular surface, with exact, precisely right-angle turns being made at each corner. Thus it will be seen that the present invention is suitable for use with applying marking tape to gymnasium floors, for fastening decorative tape to display windows, and for a great number of other uses which will become apparent from the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing and still additional features and advantages of the present invention will be described below

2

in greater detail and illustrated in connection with the accompanying drawings, in which:

FIG. 1 is an elevational view in perspective showing the tape applying instrument in position on the surface of a window;

FIG. 2 is a view substantially similar to FIG. 1 but showing the instrument as it is moved in an orthogonal path along the lower edge of the window;

FIG. 3 is a top plan view to enlarged scale showing the constructional details of the instrument;

FIG. 4 is a partial sectional view taken along the section lines 4—4;

FIGS. 5 and 6 are partial views illustrating the mode of operation of the two knife-edge members and the manner in which they are operated to provide a right-angle corner turn;

FIG. 7 is a partial sectional view taken along the sections lines 7—7 of the FIG. 3 drawing;

FIG. 8 is a partial prospective view with parts broken away illustrating the biasing means, that is, the roller and arm used to provide a constant pressure against the upper surface of the tape, as it is being applied against the planar surface of the window; and

FIG. 9 is a partial sectional view taken along the lines 9—9 of FIG. 3.

DETAILED DESCRIPTION

Reference is made to FIGS. 1, 2 and 3 for their showing of the tape applying instrument positioned in its operating position with respect to the window and further with respect to the detail of the device used for each right corner turn. In FIG. 1, the instrument is being moved in the direction of the arrow in a top to bottom direction relative to the window 12. The instrument includes a base, or plate 10 which is movable across the surface of the window 12 on two pairs of ball bearings 14, each of which is located at one corner of the plate 10. Also mounted on the plate 10 at each corner is a roller 16 which is rotatable about its axis vertical with respect to the plate 10 and movable in registration with the adjacent window edge to lay a constant uniformly spaced strip of tape along the window edge. An indexing member 18 is rotatably mounted on the upper surface of the plate 10 and carries mounted on it a rightward extension arm 20 having rotatable on it a roll of electrically conductive tape 22. The tape 22 is shown as it is unreeled between a pair of guide pins 24 across a guide arm 26 and about a pair of biasing rollers 28, which are used to maintain a constant pressure to apply the tape 22 firmly against the window surface 12.

The tape 22 may typically be made of a flexible lead-tin compound and include an adhesive backing which is adapted to provide a firm connection to the window surface 12. After the tape has been applied in the desired pattern about the periphery of the window 12, sometimes the tape is optionally further sealed or secured in place by applying a sprayed coating of varnish or other like sealant substance.

It will further be seen that the indexing member 18 has a substantially open center portion which permits the manual operation of the several turn forming devices, one set of which is located in each of the four quadrants on the plate 10. It will further be seen that there are included two pair of orthogonally aligned double roller pairs 28 and 30, which provide respectively for application of vertical strips of tape 22 and successively transverse strips of tape 22 after each corner has been formed.

In the FIG. 1 drawing, it can be seen that the rollers 16 are maintained in close engagement with the side edge of the window 12, while, subsequently in FIG. 2, the appropriate rollers 16 at the bottom edge of the plate 10 are maintained in registering engagement with the

lower edge of the window 12. The distances D_1 and D_2 from the sides and bottom of the window are accordingly maintained constant and equal.

One outstanding advantage arising from the use of the present invention is that the plate may be maintained against the window surface at all times during the application of the tape 22 so that there is no possibility of tearing the tape when the installation is only part-way completed.

The indexable plate member 18 is rotatably supported on the upper or outer surface of the plate 10 by a roller bearing and cage arrangement, the detail of which will be better shown in FIG. 4 hereinafter.

To provide the required right-angle turn at each corner of the window, each quadrant contained within the open portion of the indexable member 18 includes a pair of cooperative knife-edge members 32a and 32b which are moved successively into engagement with the tape 22 to provide for successive partial bends of the tape 22 and therefore complete a final 90° corner turn without tearing or ripping the tape. The relative positioning of the knife-edge members 32a and 32b will be further clarified by FIGS. 5 and 6 and described in the section "Description of Operation" hereinafter.

With reference to FIGS. 3 and 4, it can be seen that the indexable member 18 has an outer lip 18a and an inner lip 18b formed about its outer and inner edges respectively. Connected to the outer lip 18a is a journal 18c for containing in place a plurality of roller bearings 19, while a second bearing retainer 21 is fixed to the upper surface of the plate 10. Thus, according to the particular orientation of the right-angle turn being made, the right hand extension arm 20 at the side of the member 18 is indexed either clockwise or counterclockwise with free movement provided by the roller bearing members 19.

Also shown in FIG. 4 is the mounting means for one of the several rollers 28, which includes an arm 34 and a spring biasing means 36 which provides a downward biasing of the roller 28 into constant engagement with a tape 22 when it is being applied to the window surface 12. When the orientation of the tape 22 is being changed to turn a corner, the arm 34 can be pivoted about a pin 38 to move the associated roller 28 temporarily out of engagement with the tape 22. One of the knife-edge members 32 is shown in section with an included and elevated thumb piece 40, engageable by the operator's thumb to provide for a suitable movement with the associated knife-edge into a bending contact with the tape 22 as the corner turn is being made. Also shown is the manner in which the tape 22 is mounted in a roll on a central hub 23 formed on and extending from the upper surface of the arm 20.

FIG. 7 shows a corner portion of the square plate 10 and clarifies the manner in which the rollers 16 are mounted at each corner for registration with the window edge as the tape applying instrument is being moved along the edge.

DESCRIPTION OF OPERATION

With reference to FIG. 1, the initial movement of the instrument base 10 is from top to bottom of the window planar surface 12, with the left hand pair of rollers 16 held in tight rolling engagement with the left hand edge of the window. Upon completing the travel to the lower window edge, the bottom pair of rollers 16 come into abutment with the lower window edge. At this time the first and uppermost of the two knife-edge members 32a is indexed by the movement of the operator's thumb so that the edge as shown in FIG. 5 is used to make a first partial bend of the tape 22. Next, the lower knife-edge member 32b is moved in the position illustrated in FIG. 6 so that a second bend is made, therefore completing a composite 90° turn of the tape 22 in the manner finally indicated in the FIG. 6 drawing.

At this point, the indexing member 18 is rotated in a counterclockwise direction so that the tape 22 and the guide 26 also mounted on the member 18 are rotated to align the tape 22 with the horizontally oriented slot 30. The pair of rollers 28 which cooperate with the slot 30 are biased downwardly into engagement with the tape 22 strips so that movement may be continued as shown in FIG. 2 in a right hand direction. In each case, there is provided in each of the four quadrants, as divided up by the intersecting slots 29 and 30, a pair of bend devices, namely the knife-edge members 32a and 32b, which are thus available for operation to complete each right-angle turn at each corner.

It has been found that the angular relationship between the corner lines of the right-angle turns being made and the axes of the knife-edge devices 32a and 32b, respectively, are of particular importance in making the two bends illustrated without tearing the tape which is relatively fragile in its tensile strength. The overlapping relationship of the two knife-edge members further contributes to the formation of a flat, neat fold, as is best illustrated in the FIG. 6 drawing.

Reference is made to FIG. 9 for the showing of the mechanism used to latch the indexable member 18 in each of the four different quadrant positions. The mechanism includes a spring biased plunger 50 mounted on a bracket 52, which in turn is fastened on the plate 10. The plunger 50 is engageable with an opposed one of four spaced openings 54 provided in the member 18 when it is indexed into the selected position.

It will thus be seen that by the present invention I have provided a novel and greatly improved instrument for applying tape, particularly electrical conductive tape as is used in electrical alarm systems. In the interest of brevity, the alarm system itself will not be described in detail, but it is well known in that art that when the continuous conductive tape 22, which is applied to any individual window, is broken, this will cause an interruption of a circuit of the electronic system such that an audible or visual alarm signal is produced. As already indicated, the present invention is not limited to electrically conductive tapes for this purpose, but also applies to any tape applying system and instrument by which it is desired to provide a rectangular tape strip with sharply defined, uniform, unbroken and durable corners.

What is claimed is:

1. An instrument for applying a tape on a planar surface comprising a base movable in a predetermined path along said surface, a roll of tape rotatably mounted on said plate, a biasing means for receiving the tape from said roll and pressing it into firm engagement with said surface, and means for applying a right-angle turn of said tape on said surface, comprising means selectively engageable in bending engagement with said tape to provide at least one angular bend thereto to provide the right-angle turn.

2. The combination as set forth in claim 1 wherein said base comprises a plate and said tape is guided in its path of application to said surface in one direction by a central cut-out slot portion of said plate.

3. The combination as set forth in claim 2 wherein said biasing means comprises a spring-loaded roller, movable into said slot to maintain a relatively constant pressure against said tape and said planar surface portion opposed to said tape.

4. The combination as set forth in claim 1 wherein said bending means comprises a pair of devices, each moveable along intersecting lines of travel and engageable successively with said tape to provide a pair of successive bends to said tape to provide a composite, substantially 90° turn of said applied tape.

5. The combination as set forth in claim 4 wherein said two devices comprise a pair of knife-edges, movable consecutively along said lines of travel, said lines of travel spaced and each at an angle of substantially 22½° to a different one of the adjacent sides of said turn.

5

6. The combination as set forth in claim 1 wherein said plate is supported on a plurality of ball bearings to provide a variable path movement across said planar surface.

7. The combination as set forth in claim 2 wherein said cut-out portion includes a pair of orthogonal slots formed therein to provide for a tape application in a plurality of right-angle turns without removing the plate from said planar surface.

8. The combination as set forth in claim 7 wherein a plurality of rollers are rotatably mounted about the periphery of said plate and engageable with a guide edge surface about said planar surface to maintain a uniform spacing of the tape from the guide edge surface.

9. The combination as set forth in claim 7 wherein a rotatable member is mounted on said plate and indexable to four different positions to provide for tape alignment in a like plurality of right-angle turns of said tape on said planar surface.

10. The combination as set forth in claim 9 wherein said tape roll is mounted on said rotatable member and turnable therewith to provide a continuous strip of tape for application to said planar surface about said turns.

11. An instrument for applying a continuous strip of electrically conductive tape equally spaced about the edges of a window, said tape mounted on a window constituting the sensing element of an electrical alarm system, said instrument for applying said tape and making right-angle turns at each window corner, comprising a plate movable

6

along the window edges and in registration one at a time therewith, a roll of tape rotatably mounted on said plate, a slotted portion formed centrally in said plate, a means for biasing said tape through said portion into engagement with the surface of said window, and means for making a pair of successive bends in said tape to provide a continuous right-angle turn of said tape at each window corner.

12. The combination as set forth in claim 11 wherein said last mentioned means comprises a pair of edged members movable transaxially one relative to the other and into successive engagement with said tape to provide said pair of bends.

References Cited

UNITED STATES PATENTS

2,546,308	3/1951	Kahler	156—577
1,892,544	12/1932	Wanders	242—55.53
3,730,815	5/1973	Terzian	156—577
3,076,493	2/1963	Berg	156—478
3,677,865	7/1972	Wagner	156—526
3,087,145	4/1963	Fruh	340—274
2,771,598	11/1956	Gerber	340—276

CLIFTON B. COSBY, Primary Examiner

J. E. KITTLE, Assistant Examiner

U.S. Cl. X.R.

156—481, 523, 579; 242—55.54; 340—274