

1 FOIL APPLICATOR

2 Field Of The Invention

3 This invention relates to processes for the mass
4 production of data recording compact discs. More particularly it
5 relates to screen printing on a surface of such discs.

6 Background Of The Invention

7 Compact discs are record carriers for digital or analog
8 information, for example audio and/or video information, which
9 have the form of a flat disc-shaped plastic surface on which a
10 data modulated optical structure is provided in accordance with
11 the information. The data is formed as pits of varying length
12 present in the surface and arranged in a spiral path. The pits
13 have nanometer dimensions and are formed by injection molding
14 against a mold having corresponding raised regions. The data is
15 read through one side of the disc which is transparent to laser
16 light. The other side of the disc is coated with a screen
17 printed label identifying the disc and containing design and logo
18 information. These screen printed labels may be quite elaborate
19 and employ several different colors formed by several printing
20 stages.

21 The process of screen printing employs a mesh which is
22 pressed against the surface of the disc. Ink is applied to the
23 surface of the disc through the mesh by a squeegee. The mesh
24 used for screen printing compact discs is subjected to extreme

1 wear along the perimeter of the disc. The wear is a result of
2 the squeegee climbing from the disc holding fixture onto the
3 printable surface. To lengthen the life cycle of the mesh, an
4 aluminum foil tape is applied along the perimeter of the disc.
5 The foil tape is manufactured in ten inch squares with a center
6 hole cut out. The center hole diameter equals one hundred and
7 eighteen millimeters for some and one hundred and twelve
8 millimeters for others depending upon graphics.

9 The foil is manually applied to the screen frame by
10 positioning the "foil hole" around the image area. Just as with
11 any process involving manual application, the foil location can
12 never be consistent. More specifically, if the foil is off
13 center in any direction, to any degree, the result will be
14 premature screen wear caused by the edge of the disc.

15 Brief Description Of The Invention

16 The foil applicator of the present invention is a
17 device for centering the foil in the screen frame. This device
18 and its method of use ensures that the foil will be located
19 precisely in the center of the screen frame each time. This
20 prolongs screen life and establishes a quality checkpoint for
21 image location. Previous to the foil applicator, all foil was
22 applied manually. The advantages of locating the foil in the
23 exact position with each application are the elimination of
24 variation, having a quality check point of image location, fewer

1 instances of the compact disc being pulled from its holding
2 fixture by a folded foil edge, extended screen life, the
3 elimination of foil wrinkles that can cause smears, fewer
4 instances of edge leak and faster printer setup time. In a mass
5 production system for the manufacture of compact discs these
6 advantages are significant in the reduction of the cost of the
7 disc. In general, the productivity of compact disc printing
8 becomes more efficient and cost effective.

9 Brief Description Of The Drawings

10 Figure 1 is a schematic representation of a carousel
11 for screen printing of compact discs.

12 Figure 2 is a top view of a printing station for screen
13 printing of compact discs.

14 Figure 3 is a top view of the printable surface of a
15 compact disc.

16 Figure 4 is a perspective drawing of a foil applicator.

17 Figure 5 is an exploded drawing of the components of a
18 foil applicator.

19 Detailed Description Of A Preferred Embodiment

20 Figure 1 is a schematic diagram of a carousel 1 onto
21 which compact discs 3 are placed by a robot arm (not shown). The
22 discs are held in place by a holding fixture 7, which may be a
23 chuck of some type, and carried by the rotation of the carousel

1 to a printing station 5. The carousel pauses for a time long
2 enough to complete a screen printing of the disc. The carousel
3 then continues to rotate bringing another disc to the printing
4 station 5, and rotating the disc just printed to another printing
5 station where a second printing, typically of another color in a
6 multicolor printing process may occur. The movement of the discs
7 is controlled so that sufficient time is allowed for drying
8 between printing stages, which may entail a disc being carried by
9 the carousel for more than a complete rotation before being
10 removed by a robotic arm.

11 As shown in Fig. 2, at the printing station the disc is
12 overlaid by a screen frame 9 that supports the mesh or screen 11
13 that rests on the printable surface of the disc. The mesh is
14 supported by a foil tape 13 that has a circular opening 15 which
15 has a smaller radius than that of the edge 17 of the disc. The
16 edge of the disc is labeled more clearly in Fig. 3. The ink is
17 then applied by the ink applicator means 19, which may be a
18 squeegee and is depicted a roller in the schematic
19 representation. The applicator means is passed radially with
20 respect to the carousel and rises from the level of the holding
21 fixture to that of the printable surface, passing over an edge of
22 the disc when doing so and subjecting the foil surface to wear.

23 An aspect of the present invention is the application
24 of the foil tape 13 to the screen by means of an applicator 21.

25 Preparing the foil covered screen is begun by raising

1 the applicator lid 23 to its upright position and installing the
2 screen frame. The screen frame sets on the alignment pins 25 of
3 the base 24 with the emulsion side up. The lid, as shown in Fig.
4 5 has perforations that provide opening to a vacuum distribution
5 plate 27 which allows planar surfaces to be temporarily held to
6 the lid. The applicator vacuum is then switched on via a foot
7 switch.

8 The proper hole diameter of the foil is chosen,
9 typically one hundred and eighteen millimeters or one hundred and
10 twelve millimeters. A centering disc 29 is placed in position on
11 a center disc alignment pin 31 and the foil with the adhesive
12 side facing out is rotated until it is squared up along the
13 applicators edge. At this point, the applicator vacuum holds the
14 foil in position. Once the vacuum has been established, it is
15 possible to remove the centering disc without concern of foil
16 movement.

17 The applicator lid is then lowered onto the screen.
18 This will exert an equal amount of pressure across the surface
19 area of the mesh to achieve foil to mesh adhesion. Next, the
20 vacuum is shut off by releasing the foot switch. The applicator
21 lid can now be raised back to its upright position. Lastly, the
22 foil should be rolled, i.e. compressed by passing a roller over
23 it, to insure a permanent bond.

24 The foil applicator provides a vehicle in which foil
25 tape is positioned precisely in the center of a screen frame with

1 repeatability. Such a task is achieved with an applicator lid
2 that has vacuum porting for the foil and a precision alignment
3 hole for the centering disc. The applicator hinges 33 connect
4 the lid 23 to the base 24 and provide a positive screen frame
5 location. The foil is aligned on the applicator by using the
6 centering disc then lowered onto the base. The center points
7 of the applicator and the base meet with an accuracy of plus
8 or minus two thousandths of an inch.

9 While there have been shown and described and
10 pointed out the fundamental novel features of the invention as
11 applied to preferred embodiments thereof, it will be under-
12 stood that various omissions and substitutions and changes in
13 the form and details of the device illustrated and in its
14 operation may be made by those skilled in the art without
15 departing from the spirit of the invention, which is specified
16 in the following claims:



- 1 What is claimed is:
- 2 1. A method for attaching an adhesive sided foil
3 having a circular opening therein to a screen in an alignment
4 applicator having a base hinged to a vacuum ported lid for use
5 in assembly line screen printing of compact discs comprising
6 placing a centering disc in position on an
7 center disc alignment means attached to said lid,
8 placing the foil with the adhesive side facing
9 out over said centering disc and rotating said foil until it
10 is squared up along an edge of said lid,
11 engaging a vacuum means to provide vacuum to
12 said vacuum ported lid to hold the foil against said lid,
13 removing the centering disc and lowering
14 applicator lid onto the screen, wherein a uniform pressure is
15 exerted across the surface area of the mesh to achieve foil to
16 mesh adhesion,
17 releasing the vacuum and raising the applicator
18 lid.
- 19
- 20 2. The method for attaching an adhesive sided foil
21 of claim 1 followed by the additional step of rolling the foil
22 to insure a permanent bond.
- 23
- 24 3. A method for producing compact discs printed on
25 one surface comprising placing said discs on a carousel and
26 advancing by rotation of said carousel the disc to a screen
27 printing station having a foil adhered screen prepared by the
28 method of claim 1.



1 4. An alignment applicator for adhering a foil
2 tape having a center opening to a screen for screen printing
3 of compact discs comprising
4 a centering disc,
5 an applicator lid attached by a hinge to a
6 base, said base having alignment pins thereon for engaging
7 corresponding holes in a screen frame,
8 said lid having perforations that provide
9 opening to a vacuum distribution plate, and a center disc
10 alignment means for engaging corresponding engaging means in a
11 center disc.
12