A novel fastening device for securing a blanket or cover on a cylinder includes a split ring annular band terminating at one end with a mounting member of U-shaped cross section and a fastening element at the opposite end formed from an elastically deformable material. The fastening element is held in deformed engagement by the opposite side walls when the cover is mounted on a cylinder.

5 Claims, 1 Drawing Figure
CYLINDER COVER FASTENING DEVICES

BACKGROUND OF INVENTION

1. Field of Invention
This invention relates generally to fastening devices. More specifically, this invention relates to a simple, compact device for releasably securing a flexible split ring annular member around a cylinder body. Even more specifically, this invention relates to a novel fastening device which is particularly well adapted for releasably securing a cylinder blanket around the impression receiving cylinder of a rotary die cutting machine.

2. Description of Prior Art
With the growth in complexity of modern industrial machinery, there has been an ever growing demand for new and improved methods for positively fastening together various types of work-pieces, machinery parts, and the like. Very frequently fastening devices are required which can be disengaged simply without damage to work-pieces fastened by the device. Also, fastening devices which permit installation of new machinery parts relatively quickly, thus avoiding long shut-down time of expensive machines, are in exceptionally great demand.

The present commercial practice of fastening a composition cover on an impression-receiving cylinder of a rotary die cutting machine is an illustration of the acute need for new and improved fastening devices.

Rotary die cutting machines are utilized in the corrugated box industry, for example, to score and/or cut the heavy corrugated paperboard into various shapes, sizes, and patterns so that the board can be formed into end-use configurations, such as, boxes and shipping containers. These machines are equipped with metal cylinders which support the board at the point where the cutting or scoring element makes its impression. In effect, the cylinder acts as an anvil.

In order to protect the cutting element of rotary die cutting machines from excessive wear and possible damage, however, the metal cylinder supporting the corrugated board is fitted with a cover or cylinder blanket which has an outer surface or layer of a composite or polymeric material. The outer surface of the blanket is sufficiently rigid to give adequate support to the paperboard, yet soft enough so that the cutting element will not wear or be damaged upon impact with the cylinder. Obviously, no metal parts which might come in contact with the cutting element can remain exposed after the cylinder is fitted with the cover or blanket.

A typical blanket or cylinder cover can be described essentially as a split annular band and generally comprises a thin, 10-inch wide and 60-inch long metal backing strip on which is cast a polyurethane polymeric material. The blanket is fastened to the cylinder by first wrapping the blanket around the cylinder so that the ends meet at a slot milled in and running the length of the cylinder. The ends of the blanket are forced into the slot and held in place by a metal bar inserted in the slot over the blanket ends. The bar is then bolted or screwed into the cylinder. Next a piece of precast polyurethane material is adhesively bonded in the depression over the bar to provide a continuous composite cover around the periphery of the cylinder. Most frequently the section of polyurethane covering which was fitted in the depression and over the bar on the cylinder has to be sanded or worked down so that the cover is completely smooth around the entire cylinder circumference.

The number of such blankets that are fastened to a typical rotary die cutting cylinder will depend upon the cylinder length. As many as from eight to fifteen blankets have been employed. In any event, all the blankets do not wear equally, since most of the cutting generally is centered on the cylinder. This necessitates frequent shutdowns to change a worn blanket. Also, if it is desired to reposition any of the blankets on the cylinder to provide for more uniform wear, additional costly downtime is encountered.

In our copending application, Ser. No. 184,348, filed Sept. 28, 1971 now U.S. Pat. No. 3,765,329, there is provided a positive locking, releasable fastening device which is particularly well adapted for use in installing a blanket or covering on a cylinder without leaving a void where the ends of the covering meet. In its simplest form the fastening device features a two-part, snap-in construction comprising self-holding interfiting male and female parts which are coextensive in length. The female part is composed of a smooth resilient material, and the male part includes a longitudinal flange for attaching the male part to one end of a split ring annular member. Means are also provided for attaching the female part to the other end of the split ring annular member.

The present invention is based in part on the novel snap-in construction or our prior copending application.

SUMMARY OF INVENTION

According to the present invention, a positive locking releasable fastening device is provided that is readily adaptable for use in installing a removable resilient cover on the cylinder. The fastening device is made up of a mounting member of substantially U-shaped cross section and a fastening element formed of an elastically deformable material which is held in deformed engagement by the opposite side walls of the mounting member when in a fastened position. The elastically deformable material of the fastening element preferably is integral with the cylinder cover material.

In one embodiment of the present invention the fastening element is provided with a rounded tongue for cooperative engagement with a rounded groove defined by elastically deformable material covering the side walls and base of the mounting member.

In another embodiment of this invention a longitudinal flange of resilient material is provided on the mounting member for engaging a cooperative projection on the fastening element.

Another characteristic of the invention is the provision of a split ring annular support member for a cylinder cover or blanket. The support member is attached at one end to the mounting member. The support member serves in ease of manufacture of a cylinder cover having the fastening device of this invention and also aids in maintaining the integrity of the resilient cover on the cylinder when in use.

Another feature of the present invention is the provision of at least one tongue at one end of the cylinder cover and a corresponding groove on the other end of
the cylinder cover for cooperative engagement of the cover on the cylinder.

Other features of novelty which characterize the invention will become apparent upon reading the description which follows, especially when read in light of the accompanying drawing.

**BRIEF DESCRIPTION OF DRAWING**

The drawing is an end view, partly in perspective and partly cut away, of the preferred fastening device of the invention. The balance of the cylinder cover is shown schematically in the drawing.

**DETAILED DESCRIPTION OF INVENTION**

With reference now to the drawing, a split ring annular band is shown schematically by the dotted line. The flexible split ring annular band has a composite coating. In the drawing the flexible split ring annular band is shown at each terminal end as reference numeral 53 and the composite coating as reference numeral 54.

Split ring band 53 may be fabricated from any flexible material conventionally employed as a backing for cylinder covers, such as, thin metal sheets, thin fiber sheets, wire re-enforced rubber, and the like. Typically, flexible band 53 will be up to about sixty inches long and from about eight to about ten inches wide, depending upon the dimensions of the cylinder for which it is designed to cover.

The composite coating 54 can be any polymeric material such as polyurethane, polyvinyl chloride, chlorinated butyl rubber and the like. The choice of cover material generally will depend in part upon the function of the cylinder. Preferably, however, the coating 54 will have the same composition as the fastening element of the instant device, as will be explained subsequently.

As shown in the drawing, the mounting member of the fastening device is generally of a U-shaped cross section having a base 14a and two side walls, 14b and 14c, extending upwardly. Means are provided for mounting the member to one end of split ring member 53. One such preferred means is a flange 14d extending downwardly from member 53. This flange 14d can be provided by simply bending the terminal end of 53 down at right angles to 53. In the drawing the flange 14d is shown attached to side wall 14c. Flange 14d can be attached to wall 14c by any means, such as, rivets, adhesives, and the like.

Optionally and preferably at least one bolt hole 140 is provided for bolting the mounting member on a cylinder. This portion of the mounting member can be fabricated from any material which has the requisite mechanical strength. Advantageously it is sized to fit snugly within an axial groove provided in a cylinder.

As the drawing indicates, the channel opening defined by side walls 14c and 14d of the mounting member is partially closed by flange 154, which in the preferred embodiment of this invention is fabricated from an elastically deformable material and is integral with composite cover 54. Indeed, fabrication is greatly simplified when flange 154 is formed from the same material as cover 54. In such an instance, split ring 53 can be attached at one end to the U-shaped channel, and then flange 154 can be formed from the composite cover material when casting cover 54; and flange 154 can be made to extend over the opening of the U-shaped channel of the mounting member. In any event, flange 154 is coextensive in length with side wall 14c. As shown, extending downwardly from flange 154 is wall cover 156. Wall cover 156 at least partially covers wall 14c of the mounting member. However, the wall cover can also be designed to cover side wall 14b as well as base 14a.

Preferably wall cover 156 is formed of the same elastically deformable material as composite coating 54. Wall cover 156 serves, in effect, as a shim, thereby increasing the snugness of the fit of the fastening element. When the flange 154 is not integral with coating 54, wall 156 also serves as a means for attaching flange 156 to the channel member at wall 14c.

Flange 156 preferably is provided with a groove 157 for cooperatively engaging the tongue 158 provided at the opposite end of cover 54. This cooperating tongue and groove arrangement helps in centering the cover as well as increasing the strength of the lock when the cover is mounted on a cylinder. More than one such groove and corresponding tongue can be provided, but in the preferred embodiment of this invention, at least one tongue and groove is provided. Also it is not essential that the tongue configuration be used, but other interfitting shaped grooves and corresponding extensions can be used. For example, a dovetail and correspondingly shaped groove can be employed.

Thus at one end of the split ring annular band 53 is provided a downwardly extending flange 14d to which a U-shaped mounting member is secured. The composite cover material 54 extends both downwardly so as to at least partially cover at least the upwardly extending wall 14c of the U-shaped mounting member to which flange 14d is attached, and it also extends horizontally partially covering the opening of the U-shaped mounting member.

Turning now to the fastening element, in the preferred embodiment of the invention, fastening element 159 consists of an elastically deformable material integral with cover material 54 and coextensive in length with the mounting member. A flange 160 is provided on element 159 for interfitting engagement with the mounting member. The width of the fastening element is sufficiently large that when the element is inserted in the mounting member, it is deformed considerably and thereby held in position. Optionally, a removable shim (not shown) can be inserted preferably behind the fastening element 159 to increase the tightness with which the element is held in the mounting member.

As can be seen in the drawing, preferably fastening element 159 is formed on an inwardly and downwardly curling end 153 of an end of backing member 53, however, a fastening element 159 can be separately formed and secured by other means, such as adhesives, to the cover material and/or the backing member.

Also, although not shown, fastening element 159 can have a rounded tongue portion adapted to be received in a rounded groove in the mounting member. In this instance the groove is best formed by coating the walls of the mounting member with elastically deformable material in the desired configuration.

As indicated previously a lug 158 is provided to mate with a corresponding groove 157 in the mounting member.

The deformable material employed in the fastening device can be selected from the same list of materials used as a composite coating material.
To mount the blanket on a cylinder, the blanket is wrapped around the cylinder, and the mounting member is then placed within a groove provided in the cylinder body. Optionally, mounting member can be bolted to the cylinder, placing the bolt through the hole provided. Then the fastening element is forced into the mounting member by striking the top of the fastening element with a mallet along its longitudinal length.

It will be readily appreciated that a cylinder cover with the fastening device of this invention eliminates a gap or space when the cover is mounted on the cylinder periphery. It also provides a continuous cover that can be easily mounted or removed.

What we claim is:

1. A fastening device for releasably securing a split ring annular member around a rotary die cutting machine cylinder body comprising:
   a non-elasitically deformable mounting member and
   a fastening element coextensive in length, said mounting member adapted to fit within a slot provided in a cylinder and being generally of U-shaped cross section, and said mounting member including a longitudinal flange of an elastically deformable material partially restricting the opening of said mounting member and extending partially into said mounting member, said fastening element including a projection for cooperative engagement with said mounting member flange when in a fastened position, said fastening element being of an elastically deformable material, whereby said fastening element will conform to said mounting member sufficiently to be retained thereby when in operative engagement but permit forceable separation of said fastening element and mounting member; means for attaching said fastening element to one end of said split ring member; and means for attaching said mounting member to the opposite end of said split ring member.

2. A rotary die cutting machine cylinder blanket comprising in combination:
   a split ring annular band member having a first end and a second end; a mounting member of U-shaped cross section attached to the first end of the split ring annular band backing member, said mounting member adapted to fit within a slot in a rotary die cutting machine cylinder; an elastically deformable cover on said backing member, said cover extending, at said first end, partially over the opening of the U-shaped mounting member and forming thereby a longitudinal flange, said elastically deformable cover extending beyond said second end of the backing member and defining a fastening element of the shape and size adapted to be deformably received in said mounting member when said mounting member and fastening element are in operative engagement whereby a continuous cover is provided when the blanket is mounted on the cylinder.

3. The device of claim 2 wherein said cover extending partially over the U-shaped mounting member includes a groove and said cover at said second end includes a matching lug extension.

4. The device of claim 2 wherein said mounting member is adapted to fit snugly within a slot in a cylinder.

5. The device of claim 4 wherein said mounting member includes a bolt hole in the base thereof whereby a bolt can be inserted through said hole for bolting said mounting member to the cylinder.

* * * * *