

[54] **CYLINDER COVER FASTENING DEVICES**

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[58] Field of Search 101/376, 378, 415.1; 24/201 C; 29/118, 129, 129.5; 51/399; 83/505, 659, 698; 161/86, 149, 401

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[57]

ABSTRACT

A positive locking releasable fastening device is provided which is particularly well adapted for use in installing a blanket on a cylinder without leaving a void where the ends of the blanket meet. The device features a two-part, "snap-in" construction comprising self-holding interfitting male and female parts. Each part is provided with means for attachment to the opposite ends of a split ring annular member.

3 Claims, 2 Drawing Figures

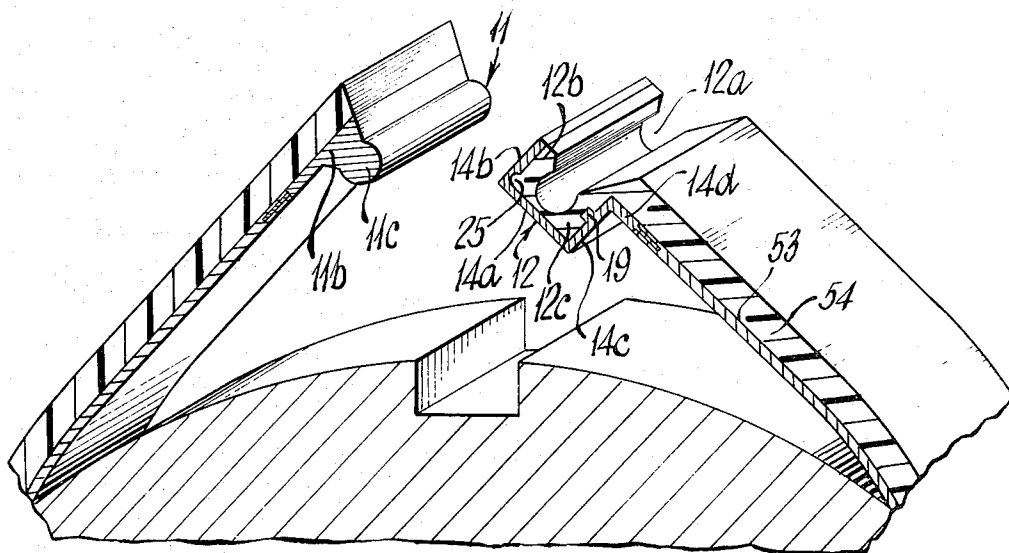


Fig. 1.

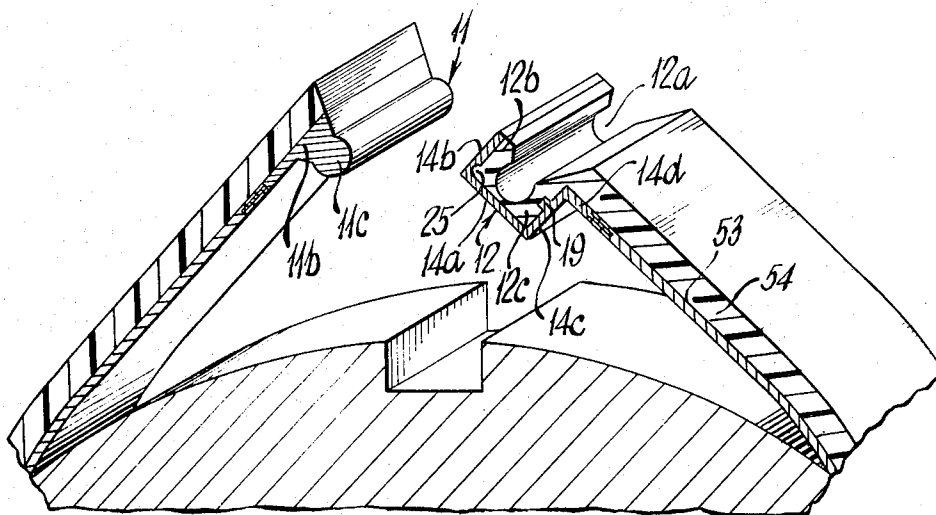
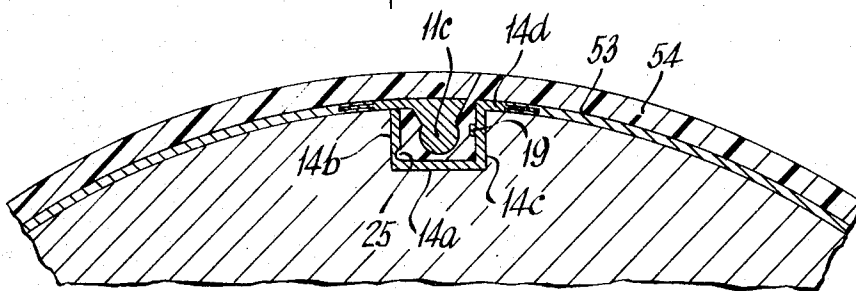


Fig. 2.



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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.

In the printing industry, for example, most of the devices which have been employed for securing a flexible printing plate to a printing cylinder of a rotary printing press have been in the nature of turnbuckles or the like which take up a relatively large section of the circumference of the printing cylinder. This large section forms a gap on which no printing can take place. Moreover, these devices are usually either of a rather complicated construction, difficult to operate or not reliable in operation. Consequently, there is a need for a mechanism which will avoid the operational and concomitant economic shortcomings of these fastening devices.

The present commercial practice of fastening a composition cover on an impression-receiving cylinder of a rotary die cutting machine is another 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 polyurethane material is cast over the bar and cured to provide a continuous composite cover around the periphery of the cylinder. Most frequently the section of polyurethane covering which was cured on the cylinder has to be sanded or worked down so that the cover is completely smooth around the entire cylinder circumference.

Generally, 10 such blankets are fastened to a typical rotary die cutting cylinder. However, all 10 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.

SUMMARY OF INVENTION

According to this invention 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 interfitting male and female parts which are coextensive in length. At least the female part is composed of a smooth resilient material. 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.

In a particularly preferred embodiment of the present invention, the female part includes a support structure, generally of U-shaped cross section, having a base and two sidewalls extending upwardly from the base. One sidewall is provided with a longitudinal flange for attaching the support structure and hence the female part to one end of a split-ring annular member. The female part is composed of a smooth resilient material, such as a plastic material, and is adapted to fit snugly within the support structure as an insert. Preferably the support structure is adapted to fit within a channel provided in the cylinder body.

In yet another embodiment of the present invention, there is provided a novel cylinder blanket comprising in combination a flexible split ring annular band, a male part attached to one end of the band, and a female part attached to the other end of the band. The male and female parts are interfitting, self-holding parts that are coextensive in longitudinal length with each other and with the band. Additionally, the female part is composed of a smooth resilient material for frictionally holding the male part when the blanket is placed around a cylinder. Also, a composite material is applied to the band and male part to an extent sufficient that when the blanket is mounted no space or gap exists in the cylinder cover.

In using this "snap-in" device, a split ring annular member having a male and a female part attached to

opposite ends of the ring is wrapped around a cylinder, and the male part is forced into the female part.

This "snap-in" mode of fastening a split ring annular member around a cylinder body overcomes the inherent disadvantages of having to use bolts or screws to mount the member on the cylinder and has the advantage of saving time when it becomes necessary to unclamp the member to change its position on the cylinder, for example.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is an end view, partly in perspective, illustrating a preferred embodiment of the fastening device of the invention together with a cylinder cover.

FIG. 2 is an end view of a cylinder blanket and fully engaged fastening device mounted on a cylinder body, the cylinder and blanket being partially cut away.

DETAILED DESCRIPTION OF INVENTION

With reference now to the drawings, the invention is seen to be applied to a cylinder blanket of the type consisting essentially of a flexible split-ring annular band 53 and a composite coating 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. 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 female part of the fastening device, as will be explained subsequently.

Referring to the figures, it can be seen that male part 11 is provided with a rounded tongue 11a which is coextensive in length with female part 12. Male part 11 also is provided with a flange 11b for attaching part 11 to one end of a split ring annular member. This connection may be made by various techniques such as eyelets, rivets, or bolts (none of which are shown). Optionally, male part 11 may be slightly flattened on the bottom part of tongue 11a at about the very end of 11a to facilitate forcing a screwdriver under tongue 11a for disengaging the device when desired. The advantage of this feature will become more apparent on further reading of this description.

The male part 11 can be made of any suitable material having the requisite mechanical strength. Metals such as steel, aluminum, and magnesium are useful in this regard.

As previously indicated, female part 12 is coextensive in length with male part 11. As can be seen in FIG. 1, the upper side of female part 12 is provided with an upwardly opening, rounded groove 12a, defined by elastic sidewalls 12b and 12c, which extends longitudinally from one end of the part to the other.

Means are provided for attaching female part 12 to one end of split ring member 53. In a particularly preferred embodiment of this invention, the means for attaching female part 12 to member 53 takes the form of a support structure 14 which is generally of U-shaped cross section having a base 14a and two sidewalls, 14b and 14c, extending upwardly from the base 14a. Sidewall 14c also is provided with a flange 14d for connecting structure 14 and hence female part 12 to member 53. Optionally and preferably sidewall 14c also is

provided with a longitudinal ridge 19 for holding female part 12 within the support. An opposing channel 25, out of register with ridge 19, is provided in sidewall 14b to keep female part 12 within the support member. The support member, of course, is advantageously sized to fit snugly within an axial groove provided in a cylinder.

Support structure can be fabricated from any material which has the requisite mechanical strength.

On the other hand, female part 12 is fabricated from a smooth but resilient material so that it will deform sufficiently under external mechanical forces to permit the "snap-in" and "snap-out" mode of fastening interfitting male and female parts, but will be otherwise self-holding when the parts are engaged. Such materials that are useful include polyurethane, polyvinyl chloride, nylon, Teflon, chlorobutyl rubber, butyl rubber, silicone rubber and the like. These materials can be obtained in various forms; for example, a suitable polyurethane material is produced by curing commercially available isocyanate terminated liquid polymer with an active hydrogen compound such as an amine.

As was indicated previously the composite cover 54 preferably is fabricated from the same material as female part 12. Then fabrication of a cylinder cover with the fastening device is simplified. To illustrate a convenient method of forming female part 12, first male part 11 and support member 14 are attached by rivets to backing member 53. Then the polyurethane cover material 54 is cast on the surface of 53, 11 and within support member 14. While still uncured, male part 11 is inserted within part 14, thereby serving as the mandrel for forming the interfitting female part 12. After curing, a screwdriver can be inserted underneath 11a, and by applying sufficient upward pressure, the parts are disengaged.

To mount the blanket on a cylinder, the blanket is wrapped around the cylinder and support 14 is then placed within a groove provided in the cylinder body. Male part 11 is then forced into female part 12 by striking the top of male part 11 with a mallet along its longitudinal length.

As can be seen in FIG. 2, the fastening device of this invention eliminates a gap or space on the cylinder periphery and provides a continuous cover that can be easily mounted or moved.

What is claimed is:

1. A cylinder blanket comprising in combination:
a flexible split ring annular band having one end and another end;

interfitting male and female parts coextensive in length, said male part including a base having a rounded longitudinal tongue depending from the base and a flange integral with and extending from the base providing a leading edge for attaching the male part to the one end of the split ring annular band;

a support structure having a generally U-shaped cross-section adapted to fit snugly within a slot provided in a cylinder, said support structure having a flange extending outwardly from the uppermost portion thereof for joining the support structure to said other end of the split ring annular band;

means for attaching each of said male part and said support structure to the one end and the other end of the split ring annular band;

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a composite coating of resilient polymeric material on the exterior peripheral surface of said split ring band and the base of said male part, said composite coating extending into and on the base and sidewalls of said support structure and defining a female part having elastic sidewalls extending upwardly and curving inwardly thereby establishing a rounded longitudinal groove, said elastic sidewalls having sufficient resiliency so as to conform to the tongue when engaged but permit forceable separation of said tongue and sidewalls.

2. The cylinder blanket of claim 1 wherein said sup-

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port structure is provided with means for preventing lateral movement of said female part.

3. The cylinder blanket of claim 2 wherein said means for preventing lateral movement of said female part comprises a longitudinal channel and an opposing longitudinal ridge on the sidewalls of said female part, said channel and ridge being adapted to conform to and engage a corresponding ridge and channel respectively on the sidewall of said support structure when said female part is within said support structure.

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