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EXPANSIBLE CORE ADAPTER

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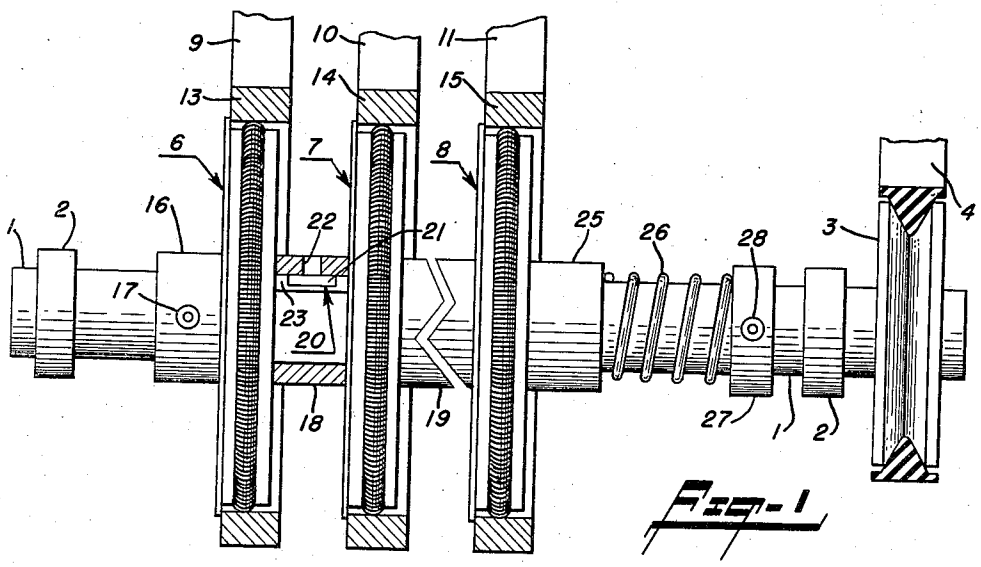


Fig-1

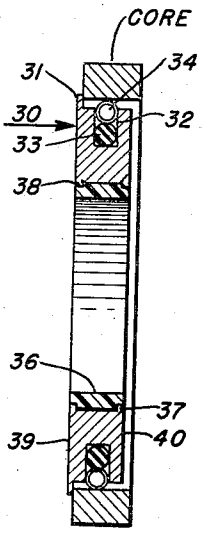


Fig-2

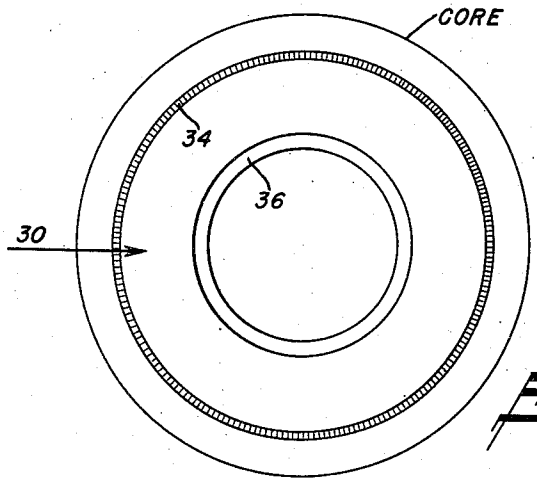


Fig-3

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EXPANSIBLE CORE ADAPTER

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4 Claims. (Cl. 242—55.15)

This invention relates to a core adapted for use in the winding mechanism of a slitting machine and more particularly to an expanding core adapter which holds a core upon which ribbons of material issuing from the slitting machine are wound. Expanding core adapters of the type contemplated by this invention have particular application in the winding mechanism of paper slitting machines wherein the ribbons of paper which feed from the slitting machine are wound upon rotatably driven cores. The cores upon which the ribbons of material are wound are often made of paper and are constructed with a bore having tolerances of ±1/64" or greater. The expanding core adapter of this invention is used to mount the core on a rotating shaft whereby the ribbons of material may be wound on the core. The core must fit snugly to the expanding core adapter so as to rotate therewith and yet be free enough to enable one to easily remove the core from the adapter by hand.

An object of this invention is the provision of an arrangement for securing a core to an expansible core adapter by which arrangement relative rotary movement between the core and expansible core adapter is prevented and yet the core may be freely slid on to and off from the expanding core adapter.

An object of this invention is the provision of an expansible core adapter for use in mounting a core upon a rotatable shaft, the said expansible core adapter comprising a cylindrical-shaped body having a circumferential annular groove therein, an annular resilient member positioned in the said groove, and a coil spring positioned in the said groove over the said annular resilient member, the sides of the spring coils normally extending above the said groove whereby a core may be longitudinally pressed over the said core adapter, the said core being restrained from relative rotary movement with the said core adapter by action of the spring coils on the core.

These and other objects and advantages will become apparent from the following description when taken with the accompanying drawings. It will be understood the drawings are for purposes of illustration and are not to be construed as defining the scope or limits of the invention, reference being had for the latter purpose to the appended claims.

In the drawings wherein like reference characters denote like parts in the several views:

Figure 1 is a fragmentary front elevation of the winding mechanism of a paper slitting machine wherein the expansible core adapter of my invention is embodied,

Figure 2 is a central cross sectional view of my novel expansible core adapter showing a core mounted thereon, and

Figure 3 is a side view of my expansible core adapter.

Reference is now made to Figure 1 wherein there is shown a shaft or mandrel **1** which is rotatably supported on a pair of suitable bearings **2** and caused to rotate by means of a pulley **3** attached to one end of the mandrel and a belt **4** which engages the pulley and is driven by a source of power not shown in the drawing. Three novel

expanding core adapters, designated generally by the reference numerals **6**, **7** and **8**, are shown mounted spaced distances apart on the shaft, or mandrel, **1**. While only three expansible core adapters are shown, it will be understood that any number may be mounted on a shaft of sufficient length. The bore in the expanding core adapters are large enough to permit rotation of the core adapters on the mandrel. Ribbons **9**, **10** and **11**, which may be of paper, plastic, metal or any other suitable material capable of being slit and wound, are shown being wound on cores **13**, **14** and **15**, which cores are mounted on the expansible core adapters **6**, **7** and **8**, respectively. The cores upon which the ribbons are wound are often made of paper and are constructed with a bore having tolerances of 1/64" or greater. The expansible core adapter of my invention is utilized to suitably mount such cores having different diameter bores. The novel connection between the respective core and expansible core adapter, which comprises an important part of this invention, is shown in detail in Figures 2 and 3 of the drawings and will be fully described later in the specification. The ribbons **9**, **10** and **11** come off a cutting machine mechanism (not shown in the drawings) at a spaced distance apart and therefore the core and expanding core adapters are spaced on the mandrel so as to be in lateral alignment with the oncoming ribbons. Lateral alignment of the expansible core adapters is accomplished by the use of a first fixed collar **16** which is secured to the mandrel **1** as by a set screw **17**, or any other suitable means, and spacers **18** and **19**, which are positioned between the expansible core adapters **6**, **7** and **8**. The spacers **18** and **19** are secured to the mandrel **1** in such a manner so as to rotate therewith and yet, at the same time, are axially slidable thereon. This is accomplished by use of a key **20** which is mounted in a radial opening **22** in the spacer as shown in the broken section of the drawing of the spacer **18**. The key is provided with an elongated portion **21** which extends internally of the spacer into a keyway **23** which runs the entire length of the mandrel. By making the keyway **23** larger than the elongated portion **21** of the key **20**, the spacers will easily slide axially on the mandrel **1** and yet rotate therewith.

A slidable collar **25** is positioned adjacent the expansible core adapter **8** and is adapted to exert an axial pressure thereon through the action of a spring **26** positioned between the slidable collar **25** and a stop collar **27**, which is secured to the mandrel **1** as by a set screw **28**, or any other suitable means. The axial pressure applied to the stack of expansible core adapters and spacers may be adjusted by changing the position at which the stop collar **27** is fixed to the mandrel. The method by which an axial force is exerted on the stacked elements is not essential to this invention and forms no part thereof. Other methods such as adjustable fluid pressure means could be used in place of the spring **26** and associated parts. Also, it is obvious that the slidable collar **25** may be another spacer such as the spacer **18** or **19**.

The operation of the winding mechanism of the slitting machine in which my novel expansible core adapter is embodied may now be understood. The machine is set up for operation by axially adjusting the fixed stop collar **16**, after first loosening the set screw **17**, to a position where the core **13**, which has been properly placed in position on the expansible core adapter **6**, is in alignment with the ribbon **9** which is coming off the slitting machine. The set screw **17** is then retightened. A spacer **18** is next chosen of a proper width so as to place the core **14**, which is on the expansible core adapter **7**, in alignment with the ribbon **10**. The spacer **18** is keyed to the mandrel **1** as above described. In a similar manner, the spacer **19** is selected and the expanding core adapter **8**, along with the core **15**, are properly mounted on the mandrel. The

slidable collar **25**, spring **26** and stop collar **27** are placed on the mandrel and the position of the stop collar **27** adjusted for the proper winding tension, as will be seen below.

The ribbons **9**, **10** and **11** come off the slitting machine at a relatively constant rate determined primarily by the rate at which the material is fed to the slitting machine. The mandrel **1** is rotated at a speed which would wind the ribbons on the cores faster than the ribbons come off the slitting machine. The ribbons **9**, **10** and **11**, obviously, can not be wound up faster than they become available and, therefore, slipping occurs between the spacers **18** and **19** (which rotate with the mandrel) and the expansible core adapters **6**, **7** and **8**. This arrangement of stacked spacers and expansible core adapters results in a clutch engagement similar to the action of a multiple disc clutch. Slipping, of course, increases as the roll of ribbon builds up on the core during the winding process. The winding tension is dependent upon the axial force between the stacked spacers and expansible core adapters and may be adjusted by adjusting the position of the stop collar **27** on the mandrel **1**.

When the cores **13**, **14** and **15** are wound full, they are removed from the expansible core adapters **6**, **7** and **8**, respectively, and empty cores placed thereon. Heretofore, when only one core adapter per core was used, it was difficult to obtain a snug fit between the core and core adapter so as to hold the two together without relative rotary movement during the winding process, and yet have a core which was easily removed from the expansible core adapter by hand. Because the core bores have a tolerance of $\pm 1/64$" or greater, as mentioned earlier, the core adapter must be of the adjustable or expansible type to accommodate the range of sizes of the core bores. Expansible core adapters to date have been both expansive to construct and cumbersome to use thereby making the handling of the same a slow process.

Reference is now made to Figures 2 and 3 of the drawings wherein there is shown my novel expansible core adapter which is both economical to manufacture and simple to operate. The expansible core adapter comprises a cylindrical-shaped body portion **30** which is provided with an annular radial outwardly extending flange **31** and an annular groove **32**. A resilient O-ring **33**, made of rubber or any other suitable material, is positioned in the bottom of the groove and "backs up" a closely coiled garter spring **34**. It will be noted that the outer periphery of the encircling garter spring extends above the top of the groove **32**. The bore of the expansible core adapter may be fitted with a bushing **36** made of a low friction coefficient material such as plastic or other suitable material. The bushing may be press fitted in the bore of the expansible core adapter and further held in place by an inwardly extending annular flange **37**, which fits in a recess in the bushing **36**, and by staking the body **30** of the expansible core adapter over the chamfered edge **38** of the bushing. The faces **39** and **40** may be machined to present smooth friction surfaces for coaction with the spacers **18** and **19** described in connection with Figure 1 of the drawings.

As mentioned above, the cores which fit on the expansible core adapters have bores of different sizes due to manufacturing tolerances. The dimensions of the expansible core adapter are such that the outer periphery of the encircling garter spring **34** is slightly larger than the maximum bore of any core, while the diameter of the cylindrical portion of the body **30**, over which the core fits, is slightly less than the minimum bore of any core. As a result, when a core is pushed axially onto an expansible core adapter and over the spring **34** the resilient O-ring **33** compresses, allowing the spring diameter to contract and permitting the core to pass over the spring.

The core is slid to a position where the side of the core abuts the flange **31**. The flange **31** helps to square the core on the adapter where only a single adapter per core is used. It may here be noted that where a wide core is being used, two adapters per core may be utilized; one adapter being pushed into each end of the core thereby providing the core with a pair of stable bearing supports.

Through the compression of the spring and resilient O-ring, the spring coils exert a constant radial pressure on the core. The pressure which is exerted, causes the spring coils to dig very slightly into the bore of the core and thereby prevent the core from rotating on the expansible core adapter. Even though the expanding action of the spring and resilient O-ring is relatively light, the multiplicity of the spring coils affords an effective retardant to any turning action between the core and expansible core adapter. At the same time, the design permits the core to be slid axially on and off the expansible core adapter by hand. The force necessary to push the cores on and off can be controlled by tolerance specifications on the free expanded diameter of the spring.

Having now described my invention in detail in accordance with the patent statutes, various changes and modifications will suggest themselves to those skilled in this art, and it is intended that such changes and modifications shall fall within the spirit and scope of the invention as recited in the following claims.

I claim:

1. A core adapter for mounting a core on a rotatable shaft, the said core adapter comprising a cylindrical-shaped body having an annular groove therein, an annular resilient member seated in the said annular groove, a coil spring in the said annular groove over the resilient member, the said coil spring having spring coils normally extending radially above the circumferential edge of the groove whereby a core may be axially pressed over the said cylindrical-shaped body and restrained from rotary movement therewith by action of the spring coils on the core, and means mounting the said core adapter on a rotatable shaft.

2. An expansible core adapter for use in mounting a core on a rotatable shaft, the said expansible core adapter comprising a cylindrical-shaped body member having an annular groove therein, an annular resilient member positioned in the said annular groove, a coil spring encircling the said cylindrical-shaped body member and positioned in the said groove over the said annular resilient member whereby the sides of the spring coils normally extend radially beyond the edge of the said annular groove, the said spring coils being adapted to be pressed radially inwardly in the said groove upon axially sliding a core onto the said cylindrical-shaped body member, and means mounting the said core adapter on a rotatable shaft.

3. The invention as recited in claim 2, including an outwardly extending flange on the said cylindrical-shaped body member, which flange is adapted to abut a side of the core when the core is in position on the expansible core adapter.

4. The invention as recited in claim 3 wherein the means mounting the said core adapter on a rotatable shaft includes a bushing of low coefficient material pressed in the said cylindrical-shaped body member.

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