

June 28, 1960

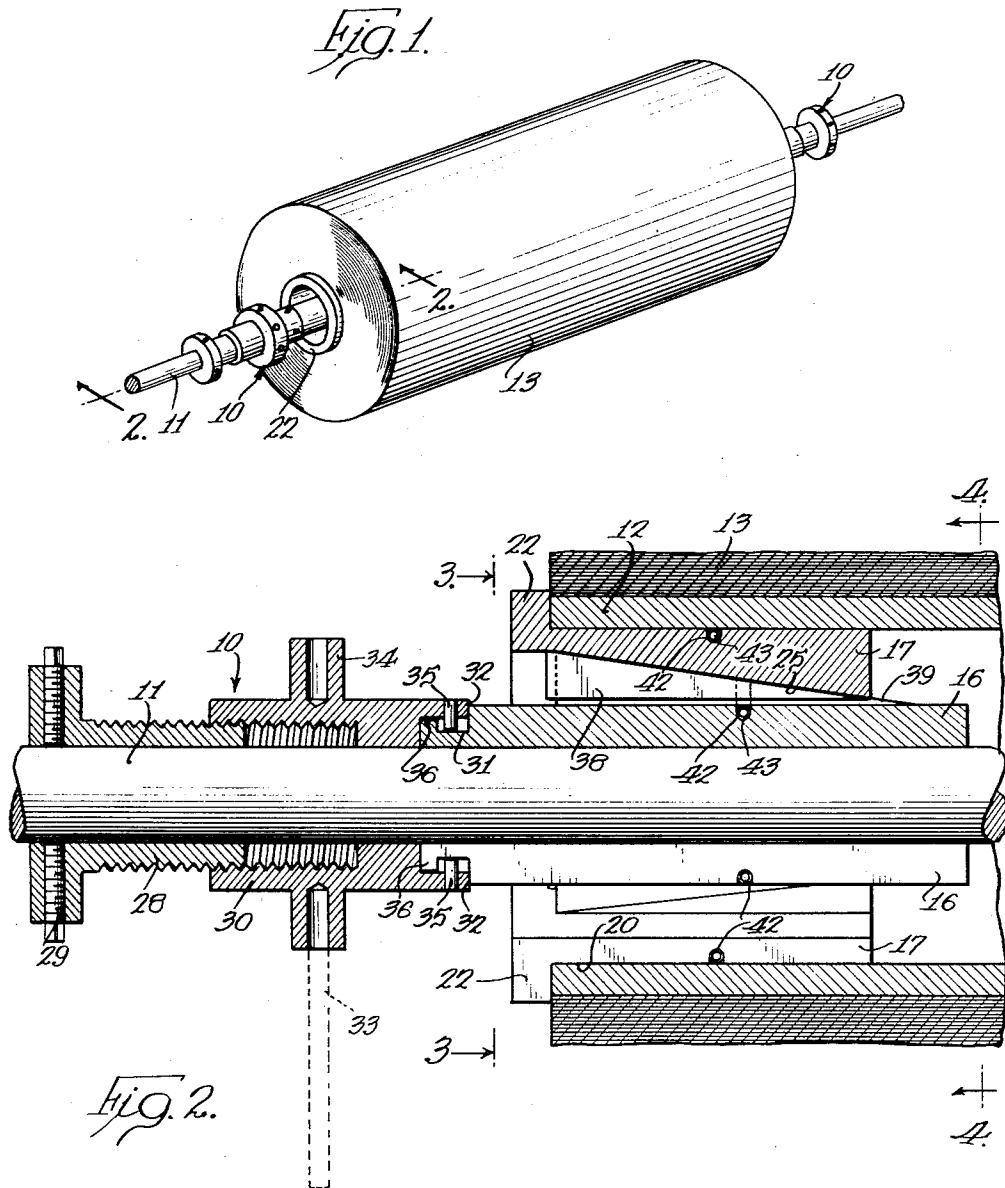
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2,942,892

CHUCK FOR PAPER ROLLS

Filed May 8, 1956

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

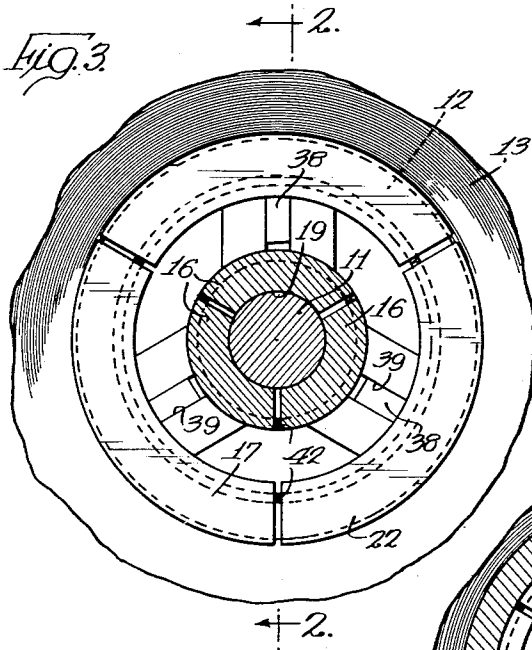
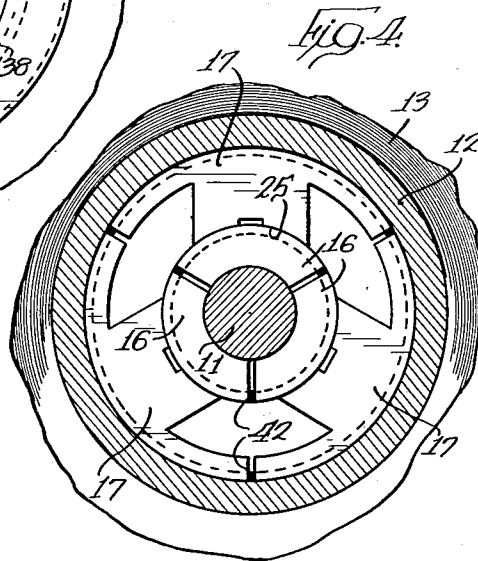
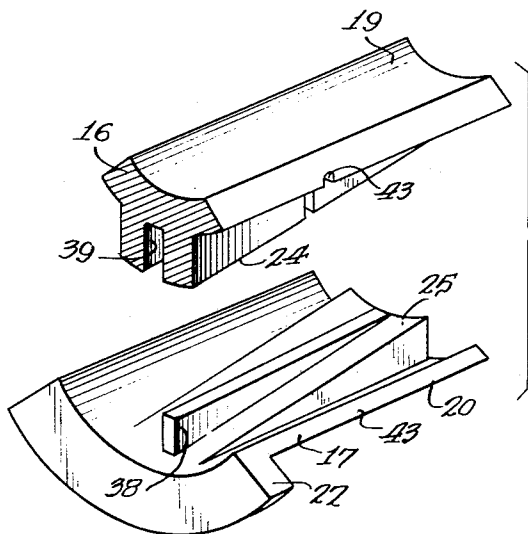


Fig. 5

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1

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CHUCK FOR PAPER ROLLS

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Filed May 8, 1956, Ser. No. 583,506

2 Claims. (Cl. 279-2)

The present invention pertains generally to expansible chucks and more specifically to expansible chucks for supporting a hollow core paper roll on a shaft.

One object of the present invention is to provide an improved expansible chuck which, when placed on a shaft and inserted in the core of a paper roll, affords a secure gripping action on both the core and the shaft resulting in a positive driving connection therebetween.

Another object of the present invention is to provide an expansible chuck having the foregoing characteristics which precisely centers the shaft within the paper roll core under all conditions of adjustment and which may be used for a wide range of core sizes.

Other objects and advantages will become apparent from the following detailed description of the invention taken in connection with the accompanying drawings wherein:

Figure 1 is an isometric view of a paper roll mounted on a shaft by means of a pair of chucks illustrative of the present invention.

Fig. 2 is a sectional view taken substantially in the plane of line 2-2 of Fig. 1 and showing the novel chuck in detail.

Figs. 3 and 4 are sectional views taken substantially in the plane of lines 3-3 and 4-4 respectively of Fig. 2 and showing end views of the novel chuck.

Fig. 5 is an enlarged perspective view of a pair of co-operating wedge members forming a part of the novel chuck.

While the invention is susceptible of various modifications and alternative constructions, a certain illustrative chuck has been shown in the drawings and will be described below in detail. It should be understood that there is no intention to limit the invention to the specific form disclosed, but, on the contrary, the intention is to cover all modifications, alternative constructions and equivalents falling within the spirit and scope of the invention as expressed in the appended claims.

In the paper and printing industries large paper rolls are generally formed by winding the paper on tubular cores or the like which are formed of paper, wood, or metal. These cores may be either of the expendible type which can be discarded after use or of the returnable types. Regardless of which type of core is used, it is desirable to use as much as possible of the paper which is rolled on them. Where the paper roll cores are of the expendible type of which paper cores are a good example, it is necessary to provide means for mounting these rolls on suitable shafts which shafts are in turn mounted on the particular printing or other machine. The shafts are generally mountable on such a machine by means of suitable bushings and, in many instances, are drivingly connected to the power mechanism of the machine so as to afford a positive drive for winding or unwinding the paper roll. Because these shafts are separable from the expendible cores, only a limited number are required. For this reason expendible cores are more desirable because they eliminate the necessity of storing

2

and shipping a large number of heavy, empty cores. These shafts extend through the center of the core and it is desirable that they be centered within the roll to prevent the roll from wobbling or shaking at high rotary speeds with resultant undesirable vibrations. Further, because the rolls are heavy, they tend to coast or slip on the shaft making desirable a secure driving connection between the paper roll core and the shaft.

In accordance with the above objects, the present invention is exemplified by a pair of novel chucks indicated generally at 10 (Fig. 1) mounted on a shaft 11 and extending into each end of a core 12 of a paper roll 13.

Briefly each chuck 10 can be expanded by external means to center the roll 13 on the shaft 11 and to grip both the shaft and the roll in such a manner as to provide a driving connection between them. The chuck is susceptible of both rapid attachment and detachment and is simply and easily installed around the shaft when it is to be used. While a pair of chucks is used, one at each end of the roll, only one will be described and it will be understood that the other one is of the same construction.

Engagement between the shaft 11 and the roll 13 is provided by the chuck 10 which comprises a plurality of inner leaves 16 for gripping the shaft and a plurality of outer leaves 17 for gripping the paper roll core. Each inner leaf 16 is formed with a concave gripping surface 19 (Fig. 5) having a radius approximately equal to the radius of the shaft 11. Three or four of these inner leaves 16 are disposed around the periphery of the shaft 11 to afford a uniform grip thereon.

The outer leaves 17 surround the inner leaves and correspond in number thereto. Each of these outer leaves 17 is formed with a convex gripping face 20 of an outer radius approximately equal to the inner radius of the core to be used. In most circumstances the core will be deformed to accommodate itself to the gripping face 20 which may be roughened in any suitable manner to enhance its ability to nonslidably engage the core.

In order to prevent the chuck from being inserted too far within the core, an annular shoulder 22 is provided on each of the outer jaws for engaging the end of the paper roll core 12.

Provision is made for forcing the inner and outer leaves radially apart from each other and into gripping contact with the shaft and the roll respectively. To this end mutually inclined surfaces 24 and 25 are provided on the outer surface of the inner leaf 16 and the inner surface of the outer leaf 17 respectively. In the illustrated chuck these mutually inclined surfaces consist of a single gentle taper forming a wedge on each leaf so that relative axial movement between the inner and outer leaves 16 and 17 results in a relative radial movement. In this manner, the mutually inclined surfaces 24, 25 cooperate to space the leaves from a minimum to a maximum distance apart as determined by the slope of the taper and the axial positions of the leaves. It can thus be seen that an axial force tending to move the leaves axially of each other is converted to a component radial force acting through the inclined surfaces 24 and 25 against the surfaces of the core and the shaft respectively. Accordingly, the inner diameter of the core and the diameter of the shaft can be varied within the limit afforded by the separation of the leaves. The chuck 10 is thus adaptable for use with various sizes of shafts and cores.

Suitable provision is made for axially moving the leaves relative to each other. One means for accomplishing this is shown, for example, in the form of an externally threaded sleeve or bushing 23 secured to the shaft 11 adjacent the chuck 10 and the end of the paper roll 13. This bushing is held in place by a suitable clamping device such as one or more set screws 29 or the like.

The threaded bushing 28 is thus adjustable along the shaft 11 according to the length of the paper roll which is determined by the width of the paper thereon.

To axially position the leaves, an internally threaded nut 30 is threadably engaged with the bushing 28 and is thus axially movable along the shaft 11. The nut 30 is provided with means for engaging the inner jaws to exert axial forces for tightening or releasing the same from the chuck. To this end an annular shoulder 31 (Fig. 2) on the exposed end of each inner leaf 16 is engaged by the axially projecting end 32 of the nut 30. When the nut is rotated, the end 32 thereof engages the shoulder 31 on the inner leaves to force those leaves axially with the nut. This axial force is transmitted to the outer leaves 17 through the mutually inclined surfaces 24, 25 and forces them outwardly and into engagement with the paper roll core 13.

In order to exert a sufficient force on the nut to urge the outer leaves against the core, force applying means are provided on the nut 30. Accordingly, the nut is formed with a capstan flange 34 having suitable openings for receiving a force applying instrument 33 such as a spanner wrench or the like. The outer leaves are prevented from sliding axially within the core when an axial force is applied on the inner leaves by the annular shoulder 22 projecting outwardly from the end of each outer leaf into engagement with the end of the core 12.

In order to loosen the chuck prior to removing it from the core, means are provided to exert an axial force on the inner leaves tending to withdraw them from engagement with the outer leaves. For example, a plurality of pins 35 or the like are provided adjacent the end 32 of the nut and extend radially inwardly into registry with a groove defined by a collar 36 formed on the end of the inner leaves 16. In this manner, when the direction of rotation of the nut is reversed, the pins 35 engage the collar 36 and an axial force is exerted on the inner leaves tending to withdraw them from the core and loosen the chuck.

To preclude relative rotation between the inner and outer leaves and at the same time allow for free axial movement therebetween, an axially extending key 38 on one leaf projects radially into an axially extending slot 39 on the other leaf (Fig. 5). The leaves of the chucks are held together as units by means of continuous coil springs 42 seated in annular grooves 43 cut on the external surfaces of the inner and outer leaves.

When the chucks are to be used for mounting a paper roll on a shaft, one chuck is mounted on the shaft and is held there by the tension of the coil springs 42. The shaft 11 is then inserted into the core of the paper roll 13 so that the chuck 10 is positioned within one end of the roll and the other chuck is slid over the free end of the shaft and into the core of the roll. With the shoulders on the outer leaves of each chuck engaging the ends of the core, the chucks are properly positioned and the set screws 29 on the threaded bushing 28 of each chuck are tightened to secure the bushing on the shaft. To expand the outer leaves against the tension of the coil springs into contact with the roll and contract the inner leaves into engagement with the shaft, a spanner wrench is applied to the threaded nut 30 of each chuck to forcefully rotate the same and apply an axial force on the inner leaves. This tightening action on the chucks centers the shaft within the roll of paper and holds it securely in driving engagement with the paper roll.

The shaft mounted paper roll 13 is then placed in suitable journal bearings and any desired power mechanism attached. Under the above mounting conditions, the roll of paper will not slip when it is being driven or coast due to stored inertia because of the positive con-

nection afforded by the novel chuck. Further, the roll will not vibrate at high rotational speeds because the above described novel chuck centers it on the shaft.

The core and the shaft are easily disassembled by the simple expedient of rotating the nuts to loosen the leaves of both chucks, removing one chuck, and sliding the shaft carrying the other chuck out of the core of the paper roll.

The chucks are susceptible of both rapid attachment and detachment and are simply and easily installed around the shaft on which they are to be used. The chuck itself is desirably formed of a light material such as aluminum, although any suitable metal or other material of sufficient strength can be used. Inasmuch as the members of the chuck are in compression, the chuck is inherently strong and is suitable for use with large, heavy rolls of paper. The mutually inclined surfaces on the leaves allow a wide range of adjustment to adapt the chuck for use with various sizes of cores while maintaining the outer surface of the chuck parallel to the core and thereby insuring that the core is centered on the shaft.

I claim as my invention:

1. A chuck for securing a hollow core paper roll on a shaft comprising, in combination, a plurality of inner leaves having a concave inner surface for engaging the shaft, a plurality of outer leaves corresponding in number to said inner leaves and having a convex outer surface for engaging the inner surface of the core, at least one continuous coil spring surrounding said outer leaves, mutually inclined wedges on said outer and inner leaves for radially separating said leaves against the tension of said spring upon relative axial movement between said inner and outer leaves, means for preventing rotation of said outer leaves on said inner leaves, said means comprising a key on at least one wedge cooperative with a key-slot on the mutually inclined wedge directly opposed thereto, an externally threaded bushing fixedly engageable on the shaft, and an internally threaded nut on said bushing and engageable with one end of said inner leaves to move said inner leaves axially of said outer leaves for expanding said chuck into secure gripping engagement with the paper roll and the shaft.

2. A chuck for securing a hollow core paper roll on a shaft comprising, in combination, a plurality of inner leaves having a concave inner surface for engaging the shaft, a plurality of outer leaves corresponding in number to said inner leaves and having a convex outer surface for engaging the inner surface of the core, at least one continuous coil spring surrounding said outer leaves, mutually inclined wedges on said outer and inner leaves for radially separating said leaves against the tension of said spring upon relative axial movement between said inner and outer leaves, means for preventing rotation of said outer leaves on said inner leaves, said means comprising a key on the wedge of each of the inner leaves cooperative with a key-slot on the mutually inclined wedge directly opposed thereto of an outer leaf, an externally threaded bushing fixedly engageable on the shaft, and an internally threaded nut on said bushing and engageable with one end of said inner leaves to move said inner leaves axially of said outer leaves for expanding said chuck into secure gripping engagement with the paper roll and the shaft, said key and key-slot being longitudinally medially disposed on the wedges of said inner and outer leaves.

References Cited in the file of this patent

FOREIGN PATENTS

120,134 Great Britain _____ Oct. 31, 1918