Oct. 12, 1965 J. MOHR 3,211,392

REEL

Filed April 21, 1964 4 Sheets-Sheet 1

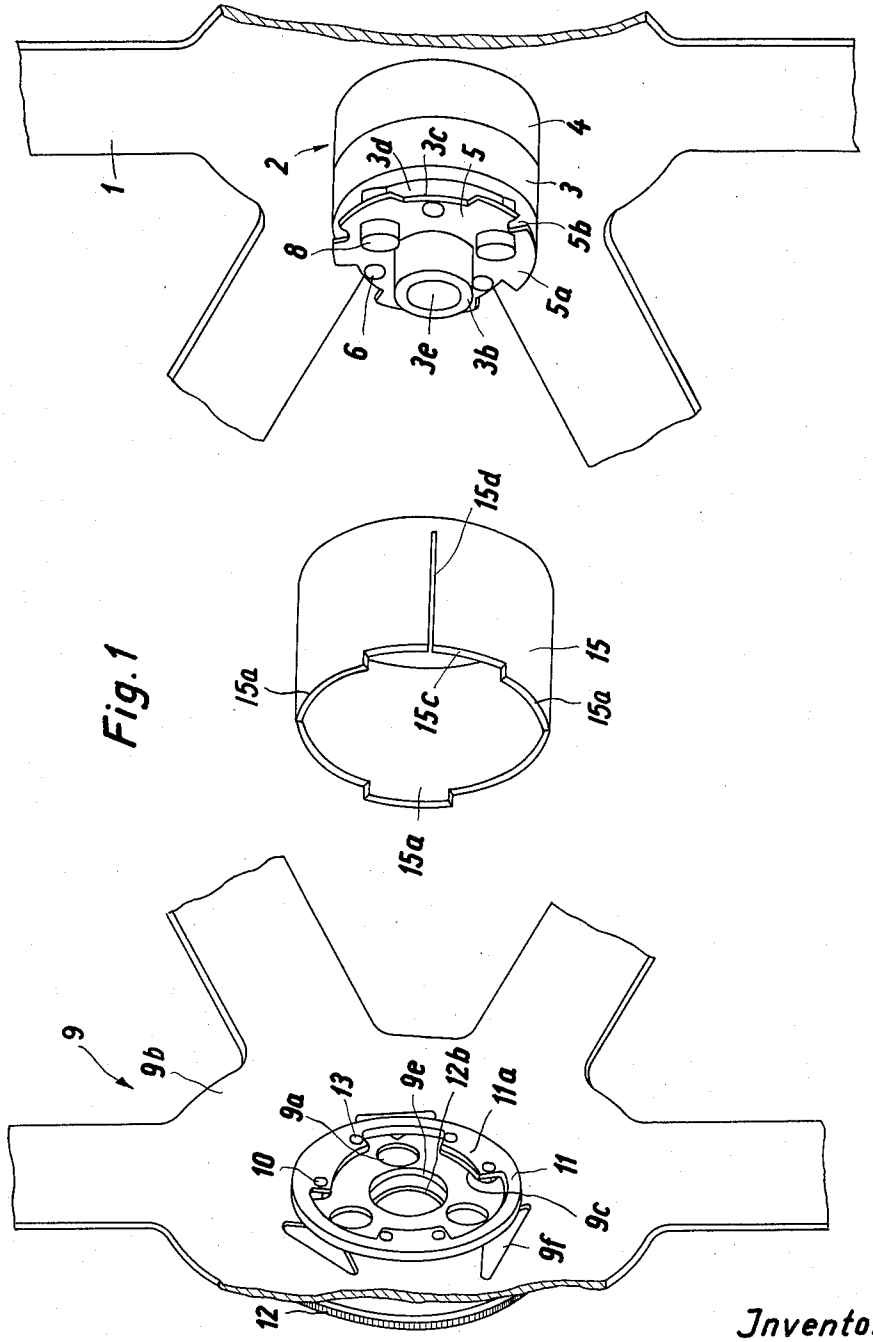


Fig. 1

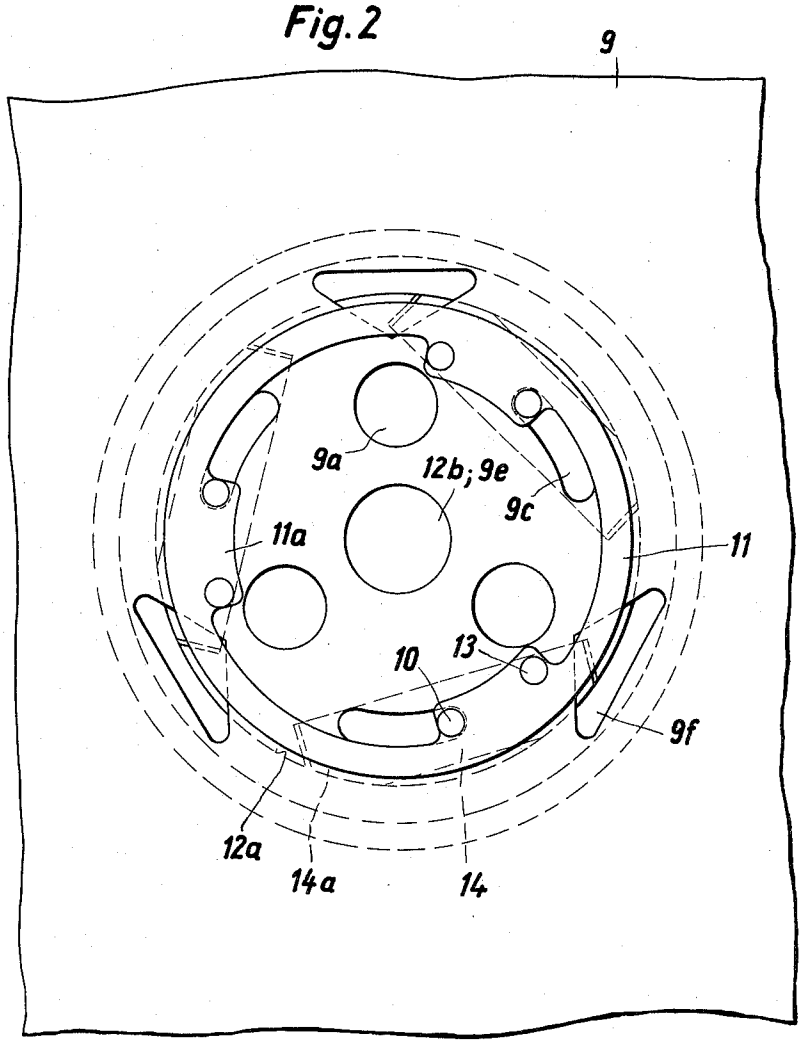
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REEL

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Fig. 2



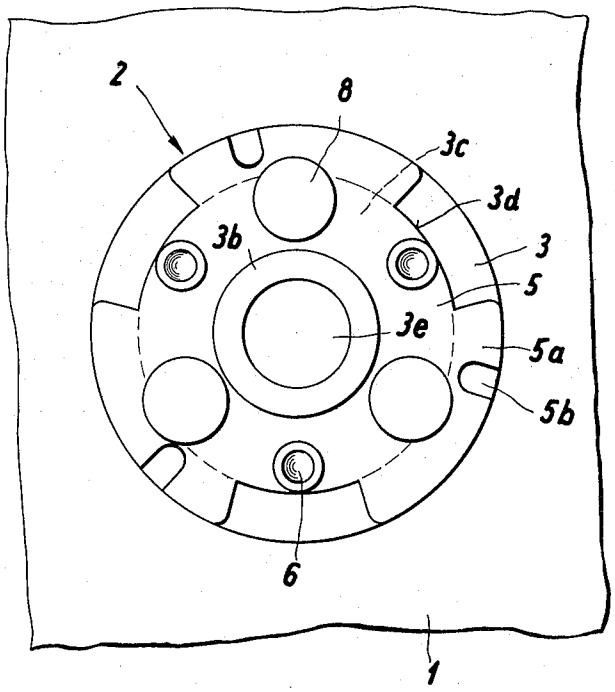
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Fig. 3



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Fig. 5

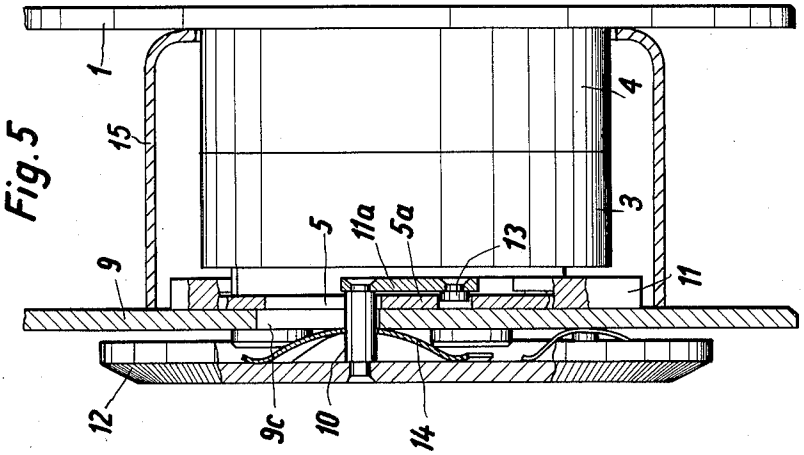
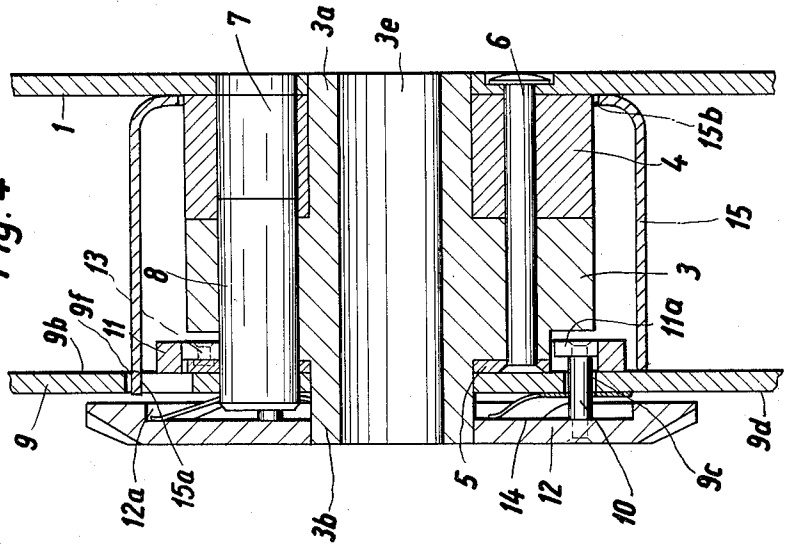


Fig. 4



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3,211,392

REEL

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Claims priority, application Germany, June 22, 1963, O 9,494
20 Claims. (Cl. 242—71.8)

The present invention relates to a reel for band-shaped intelligence carriers, which reel is provided with a removable side wall.

More particularly, the present invention relates to a reel which is adapted to hold punched tape, magnetic tape, or other elongated windable band-shaped media—hereinafter referred to simply as tape—which reel has a core and two flanges, one of which flanges is permanently attached to the core, and the other of which flanges is removably mounted on the core.

There exist reels whose removable flange is connected to the core by means of a so-called bayonet-type coupling, which allows the flange to be put on or taken off the core. It has been found, however, that, in actual use, this type of coupling will often cause the tape, which itself is inserted into a retaining slot with which the core is provided, to come out of the slot.

In other reels having removable flanges, the same are held in place by means of clasps or clips. Here, too, a number of drawbacks have been encountered, in that these clips are generally too bulky to allow them to be built into the winding and unwinding mechanism. Indeed, the space needed for such clips is often simply not available.

In still other reels, the removable flanges are held in place by means of screws. It will be readily appreciated that it takes a considerable amount of time, and a relatively large number of working steps, to remove and ultimately to replace a thus-secured flange, which, in turn, makes it impossible to change reels quickly.

It is, therefore, the primary object of the present invention to provide a tape reel which overcomes the above drawbacks and, with this object in view, the present invention resides, essentially, in a tape reel comprising a core having first and second flanges, one of which flanges is removably mounted on the core and has an inner face directed toward the inside of the reel and an outer face directed toward the outside of the reel. There are means coacting with the core and the removable flange for preventing rotation of the core and flange relative to each other when the removable flange is actually mounted on the core. Also, locking means are provided for locking the core and flange to each other, these locking means being accessible and manually operable from the outer face of the second flange. Finally, inset means are provided, which inset means are capable of having a tape wound thereon and which fit over the core between the two flanges of the assembled reel. The inset means, together with any tape wound thereon, are, after unlocking of the locking means and removal of the detachable flange from the core, removable from the reel prior or subsequent to a reeling or unreeling operation.

Additional objects and advantages of the present invention will become apparent upon consideration of the following description when taken in conjunction with the accompanying drawings in which:

FIGURE 1 is an exploded perspective view of a reel according to the present invention.

FIGURE 2 is a frontal view showing the removable flange, as seen in the direction toward the inner side of the removable flange.

FIGURE 3 is a frontal view showing the reel core, as seen in the direction toward the fixed flange.

FIGURE 4 is a sectional side elevation of the assembled reel.

FIGURE 5 is a side elevational view of the assembled reel, partly in section.

Referring now to the drawings and to FIGURE 1 thereof in particular, the same shows a reel having a core **2** and a fixed, i.e., non-removable, flange **1**. The removable flange **9**, shown at the left of FIGURE 1, is detachably connectable with the core **2**. Arranged between the fixed flange **1** and the removable flange **9** is a sleeve-shaped inset **15** of generally cup-shaped configuration, which inset can be slipped over the core **2**. The core **2** itself incorporates a sleeve **3** and a spacer ring **4**, and is provided with a plurality, e.g., three, axially extending bores **7**, as will be described more fully below in conjunction with FIGURE 4. The wall of the inset is provided with a slit **15***d* for receiving a tape leader (not shown).

The core **2** carries pins **8** which are positioned so as to fit into receiving bores **9***a* with which the removable flange **9** is provided. The core **2** also carries a notched disc **5** which is provided with radially outwardly extending projections **5***a*.

The flange **9** carries at its inner side **9***b* a notched ring **11** which itself is provided with radially inwardly directed projections **11***a*. When the flange **9** is so mounted on the core **2** that the pins **8** are received in the bores **9***a*—the pins **8** serving to prevent rotation of the core **2** and flange **9** relative to each other—the projections **5***a* and **11***a* will be staggered with respect to each other. Also, an axially projecting central collar **3***b* on core **2** will project through a central opening **9***e* of the flange **9**, thereby centering the latter on the core **2**.

Arranged next to outer face **9***d* of the flange **9** is a setting disc **12** which is firmly connected to the ring **11** by means of a plurality of circumferentially distributed rivet pins **10**. These pins **10** extend through circumferentially distributed, elongated arcuate slots **9***c* of the flange **9**, so that the unitary entity constituted by the interconnected ring **11** and disc **12** can be turned with respect to the flange **9**. The disc **12** is provided with a central opening **12***b* which, when the reel is assembled, fits over the collar **3***b* of the core **2**.

The unitary entity constituted by the ring **11** and disc **12** is spring-cushioned with respect to the flange **9**, as will be described below. Thus, when a force is exerted on the disc **12**, in the direction toward the core **2**, the entity **11**, **12**, can move axially, against the force of the cushioning springs, with respect to the flange **9**. This entity **11**, **12**, is thus movable both axially and rotationally with respect to the flange **9**. If, while the flange **9** is positioned on the core **2**, the disc **12** is pushed in and turned, the projections **5***a* and **11***a* will come to interlock with each other, in the manner of a bayonet coupling. Decoupling is effected in the reverse manner.

The ring **11** may, as shown, be provided with detent pins **13** which, when the parts are in locked position, are received in cut-outs **5***b* provided in the projections **5***a* of the disc **5**.

FIGURE 1 also shows that the left end of the insert **15**, i.e., the end directed toward the removable flange **9**, is provided with projections **15***a* which are received in openings **9***f* of the flange **9**. These openings **9***f* are of triangular configuration and have their respective apexes pointing toward the axis of the reel. This makes it possible for the reel to be used with insets **15** of different diameters. Smaller insets **15** will have correspondingly shorter projections **15***a*. Larger insets **15** having longer projections **15***a* will engage the triangular openings **9***f* at points nearer to the respective bases of the triangles. In assembled condition, the edges **15***c* come to lie against

the inner surface 9*b* of the flange **9**. If desired, the inset **16** may be provided, in addition to the slit **15***d*, with further clamping or other anchoring means (not illustrated) for holding the tape leader.

FIGURE 2 is, as set forth above, a view showing the inside of the flange **9**, and thus also shows the ring **11**. This figure clearly shows the elongated arcuate slots **9***c* through which extend the pins **10** joining the ring **11** and disc **12**, the bores **9***a* which receive the pins **8**, the central openings **9***e*, **12***b*, and the triangular openings **9***f*, as well as the inwardly extending projections **11***a* of ring **11**. Also shown are the rivet pins **10** and the detent pins **13**.

FIGURE 2 also shows, in dashed lines, the resilient elements which are interposed between the flange **9** and the disc **12**. These elements are, in the illustrated embodiment, constituted by leaf springs **14** whose edges **14***a* lie against an inner edge of a shoulder **12***a* of the disc **12**, of mating configuration. These leaf springs **14**, which are held in place by the pins **10**, act on the disc **12** to press the same away from the outer face **9***d* of the flange **9**, and, consequently, to press the ring **11** against the inner face **9***b* of the flange **9**.

FIGURE 3, being a view onto the face of the core **2** and the fixed flange **1**, shows the pins **8** as being spaced equidistantly from the axis of the reel and from each other by 120° so as to be uniformly distributed in circumferential direction. The same applies to the projections **5***a* of disc **5**. FIGURE 3 also shows the cutouts **5***b* for the detent pins **13**. The collar **3***b* is located centrally, thereby to center the flange **9** and the disc **12**.

FIGURE 4, which is a sectional view through a reel according to the present invention, shows the core as incorporating the above-mentioned sleeve **3** whose leftwardly extending sleeve-shaped collar **3***b* has been described above. The sleeve **3** also has a rightwardly extending collar **3***a*, and an internal bore **3***e* through which may project the driving spindle of the tape recorder with which the reel is used. The above-mentioned spacer ring **4** overlies the collar **3***a*.

As shown in FIGURES 1 and 3, the sleeve **3**, the flange **1**, the ring **4** as well as the disc **5** are held together by rivets **6**.

The core **2**, i.e., the sleeve **3**, the flange **1**, the ring **4**, and the disc **5**, are provided, as stated above, with the bores **7** through which may project the driving lugs (not shown) of a tape driving arrangement. The bores **7** also receive the pins **8** which are carried by the core.

Arranged between the central portion of the sleeve **3**, i.e., the portion of maximum diameter, and the collar **3***b*, are a projection **3***c* and a collar **3***d*, best shown in FIGURES 1 and 3. The projection **3***c* receives the pins **8** while the collar **3***d* terminates at the disc **5** such that the projections **5***a* extend beyond the collar **3***d*.

The inset **15**, shown in FIGURE 4 in phantom lines, is of relatively large diameter, and therefore has its projections **15***a* lying relatively close to the bases of the respective triangular openings **9***f*. The surfaces **15***c* of the inset **15** lie against the inner face **9***b* of the removable flange **9**. The right-hand end of the inset, i.e., the end directed toward the fixed flange **1**, is flanged inwardly to form the opening **15***b*, thereby to give the inset its generally cup-shaped configuration.

The lower-left corner of FIGURE 4 shows one of the leaf springs **14**, the same lying against the inwardly directed surface of the disc **12** and the outer face **9***d* of flange **9**. The rivet pin **10** projects through the leaf spring **14**, to hold the same in place. FIGURE 4 also shows the notched ring **11**, as well as one of its projections **11***a* and one of the detent pins **13**.

FIGURE 5 shows the parts in assembled conditions, with the projections **5***a* and **11***a* being in axial alignment with each other to effect the locking. The detent pins **13** are received in their respective cut-outs **5***b* of disc **5**. FIGURE 5 best shows the connection between the ring **11** and disc **12** by means of the pins **10**, which pins **10** also

serve to hold the leaf springs **14**. One of the elongated slots **9***c* is shown throughout its entire length.

When the flange **9** is to be placed into the core **2**, the central openings **9***b* and **12***b* are first placed over the projecting collar **3***b* of the sleeve **3**. The angular position of the flange **9** with respect to the core **2** will be adjusted such that the pins **8** come into registration with the bores **9***a*. After the pins **8** have been introduced into the bores **9***a*, rotation of the flange **9** and core **2** relative to each other is prevented. As a result, the projections **11***a* of the ring **11** will come to lie between the projections **5***a* of the disc **5**. The flange **9** is then locked to the core **2** by pressing the disc **12** axially toward the core against the force of the springs **14**, as a result of which the projections **11***a* will move, axially, between the projections **5***a*. The disc **12** is then rotated to bring the projections **11***a* into axial alignment with the projections **5***a*, i.e., to cause the projections **11***a* to lie underneath the projections **5***a*, until the detent pins **13** come to lie in the cutouts **5***b*.

The amount of angular rotation is limited, in both directions, by the striking of the pins **10** against the ends of the elongated arcuate slots **9***c*.

The flange **9** can be removed from the core by reversing the above steps. After the flange **9** has been removed, the inset **15** can be withdrawn, together with any tape wound thereon.

It will be seen that, thanks to the above-described arrangement, there is provided a reel having a removable flange, which allows cup-shaped insets of different diameters to be used. These insets may serve, as long as desired, as the element onto which a given tape is wound. This simplifies and reduces the costs of storing the wound tape. Furthermore, it is no longer necessary to provide complete reels for storing any one tape in wound condition, but simply to provide an inset such as is described above. This inset, it will be seen, readily fits over the core and between the flanges of the assembled reel, and, after unlocking of the locking means and the removal of the flange **9** from the core, is removable, together with any tape wound thereon, from the reel prior or subsequent to a reeling or unreeling operation.

Yet another advantage of the structure according to the present invention is that the slot by means of which the tape leader is held (and/or any other anchoring means for holding the tape leader) is provided not on the core proper but on the inset itself. This, as described above, simplifies the over-all construction.

As explained above, the feature of making the openings **9***f* of triangular configuration enables the reel to be used with insets of different diameter. This makes the reel per se very versatile.

Yet another advantage of the present invention is that the tape, which is held by the inset, will not be moved while the locking mechanism is operated, since the movement of the entity **11**, **12**, will not move the inset **15**. Consequently, there is no danger that the tape leader will accidently become detached from the element to which it is anchored, namely, the inset **15**, as had been found to be the case with prior art reels when the removable flange was attached to or taken off the core.

It will be understood that the above description of the present invention is susceptible to various modifications, changes, and adaptations, and the same are intended to be comprehended within the meaning and range of equivalents of the appended claims.

What is claimed is:

1. A tape reel comprising, in combination:

(a) a core;

(b) a first flange on said core;

(c) a second flange removably mounted on said core and having an inner face directed toward the inside of the reel and an outer face directed toward the outside of the reel;

(d) means coacting with said core and said second flange for preventing rotation of said core and said second flange relative to each other when said second flange is mounted on said core;

(e) locking means operable from said outer face of said second flange for locking said core and second flange to each other; and

(f) inset means capable of having a tape wound thereon and fitting over said core and between said flanges of the assembled reel, said inset means, together with any tape wound thereon, after unlocking of said locking means and removal of said second flange from said core, being removable from the reel prior or subsequent to a reeling or unreeling operation.

2. A tape reel as defined in claim **1** wherein said inset means include a sleeve-shaped member having a generally cup-shaped configuration.

3. A tape reel as defined in claim **2** wherein said sleeve-shaped member is provided with means for holding a tape leader.

4. A tape reel as defined in claim **3** wherein said holding means comprise a slot provided in the wall of said sleeve-shaped member.

5. A tape reel as defined in claim **2** wherein said sleeve-shaped member is provided, at that end thereof which is directed toward said second flange, with projections, and wherein said second flange is provided with openings which are positioned to receive said projections of said sleeve-shaped member.

6. A tape reel as defined in claim **5** wherein said openings are of generally triangular configuration, the apexes of said openings pointing toward the axis of the reel.

7. A tape reel as defined in claim **1** wherein said rotation preventing means comprise pins carried by said core and received by openings with which said second flange is provided.

8. A tape reel as defined in claim **7** wherein said core is provided with openings within which said pins are arranged, and wherein said last-mentioned openings are adapted to constitute a means with which a reel drive may engage the reel.

9. A tape reel as defined in claim **1** wherein said locking means comprise a first notched element carried by said core and a second notched element carried by said second flange, said notched elements having projections which interengage each other to form a bayonet-type coupling.

10. A tape reel as defined in claim **9** wherein said first notched element carried by said core is a disc whose projections extend radially outwardly and wherein said second notched element carried by said second flange is a ring whose projections extend radially inwardly.

11. A tape reel as defined in claim **9** wherein said locking means further comprise a setting element arranged next to said outer face of said second flange, and connecting means extending through said second flange and interconnecting said setting element and said second notched element for combining said elements into a unitary entity.

12. A tape reel as defined in claim **11** wherein said second flange is provided with a plurality of arcuate elongated slots and wherein said connecting means comprise a corresponding plurality of connecting pins passing through said slots, respectively.

13. A tape reel as defined in claim **12** wherein said locking means further comprise spring means for continuously urging said second notched element against said inner face of said second flange.

14. A tape reel as defined in claim **13** wherein said spring means are interposed between said outer face of said second flange and that face of said setting element which is directed toward said second flange.

15. A tape reel as defined in claim **13** wherein said spring means comprise leaf springs having edges whose configurations mate with the configuration of an inner edge of a shoulder formed on said setting element.

16. A tape reel as defined in claim **15** wherein said leaf springs are held in place by said connecting pins.

17. A tape reel as defined in claim **9** wherein said locking means further comprise detent means operable when said notched elements are in a position in which they maintain said core and said second flange in locked position.

18. A tape reel as defined in claim **17** wherein said detent means comprise detent pins carried on said projections of said second notched element, said detent pins being received in openings with which said projections of said first notched element are provided.

19. A tape reel as defined in claim **1** wherein said locking means comprise:

(1) a notched disc carried by said core and having outwardly extending radial projections;

(2) a notched ring carried by said second flange next to said inner face thereof and having inwardly extending radial projections;

(3) said projections of said notched disc and notched ring interfitting with each other to constitute a bayonet-type coupling;

(4) a setting disc arranged next to said outer face of said second flange; and

(5) connecting pins extending through elongated arcuate slots with which said second flange is provided and interconnecting said notched ring and said setting disc in consequence of which the same form a unitary entity which is both rotatably and axially displaceable with respect to said second flange, thereby to allow the bayonet-type coupling constituted by said notched disc and said notched ring to be operated from the outside of the reel.

20. A tape reel as defined in claim **19** wherein said locking means further comprise:

(6) spring means interposed between said second flange and at least one of the interconnected components which together form said unitary entity for continuously urging said entity axially in a direction away from said core.

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MERVIN STEIN, *Primary Examiner.*