April 30, 1968 J. A. FRY ETAL 3,380,204

AXIALLY PROJECTABLE STEM DEVICE

Filed June 14, 1965

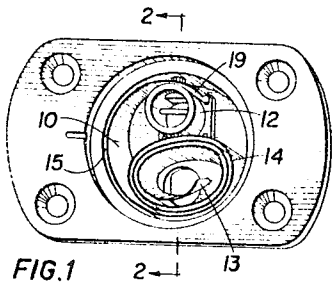


FIG.1

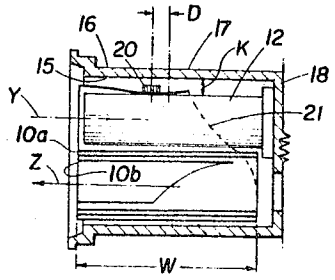


FIG.2

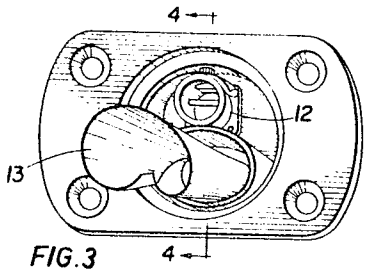


FIG.3

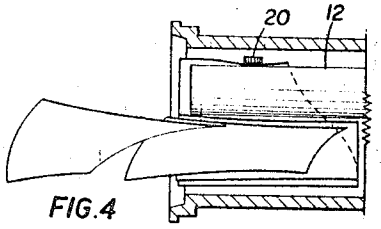


FIG.4

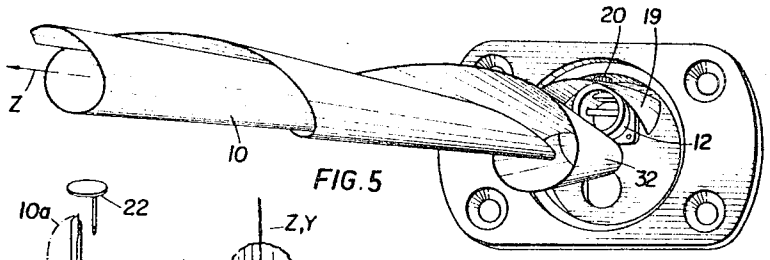


FIG.5

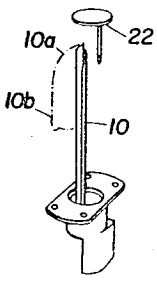


FIG.10

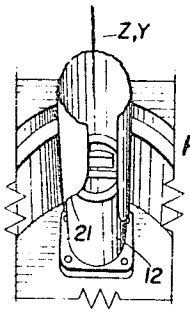


FIG.6

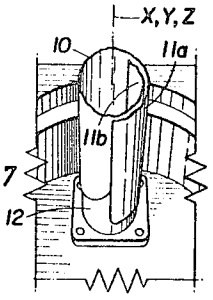


FIG.7

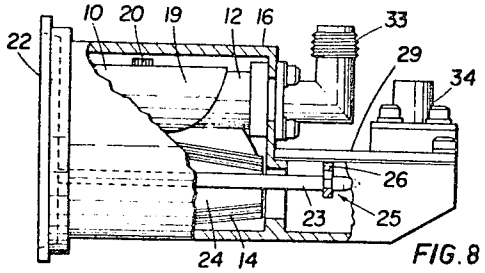


FIG.8

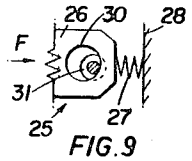


FIG.9

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AXIALLY PROJECTABLE STEM DEVICE

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Continuation-in-part of application Ser. No. 387,162, Aug. 3, 1964. This application June 14, 1965, Ser. No. 463,840

5 Claims. (Cl. 52—108)

This application is a continuation-in-part of my co-pending application Ser. No. 387,162, filed Aug. 3, 1964 and now abandoned.

This invention relates to an axially projectable stem device wherein the stem strip when free defines a thin walled tube having an overlap of about 180 degrees extending throughout the length thereof.

The art of flexible carpenters' rules and the like embodies stem devices in which the projectable strip in the free extended position is arched transversely but does not extend to overlap upon itself. Such strips may be coiled upon either of the convex or concave surfaces thereof about a transverse drum or container axis. Such devices are therefore projectable in their longitudinal direction at right angles to the coiling axis thereof in contrast to be projectable in the direction of the coiling axis as contemplated by this invention.

Another kind of carpenters' rule coiled strip device causes the strip to be taken off at a helical angle from the middle area of the coil strip and to maintain such angle throughout its projection such angle being of the order of about 30 degrees to 45 degrees. Such strips do not form a tube and are not as contrasted as with this present invention projected axially that is a direction of right angles to the longitudinal axis of the strip when coiled as set forth hereinafter according to this invention.

Also, in application Ser. No. 269,258 filed Apr. 1, 1963 issued to Patent No. 3,243,132 dated Mar. 29, 1966 and application Ser. No. 129,184 filed Aug. 3, 1961 now issued to Patent No. 3,144,104 dated Aug. 11, 1964 respectively. and issued to the same assignee as this instant application, the stem tube devices are coiled longitudinally about a lateral drum axis and are projectable in the longitudinal direction as contrasted with projection in the axial direction according to this invention.

It is an object of this invention to provide an axially projectable stem device in the form of a long thin strip formed into an overlapped tubular element heat treated into a circular or other self enveloping section in such manner that the edges of the metal overlap by about 180 degrees, and wherein said strip is coiled within itself against the force of its inherent spring energy to an inner coil form with the free end coiled innermost and an anchored end outwardly of the coil pivotally anchored in a post-like anchorage, thus to provide for swinging pivotal action of the anchorage region of said strip at the final position of projection thereof and rotation of said anchorage about said post and through substantially 90 degrees thereon for rigid anchorage of said strip on said post in the projected position axially at right angles to the longitudinal direction of said strip in the coiled position.

Other objects of the invention will be appreciated from a study of the following specification taken in conjunction with the accompanying drawings.

In the drawings:

FIGURE 1 is a perspective view of the stem device of the invention with the retaining cover thereof removed revealing the strip therein coiled for projection under its inherent spring energy;

FIGURE 2 is a sectional view on the line 2—2 of FIGURE 1;

FIGURE 3 is a view similar to FIGURE 1 illustrating the outward axially projecting motion of the strip during the initial stages of such projection;

FIGURE 4 is a sectional view on the line 4—4 of FIGURE 3;

FIGURE 5 is a further developed view of axial motion of the strip beyond the position of FIGURE 3 at a point at which the anchorage region of the strip is rotating about the anchorage pivot through 90 degrees;

FIGURE 6 is an enlarged perspective detail of the post region of the device as the strip reaches the final portion of the 90 degree swing of the anchorage end thereof revealing the wrapping function of the strip about the post;

FIGURE 7 is a view similar to FIGURE 6 illustrating substantial envelopment of the post by the strip for a firm anchorage of the stem strip in the extended position;

FIGURE 8 is a side elevation partly broken away in section to reveal the assembly of the components of the device of the invention when the stem strip is in the full storage position and retained in such position by a suitable latched cover retaining device; and

FIGURE 9 is an enlarged partial detail of a latch mechanism for retaining and releasing the stem strip retaining device; and

FIGURE 10 is a functional perspective view of the device of the invention illustrating the projection thereof.

In the drawings the axially projectable strip **10** of the invention is of a self-enveloped tubular form in the free state a shown partially in FIGURE 7 wherein portions **11***a* and **11***b* have an overlap of about 180 degrees in section and extending throughout the length of the stem strip. For purposes of this specification the term axis as applied to the stem strip is intended to define the longitudinal axis of the same when in the extended position, that is, the axis X of FIGURE 7 being coincident with the longitudinal axis Y of the anchorage post **12** when the strip is in the free extended position of FIGURE 7. In FIGURES 1 to 4 the longitudinal axis X of the strip is disposed at right angles to axis Y of the post, or more clearly expressed, the strip is longitudinally coiled within itself whereby its longitudinal dimension is at right angles to said post when in the coiled position with the outward end **13** freely nested innermost within a coil **14** of the strip material located between said post and inner surfaces **15** of the side wall **16** of cup structure **17** having a bottom or end wall **18** supporting said posts in close spaced relation K from said inner surface and eccentrically within said storage cup structure. A projection axis Z substantially parallel to post axis Y and located in the region of maximum distance between surfaces of the post and surfaces **15** of cup **16** may be sometimes described hereinafter as a lateral axis about which the coiled stem strip is axially projectable in a lateral direction with respect to its coiled state.

The anchorage end **19** of strip **10** is pivotally connected in a particular way to post **12**. Thus, the pivot pin **20** is located "eccentrically" that is to say, off-centre, a distance from the middle of the width dimension W of the strip and in the direction of desired axial projection. Observe that the terminal contoured edge **21** of the strip adjacent the cup end wall **18** and about post **12** is relieved or cut away to permit free rotation of the strip at the anchorage end about the pivot **20** through an angle of 90 degrees to the position indicated in the FIGURES 6 and 7. The eccentric dimension D will assist a free swinging of the strip about post **12** at the end of its outward motion.

The strip in coiled form is retained stored within the cup by a suitable cover **22** shown in FIGURE 8 having a locking rod **23** extending eccentrically therefrom substantially on axis Z through the coiled middle region **24** of the strip coil **14** to engage in the latch device **25**. In

FIGURE 9 a portion of latch device **25** comprises a latch arm **26** movable by a solenoid or manual actuating means against latching biasing pressure of spring means **27** from a suitable abutment **28** such as frame structure **29** of the device of the invention to cause the latching opening **30** of member **26** to engage in the annular recess **31** of rod **23**. Thus, actuation of member **26** in the direction of arrow F will unlatch the rod **23** permitting the cover **22** and rod thereof to be projected laterally and outwardly under the projecting biasing force of the self-emerging end region **13** of the strip coil **14** in the manner indicated in FIGURES 3 and 4. In the initial stages of coil projection no noticeable rotation of the anchorage end **19** of the strip about the anchorage pivot **20** appears to take place. Such rotation does, however, specifically take place upon emergence of the last inner coil **32** during the initial stage of such emergence at which point as indicated in FIGURE 5 the anchorage region **19** begins to progress through an angle of rotation about pivot **20** of 90 degrees. Such rotation is completed in the position indicated partially in FIGURE 6 at which the contour edge **21** begins to seek its enveloping relationship when the other edge of the strip and wherein the axis Z becomes coincident with the axis Y to achieve coincidence of all axes X, Y and Z in fully projected and self-enveloping position indicated in FIGURE 7 at which maximum rigidity of fully extended stem strip upon its anchorage post support is realized revealed in FIGURE 10 the retaining cover **22** flies free of extended strip **10**.

According to the invention and as evident from FIGURE 8 a suitable fitting **33** for communication of radio frequency signals may be supported by bottom wall of cup structure **16** and connected within post **12** to the anchorage region **19** of strip **10** through pivot member **20** or flexible connector as may be preferred by skilled persons. Fitting **34** on frame **29** preferably embodies means for actuation of the latch member **26** in response to an electrical signal. The stem device of the invention is preferred for use as a single operation device and for this reason does not embody mechanism for incoiling the strip though this may be done manually. The cover may be released in response to various signals or manual actuation. Such signals may be responsive to any one of a number of effects such as temperature, atmospheric pressure, gravity, light or other information or lack of information to cause the stem strip to be projected under its own inherent tension for the purpose of mechanically employing its physical spring energy or to utilize same as a sensing device for signals or other form of antenna.

The outer edge contour **10*a*** of the free end **13** of the stem strip is relieved parabolically as shown in chain lines in FIGURE 10. Thus edge **10*a*** assumes alignment with outer edge **10*b*** of the strip in the coiled position as shown in FIGURE 2 to bias and incline the innermost coil that is, the free end portion **13**, outwardly toward the container opening in the Z direction. If curve **10*a*** were on the other edge of the strip the latter would be biased for motion in the opposite direction.

It will be observed in the drawings that the stem strip of the invention is mounted with its concave surface next said anchorage post that is about the surfaces thereof and that the strip is coiled within its concave inward surfaces. It will be seen that the storage container is in the form of a cup-like structure having an end wall, a side wall and an open end the depth of the cup structure being substantially equal to the width of the strip at least in the form shown. The anchorage post in the cup is of a length conforming substantially to the depth thereof and is so rigidly mounted eccentrically with respect to the side wall as to define a storage coiling space for the strip therein. The location of the anchorage pivot for the stem strip is preferable in closest juxtaposition of surfaces of the anchorage post and inner surfaces of the cup.

It is intended that the present disclosure should not be construed in any limiting sense other than that indicated by the scope of the following claims having regard to the state of the prior art.

We claim:

1. An axially projectable stem device comprising: a stem strip of thin spring metal defining a tubular element having overlapping side edges when free; a storage container for said strip in the form of a cup-like structure having an end wall, a side wall and an open end the depth of said cup structure being substantially equal to the width of said strip at least, an anchorage post in said cup of a length conforming substantially to the depth thereof and rigidly mounted eccentrically with respect to the side wall thereof to define a storage coiling space for said strip therein; means pivotally connecting one end of said strip to said post; and releasable means for retaining the remainder of said strip coiled within itself within the storage space beside said post.

2. An axially projectable stem device comprising: a stem strip of thin spring metal defining a tubular element having overlapping side edges when free; a storage container for said strip in the form of a cup-like structure having an end wall, a side wall and an open end the depth of said cup structure being substantially equal to the width of said strip at least; an anchorage post in said cup of a length conforming substantially to the depth thereof and rigidly mounted eccentrically with respect to the side wall thereof to define a storage coiling space for said strip therein; means pivotally connecting one end of said strip to said post; releasable means for retaining the remainder of said strip coiled within itself within the storage space beside said post, said pivotally connecting means being located nearer said cup opening than the end wall thereof and at a point on said anchorage post of substantially closest juxtaposition of surfaces of said anchorage post and inner surfaces of said cup.

3. An axially projectable stem device comprising: a stem strip of thin spring metal defining a tubular element having overlapping side edges when free; a storage container for said strip in the form of a cup-like structure having an end wall, a side wall and an open end the depth of said cup structure being substantially equal to the width of said strip at least; an anchorage post in said cup of a length conforming substantially to the depth thereof and rigidly mounted eccentrically with respect to the side wall thereof to define a storage coiling space for said strip therein; means pivotally connecting one end of said strip to said post; releasable means for retaining the remainder of said strip coiled within itself within the storage space beside said post; and a contoured edge at the anchorage end of said strip relieved to provide for clearance of said strip with said end wall upon rotation of said strip on said pivot and to assist in envelopment of said anchorage post by said strip at the final stages of extending projection of said strip on said post.

4. An axially projectable stem device comprising: a stem strip of thin spring metal defining a tubular element having overlapping side edges when free; a storage container for said strip in the form of a cup-like structure having an end wall, a side wall and an open end the depth of said cup structure being substantially equal to the width of said strip at least; an anchorage post in said cup of a length conforming substantially to the depth thereof and rigidly mounted eccentrically with respect to the side wall thereof to define a storage coiling space for said strip therein; means pivotally connecting one end of said strip to said post; releasable means for retaining the remainder of said strip coiled within itself within the storage space beside said post; said pivotally connecting means being located nearer said cup opening than the end wall thereof and at a point on said anchorage post of substantially closest juxtaposition of surfaces of said anchorage post and inner surfaces of said cup; and a contoured edge at the anchorage end of said strip relieved to provide for clearance of said strip with said end wall upon rotation of said strip on said pivot and to assist in envelopment

of said anchorage post by said strip at the final stages of extending projection of said strip on said post.

5. An axially projectable stem device comprising: a stem strip of thin spring metal defining a tubular element having overlapping side edges when free; a storage container for said strip in the form of a cup-like structure having an end wall, a side wall and an open end; an anchorage post in said cup rigidly mounted eccentrically with respect to the side wall thereof to define a storage anchorage space for said strip between said post and said wall; means pivotally connecting one end of said strip to said post partially to envelop said post by concave surfaces of said strip, said strip being coilable thereby in

inner coiled relationship with respect to its concave surfaces to locate the other end of said strip innermost in said coil in the fully coiled position thereof within said coiling space.

References Cited

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