June 5, 1956 J. G. BAKER 2,749,153

SPRING DETENT COUPLING FOR TELESCOPED PARTS

Filed March 16, 1953

Fig. 1

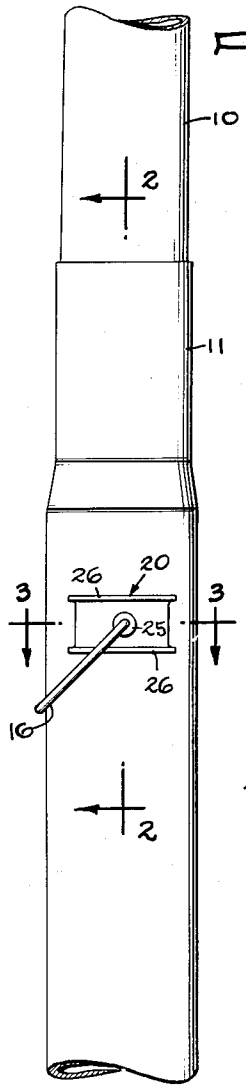



Fig. 2

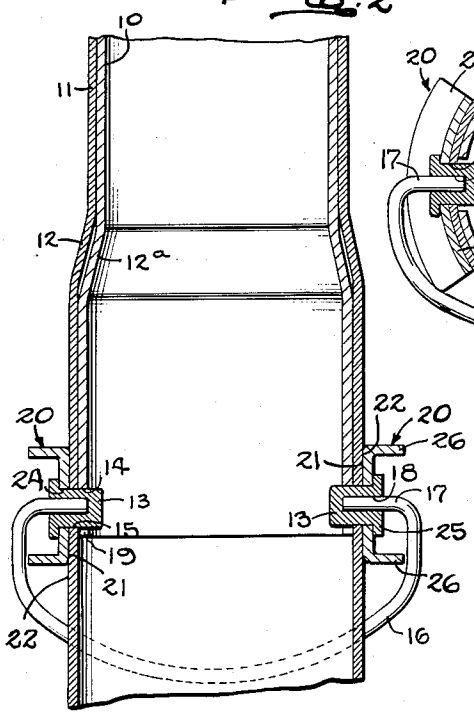



Fig. 3

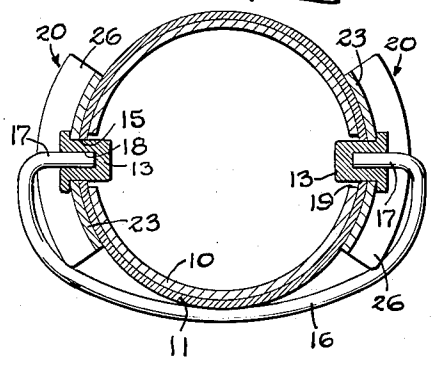



Fig. 4

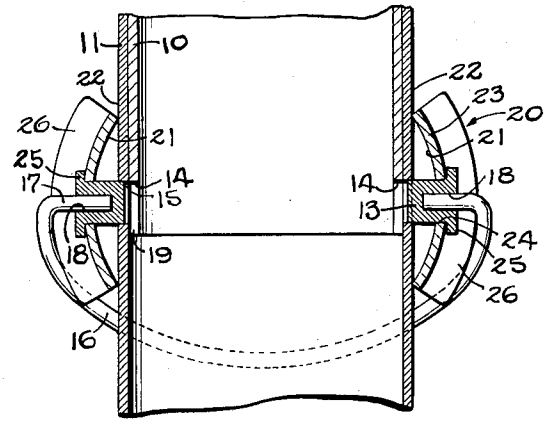
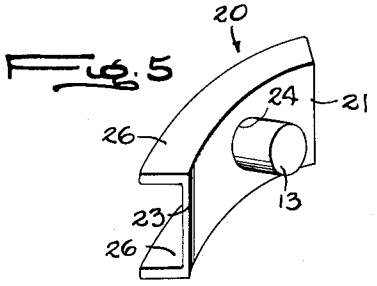



Fig. 5

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# SPRING DETENT COUPLING FOR TELESCOPED PARTS

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5 Claims. (Cl. 285—169)

This invention relates to a coupling for extendible structures having telescoped parts and, more particularly to structures having an elongated inner section telescoped within an outer tubular section and slidable outwardly to an extended position in which it is held by a coupling.

The general object is to provide for an extendible structure of the above character a new and improved coupling or joint which holds the inner section securely in the extended position, which is economical in construction and which permits the parts to be telescoped safely and easily.

A more detailed object is to hold the parts in the extended position by detents which project through holes in the outer tube and are yieldably urged into engagement with an abutment on the inner section and to move the detents out of engagement with the inner section by the cam action of cooperating surfaces on the outer tube and on releasing devices which are connected to the detents.

Another object is to cam the detents out of engagement with the inner section by a simple manual turning of the releasing devices.

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

Figure 1 is a fragmentary elevational view of an extendible mast employing the novel coupling of the present invention.

Fig. 2 is a fragmentary sectional view taken along the line 2—2 in Fig. 1.

Fig. 3 is a sectional view taken along the line 3—3 in Fig. 1.

Fig. 4 is a view similar to Fig. 2 showing the parts in a different position.

Fig. 5 is a perspective view of one of the releasing devices.

For purposes of illustration, the invention is shown in the drawings incorporated in an extendible mast comprising an inner tube **10** smaller than and telescoped within an outer tube **11** so as to slide within the latter from a collapsed or telescoped position to an extended position as shown in Fig. 1. Herein, both tubes are circular in cross section and tapered adjacent their ends as indicated at **12** and **12a** (Fig. 2) to prevent the inner tube as it is moved to the extended position from being removed from the outer tube.

To hold the inner tube **10** in the extended position, detents **13** supported by the outer tube **11** are urged inwardly so as to move in behind and engage abutments **14** on the inner tube thus preventing the latter from returning to the telescoped position. The detents project through holes **15** in the outer tube on opposite sides of the latter and may be urged into engagement with the abutments **14** by a generally semi-circular U-shaped bail **16** straddling the exterior of the outer tube. While the detents **13** may be formed by the inturned ends **17** of the



bail proper, it is preferred to use short headed studs having axial recesses **18** in their outer ends to receive the bail ends. The bail is stressed to contract the ends **17** toward each other so that, when the holes **15** are uncovered by the abutments **14** in the outward movement of the inner tube to the extended position, the detents **13** enter behind the abutments. Herein, the latter are the upper edges of notches **19** which are formed in the lower end of the inner tube (Figs. 2 and 3) and are slightly wider than the detents. Thus, in the extended position, the detents are received within the notches locking the inner tube against rotation.

In accordance with the present invention, a releasing device **20** is associated with each of the detents or locking members **13** and, by a novel cam action, cooperates with the outer tube **11** upon turning relative thereto to retract the detent at least out of locking engagement with the inner tube **10**. For this purpose, the releasing devices **20** have follower surfaces **21** engaging cam surfaces **22** on the exterior of the outer tube. In the present instance, the releasing devices are curved channel members having on the inner side of the web **23** an arcuate surface which, in the inactive position, lies alongside, mates with, and, in the form shown, fits snugly against the outside of the outer tube. Thus, the inner web surface constitutes the follower surface **21** and engages the exterior surface of the outer tube, the latter surface in this case forming the cam surface **22**.

To connect each detent **13** to its respective releasing device **20**, the detent is received in a centrally disposed hole **24** in the web **23** so that it projects inwardly from the middle of the follower surface **21**. The head **25** of the detent stud **13** is disposed against the outer side of the web to hold the detent in place with the projecting end of the stud extending beyond the follower surface a distance slightly greater than the combined thickness of the two tubes **10** and **11**. With this arrangement, the detents project in through the notches **19** when the releasing devices **20** are in the inactive position as shown in Figs. 2 and 3 and support the inner tube **10** in the extended position. The releasing devices **20** are restrained in the inactive position by the spring action of the bail **16**. As the releasing devices are turned, by a force sufficient to overcome the restraint, through a right angle to the active position illustrated in Fig. 4, the ends of the follower surface **21** ride out on the exterior surface **22** of the outer tube **11** moving the central portion of the web **23** away from the tube. As a result, the detents **13** are withdrawn from the notches **19** against the spring action of the bail **16** permitting the inner tube to be telescoped within the outer tube. Preferably, the length of the follower surface **21** is such that, when the releasing device **20** is in the active position, the detent **13** still projects into the hole **14** in the outer tube to retain the releasing device in place for turning back to the inactive position. The flanges **26** of the releasing devices project outwardly from the web **23** to provide a finger grip to permit the turning of the devices between the active and inactive positions to be effected manually.

In erecting the mast, the inner tube **10** is telescoped within the outer tube **11** and the releasing devices **20** are turned to the inactive position shown in Figs. 2 and 3 in which the arcuate cam and follower surfaces **22** and **21** are concentric. Then the outer tube is mounted in an upright position and the inner tube is slid upwardly toward the extended position. During such sliding the tapered portion **12a** of the inner tube engages the detents **13** and force the latter outwardly against the action of the bail **16** and, during the remainder of the upward sliding, the detents are held out by the inner tube. When the latter reaches the extended position, the holes **15** are uncovered permitting the bail to snap the detents in under

the lower end of the inner tube. Next, the inner tube is turned until the notches **19** are alined with the detents so that the tube drops down to the locked position shown in Fig. 2.

To disassemble the mast, first one releasing device **20** is turned through a quarter revolution to the active position shown in Fig. 4 so that the associated detent **13** is cammed out of its respective notch **19** and then the other releasing device is turned in a similar manner. With both detents withdrawn, the inner tube **10** is unlocked and may again be telescoped within the outer tube **11**.

It will be observed that the joint of the present invention is comparatively inexpensive to manufacture since it requires only a few parts and, at the same time, it locks the tubes **10** and **11** securely in the extended position. The cooperation of the spring action and the mating curved surfaces positively restrains the releasing member in the inactive position. With this joint, the tubes may be collapsed merely by turning the releasing devices **20** to the active position to cam the detents **13** out of engagement with the inner tube. Such turning may be effected easily by hand without the use of a tool to pry the detents out. Further, since the releasing devices hold the detents in the retracted position, they may be turned one at a time leaving the worker with one free hand to support himself.

I claim as my invention:

1. In an extendible structure, the combination of, an outer cylindrical tube, an inner tube telescoped within an end portion of said outer tube and shiftable outwardly to an extended position, diametrically disposed holes extending through said end portion and spaced from the end of said portion so as to be uncovered by the inner end of said inner tube in the outward movement of the same to said extended position, two members, one disposed adjacent each of said holes and each having a lateral projection extending into its respective hole, and a generally U-shaped bail straddling said outer tube and having inturned ends engaging said members and urging said projections inwardly so as to enter behind the end of said inner tube as the latter moves outwardly to said extended position, said members having arcuate inner surfaces normally lying snugly against the outer surface of said outer tube and positively restrained in place thereagainst by said bail while serving, when the members are turned about the axes of said projections by a force sufficient to overcome said restraint, as cams to retract said projections out from behind the inner end of said inner tube.

2. In an extendible structure, the combination of, a tube of arcuate cross section, an inner member telescoped in an end portion of said tube and shiftable outwardly to an extended position in said tube portion, said tube having angularly disposed holes extending through said end portion and spaced from the end of said portion so as to be uncovered by an abutment on said member in the outward movement of the latter to said extended position, a plurality of supports, one disposed adjacent each of said holes and each having a curved surface normally lying snugly against the outer surface of said tube, a lateral projection on each of said supports extending inwardly through said holes to enter behind said abutment as said members moves outwardly to said extended position, and means resiliently urging said supports against said tube to hold said projection in engagement with said



abutment and to restrain said supports in place against said outer surface while permitting the supports to be turned about the axes of said projections, when said restraint is overcome, thereby to cam the projections out of engagement with the abutment.

3. An extendible structure comprising, an outer tube having an arcuate cross section and two angularly disposed holes extending through an end portion thereof and spaced from the adjacent end of the tube, an inner tube telescoped within said end portion and shiftable outwardly from a telescoped position to an extended position in which said holes are uncovered by notches in the inner end of said inner tube, two detents, one projecting into each of said holes, a support for each of said detents, and a resilient member having its ends connected to said detents and yieldably urging the same into said holes so as to enter said notches as said inner tube moves outwardly to said extended position and prevent the inner tube from returning to said telescoped position, said supports having arcuate inner surfaces normally lying snugly against the exterior surface of said outer tube and positively restrained in place thereagainst by said resilient member, while operable when the supports are turned about the axes of said detents by a force sufficient to overcome said restraint to cam the latter out of said notches and permit said inner tube to be returned to said telescoped position.

4. In an extendible structure, the combination of, a tube having an inner and an outer surface and having holes through opposite sides, a resilient bail straddling said tube and having end portions turned inwardly and received in said holes, said bail tending to collapse to project the ends of said portions inwardly beyond the inner surface of said tube, and members journaled on said inturned portions and having surfaces coacting with a surface on the exterior of said tube to positively resist turning of said member and when said resistance is overcome during turning of the member to cam the end portion outwardly at least to said inner tube surface.

5. In an extendible structure, the combination of, an outer tube, an inner member telescoped within an end portion of said tube and shiftable outwardly to an extended position, a hole extending through said end portion and spaced from the adjacent end of said tube so as to be uncovered by an abutment on said member in the outward movement of the same to said extended position, an element disposed adjacent said hole exteriorly of said tube and having a part projecting laterally into the hole, means engaging said element and yieldably urging said part inwardly so as to enter behind the inner end of said member as the latter moves outwardly to said extended position, and cam and follower surfaces on said tube and said element coacting to positively resist turning of the latter and operable when the element is turned relative to said tube by a force sufficient to overcome said resistance to shift the part out from behind said abutment.

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