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TELESCOPING TUBE ASSEMBLY

Filed Aug. 26, 1966

Fig. 1

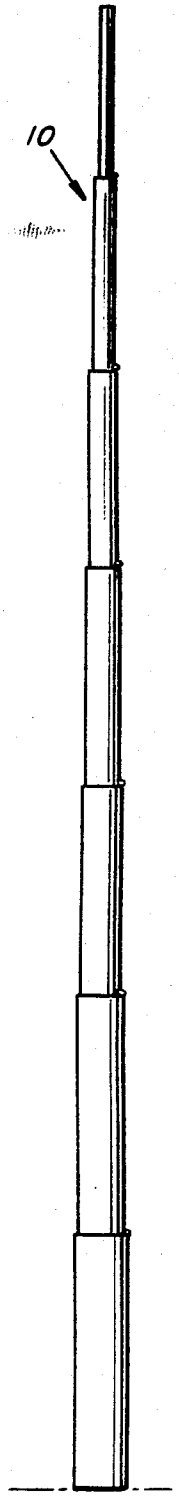


Fig. 2

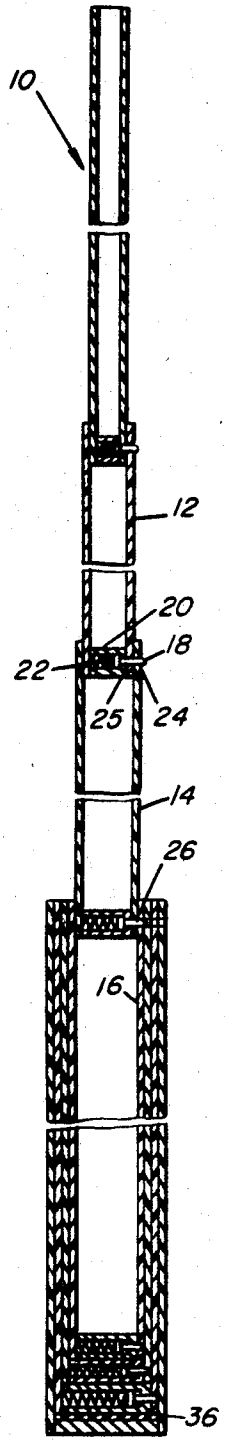


Fig. 3

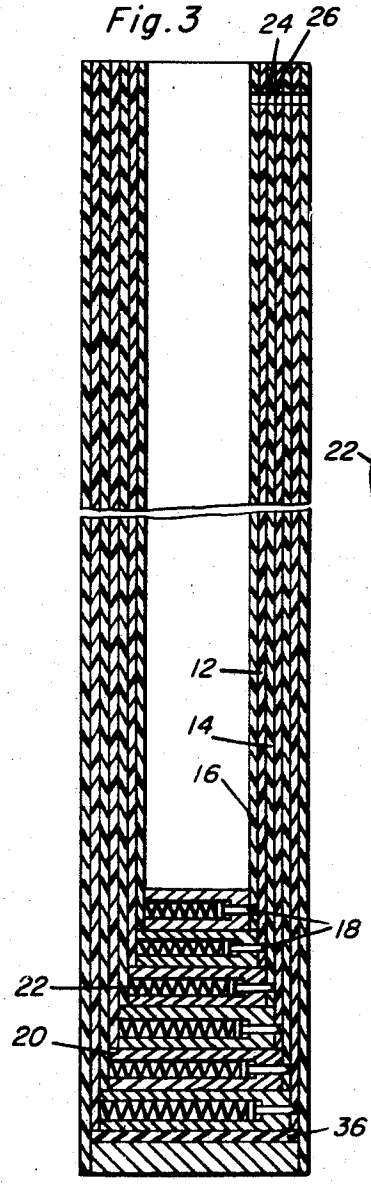
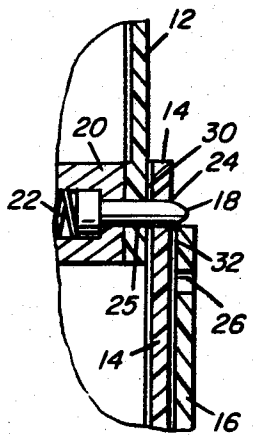


Fig. 4



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TELESCOPING TUBE ASSEMBLY

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The invention relates to a telescoping tube assembly and, more particularly, to such a tube assembly in which a plurality of tubes of varying diameter are arranged in a telescoping position and are adapted to be extended to provide a mast or the like of considerable height, and further adapted to be retracted while not in use.

Such assemblies are well known and have many uses, such as for fishing poles, game equipment, antenna masts and any other use where it is desired to erect a portable pole or mast of a considerable height, which can be disassembled easily into a package that is not bulky and can be easily transported.

In effecting an extension of a given tube of these known assemblies within its next outer tube, it has been common to utilize a spring based pin in the first tube which extends outwardly therefrom and into a hole provided in the next outer tube. When it is desired to retract the extended tube, the pin is manually pressed inwardly to a position without the hole in the next outer tube to enable the inner tube to be retracted into the outer tube. However, these known arrangemens suffer from several deficiencies.

Specifically, the tubes used in these type arrangements must be of a relatively small size since the pins are limited in the amount of weight they can support, mainly due to the fact that the distance which they can extend outwardly from the next outer tube while supporting a given tube is limited, since, otherwise, a binding would occur when the next outer tube itself is being retracted, and the pins would be chipped when contacting the top portion of the tube which receives the next outer tube.

Another problem encountered by the known arrangements is that these support pins, due to their shape, would tend to catch and pinch the hand or finger when a section was lowered.

A third problem occurring in these known arrangements is the occurring of a shock on the tubes when a given tube is retracted to the bottom of the assembly, which leads to an elongation of the holes of the tubes which are supporting extended tubes.

It is therefore an object of the present invention to provide a telescoping tube assembly which permits the pin supporting a given tube to extend outwardly from the supporting tube to provide additional support, while overcoming the disadvantages discussed above.

It is a further object of this invention to provide a tube assembly having support pins with a unique cam surface in order to permit the extending pin to be cammed inwardly during retraction of a given tube to prevent binding of the tubes, chipping of the pins, and chipping of the top of the next outer tube section.

It is a further object of this invention to provide a telescoping tube assembly which eliminates the shock occurring on the extended tubes when a given tube is retracted thus preventing elongation of holes in which the support pins extend.

Briefly summarized, the present invention provides a tube assembly having a plurality of telescoping tubes of varying diameter, all but one of which is provided with a spring urged pin in the bottom adapted to extend completely through a corresponding hole provided with a cam of the next outer tube. Each pin is provided with a cam surface which is cammed inwardly when the tube supporting a given tube is itself retracted into its next outer

tube, the camming occurring by engagement of the pin with the upper end of the latter next outer tube.

A plurality of horizontal slots may further be provided in the tubes in alignment with their pin receiving holes in order to maintain the tubes in axial alignment, and a rubber plug can be provided in the bottom of at least the outermost tube in order to absorb shocks occurring when each individual tube is retracted.

Further and other objects of this invention will become apparent from the description of the accompanying drawings in which like numerals refer to like parts.

FIGURE 1 is a perspective view of the tube assembly in an extended position;

FIGURE 2 is a vertical sectional view of the tube assembly depicting a portion of the tubes being retracted and a portion extended;

FIGURE 3 is a vertical sectional view of the tube assembly depicting the tubes in their retracted position; and

FIGURE 4 is an enlarged vertical sectional view, partially cut away, showing the cooperating parts as a tube is being retracted into its next outer tube.

Referring specifically to the drawings, FIG. 1 depicts the tube assembly, shown in general by the reference numeral **10**, in its extended position. The assembly comprises a plurality of individual tube sections which may vary in number and length according to height requirements. In the particular example shown, there are seven sections, each approximately 5 feet in length, this length varying slightly between tubes, as will be explained in detail later.

Referring specifically to FIG. 2, which depicts the assembly in a partially contracted position, tubes **12**, **14** and **16** and their associated components are shown by example, it being understood that the remaining tubes all are similarly constructed and arranged.

Referring specifically to tube **12**, which is shown in its extended position, there is provided a pin **18**, the head of which is cammed in a housing **20**, the latter being mounted flush with the bottom end of tube **12**. Spring **22** is disposed in housing **20** and urges the free end of pin **18** outwardly through a hole **25** in the lower portion of tube **12**.

As seen in FIG. 2, pin **18**, in the extended position of tube **12**, extends completely through a hole **24** provided near the upper end of the next outer tube **14**, the end of pin **18** extending a small distance outwardly from tube **14** to insure a more stable support of tube **12**.

The tubes may be of a varying length, the length of the tube **16** being greater than tube **14** by an amount corresponding to the distance housing **20** extends into tube **14**. In this manner, the upper ends of the tubes are flush when all of the tubes are in their retracted position, as shown in FIG. 3.

Also, due to the staggered length of the tubes, an inwardly camming of pin **18** of tube **12** is effected by engagement of this pin with the top end of tube **16** as tube **14** is telescoped inwardly into tube **16**. This camming is better shown with a reference to FIG. 4 and is aided by the tapered cam surface formed on the end of pin **18**, said surface being more clearly shown in FIG. 4. When tube **14** has been completely withdrawn into tube **16**, the bottom end thereof abuts the top of the housing of tube **16** and pin **18**, which has been cammed inwardly by engagement with the top end of tube **16**, will subsequently extend outwardly, under the action of spring **22**, into hole **26**.

It is thus seen by this arrangement, as the tubes are withdrawn in order from the lowermost to the uppermost, the pins which are supporting the next upper tube to the one being withdrawn will each be aligned within a series of holes including holes **24** and **26** of tubes **14** and **16**,

respectively, as shown in FIG. 3. This, of course permits the entire series of tubes to be retracted at the same location by a manual pressing inwardly of the pin of the tube to be retracted. For example, after tube **14** has been completely retracted, pin **18** will be aligned with the series of holes including holes **24** and **26** and can be depressed by manual pressure applied through these holes. Tube **12** will then be retracted and the pin of the next inner tube will align with these holes for retracting the latter tube, and so on.

As an alternate feature of the present invention, a longitudinal groove may be provided in each tube in alignment with the holes therein in order to provide a track in which the pin of the next inner tube rides when the inner tube is being retracted.

These grooves are shown in FIG. 4 by dotted lines **30** and **32** on tubes **14** and **16**, respectively, groove **30** being utilized to guide pin **18** when tube **12** is retracted into tube **14** and groove **32** being utilized to guide the pin (not shown in FIG. 4) of tube **14** as the latter is being retracted into tube **16**, to maintain the tubes in a constant axial relationship. As an added advantage of these grooves, it should be noted that just prior to tube **14** being completely retracted within tube **16**, as shown in FIG. 4, pin **18** will ride in that portion of groove **32** extending above hole **26**, which of course affords added stability to the entire assembly since groove **32** will have the pin of tube **14** riding in its lower portion as well as pin **18** riding in its upper portion.

It is also within the scope of the invention to vary the relative lengths of the housings **20** extending in one end of each of the various tubes in order to permit the other ends of the tubes to be flush when they are retracted. In this arrangement the tubes themselves may be of the same length, or they also may be of varying lengths, as discussed above.

As a further alternate feature of the present invention, a rubber plug **36** may be disposed in the bottom portion of the outermost tube, as shown in FIGS. 2 and 3. The plug may be of any reasonable thickness, for example ½", and will absorb a substantial amount of the shock caused by each tube as they are retracted into the outermost tube, thus minimizing shock on the various holes, as explained above.

While the foregoing assembly is described as a preferred embodiment of the invention, it is to be understood that certain changes, alterations, modifications and substitutions can be made without departing from the spirit and scope of the appended claims.

What is claimed is:

1. A tube assembly comprising a plurality of telescoping tubes of varying diameter, a spring urged pin located in the lower portion of all of said tubes but the outermost one, a hole formed through the upper portion of all of said tubes but the innermost one, the pin of a given tube adapted to extend completely through the hole of the next outer tube to maintain said given tube in an extended position, the end of each of said pins extending outwardly from the next outer tube and having a cam surface so that, when said next outer tube is telescoped within its next outer tube, said pin is cammed inwardly by the end of said latter next outer tube.

2. The assembly of claim **1** wherein said spring is disposed in a housing terminating flush with the lower end of each of said tubes, each of said tubes having a length varying from the length of its next outermost and innermost tube by an amount corresponding to the length of said housing so that, in a retracted position, the upper ends of said tubes are flush, and their holes aligned.

3. The assembly of claim **1** wherein an internal guide track is formed in all of said tubes but the innermost one, said track extending the length of each tube in alignment with said hole, the pin of a given tube being adapted to ride in the track of the next outer tube when extending and retracting said given inner tube to maintain said tubes in a constant axial relationship.

4. The assembly of claim **3** wherein, when said next outer tube is telescoped into its next outer tube, the pin from said given tube rides into a portion of the track of said latter next outer tube after being cammed inwardly by the end of said latter next outer tube.

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U.S. Cl. X.R.

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