Oct. 28, 1958 KARL-ERIK JOHANSSON 2,858,154

TELESCOPICALLY EXTENSIBLE TUBES

Filed July 20, 1953 3 Sheets-Sheet 1

FIG 1

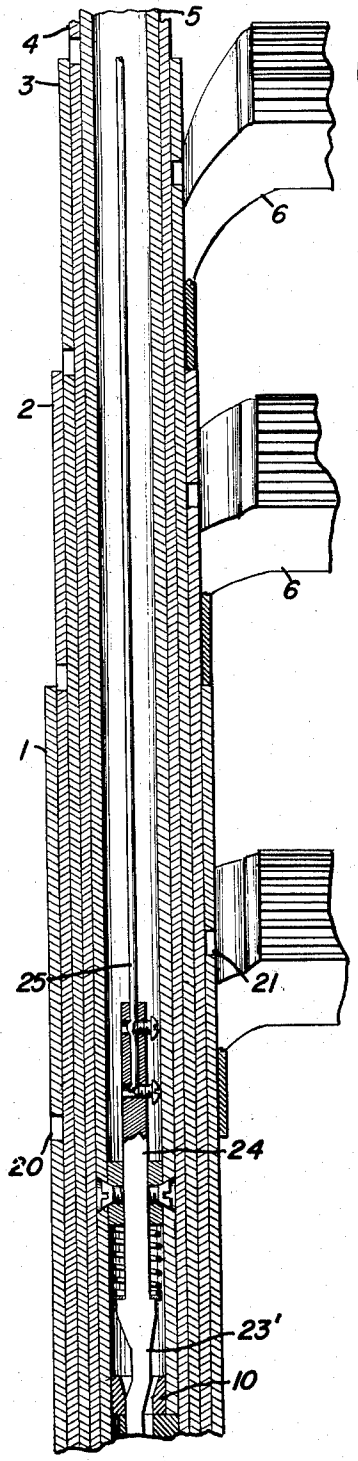
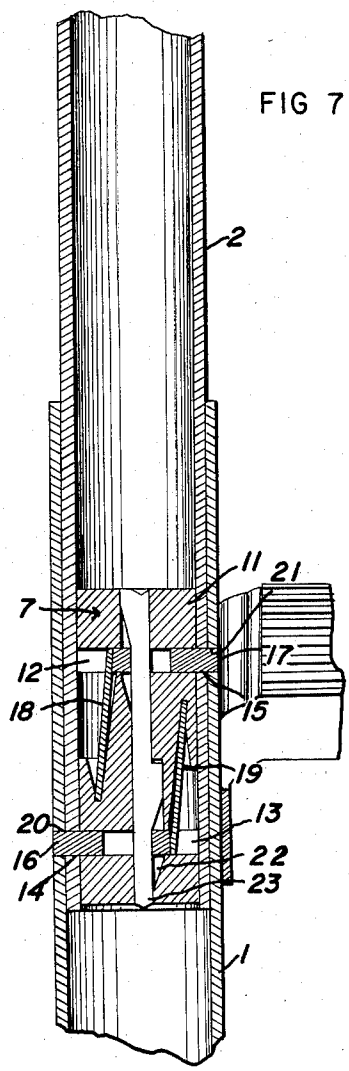


FIG 7



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TELESCOPICALLY EXTENSIBLE TUBES

Filed July 20, 1953 3 Sheets-Sheet 2

FIG 2

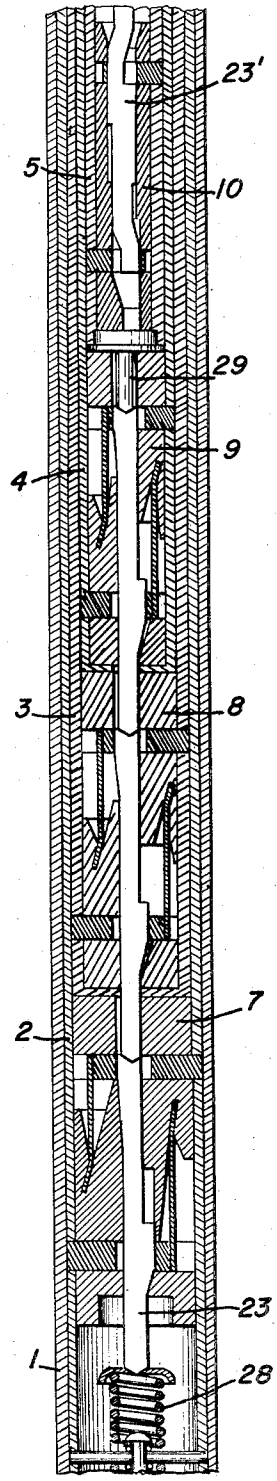


FIG 3

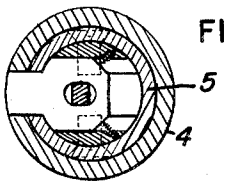


FIG 4

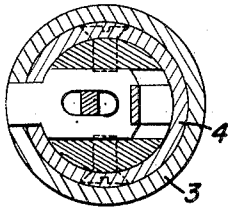


FIG 5

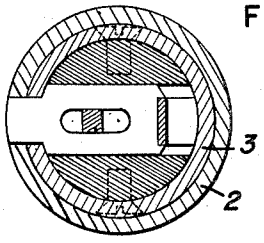
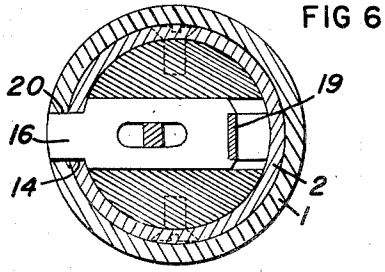


FIG 6



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TELESCOPICALLY EXTENSIBLE TUBES

Filed July 20, 1953 3 Sheets-Sheet 3

FIG 8

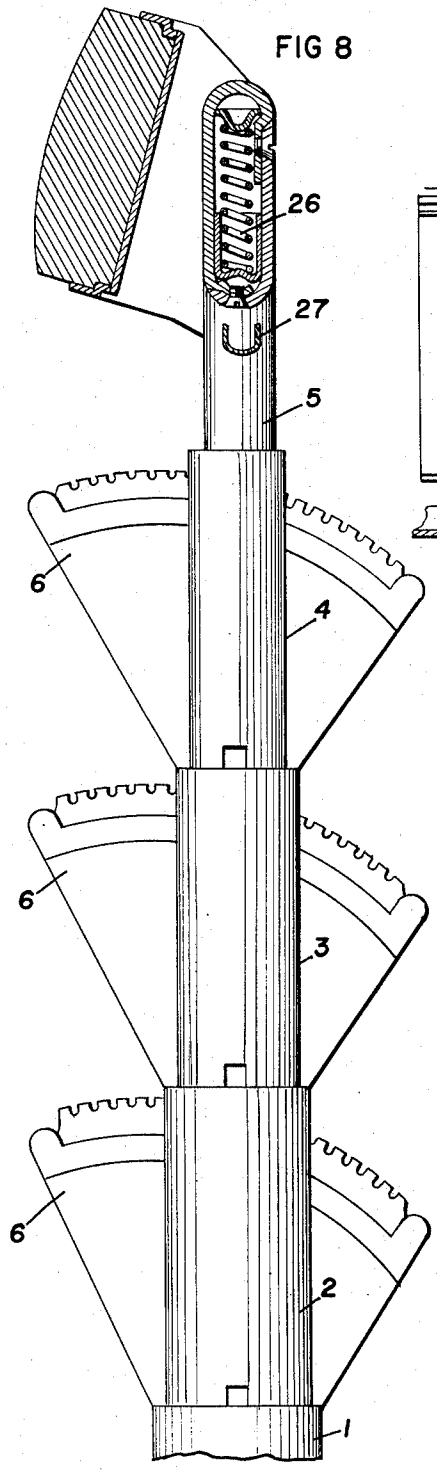
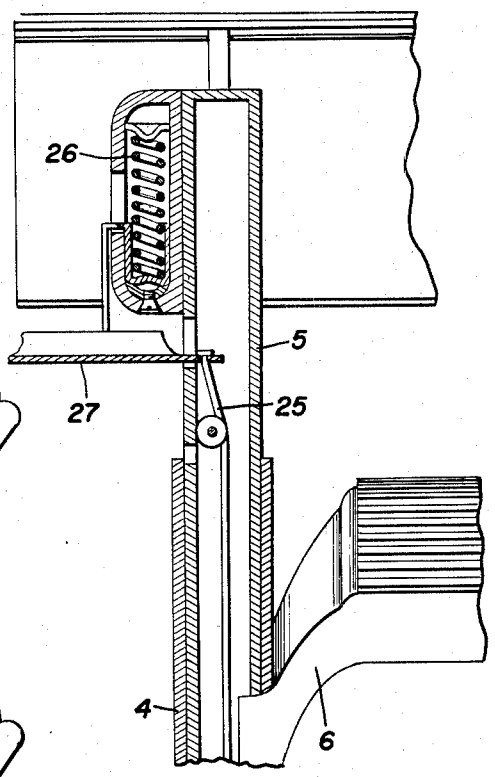


FIG 9



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United States Patent Office

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TELESCOPICALLY EXTENSIBLE TUBES

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Application July 20, 1953, Serial No. 369,101

Claims priority, application Sweden August 7, 1952

3 Claims. (Cl. 287—58)

This invention relates to improvements in telescopically extensible tubes and is especially intended for use in extension ladders, masts, tent poles and the like.

An object of this invention is to provide such telescopically extensible tubes as will ensure safe interlocking of the tubes in the extended position in that said tubes are provided at their lower ends with internal locking means that are adapted in the extended position of the tubes to engage in recesses at the upper ends of the tubes, thus providing a safe interlocking of the respective tubes in their extended positions.

Further objects and advantages will become apparent from the following description of a preferred embodiment of the invention as applied to an extension ladder, reference being had to the accompanying drawings, in which:

Fig. 1 is a longitudinal section of the upper part of one sidepiece of the ladder in the non-extended position thereof.

Fig. 2 is a longitudinal section of the lower part of the side piece of Fig. 1, and is substantially a continuation of the part shown in Fig. 1.

Figs. 3 to 6 are cross sections of four different locking means in their locking position.

Fig. 7 is a longitudinal section of two tubes in their extended and locked position.

Fig. 8 shows part of the ladder in its non-extended position and partly in section.

Fig. 9 is an enlarged front sectional view of the upper end of the ladder as shown in Fig. 8.

With reference to the drawings, the sidepieces of the ladder are constituted by a number of relatively telescopically extensible tubes 1 to 5, at the upper ends of which the ladder steps 6 are secured. Locking means 7 to 10 are arranged within the tubes 2 to 5 at their lower ends. Said locking means which are substantially of the same nature will be described more in detail in connection with Fig. 7.

The locking means 7 comprises a block 11 which is provided with two transverse recesses 12 and 13 which are arranged in register with corresponding holes 14 and 15 in the tube in which it is positioned, in Fig. 7 the tube 2, and which serve as guiding means for locking pistons 16 and 17. The holes 14 and 15 which are situated at different levels in the tube, are provided on diametrically opposed sides of the tube. Attached to each piston 16 and 17, respectively, is one end of a leaf spring 18 and 19, respectively, or a wire spring (see Fig. 3) while the other end of the springs are attached to the body 11 in such a way that the springs tend to move the pistons 16 and 17, respectively, out of the hole 14 or 15 in the tube 2 corresponding to the recess 12 or 13, so that when the ladder is extended the piston is urged into holes 20 and 21, respectively, at the upper end of the tube surrounding and telescoping over the tube containing the locking means, in Fig. 7 the tube 1, which holes register with the holes 14 and 15. The tube 1 is now interlocked with the tube 2.

The block 11 also has a longitudinal recess 22 for a cam member 23 which is disposed in said recess for movement between two extreme positions and which when it is moved from one end position in which the pistons 16 and 17 can engage in the holes 20 and 21, forces the pistons to be withdrawn from the holes 20 and 21 into the tube 2 so that they will be held within said tube 2 when the cam member is at the other extreme position.

The cam member 23' of the upper locking means 10 in the lower end of the smallest tube 5 has a prolongation 24 which is attached to one end of a wire 25 or the like the other end of which, being preferably passed over pulleys or the like, cooperates with a handle 27 which is in turn under the influence of springs 26. The cam member 23', although it is shaped similarly to cam 23, moves in the opposite direction to disengage pistons 16 and 17 and can be operated so as to move the pistons of the locking means 10 out of locking position by moving handle 27 to pull wire 25 upwardly.

At the lower end of the largest outer tube 1 there is secured a coil spring 28 which when the extension movement of the upper inner tube 5 has been started, moves the cam members 23 of the locking means 7 to 9 upwardly out of the position in which they lock the pistons. The action of spring 28 is transmitted through the cam members, which are aligned, their ends bearing against each other in the non-extended position of the ladder. This permits the pistons 16 and 17 to slide outwardly under the action of springs 18 and 19 and engage in the holes 20 and 21 when these holes come into alignment with the holes 14 and 15.

For collapsing the ladder the handles 27 are first pulled to move cams 23' and withdraw pistons 16 and 17 in tube 5 so that the tube 5 can be pushed into the tube 4. When the locking means 10 with extension member 29 extending downwardly therefrom abuts against the cam member 23 of the locking means 9, said cam member urges the pistons out of their locking position so that the tube 4 can be pushed into the tube 3, the cam member of the locking means 8 being actuated by the cam member of the locking means 9 etc. until the cam member 23 of the locking means 7 finally abuts against the spring 28 so that it is compressed. This is a prerequisite for said spring fulfilling, on extending the ladder, its task of moving the cam members of the locking means 7 to 9 out of the positions in which they lock the pistons.

The ladder can be constituted by two oppositely telescoping devices, the tube 1 being common to said two devices. This will be apparent to some extent from Fig. 2. In this case, a ladder step should be arranged at the juncture between the two telescopic devices.

The invention is not restricted to the embodiment described and shown. Thus, for instance the locking means and cam members can be varied in many different ways within the scope of the invention defined by the appendant claims. The device of the invention can of course be applied also within fields other than those mentioned.

What I claim and desire to secure by Letters Patent is:

1. In combination, a plurality of telescopically extensible tubes each having an outer and an inner end, the inner end of each tube being surrounded by the next larger tube and the outer end of each tube surrounding the next smaller tube when said tubes are in the extended position, a block in the inner end of each tube having at least one transverse bore therein, each of said tubes having an aperture in the inner end thereof aligned with said bore and each having an aperture in the outer end thereof alignable with said bore, a spring loaded

locking piston slidable in each of said bores, said blocks and pistons each having a central longitudinal aperture therein, a cam member slidable in each longitudinal aperture and bearing on the piston through which it extends for sliding said piston against the action of its spring loading, said cam members being aligned in the extended position of said tubes and contacting each other in the collapsed position of said tubes, and means on one of said tubes connected to one of said cam members for sliding said one cam member.

2. The combination as claimed in claim 1 and a spring in the inner end of the end one of said tubes and bearing against the cam member in the next tube urging said cam member to slide in the longitudinal aperture in the block of said next tube.

3. In combination, a plurality of telescopically extensible tubes each having an inner and outer end, the inner end of each tube being surrounded by the next larger tube and the outer end of each tube surrounding the next smaller tube when said tubes are in the extended position, the inner and outer ends of each of said tubes having an aperture therein, the apertures in the inner ends of said tubes being alignable with the apertures in the outer ends of the next larger tubes, a spring loaded locking member in the inner end of each of said tubes

and slidable transversely of said tubes into the aligned apertures, a cam member slidable in the inner end of each of said tubes and bearing on said locking member for sliding said locking member against the action of the spring loading, said cam members being aligned in the extended position of said tubes and contacting each other in the collapsed position of said tubes, and means on one of said tubes connected to one of said cam members for sliding said one cam member.

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