O. MACKENSEN.

TELESCOPIC TUBE.

APPLICATION FILED DEC. 15, 1909.

958,752. Patented May 24, 1910.

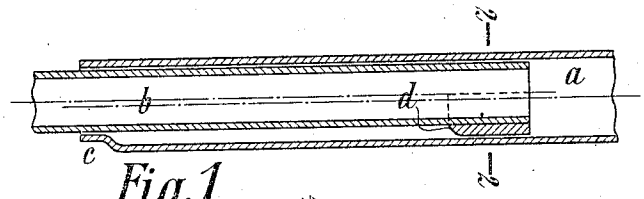

Fig. 1

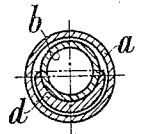

Fig. 2

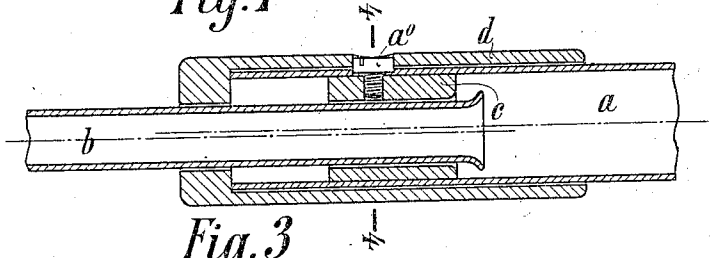

Fig. 3

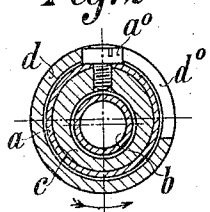

Fig. 4

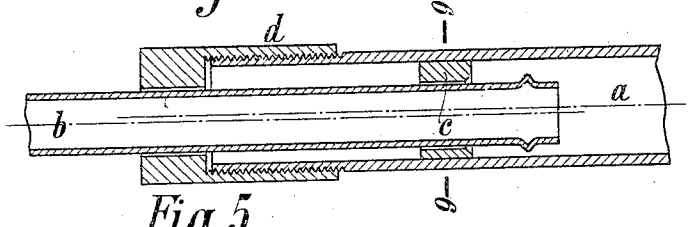

Fig. 5

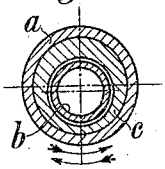

Fig. 6

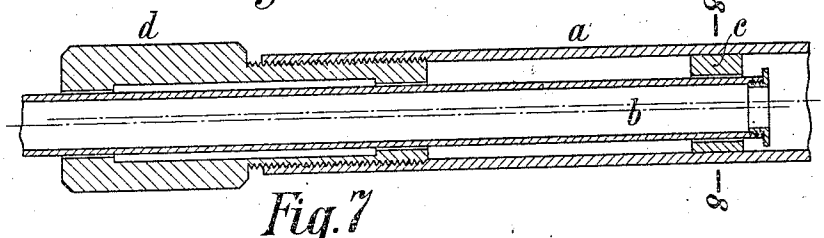

Fig. 7

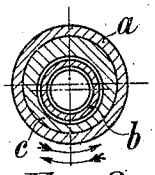

Fig. 8

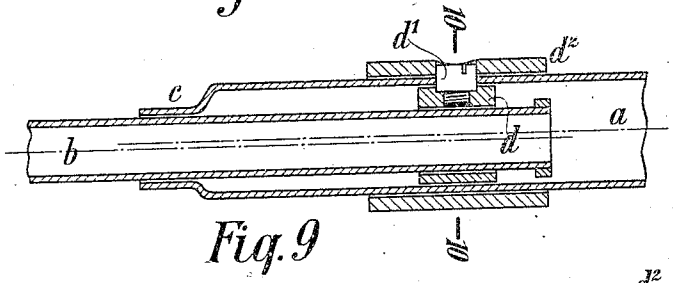

Fig. 9

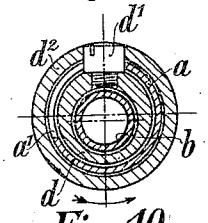

Fig. 10

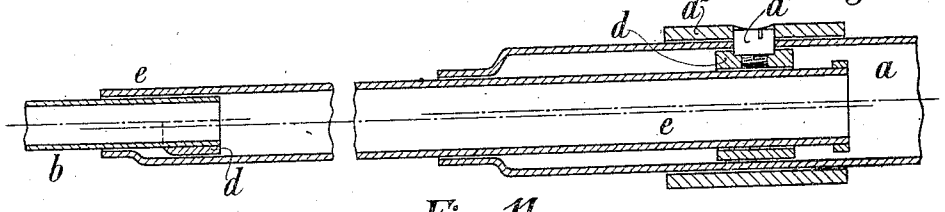

Fig. 11

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OTTO MACKENSEN, OF JENA, GERMANY, ASSIGNOR TO THE FIRM OF CARL ZEISS, OF JENA, GERMANY.

TELESCOPIC TUBE.

958,752. Specification of Letters Patent. Patented May 24, 1910.

Application filed December 15, 1909. Serial No. 533,164.

To all whom it may concern:

Be it known that I, OTTO MACKENSEN, a citizen of the German Empire, residing at Carl-Zeiss strasse, Jena, in the Grand Duchy of Saxe-Weimar, Germany, have invented a new and useful Telescopic Tube, of which the following is a specification.

The invention relates to telescopic tubes, for instance, such used as legs of stands, and consists in improved means for allowing the outer and the inner tube to be immovably jammed together in any one of their relative positions. For this purpose the outer tube is equipped with an eccentric surface for guiding the inner tube, and in addition thereto an eccentric annular body, which may be a sleeve, a simple ring or a sector of a ring, is located tightly around the inner tube and rotatably mounted by means of a concentric surface of the outer tube, so that it likewise brings about a position of the inner tube eccentric to that of the outer tube. When the eccentric surface of the annular body is in line with that of the outer tube, there is no obstacle to the telescopic movement of the tubes. Rotating the annular body tends to enforce another eccentric position of the inner tube than that prescribed by the guiding surface of the outer tube. Thereby the inner tube becomes slightly inclined to the outer tube, and in most cases both tubes, always the inner one, are slightly bent. The radial pressures connected with this deformation first cause the telescopic mobility to cease and thereafter, when the rotation of the annular body is continued, check even this rotation, so that both tubes and the annular body are jammed together.

In the annexed drawing: Figure 1 is a longitudinal section through a set of two telescopic tubes constructed according to the invention. Fig. 2 is a cross section on line 2—2 in Fig. 1. Fig. 3 is a longitudinal section through another set of two telescopic tubes. Fig. 4 is a cross section on line 4—4 in Fig. 3. Fig. 5 is a longitudinal section through a third set of two telescopic tubes. Fig. 6 is a cross section on line 6—6 in Fig. 5. Fig. 7 is a longitudinal section through a fourth set of two telescopic tubes. Fig. 8 is a cross section on line 8—8 in Fig. 7. Fig. 9 is a longitudinal section through a fifth set of two telescopic tubes. Fig. 10 is a cross section on line 10—10 in Fig. 9. Fig. 11 is a longitudinal section through a set of three telescopic tubes.

The example of Figs. 1 and 2 is particularly simple. The outer tube *a* surrounding partly the inner tube *b* is provided at its end with a one-sided contraction *c* so as to present an eccentric guiding surface to the inner tube *b*. The annular body *d* is a sector movably fitted in the outer tube *a*, but fixed with its eccentric inner surface to the end of the inner tube *b*. In this arrangement, the annular body *d* is rotated, from its loose position as shown to its jamming position and back, by rotating the inner tube *b*. As this body participates in the telescopic displacement of the inner tube, its distance from the eccentric guiding surface of the contraction *c* at the end of the outer tube varies. The shorter this distance is, the sooner, in rotating the inner tube *b*, the jamming position of the annular body *d* is attained.

Figs. 3 and 4 present the first example of a less simple arrangement, in which the annular body is an independent element of the structure. In this example the annular body *d* consists of a sleeve rotatably fitted on the outer surface of the outer tube *a* and presenting its innermost surface as an eccentric guiding surface to the inner tube *b*. The eccentric guiding surface of the outer tube is formed by the inner surface of a ring *c* fixed in the outer tube. To prevent the annular body *d* from being displaced along the outer tube, a transverse slot *d*° is provided in it, and a screw *a*° is so fastened in the outer tube, that the screw head serves as a peg projecting into the slot. One end surface of the slot and the screw head serve as stops, being in contact with each other in the loose position of the annular body *d*, in which as shown the eccentric guiding surface of the annular body and the eccentric guiding surface of the outer tube are in line with each other. As the distance between these two eccentric guiding surfaces does not vary with the telescopic position of the tubes, the angle through which the annular body is to be rotated from its loose position to its jamming position is always the same.

The example of Figs. 5 and 6 does not essentially differ from the preceding one except in the outer surface of the outer tube *a*, on which the annular body *d* is rotatably fitted, being formed as a thread. Thereby

special means for preventing the annular body from being displaced along the outer tube are dispensed with.

In Figs. 7 and 8 substantially the same arrangement is repeated, only the annular body d being furnished with the outer thread and the outer tube a with the inner thread.

In the example of Figs. 9 and 10, similarly as in the first one, the outer tube d carries the eccentric surface for guiding the inner tube b in a contraction c at its end. The annular body d is a simple eccentric ring located around the inner and within the outer tube. It is made accessible from without by the outer tube a being provided with a transverse slot a^1, a screw d^1 being fixed in the annular body d and its head projecting as a peg through that slot into a corresponding bore of an operating sleeve d^2. In this case also the screw head and one end surface of the slot act together as stops for marking the loose position of the annular body as shown.

In Fig. 11 on the right hand the structure of Figs. 9 and 10, on the left hand that of Figs. 1 and 2 is repeated. The median tube e represents the inner tube in the right structure and the outer tube in the left one. When the inner tube b is fixed and the annular body d^2 is rotated from its loose position as shown into its jamming position, also the median tube e is rotated and jammed together with the inner tube b. It will be understood, that this double effect would not be obtained, if also in the left structure the annular body were an independent element as in the right one.

I claim:

1. The combination of two cylindrical telescopic tubes and an eccentric annular body located tightly around the inner tube and adapted to be rotated concentrically to the outer tube, the latter tube being fitted with an eccentric surface for guiding the inner tube.

2. The combination of two cylindrical telescopic tubes and an eccentric annular body presenting a guiding surface to the inner tube and adapted to be rotated concentrically to the outer tube, the latter tube being fitted with an eccentric surface for guiding the inner tube and means being provided for preventing the annular body from being displaced along the outer tube.

3. The combination of two cylindrical telescopic tubes and an eccentric annular body presenting a guiding surface to the inner tube and adapted to be rotated concentrically to the outer tube, the latter tube being fitted with an eccentric surface for guiding the inner tube and means being provided for preventing the annular body from being displaced along the outer tube and from being rotated beyond the position, where its guiding surface is in line with that of the outer tube.

4. The combination of two cylindrical telescopic tubes and an eccentric annular body located around the inner and within the outer tube so as to present a guiding surface to the inner tube and be rotatable concentrically to the outer tube, the latter tube being fitted at its end with an eccentric surface for guiding the inner tube, a transverse slot being provided in the outer tube and a peg projecting through the slot being fastened in the annular body.

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RICHARD HAHN.