

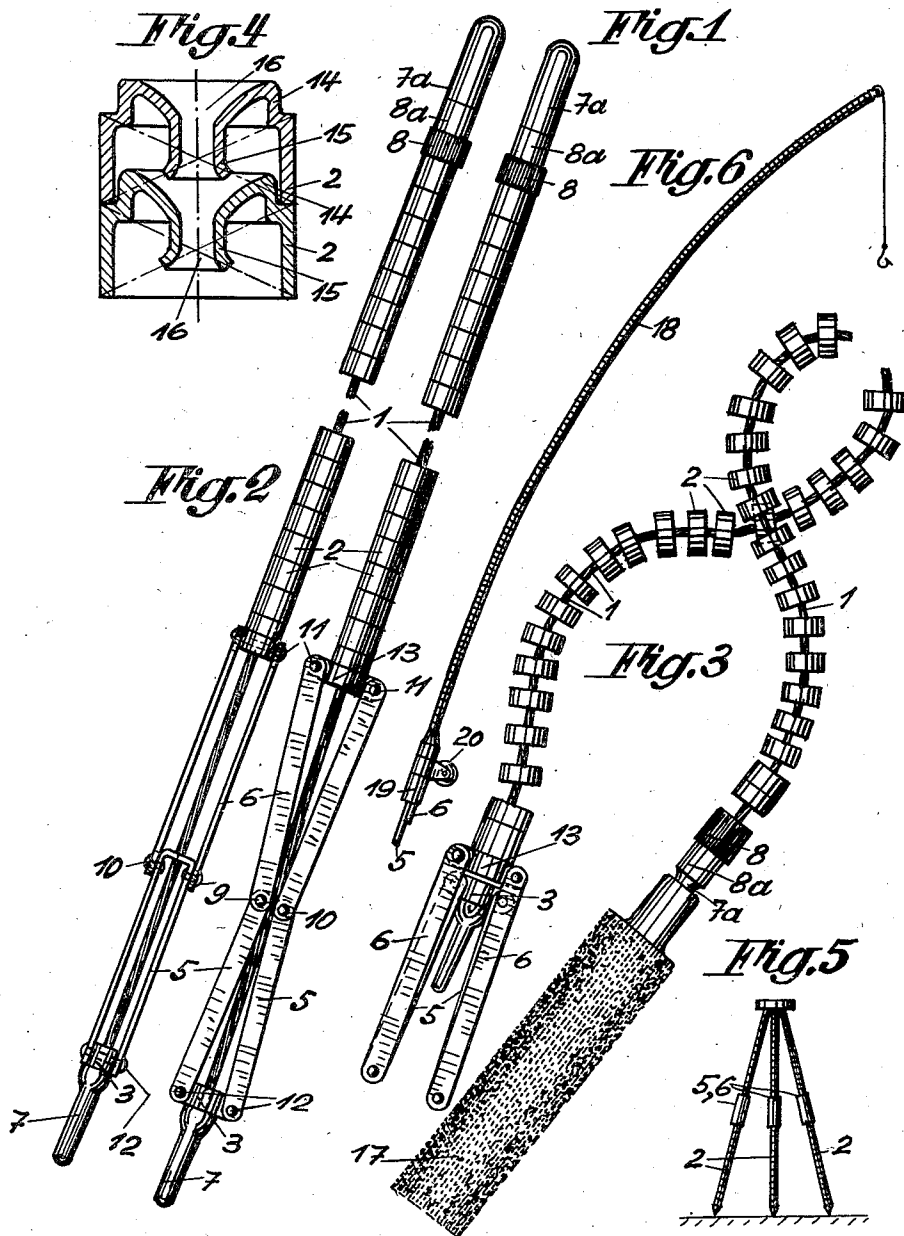
Feb. 11, 1958

W. SCHUSTER
COLLAPSIBLE DEVICE

2,822,896

Filed April 8, 1952

2 Sheets-Sheet 1



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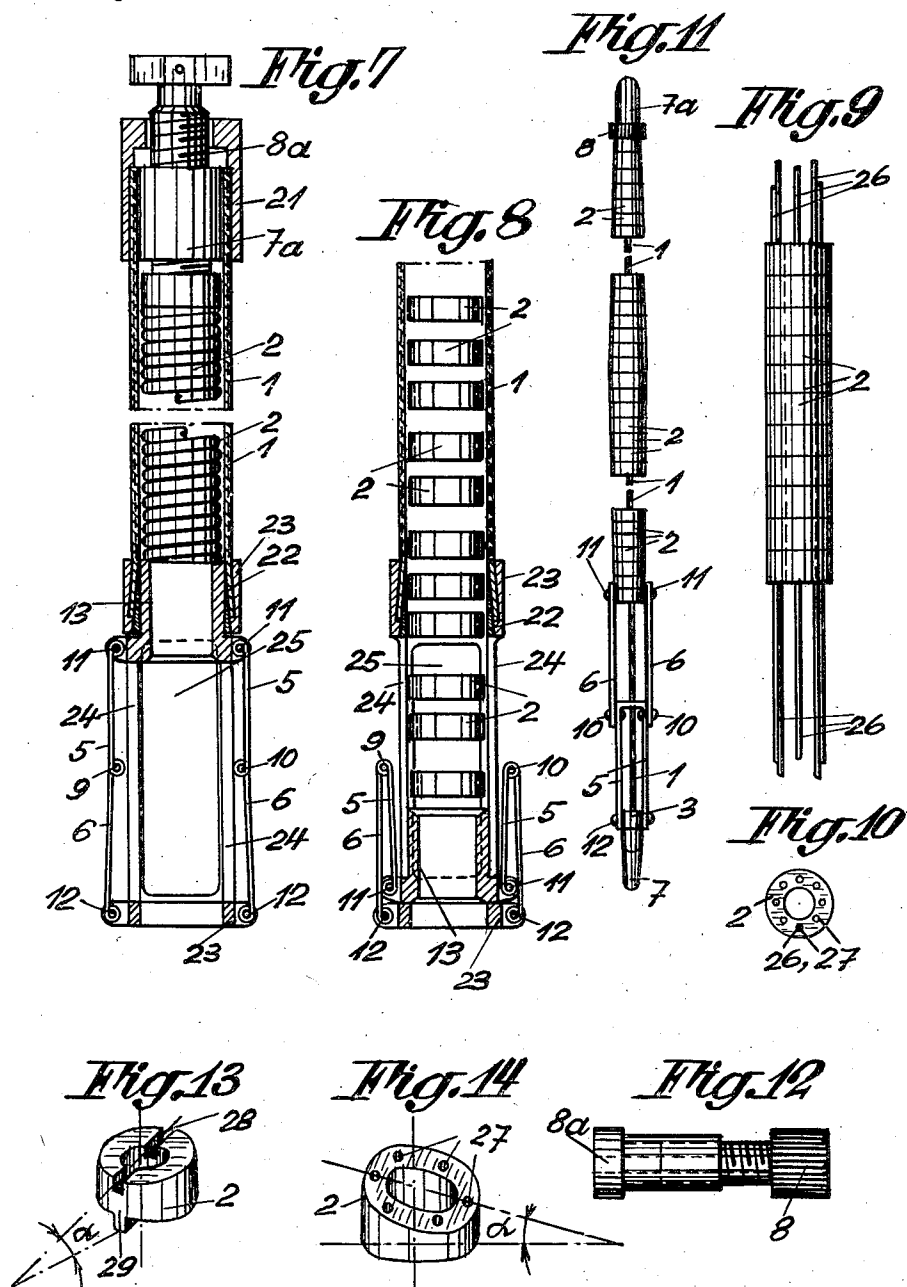
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COLLAPSIBLE DEVICE

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5 Claims. (Cl. 189—26)

This invention relates to a device which may be coiled and stretched.

The invention is based on the idea to form an element serving as a manual implement, a tool, carrier, support, or tension member, so that when out of use it may be coiled whereas for use it may be transformed into an article or element of construction which resists kinking and bending.

In toy design it has been suggested to form the limbs of a doll of single elements lined up on a string and to load the elements by a spring to stretch by its resiliency the string, which may relax on the slightest counterpressure. This leads to novel effects in toys but does not provide a safe element of construction for lack of the necessary requirements, consisting in the provision of an inelastic stretching device, which may be stretched out rigidly.

In accordance with the invention the idea underlying the same is realized thereby that an inelastic, flexible carrier, which may be stretched out and has rigid end stops, is combined with a number of spacers, which when the carrier is relaxed are aligned with such play as to permit of bending the carrier in all directions, and with an inelastic stretching device for clamping the spacers against each other and the end stops whereby the flexible carrier is stretched and the spacers are transformed into a load-resistant, rigid rod.

This principle may be embodied in two different types. In one type according to the invention, the inelastic, flexible and stretchable carrier consists of a rope, or another tension-resistant, flexible element, and the spacers consist of a number of compression members, which are lined up on the rope and may be pressed by the stretching device against the end stops of the rope, whereby the latter is stretched and the compression members are transformed into a rigid rod.

In the other type according to the invention, suitable particularly for high stresses, the inelastic, flexible and stretchable carrier consists of a flexible hose or the like, and the aligned spacers are a loose fit in this flexible hose and may be pressed against one another between the end stops by means of the stretching device stretching the hose.

In the drawing several embodiments of the device according to the invention are shown by way of example, in and out of use.

The first embodiment, consisting of a cleaning rod, is shown in Figs. 1 and 2 in two views in position for use, and in Fig. 3, with the cleaning instrument, in a relaxed position, out of use.

Fig. 4 shows by way of example two of the spacers in longitudinal section.

Figs. 5 and 6 show two further examples of the invention, applied to a tripod and a fishing rod, respectively, in diagrammatic views.

Figs. 7 and 8 show parts of two embodiments of a stick in longitudinal section, the stretching device being in stretching position and relaxed, respectively.

Figs. 9 and 10 show parts of an embodiment consisting

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of a rod, forming an element of construction and composed of several tension members having spacers lined up thereon, in elevation and top plan view, respectively.

Fig. 11 shows a rod of varying cross section, forming an element of construction.

Fig. 12 shows a spacer element, which consists of two parts that may be screwed one into the other to vary its length. Finally,

Figs. 13 and 14 show by way of example two embodiments of spacers having end faces including an acute angle with one another.

The stick shown in Figs. 1 to 3 consists of a tension-resistant rope 1 or another tension-resistant, flexible element of suitable material, a number of spacers 2 lined up thereon, a stretching device 5, 6, two end stops 7 and 7a affixed to the rope ends, and a spacer 8, 8a of adjustable length freely movably mounted on the rope, such as shown in Fig. 12, and formed of two parts which may be screwed one into the other. The stretching device may consist, e. g., of two pairs of stretching members 5, 6, which are jointed together in the middle by pins 9 and 10, and are pivotally connected by pivots 11 and 12 to an engaging piece 3 adapted to engage with the end stop 7, and to a clamping head 13. The pair of stretching members 5 is somewhat shorter than the pair of stretching members 6 so that when the stretching device is relaxed the rope 1 or the like will be slackened by the whole length of the pair of stretching members 5, as shown in Fig. 3. In this case the engaging piece 3 lies directly at the clamping head 13. Fig. 3 shows that when the stick is relaxed there will be a certain play between the several spacers 2, to provide between the spacers 2 sufficient space permitting of coiling the rope 1 together with the spacers 2, as desired. The total spacing between the spacers 2 corresponds substantially to the length of the rope part taken up by the stretching device. The tension of the rope and the force by which the spacers are compressed may be adjusted by the spacer element 8, 8a (Fig. 12).

To stretch the stick the stretching members 5, 6 are swung out toward both sides out of the position shown in Fig. 3 and the engaging piece 3 is pulled downwardly. Then the stretching members 5, 6 form a jointed parallelogram, which may be gripped with two fingers at the joints 9, 10 and may be compressed so that the joints 9, 10 engage and assume a re-entrant position inwardly of the stretching zones (indicated by dash-and-dot connection lines) to be secured against unintended relaxation. At the same time the rope 1 is stretched taut and under the pressure of the clamping head 13 the spacers 2 come close to each other. The taut rope 1 pulls with its end stops 7, 7a all spacers 2 firmly together so that a rigid rod of high resistance to kinking and bending is formed. These spacers 2 may be formed out of the solid, or may be pressed, stamped, or cast, of metal or a new synthetic material, e. g., a thermoplastic composition.

In accordance with Fig. 4 the spacers 2 may, e. g., be formed from a drawn sleeve 2 having a stepped cap 14, which is conformed to a guide nozzle 15 providing a cup-shaped guide passage 16. The cup-shaped guide is drawn inwardly to the middle, i. e., the middle of the sleeve body 2 and curves outwardly at the end. Thus the rope passing through the cup-shaped guide passage 16 of the cap 14 will engage the nozzle 15 at about half the length of the sleeve 2, which is thus given a theoretical pivot, about which it is movable in all directions, whereas it remains centrically aligned relative of the adjacent sleeve 2. The step on the inwardly drawn cap 14 of the sleeve 2 provides a free rim embracing the cap of the next sleeve 2 for a safe centric alignment therewith. This shape of the spacer 2 enables the simple manufacture thereof from thin, compression-resistant material and has the great advantage that it will not interfere with stretching

the stick, whereas in the stretched condition the latter will have a perfectly smooth surface. It is also possible to make the section shown of solid material, with the exception of the cup-shaped guide passage 16, from a thermoplastic synthetic composition; e. g., However, the spacers may also be formed from a sleeve of compression-resistant material, in combination with two rings or disks of synthetic material, which are inserted therein and provided with centric bores. The essential feature is always to ensure the curvature of the rope in the relaxed condition and the accurate relative alignment of the spacers 2 when the stick is stretched.

A stick so constructed may be formed in accordance with the purpose for which it is intended, as has been mentioned hereinbefore. One embodiment of the stick is shown in Figs. 1 to 3, discussed already. In this case one end stop 7a of the rope 1 may form a cleaning instrument, e. g., a cylindric brush 17 (Fig. 3). It is also possible to form the end stop 7a as a coupling member for such cleaning instrument 17; which in that case may be coupled by screwing, hanging, or fitting as with a bayonet joint. In this case the stick may be used for the cleaning of rifle barrels or all types of tubes.

When the rod is to be used in a tripod, the stretching device 5, 6 is suitably arranged not at the foot end, but, e. g., at half the length of the tripod between the spacers 2. Fig. 5 shows a tripod constructed in that way. Fig. 6 shows a rod forming a fishing rod 18, which at its lower end has a handle 19, out of which the stretching device 5, 6 protrudes, and has at the handle the usual reel 20 for winding the fishing line. When the stick is hollow, the fishing line may be passed through its cavity. This stick is curved. The curvature is achieved thereby that the end faces of the spacers are given an acute angle α , which depends on the radius of curvature. Thus the spacers form short segments. To ensure that these spacers 2 always remain in their proper position, they interlock, e. g., as shown in Fig. 13, by grooves 28 and tongues 29, in the stretched and relaxed conditions.

Another embodiment of the invention is shown in Fig. 11. This is an element of construction, the resistance of which to bending and kinking is increased thereby that it is provided at a point of its length subjected to highest stress, e. g., in the middle, with spacers larger in diameter than those at the ends so that a conical or double-conical element of construction results, which may be subjected to loads much higher than possible in the case of the previously described embodiments.

The second type according to the invention is shown diagrammatically in Figs. 7 and 8. On principle this type differs from the first in that the element subjected to the stretching tension of the stretching device is not a tension-resistant rope or the like, but a tension-resistant, flexible hose 1, which is of higher tensile strength and, moreover, has the advantage that it loosely encloses the spacers 2 and permits of a distribution of the clamping pressure on the spacers 2 in a manner much more favorable than in the case of the tension rope 1. This hose 1 may consist of tension-resistant fabric, wire mesh with or without covering or impregnation with a thermoplastic composition, rubber, or the like. It may also be formed out of a somewhat elastic material, such as rubber or a plastic synthetic composition, with or without flexible reinforcements. This hose 1 is closed on top by the end stop 7a, into which, e. g., an adjusting screw 8a may be screwably inserted to adjust the compression on the spacers 2. A clamping socket 21 holds the hose end firmly at the end stop 7a. The spacers 2 may be formed of solid disks, rings, or sleeves, or compression-resistant material. The spacers 2 may also be formed of the turns of a profile wire 2, of metal or any other compression-resistant material, which is helically wound and tends to open with relatively small resiliency to the normal lead. The wire profile may be round or angular. It is also possible to wind helically a compression-resistant

strip having a stepped cross-sectional profile, e. g., as used in gas hoses, so that the width of the strip exceeds the lead and the turns of the strip overlap with axial play by a certain, determinable measure.

The hose end facing the stretching device is clamped by a tapered clamping ring 22 to a guide sleeve 23, which carries the stretching device and serves as a guide for the push button 13 thereof and as a support for the stretching members 5, 6. The longer stretching members 6 are pivoted at the eyes 12 to the guide body 23 and are jointed to the short stretching members 5 by pivots 9, 10. The short stretching members are pivoted with eyes 11 to the clamping head 13, which consists of a slide sleeve axially displaceable within the guide body 23 and has two eye lugs passing through two longitudinal slots 24 of the guide body 23 for connection with the eyes 11 of the stretching members 5. The guide body 23 has in addition to the longitudinal slots 24 two opposed apertures 25 for the passage of the fingers, to permit of forcing the stretching members 5, 6 from the inside outwardly out of the stretching position. When the joints 9, 10 are provided with springs having legs bearing on the stretching members 5, 6 of the stretching device, the stretching members may swing out automatically and assume a preparatory position as soon as they are removed by hand out of the collapsed position shown in Fig. 8 so that thereafter the joints 9 and 10 need only to be pressed into the locking position shown in Fig. 7. The same applies to the collapsing of the stretching members into their inoperative position. The guide body 23 together with the stretching members 5, 6 forms a convenient handle, which owing to its hollow construction may form together with annular spacers a conduit for liquids directly, or may be provided with such conduit. E. g., a hose may be stiffened throughout its length of part thereof by pressure exercised on the stretching members.

As shown in Figs. 9, 10 the spacers 2 may be provided with a circle of holes 27, by which they are lined up on several flexible tension elements 26 arranged in a circle. In this case the tension elements 26 are fixed at the end stops 7, 7a and the clamping head 13 and the engaging piece 3 of the stretching device are slidably lined up on the tension elements 26. In this embodiment of the device it is also possible to use spacers 2 having end faces including an acute angle α , according to Fig. 14, to provide for a curvature of the whole device. If the spacers are provided with a central bore, the entire device may be used as a support for an electric conductor, a tension string, or a hose.

Finally it may be mentioned that the invention is not restricted to the embodiments shown but may be embodied with manifold modifications. Even the features of the examples mentioned may be exchanged amongst each other. The following examples may be given how the invention may be applied:

The device may be used as a baton, walking stick, slashing or pointed weapon, flagpole, e. g., for automobiles, as tension rod for the trailer, as make-shift support for all purposes, and in many other variations in conjunction with tools. The stretching device may also comprise a cam or eccentric.

Reference is made to applicant's U. S. Patent No. 2,688,426, issued on September 7, 1954.

I claim:

1. A supporting rod comprising, in combination, a tension-resistant flexible elongated carrier means; a plurality of body members attached to said tension-resistant flexible carrier means, at least two of said body members being arranged at and fixedly secured to the ends of said carrier means and constituting end members, each of said body members having opposite end faces adapted to abut against adjacent body members, the total length of said body members in direction of said tension-resistant flexible carrier means being shorter than the total length of said carrier means between said end members

by a fixed distance; and manually operable spacing means mounted on said tension-resistant flexible carrier means between one of said end members and one of said body members thereon and having ends abutting against said last-mentioned two members, respectively, said spacing means including two end pieces and a pair of toggle levers pivotally connected to said end pieces, each pair of toggle levers including two pivotally connected toggle levers of different lengths, said two pairs of toggle levers being movable between an inoperative position in which said end pieces thereof are in direction of said flexible carrier means at a distance from each other which is shorter than said fixed distance and in which the two toggle levers of each pair of toggle levers are folded upon each other and extend in direction of said flexible carrier means, and an operative position in which said end pieces are spaced at a distance equal to said fixed distance whereby in said operative position of said two pairs of toggle levers said carrier means is held in stretched position by said body members and said spacing means, while in said inoperative position of said spacing means said body members are spaced on said carrier means so that the same is unstretched and loose.

2. A supporting rod as set forth in claim 1 wherein said carrier means is a string means secured to said end members of said body members, and wherein the other body members are annular and beaded on said string means.

3. A supporting rod as set forth in claim 1 wherein said carrier means is a tubular carrier means, and wherein said body members are arranged within said tubular carrier means.

4. A supporting rod comprising, in combination, a tension-resistant flexible string means having a predetermined diameter; two end members fixed to the ends of said string means; a plurality of body members, each body member being formed with a central passage having the same predetermined diameter as said string means, said passage flaring at both ends thereof, each body member being formed at one end thereof with a recess bounded by an annular transverse abutment face, each body member having at the other end thereof a central projection adapted to fit into said recess of an adjacent body member, each body member having at said other end thereof an annular transverse abutment face surrounding said central projection for engaging the annular abutment face on said one end of an adjacent body member, said body members being beaded on said string means with said string means passing through said passages of said body members whereby the same are centered on said string means, the total length of said body members being shorter than the total length of said string means between said end members by a fixed distance; and manually operable spacing means mounted on said string means between one of said end members and one of said body members and having ends abutting against said last-mentioned members, respectively, said spacing means being constructed for manual adjustment between an inoperative position in which said ends thereof are in direction of said string means at a distance from each other which is shorter than said fixed distance, and an operative position in which the ends thereof are held at a distance equal to said fixed distance whereby during movement of said spacing means from said inoperative to said operative position, said body members slide on said string means until said projections thereof engage said recesses

whereby said body members form a rigid body and said string means is held in stretched position, while in said inoperative position of said spacing means said body members are spaced on said string means so that the same is unstretched and adapted to be coiled with said string means being curved along said flaring ends of said passages in said body members, said spacing means including two end pieces and a pair of toggle levers pivotally connected to said end pieces, each pair of toggle levers including two pivotally connected toggle levers of different lengths, said two pairs of toggle levers being movable to a contracted position in which said end pieces thereof are located adjacent each other and in which the two toggle levers of each pair of toggle levers are folded upon each other and extend in direction of said string means, and an expanded position in which said end pieces are spaced at a distance equal to said fixed distance.

5. A supporting rod comprising, in combination, a tension-resistant flexible elongated carrier means; a plurality of body members attached to said tension-resistant flexible carrier means, at least two of said body members being arranged at and fixedly secured to the ends of said carrier means and constituting end members, each of said body members having opposite end faces adapted to abut against adjacent body members, the total length of said body members in direction of said tension-resistant flexible carrier means being shorter than the total length of said carrier means between said end members by a fixed distance; manually operable spacing means mounted on said tension-resistant flexible carrier means between one of said end members and one of said body members thereon and having ends abutting against said last-mentioned two members, respectively, said spacing means including two end pieces and a pair of toggle levers pivotally connected to said end pieces, each pair of toggle levers including two pivotally connected toggle levers of different lengths, said two pairs of toggle levers being movable between an inoperative position in which said end pieces thereof are in direction of said flexible carrier means at a distance from each other which is shorter than said fixed distance and in which the two toggle levers of each pair of toggle levers are folded upon each other and extend in direction of said flexible carrier means, and an operative position in which said end pieces are spaced at a distance equal to said fixed distance whereby in said operative position of said two pairs of toggle levers said carrier means is held in stretched position by said body members and said spacing means, while in said inoperative position of said spacing means said body members are spaced on said carrier means so that the same is unstretched and loose; a handle means secured to said spacing means; and a tool means secured to the end of said supporting device remote from said handle means.

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