Dec. 15, 1953 L. C. ROSE 2,662,712

TELESCOPIC MAST

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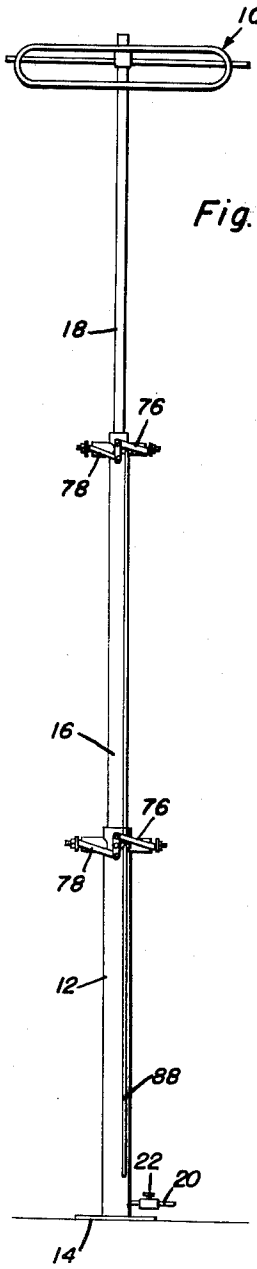


Fig. 1

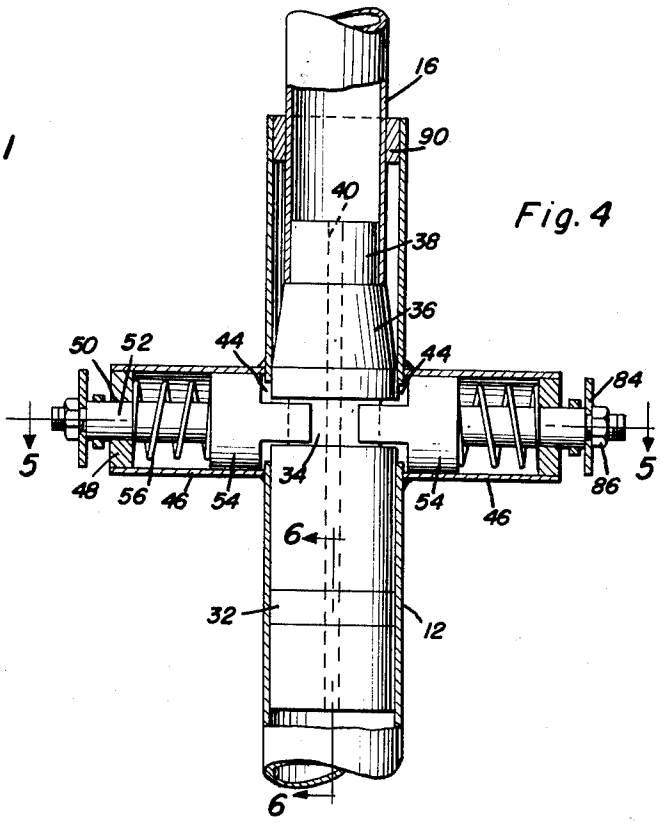


Fig. 4

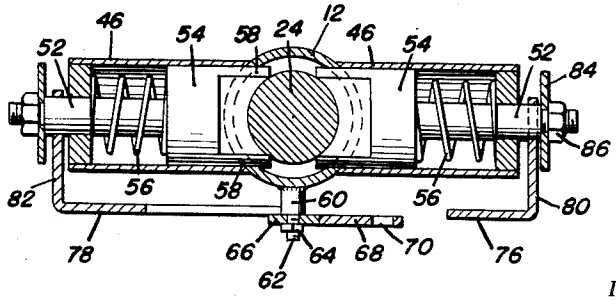


Fig. 5

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Fig. 2

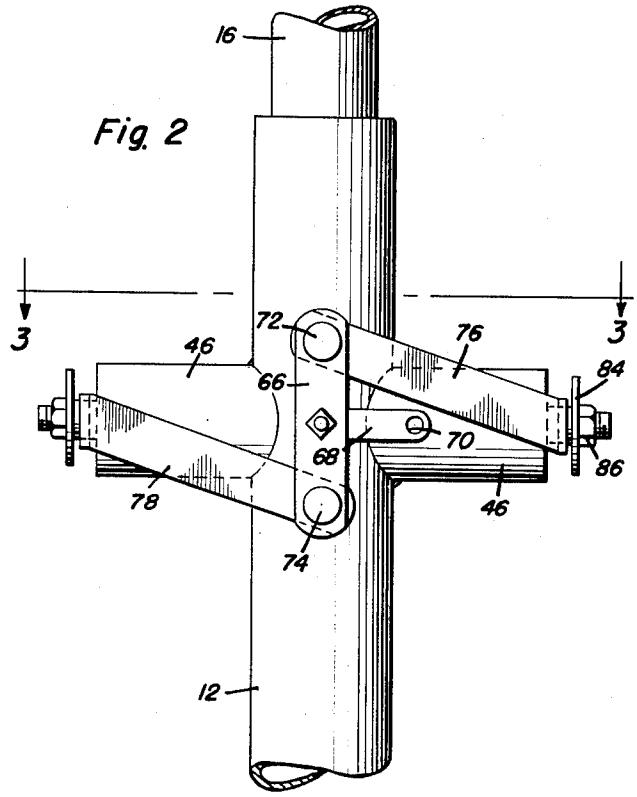


Fig. 7

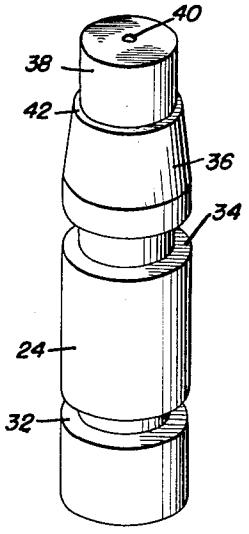
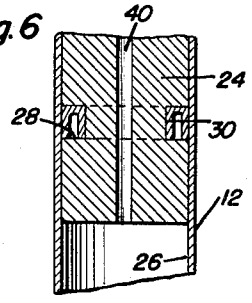


Fig. 6



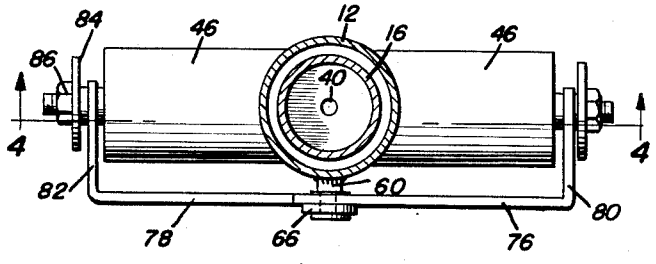


Fig. 3

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TELESCOPIC MAST

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Application September 21, 1950, Serial No. 186,044

3 Claims. (Cl. 248—161)

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This invention comprises novel and useful improvements in a telescopic mast and more specifically pertains to a vertically telescopic hydraulically actuated mast specifically adapted for use as a television aerial and the like.

The primary objects of this invention are to provide a mast suitable for television aerials and the like which shall be capable of vertical adjustment to varying heights; shall be capable of being securely locked in extended or adjusted position; may be readily released from its locked position when it is desired to collapse or lower the mast; and which have an improved hydraulic actuating means for raising or longitudinally extending the mast.

These, together with various ancillary features and objects of the invention, which will later become apparent as the following description proceeds, are attained by the present invention, a preferred embodiment of which has been illustrated, by way of example only, in the accompanying drawings, wherein:

Figure 1 is a side elevational view showing one embodiment of a telescoping mast incorporating therein the principles of this invention in its extended or raised position;

Figure 2 is a fragmentary side elevational view of a portion of the telescopic mast of Figure 1, showing in elevation the locking means together with a release mechanism for the same;

Figure 3 is a horizontal sectional view, taken substantially upon the plane indicated by the section line 3—3 of Figure 2;

Figure 4 is a vertical sectional detail view taken substantially upon the plane indicated by the section line 4—4 of Figure 3;

Figure 5 is a horizontal sectional view taken substantially upon the plane indicated by the section line 5—5 of Figure 4;

Figure 6 is a vertical sectional view taken substantially upon the plane indicated by the section line 6—6 of Figure 4; and

Figure 7 is a perspective view of a portion of one of the telescoping sections of the mast.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, it will be seen that a television aerial or the like and designated generally by the numeral 10 is mounted upon the upper end of a telescoping mast whose construction forms the subject of this invention.

Although it will be apparent from the following description that the essential and basic principles of this invention may be incorporated in

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masts which have any desired number of telescoping sections, the same has been illustrated in connection with a mast consisting of three telescoping sections as constituting a preferred construction and one which may be more readily and simply described in the drawings and description as to its construction and principles of operation.

As illustrated in Figure 1, it will be apparent that the telescoping mast consists of an outer cylinder member 12 which constitutes the bottom or base member of the mast and which may be conveniently provided with a foot plate 14 or the like, together with a second member 16 which is telescopingly and slidingly disposed within the outer member 12, and an inner member 18 which is slidably received in the second cylinder member 16. It is to the upper end of the member 18 that the television or other aerial 10 is secured in any desired manner, which forms in itself no part of the present invention.

The outer cylinder member 12 is of course of greater diameter than the other cylindrical members and is provided with a cylindrical chamber in its interior which is open at its upper end to slidably receive the second cylindrical member 16. Adjacent its bottom end, the outer member 12 is in communication with a source of fluid pressure such as hydraulic or water pressure from any desired source, by means of a conduit or pipe 20, under the control of a manual valve indicated at 22. The second cylindrical member 16, as will be especially apparent from Figure 6, is provided with a closed lower end which consists of a cylindrical body 24 constituting a piston slidably received in the cylindrical chamber 26 formed in the outer cylindrical member 12. A fluid tight seal is established between the piston 24 slidable within the outer member 12 as by means of an annular groove 28 formed in the circumference or periphery of the body 24 and in which groove is seated a sealing ring 30 of any desired construction. This body 24, as shown more clearly in Figure 7, may be provided with a plurality of circumferentially disposed annular grooves 32 and 34 which constitute locking recesses as set forth hereinafter, and in its upper end the body has a conical tapered portion 36 surmounted by a cylindrical diametrically reduced portion 38. An axially disposed bore or passage 40 extends throughout the body from its upper to its lower end. The cylindrical portion 38 joins the conical portion to provide an annular shoulder 42 upon which rests the lower end of the tubular, cylindrical second member 16, as shown

more clearly in Figure 4. Obviously, the lower end of the member 16 will be secured fixedly in any desired manner as by welding, screw-threading or the like upon the cylindrical member 38 and abutting and resting upon the shoulder 42 thereof. The above mentioned axial bore 40 thus establishes communication between the chamber 26 formed in the outer cylinder 12 and the interior of the second cylindrical member 16.

Preferably the inner cylindrical member 18 has its lower end slidably received within the cylindrical chamber formed within the tubular sleeve like second cylindrical member 16, the lower end of the member 18 forming a piston which may have a sealing means such as that shown in Figure 6 to establish a fluid tight sealing engagement between the member 18 and the member 16. However, the bottom wall of the member 18 is imperforate, rather than being provided with a bore such as that at 40 and described in connection with the lower end of the member 16.

As so far described, it will be apparent that by admitting pressure fluid from the line 20 under the control of the valve 22 into the bottom of the cylinder or chamber 26 and the outer member 12, that the fluid will flow upwardly through the bore 40 and into the chamber within the member 16, until the member 18 is raised therein to its uppermost limit. When the member 18 has been raised to its fullest extent, the continued inflow of pressure fluid will then raise the second cylindrical member 16 until the latter is also at its fullest extent, whereby the entire telescoping mast will be extended to its greatest height. Obviously, by releasing the pressure fluid, reverse operation will occur and the mast members or sections will telescope or collapse under their own weight, until the mast is in its collapsed or lowered position. Any suitable means may be provided to effect the desired collapsing operation as for example by permitting a back flow through the conduit 20 past the valve 22; or by any other pressure release means, as desired.

While as above described, the pressure of the pressure fluid itself may be sufficient to securely maintain the mast in its vertically adjusted and extended position, it is preferred to provide a positive lock to more effectively insure the secure extension of the mast.

For this purpose, a locking device is provided for the lower end at each of the two inner mast sections for positively locking the same to their immediately adjacent outer mast section when the corresponding sections are in their extended position. Since the construction of these locking means is identical, the showing of Figures 2–5 is considered to be applicable to both of the locking members illustrated in Figure 1 and a description of this locking means is to be understood as being directed to the construction of both or all of the locking means provided.

Adjacent the upper end of the same, the outer cylindrical member 12 is provided with diametrically disposed slots 44, and oppositely and diametrically disposed cylindrical sleeves 46 are welded or otherwise secured to the exterior of the member 12 and over these slots 44. These sleeves are provided with outer closure plugs or heads 48 of any desired character, and which are apertured as at 50 to receive the stem portions 52 of slides 54 which are slidably received within the cylindrical members 46. Compression springs 56 are disposed between the heads 48 and the slides 54 to yieldingly urge the slides inwardly of the cylinders 46, that is radially inwardly of the outer cylindrical member 12. At their inner ends, the slides 54 are provided with yoke members or fingers 58 which extend through the slots 44 and bear against the adjacent cylindrical outer surfaces of the member 16, the conical portion 36, and the body or piston member 24, until the locking grooves 32 or 34 register with the forks 58, at which time the springs 56 urge these forks into the locking recesses, thereby positively preventing any vertical movement of the member 16 and its body portion 24 with respect to the outer cylindrical member 12. As will be readily understood, any desired number of locking recesses 32, 34 may be provided in order to permit the telescoping mast to be positively locked in various vertically adjusted positions.

As will now be readily understood, as the mast sections are raised, the locking means will be automatically biased by the springs 56 to locking engagement as soon a a locking recess is disposed in transverse alignment with the oppositely disposed locking forks 58 of the opposed slides 54.

In order to withdraw the locking means from engagement with the locking recesses, and thereby to permit vertical adjustment between the various locking recesses as well as to permit collapsing or lowering of the mast, the lock releasing means is provided. This means, disclosed more clearly in Figures 2 and 5, comprises a laterally projecting boss 60 extending from the side of the outer cylindrical member 12 and perpendicular to the opposed cylinders 46, which boss has extending therefrom an externally threaded stud 62 having a lock nut 64 thereon. Pivoted on this stud, and intermediate its ends, is a lever 66 having a crank arm 68 rigidly attached thereto and provided with an aperture 70 at its outer end. At its opposite ends, the lever 66 is pivotally connected as by pivot pins 73 and 74, at their outer ends with a pair of links 76 and 78 respectively whose outer extremities are provided with perpendicular end portions 80 and 82 which are apertured to embrace the extending ends of the stem portions 52 of the slides 54, suitable washers 84 and nuts 86 being provided for securing the ends 80 and 82 to the stems 52.

It will now be apparent from Figure 2 that when oscillatory motion is imparted to the arm 68, the member 66 will be rocked about the stud 62, and to the links 76 and 78 will cause an outward sliding movement of the slides 54 in the cylinders 46 thereby withdrawing the locking fingers or yokes 58 from engagement with the locking recesses.

A pull cable or the like, as indicated at 88 in Figure 1, is secured to the aperture 70 in the arm 68 to permit operation of the lock releasing means.

Obviously, various and suitable sealing means may be provided between the telescoping sections, as suggested by the sealing or packing gland 90, see Figure 4, disposed between the members 16 and 12.

As will be readily understood, it will be impossible for the fluid or hydraulic pressure to force any of the sections out of the section which the same is slidably received, since as soon as the piston end of the inner section passes the locking member slots 44, the fluid pressure will vent through the same and thereby prevent further outward movement of the inner section.

From the foregoing, the construction and operation of the device will be readily understood and

further explanation is believed to be unnecessary. However, since numerous modifications and changes will readily occur to those skilled in the art after a consideration of the foregoing specification and accompanying drawings, it is not desired to limit the invention to the exact construction shown and described, but all suitable modifications and equivalents may be resorted to, falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. A telescoping mast comprising an outer member constituting a base for said mast, an inner member slidable in said outer member, means for applying fluid pressure into said outer member and below said inner member to cause relative sliding movement, a guiding and locking member having a reduced portion received in and secured to the inner member, said guiding and locking member having an outer diameter substantially equal to the inner diameter of said outer member, an annular groove in said guiding and locking member, spring actuated latch means mounted on said outer member and passing through the wall thereof to engage in said annular groove, said latch means being mounted on said outer member in fluid tight relation.

2. A joint between telescoped tubular members comprising an outer tubular member, an inner tubular member having an end received within said outer tubular member, a guiding and locking member having a reduced portion received in said end and secured thereto, said guiding and locking member having an outer diameter equal to the inner diameter of said outer tubular member, an annular groove in said guiding and locking member, diametrically opposed spring actuated latch elements mounted on said outer tubular member and passing through aligned openings in the wall thereof to engage in said annular groove, link means for simultaneously releasing said latch elements, said link means including a first link pivotally connected at its center to said outer tubular member, a second link pivotally connected to ends of said first link and to said latch elements, said first link being provided with a remotely controllable actuating arm.

3. A joint between telescoped tubular members comprising an outer tubular member, an inner tubular member having an end received within said outer tubular member, a guiding and locking member having a reduced portion received in said end and secured thereto, said guiding and locking member having an outer diameter equal to the inner diameter of said outer tubular member, an annular groove in said guiding and locking member, diametrically opposed spring actuated latch elements mounted on said outer tubular member and passing through aligned openings in the wall thereof to engage in said annular groove, link means for simultaneously releasing said latch elements, said link means including a first link pivotally connected at its center to said outer tubular member, a second link pivotally connected to ends of said first link and to said latch elements, said first link being provided with a remotely controllable actuating arm, said latch elements having major portions thereof guidingly mounted in closed sleeves carried by said outer tubular member, said latch elements being in fluid-tight relation relative to said outer tubular member, said second links being connected to portions of said latch elements extending beyond said sleeves.

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