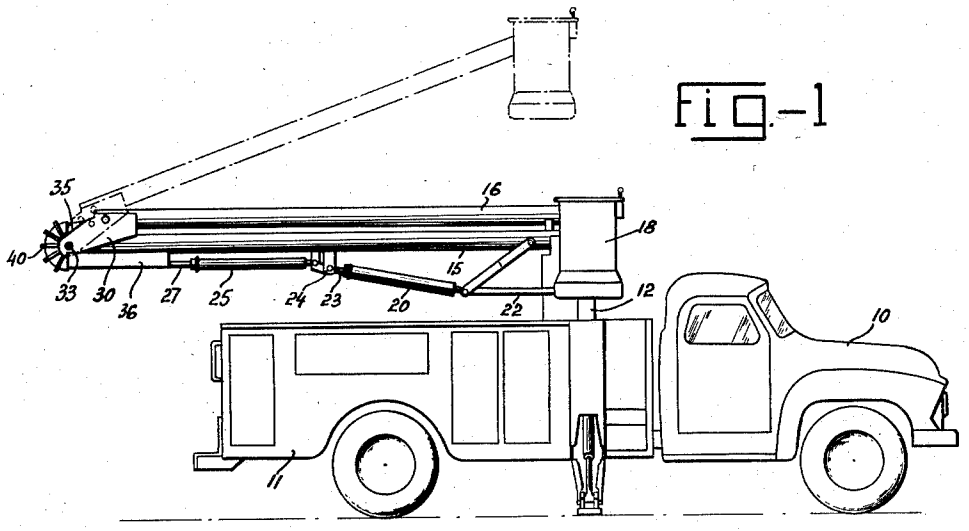
July 8, 1958 H. J. TROCHE 2,841,998

ARTICULATED APPARATUS

Filed Aug. 27, 1956 2 Sheets-Sheet 1

Fig.-1



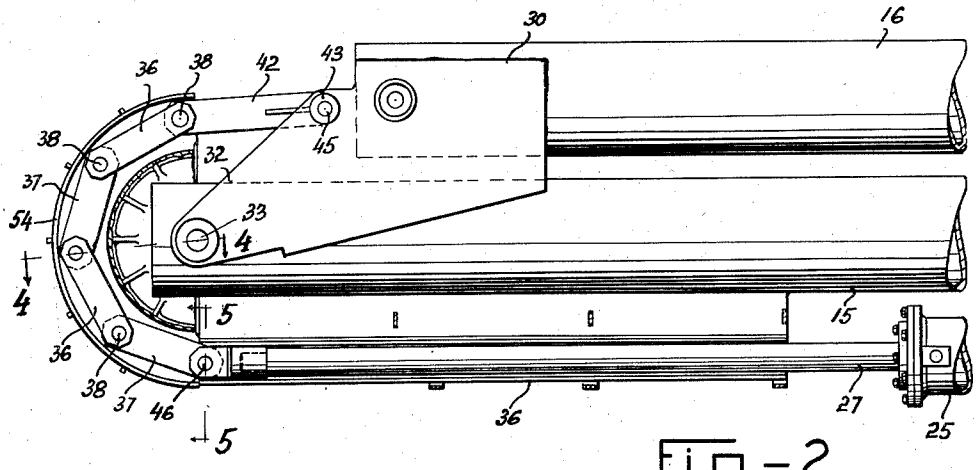
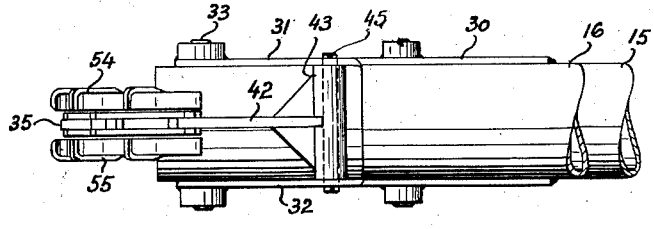


Fig.-2

Fig.-3



INVENTOR.
HERMAN J. TROCHE
BY
Bates, Teare & McBeau
ATTORNEYS

July 8, 1958 H. J. TROCHE 2,841,998

ARTICULATED APPARATUS

Filed Aug. 27, 1956 2 Sheets-Sheet 2

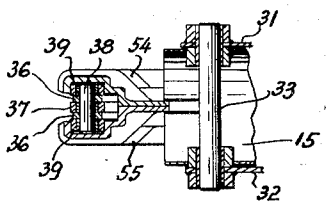


Fig. – 4

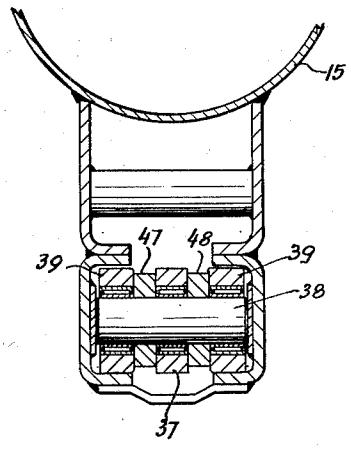
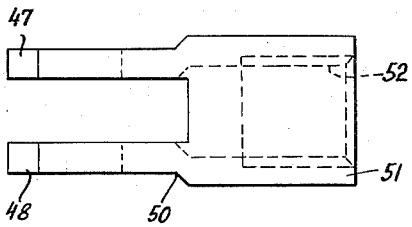


Fig. – 5

Fig. – 6



INVENTOR.
HERMAN J. TROCHE
BY
Bates, Teare & McBean
ATTORNEYS

United States Patent Office 2,841,998 Patented July 8, 1958

2,841,998

ARTICULATED APPARATUS

Herman J. Troche, Fairview Park, Ohio, assignor to The J. H. Holan Corporation, Cleveland, Ohio, a corporation of Ohio

Application August 27, 1956, Serial No. 606,287

6 Claims. (Cl. 74—99)

This invention relates generally to articulated apparatus such as a mobile aerial tower having a pair of tower sections pivotally interconnected with one another to provide access to over head traffic light, street lamps and similar objects for installation, maintenance and repair. More particularly, the invention is directed to an improved articulated connection which may be advantageously used between relatively movable members such as relatively movable tower sections for selectively tilting one of the sections relative to the other.

Aerial towers of the type indicated require simplicity and economy of construction without sacrificing efficiency or mobility. The tower should be capable of unrestricted articulation throughout its operating range with a minimum of extraneous controls to prevent over-running and uncontrolled operation. The connection between the articulated tower sections should be self-contained to reduce maintenance and service.

Accordingly, it is a principal object of this invention to provide an articulated connection between relatively movable tower sections which is under continuous control of an operator throughout the operating range.

Another object of this invention relates to the provision of an improved articulated connection between relatively movable tower sections which is self-contained and capable of holding the tower sections in any selected position relative to each other throughout their operating range.

A further object of this invention relates to the provision of an improved articulated connection between relatively movable tower sections which is simple and economical in construction and which requires a minimum of maintenance and service.

The foregoing and other objectives will become more apparent in connection with the following detailed description and briefly are accomplished in accordance with this invention by mounting a reciprocable power-actuated device on one tower section and flexibly interconnecting the device with the pivoted tower section in such manner that reciprocation of the device will tilt the pivoted tower section about the pivot axis. The flexible interconnection includes a plurality of interconnected links which are movably disposed within an arcuate guide carried by said one tower section to provide a self-contained power-driven articulated connection between the pivoted tower sections.

In the drawings:

Fig. 1 is a side elevation of a utility vehicle carrying an articulated aerial tower and illustrating in dotted lines one tilted position of the upper tower section;

Fig. 2 is an enlarged view of the power-driven articulated connection between the tower sections;

Fig. 3 is a top plan view on a somewhat reduced scale of the articulated connection of Fig. 2;

Fig. 4 is a partial sectional view taken along the line 4—4 on Fig. 2 of the drawings;

Fig. 5 is a partial sectional view taken along the lines 5—5 in Fig. 2 of the drawings; and

Fig. 6 is a plan view of a coupling member for connecting the flexible link assembly to a piston rod.

Referring now more particularly to Figs. 1 and 2 of the drawings, there is shown a wheeled utility vehicle 10 having a truck body 11 which supports a vertical mast 12. The upper portion of the mast 12 may be rotatable and supports an articulated tower assembly which includes a pair of tower sections 15 and 16 pivotally interconnected in end to end relation. The upper tower section 16 carries a work platform 18 at its outer extremity and the lower tower section 15 is pivotally connected to the rotatable mast for tilting movement in a vertical plane. The work platform 18 is in the form of an enclosed box-like structure which is preferably supported in cantilever fashion from the upper tower section 16 in such manner that as the tower sections 15 and 16 are tilted in a vertical plane the work platform 18 can be maintained level for any tilted position.

The lower tower section 15 is tilted on the mast 12 by means of a fluid-actuated piston motor 20 which has one end anchored to a bracket 22 on the mast 12 and a piston rod 23 pivotally connected at its extremity to a bracket 24 mounted intermediate the ends of the lower tower section 15. The tower upper tower section 16 is tiltable relative to the lower tower section 15 by means of a fluid-actuated piston motor 25 which has one end pivotally connected to the bracket 24 and a piston rod 27 connected at its extremity to a flexible member forming part of the articulated connection between the tower sections and coacting therewith to cause controlled rotation of the upper tower section 16 about its pivotal connection to the lower tower section 15 in a manner to be hereinafter more fully described.

Referring now more particularly to Figs. 2 and 3 of the drawings, the articulated connection between the upper and lower tower sections is shown in greater detail as including a channel shaped saddle member 30 which partially surrounds and seats the pivoted end of the upper tower section 16 and is welded or otherwise secured thereto. The saddle member 30 has extended side plates 31 and 32 which are journalled for rotation on a pivot shaft 33 extending transversely through the adjacent extremity of the lower tower section 15.

A plurality of interconnected links form a flexible strap connection 35 between the saddle member 30 and the piston rod 27 which reciprocates within a channel 36 carried by the lower tower section 15. As best shown in Figs. 2 and 5, flexible strap connection 35 includes a plurality of parallel pairs of similar links 36 which have their opposite extremities pivotally connected to transverse pins 38 which are journalled in the opposite extremities of a single link members 37. Suitable roller bearings 39 are journalled on opposite extremities of the pivot pins 38 and are adapted to be guided in a race formed by an arcuate track 40 in a manner to be hereinafter more fully described. In the preferred form shown, the single links 37 also carry roller bearings which are journalled on the corresponding pivot pins 38. Thus, the flexible strap connection 35 is longitudinally rigid and transversely flexible to provide a direct articulated connection between the relatively movable tower sections.

One extremity of the flexible connection 35 includes an elongated link 42 having a transverse sleeve 43 at one end which is journalled for rotation on a pin 45 extending transversely through the side plates 31 and 32 of the saddle member 30. The other extremity of the flexible connection 35 is pivotally connected to a transverse pin 38 carried by the outwardly extending fingers 47 and 48 of a clevis-type coupling member 50 (Fig. 6). The base 51 of the coupling member 50 has a threaded aperture 52 adapted to receive the adjacent threaded extremity of the piston rod 27 therein.

The arcuate guide track 40 is formed of complementary sections 54 and 55 welded or otherwise securely fixed to the joined extremity of the lower tower section 15, each section forming an arcuate channel open towards the other to define the arcuate track for guiding the flexible connection 35. Thus, when the piston rod 27 is reciprocated in response to selective application of fluid under pressure, the flexible connection will follow the piston rod along the arcuate track 40 to raise and lower the upper tower section 16 depending upon the direction of reciprocation of the piston rod. The individual links are rigid members which are only transversely flexible at their pivotal connections and are otherwise confined to the arcuate path formed by the guide track 40. As a consequence, the flexible connection 35 is capable of supporting the upper tower section 16 in any tilted position relative to the lower tower section 15 so long as fluid pressure or other suitable means maintain the piston rod 27 in a corresponding fixed position.

Thus, there has been provided in accordance with this invention an improved power-driven articulated connection between relatively movable tower sections which is continuously under the control of an operator throughout its operating range and which coacts with the power operated device as a self sustaining arrangement for holding one tower section in any selected position relative to the other tower section. The articulated connection is self-contained with a minimum of parts which results in simplicity and economy of construction as well as a minimum of maintenance and service. The improved power-driven articulated connection between the tower sections is capable of providing optimum controlled performance for the diverse operating conditions of the mobile aerial tower and because of its direct nature it provides greater safety for a workman on the platform at the upper extremity of the tower.

I have shown and described what I consider to be the preferred embodiment of my invention along with suggested modified forms, and it will be obvious to those skilled in the art that other changes and modifications can be made without departing from the scope of my invention as defined by the appended claims.

I claim:

1. In an apparatus having a pair of relatively movable members pivotally interconnected with one another at adjacent ends, an articulated connection comprising, extensible means carried by one of said movable members adjacent its pivoted extremity and disposed with its extension axis transverse to the pivotal axis between said movable members, a plurality of rigid members pivotally connected in end-to-end relation to form an elongated transversely flexible member, means pivotally connecting the extremities of said flexible member respectively to the extensible means and to the pivoted extremity of the other movable member, and arcuate guide means carried by said one movable member concentric with the pivotal axis between the movable members and partially enclosing said flexible member intermediate its extremities, whereby said flexible member is movable along the arcuate path of said guide means to rotate said other movable member in either direction corresponding to extension and retraction of said extensible means respectively.

2. The articulated connection of claim 1 wherein said extensible means includes a fluid-actuated motor having a reciprocable piston rod supported by said one movable member and pivotally connected at its extended extremity to the adjacent extremity of said flexible member.

3. The articulated connection of claim 1 wherein said pivoted rigid members include rigid links journalled at their extremities on transverse pins and wherein roller bearings are journalled on the extremities of said pins for bearing coaction within said guide means.

4. The articulated connection of claim 1 wherein said guide means includes a pair of complementary arcuate channel-shaped members mounted on the pivoted extremity of said one movable member with the channels facing each other to form a partially enclosed guide track for said flexible member, and bearing means coacting between the flexible member and said guide track to retain the flexible member therein.

5. In combination, a pair of relatively movable members adapted to be pivotally interconnected, one of said movable members having a bifurcated extremity adapted to straddle the other of said movable members, means transversely intersecting the bifurcated extremity and extending through an extremity of said other member to provide a pivotal connection therebetween, extensible means operably supported by said other movable member and having its extension axis disposed transverse to the pivot axis of said relatively movable members, arcuate guide means on the pivoted extremity of said other movable member disposed concentric with the pivotal axis, a longitudinally rigid and transversely flexible strap movably supported within said guide means and extending beyond said guide means at its ends, and means coupling the extended ends of said strap to the bifurcated extremity of said one movable member and to the extensible means respectively, whereby extension and retraction of said extensible means will rotate said one movable member in either direction about its pivotal axis respectively.

6. The combination of claim 5 wherein said bifurcated extremity includes a saddle member having a pair of side plates secured at one end to an end of said one movable member and extending outwardly and downwardly therefrom and wherein said extended side plates are disposed on either side of an end of the other movable member, and wherein said transverse means includes a pivot pin extending through and journalled in the side plates and said other movable member.

References Cited in the file of this patent

UNITED STATES PATENTS

2,450,152	Miller	Sept. 28, 1948
2,500,815	Gerl	Mar. 4, 1950
2,616,768	Stemm	Nov. 4, 1952
2,682,432	Schmidt	June 29, 1954
2,724,620	Johnson	Nov. 22, 1955