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54 Elevating device for the mast sections of a sectional mast, especially a movable aerial mast of framework type.

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## Description

The present invention refers to and elevating device for lifting the mast by the lowermost mast sections a sectional mast, especially a movable aerial mast of framework type, comprising a foot portion with a mast support and guide jacket, said elevating device including a power-operated screw mechanism, the elongated transport screw of which extends vertically along one side of the guide jacket.

Such a mast and lifting device is known from BE-A 449 601.

Movable aerial masts have to fill a plurality of partly contradictory requirements. Thus, they have to be strong and rigid but still relatively light and easily mountable and dismountable. Conventional mast structures usually are of framework type and the masts are put together from a number of sections. The mast is erected by arranging at a desired place a foot portion of the mast having a support and guide jacket therefor and introducing into said jacket the sections one by one, coupling them together with the nearest preceding section and raising them by means of any suitable raising and lowering mechanism a sufficient distance for allowing the introduction of the subsequent mast section into the jacket. For this purpose the conventional raising and lowering mechanisms have been rope blocks or chain winches having a hook which is connected with the lower end of each mast section after the same has been inserted into the guide jacket after which raising is made, the mast is locked, the hook released and the raising and lowering mechanism returned to the initial position for again connecting the hook to the lower end of the subsequent mast section. When lowering the mast and dismounting thereof, the operation of course is carried out in the same way although in reversed order.

In another kind of mast design which has mutually telescopically movable sections it has also been suggested to utilize a centrally mounted transport screw for expansion and retraction of the mast.

Conventional framework masts of the kind referred to above and put together in sections have turned out to serve their purpose rather well but at many occasions of use in which the time aspect is essential the conventional raising and lowering mechanism has been considered to operate too slow since it has to be returned to the initial position after each working movement. There is thus a need for a faster operating device for this purpose.

Quite surprisingly it has now turned out that this can be achieved very easily by means of a differently designed screw mechanism which does not require any return movement between the working movements. The object of the present invention now is to suggest such a device and the invention comprises mast and device of the aforementioned type which is characterized in that the screw contacts externally with its periphery the peripheral contour of a mast section housed parallel therewith within the jacket and in that each mast section in its lower portion at the point of contact on the peripheral contour is provided with a mechanical component serv-

ing as an open-sided nut segment meshing with the threads of the transport screw.

Owing to said design, the transport screw certainly operates intermittently but permanently in the same direction during the erection of the mast and in the opposite direction during the lowering of said mast. The respective mast sections only need to be inserted into the support and guide jacket of the foot portion in order to be brought directly into meshing with the transport screw with its nut segment, after which the screw is rotated and the mast section together with the preceding sections is raised a distance substantially corresponding to the length of one section, after which the subsequent mast section is introduced into the guide jacket, coupled to the preceding mast section and thereafter raised by means of the transport screw in cooperation with the nut segment of the last-mentioned section.

By way of example, the invention is further described below with reference to the accompanying drawing, in which Fig 1 is a side elevational view of a mast with an elevating device according to the invention with a support and guide jacket in a foot portion of the mast and Fig 2 is a plan view from above of said guide jacket.

As is evident from the drawing a movable aerial mast of framework type comprises a foot portion 1 and a plurality of mutually equal mast sections 2 of framework type and in the present case having triangular cross section. The uppermost section carries in its upper end an aerial element such as a paraboloidal aerial 3. At each end the sections 2 are provided with suitable mountings for some suitable kind of coupling means such as a bolt connection of easy-coupling type. In its erected position the mast rests with its lowermost sections in a support and guide jacket 4 having an elevating device 5. The jacket has the same general cross sectional shape as the mast sections 2, in the present case thus triangular shape, and surrounds the lowermost mast sections 2 with moderate clearance. The height of the jacket substantially corresponds to the total length of two mast sections 2 and for stabilizing the mast the jacket 4 is provided with support legs 6 and side struts 7 protruding from the corners of the triangular cross section. From the top as well as from other levels of height of the mast, if desired, usually also extend span wires 8.

In order to provide for the individual mast sections 2 one by one into the support and guide jacket 4 when erecting the mast as well as for removal of said sections in the corresponding manner when dismounting the mast, the jacket which suitably also is of framework type, is provided in the lower portion of one of its sides with an opening 10 in said side wall. Within the guide jacket the mast sections 2 are guided by means of suitable guide members 11, preferably in the form of guide rollers cooperating with the corner edges of said mast sections 2.

According to the invention the elevating or raising and lowering mechanism 5 may comprise an elongated vertical transport screw 12 which is along another side of the guide jacket 4 also provided with a suitable opening. The screw 12 has a length which at

least corresponds to the length of each mast section 2 and extends from a bottom of the guide jacket 4 and upwardly to a position above the level of a mast section 2 standing on the bottom of the jacket 4 or, in other words above the open portion of the framework at the insertion and removal side of the jacket 4. At said position the transport screw 12 is connected with some suitable kind of drive mechanism 13 not further illustrated, such as a worm drive driven by an electric motor for 12 or 24 volts. Suitably the device also is provided with a connection for mounting of a hand crank for allowing manual operation of the transport screw in case of lack of electric current.

According to the invention the transport screw 12 may be arranged in a plane coinciding with the center line of the adjacent jacket side such that the screw with its periphery approximately contacts externally one of the sides of a mast section 2 located in the jacket 4 and oriented parallelly thereto along an axis extending in said side, said axis preferably being the longitudinal center line of said side. At least at one of its sides each mast section 2 according to the invention may be provided at the lower end of said center line with a nut segment 14 adapted for meshing with the threads of said transport screw 12. The nut segment may be constituted by a slide block of suitable material such as bronze or by a roller.

The mast provided with the elevating device according to the invention may be erected in the following way. Firstly, the support and guide jacket 4 is arranged and levelled at the desired place and thereafter a first mast section 2 is inserted into the guide jacket 4 through the opening in one of the sides thereof, said section 2 of course being oriented in such a way that a side provided with a nut segment 14 is turned towards the side of the jacket 4 at which transport screw 12 is located. After that the rotation of the transport screw 12 is started and owing to the movement of the nut segment 14 along the threads of the screw 12 a raising of the mast section 2 through the jacket 4 is obtained. When the mast section 2 has been raised to such an extent that a subsequent mast section 2 can be inserted into the guide jacket 4, the rotation of the transport screw 12 is stopped. This can easily be provided by a limit switch for the electric drive motor or any similar manner obvious to the artisan. The subsequent mast section 2 which has been inserted into the jacket 4 is coupled with its upper end to the lower end of the preceding mast section 2 by means of a bolt connection of easy-coupling type not further illustrated, after which the rotation of the transport screw 12 again is started, now in the same direction as during the first transport movement and without any need of a return movement such as in rope blocks or other raising and lowering mechanisms previously used for the same purpose. This is repeated until all, in the present case 19, mast sections have been brought into position and been coupled to each other.

When dismantling the mast the same operation is repeated although in reversed order. For locking at each occasion the respective mast section 2 next to

the lowermost one in the guide jacket 4 it is suitable that the transport screw 12 or the screw 12 together with the drive mechanism 13 is of a self-braking type. Said locking also can be provided by locking means, not illustrated.

## Claims

1. Sectional mast, especially a movable aerial mast of framework type and elevating device for lifting the mast by the lowermost mast sections comprising a foot portion with a mast support and guide jacket, said elevating device including a power-operated screw mechanism, the elongated transport screw (12) of which extends vertically along one side of the guide jacket (4) characterized in that the screw (12) contacts externally with its periphery the peripheral contour of a mast section (2) housed parallel therewith within the jacket and in that each mast section (2) in its lower portion at the point of contact on the peripheral contour is provided with a mechanical component (14) serving as an open sided nut segment meshing with the threads of the transport screw (12).

2. A device according to claim 1 for mast sections and a support and guide jacket (4) having a polygonal cross sectional shape and particularly triangular shape, characterized in that the transport screw (12) is arranged with its longitudinal axis located in a plane coinciding with the longitudinal center line of the jacket side and in that the nut segment (14) of each mast section (2) is mounted at the lower end of the longitudinal center line of at least one of the sides of the sections (2), the transport screw (12) furthermore extending from a bottom of the jacket (4) and upwardly to a level exceeding the length of a mast section (2).

## Patentansprüche

1. Zusammengesetzter Mast, insbesondere beweglicher Antennenmast der Fachwerkart, und Hebevorrichtung zum Anheben des Mastes an den untersten Mastteilen, mit einem Fußabschnitt mit einer Maststütze und einem Führungsgerüst, wobei die Hebevorrichtung einen kraftbetätigten Gewindespindeltrieb aufweist, dessen lange Verstellspindel (12) sich senkrecht entlang einer Seite des Führungsgerüsts (4) erstreckt, dadurch gekennzeichnet, daß die Gewindespindel (12) mit ihrem Außenumfang an der Außenumfangskontur eines parallel zu ihr im Gerüst aufgenommenen Mastteils (2) anliegt, und daß jeder Mastteil (2) in seinem unteren Abschnitt an der Berührungsstelle der Außenumfangskontur mit einem mechanischen Bauteil (14) versehen ist, das als offenes Muttersegment dient, welches mit dem Gewinde der Verstellgewindespindel (12) in Eingriff ist.

2. Vorrichtung nach Anspruch 1 für Mastteile und eine Stütze und ein Führungsgerüst (4) von polygonaler, insbesondere dreieckiger Querschnittsgestalt, dadurch gekennzeichnet, daß die Verstellgewindespindel (12) so angeordnet ist, daß ihre Längsachse in einer durch die Längsmittellinie der Gerüstseite gehenden Ebene zentriert ist, und daß

das Muttersegment (14) jedes Mastteils (2) am unteren Ende der Längsmittellinie von wenigstens einer der Seiten der Teile (2) angeordnet ist, wobei sich die Verstellgewindespindel (12) ferner von einem Unterteil des Gerüsts (4) nach oben bis auf eine Höhe erstreckt, welche die Länge eines Mastteils (2) übersteigt.

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## Revendications

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1. Mât en sections, en particulier mât d'antenne mobile du type en charpente, et dispositif de levage pour soulever le mât par les sections de mât inférieures, comportant une partie de base munie d'un manchon de support et de guidage du mât, ledit dispositif de levage comportant un mécanisme commandé à vis dont la vis allongée de déplacement (12) s'étend verticalement le long d'un côté du manchon de guidage (4), caractérisés en ce que la vis (12) est en contact extérieurement par sa périphérie avec le contour extérieur d'une section de mât (2) logée parallèlement à elle à l'intérieur du manchon et en ce que chaque section de mât (2), dans sa partie inférieure au point de contact par son contour périphérique, comporte un élément mécanique (14) servant d'élément écrou ouvert sur le côté et engageant avec le filet de la vis de déplacement (12).

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2. Un dispositif selon la revendication 1 pour les sections de mât et un manchon (4) de support et de guidage présentant une forme polygonale en section droite, en particulier une forme triangulaire, caractérisé en ce que la vis de déplacement (12) est disposée pour que son axe longitudinal soit situé dans un plan coïncidant avec la ligne entraine longitudinale du côté du manchon, et en ce que l'élément écrou (14) de chaque section de mât (2) est monté à l'extrémité inférieure de la ligne centrale verticale d'au moins l'un des côtés des sections (2), la vis de transport (12) s'étendant de plus vers le haut, à partir de la partie inférieure du manchon (4), jusqu'à un niveau situé au-delà de la longueur d'une section de mât (2).

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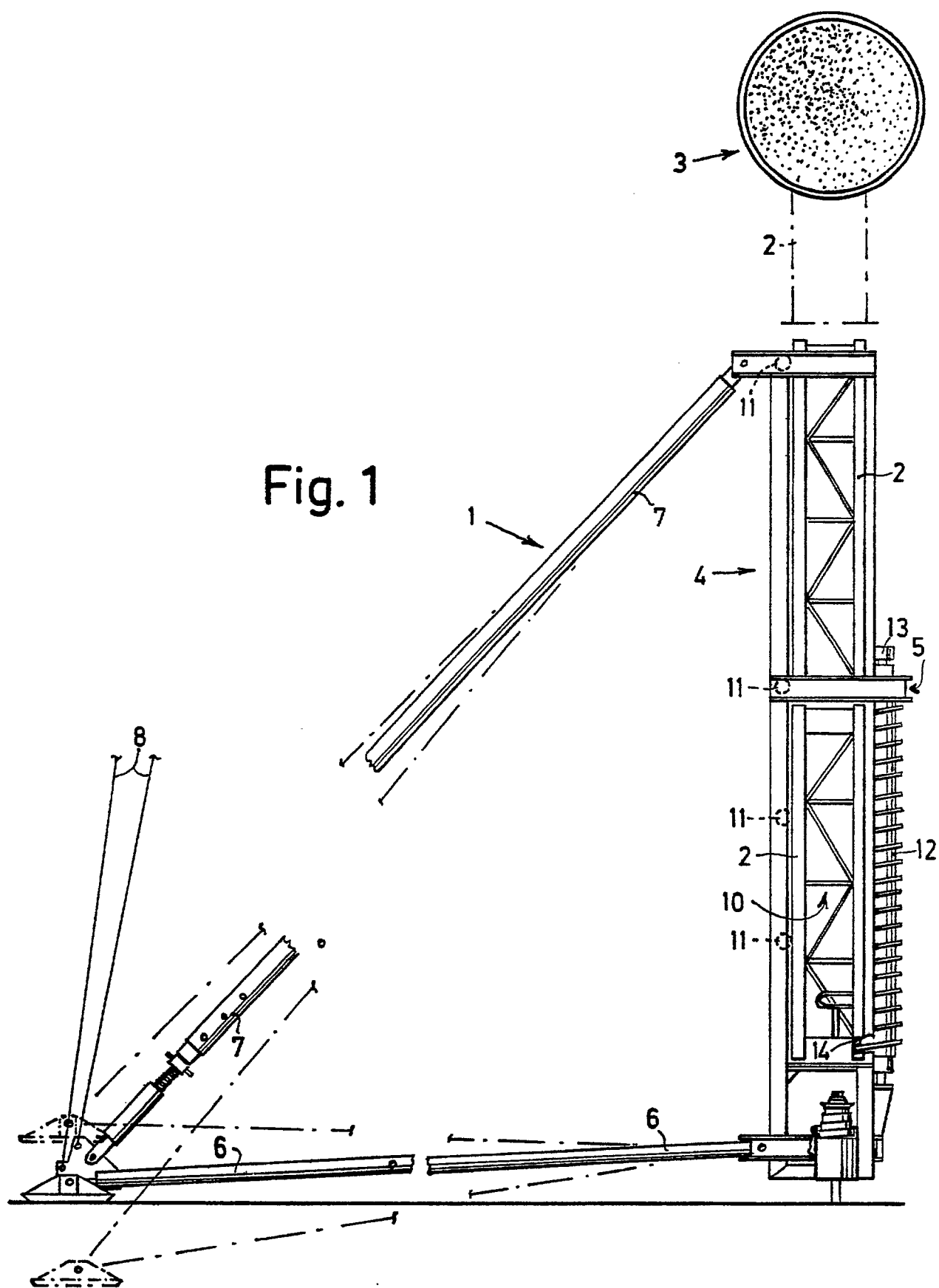


Fig. 2

