F. A. NILSSON.

LINK DEVICE.

APPLICATION FILED SEPT. 26, 1917.

1,293,884.

Patented Feb. 11, 1919.

2 SHEETS—SHEET 1.

Fig:1.

Fig:2.

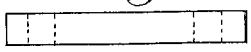


Fig:3.

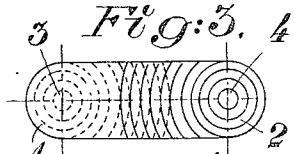


Fig:4.

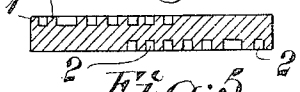


Fig:5

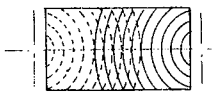


Fig:6

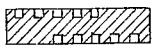
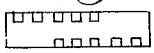


Fig:7.

Fig:8



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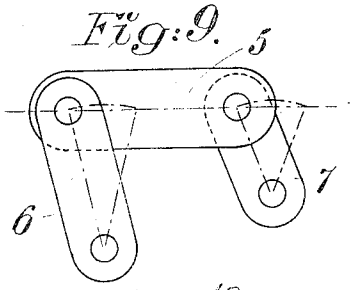


Fig:10.

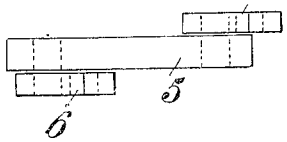


Fig:11.

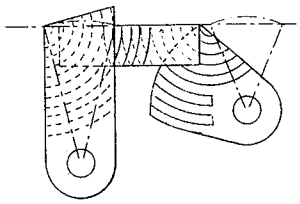


Fig:12.

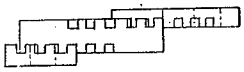


Fig:13.

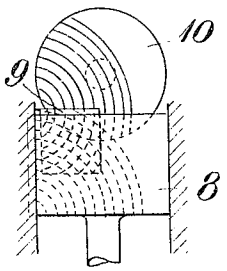
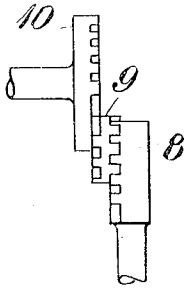


Fig:14.



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2 SHEETS—SHEET 2.

Fig: 15

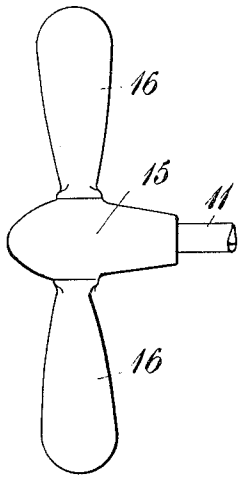


Fig: 16.

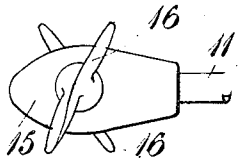


Fig: 17

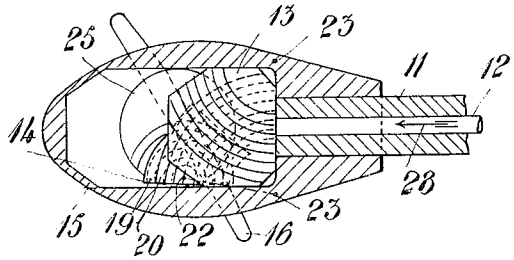


Fig: 18

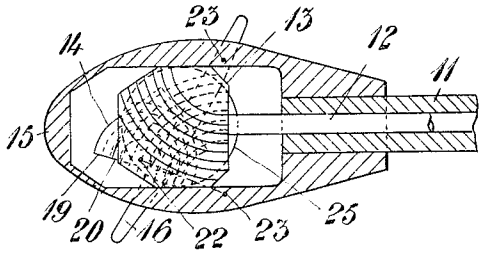


Fig: 19

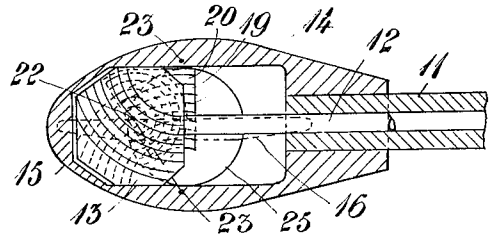
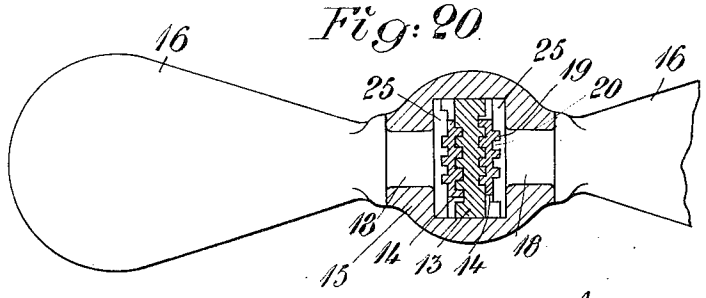


Fig: 20



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UNITED STATES PATENT OFFICE.

FRITZ ALBERT NILSSON, OF JÖNKÖPING, SWEDEN, ASSIGNOR TO JÖNKÖPINGS MEKANISKA WERKSTADS AKTIEBOLAG, MOTORFABRIKEN, OF JÖNKÖPING, SWEDEN.

LINK DEVICE.

1,293,884. Specification of Letters Patent. Patented Feb. 11, 1919.

Application filed September 26, 1917. Serial No. 193,261.

To all whom it may concern:

Be it known that I, FRITZ ALBERT NILSSON, a subject of the King of Sweden, residing at Jönköping, in the Kingdom of Sweden, have invented a new and useful Improvement in Link Devices, of which the following is a specification.

The link devices heretofore used for transmitting motion from one rocking arm to another with equal or different angles of turning, or from a member reciprocating in a straight path to a turning arm, or reversely, have chiefly consisted of a rod of greater or less length provided in each end with an aperture or eye, in which apertures or eyes pins or studs project, and in this manner the motion has been transmitted between the rocking and the reciprocating member. When transmitting great forces it has been necessary to make the links and the pins of considerable dimensions. Such a link must also possess a certain and not too small distance between the centers of the apertures, in order that no breaking shall occur when transmitting the motion.

In the application of the mechanical movements above referred to it is often desirable, particularly when the space is very much limited, to make the link or the member transmitting motion, of small dimensions without losing strength or durability when subjected to great stresses. This is not possible, however, or at least only in solitary cases, with the ordinary link device above referred to.

The present invention refers to a link device of such character that it transmits the motion in the same manner as an ordinary link, but without breaking, at the same time as it is of small dimensions and possesses great strength and durability against wear. These properties of the link are attained by providing the same with two or several series of annular or curved grooves or ribs which are concentric within each series, but which series are out of center relatively to one another. The members, for instance rotatable arms or members guided rectilinearly, between which the link is to transmit motion, are provided with annular or curved ribs or grooves fitting the different series and which enter into and are movable in the above-named grooves or ribs in the link.

Now, if the space within which the link and the arms or the member guided rectilinearly are to be used, is much limited, the link may be shortened by cutting off the same at the two center lines of the grooves, or even inside the center lines, so that only the middle portion remains, without its action being altered. The parts meshing with the grooves in the link are cut off at corresponding places. In this manner a very short link is obtained which transmits the motion in exactly the same manner as a long link while being guided by the grooves around two centers which do not lie within the link itself, but which lie in the space wholly outside the same. It is also possible to cut off the original link along a line through both centers so that only one half of the link remains, without the action becoming changed. Practically, a portion of the link may be taken anywhere, even altogether outside one center or both centers, and it may be used in the same manner as an entire link.

By distributing the pressure on a great number of grooves the greatest possible strength as well as endurance to wear are attained.

The device is illustrated in the accompanying drawings. Figure 1 illustrates an ordinary link viewed from the side, and Fig. 2 the same viewed from above. Fig. 3 shows a plan view of a link according to this invention before being cut off and Fig. 4 shows a longitudinal section of the same. Figs. 5 and 6 show corresponding views of the links after the same has been reduced in length, and Figs. 7 and 8 show corresponding views of the link having been reduced in breadth. Fig. 9 shows a side view and Fig. 10 shows a top view of an ordinary link device, while Fig. 11 shows a side view and Fig. 12 a top view of a device according to the present invention. Figs. 13 and 14 show in elevation and edge view respectively the transmission of movement from a rectilinearly guided member to a rotatable member. Figs. 15 and 16 show two views of an adjustable propeller of which Figs. 17, 18 and 19 show longitudinal sections with the blades in different positions of adjustment. Fig. 20 shows a cross section through the propeller head.

In Figs. 3 and 4, 1 denotes the angular or

curved grooves on one side of the link, while 2 denotes the grooves on the other side, which grooves are concentric with the centers 3 and 4 respectively. In Fig. 4 the grooves are shown having rectangular cross section, but the section may also have the shape of a trapezium or other shape. In Figs. 5 and 6 a portion has been cut off from the link on each end of the same, and in Figs. 7 and 8 the link has been reduced to one half of its breadth. Figs. 9 and 10 illustrate how an ordinary link 5 transmits motion from a rocking arm 6 to a shorter arm 7, or reversely. Figs. 11 and 12 illustrate the same transmission of motion according to the present invention. It will be seen from the drawing that this device does not require equally large space. Figs. 13 and 14 illustrate the manner of transmitting motion according to the present invention, from a rectilinearly guided member 8 by means of a link 9 to a rotatable arm or disk 10, or reversely. This latter device may advantageously be used for propellers with adjustable blades.

As is well known, the purpose of providing a propeller with rotatable blades is to realize an arrangement by means of which the boat may be driven ahead and astern without the direction of rotation of the propeller shaft having to be changed. Nowadays the propeller blades are also required to be capable of being adjusted parallelly with the direction of the keel, when sailing. For this purpose the propeller blades must be capable of being turned about 120°.

Figs. 15 to 20 illustrate a two-blade left hand propeller arranged according to the present invention. The propeller shaft 11 is hollow and a rod 12 slides lengthwise in the same, said rod being arranged by suitable means such as screws, hand-spikes or the like to be moved forward and back into and to be secured in different positions. The rod 12 is rigidly connected to a member 13 guided rectilinearly, which when moving the rod 12 is thus moved rectilinearly forward and backward. The two links 14 transmit the motion to the propeller blades 16 the journals 18 of which are journaled in the propeller head 15. Each link 14 is provided on both sides with annular or curved grooves and ribs 19, 20, which engage ribs and grooves in the member 13 and in a flange 25 secured to the journal 18 of each propeller blade. The annular grooves in the link 14 on the side directed toward the flange 25 are concentric around the center 22, while the grooves on the side directed toward the member 13 are concentric around the center 23. Between these two centers there must be a certain distance. If they coincide, that is to say if they are located opposite each other there can be no movement, the device becoming locked. This distance between the centers is the "length" of the link. As shown in the drawing the one center is in this case outside the link itself and the link turns around an imaginary center in the space.

Fig. 17 illustrates the positions of the different members when the propeller blades are adjusted for "ahead", and Fig. 18 the position for "astern". Intermediate these positions there is a stop position. Fig. 19 illustrates the positions of the members when the propeller blades are adjusted for "sailing".

The device operates in the following manner:

When moving the rod 12 in the direction of the arrow 28 (Fig. 17) the member 13 is also moved rectilinearly in the same direction. The link 14 is then also forced to participate in the movement, and it also engaging the annular grooves in the flange 25 of the propeller blade, which grooves are out of center with the journal 18, there will result a turning moment on the propeller blade which is thus turned. Fig. 18 shows the position of the propeller blade for "astern". If the movement of the rod 12 is further continued, the position for "sailing" is obtained (Fig. 19). While the propeller blade is thus turned around the journal 18 the link 14 is given a peculiar but entirely definite combined sliding and turning movement.

The distance between the centers 22 and 23 and also their positions with relation to the center lines of the journal 18 and of the rod 12, are so chosen that the turning movement imparted to the propeller blade becomes very nearly equal to the movement obtained by means of a toothed sector and a toothed rack. In other words, the same turning effect and the same power are obtained in any position of the rod 12. In this regard the present device is essentially distinguished from heretofore known links or the like. It is well known that the turning effect and the force are constantly varied in such devices, nor is it possible to obtain so great an angle of turning, as "locking" takes place long before.

Instead of two propeller blades as shown in the drawing three or several may be used by providing a corresponding number of links and by providing the member 13 with an equal number of sides.

I claim:

1. In a link device, the combination of a link provided with at least two series of curved grooves and ribs which are concentric within each series but which series are out of center relatively to one another, a movable member provided with ribs and grooves fitting into one of the series of grooves and ribs of the link, and another movable member provided with ribs and

grooves fitting into the other series of grooves and ribs of the link substantially as and for the purpose set forth.

2. In a link device for reversing the blades of propellers with rotatable blades, the combination of a propeller head, a member sliding in said head in the longitudinal direction of the propeller shaft said member being provided with a series of concentric curved grooves and ribs, a link provided with two series of concentric curved grooves and ribs which series are out of center relatively to one another and one of which fits into the series of grooves and ribs of the said member, a propeller blade, a journal for said blade journaled in the propeller head, and a flange on said journal provided with a series of curved grooves and ribs fitting into the other series of grooves and ribs of the link, substantially as and for the purpose set forth.

FRITZ ALBERT NILSSON.