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ROTATABLE ARRANGEMENT, ESPECIALLY FOR DREDGES

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2 Sheets-Sheet 1

III—*Fig.1*

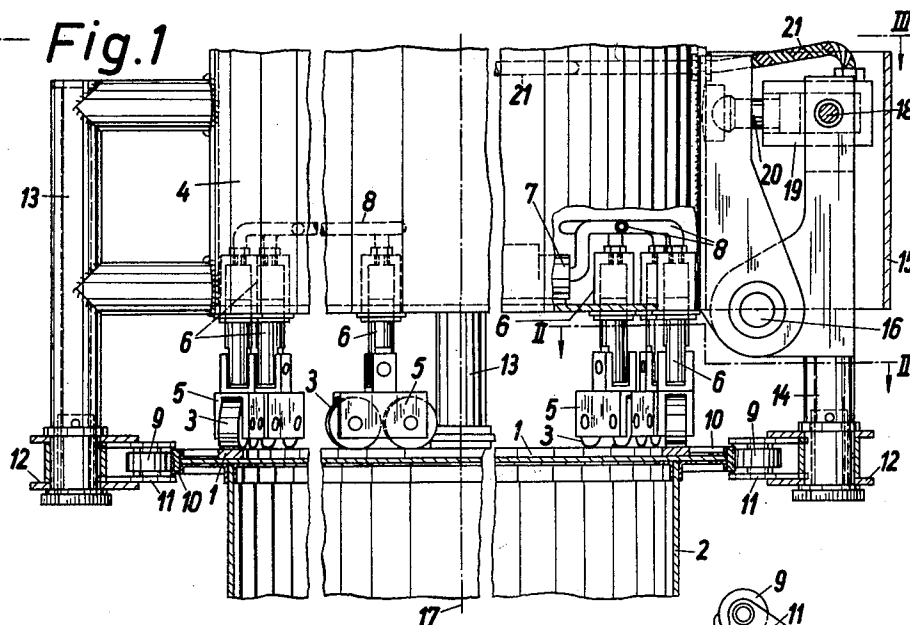


Fig.2

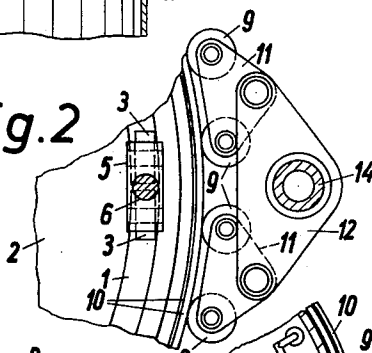


Fig.3

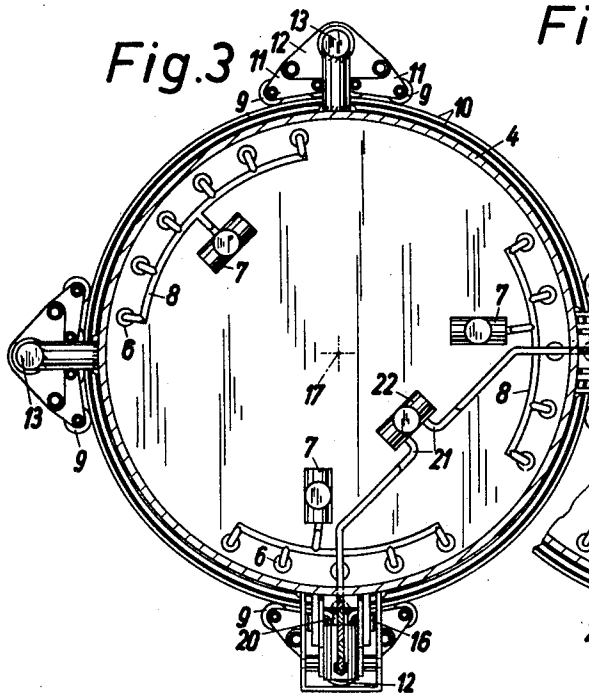
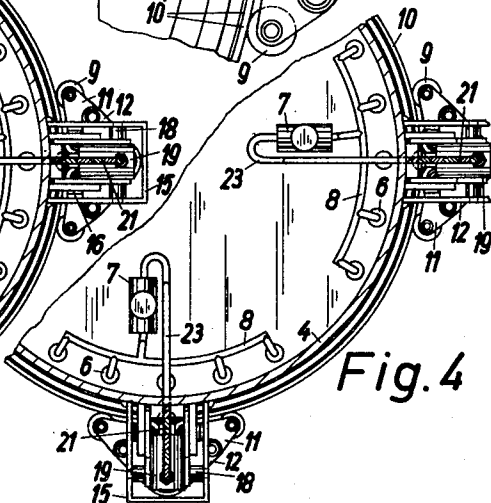


Fig.4



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Fig. 5

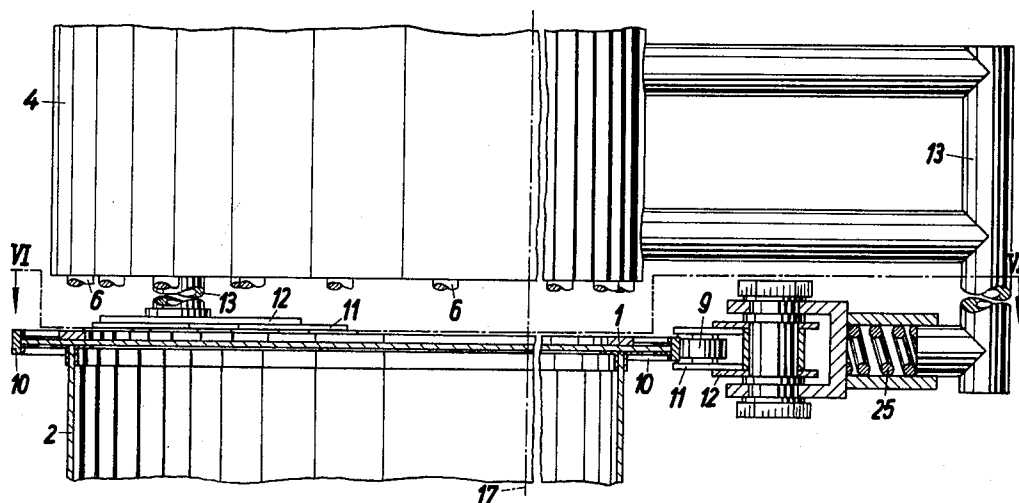
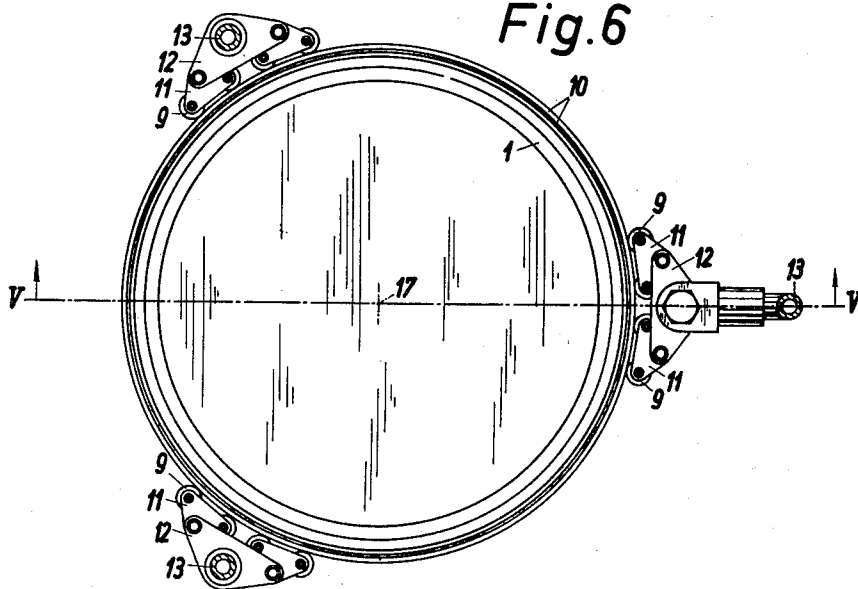


Fig. 6



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ROTATABLE ARRANGEMENT, ESPECIALLY FOR DREDGES

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5 Claims. (Cl. 308—203)

The present invention relates to a rotatable system, especially for dredges, having an upper structure rotatably journaled on a lower structure about a vertical axis, said lower and upper structures being axially aligned by roller means which are preferably combined to groups and journaled on one of said two structures while moving along an annular path on the other structure.

Structures of the above mentioned type, particularly when employed in connection with dredges have the drawback that undue feeding forces and other outer forces such as heavy wind may impair the proper guiding of the upper structure relative to the lower structure. Furthermore, with the heretofore known structures of the type involved, considerable precision work is required with regard to the creation of the circular track in which one structure is guided by the other structure in order to assure a proper guiding of the structures relative to each other.

It is an object of the present invention to provide a rotatable structure of the general type set forth above, which will overcome the above mentioned drawbacks.

It is another object of this invention to provide a rotatable system of the general type set forth above, in which also when great horizontal forces act upon the upper structure, a proper guiding of the upper structure relative to the lower structure will be assured regardless of possible deviations in the annular path, in which the upper structure is guided, from the true circular shape.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawings, in which:

FIG. 1 illustrates partly a side view and partly a section of a lower and upper structure of a dredge with the journaled roller group.

FIG. 2 represents a section along the line II—II of FIG. 1.

FIG. 3 is a section along the line III—III of FIG. 1 but on a smaller scale than that of FIG. 1.

FIG. 4 represents a portion of a section similar to that of FIG. 3 but pertaining to a slightly modified structure.

FIG. 5 illustrates partly in side view and partly in section a lower structure and an upper structure with a modified journaled roller group, said section being taken along the line V—V of FIG. 6.

FIG. 6 is a section along the line VI—VI of FIG. 5 but on a reduced scale with regard to that of FIG. 5.

General arrangement

The objects of the present invention are realized primarily in that at least one of the rollers or roller groups on the upper or lower structure are journaled in such a way that they are movable in radial direction with

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regard to the vertical axis of rotation of the rotatable system, said roller or roller groups being continuously yieldably urged against an annular path on one of said structure.

The means for yieldably urging the roller or roller groups against said yieldable path may consist for instance of a spring system or of hydraulic cylinder piston means mounted for instance at one end of a lever, the other end of which carries the roller or roller group. If desired, two or more fluid operable cylinder piston means may be associated with each roller or each roller group and may be held continuously under a certain pressure by a pump common thereto. If the rollers carrying the upper structure are equipped with a hydraulic load equalizer, those hydraulic cylinder piston means which press the radially movably journaled rollers against the annular path are acted upon by the same pressure source which conveys the hydraulic load equalization.

For the sake of completeness, it may be mentioned that in connection with bucket wheel dredges having an upper structure guided relative to a lower structure in horizontal direction by rollers, it is known to support that roller group which is arranged in the longitudinal central plane of the upper structure by interposing a power measuring element which when a certain pressure is exceeded causes a switch to turn off the driving means for the dredge. This device, however, represents a mere safety device to prevent the dredge from being endangered by too high a feeding force. This device, however, does not deal with the problem underlying the present invention, namely to assure a precise guiding of the upper structure relative to the lower structure also when the annular path deviates from a true circular shape. The fact that the said mentioned heretofore known arrangement with the safety device does not deal with the just mentioned problem according to the invention is also evident from the fact that with the said heretofore known structure, the power measuring device maintains the upper end of a lever carrying the guiding roller group at normal feeding power of the bucket wheel in engagement with a non-yieldable abutment. Consequently, if with such a structure the annular path deviates from a true circular shape, the said roller group cannot engage those portions of the annular path which have a radius exceeding that of the normal radius.

Structural arrangement

Referring now to the drawings in detail, the arrangement shown therein comprises an annular path or track 1 mounted on the upper side of the lower dredge structure 2 and also comprises supporting rollers 3 for the upper dredge structure 4. The supporting rollers 3 are arranged in pairs respectively supported by rockers 5 which latter by means of hydraulic cylinder piston systems 6 support the upper structure 4. The supporting rollers 3 form three groups. The hydraulic cylinder piston systems 6 of each group are respectively supplied with oil under pressure by pumps 7 through conduits 8 so that a load equalization will be obtained between the rollers of each of the three groups.

The supporting rollers have no guiding rims or treads. Instead, the upper structure 4 is with regard to lateral forces guided by four groups of rollers 9 which by means

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of vertical rotatable shafts move on a cylindrical annular track 10 connected to the lower dredge structure 4. The guiding rollers 9 are arranged in pairs and supported by rockers 11 each two of which are interconnected by a rocker beam 12 adapted to pivot about a vertical shaft 13, 14.

The shafts 13 of two groups of guiding rollers 9 are fixedly connected to the upper structure 4. In contrast thereto the shafts 14 of the two other guiding roller groups form levers journaled in an extension or protrusion 15 of the upper structure 4 by means of a horizontal shaft 16 in such a way that the roller group is adapted to pivot or tilt in a direction radial to the vertical tilting axis 17 of the dredge upper structure 4.

The upper end of each lever 14 has by means of pivots 18 journaled therein the cylinder or a hydraulic cylinder piston system 19 the piston 20 of which rests against the upper structure 4. The oil under pressure is supplied to the cylinders 19 of shaft 14 carrying the two movable roller groups through conduits 21 from a pump 22 common to said cylinders 19.

By means of the hydraulic cylinder piston systems 19, 20, the radially movable roller groups are, through the intervention of levers 14 always held under the necessary pressure in engagement with the annular path or track 10. Therefore, if the track 10 should, due to lack of precision work not be precisely circular, it will nevertheless be assured that all guiding rolls 9 will always engage said track so that the upper structure 4 with the lower structure 2 will always be in power locked connection, in other words, a closed power path will be secured. Consequently, the upper structure will be prevented from lateral displacement relative to the lower structure by greater forces such as considerable wind or an inclination of the device.

The radially movable guiding rollers 9 may also by other yieldable forces be pressed against the track 10, as for instance by springs 25. As shown in FIGS. 5 and 6, the corresponding forces may act upon the radially movable roller groups without the intervention of a shaft, lever or the like.

The tilting shafts 16 of the levers may be so arranged that a desired transmission ratio will be obtained. The number of the non-yieldably journaled guiding roller groups and of the yieldably journaled guiding roller groups may, depending on the respective prevalent conditions, be different from that shown in FIGS. 1 to 4. For instance, two non-yieldable and one yieldable roller group may be provided as shown in FIGS. 5 and 6.

The hydraulic cylinder piston systems 19, 20 which press the movable guiding rollers against the annular rail may instead by a separate pump 22 be supplied with oil under pressure through conduits 23 by pumps 7 pertaining to the hydraulic cylinder piston systems 6 of the respective supporting roller groups (see FIG. 4). It is also possible in a kinematically inverse arrangement to arrange the guiding rollers at the lower structure and to arrange the annular track pertaining thereto on the upper structure.

It is, of course, to be understood that the present invention is, by no means, limited to the particular constructions shown in the drawings but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. A rotary arrangement, especially for rotatable dredges, which comprises: a lower structure, an upper structure, trackless supporting rollers interposed between said lower structure and said upper structure and supporting said upper structure for rotation about a vertical axis, centering rollers mounted on one of said structures and rotatable about vertical axes, circular guiding means mounted on the other one of said structures and engaged by said centering rollers, at least one of said centering rollers being movable radially with regard to the vertical axis about which said upper structure is rotatable, and

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means continuously yieldably urging said one centering roller against and holding the same in engagement with said circular guiding means, at least another one of said centering rollers being non-yieldably mounted.

2. A rotary arrangement, especially for rotatable dredges, which comprises: a lower structure, an upper structure, trackless supporting rollers interposed between said lower structure and said upper structure and supporting said upper structure for rotation about a vertical axis, first lever means supported by one of said structures and respectively tiltable about vertical axes, pairs of second lever means pivotally connected to said first lever means for pivoting about vertical axes, the arrangement being such that each of said first lever means has pivotally connected thereto two of said second lever means in horizontally spaced relationship to each other, centering rollers arranged in pairs, each of said second lever means carrying two horizontally spaced centering rollers respectively rotatable about vertical axes, circular guiding means mounted on the other one of said structures and engaged by said centering rollers, at least one of said second lever means with said centering rollers thereon being movable radially with regard to the vertical axis about which said upper structure is rotatable, and means continuously yieldably urging the centering rollers on said one second lever means against and holding the same in engagement with said circular guiding means, at least another one of said second lever means with the centering rollers thereon being non-yieldably mounted.

3. A rotary arrangement especially for rotatable dredges, which comprises: a lower structure, an upper structure, trackless supporting rollers interposed between said lower structure and said upper structure and supporting said upper structure for rotation about a vertical axis, lever means tiltable journaled on one of said structures for rotation about a horizontal axis, groups of centering rollers rotatable about vertical axes and supported by said one of said structures, at least one of said groups of centering rollers being journaled on said lever means, circular guiding means mounted on the other one of said structures and located in a plane perpendicular to said first mentioned vertical axis for engagement by said centering rollers, yieldable power means continuously urging said lever means in a radial direction with regard to said first mentioned vertical axis to hold said group of centering rollers supported by said lever means in engagement with said circular guiding means, at least another one of said groups of centering rollers being non-yieldably mounted.

4. A rotary arrangement, especially for dredges, which comprises: a lower structure, an upper structure, trackless supporting rollers interposed between said lower structure and said upper structure and supporting said upper structure for rotation about a vertical axis, a plurality of lever means tiltable journaled on one of said structures for tilting about a horizontal axis, at least two groups of centering rollers respectively journaled on said lever means, circular guiding means mounted on the other one of said structures in a plane perpendicular to said vertical axis, a plurality of fluid operable cylinder piston means for urging the groups of rollers respectively connected thereto in radial direction with regard to said vertical axis for engagement with said circular guiding means, pump means common to said cylinder piston means for maintaining a certain pressure in said cylinder piston means, at least a further centering roller non-yieldably mounted on said one structure.

5. A rotary arrangement, especially for dredges, which comprises: a lower structure, an upper structure, trackless supporting rollers interposed between said lower structure and said upper structure, first cylinder piston means interposed between and connected to said supporting rollers and said upper structure for supporting the latter, said upper structure being adapted by means of said supporting rollers to rotate about a vertical axis,

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centering rollers mounted on one of said structures and rotatable about vertical axes, circular guiding means mounted on the other one of said structures and engaged by said centering rollers, lever means on one of said structures and tiltable about a horizontal axis, at least some of said centering rollers being mounted on said lever means, second cylinder piston means operatively connected to said lever means and continuously urging the centering rollers mounted thereon in a direction perpendicular to said vertical axis about which said upper structure is rotatable to hold the rollers supported by

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said lever means in engagement with said circular guiding means, pump means common to at least one cylinder of said first and of said second cylinder piston means for maintaining a predetermined pressure therein.

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