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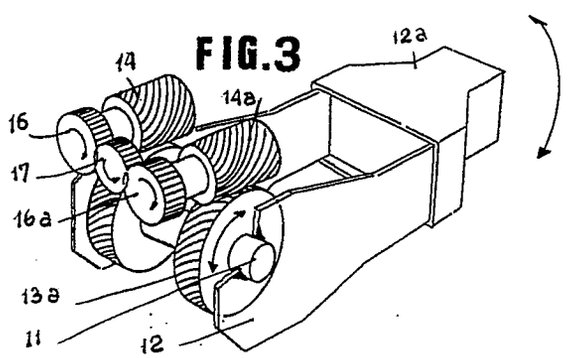
(54) **Electromechanical group for the automatic control of the correct position of aerial cabs mounted on hoist machinery.**

(57) Electromechanical group for the automatic control of the horizontal and angular position. on the horizontal plane, of aerial cabs borne by extensible arms of hoist machinery. The group comprises: one or a pair of hydraulic motors associated to helicoidal wheels and endless screws activated to move in two directions; a support, fixed to the cab and hinged at the end of the extensible arm; electric pulses, generated by suitable sensors for controlling the horizontal position of the cab, are sent to an electronic central amplifying station which, in real time, activates hydraulic motors to stabilise the horizontal position of the cab. A second mechanical device, comprising a helicoidal wheel with an endless screw, connected to another hydraulic motor, is able to force angular movements on the cab, on the horizontal plane, in two directions and for more than 360°.

FIG.3



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Hydraulic cylinders or hydraulic parallelograms are used for aerial cabs or platforms for lifting persons, or other entities which require a constant horizontal position of the floor of said cab or platform, terminally connected to an extendable system of arms. Hydraulic parallelogram devices can only be applied to simple machines with lifting arms provided with only one joint. Electrohydraulic devices, which are more versatile, and which can be used on complex machines with arms provided with a number of joints, are inconvenient in that the control is not completely gradual and progressive, for two fundamental reasons:

- the double acting hydraulic jacks or cylinders have a differential drive and therefore the speed of action varies according to the oil capacity, when the corresponding pistons are in the extended and/or return phase. The connection points between the jack and the platform, the first set to maintain the horizontal position of the latter, and the point of connection of the jack with respect to the end of the lifting arm, vary one from the other in space during the entire correction movement, which generates movements that cannot be perfectly controlled when correcting speed with the consequent and dangerous effect that the cab swings.
- The use of sophisticated electronic circuits provided to control the quantity of the oil entering or leaving the jack, to control the speed of the correction movements, so that they are not too quick or too slow, has not completely eliminated the above mentioned problems.

The object of the present invention is to construct an electromechicanical group for the constant control of the horizontal position of the aerial platforms or cabs capable of resolving the above mentioned problems.

For this purpose the group according to the invention is characterised by the fact that it comprises at least one hydraulic motor associated to an endless screw and helicoidal wheel, the latter being fixed to a support which bears the platform or cab to which a horizontal level sensor is connected which transmits to electric pulses deriving from the variations in position of the platform to an electronic central station; said pulses, amplified by said central station, are transmitted to the control organs of the hydraulic motor(s) which, in real time and with constant graduality by means of the helicoidal wheel group and endless screw, are able to establish the correct position of the cab.

The helicoidal wheel and endless screw group can be duplicated. In this case the two mechanisms are coupled by means of gears comprising an idle toothed wheel, as described below with reference to the attached drawings, provided purely by way of examples.

Figure 1 is a plane view of the mechanical group supporting the cab, with the housing partially in section, comprising two helicoidal wheels and corresponding endless screws, without the hydraulic motors;

Figure 2 is a side view of the same group:

- Figure 3 is a schematic axonometric view of the same group;
- Figure 4, on a different scale, is a plane view of a cab and relative support group;
- Figure 5, similar to figure 4, schematically illustrates one of the possibilities of movement of the cab on a horizontal level;
- Figures 6 and 7 are schematic and illustrative views of the same cab, seen from the side, with the floor in a horizontal position with respect to the last arm of the machine, for any established and set inclined position of said arm.

With reference to the figures 1 to 3, reference number 10 indicates a metal box with a shaft 11 passing through, having a grooved shell, fixed to the forked support 12. In the example illustrated, two helicoidal wheels 13, 13a, are connected onto the shaft 11, figure 3, engaged with corresponding endless screws 14, 14a, fixed to the hubs 15, 15a and to toothed wheels 16, 16a kinematically connected by the idle toothed wheel 17. Single hydraulic motors, not illustrated, are connected to the hubs 15.

A metal box 18 is fixed to the fork 12, said box containing an endless screw 19 and helicoidal wheel 20. The axes of the helicoidal wheels 13 and 20 are orientated at 90° one from the other.

In figures from 4 to 7, -A- indicates an aerial cab supported by the end of the terminal arm -B- of any hoisting machine. The cab -A- is anyway connected to the fork 12, for example by means of a shelf -C- and is fitted with a sensor of a known type which controls the horizontal position and which, as already mentioned, is able to transmit electric pulses for each variation in position of the cab to an electronic central station which amplifies said pulses and activates one or two hydraulic motors associated to the hubs 15, 15a, figure 1.

In the conditions as described, while the position of the cab on the horizontal plane is automatically controlled by the subject group, for any position taken on by the arm -B-, figure 7, its angular position on the horizontal plane, which can be controlled, is determined by the activation of the helicoidal wheel and endless screw group 19, 20, associated to another hydraulic motor.

The use of one or two hydraulic motors applied to the hubs 15, 15a, is prefixed according to the requisites of the use the cab -A- itself is put to.

Obviously, when only one hydraulic motor is used the group contained in the box 10 mechanically comprises only one helicoidal wheel and corresponding endless screw.

From the above, it is clear that each variation in the horizontal position of the floor of the cab -A- generates electric pulses which, suitably amplified, activate the hydraulic motor(s) of the electromechanical group which provides the constant horizontal position of the cab itself.

Without deviating from the use of a mechanical group with helicoidal wheel and endless screw activated by a hydraulic motor piloted by a suitable device for for sensing the horizontal position of the floor of the cab the structure of the group described can vary without in any way deviating from the sphere of the invention which comprises any other similar or equivalent solution.

Claims

1. Electromechanical group for automatically controlling the correct position of aerial cabs mounted on the ends of extensible arms of hoist machinery, characterised by the fact that it comprises helicoidal wheels (13, 13a) and endless screws (14, 14a) able to control the horizontal position of the floor of the cab (A), said means associated to at least one hydraulic motor which can be controlled in movement, in two directions, by the electric pulses generated by a horizontal position sensor of the floor of the cab electronic organs are provided for amplifying the electric pulses generated by the horizontal position sensor which are transmitted to the hydraulic motor(s).

2. Electromechanical group according to claim 1, characterised by the fact that the kinematic means are comprised of at least one helicoidal wheel (13) with an endless screw (14); said helicoidal wheel being fixed to a shaft (11) which, in turn, is fixed to a support (12) connected to the cab (A) while said endless screw is connected to a hydraulic motor which is activated, in two angular directions by the electric pulses generated by a sensor which controls the horizontal position of the support floor of the cab (A).

3. Electromechanical group according to claim 1, characterised by the fact that it comprises a pair of helicoidal wheels (13, 13a) connected to a shaft (11) having a grooved shell, fixed to the support (12) of the cab (A); said helicoidal wheels being associated to corresponding endless screws (15, 15a) coupled to single hydraulic motors which are activated by the electric pulses, amplified, generated by a sensor which controls the horizontal position of the loading floor of the cab (A).

4. Electromechanical group according to claim 1, characterised by the fact that it comprises a mechanism which is independent from the horizontal position controlling means of the loading floor of the cab, which comprises a hydraulic motor which activates an endless screw (19) and a helicoidal wheel (20) for controlling the angular position, on the horizontal plane, of the cab (A).

5. Electromechanical group according to claim 1, characterised by the fact that both the mechanisms for controlling the correct position in space of the cab (A) are contained in a boxed casing (12, 12a).

6. Electromechanical group according to claims 1 and 5, characterised by the fact that the boxed casing (12) supporting the mechanism for the control of the horizon tal position of the cab (A) comprises a fork-shaped element.

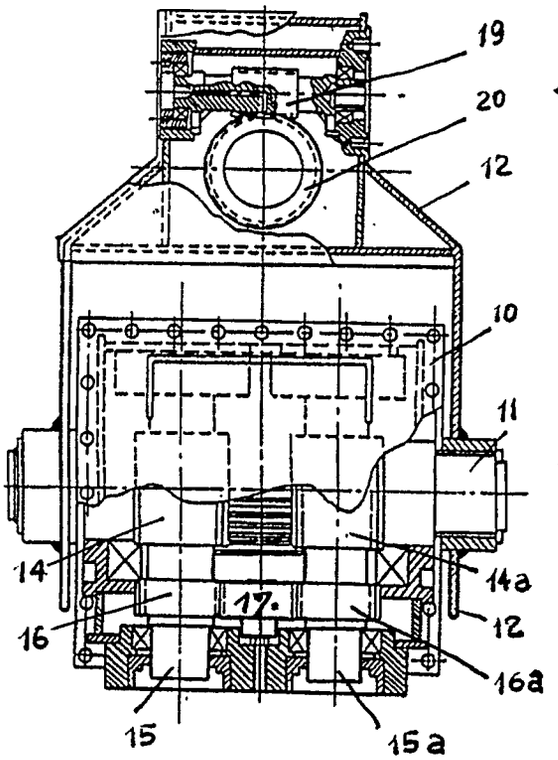

FIG.1

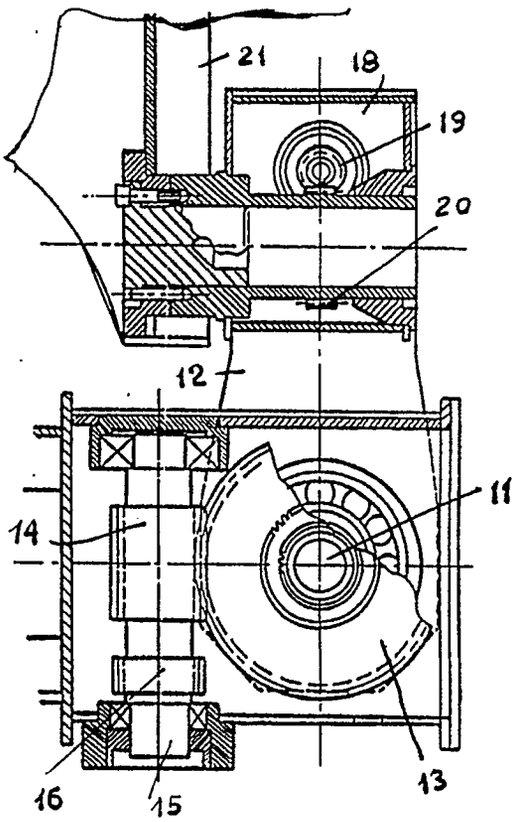

FIG.2

FIG.3

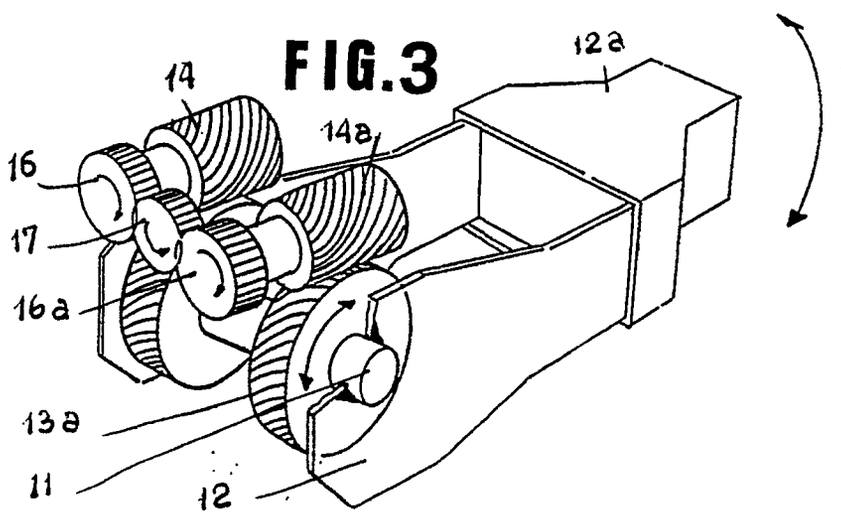

FIG.4

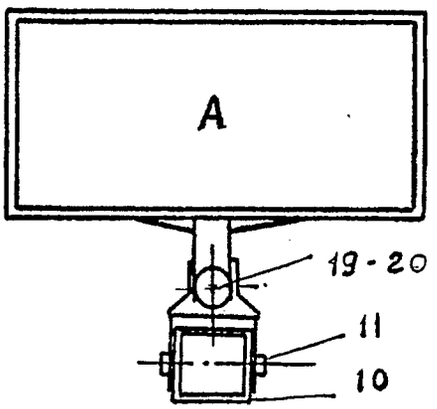

FIG.5

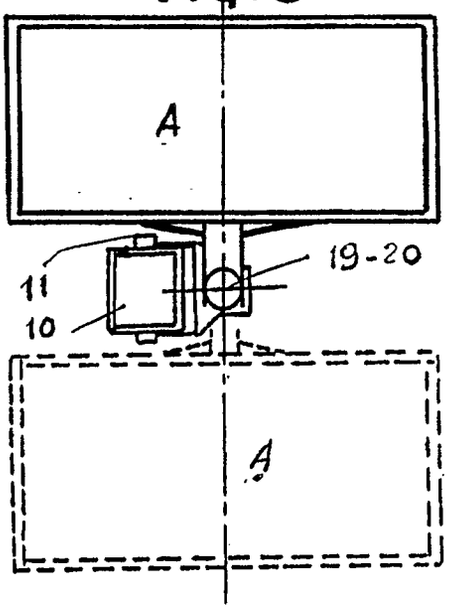

FIG.6

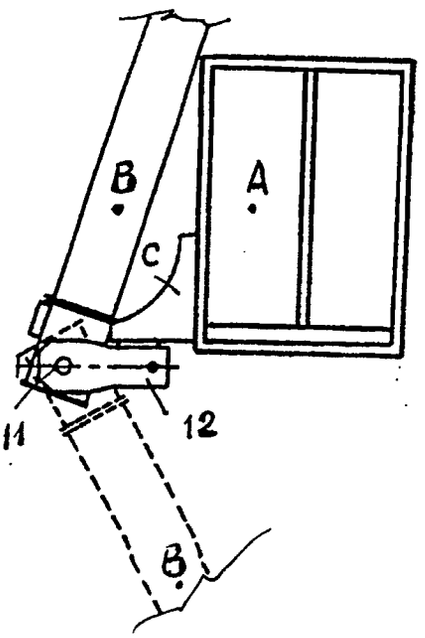

FIG.7