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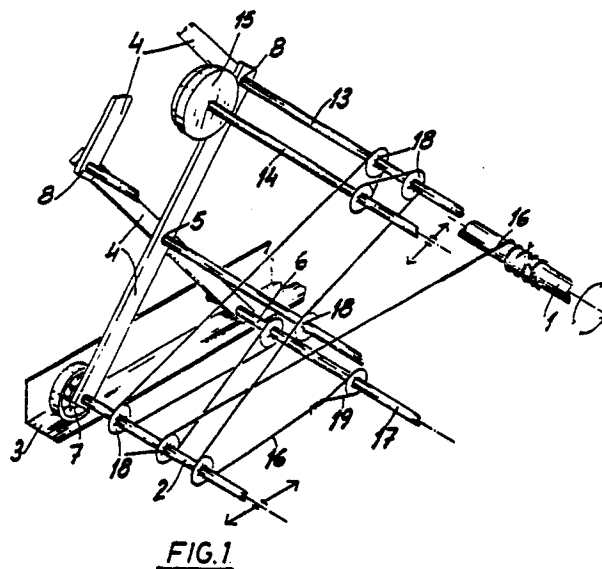
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54 Horizontal platform lifting device.

57 Horizontal platform lifting device, including a parallel arranged driving shaft superimposed on a lower horizontal support base, on both sides of which two similar side lifting units are arranged parallel and opposite each other, which are simultaneously driven by some driving means. Each one of the mentioned side lifting units includes two pairs of superimposed St Andrew's crosswise linked levers, of which the lower one has one of its lower ends linked to a fixed point in the lower support base and the other lower end arranged slidingly over the actual base. The upper ends of the lower St Andrew's cross are linked to the lower ends of the upper cross and one of the upper ends of the upper cross is linked to a fixed point of the lower side of the lifting horizontal platform, while the other upper end of the upper cross is arranged slidingly over the mentioned lower side of the mentioned lifting platform. The mentioned driving means include a pulling cord coiling drum, a first cord returning shaft, a second returning shaft, and a free transversal bar fitted at its ends with two wheels which are supported on the internal edges of the respective angles formed by the pairs of linked levers at the connection points of the bar which forms the second returning shaft.



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"HORIZONTAL PLATFORM LIFTING DEVICE"

The present invention refers to a horizontal platform lifting device, including an electric motor, driving at least one parallel arranged driving shaft superimposed on a lower horizontal support base, on both sides of which two similar side lifting units are arranged parallel and opposite each other, which are simultaneously driven by some driving means.

The so-called lifting tables or the pneumatically lifting platforms, frequently used in workshops and industries have been known for a long time, and which include two lateral pairs of crosswise linked arms, arranged in respective lateral vertical planes underneath, so that thanks to the fixed linkage of one lower end of each pair and the bringing up or taking away of the other lower end on an appreciably horizontal plane, the lifting or the descent of the four upper end of the arms, which are always maintained horizontally coplanar, is produced simultaneously.

However, this type of device has a high cost and presents notorious maintenance difficulties, for in most cases it is hydraulically driven, with the aim of supporting and lifting large loads.

Moreover, when it is a question of not so large loads, for example, for domestic purposes, other problems such as the reduction of the space occupied, minimizing the noise of the motor of the mechanism, eliminating the maintenance operations and reducing the cost of the equipment, are to be solved first of all.

For this end, more or less viable solutions have been envisaged, such as, for example, those described in the Utility Models Nos. 263.529 and 263.530, in one of which a driving of the two lateral pairs of arms is furnished by means of electric motor, while in the other an application of a winch used as lifting gear is described.

However, in both Utility Models, several important problems remain unsolved, among which the following stand out:

- Limitation of the maximum lifting height, given a determined length of the arms which implies a certain length of the folded device.
- Limitation of the weight capable of being lifted, which could be greater with equality of arm section and motor power.

All these disadvantages are fully eliminated in the device which is the object of this invention, which is essentially characterized by the fact that it includes an electric motor, which drives at least one parallel arranged driving shaft superimposed on a lower horizontal support base, on both sides of which two similar side lifting units are arranged parallel and opposite each other, which are simulta-

neously driven by some driving means, characterised by the fact that each one of the mentioned side lifting units includes at least two pairs of St Andrew's crosswise linked levers, which are similar and vertically superimposed over each other, of which the lower one has one of its lower ends linged to a fixed point of the lower support base, while the other lower end is arranged slidingly over the actual lower support base, with the upper ends of the mentioned lower cross being linked to the lower ends of the immediate upper cross and with one of the upper ends of the upper cross being linked to a fixed point of the lower side of the lifting horizontal platform, while the other upper end of the upper cross is slidingly arranged over the mentioned lower side of the mentioned lifting platform.

In accordance with another characteristic of the invention, the mentioned driving means include, in the case of each side lifting unit being made up only of two pairs of St Andrew's crosswise linked levers, at least one first transversal coiling drum with at least one pulling cord, driven by the driving shaft of the electric motor and arranged near the lower linked ends of the lower cross; a first cord returning shaft, coinciding with and near the transversal connecting bar of both ends sliding over the support base of the lower cross; a second returning shaft, coinciding with or near the transversal connecting bar between the facing linkage points between an upper end of the lower cross and a lower end of the upper cross; and a free transversal bar, fitted at its ends with two wheels which are supported on the internal edges of the respective angles formed by the pairs of linked levers at the connection points of the bar which forms the second returning shaft, with the cord able to be coiled one or more times between any of the mentioned coiling drums, returning shafts and free transversal bar.

In accordance with another characteristic of the invention, it is characterised by the fact that the mentioned driving means include, in the case of each side lifting unit being made up only of two pairs of St Andrew's crosswise linked levers, a first transversal coiling drum with at least one pulling cord, driven by the driving shaft of the electric motor and arranged near the lower linked ends of the lower cross; a first cord returning shaft, coinciding with or near the transversal connecting bar of both ends sliding over the lower cross support base; a second returning shaft, coinciding with or near a transversal connecting bar between the central linkage points of the levers which make up the lower crosses; a third returning shaft, made up of a free transversal bar whose ends are fitted with two

wheels which are supported on the external edges of the respective angles formed by the pairs of levers of the lower crosses; a fourth returning shaft, coinciding with or near the transversal connecting bar between the opposite linkage points between one upper end of the lower cross and one lower end of the upper cross; a fifth returning shaft coinciding with or near the transversal connecting bar of the central linkage points of the pairs of levers making up the upper crosses; and a second free transversal bar, whose ends are fitted with two wheels which are supported on the external edges of the respective angles formed by the pairs of levers linked at the central linkage points of the upper crosses, with the cord being able to be coiled one or more times between any of the mentioned coiling drums, returning shafts and free transversal bars.

In the enclosed diagrams, a preferred form of realization of the described horizontal platform lifting device has been illustrated, as a non-limiting example, it being stated that the other forms described in the enclosed claims can be easily deduced from the representation and explanations enclosed of the mentioned preferred form realization.

Fig. 1 is a schematic view in perspective of the preferred form of realization mentioned;

Figures 2, 3 and 4 are detailed cross-section views of different linkage and rolling points;

Figures 8 and 9 show corresponding - schematic views of the device, in the elevated position and in the nearly descended position;

Figures 5 and 7 illustrate two detailed views on an enlarged scale of the linkage of two levers with two superimposed crosses; and

Fig. 6 is also a detailed cross-section view, on an enlarged scale, of the wheels of the ends of the free shaft.

In the mentioned diagrams, it can be appreciated that the device in question includes an electric motor 2 which drives at least one driving shaft 1 arranged parallel and superimposed over a lower horizontal support base 3.

On both sides of the mentioned base 3 there are two parallel arranged similar side lifting units facing each other, which are simultaneously driven by some driving means.

In the case represented, each side lifting unit is made up only of two pairs of St Andrew's crosswise linked levers 4 at two linkage points 5, which are similar and vertically superimposed over each other, of which the lower lever has one of its lower ends 6 linked to a fixed point in the lower support base 3, while the other lower ends is arranged slidingly over the actual lower support base 3, by means of a wheel 7 preferably fitted with bearings.

The upper ends of the lower cross are linked at

8 to the lower ends of the immediate upper cross and one of the upper ends 9 of the upper cross is linked to a fixed point of the lower side of the horizontal lifting platform 11, while the other upper end of the upper cross is arranged slidingly over the mentioned lower side of the mentioned platform 11, by means of a wheel 10 preferably fitted with bearings.

The mentioned driving means include at least one first transversal coiling drum with at least one pulling cord 16, which coincides with the driving shaft 1 of the electric motor 2; a first-returning shaft of the cord 16, which coincides with the transversal connecting bar 12 of both ends 7 sliding over the base 3; a second returning shaft, which coincides with the transversal connecting bar 13 between the facing linkage points 8 between one upper end of the lower cross and one lower end of the upper cross; and a free transversal bar 14.

The mentioned bar 14 is fitted at its ends with two wheels 15 which are supported on the internal edges of the respective angles formed by the pairs of linked levers 4 at the connecting points 8 of the bar which forms the second returning shaft 13.

The cord 16 can be coiled one or more times between any of the mentioned coiling cylinder 1, returning shafts 12 and 13 and the free transversal bar 14. Preferably, the cord is supported on shafts 12 and 13 and the bar 14 by means of small pulleys 18 which freely rotate on themselves, as can be seen in Fig. 4.

The free end 19 of each pulling cord 16 is solidly attached to any connecting bar 17 between the linkage points 6.

The nature of the invention having been sufficiently described, as well as the way for it to be put into practice, it is stated that all that which does not alter, change or modify its fundamental principle may be subjected to variations in details, being the essential and by which the Patent is applied for, which is summarised in the following claims:

Claims

1.-Horizontal platform lifting device, including an electric motor, driving at least one parallel arranged driving shaft superimposed over a lower horizontal support base, on both sides of which two similar side lifting units are arranged parallel and opposite each other, which are simultaneously driven by some driving means, characterized by the fact that each one of the mentioned side lifting units includes at least two pairs of St Andrew's crosswise linked levers, which are similar and vertically superimposed over each other, of which the lower one has one of its lower ends linked to a fixed point of the lower support base, while the

other lower end is arranged slidably over the actual lower support base, with the upper ends of the mentioned lower cross being linked to the lower ends of the immediate upper cross and with one of the upper ends of the upper cross being linked to a fixed point of the lower side of the lifting horizontal platform, while the other upper end of the upper cross is slidably arranged over the mentioned lower side of the mentioned lifting platform.

2.-Horizontal platform lifting device, in accordance with claim 1, characterized by the fact that the mentioned driving means include, in the case of each side lifting unit being made up only of two pairs of St Andrew's crosswise linked levers, at least one first transversal coiling drum with at least one pulling cord, driven by the driving shaft of the electric motor and arranged near the lower linked ends of the lower cross; a first cord returning shaft, coinciding with or near the transversal connecting bar of both ends sliding over the support base of the lower cross; a second returning shaft, coinciding with or near the transversal connecting bar between the facing linkage points between an upper end of the lower cross and a lower end of the upper cross; and a free transversal bar, fitted at its ends with two wheels which are supported on the internal edges of the respective angles formed by the pairs of linked levers at the connection points of the bar which forms the second returning shaft or which is near it, with the cord being able to be coiled one or more times between any of the mentioned coiling drums, returning shafts and free transversal bar.

3.-Horizontal platform lifting device in accordance with claim 1, characterized by the fact that the mentioned driving means include, in the case of each side lifting unit being made up only of two pairs of St Andrew's crosswise linked levers, a first transversal coiling drum with at least one pulling cord, driven by the driving shaft of the electric motor and arranged near the lower linked ends of the lower cross; a first cord returning shaft, coinciding with or near the transversal connecting bar of both ends sliding over the lower cross support base; a second returning shaft, coinciding with or near a transversal connecting bar between the central linkage points of the levers which make up the lower crosses; a third returning shaft, made up a free transversal bar whose ends are fitted with two wheels which are supported on the external edges of the respective angles formed by the pairs of levers of the lower crosses; a fourth returning shaft, coinciding with or near the transversal connecting bar between the opposite linkage points between one upper end of the lower cross and one lower end of the upper cross; a fifth returning shaft coinciding with or near the transversal connecting bar of the central linkage points of the pairs of levers

making up the upper crosses; and a second free transversal bar, whose ends are fitted with two wheels which are supported on the external edges of the respective angles formed by the pairs of levers linked at the central linkage points of the upper crosses, with the cord being able to be coiled one or more times between any of the mentioned coiling drums, returning shafts and free transversal bars.

4.-Horizontal platform lifting device, in accordance with claim 2, characterized by the fact that in the case of each side unit being made up of three or more crosses, the driving means include in each unit, apart from the elements mentioned for the case with two crosses, one free transversal bar, fitted with wheels at its ends, similar to that mentioned in the two-cross case, for each additional cross exceeding the two lower crosses, with their wheels being supported on the internal edges of the respective angles formed by the pairs of levers linked at the connecting points between two consecutive crosses, the necessary returning shafts being arranged for suitable pulling cord travel.

5.-Horizontal platform lifting device, in accordance with claim 3, characterized by the fact that in the case of each side unit being made up of three or more crosses, the driving means include in each unit, apart from the elements mentioned for the case with two crosses, a free transversal bar, fitted with wheels at its ends, similar to the one mentioned in the two-cross case, for each additional cross exceeding the two lower crosses, with their wheels being supported on the external edges of the respective angles formed by the pairs of levers linked at the crosswise linkage points of each pair of St Andrew's levers, with the necessary returning shafts also being arranged for suitable pulling cord travel.

6.-Horizontal platform lifting device, in accordance with any of claims 2, 3, 4 or 5, characterized by the fact that the free end of each pulling cord is solidly fixed to any resistant point.

