

June 28, 1966

A. MIEVILLE

3,258,130

ARRANGEMENT CONTROLLING THE PIVOTING ARM OF A CRANE
AND CRANES INCORPORATING SAID ARRANGEMENT

Filed April 13, 1964

3 Sheets-Sheet 1

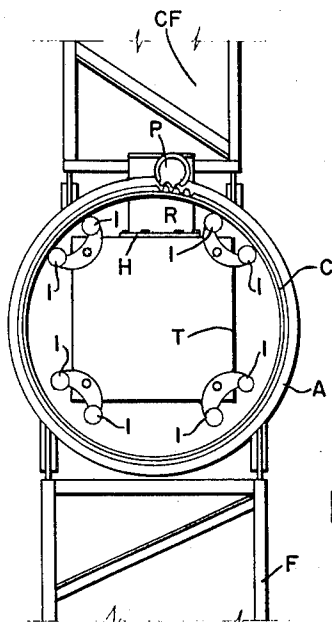


Fig. 1

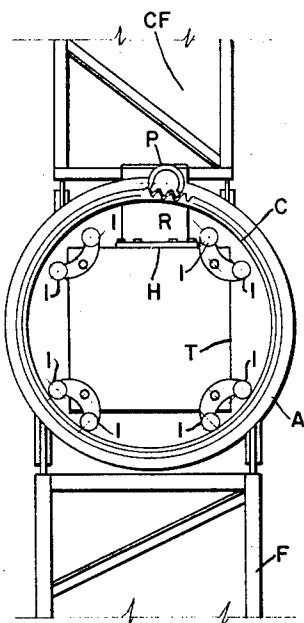


Fig. 2

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3 Sheets-Sheet 2

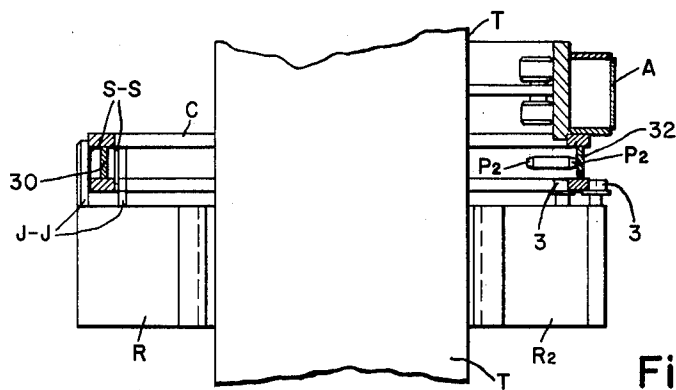


Fig. 4

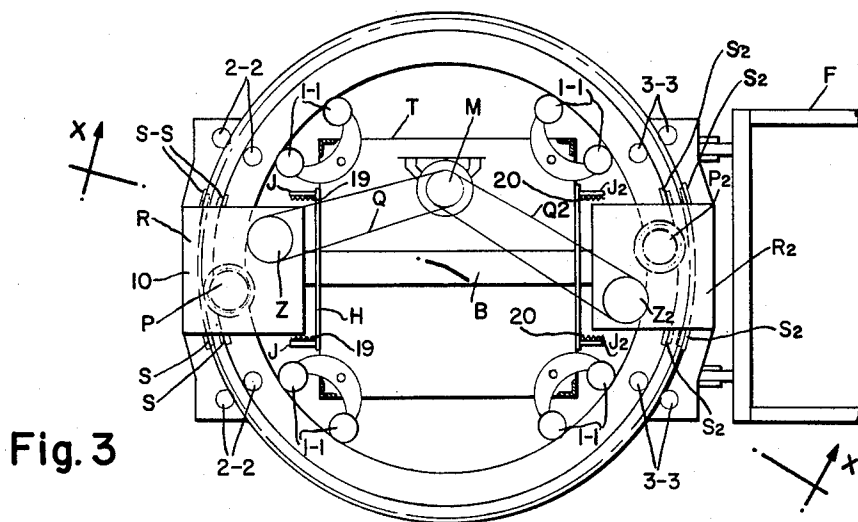


Fig. 3

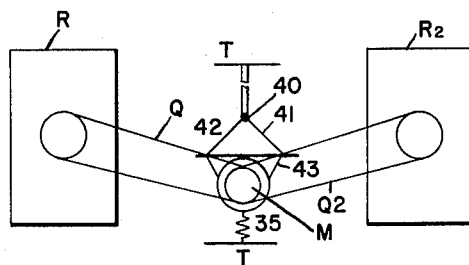


Fig. 6

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3 Sheets-Sheet 3

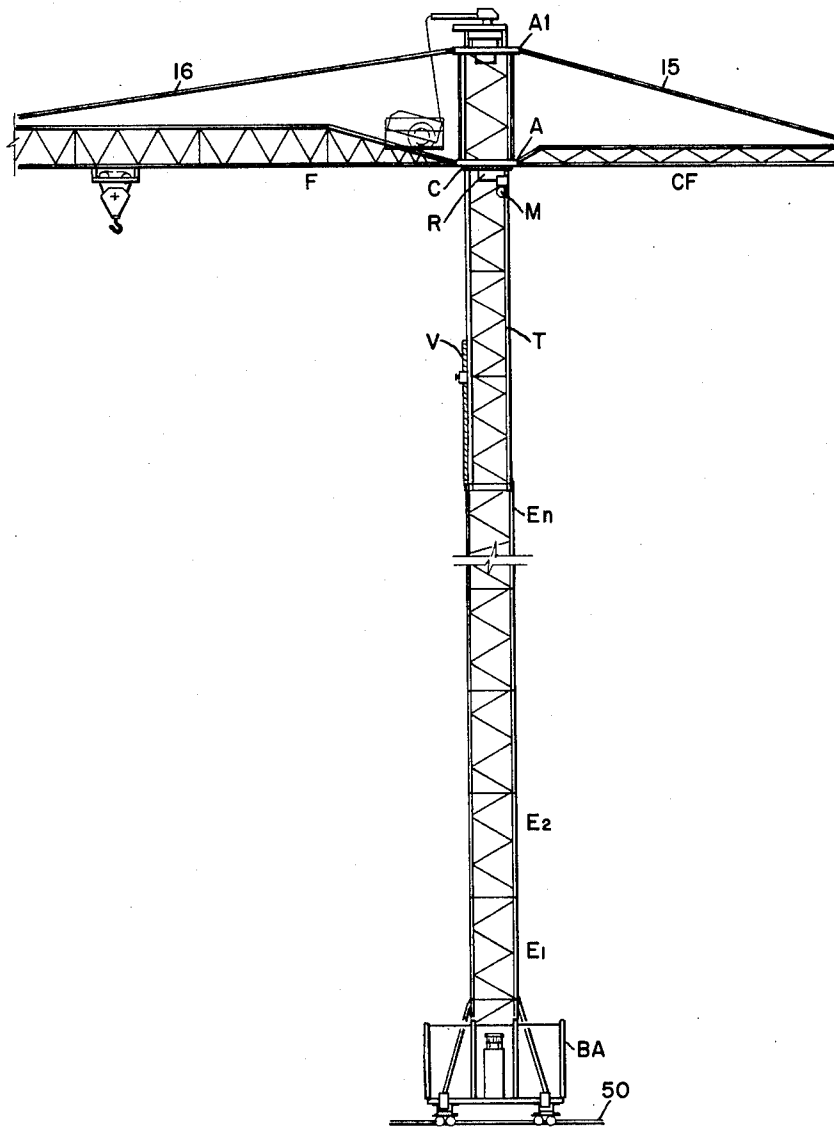


Fig. 5

1

2

3,258,130 ARRANGEMENT CONTROLLING THE PIVOTING ARM OF A CRANE AND CRANES INCORPORATING SAID ARRANGEMENT

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4,621/63

16 Claims. (Cl. 212—68)

The present invention has for its object an arrangement for controlling the rotation of the pivoting arm of a crane and cranes incorporating such arrangements.

It is a well-known fact that one of the most intricate sections of a crane, in particular in the case of a crane carried on a tower, is constituted by the apparatus controlling the rotation of the crane arm including a jib and a counterjib. The most generally used cranes were hitherto the cranes carried by towers of which the vertical support is in the shape of a tower including a pedestal, whether stationary or running on rails, a series of superposed intermediate standard elements or panels forming an upright and furthermore an element forming the head of the tower and secured over the uppermost panel of the upright formed by the intermediate panels, said head carrying in its turn the rotary arm of the crane.

Cranes of such a type are well-known and have achieved a considerable success by reason of their easy assembling and efficiency and they are widely used on all building sites in the case both of houses or of engineering works where it is necessary to hoist mortar, bricks or the like building materials.

The technique of building is however nowadays subjected to a complete revolution ascribable to the possibility of producing certain elements outside the site which cuts out the major fraction of the preparatory work in situ while novel, far more economical and efficient building methods have been developed, which methods rely directly on the preliminary preparation in a plant of the major part of the chief components of a building.

Thus nowadays cranes of a novel type are required, which are capable of raising and positioning structural elements of an intricate shape and which are comparatively large-sized, said cranes being capable of ensuring a maximum safety and an optimum efficiency in operation.

In conventional cranes, the jib and the counterjib are carried by a ring-shaped member provided with bearing sections or flanges and actuated in unison with a sprocket wheel adapted to be driven into rotation by an electric motor with the interposition of a speed-reducing gear which actuates in its turn a pinion engaging directly said sprocket wheel.

The electric motor, speed-reducing gear and pinion are mounted permanently on the crane tower in such prior arrangements. A drawback is met therein which consists in that the connection between the pinion and the sprocket wheel is governed permanently by the position of the jib with reference to the pinion the axis of which is stationary and by the conditions of loading of the crane. Even for identical relative positions of the jib with reference to the pinion, it is found that the latter is shifted between a first limit condition of coupling with the sprocket wheel corresponding to a maximum clearance and a second opposite diametrically opposed limit condition of coupling corresponding to a minimum clearance, according as to whether the jib is devoid of any load in the case of the first-mentioned limit condition or is loaded which is the case for the second-mentioned limit condition. As a matter of fact, when the longitudinal axis of

the jib crosses orthogonally the rotary axis of the pinion, while the jib is not subjected to any stress by reason of the momentum produced by the predominating load of the counterjib, a force is exerted on the ring-shaped member carrying the arm and consequently on the sprocket wheel, which force urges said sprocket wheel away from the pinion and leads to a minimum coupling between the teeth of the pinion and the teeth of the wheel.

This limit position is illustrated in the explanatory FIG. 1 whereas the other condition is illustrated in the explanatory FIG. 2, said figures being diagrammatic plan views of conventional arrangements for rotating crane arms.

In said figures, C designates the sprocket wheel, P the pinion, R the speed-reducing gear, A the ring-shaped member rigid with and overlying the sprocket wheel C, F the jib fitted over the flanges of the ring-shaped member A, T the tower of the crane while 1—1 designate four pairs of rollers mounted loose at the upper end of the tower T inside the sprocket wheel and opposing the translation of the latter. In said figures, the electric motor M controlling the speed-reducing gear R and permanently secured to the tower T is not illustrated. The counterjib is designated by CF. As illustrated, the speed-reducing gear R of conventional cranes is rigidly secured to a carrier plate H rigid with the tower T so that the said speed-reducing gear R and cooperating pinion P are always held in an identical position with reference to the sprocket wheel C. FIG. 1 shows the arrangement when the jib F carries no load in the position illustrated. By reason of the counterweight applied to the counterjib, the pinion P and the sprocket wheel C have a tendency to move apart and to show a comparatively large clearance between them, whereby the pinion teeth which engage only a small fraction of the surface of the teeth of the sprocket wheel are subjected to an exaggerated stress per unit of surface and may become blunt, taking also into account the action of a possible sliding.

FIG. 2 illustrates in contradistinction the condition for which the jib F is subjected to a load while it extends in the same direction as in FIG. 1.

In such a case, the momentum due to the action of the load on the jib predominates generally over that produced by the counterjib CF and therefore the force acting on the ring-shaped member A and consequently on the sprocket wheel C is reversed, so that the latter is then urged against the pinion which leads to a risk of breaking said pinion. Said stresses in opposite alternating directions arise according to the presence and the absence of a load on the jib and have an intensity which varies with the weight of the load and with the position of the jib with reference to the pinion. The coupling between the pinion and the sprocket wheel is executed consequently under always different conditions and leads to the production of very different stress values.

These phenomena are unavoidable by reason of the nature and size of the coupled parts and chiefly by reason of the elasticity of the material subjected to these variable stresses. Consequently, in conventional cranes, it is a difficult matter to obtain a coupling which shows an unvarying clearance and this is all the more certain since the gang assembling the crane operates under uneasy conditions at a high level above ground, said level lying nowadays as high as 50 to 80 m. above ground. The initial adjustment of the coupling between the pinion and the sprocket wheel can therefore never be executed with a 100% accuracy.

Finally, it is possible for the stresses to rise to an intensity such as may lead to a breaking of the pinion or of part of its teeth or else of the teeth on the sprocket wheel or again an unceasing and speedy wear of the coupled parts may appear which makes their speedy re-

placement necessary. Such a replacement is however no easy or speedy matter since it may require executing at a considerable height above ground, a difficult dismantling of parts of the crane which are furthermore heavy and of a complex nature.

This leads to a considerable loss of time and such a replacement may even produce a more or less complete paralysis of the building yard.

One of the objects of the present invention consists in providing a rotary arrangement showing none of the above drawbacks while operating under unvarying perfect coupling conditions independently of the presence or of the absence of a load on the jib and of the angular position of said jib with reference to the pinion.

A further object of the invention is constituted by a crane and chiefly a crane mounted on a tower and incorporating a balanced arrangement controlling the rotation of the arm.

The improved arrangement according to the invention includes at least one speed-reducing gear carried by the sprocket wheel without being rigid with the stationary section of the crane and adapted however to execute movements of a reduced amplitude, whereby it is always possible to set the pinion associated with the sprocket wheel under unvarying coupling conditions with the latter for any position of and/or for any load on the rotary section of the crane. To this end, the sprocket wheel is given an I-shaped transverse cross-section and the speed reducing gear is carried by at least one pair of carrier rollers or shoes engaging the interval between the upper and lower flanges of the sprocket wheel. There are preferably two such pairs of carrier rollers or shoes. Furthermore, the speed reducing gear is guided by at least one pair, and preferably by two pairs of centering shoes. In a particularly advantageous embodiment, the speed reducing gear is carried by a plate carrying simultaneously the pair or pairs of carrier rollers or shoes and the pair or pairs of centering rollers or shoes. In order to prevent the sprocket wheel from carrying along with it the system including the speed reducing gear and the pinion when the sprocket wheel turns, there are provided two stationary stops projecting with reference to the crane tower, which stops allow short movements of said speed reducing gear and pinion system by amounts ranging between 0.1 and 40 mm., with reference to the sprocket wheel. The possibility of such movements ensures automatically permanent coupling conditions between the sprocket wheel and the pinion.

According to a particularly important feature of the invention, the surfaces of the stops or of the movable speed reducing gear associated with the latter, are provided with damping elements of an elastic material, such for instance as small rubber buffers or slightly projecting springs adapted not only to damp the engagement between the speed reducing gear and the stationary stops, but also to absorb part of the kinetic energy of the arms constituted by the jib and counter-jib when the latter start or stop at the end of their travel. Since the speed reducing gear or gears are carried by the jib, they are subjected to the acceleration of the arms when starting or stopping and cooperate in ensuring a greater uniformity for the movement of the arms under the action of the uninterrupted engagement with the damping means provided for the entire rotary section of the crane.

By reason of the novel structure of the oscillating coupling between the sprocket wheel and the pinion, it is possible to resort to more than one pinion and speed reducing gear system.

According to a preferred embodiment of the invention, the means ensuring constant coupling conditions include two speed-reducing gear and pinion systems driven by a single motor and arranged in diametrically opposed relationship while they are interconnected by a rigid coupling constituted by a rod for instance.

According to a further embodiment of the invention,

it has been found that when two speed reducing gears are provided in diametrically opposed relationship in association with a single motor, it is advantageous to set the motor in a position which is symmetrical with reference to said speed reducing gears and to allow said motor to be slightly shifted.

Such an arrangement provides the advantage consisting in that the speed reducing gears are controlled and tensioned by the motor in a constantly balanced manner since any initial lack of balance is automatically cut out by a slight shifting of the motor towards the speed reducing gear which is idling and by a corresponding increase of the stress exerted on the speed reducing gear which has been precedingly subjected to a lesser load.

The present invention covers also the hoisting cranes particularly when carried on towers, which incorporate the arrangement disclosed constituted by a single speed reducing gear and pinion system or by two such systems fitted on the sprocket wheel C, instead of being fitted on the crane tower.

The invention will now be described with reference to the accompanying drawings given by way of example and wherein:

FIGS. 1 and 2 are, as already mentioned, explanatory figures,

FIG. 3 is a diagrammatic plan view, similar to FIGS. 1 and 2, of the improved arrangement,

FIG. 4 is a cross-section through line IV—IV of FIG. 3,

FIG. 5 is a front view of a crane incorporating the arrangement according to the invention,

FIG. 6 is a diagrammatic plan view of a preferred arrangement with a motor driving two speed reducing gears.

In FIGS. 3 to 5, the tower is again designated by the reference letter T, the ring-shaped member on which the jib F and the counter-jib CF are fitted by the reference letter A, the sprocket wheel by C, the speed-reducing gear controlled by the motor M by the reference letter R, the pinion by the reference letter P and the four pairs of rollers on the sprocket wheel C by the numbers 1—4.

As illustrated in FIGS. 3 and 4 and in accordance with the invention, the speed reducing gear R is no longer secured through a plate to the tower T, but is suspended to the sprocket wheel C by means of one or more pairs of rollers or carrier shoes S—S. Preferably two pairs of rollers or carrier shoes are provided for each speed reducing gear. The sprocket wheel C is given in the present case a cross-section in the shape of an I which allows the speed reducer R and the corresponding pinion P to be carried directly by said sprocket wheel C upon insertion, between the two upper and lower flanges defined by the cross-section of the sprocket wheel in a manner somewhat similar to the bead and flange of a rail, of at least one pair of rollers S—S to which are secured the rods ss carrying the whole speed-reducing gear and pinion system (FIG. 4). The carrier rollers SS may be replaced by shoes.

FIG. 3 illustrates the case where the suspended speed reducing gears are distributed in diametrically opposed relationship at R and R2. It should be mentioned that it is also possible to obtain constant coupling conditions with a single speed reducing gear R. In the latter case, the motor M may be fitted directly on the speed-reducing gear R. In addition to the pinion P and to the pairs of carrier rollers SS already mentioned, it is possible to associate with each speed reducing gear two pairs 2—2 of rollers guiding the sprocket wheel C and a pulley Z which is driven by the motor M through the agency of a transmission belt Q. Similar elements, to wit a pinion P2, a pulley Z2 and a belt Q2, two pairs of carrier rollers S2S2, two pairs of guiding rollers 3—3 and two pairs of centering rollers 1—1 are associated with a second speed reducing gear R2 if any. When two such speed-reducing gears R and R2 in diametrically opposed relationship are

used, it is preferable to resort also to a rod B for interconnecting said gears R and R2.

In front of each speed reducing gear R, a plate H secured to the tower T is provided with two lateral stops J on which are also fitted damping cushion 19 or the like means. As to the speed reducing gear R2, the damping means are illustrated at 20. Said damping means 19 and 20 may as well be secured to the sides of the speed-reducing gears R and R2 facing the stops I and 12. The operation of said damping means is of a considerable importance since they do not serve solely for damping the contact between the speed-reducing gears and the stops but they also allow the whole arrangement of speed-reducing gears suspended to the jib to exert a damping action on the entire rotary section of the crane when the latter is subjected to an acceleration at the start and at the stop. The oscillations of said arrangement, in fact, are absorbed by the damping means 19 and 20, and consequently the speed reducing gears absorb a fraction of the kinetic energy of the pivoting arms.

With the improved arrangement including a speed reducing gear which is independent of the stationary section of the crane and is fitted on the rotary sprocket wheel, it is possible to make sure that the pinion controlled by the speed reducing gear remains permanently under the same coupling conditions with reference to the sprocket wheel without being subjected to wear or to break. The operation of the improved arrangement is very simple. The motor M transmits motion through the agency of the belt Q to the pulley Z which is connected by means which are not illustrated with the pinion P. The pinion P thus driven by the motor M drives the sprocket wheel C and has a tendency to move with the latter and to carry along with it the box or plate carrying the speed-reducing gear R. The box moves, but meets the stop J so that it remains stationary and holds the pinion P against movement and consequently the latter remains also stationary and only the sprocket wheel C moves together with the ring-shaped member A the jib F and the counterjib CF.

In FIG. 4 which is a cross-section of FIG. 3 along the line IV—IV, there is shown on the left-hand side the pair of rollers SS carrying the speed reducing gear R in contacting relationship with the part 30 of a tooth or of a pin of the sprocket wheel C while on the right-hand side there is shown a pair of rollers 3—3 guiding the sprocket wheel C associated with the speed reducer R2. The same right-hand side of FIG. 4 also shows the engagement between P2 and the tooth 32 of the sprocket wheel C. The left-hand side of FIG. 4 shows in contradistinction the rods or pins ss projecting beyond the rollers SS and holding the speed reducing gear R.

In the case illustrated in FIG. 3, a single motor M secured to the tower is illustrated. However when two speed-reducing gears R and R2 are used, it is of considerable interest to use a single central motor M which may be subjected to small displacements as disclosed in FIG. 6.

In such a case, the motor M or its base 43 is rigid with a section of the tower T or is pivotally secured for instance at 40 by means of two rods 41 and 42 whereas the same motor is connected with the other section of the tower T by an elastic element 35 which allows it to execute small movements. Under such conditions, upon starting, the motor M is nearer the second gear R2 so that the belt Q of the first gear Q is more tensioned than Q2 and consequently is subjected to a greater stress; said belt generates automatically a reaction: in other words it urges the motor M towards the speed reducing gear R. This shifting stretches however also the belt Q2 of R2 so that after one or two oscillations of the motor M, the whole arrangement assumes a position of equilibrium and there is obtained a balanced distribution of the drive and of the stresses exerted on the two belts and on the two speed reducing gears. By resorting thus to two speed-reducing gears on the sprocket wheel and a single motor

adapted to execute slight movements, there is obtained an optimum operation for the arrangement described and for the crane.

FIG. 5 is a diagrammatic front view of a complete crane incorporating the improved arrangement. In said figure, BA designates the pedestal of the tower which runs on rails 50 while E1, E2 . . . En designate standard superposed sectional elements forming the tower T and which are superposed during the assembly by a shifting of the head of the tower T by means of a worm V.CF designate furthermore the counterjib and F the jib, said jib and counterjib being secured to the ring-shaped member A superposed over the sprocket wheel C.

The references 15 and 16 designate the ties connecting the outer ends of the counterjib and of the jib with an upper ring-shaped member A1 adapted to be shifted in unison with A and C. Said upper ring-shaped member A1 may be given a diameter less than that of A whereby the movable head of the tower T extending between A and A1 may be given a frustoconical shape instead of the cylindrical shape illustrated. The motor M is secured to the tower T and may execute movements of a reduced amplitude whereas the speed reducing gear is independent of the tower T and is carried by the sprocket wheel C and may execute movements of a very reduced amplitude so that the coupling between the pinion and the sprocket wheel remains unchanged whatever may be the position of the arms and whatever may be the load carried by the jib.

In certain cranes, the sprocket wheel C may also be constituted by two or more separate ring-shaped members, in which case the arrangement according to the invention may be applied to either of said members indifferently but preferably to the upper ring-shaped member.

The invention has been described with reference to the special embodiments illustrated in the drawings solely so as to make its understanding easier. Obviously however, numerous modifications may be brought to the arrangement described within the scope of the accompanying claims.

What I claim is:

1. In combination with the upper end of the tower of a crane, stops carried by said tower, a rotary section comprising a ring-shaped member revolvably carried by said stationary section, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor controlling said pinion and carried by the sprocket wheel independently of the stationary section of the crane and holding said pinion is permanent unvarying meshing conditions with the sprocket wheel said stops allowing a small range of movement of said gear and pinion relative to said sprocket wheel.

2. In combination with the upper end of the tower of a crane, stops carried by said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member and provided with upstanding and depending peripheral flanges, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor, controlling said pinion and carried by the sprocket wheel independently of the tower of the crane, and carrier members fitted between the flanges of the sprocket wheel and holding the speed-reducing gear in position said stops allowing a small range of movement of said gear and pinion relative to said sprocket wheel.

3. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, stops carried

by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, and and provided with upstanding and depending peripheral flanges, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor, controlling said pinion and carried by the sprocket wheel independently of the tower of the crane, and two pairs of rollers fitted between the flanges of the sprocket wheel and holding the speed-reducing gear in position said stops allowing a small range of movement of said gear and pinion relative to said sprocket wheel.

4. In combination with the upper end of the tower of a crane, stops carried by said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, centering rollers fitted between the sprocket wheel and the tower, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor, controlling said pinion and carried by the sprocket wheel independently of the tower of the crane said stops allowing a small range of movement of said gear and said pinion relative to said sprocket wheel.

5. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, stops carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor and controlling said pinion, a plate carrying the speed-reducing gear independently of the tower, means centering the plate with reference to the sprocket wheel and at least one pair of rollers through which the plate is carried by the sprocket wheel said stops allowing a small range of movement of said gear and said pinion relative to said sprocket wheel.

6. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor and controlling said pinion, a plate carrying the speed-reducing gear independently of the tower, stops on said plate, two pairs of rollers centering the plate with reference to the sprocket wheel said stops allowing a small range of movement of said gear and pinion relative to said sprocket wheel and two pairs of rollers through which the plate is carried by the sprocket wheel.

7. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor and controlling said pinion, a plate carrying the motor and the speed-reducing gear independently of the tower, stops on said plate, two pairs of rollers centering the plate with reference to the sprocket wheel and two pairs of rollers through which the plate is carried by the sprocket wheel said stops allowing a small range of movement of said gear and pinion relative to said sprocket wheel.

8. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib secured to said member in diametrically op-

posed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor, controlling said pinion and carried by the sprocket wheel independently of the tower of the crane, and stops carried by the tower and engaging the speed-reducing gear at either end of its path to allow a small range of movement of said gear and said pinion relative to said sprocket wheel.

9. In combination with the upper end of the tower of a crane, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, a motor, a speed-reducing gear controlled by the motor, controlling said pinion and carried by the sprocket wheel independently of the tower of the crane, stops carried by the tower and engaging the speed-reducing gear at either end of its path to allow a small range of movement of said gear and said pinion relative to said sprocket wheel, and shock-absorbing means fitted on at least one of the following parts, the stops and the cooperating areas of the speed-reducing gear.

10. A tower crane comprising a tower including a number of superposed elements and a rotary head revolvably carried at the upper end of said tower and including a ring-shaped member, a jib and a counterjib secured rigidly to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, two pinions meshing permanently with said sprocket wheel, and a speed-reducing gear controlling each pinion, a plate carrying each speed-reducing gear, at least one pair of rollers through which each plate is carried by the sprocket wheel, at least one pair of rollers centering each plate with reference to the sprocket wheel and means rigidly interconnecting the two plates to set the speed-reducing gears in diametrically opposed relationship, a motor carried by the tower, and controlling both pinions and projecting stops carried by the tower and engaging the plate to allow a small range of movement of each gear and pinion relative to said sprocket wheel, said movement ensuring permanent unvarying coupling conditions between the pinion and the sprocket wheel.

11. In combination with the upper end of the tower of a crane, stops on said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion system comprising two pinions meshing permanently with said sprocket wheel, a motor, a speed-reducing gear system of the crane, the two systems including pinions and carried by the sprocket wheel independently of the tower of the crane, the two systems including pinions and their associated speed-reducing gears being diametrically opposed with reference to the sprocket wheel said stops allowing a small range of movement of said gear and pinion systems relative to said sprocket wheel.

12. In combination with the upper end of the tower of a crane, stops on said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion system comprising two pinions meshing permanently with said sprocket wheel, a motor, a speed-reducing gear system controlled by the motor controlling said pinions and carried by the sprocket wheel independently of the tower of the crane, the two systems including pinions and their associated speed-reducing gears being diametrically opposed with reference to the sprocket wheel, and a rod

rigidly interconnecting the two speed-reducing gears said stops allowing a small range of movement of said gear and pinion systems relative to said sprocket wheel.

13. In combination with the upper end of the tower of a crane, stops on said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion system consisting of two pinions meshing permanently with said sprocket wheel, a motor carried by the tower, a speed-reducing gear system controlling each pinion and carried by the sprocket wheel independently of the tower of the crane, two belts controlled by the motor and controlling each the speed-reducing gear corresponding to one pinion, the two systems including pinions and their associated speed-reducing gear being diametrically opposed with reference to the sprocket wheel, and a rod rigidly interconnecting the two speed-reducing gears said stops allowing a small range of movement of said gear and pinion systems relative to said sprocket wheel.

14. In combination with the upper end of the tower of a crane, stops on said tower, a rotary section comprising a ring-shaped member revolvably carried by said tower, a jib and a counterjib rigidly secured to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, a pinion system including two pinions meshing permanently with said sprocket wheel, a motor carried by the tower, a speed-reducing gear system controlling each pinion and carried by the sprocket wheel independently of the tower of the crane, two belts controlled by the motor and controlling each the speed-reducing gear corresponding to one pinion, the two systems including pinions and the associated speed reducing gears being diametrically opposed with reference to the sprocket wheel, and a rod rigidly interconnecting the two speed-reducing gears said stops allowing a small range of movement of said gear and pinion systems relative to said sprocket wheel.

15. A tower crane comprising a tower including a number of superposed elements and a rotary head revolvably carried at the upper end of said tower and including a ring-shaped member, a jib and a counterjib rigidly secured to said member in diametrically opposed

relationship, a sprocket wheel coaxially rigid with said member, a pinion meshing permanently with said sprocket wheel, and a speed-reducing gear controlling said pinion and carried by the sprocket wheel independently of the tower, a motor carried by the tower and controlling the pinion and projecting stops carried by the tower and engaging the speed-reducing gear to define a small range of movement of said pinion and gear relative to said sprocket wheel, said movement ensuring permanent unvarying coupling conditions between the pinion and the sprocket wheel.

16. A tower crane comprising a tower including a number of superposed elements and a rotary head revolvably carried at the upper end of said tower and including a ring-shaped member, a jib and a counterjib secured rigidly to said member in diametrically opposed relationship, a sprocket wheel coaxially rigid with said member, two pinions meshing permanently with said sprocket wheel, and a speed-reducing gear controlling each pinion and carried by the sprocket wheel independently of the tower, the two pinions and cooperating speed-reducing gears lying in diametrically opposed relationship and a rod rigidly interconnecting the two speed-reducing gears, a motor carried by the tower and controlling both pinions and projecting stops carried by the tower and engaging the speed-reducing gear to define a small range of movement of said gear and pinion relative to said sprocket wheel, said movement ensuring permanent unvarying coupling conditions between the pinion and the sprocket wheel.

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