April 4, 1961 R. PRESTEL 2,978,115

TRUCK-BOUND SLEWING CRANE

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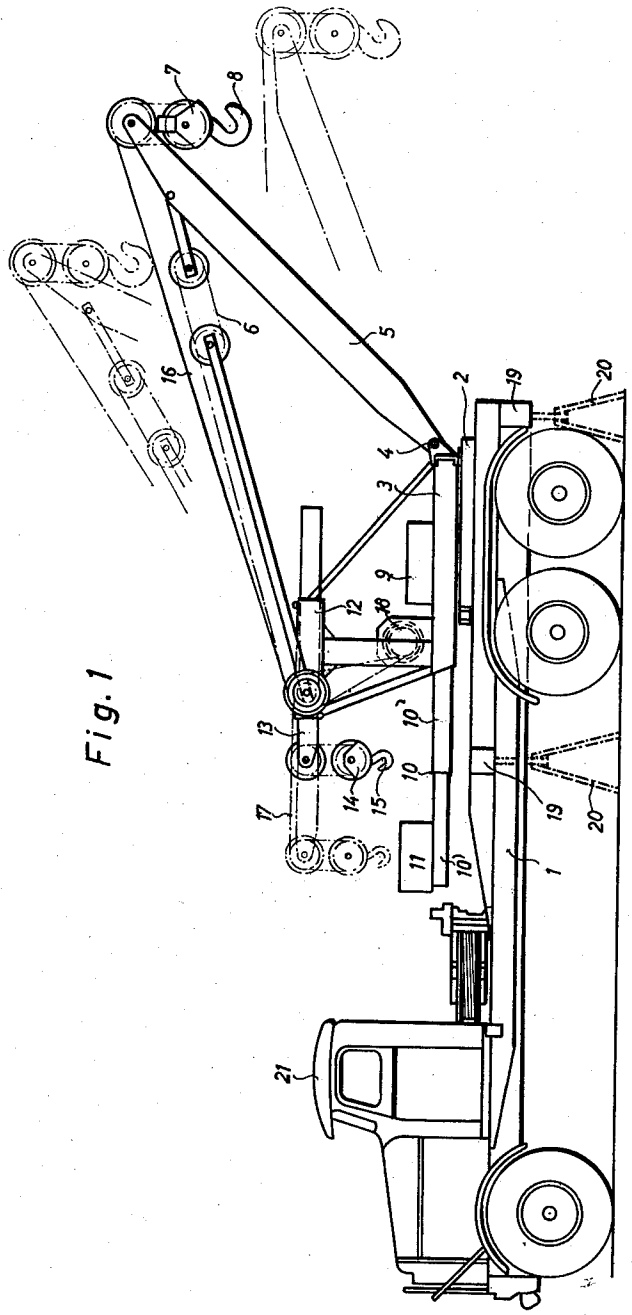


Fig. 1

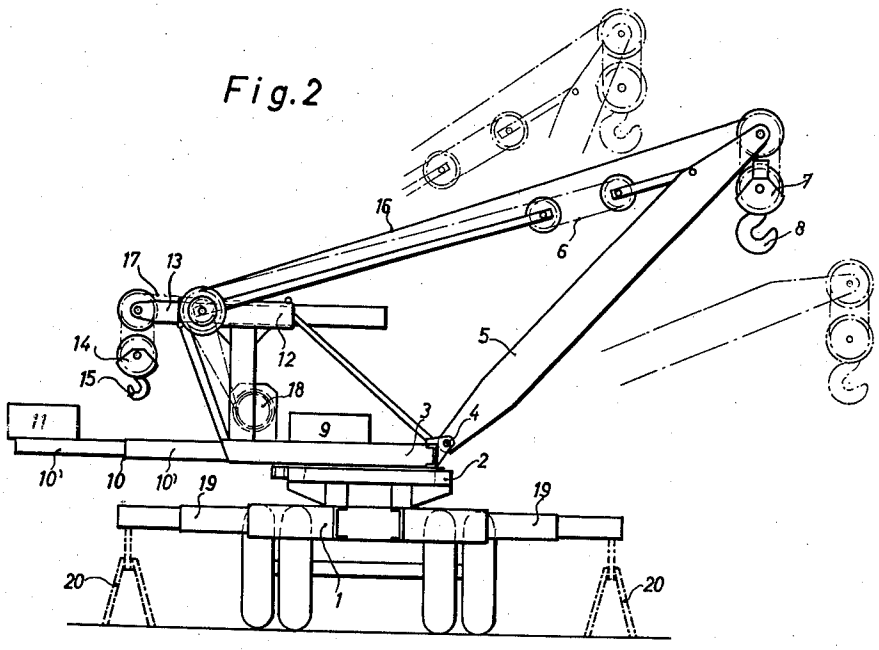
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Fig.2



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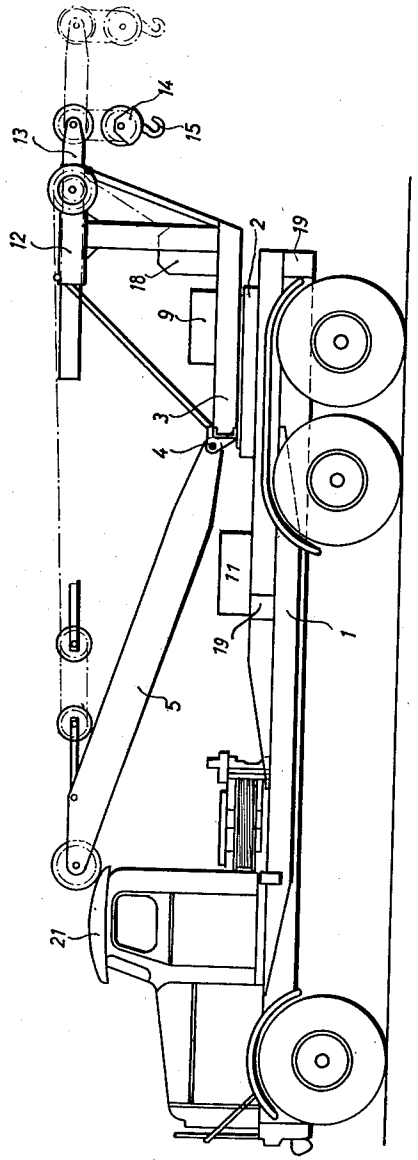


Fig. 3

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TRUCK-BOUND SLEWING CRANE

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3 Claims. (Cl. 212—49)

This invention refers to a road-bound vehicle and in particular to a truck equipped with a slewing crane.

Such truck arrangement has generally the advantage of facilitating the transportation of the crane from one site to another and of using the same without losing time in erecting and assembling the crane for operation.

However, considerable difficulties and disadvantages ensue from the aforesaid known structure. These trucks or vehicles with slewing cranes can only be employed for a particular task for which they are built, and their construction in rare cases cannot be considered economical. Besides this, working with slewing cranes of this type which require a considerable extent of revolving motion necessitate means for preventing tipping or tilting of the vehicle during operation.

Attempts have been made to provide the vehicle with lateral cantilever or extension arms and to maintain same in position by using special jacks or supports placed on the ground or road. These supports, however, were not suitable in practice, because, on the one hand, the lateral extension arms as well as the vehicle frame are subjected to great stresses and, on the other hand, they do not allow for a sufficient overhang or lateral projection and the lifting capacity does not fulfill practical requirements.

It is for that reason, that one has already proposed to dispose on the turntable or rotatable plate a counterweight, which is stationary and fixed in position relative to and opposite the slewing or extension arm. Since, however, the long extension arm must be swung during the position of transportation toward the front and in the direction of movement of the vehicle, it follows that the counterweight positioned outermost and at the rear of the vehicle contributes to an undersirable decrease of the driving conditions for the crane equipped vehicle during transportation.

In railway wagons with slewing cranes in which, however, in view of the weight disposition and distribution other conditions prevail than in road-bound vehicles, counterweights have already been used, which are connected in a position of crane operation with the rotating plate or turntable and are disassociated therefrom in the position of transportion.

The disadvantages of employing additional weights on railway vehicles have led to constructions wherein the counterweight itself is built for separate transportation, so that the weight in the position of operation of the crane may be connected to the turntable in such a manner that on the latter a substantially vertical support or arm is arranged, which is swingable adjacent its lower edge.

When the wheel-supported counterweight is arranged behind the crane vehicle and is to be connected with the turntable, then it has to be declutched from the crane supporting vehicle and the arm has to be swung in a horizontal position above said weight and the latter has to be connected by means of bolts to the arm. The arm itself must then be swung into the vertical position and has to be locked therein.

Besides the point that the swingable arm contributes to a complicated crane structure and the counterweight will be disposed rather close by the swinging arm to the turntable, the positioning and lifting off of the counterweight in the aforesaid manner is quite difficult and time consuming, so that a slewing crane of this type is only different from those used on railway wagon platforms in that the additional weight caused by the counterweight may be dispensed with in the latter case.

In other well known automotive slewing cranes the disadvantage of additional weight is taken into consideration, the depositing and taking off of the counterweight, however, is avoided, in that the counterweight is pivotable or swingable itself on the same axis, on which the turntable is journaled. Coupling means are provided to selectively connect the counterweight with the turntable for a common swinging movement.

In the position of transportation the counterweight may be supported by rollers, in order to avoid a damage or destruction of the axis of rotation during transit. In such an arrangement the bearing structures of the turntable and of the counterweight become extremely expensive and the effects of the counterweight are rather unfavorable as the same is only connected with a turntable via said common axis. Also the supporting rollers are disturbing during the swinging movements, as the distance of the counterweight from the bottom or ground is not always the same during crane load.

Furthermore, the aforesaid rollers are endangered during rapid transit movement of the vehicle due to vibrations or shocks.

The present invention fulfills a long desirable solution of a problem, to build a transportable slewing crane which is extremely simple in its structure and operation, serves various purposes and whose condition of transportation, movability and working capability shows considerable improvements as compared with known slewing cranes.

According to the invention there is provided a transportable crane, having two supports, namely, a main boom and an auxiliary extension arm and further a loose counterweight, which in the position of operation of the crane is deposited on the turntable by means of the auxiliary extension arm and in position of transportation will be lowered onto the vehicle frame.

It it an object of the present invention to provide means facilitating a very effective slewing crane structure which may be readily operated not only for carrying out usual assembly work, but also for salvage or wrecking operations in accidents and emergency cases, where it is necessary within the shortest time possible to recover, re-erect and to tow away turned over vehicles.

But also other towing service may be performed with the new transportable slewing crane which has an auxiliary extension arm which cannot be installed in known cranes provided with conventional long main booms.

The invention has consequently taken into consideration the transmission of the loose counterweight, but has simplified such handling by the provision of an auxiliary extension arm, so that this operation can be carried out within a short time by a single operator.

It is, therefore, another object of the invention to provide means contributing to a highly economical operation of the transportable slewing crane. The vehicle is, however, continuously loaded by the counterweight which rests during transportation on the vehicle frame, which is of great advantage for transporting and other conditions of the vehicle.

In emergency and towing services it is of great importance to know that the vehicle will withstand undesirable road conditions. In order to carry out the counter-

weight rather light the invention contemplates that on the turntable opposite the main boom a carrier arm is arranged above the turntable to operate the counterweight, and this carrier arm is extensible to be lengthened beyond the turntable and the vehicle cabin to facilitate swinging movements of said carrier arm in extended position.

The vehicle may be supported during its position of operation by suitable ground jacks or supports. In accidents, however, such supports are undesirable and in order to establish a balance between the load and the counterweight without carrying out any additional work therefor and in order to dispense with the aforesaid jacks or supports the extensibility of the counterweight carrier may be regulated and determined by suitable abutment means.

To this end the extension arm may be constructed for displacing the abutment and is connected in accordance with the reach of the extension arm via transmission means known per se. Furthermore the extensibility of the carrier arm in accordance with the load on the extension arm may be brought about by means of a motor which is controlled by the load or by a cable winch which is looped in lengthwise direction around a carrier arm and whereby the loop of the cable may be shortened due to the load against the action of a retraction spring.

It is still another object of the invention to provide means conducive to a balanced and versatile transportable slewing crane structure, which may be easily manipulated, is very stable, rigid and mobile so that a great number of operations may be carried out by said crane, necessitates only a minimum of constructional parts and elements and takes up relatively little space during nonuse of storage.

These and other advantages and objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings, showing preferred embodiment of the invention.

In the drawings:

Fig. 1 is a side elevation of a truck equipped with a crane embodying the invention and shown in position of operation.

Fig. 2 is a rear elevation view of the truck of Fig. 1 shown with a swung out extension arm of the crane.

Fig. 3 shows in elevation the truck with the crane components in position of transportation.

Referring now more particularly to the drawings there is disclosed a chassis of a conventional truck **1** on which there is arranged approximately at the rear end thereof a turntable **3** on a well known bearing of rotation **2**. On one end of the turnplate or turntable **3** there is arranged a bracket **4** carrying a main boom **5**, which is supported in position by means of a cable winch **6** in a manner well known and whereby said arm can be adjusted to various operative positions (as indicated in dot and dash lines). At the free end of boom **5** there is supported a hook bracket **7** to which hook **8** is connected. On the turntable **3** there is further arranged a housing **9** containing a gearing which is adapted to rotate turntable **3**.

On the opposite side of the boom **5** there is arranged at the turntable **3** a carrier **10**, which is telescopically and extensibly disposed in the turntable **3** and has the telescopic parts **10'** movable with respect to each other. On the outmost or free end of the carrier **10** there is disposed a counterweight **11** which, in this instance, may be loosely supported thereon.

Between the turntable **3** and the driver's cabin **21** of the truck or vehicle there is left sufficient space to facilitate swinging or slewing movement of the extensible carrier **10**.

In a sleeve-shaped bearing **12** which extends in horizontal direction and is rigidly connected to turntable **3** there is arranged above carrier **10** an auxiliary extension arm **13** which is provided with a hook bracket **14** and hook **15**, extension arm **13** being displaceable in lengthwise direction of sleeve-shaped bearing **12**. The extension arm may be hand operated. Cables **16** and **17** for the hook brackets **7** and **14**, as well as cable winch **6** which functions to swing main boom **5** in a substantially vertical manner are powered in a conventional manner by the motor winch **18**. The vehicle frame **1** can also be provided with telescopically operated carriers **19** which can be extended laterally in order to provide a support for blocks **20** placed on the ground (shown in dotted lines). The motor winch **18** is of conventional construction and is provided with a plurality of disc plates with clutch means for selectively engaging the disc plates to selectively operate the cables **6**, **16**, and **17**.

During the transportation the crane assumes a position as seen in Fig. 3, in which the main boom **5** is supported at one end thereof by or adjacent the cabin **21** or same could extend therebeyond, while the counterweight **11** is deposited on the vehicle frame adjacent to turntable **3** and may be secured thereat against displacement. Upon arrival of the crane truck at a desired site the turntable **3** is rotated about 180°, so that hook **15** of the auxiliary arm **13** comes to lie above the counterweight **11**. Hereafter the hook bracket **14** is lowered by means of the motor winch **18** and the loading or crane hook **15** is then engaged in an eye (not shown) of the counterweight **11** so as to lift the same.

Subsequently the carrier **10** will then be extended from its housing from within a space below the turntable **3** either by hand or mechanically under the counterweight **11**. The hook **15** with the counterweight **11** is then moved in lengthwise direction with auxiliary slide arm **13** in sleeve-shaped bearing **12** up to the end of said carrier arm, and the counterweight is then deposited on the latter. The slewing crane is now in operative position and preferably the operator of the vehicle may easily and readily carry out within the shortest time possible and while avoiding any possible danger the operation of the crane. Due to the fact that the movements of the turntable **3** are performed together with counterweight **11** main boom **5** with its load thereon may be operated to be brought into a lateral position (see Fig. 2) without any danger of tilting the truck.

If the crane is to be transformed again to assume a position of transportation the counterweight **11** is first lifted by means of the auxiliary jib or extension arm **13** and the carrier **10** is thereafter retracted into the space below the turntable **3** and the counterweight **11** is deposited onto a bearing plate (not shown) provided on the vehicle frame. Furthermore, the boom **5** then takes up the position of transportation (Fig. 3) and the vehicle may be moved to the next site.

It is within the realm of the invention to rigidly connect the carrier arm **10** with the turntable **3** and to only lower the counterweight **11** by means of the auxiliary jib or extension arm **13** in front of the carrier arm **10** onto the truck frame. It is, however, quite advantageous to retract the carrier **10** into the space below the turntable **3** before further transportation takes place, because, on the one hand, the counterweight **11** acts during crane operation on a longer lever or carrier arm and, on the other hand, an improvement in the conditions of transportation for the truck or vehicle may be had due to the fact that the counterweight **11** is disposed more toward the rear.

The carrier **10** may also be composed of more than two telescopic parts. It is advisable for that reason, that the telescopic part **10'** which serves as a support or carrier for the counterweight **11**, is guided only in lengthwise direction along its edges whereby the counterweight **11** may remain and rest during displacement movement of the carrier arm **10** on the latter. In this manner it is

possible to control the carrier arm in accordance with the load held by the extension arm during operation.

To this end, the extensibility of the carrier arm may be effectuated by an electric motor drive which controls and is dependent on the traction exerted by the cable winch **16**, whereby the cable when taking up the load expands a spring.

It is further possible that the cable may be looped or trained unidirectionally and in lengthwise direction of the carrier arm partially thereabout for displacing the same during load in a direction opposite to the force of the spring. The angle of contact or wrap may be chosen very small, so that the retraction spring may be of relatively small dimension.

The displacement of the counterweight can be adjusted through relatively inexpensive and simple means to various extents and positions of the extension arm or jib taking up the load. It is only necessary to provide on the turntable a displaceable abutment piece or limit switch to define or predetermine the movement for extending or pulling out the counterweight. This abutment may be easily manipulated for adjustment by the operator or driver either manually or mechanically. The abutment may, however, be controlled in accordance with the degree or extent of extension arm displacement through automatic means by levers or other transmission means such as mechanical lever assemblage or hydraulic means (not shown) but known per se.

Balancing control systems of the aforesaid type are highly advantageous for carrying out salvage or emergency work, since for this kind of work there remains very often no time to provide for ground support blocks or like holding devices.

In the novel transportable slewing crane according to the invention such ground supports are, therefore, not necessarily desirable as in regard to very heavy loads during operation the truck spring may be rather braked or blocked.

It can thus be seen that there has been provided according to the invention a truck-bound slewing crane having a frame and turntable thereon with a main boom equipped with a hook assembly; comprising a loose counterweight for balancing the load on said main boom, an auxiliary extension arm positioned on the crane above and opposite one end of said main boom, said counterweight being adapted to be manipulated for placement by said hook of said auxiliary extension arm in the position of operation of the crane onto the turntable, while in the position of transportation said counterweight is deposited by said hook of said auxiliary extension arm onto the frame adjacent said turntable.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A truck-bound slewing crane comprising a frame, a turntable on said frame, a main boom, one end of said boom being pivotally supported on said turntable, said boom having a hook assembly, a loose counterweight for balancing a load when taken up by said hook assembly of said main boom, an auxiliary extension arm provided with a hook and positioned on said turntable opposite said one end of said main boom, and a telescoping carrier on said turntable, said counterweight being engaged for placement by said hook of said auxiliary extension arm in the position of operation of the crane onto said carrier, while in the position of transportation said counterweight is deposited by said hook of said auxiliary extension arm onto said frame adjacent said turntable.

2. A crane according to claim 1, wherein said carrier is located on said turntable opposite said one end of said main boom, said carrier holding said counterweight remote from turntable during operation of said main boom and being oppositely disposed with respect thereto.

3. A truck-bound slewing crane comprising a frame, a turntable on said frame, a main boom, one end of said boom being pivotally supported on said turntable, said boom having a hook assembly, a loose counterweight for balancing a load when taken up by said hook assembly of said main boom, an auxiliary extension arm provided with a hook and positioned on said turntable opposite said one end of said main boom, a telescoping carrier on said turntable, said counterweight being engaged for placement by said hook of said auxiliary extension arm in the position of operation of the crane onto said carrier, while in the position of transportation said counterweight is deposited by said hook of said auxiliary extension arm onto said frame adjacent said turntable, and a sleeve mounted above and carried by said turntable, said auxiliary extension arm carrying said hook being slidably mounted in said sleeve for movement into overlying position with respect to said counterweight.

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