June 24, 1930. H. L. MITCHELL 1,767,470

DEVICE FOR STABILIZING CRANES

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Fig. 1.

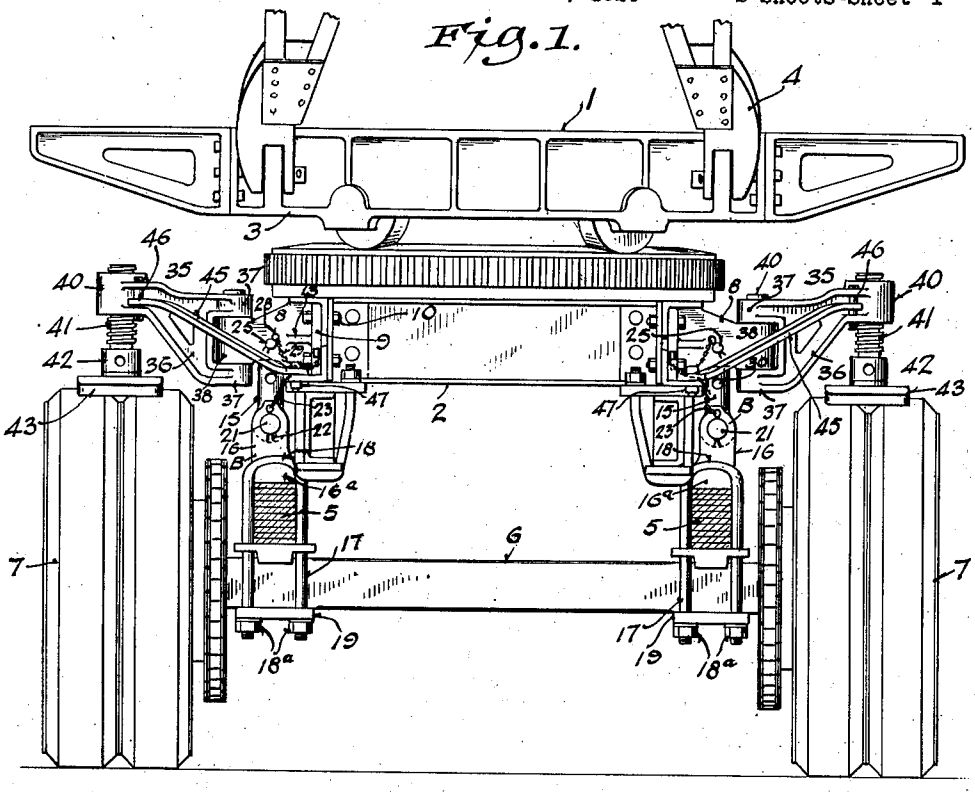
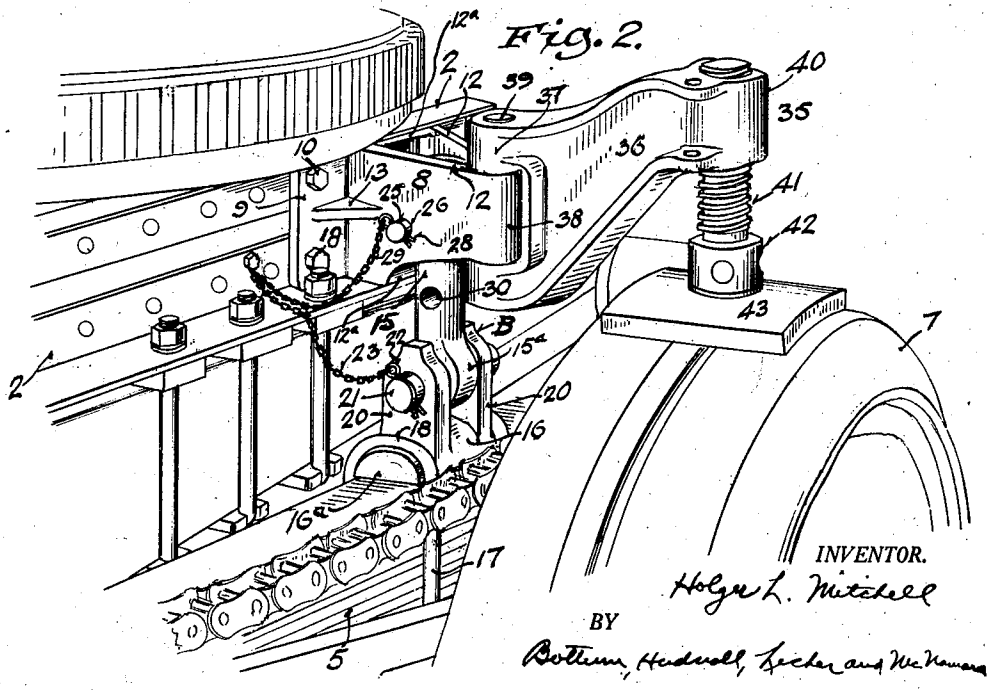


Fig. 2.



INVENTOR.
Holger L. Mitchell
BY
Bottum, Hudwalker, Fecker and McNamara
ATTORNEYS

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Fig. 3.

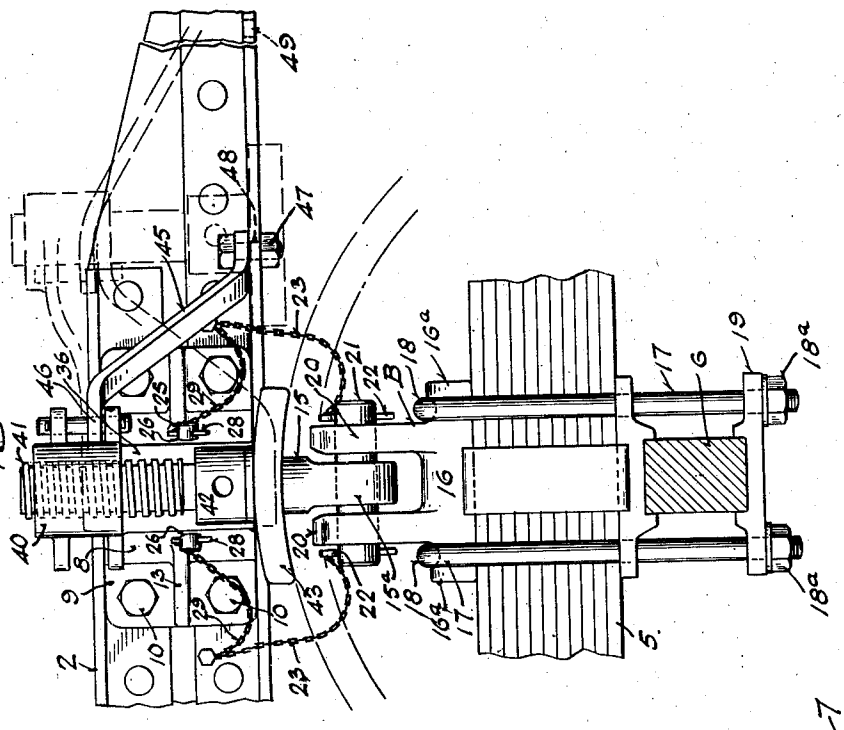
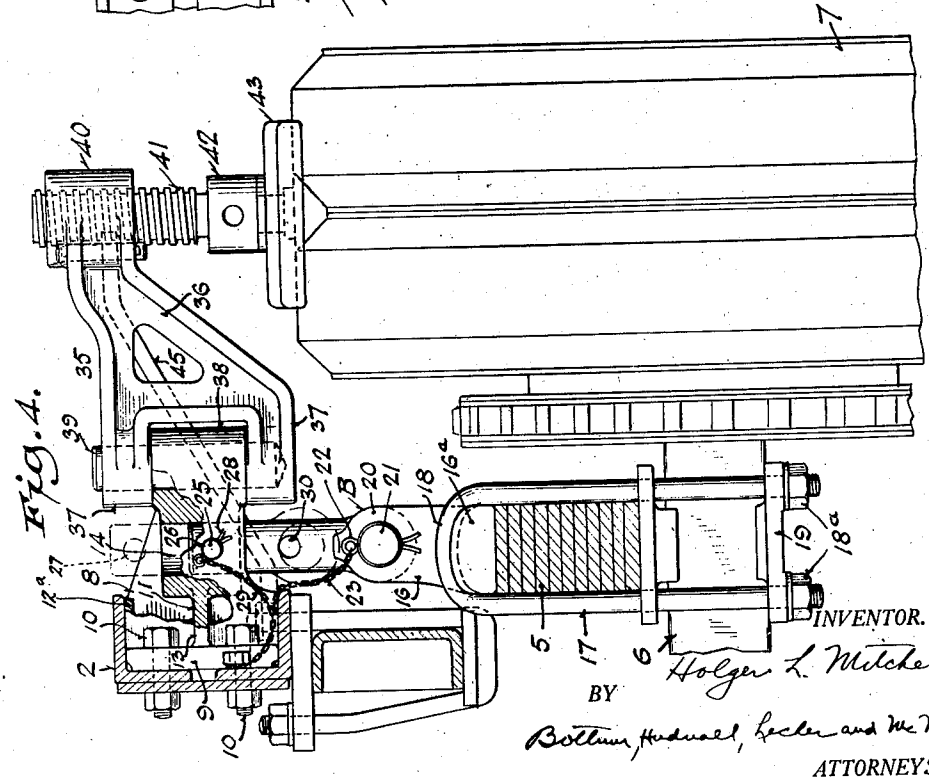


Fig. 4.



INVENTOR.
Holger L. Mitchell
BY
Bottum, Hudnall, Secker and McNamara
ATTORNEYS.

Patented June 24, 1930

1,767,470

UNITED STATES PATENT OFFICE

HOLGER L. MITCHELL, OF MILWAUKEE, WISCONSIN, ASSIGNOR TO HARNISCHFEGER CORPORATION, OF MILWAUKEE, WISCONSIN, A CORPORATION OF WISCONSIN

DEVICE FOR STABILIZING CRANES

Application filed November 8, 1926. Serial No. 146,962.

This invention relates to a device for stabilizing a truck or trailer crane and broadly is of the same general type as that forming the subject matter of my prior patent, No. 1,606,771, granted November 15, 1926.

One object of the present invention is to provide a device of this character which may be effectively used without detracting from the mobility of the cranes and yet serve to prevent tilting movement of the crane when the loaded boom thereof is swung over to one side or the other or in other phases of the crane operation which tend to cause tilting.

Another object of the invention resides in the provision of a device having the advantages and capacities set forth and which also relieves the springs of the running gear of the crane of undue or severe stresses.

Another important object resides in the provision of a stabilizing device of this character which is simple, strong and durable and embodies in its construction a minimum number of parts easily adjustable to render the stabilizing device operative or inoperative as may be desired.

In this connection it is to be understood that for some uses of the crane the stabilizing device may not be necessary, and in such event, with applicant's invention the stabilizing device may be readily and easily adjusted to inoperative position wherein it is disposed out of the way and does not interfere in any manner with the normal action of the running gear.

A further object is to provide an auxiliary jack attachment which is organized with the stabilizing device in such manner as to facilitate the adjustment of the stabilizing device from inoperative to operative position and which also may be used to enhance the action of the stabilizing device.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings forming a part of this application, and in which:

Figure 1 is a fragmentary view in end elevation showing a motor truck crane equipped with the stabilizing device embodied in the present invention;

Fig. 2 is a fragmentary perspective view showing one of the stabilizing devices of the embodiment illustrated in Fig. 1;

Fig. 3 is a fragmentary view in side elevation further illustrating one of these stabilizing devices; and

Fig. 4 is a fragmentary view partly in end elevation and partly in transverse section of the device shown in Fig. 3.

Referring to the drawings, the numeral 1 designates generally a motor truck crane. It is to be understood that this may be a trailer crane or any other type of crane mounted on a running gear which has springs liable to give during the operation of the crane and result in tilting and possibly overturning of the crane.

In the embodiment shown, the motor truck has a frame 2 to which the frame of the crane is secured. On the frame of the crane the usual revolving platform 3 is mounted. The boom 4, its operating mechanism and the other apparatus of the crane are mounted on this platform. The frame 2 is mounted on the usual running gear which includes springs 5 connected at their ends with the frame and supported on axle 6 which in turn is supported by wheels 7.

The stabilizing device constituting the present invention comprises a single rigid bridge B between the frame 2 and the axle 6 near each spring 5, one end of each bridge being positively and rigidly connected with the frame 2 and the other end of each bridge being positively connected to the axle whereby each bridge serves to relieve its associated spring of compressive and bending stresses and to constrain its associated portion of the frame against movement away from the axle thereby preserving the running gear against damage as well as preventing tilting or overturning of the motor truck crane.

The bridges B are of identical construction and a single description will apply to all. Each bridge B comprises a bracket 8 having attaching plates 9 fastened by bolts and nuts 10 to the frame 2. The bracket 8 also in-

cludes a horizontal body plate 11 along each side of which outwardly converging wings 12 are integrally formed. Upper and lower webs 12ª extend between and are integrally formed with the inner portions of the wings 12 to strengthen and stiffen the bracket. External bracing webs 13 are also integrally formed with the wings 12 and the attaching plates 9 to strengthen the bracket. Between wings 12 the body plate 11 is formed with an integral tubular socket 14 in which an intermediate connecting rod or member 15 is slidably fitted. To adapt the member 15 for sliding fit in the tubular socket 14 and bracket 8, this member 15 may be of cylindrical form for the major portion of its length, but the lower end 15ª thereof is preferably flattened and formed with a pivot opening to adapt it for pivotal connection to a bracket designated generally at 16. The bracket 16 has its base resting on the portion of the spring 5 located above the axle 6 and the bracket 16 is secured in this position and to the axle 6 by U-bolts 17 which have their body portions 18 extending around extensions 16ª on the base 16, the legs of the U-bolts extending along the opposite sides of the spring and down along and below the axle. Nuts 18ª are threaded on the lower ends of the bolts 17 and coact with a clamping plate 19 which engages the axle 6. By this arrangement the same U-bolts, nuts and clamping plate that serve to fasten each spring to its axle also serve to secure the brackets 16 to the axle. The bracket 16 is formed with upwardly extending lugs 20 formed with pivot openings aligning with the pivot openings of the flattened end 15ª of the connecting rod 15, these aligned pivot openings receiving a removable pin 21. The pivot pin 21 is held in operative position by means of cotter pins 22 extending through openings formed in the pivot pin and coacting with the lugs 20. Preferably, the cotter pins 22 are carried on chains 23 attached to the frame 2 so as to be always available when needed.

When the stabilizing device is in operation the pivot pin 21 is employed to positively though pivotally connect the lower end of the intermediate connecting rod 15 with the bracket 16 attached to the axle 6. At such time the connecting rod 15 is fixedly secured to the bracket 8 attached to the frame, the securing of the connecting rod to the bracket 8 being preferably effected by means of a pin 25 which is fitted in aligned openings 26 in the bracket 8 and in an opening 27 provided in the connecting rod or member 15 near the upper end thereof. The pin 25 is removably held in the openings 26 and 27 by means of cotter pins 28 extending through openings provided therefor in the ends of the pin 25 and engaging the outer face of the wings 12 of the bracket 8. Preferably these cotter pins 28 are carried on chains 29 attached to the frame 2 so as to be available whenever needed. When the pin 25 secures the connecting rod or member 15 to the bracket 12 by passing through the opening 27 of the connecting rod and the openings of the bracket 15, the frame of the vehicle is supported on the axle through the bracket 8, connecting rod or member 15 and the bracket 16, the springs being relieved of the load. Thus undue and severe compressive stresses are not imposed on the springs.

Furthermore, an important feature of the invention resides in providing means for preventing either side of the frame from movement away from the axle to prevent the tilting and to lessen the danger of overturning the truck when the crane carries a load to either side. To prevent such motion the bridges B are designed to take tension stresses as well as compressive stresses. Assuming the boom 4 of Figure 1 is carrying a load and is swung to the right, the bridge B on the right or the jack screw 41 on the right are placed under compressive stresses while the bridge B on the left is placed under tension, the boom 4 and frame 2 acting as a lever fulcrumed at the right hand bridge or jack. If the left hand bridge B were incapable of taking tension stresses, under these conditions the frame 2 would tilt, the center of gravity of the truck and crane would be thrown farther to the right and the truck would be in danger of overturning. Obviously, if the boom is swung to the left, the stresses in the bridges are reversed.

When it is not desirable to use the stabilizing device the pin 25 is removed from the openings 26 and 27, and in such event the connecting rod or member 15 freely slides in its socket 14 to render the stabilizing device inoperative. It is to be noted, however, that the stabilizing device does not in such adjustment interfere in any way with the normal functioning of the running gear of the crane. It may be desirable, however, to effect an inoperative adjustment of each bridge in a different manner whereby all of the parts are relieved of wear and to accomplish this purpose the connecting rod or member 15 is provided with an opening 30 arranged below the opening 27. By taking out the pin 25 and the pin 21 and raising the connecting rod or member 15 to align its opening 30 with the openings 26 and then reinserting the pins 25 through the openings 26 and opening 30, the connecting rod or member is supported on the bracket 8 in such manner that its lower end is maintained in spaced relation to the bracket 16 at all times. In this adjustment the pin 21 may be releasably secured in the lower end of the connecting rod or member 15 by its cotter pins 22.

When the stabilizing devices are adjusted to operative or inoperative position it is necessary to elevate the frame of the crane

until the load is taken off the springs and to facilitate these operations and also to enhance the stability of the crane under certain conditions, a jack attachment designated generally at 35 is provided in conjunction with each bridge B. Each jack attachment 35 comprises a jack arm 36 having at one end spaced bearing lugs 37 which embrace a bearing lug 38 integrally formed with the associated bracket 8. A pivot pin 39 extends through the openings of the bearing lugs 37 and 38 and serves in conjunction with the lugs 37 and 38 to pivotally mount the jack arm 36 on its bracket 8. The outer end of the jack arm 36 is provided with a threaded bearing 40 in which a screw 41 is operatively fitted. Adjacent the lower end of the screw an enlargement 42 is provided, the enlargement being integrally formed with or otherwise connected to the screw and having transverse openings enabling the use of a bar or lever for turning the screw. The lower end of the screw 41 is swiveled to a wheel-engaging member 43.

In order to secure the jack arm 36 in operative or inoperative position, a brace 45 is provided and has one end pivotally connected as at 46 to the outer end of the jack arm 36 and has its other end fastened to the frame 2 by means of a bolt and nut 47. The bolt of the bolt and nut 47 passes through a bolt hole in the brace arm 45 and through either one of two bolt holes 48 or 49 provided in the frame 2. When the bolt of the bolt and nut 47 passes through the bolt hole 48, the brace 45 serves to secure the arm 36 in operative position, that is in a position wherein the arm 36 projects laterally from the frame and overlies the wheel 7. In the other adjustment, that is when the bolt of the bolt and nut 47 passes through the bolt hole 49 of the frame, the brace serves to secure the arm 36 in inoperative position, that is in substantial parallelism to and snugly up against the frame.

Assuming that the bridges are in inoperative position, the jacks are first adjusted to a position wherein their arms 36 overlie the wheels 37 and the wheel-engaging members 43 are above the wheels. The braces 45 are then fastened in position to secure the arms 36 in extended position. The screws 41 are then turned to bring the wheel-engaging members 43 in engagement with the wheels 47 and as the screws 41 are advanced downwardly the frame of the vehicle is elevated and the load is taken off of the springs 5 and is transmitted directly to the wheel 7 through brackets 8 and jack attachment 35. When the frame has been elevated to such extent that the openings 27 in the connecting rods or members 15 align with the openings 26 of the brackets 8 and when the connecting rods or members 15 are connected up to the brackets 16, the pins 25 are inserted through and secured in openings 26 and 27 and the bridges are rendered operative. Then, if desired, the jacks may be released and swung back to inoperative position since the bridges in their operative position take the load off the springs and provide rigid connections between the frame and the axle to prevent tilting. If desired, however, the jack attachment may be used in conjunction with the bridges to take up some of the compressive stresses and to enhance the stability of the crane by applying the load in part at least directly to the wheels. In many phases of the operation, however, it will be preferable to use the bridges alone since the bridges perform their functions without detracting at all from the mobility of the frame.

The invention claimed is:

1. The combination with a wheeled crane of the character described having a frame, an axle and a plurality of supporting springs adapted to support said frame on said axle near each end thereof, of a single rigid bridge between the frame and the axle near each spring, one end of each bridge being positively and rigidly connected to the frame, the other end of each bridge being positively connected to the axle whereby each bridge serves to relieve its associated spring of compressive stresses and to constrain the associated portion of the frame against movement away from its axle, each bridge being made up of a plurality of members, and releasable means for positively connecting said members, and a jack attachment associated with each bridge and cooperable with the adjacent wheel for lifting the frame on the wheels to permit of connection and disconnection of the bridge members, said jack attachment also serving to aid said bridge members in taking up the compressive stresses.

2. The combination with a wheeled crane of the character described having a frame, an axle and a plurality of supporting springs adapted to support said frame on said axle near each end thereof, of a single rigid bridge between the frame and the axle near each spring, each bridge including a bracket positively and rigidly secured to the frame, a bracket positively and rigidly secured to the axle and an intermediate connecting member positively secured to the bracket connected to the frame and positively secured to the bracket secured to the axle whereby each bridge serves to relieve its associated spring of compressive stresses and to constrain the associated portion of the frame against movement away from its axle, and a jack attachment for each bridge and adjustable means adapted in one of its adjustments for holding the jack attachment in operative position, said adjustable means being also adapted in another adjustment for holding the jack in inoperative position.

3. The combination with a wheeled crane of the character described having a frame, an axle and a plurality of supporting springs adapted to support said frame on said axle near each end thereof, of a single rigid bridge between the frame and the axle near each spring, each bridge comprising a frame bracket secured to the frame of the vehicle and having a vertical socket and a transverse opening intersecting the socket, an axle bracket secured to the axle of the vehicle, a connecting member having its upper end slidably fitted into the socket of the frame bracket and having a plurality of spaced transversely extending openings adapted to be selectively aligned with the opening of the frame bracket, a pin insertable through said aligned openings, releasable means for holding the pin in position, releasable means for pivotally connecting the lower end of the connecting rod to the axle bracket, and an auxiliary jack attachment carried by the frame bracket and cooperable with the wheel for jacking up the frame to take the load off the springs and align the selected opening of the connecting rod with the opening of the frame bracket.

4. The combination with a wheeled crane of the character described having a frame, an axle, a plurality of supporting springs supporting said frame on said axle and ground wheels rotatably mounted on said axle, of wheel jacks carried by the frame and engageable with the wheels for supporting the frame on the wheels independently of the axle and of the springs thereby applying the load directly to the wheels and protecting the springs against excessive loading and flexure and a tension bridge between the frame and the axle near each spring, and operating to prevent tilting of the frame about a jack and wheel as a fulcrum even when forces applied to the frame tend to subject the same to a high overturning movement.

In witness whereof, I hereto affix my signature.

HOLGER L. MITCHELL.