

Nov. 18, 1924.

1,515,783

G. E. LUCE

AUTOMATIC LEVELER FOR BRICK SETTING CRANES AND THE LIKE

Filed Dec. 11, 1920

2 Sheets-Sheet 1

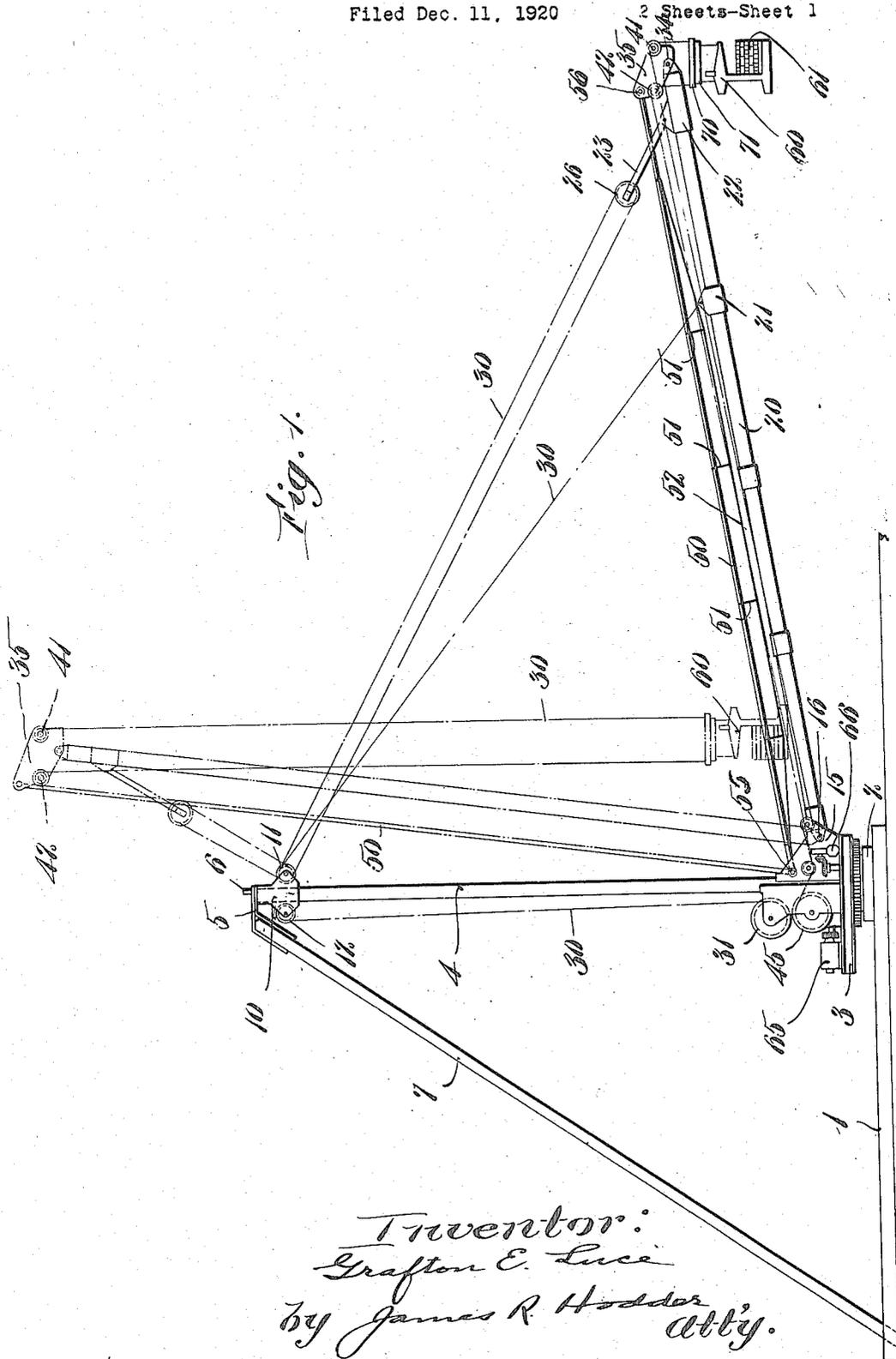


Fig. 1.

Inventor:
Grafton E. Luce
by James R. Hodder
Atty.

Nov. 18, 1924.

1,515,783

G. E. LUCE

AUTOMATIC LEVELER FOR BRICK SETTING CRANES AND THE LIKE

Filed Dec. 11, 1920

2 Sheets-Sheet 2

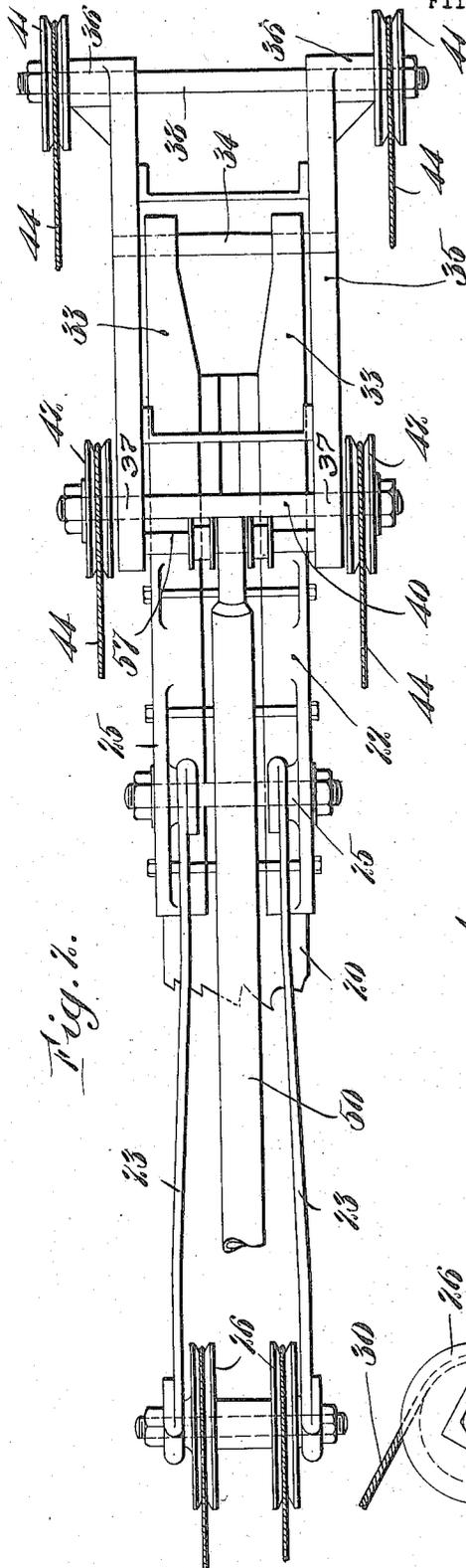


Fig. 2.

Fig. 3.

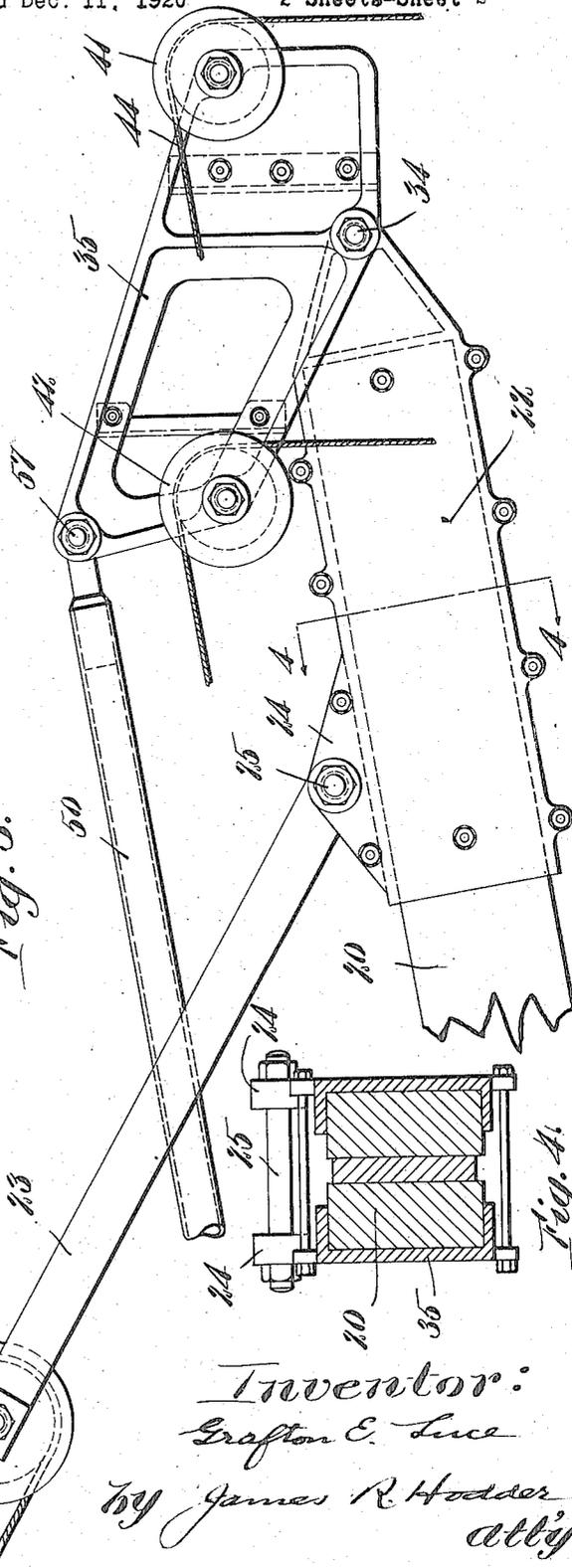


Fig. 4.

Inventor:
Grafton E. Luce

By James R. Hodder
att'y.

UNITED STATES PATENT OFFICE.

GRAFTON E. LUCE, OF CHICAGO, ILLINOIS.

AUTOMATIC LEVELER FOR BRICK-SETTING CRANES AND THE LIKE.

Application filed December 11, 1920. Serial No. 430,033.

To all whom it may concern:

Be it known that I, GRAFTON E. LUCE, a citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented an Improvement in Automatic Levelers for Brick-Setting Cranes and the like, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

My present invention is an improved crane or hoisting mechanism and is particularly directed to improve and perfect a hoisting crane for use in handling brick setters or the like wherein it is important and desirable to maintain the article, machine, apparatus or load being hoisted in a predetermined position, preferably horizontal.

My invention is particularly directed to a crane or hoisting apparatus wherein it is important to maintain the load horizontal and level, such for example as in handling brick in stacked units, or other articles, which must be maintained level during the hoisting, lowering and handling. In carrying out my invention I preferably provide a portable and rotatable crane or hoisting apparatus, wherein the hoisting boom is provided with automatic levelling instrumentalities, whereby the flexible hoisting ropes carrying the article, load, setter or the like are maintained at all times in predetermined and preferably horizontal position, irrespective of the raising, lowering or swinging of the boom. I also provide means to maintain this predetermined level which will act automatically throughout the entire range of the raising and lowering of the boom as well as during the rotation or other handling of the same. In the preferred embodiment of the invention, as herein shown, I apply adjacent the end of the hoisting boom, a yoke, pivotally supported, and connected with a rod or member which will act upon the yoke automatically, and in a manner to withstand both pulling and compressive strains equally, to hold the yoke in its predetermined level position throughout the entire range of movements of the boom. I accomplish this result in an efficient manner and by a pivotal connection with the yoke and with the rotatable part of the crane, these pivotal points being in predetermined and spaced relation with the pivot

of the boom and the pivotal support of the yoke, as will be more fully explained.

In my present invention I find it feasible to provide a four point suspension for the article, apparatus, bricksetter or the like to be handled, the flexible cables constituting the suspending devices being led over a plurality of pulleys suitably spaced and positioned on the yoke and thus affording a constantly maintained level support through which the hoisting ropes are led and from which the article being handled is sustained in its level position, throughout the entire range of movements of the boom, both vertically and rotatably. This construction enables a rotatable swinging boom to carry a four-point support, and to do the same work heretofore done only with an expensive permanent crane with a travelling carriage. The rotatable capacity of the entire crane, as well as its portability and capability of handling a bricksetter or the like while supported in a level condition, enables the present automatic levelling crane to be employed for work similar to that shown in the revolving crane of my prior and copending application, Ser. No. 262,947, filed November 18, 1918.

Further features, novel combinations of parts and important advantages will be hereinafter more fully pointed out and claimed.

Referring to the drawings, illustrating a preferred embodiment of my present invention,

Fig. 1 is a side view;

Fig. 2 is a partial plan view, on an enlarged scale, of the outer end of the boom and levelling yoke;

Fig. 3 is a side view of that part shown in plan in Fig. 2; and

Fig. 4 is a cross-sectional view on the line 4-4 of Fig. 3.

It will be understood that the automatic levelling features of the present invention may be applied to different types of cranes and hoisting members or apparatus, but is here shown as applied to a rotatable, portable hoisting crane, and preferably also in the handling of a brick setter, wherein a maintained horizontal plan is desirable and necessary. Different sizes and types of cranes may therefore be employed, the present bricksetting crane being shown for illustrative purposes, and because the present invention is particularly useful for this

work. As my levelling attachment is broadly new, I believe that it is applicable to a self-moving levelling crane of the type shown in my said prior application, and therefore I intend to claim this feature herein broadly as applied to any crane or hoisting device.

Referring to the drawings, Fig. 1 illustrates a crane having a base 2 mounted upon a portable support or platform 1, said base 2 affording a pivot for the rotatable base 3 of the crane. This base 3 carries a vertical mast 4 extending upwardly and being pivotally secured at its topmost point by a plate 5 and pin 6, said plate having one or more rigid legs or back braces 7, extending downwardly to the platform 1. Preferably these back braces are sufficiently spaced to afford the desired rigidity to the top of the mast 4 and permit its rotation within a limit of three hundred or more degrees. At the top of the mast 4 is a cap 10 carrying pulleys 11 and 12 pivoted at diametrically opposite points thereon, said cap and pulleys being adapted to turn with the mast. Supported on the rotatable base 3 is a casting 15 to afford a brace for the mast 4 and a pivotal support for the hoisting boom 20. This boom is pivoted to the casting 15 at 16, and is of suitable length for the work desired. At the outer end of the boom 20 is a collar 21 and cap 22, the latter having a pair of rods 23 pinned to a pair of flanges 24 on said cap as indicated at 25, and carrying pulleys 26 at their upper ends through which the hoisting ropes or cables 30 are led to the pulleys 11 in the plate 10, the fixed end of the hoisting rope 30 being secured to said collar 21 and the hoisting end of said rope 30 being led downwardly over the pulley 12 and to the drum 31. This is a usual construction and arrangement for raising and lowering the hoisting boom.

Applied to the boom 20 is my automatic levelling device. I form the cap 22 on the outer end of the boom, as shown at 33, with a pair of forked arms extending beyond the end of the boom, which arms carry a shaft 34, on which a yoke 35 is pivotally supported. This yoke comprises a framework consisting in a duplicate pair of plates, preferably formed open to save weight and with reinforcing ribs therein. This yoke carries a plurality, preferably a pair, of bearings 36, 36, and 37, 37 to receive shafts 38 and 40, carrying on the outer ends pulleys 41, 41 and 42, 42, respectively. These pulleys are preferably flanged to receive the hoisting cables, four in number, to afford a four-point suspension to the load, said cables being partially indicated at 44, 44, 44, 44, and being led downwardly along the boom 20, through suitable guide pulleys to a drum 45 on the base 3.

It will be understood that the yoke or

frame 35 is of suitable size to space the sets of pulleys 41 and 42 thereon so as to afford ample spacing to maintain the load, device, apparatus, bricksetter or the like intended to be handled by the hoisting crane, in a level condition, and therefore with the center of gravity of the setter, whether loaded or unloaded, sufficiently within the four points of suspension, to insure stability.

I maintain the yoke 35 with the pulleys and shafts thereon in predetermined and horizontal position by attaching to the yoke one or more stabilizing rods or members. As herein shown, I provide a single rod 50, preferably making the same in the form of a trussed rod, with a plurality of struts 51, 51 and truss members 52. This provides ample strength for the rod 50, throughout its entire length, eliminating other bearing and insuring the free functioning of the rod in the operation of the crane, and during both pulling and compressive strains.

The truss rod 50 is pivoted at 55 to the casting 15 on the base 3, and at its outer end is pivoted at 56 to a pin 57 on the yoke 35. I find that it is important to position these pivot points 55 and 56 at substantially the predetermined positions illustrated in the drawings and with the distance between the inner pivot 55 on the rod and 16 on the boom, equal to the distance between the outer pivot 34 of the yoke and the rod connection at 56. The distance between the pivotal points 55, 16 and 56, 34 should not only be equal but the lines joining them should be parallel to each other, as should also the lines joining the points 55, 56, and 16, 34 to insure the maintenance of the yoke 35 level during the raising and lowering of the boom. In Fig. 1 I have illustrated the boom in raised position, being shown in dotted lines with the yoke 35 shown relatively inclined to the boom 20 when near the uppermost position of hoisting of the boom and the innermost swinging of the load or brick setting apparatus 60, illustrating graphically the action of the rod 50. Throughout the entire range of the hoisting action on the boom 20, the yoke 35 is thus maintained in predetermined position and with the pulleys 41 and 42 in the same relative relation to the load 60 at all times. I prefer to have these pulleys 41 and 42 pivoted in substantially the same horizontal plane, but this is not essential. The four ropes 44 are operated simultaneously by the drum 45 and as they are led over the pulleys on the yoke 35 and the latter is maintained at all times in horizontal or level position, the suspension of the apparatus 60 therefrom is at all times maintained level.

A motor 65 will afford power to be applied to either the drum 31 or 45 as desired, or both simultaneously through any suitable arrangement of power transmission, clutches

or the like. The boom and crane can also be rotated by an auxiliary motor 66 or the like in any usual and well known manner, swinging the mast 4 and boom 20 with the latter in any position to which it may be hoisted throughout the range permitted by the back braces 7.

It will be appreciated that my invention enables a hoisting boom, arm, or similar device to be utilized to handle articles, apparatus or loads which must be maintained in horizontal position during their handling by the crane. The action of the rod 50 on the yoke 35 is entirely automatic, is entirely out of the way of the hoisting mechanism and of the work, and permits as full, free and large a range of movement, vertical, rotatable and otherwise, of the boom, for which movements the crane may be constructed. Furthermore, I prefer to have the pulleys 41 and 42 spaced substantially equally about the pivot 34 and the yoke 35, thus distributing the load, weight and strain of the article or apparatus being hoisted in a balanced relation. This means constitutes practically a four point suspension. If desired a rotatable turntable between the hoisting cables 44 and the setter 60 may be employed, as indicated at 70 and 71, such a construction being similar to and shown in the R. C. Penfield Patent No. 1,205,562, issued November 21, 1916.

When employed in brick handling, such for example, as in building a kiln, the entire apparatus can be readily moved at the desired point or position for setting brick in a kiln, unloading therefrom, or transporting brick from one position to another, as will be readily appreciated by those skilled in the art.

My invention is further described and defined in the form of claims as follows:

1. A portable rotatable hoisting apparatus of the kind described, a pivoted boom carried thereby, a support carried by said boom, a plurality of pulleys mounted on said support to provide a four-point suspension for the work and means acting automatically to maintain said supporting pulleys in predetermined relationship during the raising and lowering of the boom, whereby the work supported therefrom will be maintained level.

2. A portable rotatable hoisting apparatus of the kind described, a pivoted boom carried thereby, a support carried by said boom, a plurality of pulleys mounted on said support to provide a four-point suspension for the work and a member connecting said support with the fixed part of the crane movable with the boom and acting automatically, during said movement, to maintain said support level.

3. Automatic levelling apparatus of the kind described, comprising a base, a boom pivotally connected at one end thereto, means

to raise and lower the boom, a support pivotally mounted on said boom at the end remote from the base, a member connected to said support and pivoted adjacent the pivot point of the boom on the base, the line joining the pivot points of the said member at its inner and outer ends being spaced from, and lying in parallelism with, the line joining the pivotal points at each end of said boom.

4. Automatic levelling apparatus of the kind described, comprising a raising and lowering boom, a yoke pivoted thereto, a plurality of pulleys on said yoke, spaced in balanced position about said pivot, hoisting ropes led over said pulleys and providing a four point suspension for the load, means to wind and unwind said hoisting ropes simultaneously, and means to maintain the pulleys on said yoke in the same plane during the raising and lowering of the boom.

5. Automatic levelling apparatus of the kind described, comprising a raising and lowering boom, a yoke pivoted thereto, a plurality of pulleys on said yoke, spaced in balanced position about said pivot, hoisting ropes led over said pulleys and providing a four point suspension for the load, a compression and tension member pivoted at one end to said yoke and at its other end to a fixed support, and acting to maintain the yoke and pulleys thereon, horizontal during the raising and lowering of the boom.

6. Automatic levelling apparatus for hoisting cranes, comprising a movable boom, a yoke pivotally mounted about a fixed point to said boom, means to raise and lower the load from said yoke, and stabilizing means for said yoke and independent of the boom to maintain the yoke in horizontal position during the movement of the boom.

7. Automatic levelling apparatus for hoisting cranes, comprising a movable boom, a yoke pivotally mounted about a fixed point to said boom, means to raise and lower the load from said yoke, constructed and positioned to support the load in balanced relation to said yoke, and automatic means independent of the boom to maintain said yoke and load in balanced relation during the movement of the boom.

8. Automatic levelling apparatus for hoisting cranes, comprising a movable boom, a yoke pivotally mounted about a fixed point to said boom, means to raise and lower the load from said yoke, a four-point suspension from said yoke to the load arranged in balanced relation about the support for the yoke, and means independent of the boom to maintain said yoke in its balanced relation during the movement of the boom.

In testimony whereof, I have signed my name to this specification.

GRAFTON E. LUCE.