Dec. 4, 1928. 1,694,084

H. R. STRAIGHT

CRANE

Filed May 25, 1926 2 Sheets-Sheet 1

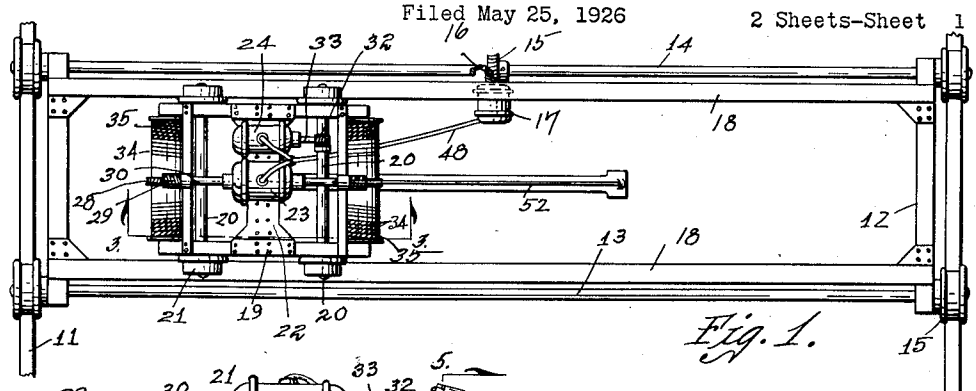
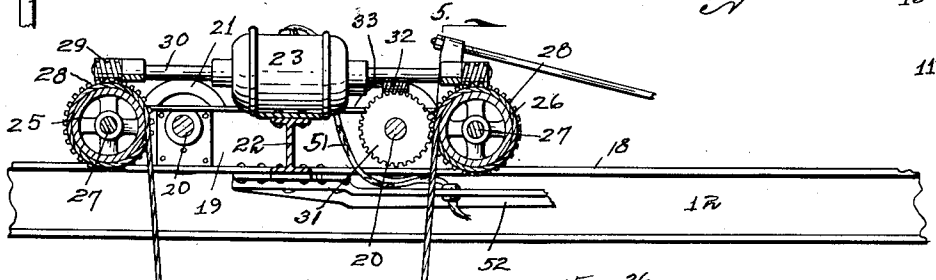


Fig. 1.



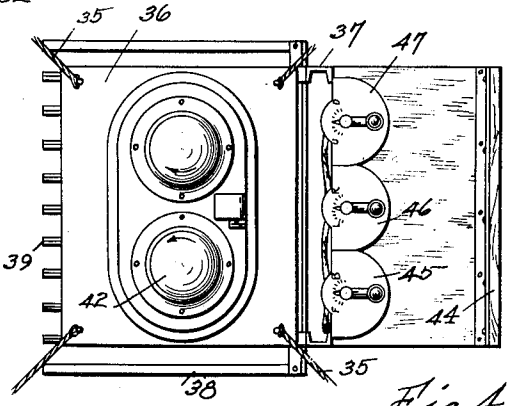


Fig. 4.

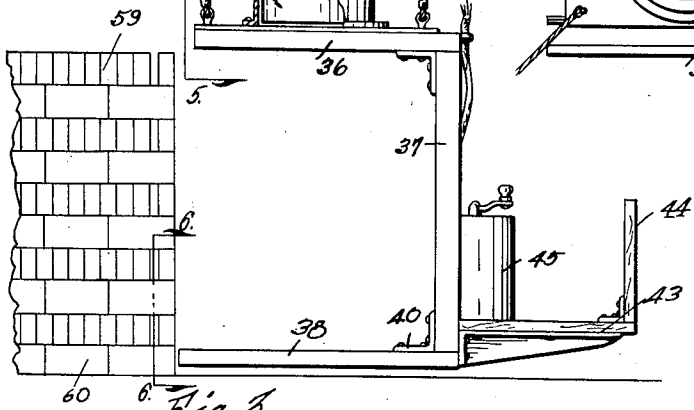


Fig. 3.

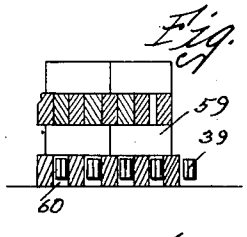


Fig. 6.

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H. R. STRAIGHT

CRANE

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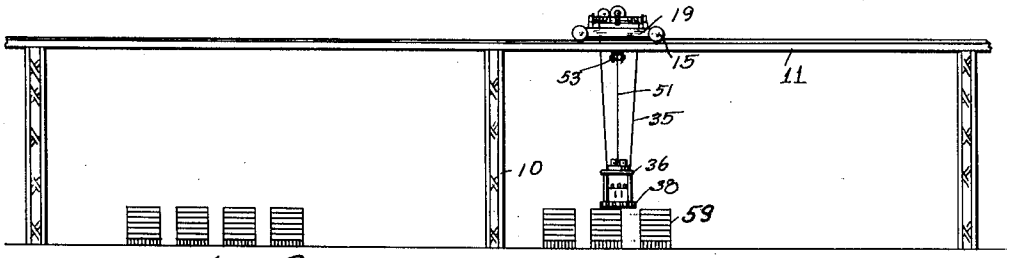


Fig. 2.

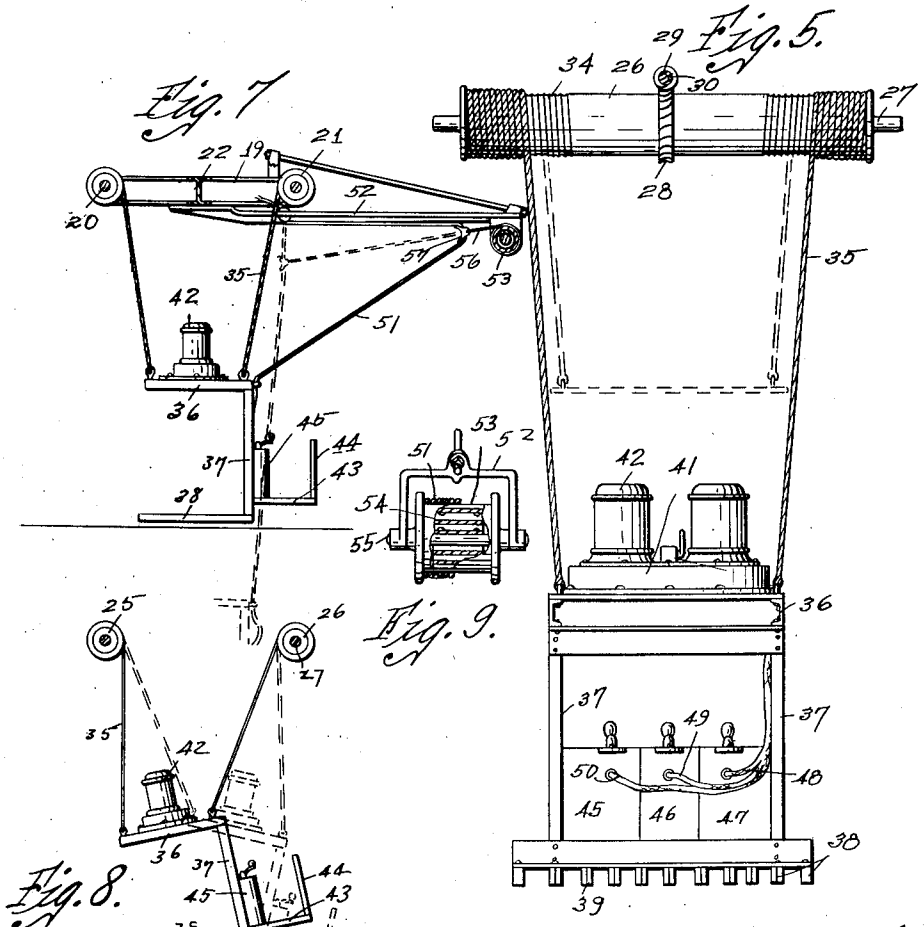


Fig. 5.

Fig. 7

Fig. 9.

Fig. 8.

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UNITED STATES PATENT OFFICE.

HALVER R. STRAIGHT, OF ADEL, IOWA.

CRANE.

Application filed May 25, 1926. Serial No. 111,527.

This invention relates to improvements in cranes of that type having a load supporting member carried by depending cables from a trolley mounted on said crane. The load supporting means is of that type having a series of horizontally arranged lifting members or fingers. In this type of a machine it is very desirable that the lifting members be held against excessive oscillatory movement relative to the trolley from which it is supported, so that the lifting fingers may be properly guided to make operative connection with the load.

It is, therefore, the object of my invention to provide means for stabilizing the load carrying means to prevent oscillation relative to the supporting trolley, and at the same time permit the load to move freely with the trolley.

A further object is to provide in a crane having a lifting member of the type above described, means whereby the operator may be stationed at a point near the loading of the lifting element, and in connection therewith means for controlling the movement of the said lifting element.

More specifically it is one of the objects of my invention to provide a platform located on the lifting element, and in connection therewith suitable motor controls for the trolly, the controls and said trolly being operatively connected through a flexible cable, and to provide in connection therewith improved means for taking up the slack of the cable while the lifting element is being raised and lowered.

My invention consists in the construction, arrangement and combination of the various parts of the device, whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims, and illustrated in the accompanying drawings, in which:

Figure 1 is a plan view of my improved crane.

Figure 2 is a diagrammatical side elevation of the same showing the manner in which the crane may be operated.

Figure 3 is a detail sectional view taken on the line 3—3 of Figure 1, showing the lifting element in position to be loaded.

Figure 4 is a detail sectional view taken on the line 4—4 of Figure 3.

Figure 5 is a detail sectional view taken on the line 5—5 of Figure 3.

Figure 6 is a detail sectional view taken on the line 6—6 of Figure 3.

Figure 7 is a diagrammatical view showing the lifting element in its elevated position, and the manner in which the slack of the electric cable is taken up.

Figure 8 is a diagrammatical view illustrating the manner in which the stabilizing device is operated.

Figure 9 is an enlarged, detail, sectional view of the spring drum for taking up the slack in the electric cable.

My improved crane comprises a series of upright supports 10 arranged in two parallel rows. The upper ends of the supports in each row are provided with a track 11 designed to receive the bridge 12, said bridge being provided with longitudinally extending shafts 13 and 14, the ends of said shafts being provided with wheels 15 designed to travel on the tracks 11. The shaft 14 is provided with a worm gear 15 near its central portion, said worm gear being operated through a worm 16 driven by an electric motor 17. Said motor 17 is mounted to the under surface of the bridge 12. The shaft 14 and the wheels fixed thereto provide means whereby the bridge may be moved laterally on the track 11.

The said bridge is provided with longitudinally extending track members 18 designed to support the trolly 19, said trolly being provided with axles 20 having wheels 21 supported by the tracks 18. The trolly 19 is provided at its central portion with an I-beam 22 on which a pair of motors 23 and 24 are mounted. The trolly 19 is also provided with cable drums 25 and 26. Each of the drums 25 and 26 is mounted on a shaft 27, the central portion of each of said drums being provided with a worm gear 28 operatively connected with a worm 29 driven from the shaft 30 of the motor 23. The drums 25 and 26 are designed to rotate in opposite directions.

One of the axles 20 is provided with a worm gear 31 in mesh with a worm 32 driven from a shaft 33 of the motor 24. The said motor 24 provides means whereby the trolly will be moved longitudinally with the bridge 12. Said drums 25 and 26 are provided at each end with a helical groove 34, the groove at one end being wound in the opposite direction from the one at the opposite end, and each designed to receive a supporting cable

35, designed to support at their lower ends the lifting frame 36, said frame being preferably rectangular and the cables attached at the corners. The width of the frame is considerably less than the length of the drums 25 and 26, so that the cables will slant inwardly toward each other so that all of the cables terminate in a common center if extended below the platform a considerable distance.

One side of the lifting frame 36 is provided with downwardly extending members 37, the lower ends of which are operatively connected to the lifting element 38, which preferably comprises a series of parallel and horizontally arranged tines 39, one end of all of said tines being supported by an angle iron 40 secured to the lower ends of the members 37, the tines extending horizontally beneath the lifting frame 36, so that the center of the lifting element is substantially vertically below the center of the lifting frame. Mounted on the top surface of the lifting frame 36 is a pair of gyroscopes 41 operated by suitable motors 42 and designed to rotate in opposite directions.

Extending outwardly from the lower ends of the members 37 is an operator's platform 43 having a railing 44 at its outer end. The inner end of the platform 43 is provided with three electric control devices 45, 46 and 47, the said controls being of the ordinary construction. The control 47 is provided with a cable 48 operatively connected with the motor 17. The control 46 is provided with a cable 49 operatively connected with the motor 24. The control 45 is provided with a cable 50 operatively connected with the motor 23. The cables 48, 49 and 50 are bound together in a common cable 51.

For taking up the slack of the cable 51 as the frame 36 is being elevated and lowered, I have provided a horizontally extending arm 52, one end of which is connected to the central portion of the lower edge of the beam 22. The outer end of the arm 52 is provided with a spring actuated drum 53 having a spiral spring 54, one end of which is connected to the fixed shaft 55, while the other end is connected to said drum 53. The drum 53 is designed to receive a cable 56, the free end of which is provided with a shoe 57 through which the cable 51 passes. By this arrangement it will be seen that when the lifting frame 36 is moved to its upper limit of movement, as shown in Figure 7, the spring 54 will cause the drum 53 to be wound up and the slack of the cable taken up, while if the frame 36 is lowered, then the cable 51 will be stretched to a position shown by dotted lines in Figure 7, at which time the spring 54 will be unwound. By this arrangement it will be seen that yieldable means is provided for taking up the slack of the electric cable. This also serves to somewhat eliminate the tendency of the platform 36 to rotate about a vertical axis.

The raising and lowering of the frame 36 is accomplished through the motor 23, which is reversible, and through the operation of the corresponding control 45, while the trolly 19 may be moved on the tracks 18 through the action of the motor 24, which is controlled by the control device 46. The bridge is advanced over the tracks 11 through the movement of the motor 17, said motor being controlled through the control 47.

It will be seen that as the frame 36 is elevated and lowered, the inclination of the cables will always be the same, whether the frame is in its elevated or lowered position, as clearly shown by dotted lines in Figure 5, by entering the helical grooves 34 as the drum is rotated.

It will be seen by reference to Figure 8 that if the frame 36 is oscillated horizontally in either direction, the said frame 36 will be tilted from a horizontal position, due to the fact that the cables are inclined from a perpendicular to the surface of said frame. It will further be seen that if the trolly 19 is moved relative to the bridge, or if the bridge is moved relative to the tracks 11, then there will be a tendency for the frame 36 to oscillate, due to the inertia of said frame and the load carried thereby, and if the said trolly or bridge is brought to a standstill with the idea of alining the teeth 38 with the stack of material, such as brick indicated by the numeral 59, then difficulty would be experienced in alining the teeth 39 with the openings 60, due to the momentum of the frame 36 and the member 38. The tendency for the lifting elements to oscillate is somewhat overcome by the fact that the natural tendency of the platform 36 is to assume a horizontal position, as any tilting movement of the platform results in a slight elevation of the entire load, and under some conditions this alone might be sufficient to prevent free oscillation of the load. Under other conditions, where the cables are quite long and the drums 25 and 26 placed comparatively close together, the above means is not sufficient to prevent free oscillation. The natural tendency for oscillation may be further overcome by providing a gyroscope 41, which, when being operated, will have a tendency to maintain the frame 36 in a positive horizontal position. It will readily be seen that if the frame is maintained in said horizontal position, the tilting positions, shown in Figure 8, will be overcome and in turn the oscillatory movement relative to the trolly eliminated, due to the fact that said movement cannot take place without tilting the platform 36.

By this arrangement it will be seen that I have provided means whereby the load may be maintained against oscillatory movement

relative to the trolley from which it is supported, thereby providing means whereby the supporting teeth 39 may be easily and quickly brought into alinement with the opening 60 of the stack of ware 59.

It will further be seen that I have provided means whereby the operator may be so stationed relative to the load that be may easily and quickly bring the said teeth into alinement with the openings 60, in view of the fact that he is so located as to be close to the work, while if he were located in a cab suspended from the trolley, as is the usual practice, he would be in such a position that it would be almost impossible for him to see when the teeth 39 were in proper alinement with the openings 60. The operator's platform is also provided with convenient control devices for the proper manipulation of the trolley and the bridge, as well as the elevating and lowering of the load supporting element.

It will be seen that by providing two gyroscopes running in opposite directions, that any torsional movement of the lifting frame will be eliminated.

I claim as my invention:

1. In a crane, a movable bridge, a trolley movably mounted on said bridge, electrically operated means for imparting movement to said bridge, electrically operated means for imparting movement to said trolley, a load supporting element depending from said trolley, a platform supported on said load supporting element, control devices carried by said platform, a cable for operatively connecting said control devices with said electrically operated means, and means connected between the ends of said cable for taking up its slack as the load supporting element is elevated and lowered.

2. In a device of the class described, a trolley, a load supporting element carried by said trolley, electrically controlled means for elevating and lowering said load supporting element, an operator's platform carried by said load supporting element, an electrical control device carried by said platform, a cable for operatively connecting said electrically controlled means with said control devices, and means connected between the ends of said cable for taking up its slack as the said load supporting element is elevated and lowered.

3. In a device of the class described, a trolley, a load supporting element, electrically controlled means for elevating and lowering said load supporting element, an operator's platform carried by said load supporting element, an electric control device carried by said platform, a cable for operatively connecting said electrically controlled means with said control device, and means for taking up the slack of said cable as the said load supporting element is elevated and lowered, said means comprising a horizontally arranged bar, a spring actuated drum on the outer end of said bar, a shoe for slidably receiving said cable, and a cable operatively connecting said shoe with said spring actuated drum.

4. In a device of the class described, a load supporting element, electrically controlled means for elevating and lowering said load supporting element, an operator's platform carried by said load supporting element, an electric control device carried by said platform, a cable for operatively connecting said electrically controlled means with said control device, and means connected between the ends of said cable for taking up its slack as the said load supporting element is elevated and lowered.

5. In a device of the class described, a trolley, a load supporting element depended from said trolley, electrically controlled means for elevating and lowering said load supporting element, an operator's platform carried by said load supporting element, an electric control device carried by said platform, a cable for operatively connecting said electrically controlled means with said control device, means for taking up the slack of said cable as the said load supporting element is elevated and lowered, said means comprising a horizontally arranged bar, a drum on the outer end of said arm, yieldable means for imparting rotation to said drum in one direction, and a cable for said drum having one end operatively connected with the central portion of the first said cable.

6. In a device of the class described, a trolley, a load supporting element depended from said trolley, electrically controlled means for elevating and lowering said load supporting element, an operator's platform carried by said load supporting element, an electric control device carried by said platform, a cable for operatively connecting said electrically controlled means with said control device, means connected between the ends of said cable for taking up its slack as the said load supporting element is elevated and lowered.

Des Moines, Iowa, May 19, 1926.

HALVER R. STRAIGHT.