

March 16, 1965

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3,173,551

SKYLINE CRANE

Filed Nov. 14, 1962

3 Sheets-Sheet 1

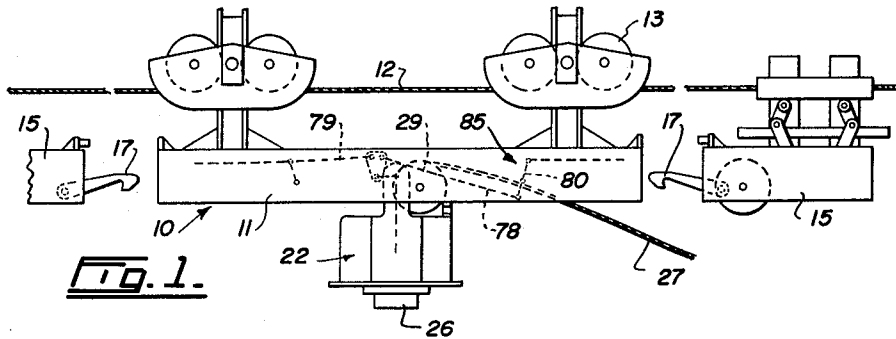


Fig. 1.

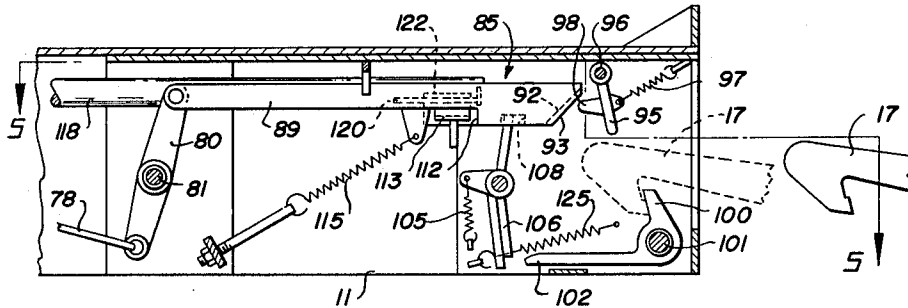


Fig. 4.

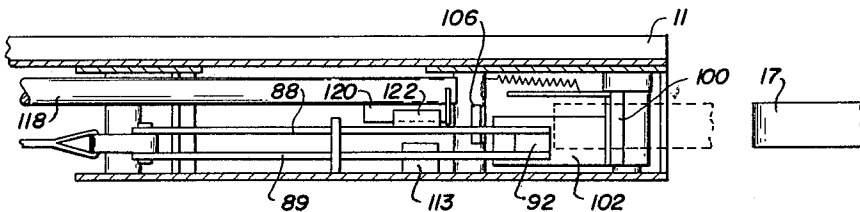


Fig. 5.

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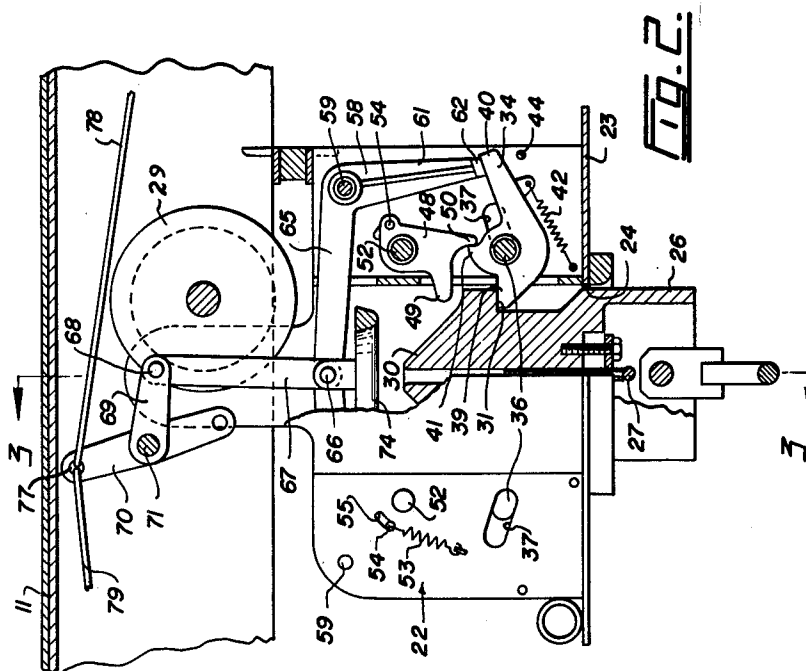


FIG. 2.

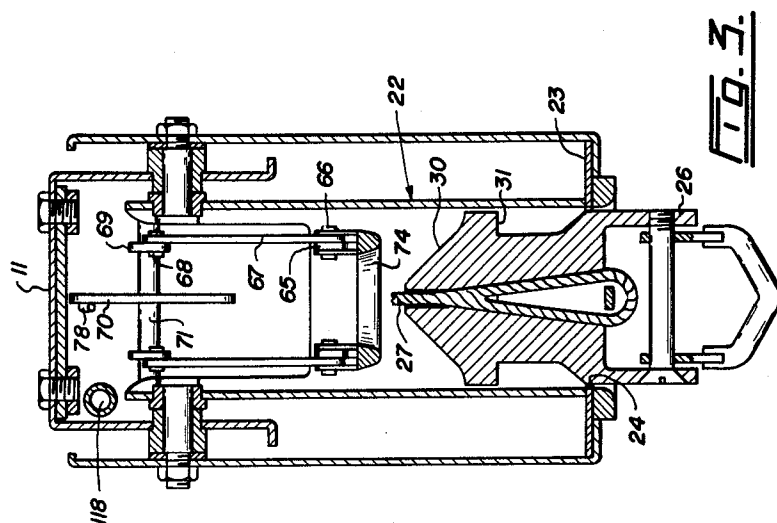


FIG. 3.

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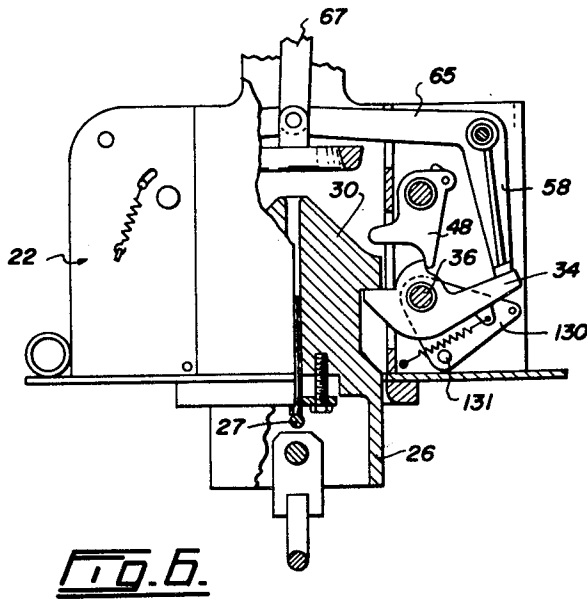
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3,173,551
SKYLINE CRANE

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12 Claims. (Cl. 212—104)

This invention relates to a skyline crane.

A skyline crane according to this invention includes a carriage adapted to travel on a skyline between anchoring hooks secured to said skyline. The carriage is moved in one direction along the skyline by the load line of the device, and the carriage is moved in the opposite direction either by gravity, if the skyline is inclined, or by a haulback line. When the load line is pulled up to the carriage, a linkage system is operated to free the carriage from one of the anchoring hooks. At the same time, the load line is locked in the elevated position. When the carriage reaches the other anchoring hook, the linkage system is operated to free the load line. If the load line is not carrying a load, it is immediately freed so that it may be lowered to the ground. However, a feature of this invention is that if the load line is carrying a load, it cannot be released by the operation of the linkage system until the load has been lifted a little by the load line. This insures a smooth and safe lowering of the load, and it protects the load line from undue stress or strain since the load cannot be released when the load line is slack, which might result in the breaking of the load line and/or excessive swinging of the load.

A skyline crane according to the present invention comprises a carriage adapted to travel on a skyline between anchoring hooks secured to the latter, an open-bottomed housing depending from the carriage, a load hook member connected to a load line extending upwardly through the housing and over a sheave on the carriage, latch means at each end of the carriage adapted releasably to engage an anchoring hook, pawl means in the housing adapted to permit the hook member to be drawn into the housing and normally to prevent said member from moving downwardly below a predetermined position, a linkage system extending from the housing to both latch means operable when the hook member is drawn above said predetermined position to cause either latch means to release an anchoring hook, locking means adapted to engage and normally retain said pawl means in position preventing the hook member from moving below said predetermined position, said locking means being connected to the linkage system whereby an anchoring hook entering the carriage to engage a latch means operates the linkage system to cause said locking means to free the pawl means to permit the hook member to move downwardly out of the housing.

A preferred form of the invention is illustrated by way of example in the accompanying drawings, in which:

FIGURE 1 is a diagrammatic side elevation of the skyline crane on a skyline, and showing the two anchoring hooks;

FIGURE 2 is a longitudinal section through the central portion of the carriage showing the load line locked thereto;

FIGURE 3 is a cross section taken on the line 3—3 of FIGURE 2;

FIGURE 4 is a longitudinal section through an end of the carriage, showing the latching means at said end;

FIGURE 5 is a horizontal section taken on the line 5—5 of FIGURE 4; and

FIGURE 6 is a fragmentary view similar to FIGURE 2, illustrating an alternative form of the invention.

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Referring to FIGURE 1 of the drawings, 10 is a skyline crane including a carriage 11 adapted to travel on a skyline 12, said carriage having wheels or rollers 13 for this purpose. Identical anchor units 15 are spaced apart and secured to skyline 12 at desired points, each of said units having an anchoring hook 17 pivotally mounted thereon and extending towards carriage 11.

Carriage 11 is shown generally in FIGURE 1, and in more detail in FIGURES 2 to 6. A housing 22 depends from carriage 11 and has a bottom 23 with a large central opening 24 therein. A load hook member 26 is connected to a load line 27 which extends upwardly through housing 22 and over a sheave 29 in carriage 11. This load line extends away from the carriage to a power-operated drum, not shown, on the ground. Hook member 26 is adapted to have a load connected thereto in the usual manner, and it has a conical upper end 30. An annular shoulder 31 is formed on member 26 below its upper end 30 and projects laterally therefrom.

A pair of pawls 34, one only being shown in FIGURE 2, are mounted in housing 22. Each pawl 34 is rotatably mounted on a shaft 36 which, in turn, slidably fits in inclined slots 37 formed in opposite walls of the housing. Pawl 34 has a finger 39 normally extending into the path of hook member 26 and adapted to fit beneath shoulder 31. Pawl 34 also has an extension 40 projecting outwardly and inclined upwardly relative to shaft 36 on the side thereof opposite finger 39, and it also has an upwardly-extending shoulder 41. A spring 42 connected to pawl 34 tends to draw extension 40 against a stop 44 mounted in housing 22.

A latch dog 48 is mounted in housing 22 near each pawl 34. Dog 48 includes a finger 49 projecting into the path of hook member 26 and spaced above pawl finger 39, and another finger 50 extending downwardly and normally engaging pawl shoulder 41. Dog 48 is rotatably mounted on a shaft 52, and is retained in its normal position by a spring 53, said spring being mounted on the outer surface of housing 22 and connected to a pin 54 projecting from the dog through a slot 55 in the housing wall.

A locking lever 58 is swingably mounted on a shaft 59 near each pawl 34. Lever 58 has a lower arm 61 with a free or lower end 62 inclined to match and bear against the inclined extension 40 of the adjacent pawl 34. An upper arm 65 of lever 58 extends substantially horizontally and is pivotally connected at 66 to the lower end of a vertical link 67, the upper end of which is pivotally connected at 68 to an arm 69 which is fixedly connected to a lever 70 mounted on a shaft 71. A ring 74 is connected to arm 65 and link 67 at 66 and lies in a substantially horizontal plane above the upper end of hook member 26. Links 78 and 79 are pivotally connected at 77 to the upper end of lever 70, and extend away therefrom in opposite directions longitudinally of carriage 11 to similar latch means at the opposite ends of said carriage. In order to operate the latch means at both ends of the carriage in the same manner, link 78 is connected to the lower end of a lever 80 swingably mounted on a shaft 81, the upper end of said lever being connected to the adjacent latch means.

Latch means 85 is provided at each end of carriage 11, and as these are identical, only one will be described in detail, the one located at the right end of carriage 11 as viewed in FIGURES 1, 4 and 5.

Latch means 85 includes horizontal and substantially parallel release and locking arms 88 and 89 which are pivotally connected at adjacent ends to the upper end of lever 80. Arm 88 has an inclined thrust plate 92 on the end thereof adjacent the end of carriage 11, said plate extending laterally from arm 89 beneath a correspondingly-inclined end 93 of arm 89. A dog 95 is piv-

totally mounted at its upper end on a shaft 96 carried by the carriage, and is retained in a normally inclined downward position by a spring 97. This dog has a flange 98 normally projecting towards and terminating near thrust plate 92.

An upwardly and inwardly inclined catch 100 is swingably mounted on a shaft 101 and has a substantially horizontal member 102 extending inwardly of carriage 11. A spring 105 tends to draw the lower end of a latch 106 over the end of member 102 to prevent the release of catch 100. The upper end of latch 106 fits into a notch 103 in the lower edge of release arm 88. When this arm is in an outer position, latch 106 is retained clear of catch member 102.

Locking arm 89 is provided with a shoulder 112 on its lower edge spaced inwardly from its free end 92, said shoulder fitting over a stop 113 mounted on carriage 11 to prevent said locking arm and release arm 88 from being drawn inwardly of the carriage by spring 115 as long as said arm 89 rests on stop 113.

A shaft 118 extends longitudinally of carriage 11 and is substantially parallel with the release arm 88 of the latch means 85 at each end of the carriage. Shaft 118 is mounted for rotation around its longitudinal axis, and it has a plate 120 thereon and projecting laterally therefrom which fits between a pair of finger plates 122 projecting laterally in the opposite direction from release arm 88. With this arrangement, when arm 88 is swung upwardly, finger plates 122 tip plate 120 upwardly to rotate shaft 118. This causes the release arm 88 of the latch means 85 at the opposite end of carriage 11 to lift upwardly as well. This action is reversed when release arm 88 moves downwardly.

A spring 125 is carried by carriage 11 and extends over the end of catch member 102 to return said member to its substantially horizontal position after it has been swung upwardly around shaft 101.

The operation of skyline crane 10 will now be described, starting with carriage 11 at the loading end of its run on skyline 12 with an anchoring hook 17 extending into the carriage and engaging catch 100, thereby locking the carriage to anchor unit 15.

After a load has been connected to load hook member 26 at ground level in the customary manner, said hook member is drawn upwardly by means of load line 27 until it enters housing 22. As the hook member passes pawls 34, fingers 39 thereof swing upwardly until their extensions 40 engage stops 44. At this time, shafts 36 ride along the inclined slots 37 so that the opposed pawls move away from each other sufficiently to permit member 26 to continue moving upwardly in the housing. As the pawls move outwardly, they swing latch dogs 48 to move fingers 49 out the path of hook member 26. When said member 26 engages ring 74, link 67 is moved upwardly to cause lever 70 to move link 78 to shift arms 88 and 89 outwardly relative to carriage 11. This movement of arm 88 swings latch 106 to clear its lower end of member 102 of catch 100, permitting the latter to swing outwardly to clear anchoring hook 17. This frees carriage 11 from anchor unit 15 so that the carriage moves along skyline 12. When the pull on load line 27 is released, hook member 26 moves downwardly to engage the fingers 39 of pawls 34 so that the hook member is locked in position beneath fingers 49 of latch dogs 48. As pawl extensions 40 engage the lower ends of arms 61 of locking levers 58 at this time, the pawls cannot release the hook member.

When carriage 11 reaches the opposite anchor unit 15, the anchoring hook 17 thereof enters the opposite end of carriage 11 and rides up and over catch 100. This swings dog 95 inwardly of the carriage so that finger 98 strikes thrust plate 92 to raise both of the arms 88 and 89, freeing locking arm 89 from stop 113 so that spring 115 is free to draw said arms inwardly of the carriage. However, the arms cannot move as long as hook member 26 while

carrying a weight rests on pawl fingers 39. The reason for this is that the inclined lower end of arm 61 of locking lever 58 cannot move because of its engagement with the inclined extension 40 of pawl 34 since the force is not sufficient to depress said extension under the influence of the load carried by member 26. In order to release the load, it is necessary to haul in on load line 27 to raise member 26 sufficiently to clear pawl fingers 39, dog fingers 49 limiting the upward movement of member 26 at this time. With the load off pawl 34, locking lever 58 is capable of swinging under the influence of spring 115 which is tending to draw arms 88 and 89 inwardly of the carriage. Now when load line 27 is paid out, hook member 26 can move downwardly clear of housing 22. The inward movement of release arm 88 swings latch 106 to move the lower end of the latter over catch extension 102 so that catch 100 cannot release anchoring hook 17 until latch 106 is again moved by outward movement of release arm 88.

Thus, it will be seen that the load carried by carriage 10 cannot be lowered until load line 27 is hauled in to lift member 26 and the load relative to the carriage. With this arrangement, the load line is carrying the total load at the time hook member 26 is free to travel downwardly relative to the carriage. At the same time, hook member 26 can be automatically released from the pawl means when it is not carrying a load. Under these conditions, when arms 88 and 89 are swung upwardly in the carriage so that arm 89 is clear of stop 113, spring 115 is capable of drawing said arms inwardly of the carriage because the spring is able to swing locking lever 58 against the pressure exerted by pawl extension 40 against the lower end of the lower arm of said lever.

FIGURE 6 illustrates a slight variation of the invention. In this embodiment, shaft 36 of each pawl 34 is carried by spaced apart parallel plates 130 which are pivotally mounted at lower edges thereof on shafts 131 carried by housing 122. Plates 130 swing outwardly relative to housing 22 when hook member 26 is being drawn upwardly into said housing to permit the hook member to clear pawl fingers 39.

What I claim as my invention is:

1. A skyline crane comprising a carriage adapted to travel on a skyline between anchoring hooks and secured to the latter, an open-bottomed housing depending from the carriage, a load hook member connected to a load line extending upwardly through the housing and over a sheave on the carriage, latch means at each end of the carriage adapted releasably to engage an anchoring hook, pawl means in the housing adapted to permit the hook member to be drawn by upward movement of the load line into the housing and to engage said hook member on downward movement of the load line thereby preventing said member from moving downwardly below a predetermined position, a linkage system extending from the housing to both latch means operable when the hook member is drawn by the load line above said predetermined position to cause either latch means to release an anchoring hook, locking means adapted to engage and normally retain said pawl means in position preventing the hook member from moving below said predetermined position, said locking means being connected to the linkage system whereby an anchoring hook entering the carriage to engage a latch means can operate the linkage system to cause said locking means to free the pawl means to permit the hook member to move downwardly out of the housing, said locking means including means for preventing the freeing of the pawl means if the hook member is carrying a load while being engaged by said pawl means so that the loaded hook member must be raised by the load line to permit said freeing of the pawl means.

2. A skyline crane as claimed in claim 1 including a latch dog in the housing positioned to be moved by the pawl means out of the way of the hook member as said

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member is being drawn into the housing and moving into a position after the member moves downwardly to said predetermined position to permit further upward movement of the member until after said member is released by the pawl means.

3. A skyline crane as claimed in claim 1 in which the latch means at each end of the carriage comprises a release arm mounted for vertical and longitudinal movement in the carriage and connected to said linkage system, a catch adapted to be removably engaged by an anchoring hook extending into the carriage, and latch means connected to the release arm and adapted when said release arm is in an inner position to retain said catch in a hook engaging position and when said release arm is moved to an outer position to release said catch to permit the catch to disengage the hook.

4. A skyline crane as claimed in claim 3 including a locking arm mounted for longitudinal movement with the release arm and for vertical movement independent of said release arm, a stop mounted in the carriage engageable by the locking arm when both arms are in the outer position, means movable by an anchoring hook entering the carriage to raise both of said arms and to free the locking arm from said stop, and spring means normally urging said arms to the inner position when the locking arm is free of the stop.

5. A skyline crane as claimed in claim 4 including a dog swingably mounted near said means movable to raise both arms and positioned to be engaged by an anchoring hook entering the carriage and swung to raise said arms, said dog being swingable when clear of the hook to a position to prevent said hook from disengaging the catch until the latter is released by the latch means.

6. A skyline crane as claimed in claim 1 in which the pawl means comprises a pawl swingably mounted on a shaft and having a finger normally projecting into the path of the hook member in the housing to prevent said member from moving downwardly, means resiliently re-

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taining the finger in said normal position, and means supporting said shaft while permitting the latter to move away from said path.

7. A skyline crane as claimed in claim 6 including an extension on the pawl extending outwardly from the shaft thereof, and means removably bearing against said extension to prevent movement of the pawl when the finger thereof is engaged by the hook member, said bearing means being connected to the linkage system and being movable by said system to free said extension.

8. A skyline crane as claimed in claim 7 in which said bearing means and said extension have cooperating surfaces which prevent the bearing means from freeing the extension while the hook member is carrying a load.

9. A skyline crane as claimed in claim 6 including means engageable by the hook member when said member is moved above the pawl to operate the linkage system and the latch means to free any anchoring hook engaged by the latter means.

10. A skyline crane as claimed in claim 8 including means engageable by the hook member when said member is moved above the pawl to operate the linkage system and the latch means to free any anchoring hook engaged by the latter means.

11. A skyline crane as claimed in claim 10 including a latch dog in the housing having a finger normally extending into said path, said finger being positioned to prevent upward movement of the hook member from the pawl finger sufficient to operate the linkage system.

12. A skyline crane as claimed in claim 11 in which the pawl includes means for moving the dog finger out of the path of the hook member when the pawl finger is moved out of said path.

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