Sept. 13, 1955 R. O. PITMAN ET AL 2,717,701

PORTABLE LOAD HOISTING DEVICE

Filed Nov. 6, 1951 3 Sheets-Sheet 1

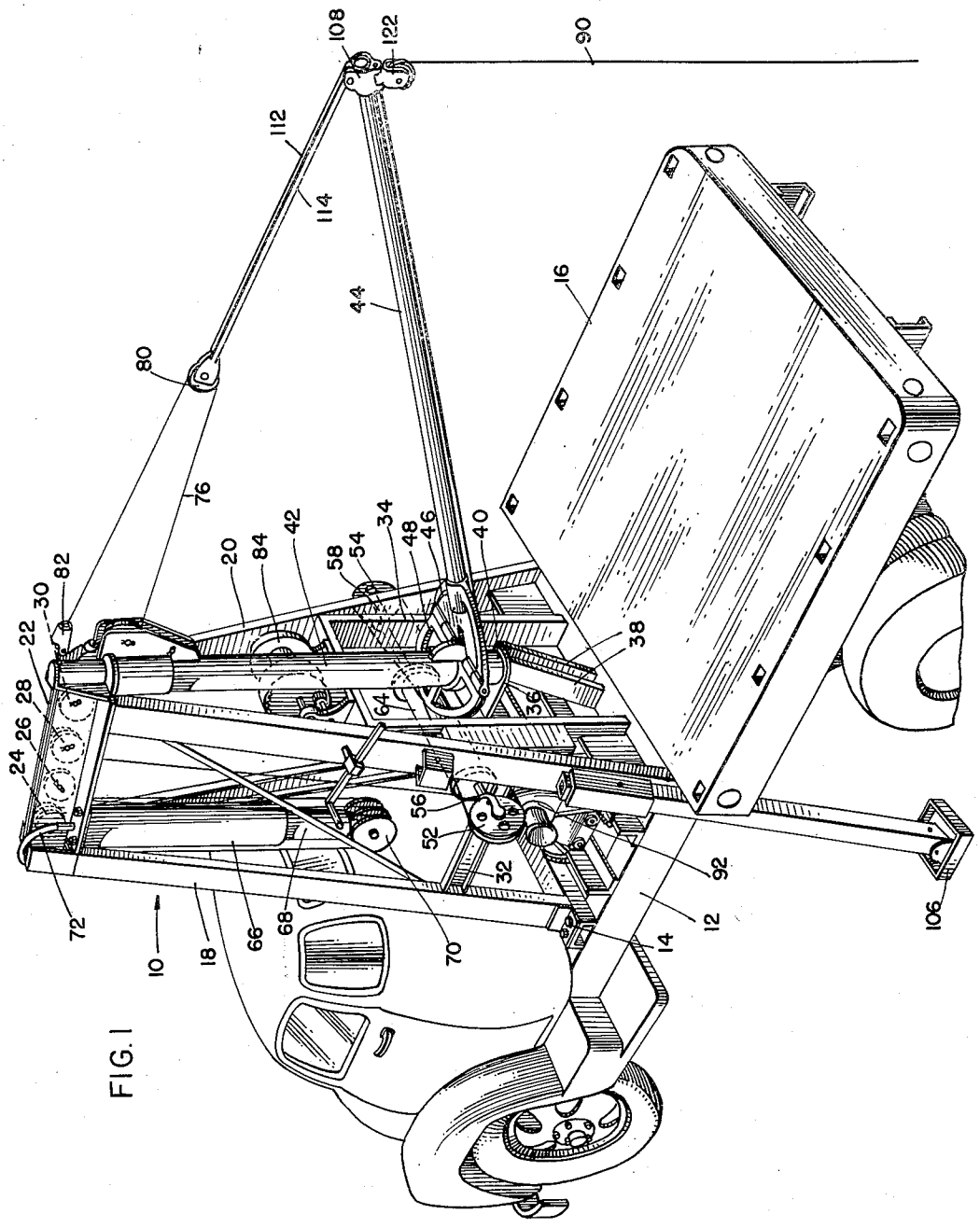


FIG. 1

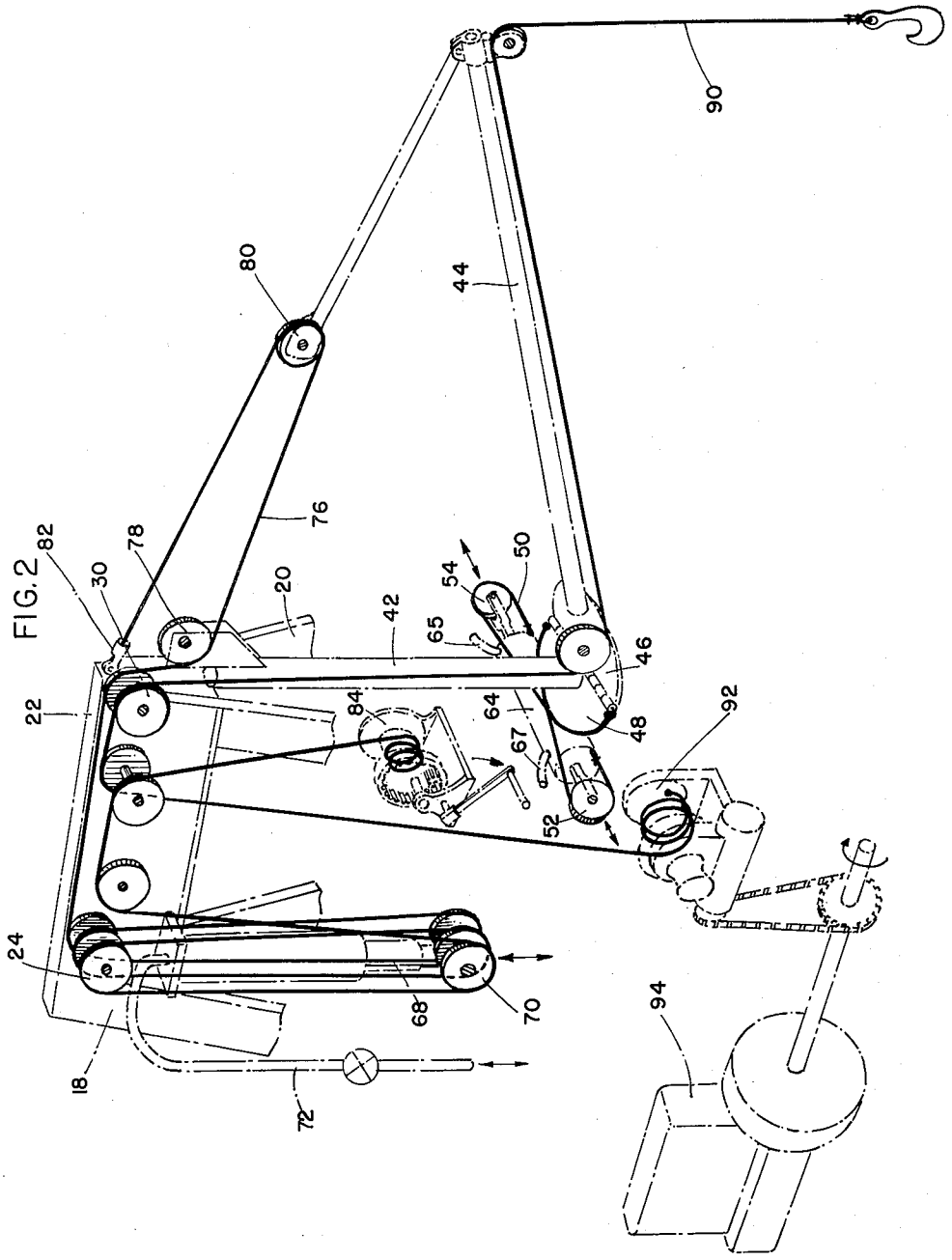
INVENTORS:
RAYMOND O. PITMAN
RAYMOND F. PITMAN
BY Spencer, Johnston Cook & Root
ATT'YS

Sept. 13, 1955 R. O. PITMAN ET AL 2,717,701

PORTABLE LOAD HOISTING DEVICE

Filed Nov. 6, 1951 3 Sheets-Sheet 2

FIG. 2



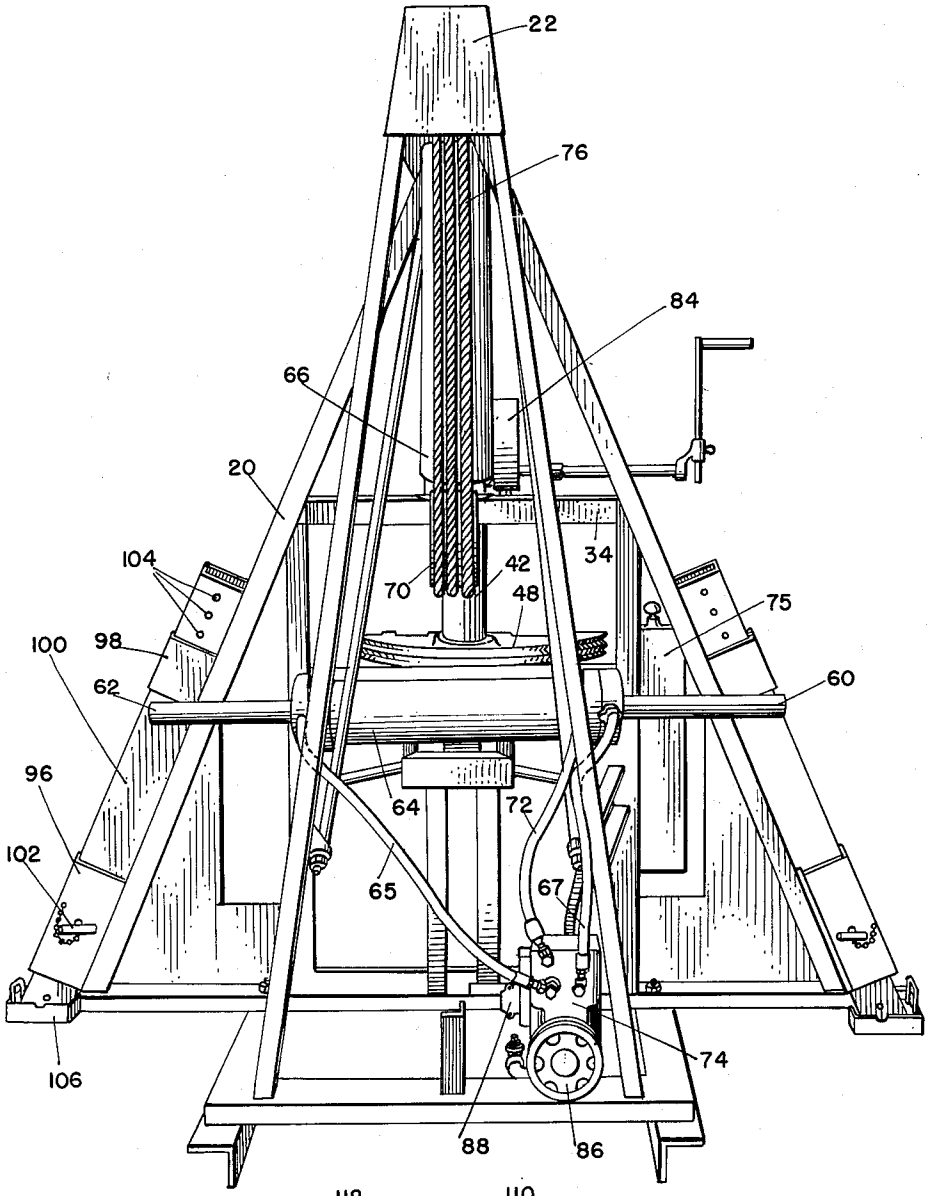
INVENTORS:
RAYMOND O. PITMAN
RAYMOND F. PITMAN
BY Spencer, Johnston Cook & Rose
ATT'YS.

Sept. 13, 1955 R. O. PITMAN ET AL 2,717,701

PORTABLE LOAD HOISTING DEVICE

Filed Nov. 6, 1951 3 Sheets-Sheet 3

FIG. 3



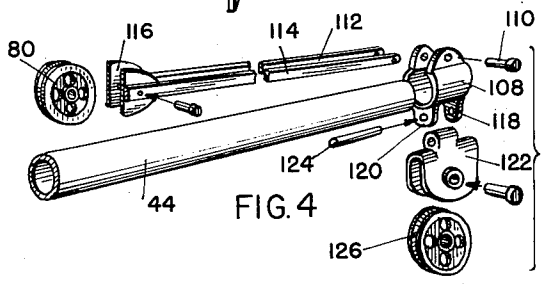


FIG. 4

INVENTORS:
RAYMOND O. PITMAN
RAYMOND F. PITMAN
BY Spencer, Johnston, Cook & Root
ATT'YS.

United States Patent Office 2,717,701 Patented Sept. 13, 1955

2,717,701

PORTABLE LOAD HOISTING DEVICE

Raymond O. Pitman and Raymond F. Pitman, Kansas City, Mo.

Application November 6, 1951, Serial No. 255,024
2 Claims. (Cl. 212—35)

This invention relates to a portable load hoisting device and particularly to a remotely controlled hoisting crane adapted to be mounted on a wheeled vehicle.

One of the principal objects of the invention is to provide a remotely controlled hoisting crane which may be moved laterally and horizontally by hydraulic mechanism.

Another object of the invention is to provide a hoisting crane adapted for mounting on a vehicle frame and having vehicle stabilizing members on either side.

A further object of the invention is to provide a hoisting crane which is raised and lowered by a single-acting hydraulic piston mechanism. Still another object of the invention is to provide a crane having a load lifting pulley which is always positioned in the direction of the load stress.

These and other objects and advantages of the invention will become more apparent upon consideration of the following description taken in conjunction with the accompanying drawings in which:

Figure 1 is a perspective view of one embodiment of this invention as mounted on a truck frame;

Figure 2 is a diagrammatic view of certain essential parts of the device of Figure 1 according to the invention;

Figure 3 is an elevational view of one embodiment of the invention without boom rotating pulleys and cable and without a load lifting winch and cable, as viewed from the front of the vehicle; and

Figure 4 is an enlarged exploded view of the pulley mechanism attached to the end of the boom in Figure 1.

According to the invention there is now provided a portable hoisting device adapted for mounting on a vehicle and comprising hydraulically actuated means for rotation of the boom through an angle of approximately 180° and a separate hydraulically actuated means adapted for raising and lowering the boom. The invention further provides a plurality of extensible supports adapted to extend from the triangular frame member to engage a solid supporting medium, such as the ground, and thereby to prevent tipping of the vehicle when the boom is extended far over the side. A novel arrangement is provided at the free end of the boom for maintaining the load lifting pulley always in the direction of the load stress.

A boom bridle is employed to support the boom tip in such a manner as to reduce the end moment at the tip and thereby to prevent bending of the boom at its fully extended position.

Referring to the drawings in greater detail it will be seen in Figure 1 that the portable load hoisting device **10** is mounted on a vehicle frame **12** in any suitable manner as, for example, by means of the bolts **14**. The device **10** is compact enough that a truck bed **16** may be mounted on the frame **12** behind the device.

The portable load hoisting device **10** is comprised of a pair of A-frames **18** and **20**. The A-frames are secured to the vehicle frame **12** and are joined at the apices by means of the ridge rail **22**. The ridge rail **22** is comprised of a pair of angle irons having a space therebetween in which are mounted four sets of pulleys **24**, **26**, **28** and **30**. The A-frames are further supported upon each other by means of the transverse element **32** and a corresponding element connecting the opposite legs of the A-frames. A box-like frame **34** is adapted to contact the inner sides of the A-frame **20** and to be supported on the truck

frame **12**. A projection **36** extends from the box frame **34** and is supported from the truck frame by the members **38**. The projection **36** carries a bearing member **40** upon which is positioned a vertical mast or upright member **42**. The upper end of the upright **42** is pivotally mounted in the ridge rail **22** in such a manner that the upright **42** is axially rotatable between the two supports.

A boom **44** is attached at one end to a yoke **46** which in turn is secured to a bull-wheel **48**. The yoke **46** is pivotally mounted on the bull-wheel **48** so that the boom **44** may be raised or lowered without affecting the horizontal alignment of the bull-wheel. The upright **42** is rigidly secured to the bull-wheel **48** for axial rotation therewith, the rotation of the bull-wheel being effected by means of a cable **50** which contacts the grooves in the bull-wheel and extends over the pulleys **52** and **54**. The cable **50** is fixed at the two ends thereof in a conventional arrangement. The pulleys **52** and **54** are mounted in brackets **56** and **58** which in turn are mounted on rods **60** and **62** (Fig. 3) connected at their inner ends to a piston (not shown) which is adapted to reciprocate in the horizontally positioned cylinder **64**. The addition of fluid under pressure to either end of the cylinder **64** will result in a movement of the piston and corresponding movement of the pulleys **52** and **54**. The cable **50** will be moved and will cause the bull-wheel **48** and the boom **44** to swing laterally about the axis of the upright **42**.

Attached to the ridge rail **22** is a vertically positioned cylinder **66** (Fig. 1). The piston **68** is adapted to move axially within the cylinder **66** and to carry with it the set of pulleys **70**. Fluid under hydraulic pressure is fed to the cylinder **66** through the hose **72** which is connected at its other end to a pump **74** (Fig. 3). Hydraulic fluid is fed to the cylinder **64** through the hoses **65** and **67**.

Referring to Figure 2 wherein the arrangement of the various cables is shown it will be seen that the pulleys **70** on the end of the piston **68** cooperate with the set of pulleys **24** on the ridge rail **22** in a sort of block and tackle arrangement. The cable **76** is threaded through each of the pulleys **70** and **24** and engages the pulley **30**, the pulley **78** on the upright **42**, and the boom supporting pulley **80**. Then the cable **76** is secured to the ridge rail **22** by a suitable clamping means **82**. From the diagram in Figure 2 it will be apparent that an advancement of the piston **68** will increase the distance between the pulleys **70** and **24** and will take up some of the cable **76**, thereby raising the boom **44**. Similarly, a retraction of the piston **68** will result in a lowering of the boom **44**.

One end of the cable **76** is secured to a small hand-operated winch **84** in such manner that the cable may be taken in or payed out to compensate for shortening or lengthening the boom **44**.

Fluid pressure is supplied to the horizontal cylinder **64** and the vertical cylinder **68** from a hydraulic pump **74** (Fig. 3) which is adapted to be driven by the pulley **86** which in turn is connected to any suitable power take-off (not shown). A reservoir **75** is provided to hold excess fluid. Suitable controls **88** are provided on the pump **74** in order to regulate the flow of fluid to the pistons **64** and **66**. Suitable remote controls may be attached to the controls **88** and may be located at any convenient place on the vehicle. The arrangement is such that the pistons in the two cylinders **64** and **66** may be advanced or retracted independently of one another thereby providing a maximum degree of control over the hoisting mechanism.

The actual hoisting mechanism is conventional in design and comprises a cable **90** (Figure 2) which is threaded over an arrangement of pulleys and is adapted to be wound or unwound on a conventional winch mechanism **92**. The winch **92** is powered from the vehicle

motor 94 in a manner well known in the art and constituting no part of the invention.

In Figures 1 and 3 the arrangement of extensible supports which operate to stabilize the load lifting device are shown. In Figure 3 there is illustrated a pair of channels 96 and 98 which are secured to the rear A-frame 20. The element 100 is adapted to pass through channels 96 and 98 in alignment with the leg of the A-frame 20. A pin 102 is adapted to be inserted through aligned openings in the channel 96 and through a corresponding opening in the member 100 when the unit is in retracted position. A series of openings 104 are provided near the upper end of the member 100 and one of these will receive the pin 102 when the member 100 is in extended position. A suitable foot 106 is provided at the lower end of the member 100 in order to maintain broad contact with a supporting surface. The extensible support is shown in fully extended position in Figure 1 with the foot 106 resting on the ground or on other primary supporting means.

The usual arrangement for the free end of the boom 44 is illustrated in detail in Figure 4. As shown therein the boom 44 has a bracket 108 firmly attached to the end thereof and held by means of the bolt 110. A bridle comprising two rods 112 and 114 is adapted to be secured to the bracket 108 by means of the bolt 110. At the opposite end of the rods 112 and 114 there is provided a bracket 116 which supports the pulley 80. At the underside of the bracket 108 there is provided a pair of projections 118 and 120 which are adapted to embrace a bracket 122 in loose engagement so that the bracket 122 may rotate about the pin 124. The load lifting pulley 126 is attached to the bracket 122. By this arrangement it has become possible to lessen the strain on the pulley 126 and the cable 90 because the bracket 122 and the pulley 126 are free to swing so that they will always point in the direction of the load. Lateral stresses are eliminated and the life of the pulley 126 and the cable 90 are substantially lengthened.

It is seen in Fig. 2 that there is a set of three movable pulleys 70 secured to piston 68 and a set of three fixed pulleys mounted on the ridge rail 22. There are also a pair of pulleys 28, a pair of pulleys 30 on the ridge rail 22, and a single pulley 26.

Thus, the first cable 90 is secured at one end thereof to the first winch 92 and passes over pulley means on ridge rail 22, which includes one of the pulleys 28 and one of the pulleys 30. Cable 90 also passes over the load lifting pulley 126 on the outer end of boom 44.

The second cable 76 passes over both the set of movable pulleys 70 and the set of fixed pulleys 24. One end of cable 76 is attached to the second winch 84 and the opposite end thereof is fixed by the clamping means 82. The boom supporting pulley 80, having means 112—114 connecting the same to the outer end of boom 44, also receives the cable 76. The additional pulley means on ridge rail 22 which receive cable 76, includes pulley 78, the other pulley 30, pulley 26, and the other pulley 28.

An important feature of this invention resides in the fact that the load lifting device may be raised or lowered independently of the lateral swinging of the boom, or if desired, the boom may be swung and lifted at the same time. The hydraulically operated means for raising and lowering the boom operates chiefly to fix the height of the boom, but it may be used for the lifting of light loads. The boom may be adjusted to various lengths by well-known methods since it is of the telescoping type and it is contemplated that such an adjustable boom will be employed. The hydraulically operated cable for raising and lowering the boom may be extended or retracted very easily to adjust it to different boom lengths by means of the hand-operated winch 84.

From the foregoing disclosure it will be apparent that there is now provided a portable hydraulically actuated hoisting device which is controllable and movable both laterally and horizontally by hydraulic means. This hoist is adaptable to innumerable uses and may be shifted from one height to another by a simple manipulation of remote controls. The horizontal adjustment of the boom requires but a few seconds and requires no exertion on the part of the operator.

The invention is hereby claimed as follows:

1. In a hoisting device, a support; an elongated boom pivotally mounted at one end thereof on the support for swinging movement on a horizontal axis; hoisting mechanism including a first cable, a load-lifting pulley on the boom and pulley means on the support, both receiving the cable, and a first winch on the support receiving one end of the cable; hydraulic multiplying gearing separate from said mechanism for swinging the boom on said axis, said gearing including a hydraulic cylinder mounted on the support, a vertically reciprocable piston in the cylinder, a set of movable pulleys secured to the piston, and a corresponding set of fixed pulleys secured to the support above the cylinder; a second cable passing over the set of movable pulleys and the set of fixed pulleys; a boom-supporting pulley having means connecting the same to the opposite end of the boom; a second winch mounted on the support; and anchoring means securing one end of the second cable to the second winch, said second cable extending from the second winch to the set of movable pulleys and from the set of fixed pulleys over the boom-supporting pulley, the opposite end of the second cable being attached to the support whereby, upon downward extension of the piston from the cylinder, the set of movable pulleys is lowered away from the set of fixed pulleys and said opposite end of the boom is raised as the boom swings on said axis.

2. In a hoisting device, a support including a pair of spaced, upright frames and a ridge rail joining the frames; an elongated boom pivotally mounted at one end thereof on the support for swinging movement on a horizontal axis; hoisting mechanism including a first cable, a load-lifting pulley on the boom and pulley means on the support both receiving the cable, and a first winch on the support receiving one end of the cable; hydraulic multiplying gearing separate from said mechanism for swinging the boom on said axis, said gearing including a hydraulic cylinder mounted on the support, a vertically reciprocable piston in the cylinder, a set of movable pulleys secured to the piston, and a corresponding set of fixed pulleys secured to the ridge rail above the cylinder; a second cable passing over the set of movable pulleys and the set of fixed pulleys; a boom-supporting pulley having means connecting the same to the opposite end of the boom; additional pulley means mounted on the ridge rail; a second winch mounted on the support; and anchoring means securing one end of the second cable to the second winch, said second cable extending from the second winch, over said additional pulley means to the set of movable pulleys, and from the set of fixed pulleys, over said additional pulley means and thence over the boom-supporting pulley, the opposite end of the second cable being attached to the support whereby, upon downward extension of the piston from the cylinder, the set of movable pulleys is lowered away from the set of fixed pulleys and said opposite end of the boom is raised as the boom swings on said axis.

References Cited in the file of this patent

UNITED STATES PATENTS

929,168	Robertson	July 27, 1909
1,254,804	Holmes	Jan. 29, 1918
1,338,161	Scott	Apr. 27, 1920
1,551,426	Pavella	Aug. 25, 1925
2,559,733	Pitman et al.	July 10, 1951
2,602,551	White	July 8, 1952

FOREIGN PATENTS

116,856	Australia	Apr. 16, 1943