

PUBLISHED

JUNE 8, 1943.

BY A. P. C.

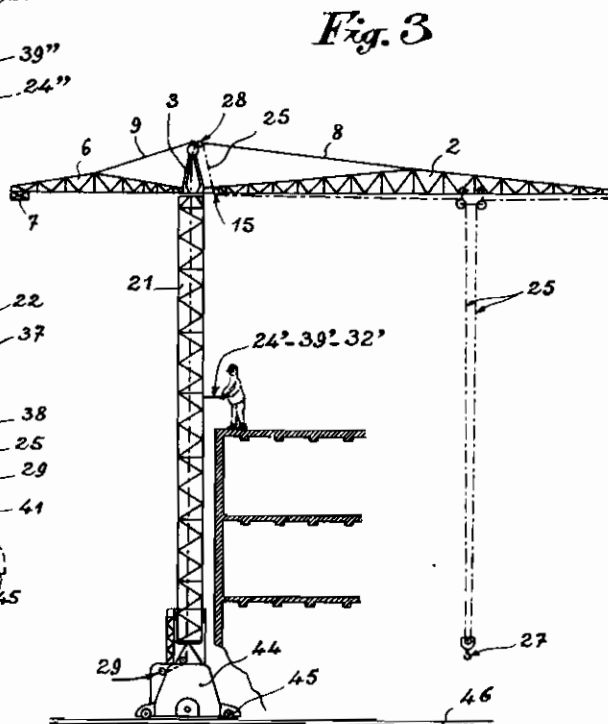
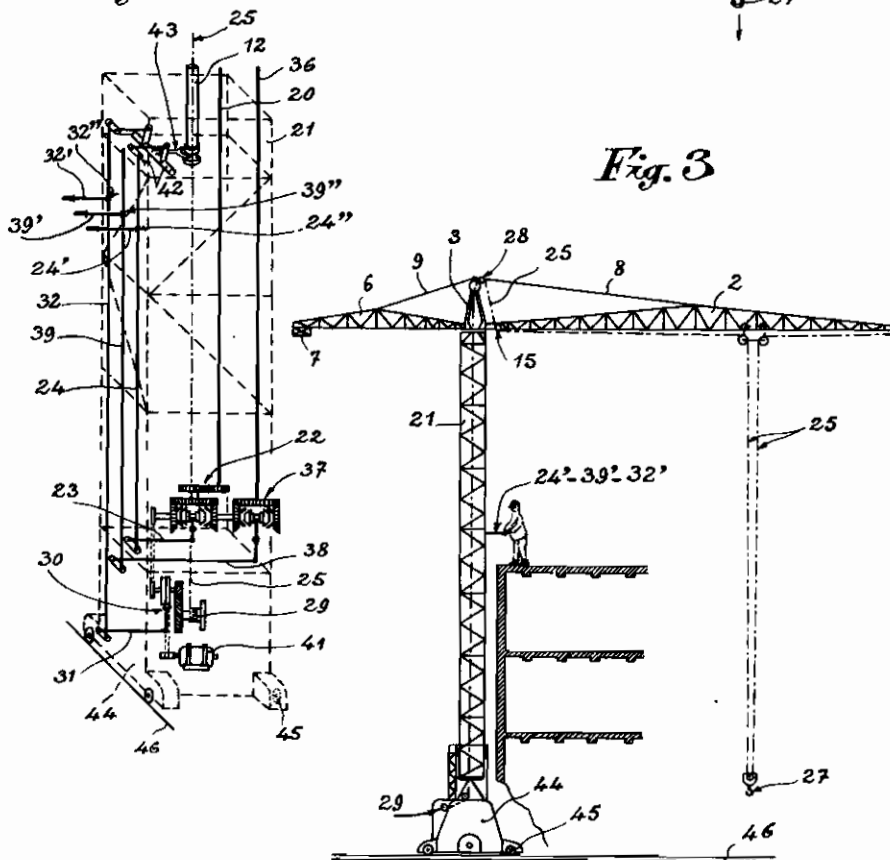
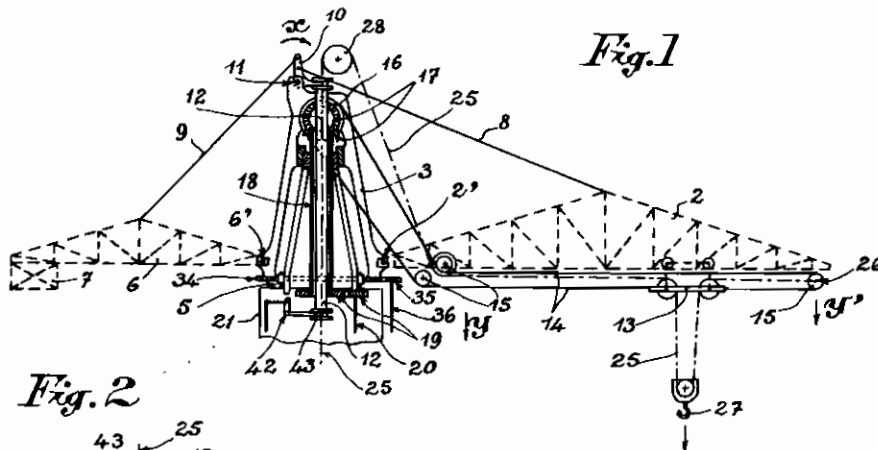
A. FAURE ETAL

CRANE

Filed Oct. 15, 1942

Serial No.

462,078



Inventors:
ANDRÉ FAURE
ANTOINE FAURE
By Haseltine, Lake & Co.
Attorneys.

ALIEN PROPERTY CUSTODIAN

CRANE

Andre Faure and Antoine Faure, Firminy, France;
vested in the Alien Property Custodian

Application filed October 15, 1942

This invention relates to cranes and more particularly to cranes having a span adjustable between wide limits and is concerned more specifically though non exclusively with those cranes wherein the span may be varied by shifting the lifting point of the load.

One disadvantage of existing cranes particularly those used for lifting materials such as ashlar, girders or joists in the erection of buildings is that the crane operator must remain in a cabin positioned in some cranes at the base of the crane thereby preventing said operator from perceiving the correct position where the load has to be discharged or, in other cranes, midway or at the top of the crane mast, this involving danger for the operator and subjecting him to tiring strains due to jerks and oscillations of the mast during service operation of the crane.

A primary object of the invention is to provide a novel or improved adjustable span crane avoiding the aforesaid disadvantages and incorporating safety means whereby the risk of accidents due to breakage or collapse of the crane may be obviated or minimized where an attempt to lift a load exceeding a prescribed limit consistent with span is inadvertently made.

Another object of the invention is to provide an improved crane as aforesaid wherein the safety means involve the utilisation of those unbalanced conditions which may arise between jib and counterjib due to an unduly large load for stopping the lifting action either by declutching the prime mover from the hoisting gear or by causing said gear to come to an inoperative position.

A further object of the invention is to provide an improved crane as aforesaid wherein the jib and counterjib instead of being united rigidly to a stationary point on the mast head are connected to a lever pivoted to said head, the rocking motion of said lever due to a tilting stress on the jib being transmitted by tripping means so as to instantaneously bring about the required declutching action.

A still further object of the invention is to provide an improved crane as aforesaid particularly utilisable for handling materials used for the erection of buildings and having a structure permitting the crane operator to stand on a floor of the building being erected or on an adjacent scaffolding at the most favorable spot for manually controlling the operation of the crane, this possibility being largely due to the provision of the prime mover at the base end of the central mast of the crane and to the arrangement of ad-

justable controllers having means such as operating handles movable along bars extending throughout the height of said mast.

Still a further object of the invention is to provide an improved crane as aforesaid wherein the several operations such as angularly adjusting the jib, raising and lowering the load, and varying the span are ensured by a common prime mover located in the lower region of the crane mast and through clutches and gears operable from said adjustable handles.

And a still further object of the invention is to provide an improved crane as aforesaid wherein variation of the load-carrying span is controlled through a drum arrangement whose axis is coincident with the pivotal center of the mast head.

With these and such other objects in view as will incidentally appear hereafter, the invention comprises the novel construction, combination and arrangement of parts that will now be described in detail with reference to the accompanying diagrammatic drawing illustrating a convenient embodiment of the same and forming a part of the present disclosure.

In the drawing:

Figure 1 is a fragmentary detail view showing the mast head mechanism of a crane according to the invention, wherein variations of the load-carrying span is obtained by means of a carriage traversable along a horizontal jib.

Figure 2 is an isometric view showing the crane mast and operating and controller means associated therewith.

Figure 3 is a view showing on a much smaller scale the crane in its entirety, many parts being omitted for the sake of clearness.

As illustrated, the crane jib 2 which has a lattice structure is hinged at 2' to the mast head 3 revolvably supported between rollers 5. The counterjib 6 also of lattice structure is fitted with a counterweight 7 and is also hinged at 6' to the mast head 3.

Tie or guy rods or wires 8, 9 connected to the jib and counterjib respectively are fastened to a cranked lever 10 pivoted at one end 11 to the top of the mast head and having its stroke limited in both directions by abutments (not shown). The other end of the lever 10 is forked and operatively connected to an upstanding hollow tripping shaft 12.

The jib 2 supports a traversable carriage 13 operated by a cable 14 (hereafter referred to as the "second cable") passing over jockey pulleys 15, 15. This cable is driven by a transmission (hereafter referred to as the "secondary trans-

mission") which includes a drum 16 actuated through a bevel gear 17 by an elongated sleeve 18 loosely surrounding the shaft 12 and actuated in turn through a straight gear 19 by an upstanding shaft 20. This shaft extends throughout the height of the lattice crane mast 21 (Fig. 2) and is provided at its lower end with a reverser 22 comprising a bevel gear and a clutch of known type. Said reverser is controlled by a suitable rigging 23 linked to and operated by a controller bar 24 extending along the mast 21, said bar being fitted with an operating handle 24' clamped thereto by an adjustable bush 24''.

The drum 18 which drives the cable 14 for traversing the carriage 13 may be formed with a groove for holding said cable. Alternatively, the cable 14 may be so wound as to form several convolutions on the drum 16.

The hoisting cable 25 (hereafter referred to as the "first cable") is secured at one of its ends at 26 (Fig. 1) to the outer end of the jib 2 and carries a hook 27 forming a load grapple. Said cable passes at the top end of the mast head over an overhead pulley 28 and then extends downwardly through the hollow shaft 12 and mast 21. The lower end of the cable 25 is secured to a winch 29 or a similar actuator which may comprise, as shown, fast and loose pulleys 30 forming a clutch and operated by a rigging 31 operated by an upwardly directed controller bar 32 extending along the mast 21 and provided with an operating handle 32' clamped to said bar by an adjustable bush 32''.

In order to permit the mast head 3 to be revolved upon its supporting rollers 5, said head 3 is rigidly girdled by a toothed ring 34 meshing with a pinion 35 actuated by an upstanding shaft 36 extending down to a declutchable reverser 37 similar to the reverser 22. Said reverser 37 forms part of a transmission (hereafter referred to as the "primary transmission") and is operated through a suitable rigging 38 and controller bar 39 from an operating handle 39' clamped to said bar by an adjustable bush 39''.

A single prime mover 41 constituted for example by an electric motor located at the bottom end of the mast 21 drives the winch 29 and the reversers 22, 37.

The controller bars 24, 32 are linked at their upper ends through a tumbler 42 to a fork 43 embracing a portion of the central shaft 12 defined between a pair of flanges thereon and thus operatively connected to said shaft so as to respond to its axial displacements, the latter causing the tumbler 42 to rock about its axis and to impart a translatory motion to the controller bars 24, 32.

It will be understood that the operating handles 24', 32', 39' can be moved along their respective carrier bars 24, 32, 39 owing to the provision of the adjustable bushes and may be clamped thereto at any suitable position so as to suit practical requirements responsive to the particular work to be effected by the crane in each instance, e. g. to match the progress of erection of a building in

a yard served by this crane. As shown in Fig. 3, this crane is assumed to be of the travelling type and comprises a base carriage 44 having wheels 45 for rolling on rails such as 46.

The foregoing possibility is illustrated in Fig. 3 which shows diagrammatically a building in the course of erection, assuming three floors to have already been laid and the crane operator to stand on the uppermost floor whence he can readily supervise the work and control the operation of the crane by means of the operating handles 24', 29', 32'' which are assumed to have been preset on their respective bars 24, 29, 32 to a corresponding level.

The operation of the crane will be readily understood from the foregoing without requiring additional explanation so far as the raising of the hook or grapple 27, the traverse of the carriage 13 along the jib 3, and the rotation of the mast head 3 upon its rollers 5 are concerned.

The safety device incorporated with the crane assembly operates as follows:

Assuming an unduly heavy load to have been grappled by the hoisting hook 27 and a lifting stress to be exerted on it through the cable 25, it will be understood that the balance between jib 2 and counterjib 6 will be broken, whereupon the jib 2 at once tilts to a slight extent, thus pulling the tie rod 8 and rocking the lever 10 clockwise as shown by the arrow x in Fig. 1. This moves the vertical shaft 12 down and through the fork 43 operates the tumbler 42, thus moving the bar 32 as though it were manually controlled by the operating handle 32'. As a result of this, declutching takes place and the winch 29 is brought to a standstill, thus precluding further hoisting stress on the hook 27 and preventing the jib from further tilting and breaking or capsizing the entire crane.

As, moreover, the crane span may be varied by a traverse motion of the carriage 13, a heavier load might be lifted at y than at y' and the motion of the carriage 13 from y to y' might prove to be dangerous since the maximum load must gradually dwindle down during that motion. Here again, the safety means operate in the same way in response to a downward tilt of the jib 2 a corresponding pull on the tie rod 8, a rocking of the lever 10, a lowering of the shaft 12 and an operation of the bar 24, thereby declutching the drive at 22 and bringing the carriage 13 to a standstill ere to its reaching a critical position during its outward stroke along the jib 2.

It will be seen from the foregoing that the numerous objects of the invention are fulfilled in a crane having the aforesaid structure and that while allowing of easy supervision and manipulation of the crane, said structure precludes all accidents arising from overloads on the grapple due regard being paid to the span connoted by the position occupied by the jib carriage when said grapple begins to exert its lifting stress.

ANDRÉ FAURE.
ANTOINE FAURE.