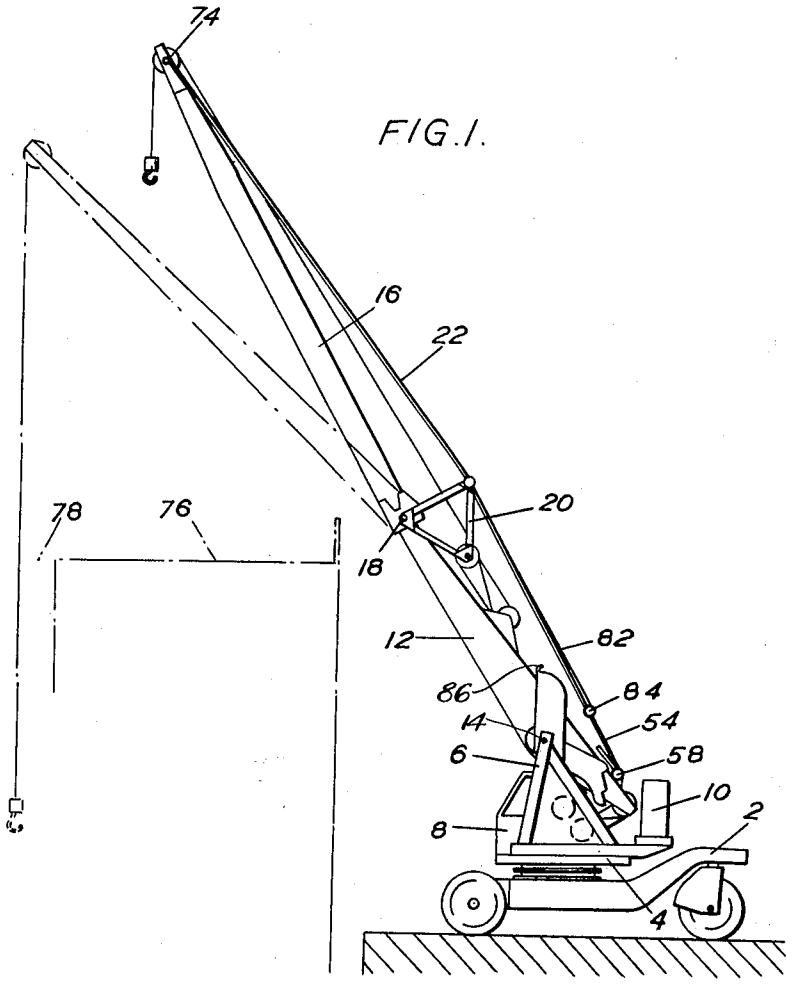
Nov. 1, 1955 A. S. STOKES 2,722,319

CRANE

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FIG. 1.



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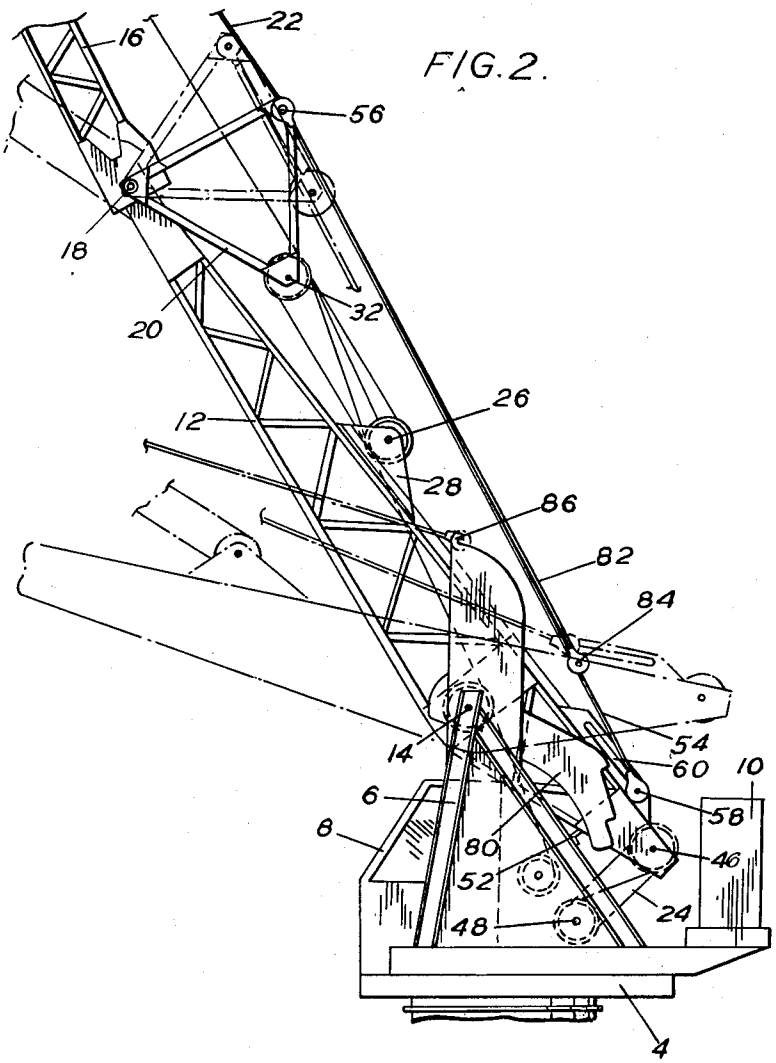
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FIG. 2.



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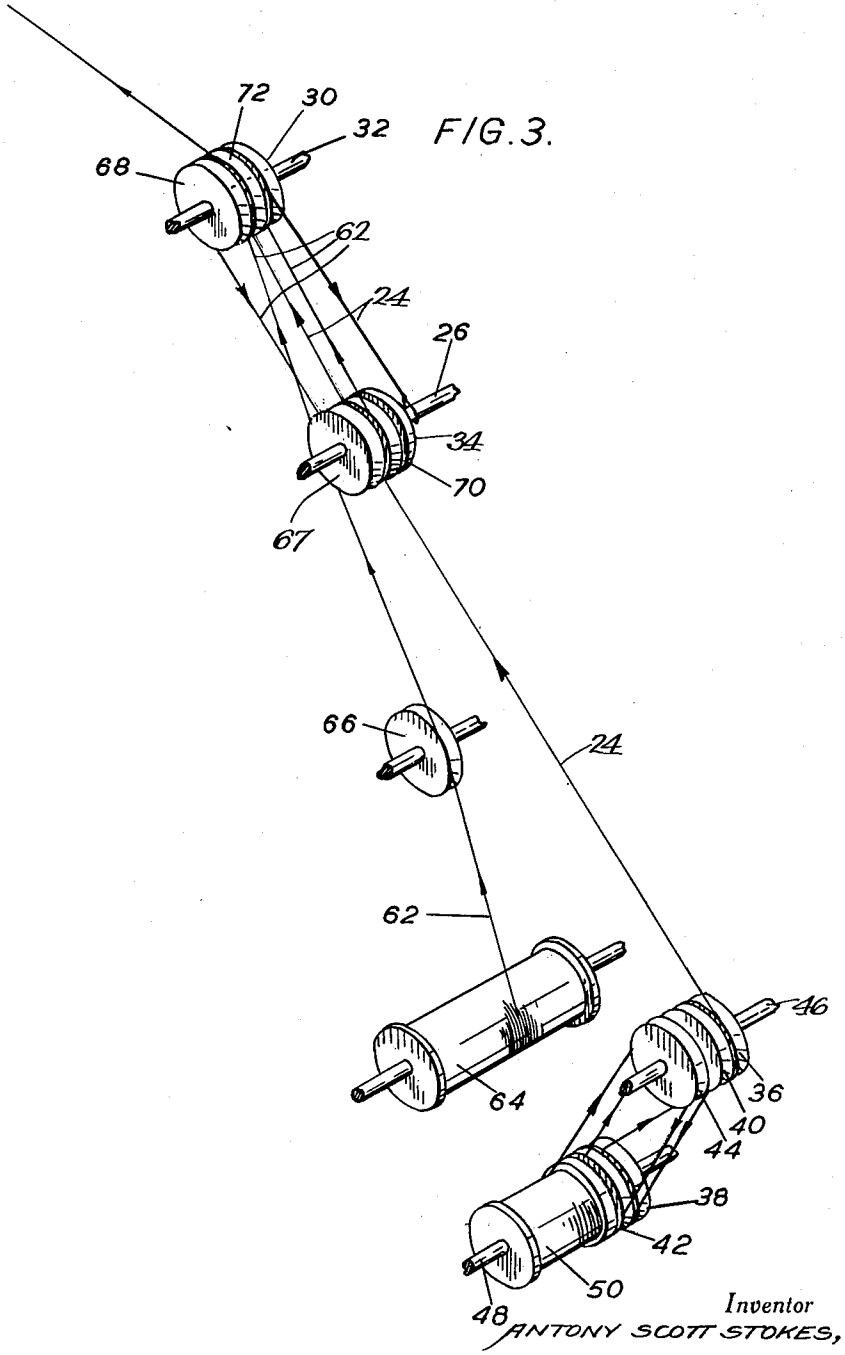


FIG. 3.

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FIG. 4.

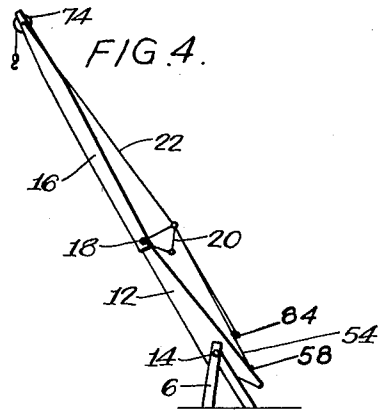


FIG. 5.

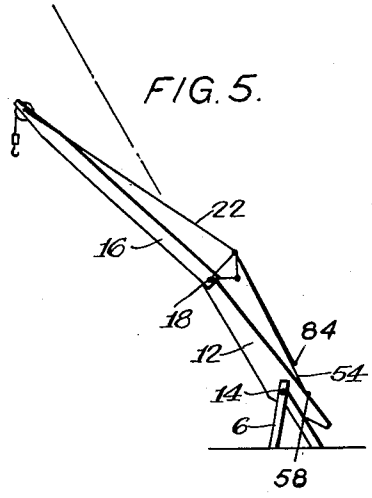


FIG. 6.

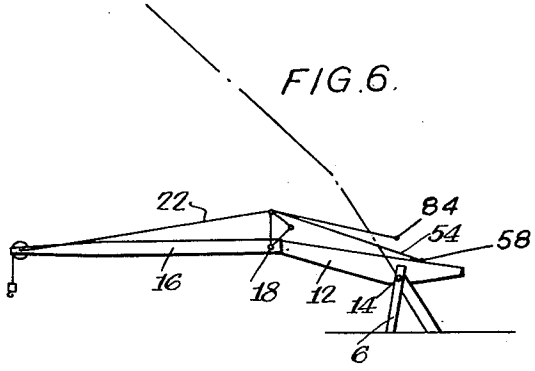


FIG. 7.

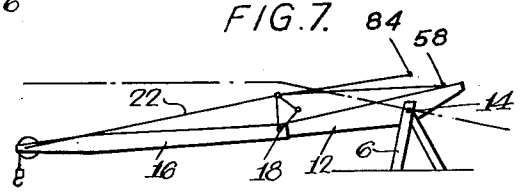
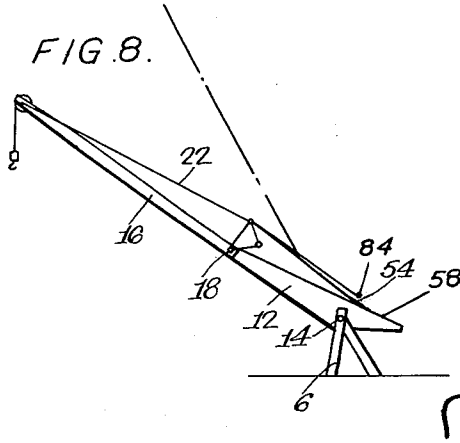


FIG. 8.



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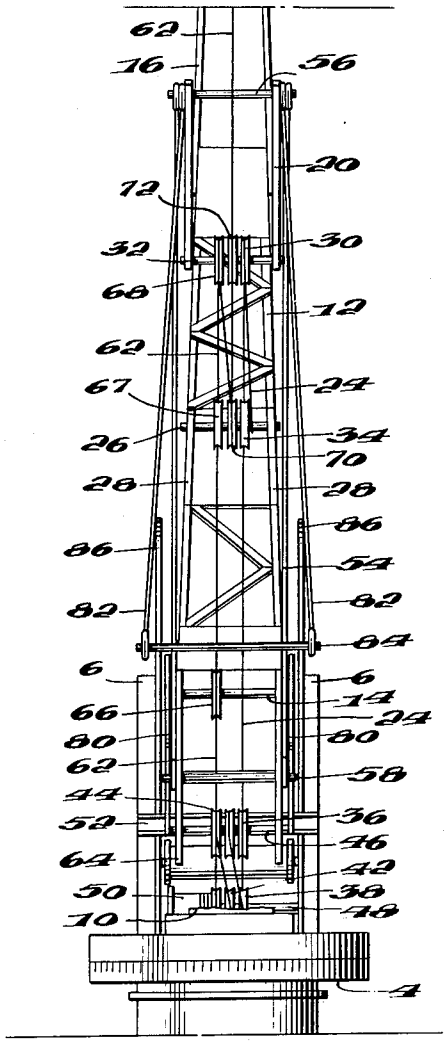
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Fig. 9.



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2,722,319

CRANE

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Application September 19, 1950, Serial No. 185,565

4 Claims. (Cl. 212—8)

Cranes used for unloading ships at a dockside have often to operate under cramped conditions and satisfy exacting requirements. Preferably they should be able to raise a load from the further side of a hold and lower it either as close as possible to the foot of the crane or at the greatest possible distance from it in various directions. At the same time the jib must clear obstructions such as the rigging and near rail of a ship. Such cranes are sometimes carried on a high gantry which runs on rails, but these are bulky, heavy and therefore more expensive to build than cranes with a jib mounted on a comparatively low and narrow base. The outwards derricking of a jib on a low base, however, is limited by obstructions such as the near rail of the ship and a good outreach can only be obtained with a jib that is either inconveniently long or is bent. A long-reaching jib is relatively heavy, slow in operation and difficult to keep clear of rigging, as also is a permanently bent jib, which becomes undesirably twisted when being slewed, and neither can be derricked in as much as is desirable to allow a load to be dropped close to the base of the crane.

It is an object of the present invention to provide a crane with a jib which can be mounted on a low base and yet manoeuvred clear of obstructions.

It is a further object to provide a crane having a jib in two parts movable by a single winding motor.

Further objects and advantages of the present invention will appear from the following description of one embodiment, reference being made to the accompanying drawings in which:

Figure 1 is a side elevation of the crane;

Figure 2 is an enlarged view of the lower part of Figure 1;

Figure 3 is a diagram illustrating the threading of the hoisting and derricking ropes;

Figures 4 to 8 are diagrams illustrating the operation of the crane; and

Fig. 9 is a rear elevational view of the lower portion of the crane.

Essentially the crane comprises a main jib pivoted to a base, an extension pivoted to the head of the main jib, and derricking mechanism controlling both the main jib and the extension and so arranged that in derricking out the extension turns through a greater angle towards the horizontal than does the main jib.

The crane consists of a wheeled chassis **2** on which is mounted a turn-table **4** carrying A-frames **6**, a cab **8** and a counterweight **10**. The main jib **12** of the crane is pivoted to the frames **6** about an axis **14** and at its upper end carries an extension **16** pivoted to the head of the main jib at **18**. A triangular frame **20** forming the heel of the extension is also pivoted at **18** and is joined to the head of the extension by ties **22**.

Derricking of the crane is controlled by a rope **24** which is at one end anchored to a shaft **26** carried in brackets **28** on the main jib. This rope passes round a pulley **30** on a shaft **32** carried by the frame **20**, then round a guide pulley **34** on the shaft **26** and thence in

succession round pulleys **36**, **38**, **40**, **42** and **44** carried by a shaft **46** at the heel of the main jib and by a shaft **48** at the rear of the cab **8**. Finally, the rope **24** is wound on a barrel **50** on the shaft **48**. When the rope **24** is wound onto the barrel **50** it tends to raise both the main jib **12** and the extension **16**. The weights of the main jib and the extension, and the numbers of parts of the rope **24** acting on their heels are such that the main jib is raised in preference to the extension. Upward movement of the main jib **12** is limited by engagement of its heel with a cross-bar **52**. After the jib has engaged this cross-bar further winding of the rope **24** onto the barrel **50** raises the extension **16** to its uppermost position which in the example is directly in line with the main jib. This position is illustrated by Figure 4.

When, starting from this uppermost position the rope **24** is unwound from the barrel **50**, the main jib **12** remains stationary while the extension **16** turns towards the horizontal and the crane reaches a position shown in Figure 5. Rotation of the extension relative to the main jib is limited by ties **54** which are pivoted to the frame **20** at **56**, and at their lower ends are linked by a cross-bar **58** sliding in slots **60** on the main jib **12**. After the cross-bar **58** has reached the upper end of the slots further unwinding of the rope **24** allows the main jib and extension to turn together towards the horizontal until they reach a position shown in Figure 6. It will be seen that the sequence of movements of the main jib and extension is under the single control of the rope **24** and thus only a single barrel and driving motor are necessary to raise and lower both the main jib and the extension.

The ratio of the forces required on the heels of the extension and the main jib to support them varies according to the load which the crane is carrying. To compensate for this, a hoisting rope **62**, which is wound on a barrel **64**, after passing over a guide pulley **66**, is led round a pulley **68** on the shaft **32**, a pulley **70** on the shaft **26** and a further pulley **72** on the shaft **32** before passing over a pulley **74** at the head of the extension **16**. The tension in the rope **62** thus contributes to the force on the heel of the extension **16** to an extent dependent on the load supported.

The value of the movement of the extension **16** relative to the main jib **12** between the position shown in Figures 4 and 5 is illustrated in Figure 1, where the outline **76** represents the near side of a ship having a hatch opening **78**. A straight jib which would both clear the rail of the ship and lower a load into the hold would have to be considerably longer than the combined lengths of the extension and main jib of the crane shown. The present crane is not however confined to this use, and provision is made, if desired, for restricting or preventing relative movement of the extension and the main jib **12** by means of a catch **80** which can be swung about the axis **14** so as to obstruct partially or completely movement of the cross-bar **58** in the slot **60**. The crane can then move from the position shown in Figure 4 to that shown in Figure 8. This may be of value in clearing overhead obstructions.

The extension **16** is also fitted with a second set of ties **82** pivoted at **56** and joined by a cross-bar **84**. This bar **84** usually rests on the ties **54**, but if the main jib is lowered below the position shown in Figure 6, the bar **84** engages an upstanding abutment **86** fixed to the frame **6**. The effect of this is to stop further rotation of the extension **16** relative to the horizontal so that the lowermost position reached by the crane is that shown in Figure 7 in which the extension has reverted to a position in line with the main jib. This enables the head of the extension to enter the doors of warehouses and the like.

I claim:

1. In a crane, in combination, a base, a main jib pivoted to said base, an extension pivoted to the head of said main

jib, a tie having one end pivoted to said extension and the other end mounted for limited sliding movement relative to said main jib, and derricking mechanism connected to said main jib and extension to permit pivotal movement of said jib and extension in a derricking-out direction whereby in derricking-out said extension rotates towards the horizontal through an angle greater than that through which the main jib rotates by an amount determined by the extent of said sliding movement.

2. In a crane, in combination, a base, a main jib pivoted to said base, an extension pivoted to the head of said main jib, a tie having one end pivoted to said extension and the other end connected for limiting sliding movement relative to said main jib, pulleys on said extension, said main jib and said base and a single derricking rope passing round said pulleys and means controlling the movement of said rope to determine the position of both said main jib and said extension.

3. In a crane, in combination, a base, a main jib pivoted to said base, an extension pivoted to the head of said main jib, a tie having one end pivoted to said extension and the other end connected for limited sliding movement relative to said main jib, means for selectively varying the extent of said sliding movement, and derricking mechanism connected to said main jib and extension to permit pivotal movement of said jib and extension in a derricking-out direction whereby in derricking-out said extension rotates towards the horizontal through an angle greater than that through which the main jib rotates by an amount determined by the extent of said sliding movement.

4. In a crane, in combination, a base, a main jib pivoted to said base, an extension pivoted to the head of said main jib, slidable means interconnecting said main jib and said extension for limiting relative movement of said extension with respect to said main jib, pulleys on said extension, said main jib and said base and a single derricking rope passing round said pulleys and means controlling the movement of said rope to determine the position of both said main jib and said extension.

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