Jan. 30, 1923.

1,443,376

J. C. MORGAN ET AL.
CRANE.
FILED MAY 8, 1920.

2 SHEETS-SHEET 1

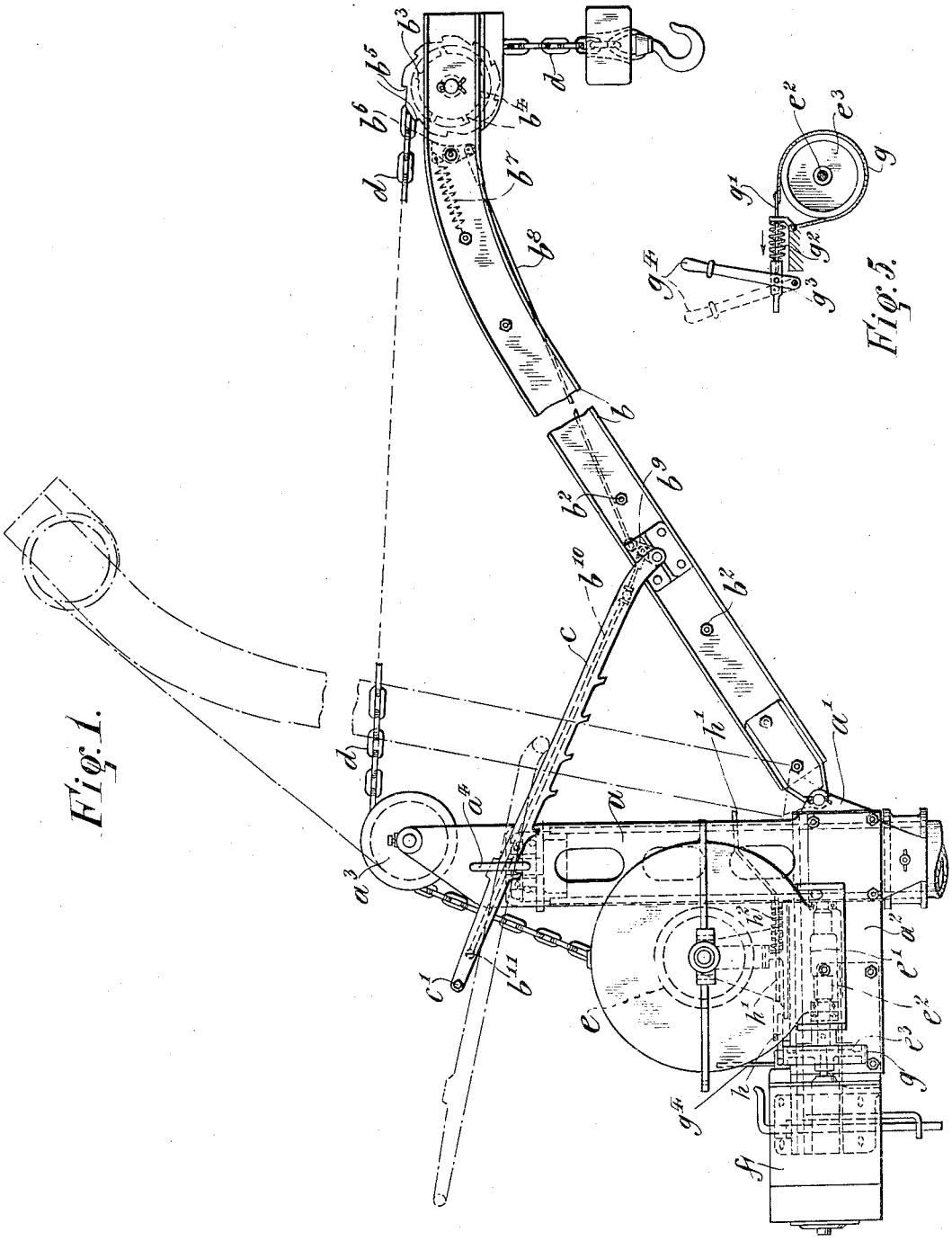


Fig. 1.

Fig. 3.

INVENTORS
James C. Morgan
and Charles S. Schroeder
BY
Redding & Greeley
ATTORNEYS

Jan. 30, 1923.

1,443,376

J. C. MORGAN ET AL.
CRANE.
FILED MAY 8, 1920.

2 SHEETS-SHEET 2

Fig. 2.

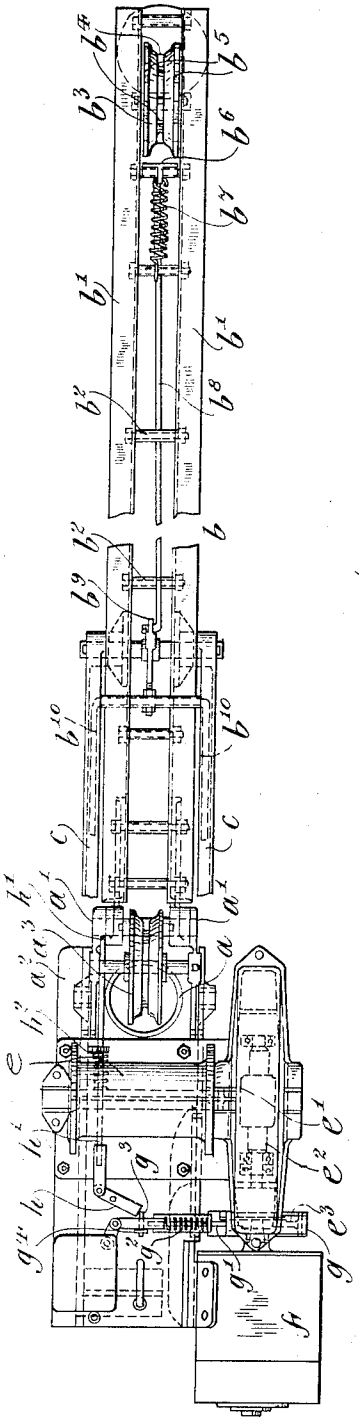


Fig. 4.

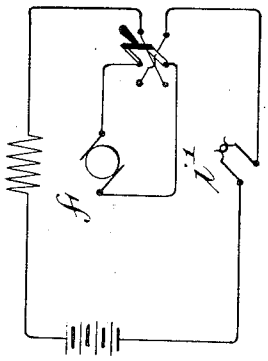
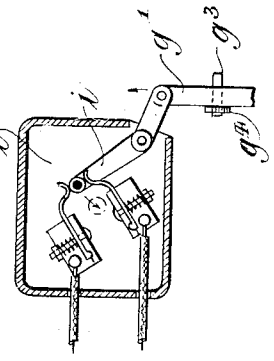


Fig. 3.



INVENTORS
James C. Morgan
and Charles S. Schroeder
BY
Redding & Greeley
ATTORNEYS

Patented Jan. 30, 1923. 1,443,376

UNITED STATES PATENT OFFICE.

JAMES C. MORGAN AND CHARLES S. SCHROEDER, OF NEW YORK, N. Y., ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE YALE & TOWNE MANUFACTURING COMPANY, OF STAMFORD, CONNECTICUT, A CORPORATION OF CONNECTICUT.

CRANE.

Application filed May 8, 1920. Serial No. 379,777.

To all whom it may concern:

Be it known that we, JAMES C. MORGAN and CHARLES S. SCHROEDER, citizens of the United States, residing in New Brighton, borough of Richmond, city of New York, in the State of New York, have invented certain new and useful Improvements in Cranes, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention has been developed with particular reference to its application to portable cranes in which hoisting mechanism is mounted on a movable platform or truck so that the crane with its load can be moved from place to place, but as the invention is concerned only with the hoisting mechanism it is capable of application to stationary cranes as well as to portable cranes. It is particularly adapted, however, to cranes which are intended for the handling of loads which are not excessively heavy and do not require to be hoisted or swung through great distances, so that the mast does not need to be guyed, and a single rope or cable or chain, led from the load to the hoisting drum, can be used both for the hoisting of the load and the raising of the boom. One object of the invention is to improve the means whereby, in such a crane, the single hoisting rope or chain can be made to engage the boom for the purpose of raising it. Another object is to provide improved means for retaining the boom in its raised position. Still another object is to provide means whereby the circuit of the motor by which the hoisting drum is driven is interrupted and a brake applied automatically when the boom approaches the upward limit of its movement, so that the danger of breakage through the continued operation of the motor is avoided. The invention will be more fully explained hereinafter with reference to the accompanying drawings in which it is illustrated and in which—

Figure 1 is a view of the improved crane in side elevation.

Figure 2 is a top view of the same.

Figure 3 is a detail view of the cut-out switch for the motor.

Figure 4 is a diagrammatic view of the electric circuit of the motor.

Figure 5 is a detail view of the brake.

The mast a of the crane is suitably supported for rotation upon the movable or stationary platform, not necessary to be shown. At its lower end, at one side, it is provided with lugs a' on which the boom is pivoted and at the other side it receives the platform a^2 on which the motor and the hoisting drum are supported, which thus act as a counter-balance for the boom. At its upper end the mast receives the guide sheave a^3 over which the hoisting chain is guided and also near its upper end it receives one member a^4 of the boom holding device.

The boom b, shown as constructed of two channel irons b', with suitable spacing bars b^2, has mounted in its outer end a sprocket chain wheel b^3, provided with teeth as at b^4, so that the chain cannot slip on the wheel, and provided also with pawl teeth b^5 for engagement with a pawl b^6 which is pivoted between the members b' of the boom and is held normally by a spring b^7 out of engagement with the chain wheel b^3. Toothed detent bars c, pivotally connected to the boom b at some distance from its own pivot at a', pass through the detent members a^4 near the upper end of the mast, so as to hold the boom in raised position, and receive between them, at their upper ends, a transverse handle c'. The pawl b^6 is connected by suitable linkage, including a rod b^8, and a bell-crank lever b^9, with a double rod or stirrup b^{10} which is provided with a cross rod or handle b^{11} in convenient proximity to the cross rod or handle c' of the holding bar c, so that the operator may grasp both cross rods in one hand and so draw the pawl b^6 into engagement with the pawl teeth b^5 of the chain wheel b^3, to hold the wheel against rotation, so that whenever it is desired to raise the boom the movement of the chain d with respect to the boom shall be prevented and by the continued operation of the hoisting drum e the boom will be raised, its descent being prevented automatically by the engagemnet of the toothed detent bar c with the detent member a^4 on the mast. If at any time it is desired to lower the load without lowering the boom the operator, by the described devices, can disengage the pawl b^6 from the toothed sheave b^3 and release or reverse the drum.

Because of the momentum of the boom

and load and the tendency of the motor to coast after the current has been interrupted it is desirable to provide means whereby, as the boom approaches the limit of its upward movement, the current of the motor shall be interrupted and a brake applied automatically, so that the danger of breakage shall be avoided even if the operator is inattentive. The drum e is driven through a worm gearing, indicated generally by the dotted lines at e' in Figures 1 and 2, from the tangential shaft e^2 of the motor f. A brake wheel e^3 on the motor shaft is encircled by a brake band g, of usual arrangement, one end of which is connected in the usual manner to a brake rod g', adapted to be actuated by a spring g^2 to apply the brake when the rod is released. The rod is provided with a stop pin g^3 normally engaged by a latch h connected to a rod h' which is acted upon by a spring h^2 to hold the latch h normally in engagement with the pin g^3. The rod h' is carried forward beside the mast and projects beyond the same, as shown clearly in Figure 1, to such an extent that after the boom approaches the limit of its upward movement it strikes the end of the rod and thrusts it backward, thereby removing the latch h from the path of the pin g^3 and permitting the brake to be applied by the spring g^2. At the same time the current to the motor is interrupted. For this purpose the rod g' is extended and connected to the movable switch arm i of a cut-out switch i' of usual construction, interposed in the circuit of the motor as shown in Figure 4. As the brake rod g' is released to permit the brake to be applied, the switch arm i is moved to interrupt the circuit of the motor. By such means the motor is brought to a stop before the boom has been moved to such a point as to create danger of breakage.

When the boom and the load have been swung to the desired position and the load is to be placed, the motor is first started ahead a little in order to raise the boom and the load so as to permit the operator to disengage readily the detent bars c from the holding device a^4. It is assumed that the pawl b^6 is already engaged with the pawl teeth b^5 of the chain wheel b^3, but if this is not the case the operator first brings about such engagement by grasping the cross rods b^{11} and c', so that the boom shall be raised slightly. Then the motor, which has been stopped, is reversed and the boom is lowered to the position desired. Finally the pawl b^6 is disengaged from the teeth b^5 and, the backing-off continuing, the chain is paid out and the load is lowered away to the position of rest.

It will be understood that the brake rod g' is provided with a brake lever g^4 so that the spring g^2 can be compressed to release the brake g when desired.

It will be understood that various changes in details of construction and arrangement can be made to suit different conditions of use or the convenience of the manufacturer and that the invention is not restricted to the precise construction shown and described herein except as pointed out in the claims.

We claim as our invention:

1. In a crane, the combination of a mast, a boom, a guide sheave on the mast, a chain sprocket wheel on the boom, a hoisting chain passing over the sheave and the chain sprocket wheel, and means to prevent the rotation of the chain sprocket wheel with the chain whereby the boom is raised by the same.

2. In a crane, the combination of a mast, a boom, a guide sheave on the mast, a chain sprocket wheel on the boom, a hoisting chain passing over the sheave and the chain sprocket wheel, and a pawl under the control of the operator and adapted to be engaged with the chain sprocket wheel to prevent rotation thereof with the chain whereby the boom is raised by the continued movement of the chain.

3. In a crane, the combination of a mast, a boom, a detent member on the mast, a toothed and handled bar connected to the boom and adapted to engage the detent member on the mast, a guide sheave on the mast, a toothed sprocket chain wheel on the boom, a pawl carried by the boom and adapted to engage the sprocket chain wheel to prevent rotation thereof with the chain, and a handle supported by the toothed detent bar and operatively connected with the pawl.

4. In a crane, the combination of a hoisting drum, a boom, a connection from the hoisting drum to the boom, a brake in operative relation with the hoisting drum and devices actuated by the movement of the boom to permit the automatic application of the brake as the boom approaches its upright position.

5. In a crane, the combination of a hoisting drum, a boom, a connection from the hoisting drum to the boom, a spring actuated brake in operative relation with the hoisting drum, a latch to hold the brake in inoperative position, and devices actuated by the movement of the boom to disengage the latch and permit the application of the brake.

6. In a crane, the combination of a hoisting drum, a boom, a connection from the hoisting drum to the boom, a spring actuated brake in operative relation with the hoisting drum, a latch to hold the brake in inoperative position, and a rod connected to the latch and extended into the path of movement of the boom.

7. In a crane, the combination of a hoisting drum, a boom, a connection from the

hoisting drum to the boom, an electric motor in operative relation with the drum, a cut-out switch for the motor, and devices actuated by the movement of the boom to open the cut-out switch and interrupt the current to the motor.

8. In a crane, the combination of a hoisting drum, a boom, a connection from the hoisting drum to the boom, an electric motor in operative relation with the drum, a cut-out switch for the motor, a spring actuated device to open the cut-out switch, a latch to hold said device in inoperative position and means actuated by the movement of the boom to disengage the latch.

9. In a crane, the combination of a hoisting drum, a boom, a connection from the hoisting drum to the boom, an electric motor in operative relation with the drum, a cut-out switch, a latch to hold said device in inoperative position and a rod connected to the latch and extended into the path of movement of the boom.

10. In a crane, a boom and a support therefor, a flexible hoist member led over the boom, a winding drum for said flexible hoist member, means including the flexible hoist member whereby the boom may be elevated by said drum independently of the position of the load, and means acting automatically to lock the boom in any position to which it may be elevated to permit the lowering of the flexible hoist member.

11. In a crane, a boom and a support therefor, a hoist chain led over the boom, a hoisting drum for said chain, a sprocket carried by the boom and engaged by the chain, and means for locking said sprocket against rotation at the will of the operator.

12. In a crane, a boom and a support therefor, a flexible hoist member led over the boom, a hoisting drum, means including the flexible hoist member whereby the boom may be elevated by said drum, means acting automatically to lock the boom in any position to which it may be elevated, comprising a ratchet member carried by the boom and a member mounted on said support, and having guide surfaces for said ratchet member and also carrying a locking member for interengagement with said ratchet member.

13. In a crane, a boom and a support therefor, a flexible hoist member led over the boom, a hoisting drum, means including the flexible hoist member whereby the boom may be elevated by said drum, means acting automatically to lock the boom in any position to which it may be elevated, comprising a ratchet bar pivotally connected with the boom and a locking member mounted on said support for interengagement with said ratchet bar.

This specification signed this 7th day of May, A. D. 1920.

JAMES C. MORGAN.
CHARLES S. SCHROEDER.