H. L. ALLEN.

BUCKET OPERATING MECHANISM.

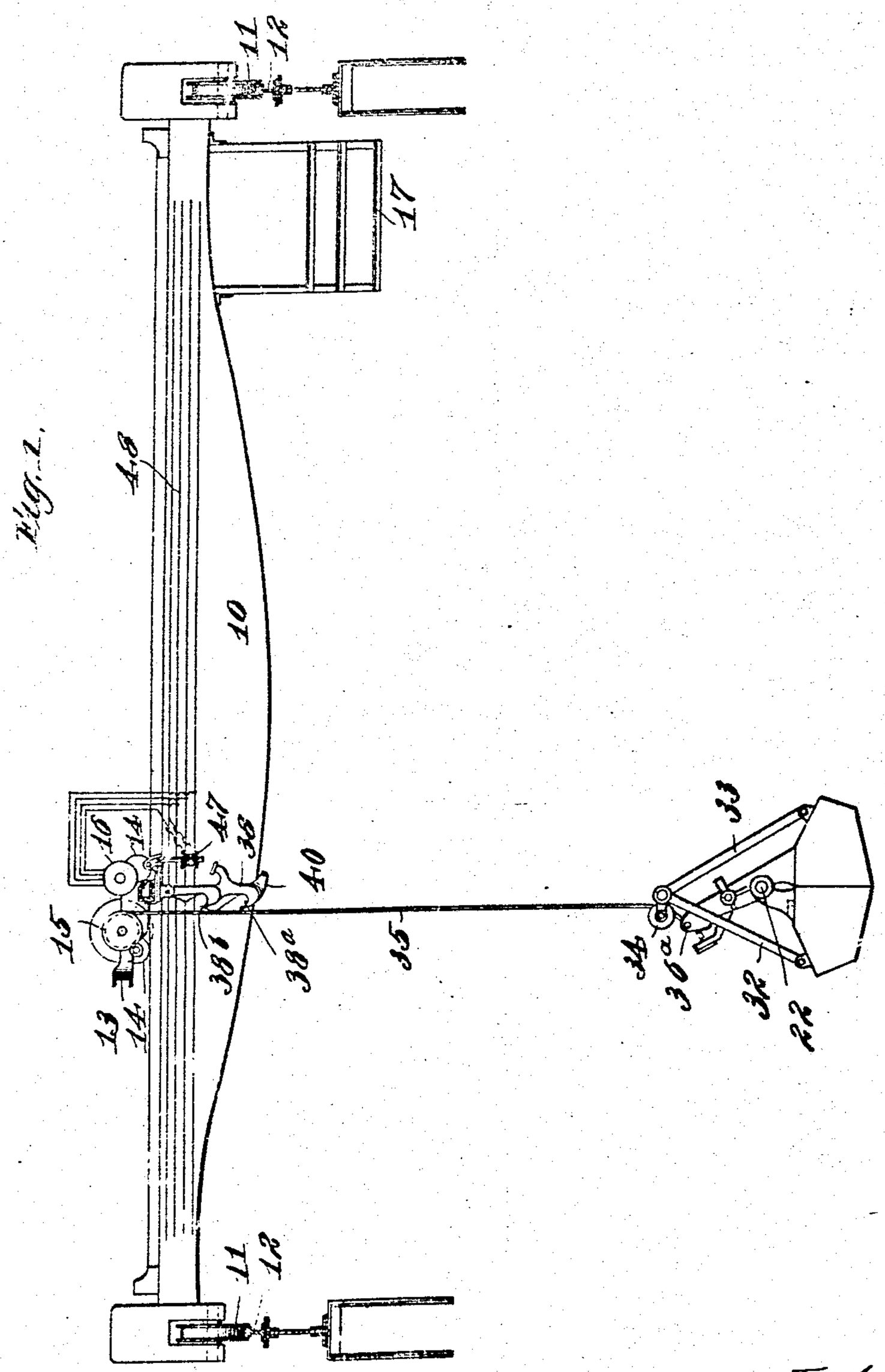
APPLICATION FILED JUNE 17, 1908.

924,719.

Patented June 15, 1909.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig. 2.

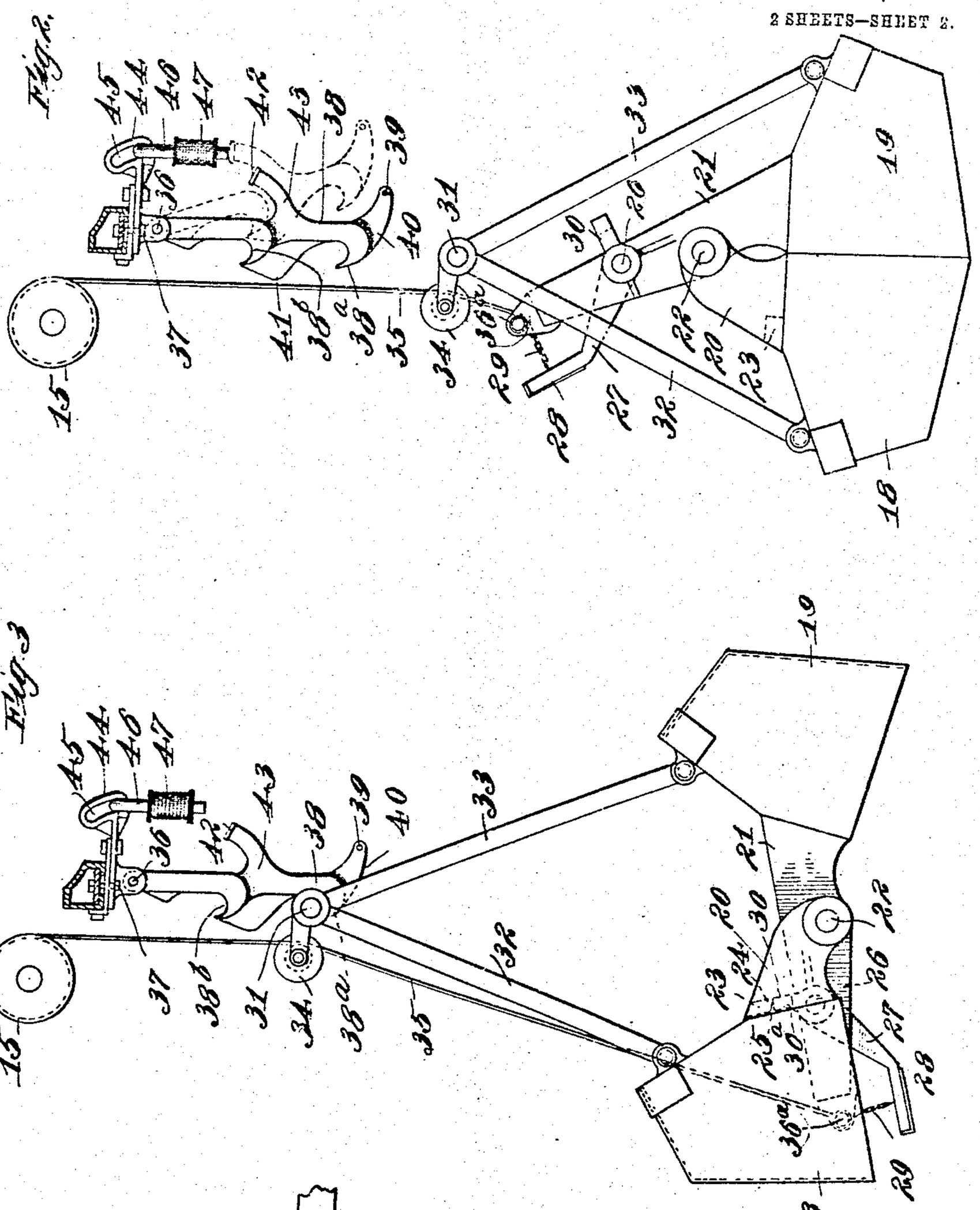
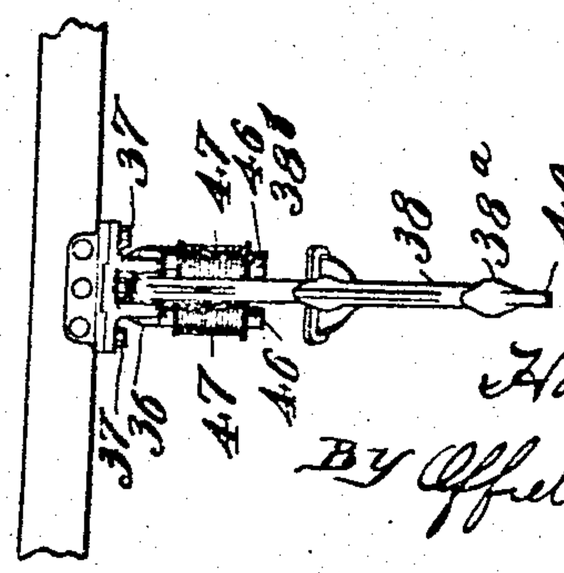


Fig. 3

Fig. 4.



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UNITED STATES PATENT OFFICE.

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BUCKET-OPERATING MECHANISM.

No. 924,719. Specification of Letters Patent. Patented June 15, 1909.

Application filed June 17, 1908. Serial No. 439,078.

To all whom it may concern:

Be it known that I, HARRY L. ALLEN, a citizen of the United States, residing at Alliance, in the county of Stark and State of Ohio, have invented certain new and useful Improvements in Bucket-Operating Mechanisms, of which the following is a specification.

My invention pertains to improvements in the operating means used in connection with buckets, such as those of the grab-bucket type, its main and leading object and purpose being to make such mechanism to a certain extent automatic in its operation. In other words, by the employment of means embodying my invention, the operator of an electric crane can easily and readily govern and regulate the movements of the bucket adapted to be raised and lowered by the usual rotary drum and cable, and also control the opening and closing of the bucket; that is, regulate its dumping and filling merely by controlling the actuation of the motor driving the hoisting drum.

Briefly stated, my invention includes the employment of a supporting hook, used during the dumping or discharging operation to support the bucket, which is automatically displaced or pushed out of operative position by the bucket itself or some part associated with it when not wanted so as to permit descent of the bucket for another load, electromagnetic means in circuit with the hoisting drum motor being provided for temporarily maintaining the hook displaced. As soon, however, as the current in the motor ceases flowing, as during the interval when it is reversed to again hoist the bucket, the electromagnetic means becomes inoperative to retain the hook displaced, and it returns to normal operative position due to its own gravity.

On the accompanying drawings, forming a part of this specification, I have illustrated in detail a desirable embodiment of this invention.

On the drawings,—Figure 1 is a side elevation of an electric traveling crane equipped with my improved bucket operating and controlling means; Fig. 2 illustrates in elevation and partly in section my improved construction for actuating the bucket, the latter being indicated closed; Fig. 3 is a similar view illustrating the method of discharging the load of the bucket; and Fig. 4 is an edge view of the hook used to support the bucket.

The traveling bridge or girder 10 of the crane has rollers or wheels 11 at its opposite ends which are adapted to roll or travel on suitably-supported rails 12, as is usual and customary in constructions of this character. Reciprocatory on the top of the bridge or girder 10 I provide the usual carriage or truck 13 provided with supporting wheels 14, a rotary hoisting drum 15, and a drum driving electric motor 16, the operation of which is governed by an operator in the car or platform 17 at one end of the bridge or girder.

The bucket proper has two sheet-metal spades or scoops 18 and 19, the former of which is supplied with a pair of spaced arms 20, the latter having similar arms 21, the two pairs of arms being hinged or pivoted together on a common rod or shaft 22. Each of the two arms or projections 20 has on its inner surface a lug 23 having a side face 24 and a bottom face 25, shown most clearly in dotted lines in Fig. 3. Pivoted on a pin 26 supported by the spaced arms 21, I employ a locking lever 27 having at its outer end a steel-shod foot 28 connected to the ends of the arms 21 by one or more chains 29 which limit swinging or turning of the locking lever 27 in one direction. This lever on the opposite side of its fulcrum has an end or block 30 adapted to coöperate with the lugs 23 to maintain the spades or shovels of the bucket in the open position indicated in Fig. 3. Each spade or shovel 18 and 19 is connected to a bucket-supporting rod or shaft 31 by means of a pair of links 32 and 33, one or more sheaves 34 being provided adjacent to the bucket-supporting shaft or rod 31 for the guidance of one or more cables 35 adapted to coöperate with the hoisting drum 15, and connected at their lower ends at 36^a to the arms 21 or a suitable cross-rod.

Hinged at 36 on a bracket 37 mounted in any suitable manner on the truck or carriage 13, I provide a hook 38 having a downwardly-extended tail 39 and a bottom inclined or beveled surface 40 normally in the upward path of travel of the supporting rod or shaft 31 of the bucket. Above the supporting portion or projection 38^a of the hook 38 the latter is supplied with a cam or inclined surface 41, and opposite this cam portion it is supplied with an armature 42 on the end of an outwardly-extended arm 43. The bracket 37 is supplied with a magnet-supporting portion 44 having a curved slot 45

through which passes the core 46 of a horse-shoe electro-magnet, the spools or coils of which are characterized 47.

On Fig. 1 I have illustrated conventionally the wiring or circuits of the armature and field of the hoisting drum driving motor 16, and have clearly indicated that the wiring or coils of the magnet spool 47 are in series connection with the field circuit of the motor. It will be readily understood that the beam or girder 10 is provided with a plurality of electrically-conducting contact strips 48 on which slide a plurality of contact brushes, not shown in detail, these electrical features and connections being well understood in the art. It is merely sufficient to state that the coils of the magnet are in the circuit of the motor, whereby when the motor is running the magnet 47 is energized, and when the motor is still the magnet is deënergized.

The operation of the structure herein shown and described is substantially as follows: Assuming that the hoisting drum 15 is paying out the cable or cables 35, causing the lowering of the bucket in locked open condition, as indicated in Fig. 3, the shoe or foot 28 of the tripping or locking lever 27 in this condition of the parts forming the lowermost member of the bucket, it is apparent that when the shoe or foot 28 strikes the sand or other material to be raised, the lever 27 will be turned on its fulcrum 26 sufficiently to free the tooth or projection 30 from the underside of the lugs 23, thereby unlocking the hinged jaws or scoops of the bucket. If the rotation of the drum 15 is now reversed so as to wind up the cable or cables 35, the bucket will be raised, and during this initial movement of the parts the bucket will close to the condition indicated in Fig. 2, at the same time scooping or grabbing up a load of the sand or other material on which it has temporarily rested or come in contact. As the bucket continues its upward travel the supporting bar 31 will engage the beveled or inclined surface 40 of the hook 38, swinging the hook laterally on its pivotal support 36 so that the bar or rod 31 passes by the outwardly-extended finger 38^a thereof, whereupon the hook, due to its own gravity, swings back to vertical position beneath the rod or pin 31. The cable or cables 35 are now paid out from the drum 15 so that the bar 31 engages the hook and is supported thereby, further paying out of the cable or cables causing the opening up of the bucket, as is indicated in Fig. 3, and a consequent discharge or dumping of its load. As the parts of the bucket approach their open position, the face 30^a of the finger or lug 30 first strikes the side face 24 of the bar 23, afterward passing therefrom so that the projection 30 comes under the lugs 23, as is indicated in Fig. 3, thereby locking the bucket in open-most position.

In order to free the bucket and its supporting members from the hook 38 so that they may be permitted to descend for a new load, the operator controls the motor of the drum so as to wind up the cable or cables 35 and raise the rod 31 and the bucket. During this upward movement of the rod or shaft 31 it engages the bevel or cam edge of the portion 41 of the hook, forcing the hook to one side sufficiently to bring the armature 42 into the field of action of the core 46 of magnet 47, the armature being attracted to and held in contact with the pole faces of the core, as will be readily understood. The magnet at this time, is energized because current is flowing through the motor driving the drum. While the hook is thus held displaced or thrust to one side by the coöperating rod 31 and the cam or bevel edge, the current of the motor is reversed to lower the bucket, and, owing to the continued displacement of the hook by the magnet, the current being on during the descent of the bucket, the rod 31 escapes the hook in its downward travel. When the bucket reaches the material of which it is to scrape or scoop up a load, and the motor is reversed to elevate or hoist the bucket, the operator, through the controller, allows a sufficient interval of time during which no current flows to the motor and magnet to deënergize the latter and permit the hook to swing back to normal vertical operative position, as shown in Fig. 2, ready to again engage the pin or rod 31.

The loose connection between the core 46 of the magnet and its supporting element 44 is provided so that the hook and bucket may swing without injury to any of the parts. I have shown the hook 38 supplied with an upper supplemental hook 38^b, which may be also used for suspending the bucket, if desired. It is, of course, to be understood that after the lifting of a load in the bucket the latter may be carried or transported by the crane to any desired spot before the load is discharged.

Although I have set forth in detail my improved construction, and its operation, I desire to have it understood that the invention is not restricted and limited to the exact structures shown and described, the structural features of which may be modified to a considerable extent without departure from the substance of my invention.

I claim:

1. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, a suitably-supported hook normally in the path of travel of said bucket-supporting means and adapted to suspend said bucket by engagement with said bucket-supporting means, electro-magnetic means to maintain said hook inoperative upon said bucket-support-

ing means, and means to cause said electro-magnetic means to become operative upon said hook, substantially as described.

2. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, a suitably-supported hook normally in the path of travel of said bucket-supporting means and adapted to suspend said bucket by engagement with said bucket-supporting means, electro-magnetic means to maintain said hook inoperative upon said bucket-supporting means, and means actuated during movement of said bucket to cause said electro-magnetic means to become operative upon said hook, substantially as described.

3. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, an electric motor to drive said latter means, a suitably-supported hook normally in the path of travel of said bucket-supporting means, electro-magnetic means in the circuit of said motor and adapted to maintain said hook inoperative upon said bucket-supporting means, and means to cause said electro-magnetic means to become operative upon said hook, substantially as described.

4. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, a suitably-supported hook normally in the path of travel of said bucket-supporting means and adapted to sustain said bucket by engagement with said bucket-supporting means, a suitably-supported magnet, an armature connected to said hook, means acting during the raising of said bucket-supporting means to displace the hook sufficiently whereby its armature is brought into the field of influence of said magnet and the hook is maintained inoperative upon and out of the path of travel of said bucket-supporting means as long as said magnet is energized, substantially as described.

5. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, an electric motor to operate said latter means, a suitably-supported hook normally in the path of travel of said bucket-supporting means and adapted to sustain said bucket by engagement with said bucket-supporting means, a suitably-supported magnet in the circuit of said electric motor, and an armature connected to said hook, means acting during the raising of said bucket-supporting means to displace the hook sufficiently whereby its armature is brought into the field of influence of said magnet and the hook is maintained inoperative upon and out of the path of travel of said bucket-supporting means as long as said armature is energized, substantially as described.

6. The combination of a bucket, means by which said bucket may be supported, means to hoist and lower said bucket, an electric motor to drive said latter means, a suitably-supported hook normally in the path of travel of said bucket-supporting means and adapted to sustain said bucket by engagement with said bucket-supporting means, a suitably-supported electro-magnet in the circuit of said electric motor, an armature for said magnet on said hook, and a cam or beveled surface on said hook with which said bucket-supporting means is adapted to cooperate to displace the hook sufficiently during the raising of said bucket-supporting means whereby said armature is brought into the field of influence of said magnet and the hook is maintained inoperative upon and out of the path of travel of said bucket-supporting means as long as said magnet is energized, substantially as described.

7. The combination of a bucket, means by which said bucket may be supported, a hoisting and lowering drum, a cable connected to said bucket and coöperating with said drum, an electric motor to drive said drum, a pivoted hook normally in the path of travel of said bucket-supporting means and adapted to sustain said bucket by engagement with said bucket-supporting means, said hook having a beveled surface with which said bucket-supporting means coöperates to shift the hook to permit the bucket-supporting means to pass by the same, a suitably-supported electric magnet in circuit with said electric motor, an armature for said magnet connected to said hook, and a cam or beveled surface on said hook with which said bucket-supporting means coöperates to displace the hook sufficiently during the raising of said bucket-supporting means whereby the armature is brought into the field of influence of said magnet and the hook is maintained inoperative upon and out of the path of travel of the bucket-supporting means as long as said magnet is energized.

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