(No Model.) 3 Sheets—Sheet 1.

J. A. ESSBERGER & A. W. GEYER.

ELECTRICAL APPARATUS FOR CONTROLLING MOTION OF CRANES, &c.

No. 561,777. Patented June 9, 1896.

Fig. 1.

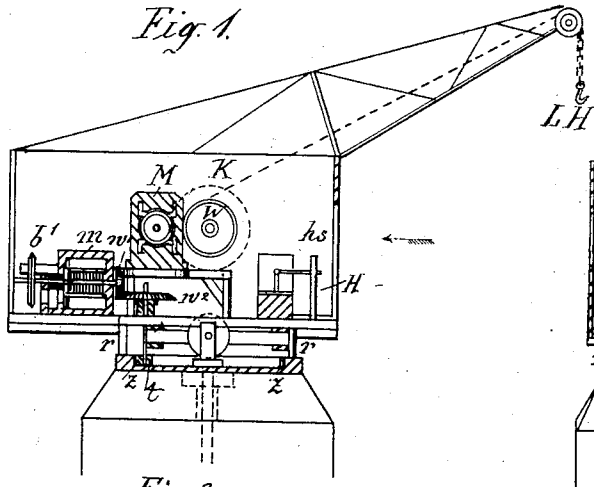


Fig. 2

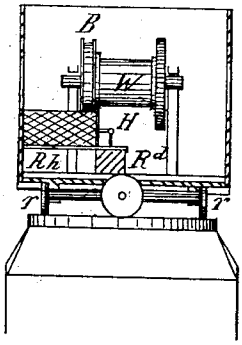


Fig. 3.

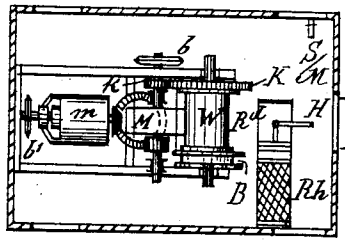


Fig. 5.

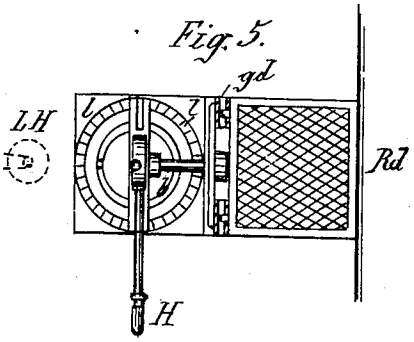


Fig. 4.

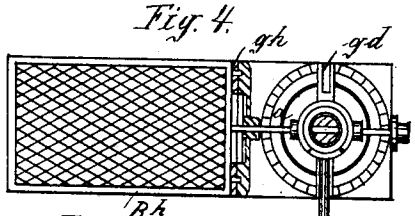


Fig. 6.

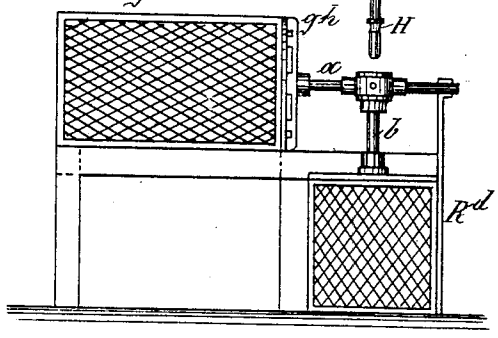


Fig. 7.

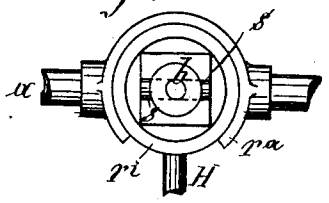
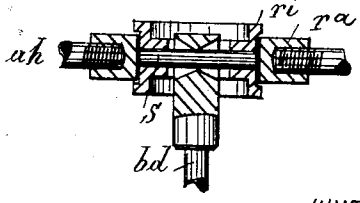


Fig. 8.



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ELECTRICAL APPARATUS FOR CONTROLLING MOTION OF CRANES, &c.

No. 561,777. Patented June 9, 1896.

Fig. 9.

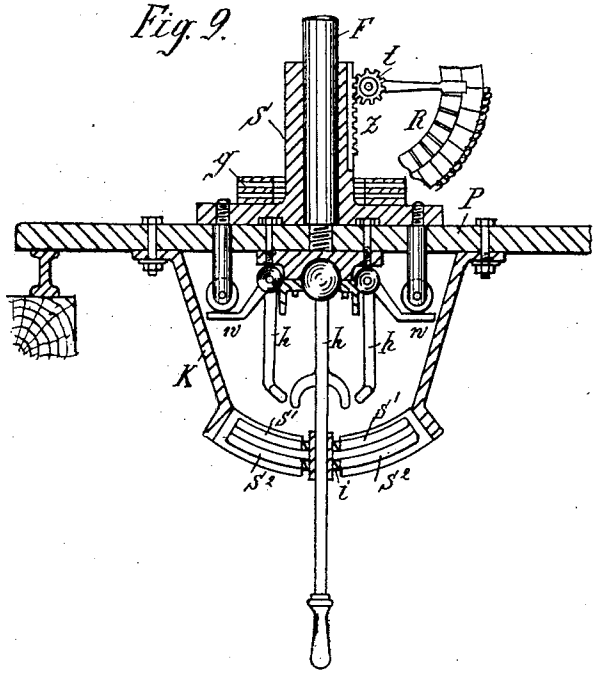
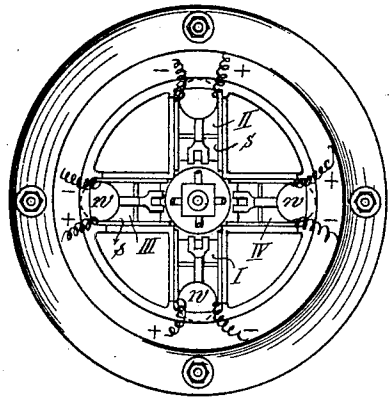


Fig. 10.



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ELECTRICAL APPARATUS FOR CONTROLLING MOTION OF CRANES, &c.

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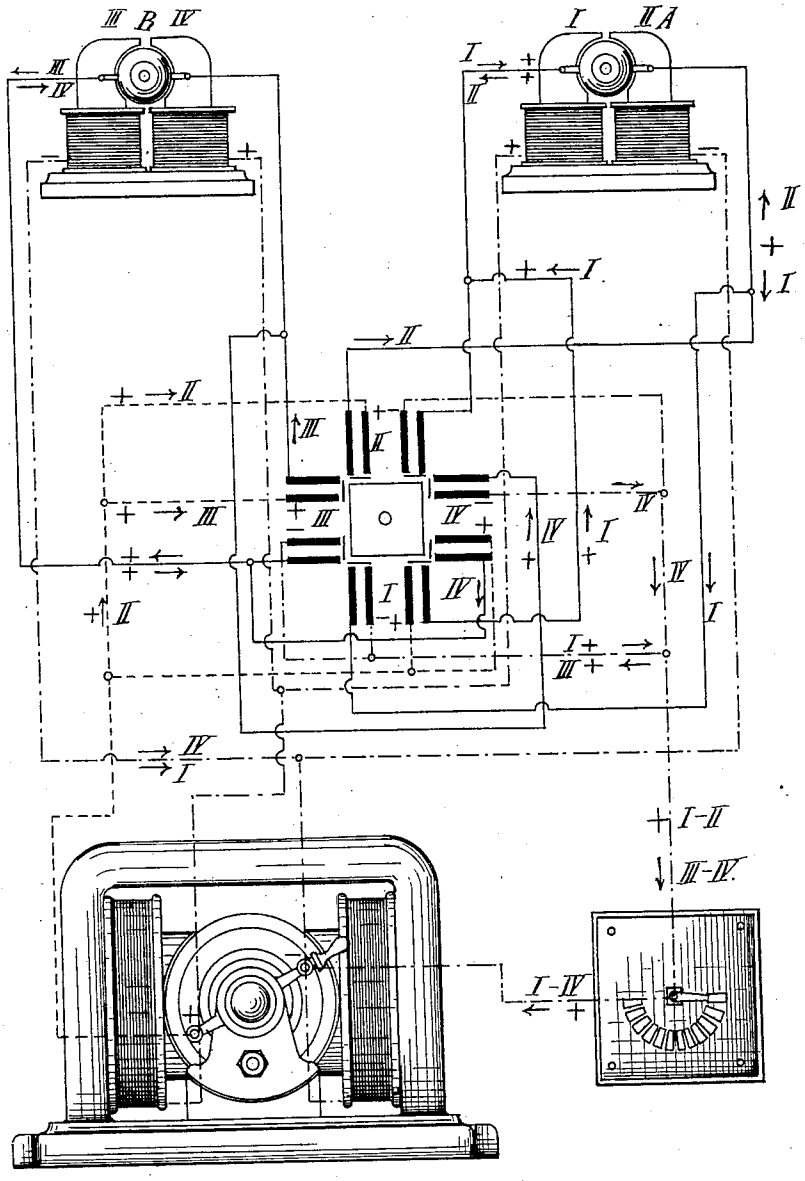
Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN AUGUSTUS ESSBERGER AND ALEXIUS WILHELM GEYER, OF BERLIN, GERMANY.

ELECTRICAL APPARATUS FOR CONTROLLING MOTION OF CRANES, &c.

SPECIFICATION forming part of Letters Patent No. 561,777, dated June 9, 1896.

Application filed September 29, 1894. Serial No. 524,450. (No model.)

To all whom it may concern:

Be it known that we, JOHN AUGUSTUS ESSBERGER, a subject of the Queen of England, and ALEXIUS WILHELM GEYER, a subject of the King of Prussia, residing at Berlin, in the Kingdom of Prussia, Germany, have invented new and useful Improvements in Electrical Apparatus for Controlling the Motion of Cranes and other Similar Apparatus, of which the following is a specification.

With the introduction of the method of actuating, raising, and lowering apparatus of all kinds by electrical energy it was felt necessary to effect a simplification not only in the general construction of the apparatus, but also in the appliances for controlling and regulating the working thereof.

The present invention has reference to the latter purpose, and consists in two arrangements whereby the movement of a load by means of cranes or travelers can be easily controlled and regulated by electrical energy in a manner capable of ready supervision.

With cranes having two separate motors, one for raising the load and the second for turning the crane, there are provided, more particularly in electric cranes, two starting and regulating resistances, and in addition for working the brakes there is a lever for each brake. If now rheostats without automatic reversal of the motion are provided, the engineer will, under certain circumstances, have to work six levers.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a partly sectional side elevation of a crane and its operating mechanisms. Fig. 2 is a side view looking in the direction of the arrow, shown in Fig. 1, parts being omitted and others shown in section. Fig. 3 is a sectional plan view. Fig. 4 is a plan view, on a larger scale, of the rheostats and the single controlling-lever. Fig. 5 is an end view of the devices shown in Fig. 4. Fig. 6 is a side view thereof. Fig. 7 is a plan detail view at the lever-pivot. Fig. 8 is a detail sectional elevation at such pivot. Fig. 9 is a sectional elevation of a controlling lever and switches for controlling two motors with a single resistance. Fig. 10 is an inverted plan view of the devices shown in Fig. 9; and Fig. 11 is a diagrammatic view showing the circuits from the generator, two motors, a single rheostat for the motors, and a switch, as shown in Figs. 9 and 10.

In the construction of crane shown at Figs. 1 to 8 of the accompanying drawings the motion is controlled by only two levers, the one lever H serving for controlling the up-and-down motion, as also for turning to the right or left, using two electromotors, while the second lever serves for lowering loads without consumption of current.

The construction shown at Figs. 9, 10, and 11 enables both motors to be controlled by one and the same hand-lever, using only a single regulating-resistance.

In the arrangement at Figs. 1 to 8 the controlling-lever H is so arranged that the movement thereof corresponds accurately to the movements to be effected by the load. The controlling movements to be effected by the operator are therefore so simple and natural that any mistakes would be impossible. The working of a crane provided with such controlling mechanism can therefore be intrusted to any workman.

Figs. 1 to 3 show a revolving crane with winch W, driven by the electromotor M by means of the toothed wheels K k. On the barrel-shaft of the winch is a brake-disk B and on the motor-shaft a disk b. The brake-levers are omitted for the sake of clearness. The brake B, which is free in the position of rest, is worked by the lever h. The brake b is held fast in its position of rest and is automatically released on starting the motor by a magnetic lifting device. The crane-shed revolves around the crane-pillar and runs on the four rollers r. The rotation of the crane is effected by the electromotor m, which drives, through the bevel-wheels w' w^2, Fig. 1, the toothed wheel t, gearing with the fixed circular rack Z. On the motor-shaft m is a brake-disk b', serving to hold the crane in the position into which it has been moved. This brake is also released by an electromagnetic device.

Figs. 1 to 8 only show means for regulating the raising of the load and the turning, the

other parts of the apparatus being omitted for the sake of clearness. The operator assumes generally the position indicated by S M, Fig. 3, and stands facing the crane-hook L H. With the right hand he moves the lever H. If he lifts it, the motor is actuated so as to raise the load. If he depresses it, the load is lowered. If he turns the lever to the left, the motor *m* for the rotation is actuated so as to turn the crane to the left. If he moves the lever to the right, the crane turns to the right. The lever H, the details of which are shown in Figs. 4 to 8, is pivoted to a universal joint so arranged that the axes *a* and *b* of the rheostats can either be turned singly or both together.

In Fig. 4 the contact-arm *g h* of the rheostat, which serves for raising, is shown in cross-section, the casing being in elevation. The shaft *a* serves for turning the contact-slide upon the separate plates *l* of the rheostat, as shown in Fig. 5. In this figure the contact-slide *g d* of the second rheostat is shown in section, and the casing and the contact rings and plates of the lifting-rheostat are shown in elevation. The shaft *b*, Fig. 5, serves for turning the contact-lever *g d*. The universal joint, which can also be differently formed, consists in this case, as shown at Figs. 7 and 8, of a grooved ring *r i*, to which the hand-lever H is fixed. This ring *r i* moves in the ring-segment *r a*. If the lever H in Fig. 7 be raised and lowered, the outer ring *r a* will participate in this motion, and the axis *a* of the rheostat R *h* is thus turned. In the ring *r i* is fixed a bolt *s*, which passes through the head-piece of the rheostat-axis *b*.

If the lever H, Fig. 7, be moved to the right or left, the ring *r i* will, by means of the bolt *s*, transmit this motion to the axis *b d* of the rheostat. Consequently by means of one and the same lever the rheostat for lifting, as also that for turning, can be actuated. In order to effect both movements of the lever H simultaneously and to allow the axis *s* to follow the resultant motion, the hole of the head-piece *b d* is correspondingly enlarged both upward and downward. The rheostats R *h* and R *d* could also be brought into a different position relatively to each other. They can, for example, where want of space makes it necessary, be arranged one above the other, so that the axes of the rheostats are parallel to each other. In this case the motion would have to be imparted to one of them by means of bevel-wheels.

In the arrangement shown at Figs. 9, 10, and 11, by means of which the control of two motors can be effected by a single controlling-lever with use of a single regulating-resistance, a guide-bolt F and a conical bracket K are fixed, respectively, to the upper and under sides of a plate P. The bracket K is formed with cross-shaped slots at bottom, and on the inner sides of these slots are mounted insulated metal strips $s' s^2$, that supply the current. In the bracket attached to a ball-and-socket joint is the control-lever H, which can be moved at will into each of the slots. It carries insulated metal plates at *i*, which, on the introduction of the lever H into a slot, establishes a contact between the two contact-plates at the side of the latter and thus closes the circuit. Within the bracket are furthermore mounted elbow-levers *h w*, one over each slot, so that as the lever H is moved along the slot it moves the corresponding elbow-lever along with it. Loose on the bolt F is mounted a disk S, the boss of which has a toothed rack Z formed on it gearing with a pinion *t*, on the axis of which is fixed the regulating-arm of a rheostat R. By the motion of an elbow-lever *h w* by means of the lever H the disk S is raised, whereby the rheostat is put in action. The connections of the current-generator, rheostat, and motor are so arranged relatively to the slots that, first, by inserting the lever H in slot I the motor A is turned to the left; second, by inserting into II the motor A is turned to the right; third, by insertion into III the motor B is turned to the left; fourth, by insertion into IIII the motor B is turned to the right, or the converse may be arranged.

In the diagram of connections shown at Fig. 11 the course of the current can be readily followed from the indices I⟶+ or II⟵, &c.

We claim—

In electrically-operated cranes or the like having mechanisms for giving motion thereto in directions at an angle to each other, a single controlling-lever movable in different directions to put into operation the different mechanisms according to the direction of movement given such lever, and two resistances controlled by said lever, and shafts carrying the contact-arms of the rheostats, the shafts being arranged at an angle to each other, and having a connection comprising rings arranged one within the other, the outer ring carrying the controlling-lever, all in combination, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JOHN AUGUSTUS ESSBERGER.
ALEXIUS WILHELM GEYER.

Witnesses:
LUDWIG GLASER,
GUSTAV HÜLSMANN.