(No Model.) 3 Sheets—Sheet 1.

A. J. SHAW.

SWITCH OPERATING MECHANISM FOR HOISTING MACHINERY.

No. 528,615. Patented Nov. 6, 1894.

Fig. 1.

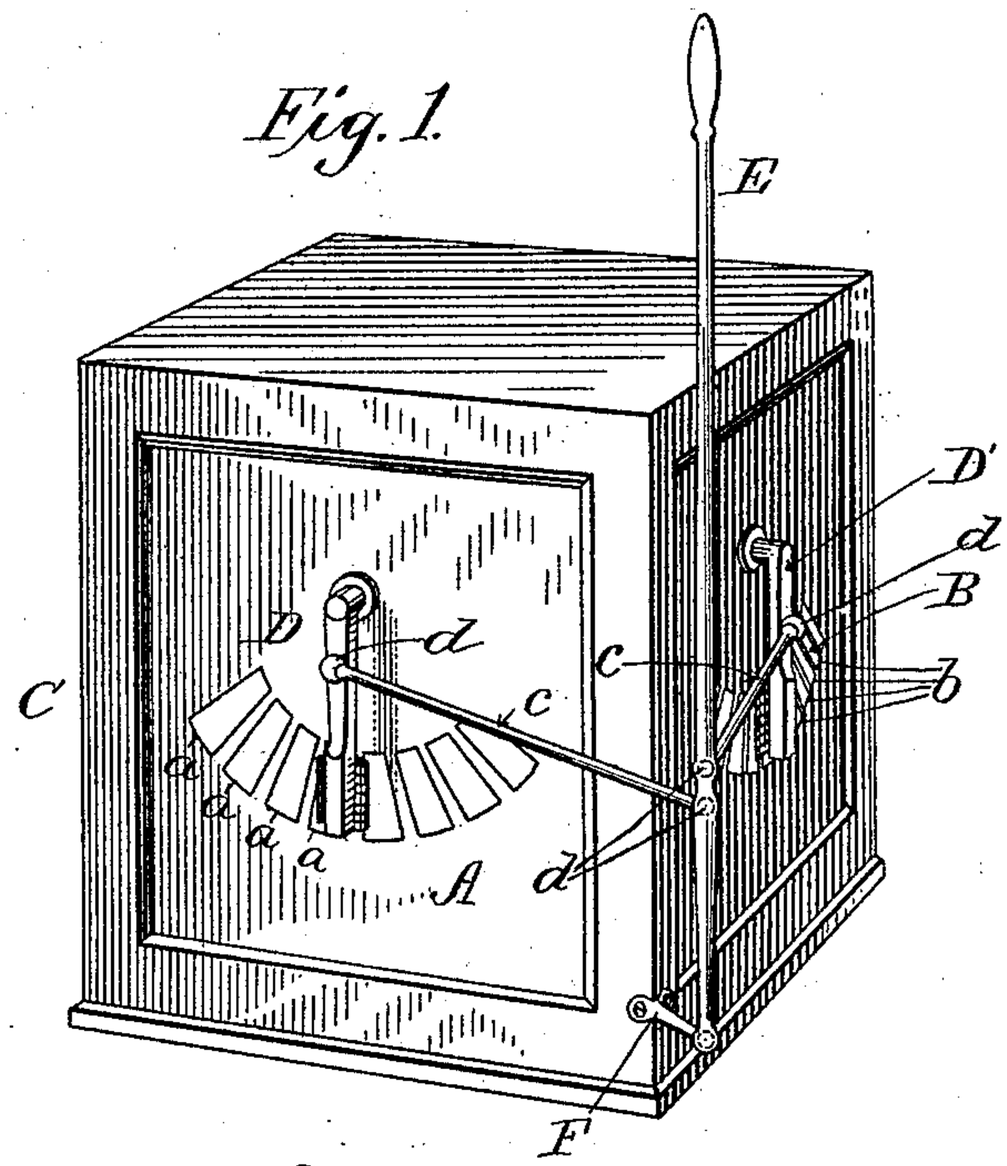
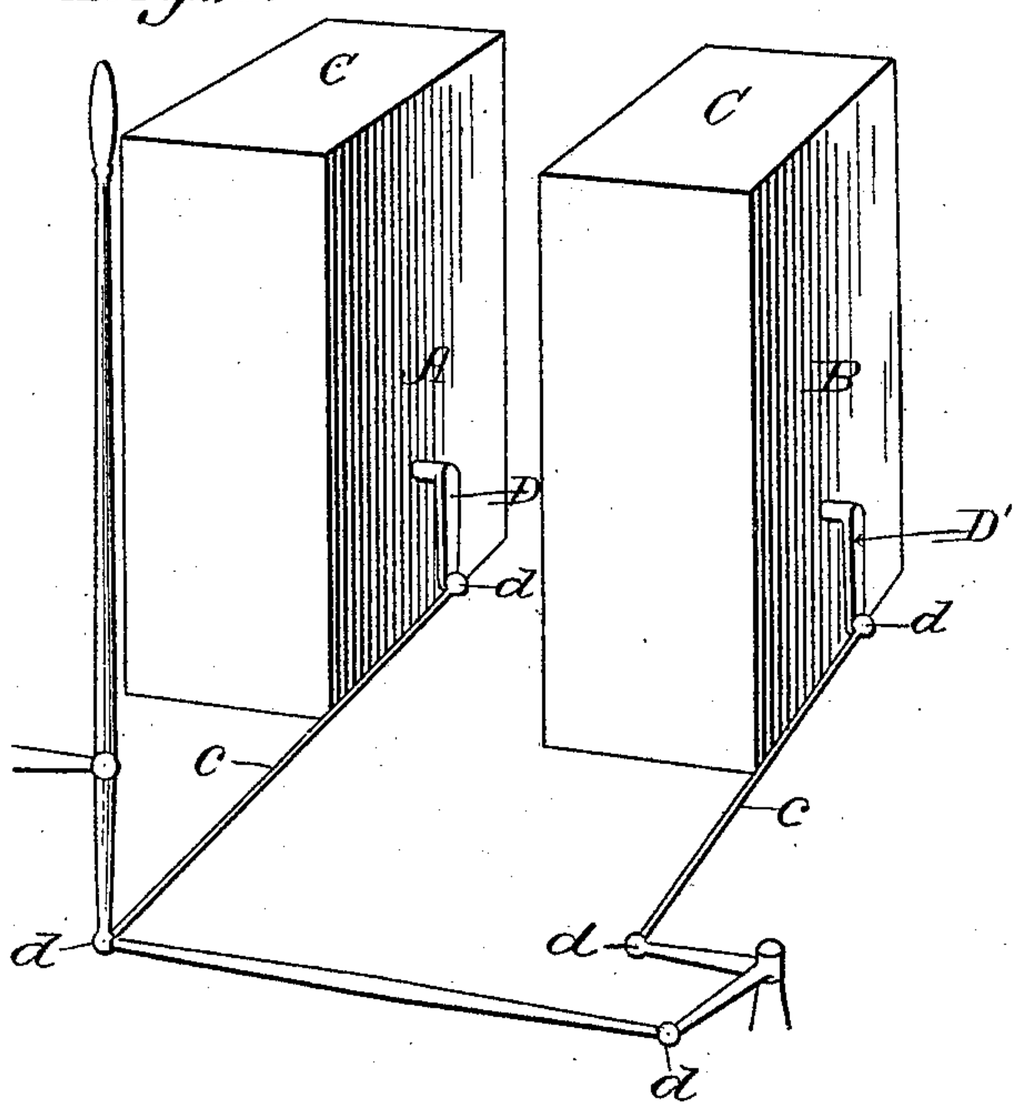


Fig. 2.



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(No Model.) 3 Sheets—Sheet. 2.

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Fig. 3.

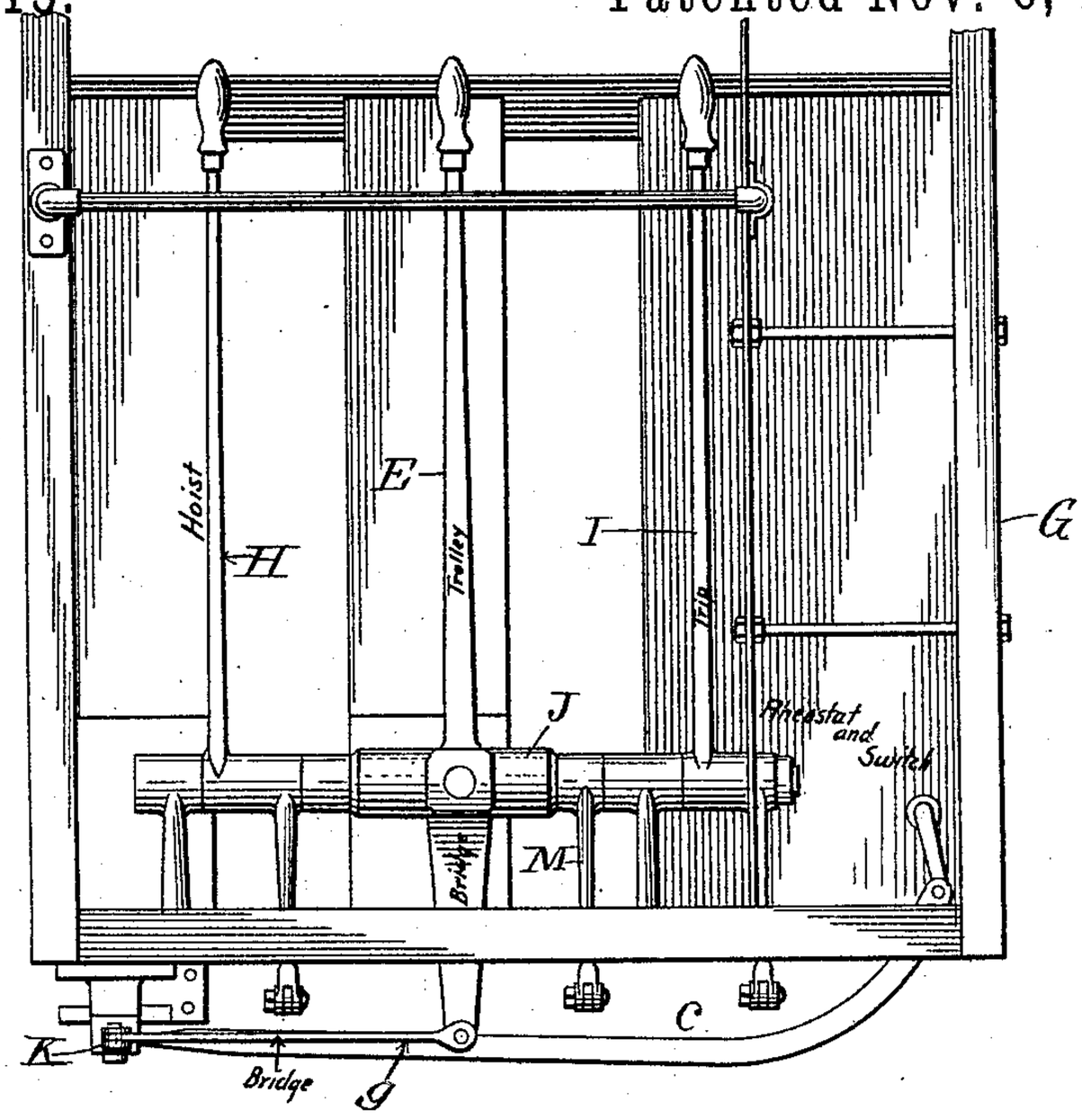

Fig. 4.

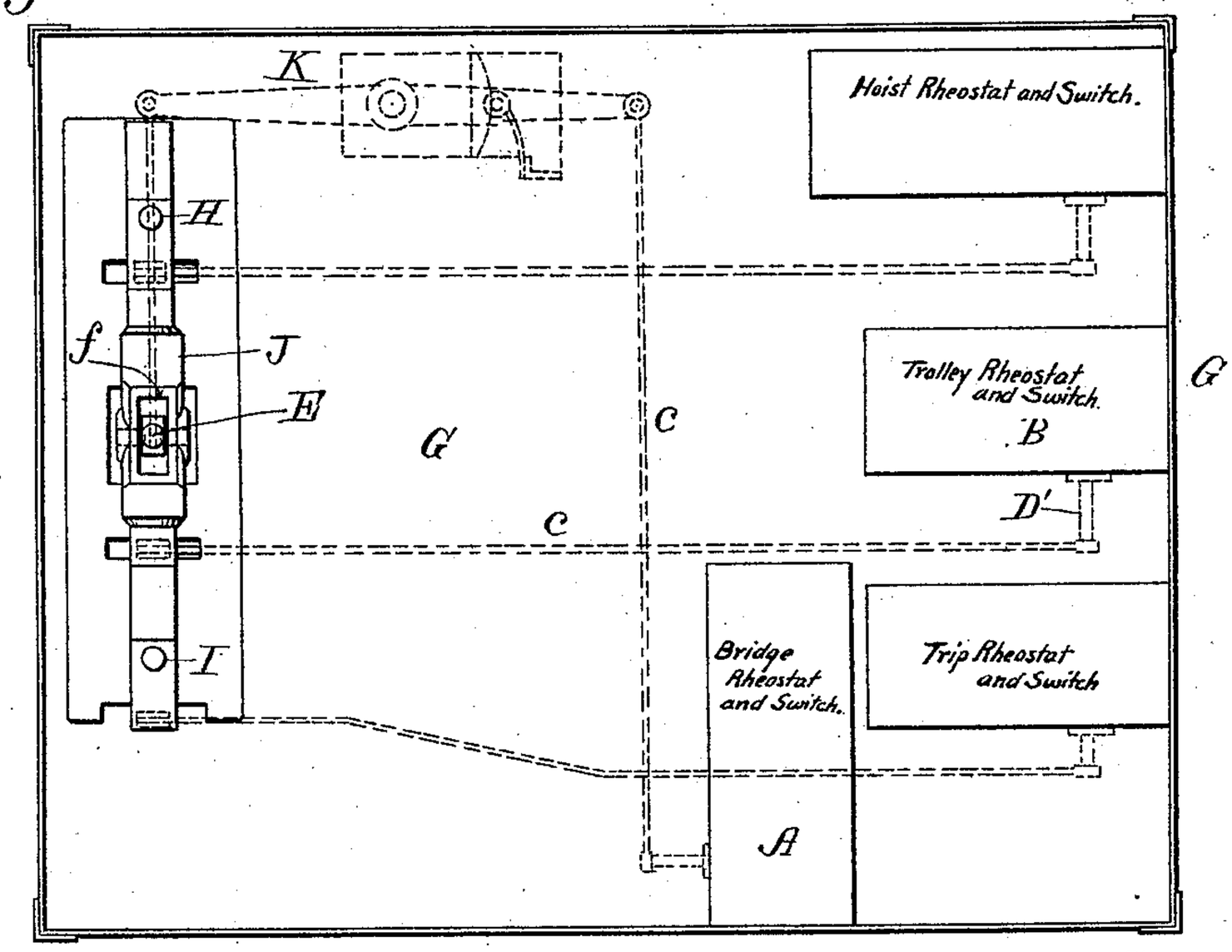

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Fig. 5.

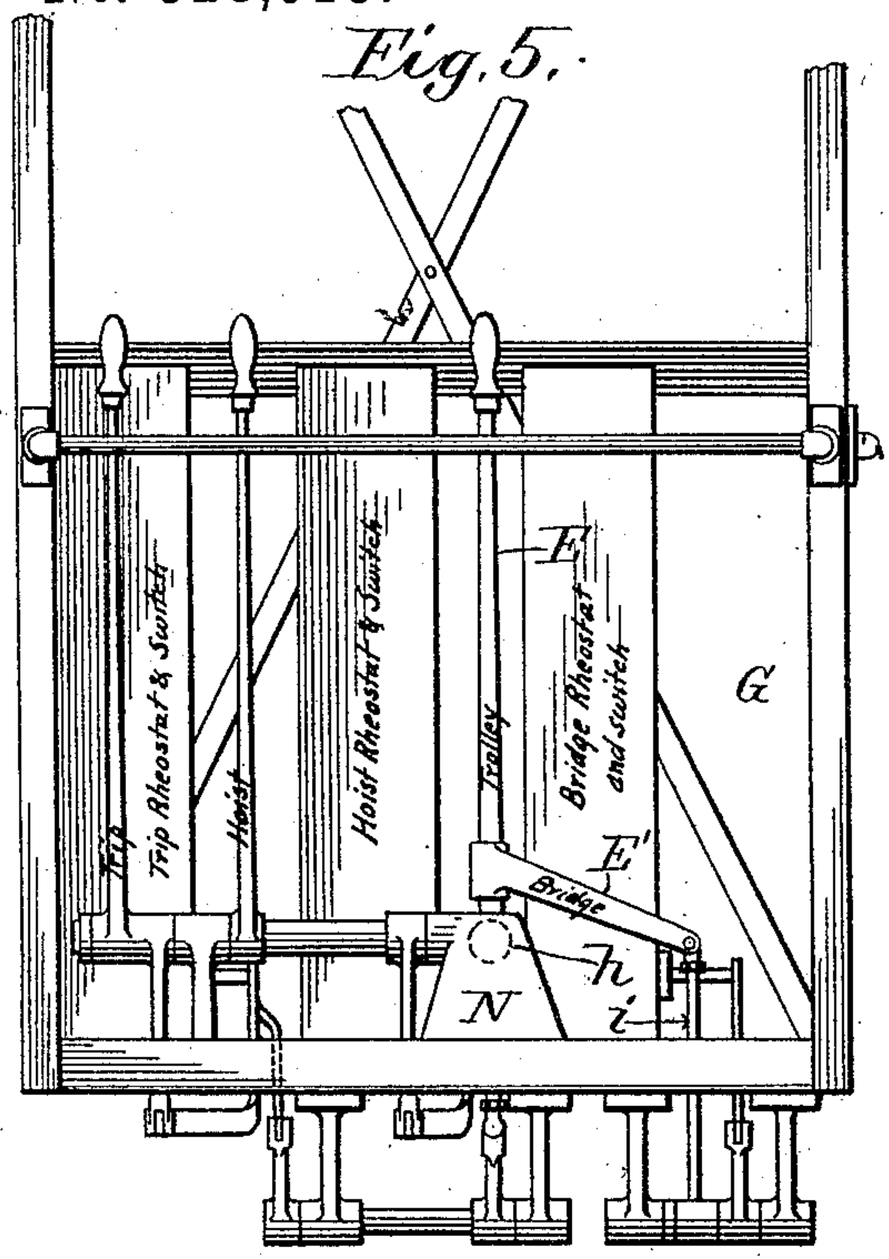


Fig. 6.

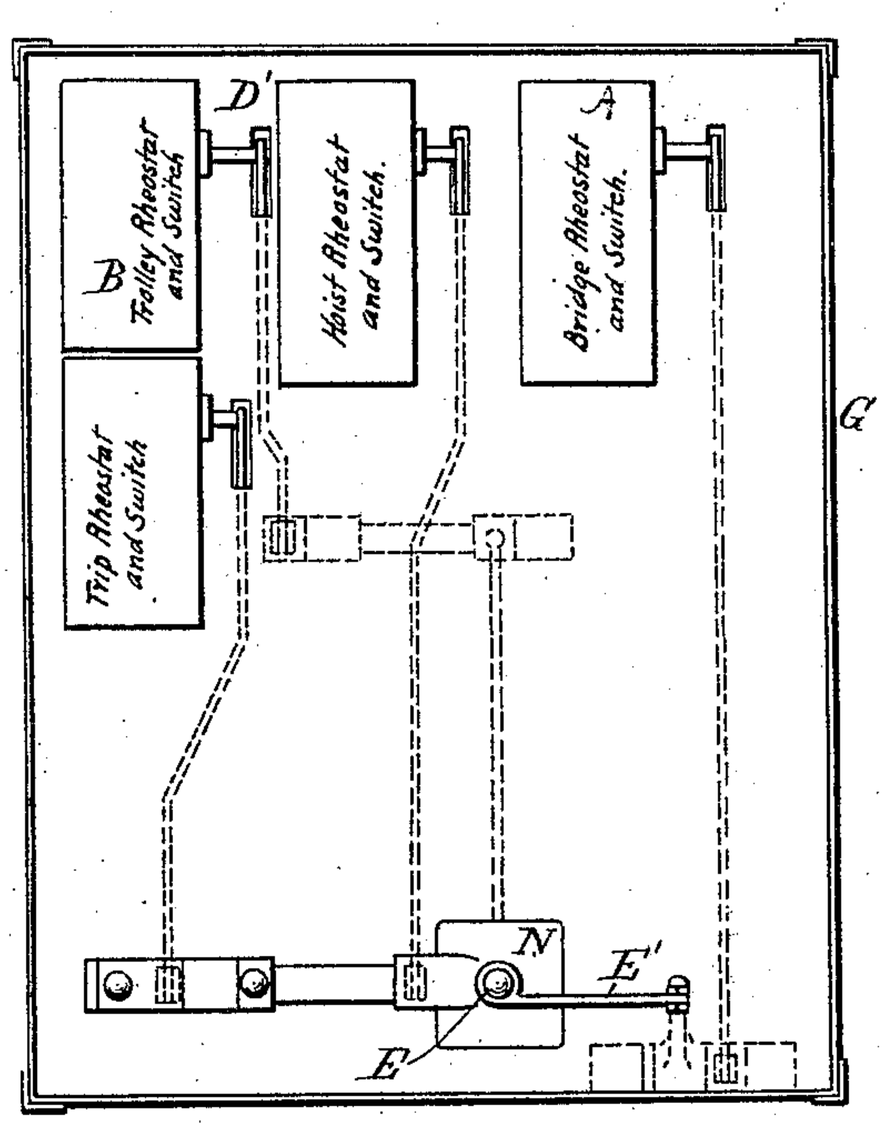
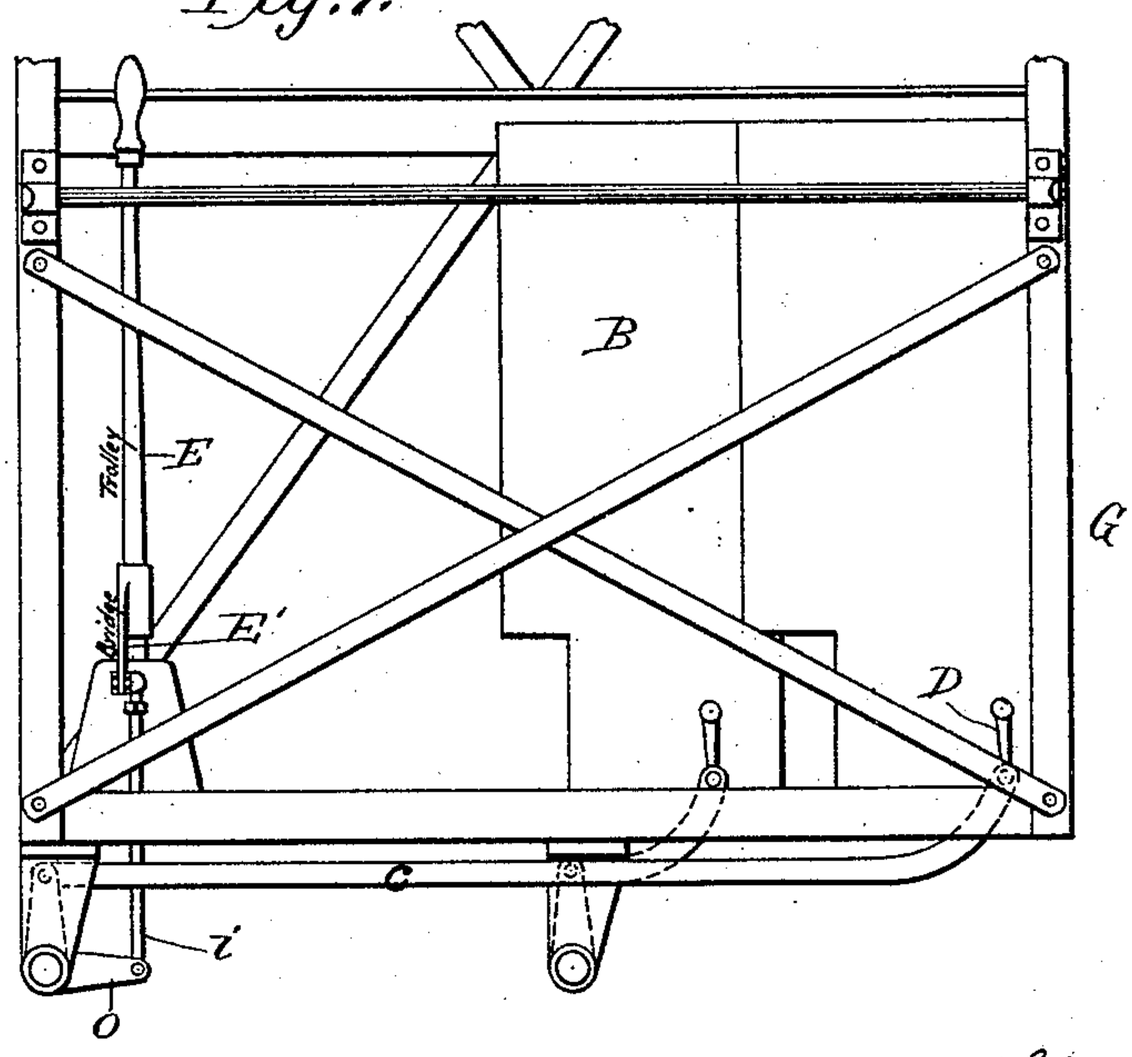


Fig. 7.



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UNITED STATES PATENT OFFICE.

ALTON J. SHAW, OF MUSKEGON, MICHIGAN, ASSIGNOR TO THE SHAW ELECTRIC CRANE COMPANY, OF SAME PLACE.

SWITCH-OPERATING MECHANISM FOR HOISTING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 528,615, dated November 6, 1894.

Application filed June 7, 1894. Serial No. 513,845. (No model.)

To all whom it may concern:

Be it known that I, ALTON J. SHAW, a citizen of the United States, residing at Muskegon, in the county of Muskegon and State of Michigan, have invented certain new and useful Improvements in Switch-Operating Mechanism for Hoisting Machinery, of which the following is a specification.

My invention relates to electric cranes or hoisting machinery wherein two or more independent electric motors are employed; and it consists in the combination of a plurality of reversing switches, rheostats, or combined rheostats and switches with a single controlling lever, capable of actuating them independently, or simultaneously, as required.

The purpose of my invention is to reduce the number of levers, and to facilitate the manipulation or control of the several motors.

In the accompanying drawings,—Figure 1 is a perspective view of an apparatus embodying my invention; Fig. 2, a perspective view illustrating another form of such apparatus; Fig. 3, a side elevation of the cage or cab of an electric crane, showing an arrangement of three levers for controlling four combined rheostats and switches; Fig. 4, a top plan view of the same; and Figs. 5, 6 and 7, views illustrating a somewhat different arrangement of like apparatus.

At the present time it is a common practice to provide electric traveling bridge cranes with four reversible electric motors, one to propel the bridge, another to traverse the trolley over or upon the bridge; another to actuate the holst gear upon the trolley, and a fourth to actuate a small hoist for lifting light loads quickly, tipping ladles, tripping tongs, and performing other light work. Other cranes are constructed with two trolleys, and the number of motors is increased accordingly. It is manifest that if each motor be controlled by a separate and independent lever, the number of levers will be so great as to occupy undue space in the cab or cage; cause confusion of the attendant, and involve his movement from one position to another to reach and operate the different levers.

Such multiplication of levers is a serious inconvenience, and is objectionable from every point of view; but especially so because of the danger involved in grasping a wrong lever, or in being delayed in getting to the one required. When handling heavy molds and castings, and particularly in handling molten metal, certainty and promptness of movement are of vital importance. In practice I find it convenient to use one lever for actuating both the bridge and the trolley-traverse switches and rheostats; but any two may be connected with a common lever.

Referring again to the drawings, A and B indicate two reversing switches, or combined rheostats and switches, which may represent those controlling the bridge-traverse motor and the trolley-traverse motor of a traveling bridge crane, such as shown in Letters Patent No. 430,487, granted to me on the 17th day of June, 1890.

The special construction of the combined rheostat and switch is immaterial, though it will be found convenient to group the contact blocks thereof in a segmental series, comprising two groups, those of each group connecting with the commutator brushes in a reverse order from those of the other group, the resistance of each group decreasing from the medial point of the series outward. Under this arrangement the motor is brought to rest when the contact arm stands at the medial point, or between the two groups of contacts, and the current delivered increases as the arm moves away from such medial position. In Fig. 1 I have represented two such series or double groups, A and B, of contact blocks *a* and *b*, arranged on two faces of a rectangular box or casing C, inclosing the rheostats and switches. Concentric with the contacts *a b*, of each set or series, is pivoted a movable arm D or D′, carrying rollers, springs or metallic brushes to bear upon and make contact with the blocks *a* and *b*, as in various types of rheostats now in use.

E indicates a lever common to both the arms D, D′, being connected with each by a rod or bar *c*, through the medium of ball joints *d*, or universal joints of other form.

The lever E shown in Fig. 1 is itself carried upon a ball or universal joint at its lower end, and hence its upper end may be moved in any direction about the lower support. To permit the lever thus connected with the two

arms D, D′ to move said arms over the full range of contact blocks *a*, *b*, its lower bearing or support is advisably set away from the box or casing C, though the lever may itself be bent to accomplish the same purpose. I prefer, however, to mount the lever upon an arm F projecting from the corner of box or casing C diagonally, or at an angle to the two faces upon which the contact blocks are secured.

It will be seen that under the construction and arrangement set forth a movement of lever E in a plane parallel with the front face of box or casing C, or approximately so, will cause the arm D in front of that face to be moved in one or the other direction, as the lever is moved to the right or the left, and this without affecting the arm D′ on the side face materially if at all, because during this movement of lever E the connecting rod *c* simply swings from its point of connection with said second arm D′. The mechanical resistance of arm D′ to movement about its pivot overcomes the slight tendency toward movement of that arm in moving arm D, and a very little practice enables the operator to give the lever E a slightly curving path regardless of the presence or absence of such resistance. In like manner, movement of lever E forward or backward will carry arm D′ forward or backward over its contact blocks without affecting arm D.

Should it be desired to move both arms D and D′ together, it is only necessary to move the lever E directly inward or outward toward or from the corner of box or casing A, or with a swinging motion such as shall produce a pulling effect upon one arm and a pushing effect upon the other. The direction and character of movement must of course depend upon the effect desired to be produced.

In Fig. 2 I have represented each reversing switch or rheostat and switch as mounted in a separate box, and the arms D D′ arranged to swing or move in parallel planes. Under this arrangement I prefer to make the lever E of the first order instead of the second, and I connect the lower end of said lever with arm D by a direct connecting rod *c*, while a second rod *d* and a bell crank or elbow lever *e* are interposed between lever E and the connecting rod *c* of arm D′. The action of this is the same essentially as that of the foregoing.

In Figs. 3 and 4 I have represented one practical application of my invention to traveling bridge electric cranes. In said figures, G indicates the operator's cage or cab, which is commonly suspended from the rolling bridge, and within said cage or cab, or at any convenient point, are located the several combined rheostats and switches necessary to the proper control of reversible motors. These devices are properly designated in Fig. 4, and as shown in said figure the hoist rheostat and the trip rheostat are operated each by a lever of its own, said levers being designated by the letters H and I, and shown directly connected with the arms of the respective rheostats controlled by them.

E indicates a lever which is pivoted in a slot or opening *f*, formed in a rockshaft J, which turns in suitable bearings, and also constitutes an axle or supporting shaft for the levers H and I. The rockshaft J is enlarged in that portion which contains the slot or opening *f*, and the lever is carried upon a transverse pivot pin, and hence is free to swing to the right or left in the direction of the length of the rockshaft, without moving said shaft; and it is likewise capable of being swung forward or backward, transversely to the shaft, or a compound movement may be produced by combining the right or left and the forward or backward movements.

From the lower end of lever E a connecting rod or bar *g* extends to one end of a lever K of the first order, the other end of which connects with the arm D of the bridge rheostat A through the medium of a rod *c*. A suitable friction device L prevents the accidental movement of lever K or of the parts connected therewith.

M indicates an arm projecting radially from the rockshaft J, and secured to or made integral with said shaft. This arm connects by a rod *c* with arm D′ of the trolley rheostat and switch B, as shown in Fig. 4. From this description it will be apparent that both rheostats A and B can be controlled by lever E, and that they may be moved simultaneously or independently, and in like or different directions.

It is of course understood that ball-and-socket or other universal joints are to be used where the connecting rods join the levers and the rheostat arms, in order that the movements of the lever shall not cramp any of the parts.

In Figs. 5, 6 and 7 the rheostats are all set with their arms arranged to swing in vertical planes, which cannot conveniently be done in some cases, owing to the location of other apparatus. The lever E which controls the bridge and trolley rheostats and switches is in this case provided with a spherical enlargement *h* which is seated in a socket of like form, in a metallic base or casting N. This enables the lever to be swung in any direction about the center of the spherical pivot *b*. The lower end of lever E connects through suitable intermediates with the trolley rheostat and switch B, which is actuated through a movement of the lever in a plane parallel with that in which the arm D′ of said rheostat swings. Above its spherical pivot, the lever E is provided with an arm E′, which connects by a rod or bar *i* with an elbow or bell crank lever O, which connects by a rod or bar *c* with the arm D of bridge rheostat and switch A. The action of this mechanism is essentially like that of the preceding.

The foregoing arrangements are such as I have used in the construction of traveling bridge cranes, and have been designed to

meet the special working conditions there met with. It is, however, to be understood that these are merely illustrative, and that the precise construction and arrangement of parts are immaterial and may be varied as desired, the invention contemplating and including broadly the combination with two rheostats or combined rheostats and switches, of a controlling lever common to both and capable of actuating either at will and both together, as required. It is likewise to be understood that it is not my intention to restrict myself to a combined switch and rheostat, but to include any usual current controller by which the operation of a motor can be determined.

Having thus described my invention, what I claim is—

1. In combination with two independent electric switches, an operating lever common to both, and adapted to move both together and either one alone, substantially as set forth.

2. In combination with a combined reversing switch and rheostat A, a second reversing switch and rheostat B, and a lever E connected with the movable arms of both by universal joints, whereby the single lever is enabled to operate the two arms both simultaneously and independently.

3. In combination with two independent electric switches A and B, operating arms D and D′ for said switches arranged to move in planes at right angles to each other, and a lever connected with both of said arms and carried by a universal bearing or joint, whereby the lever is enabled to operate either switch at will, or both together.

In witness whereof I hereunto set my hand in the presence of two witnesses.

ALTON J. SHAW.

Witnesses:
F. W. BABCOCK,
T. C. AKIN.