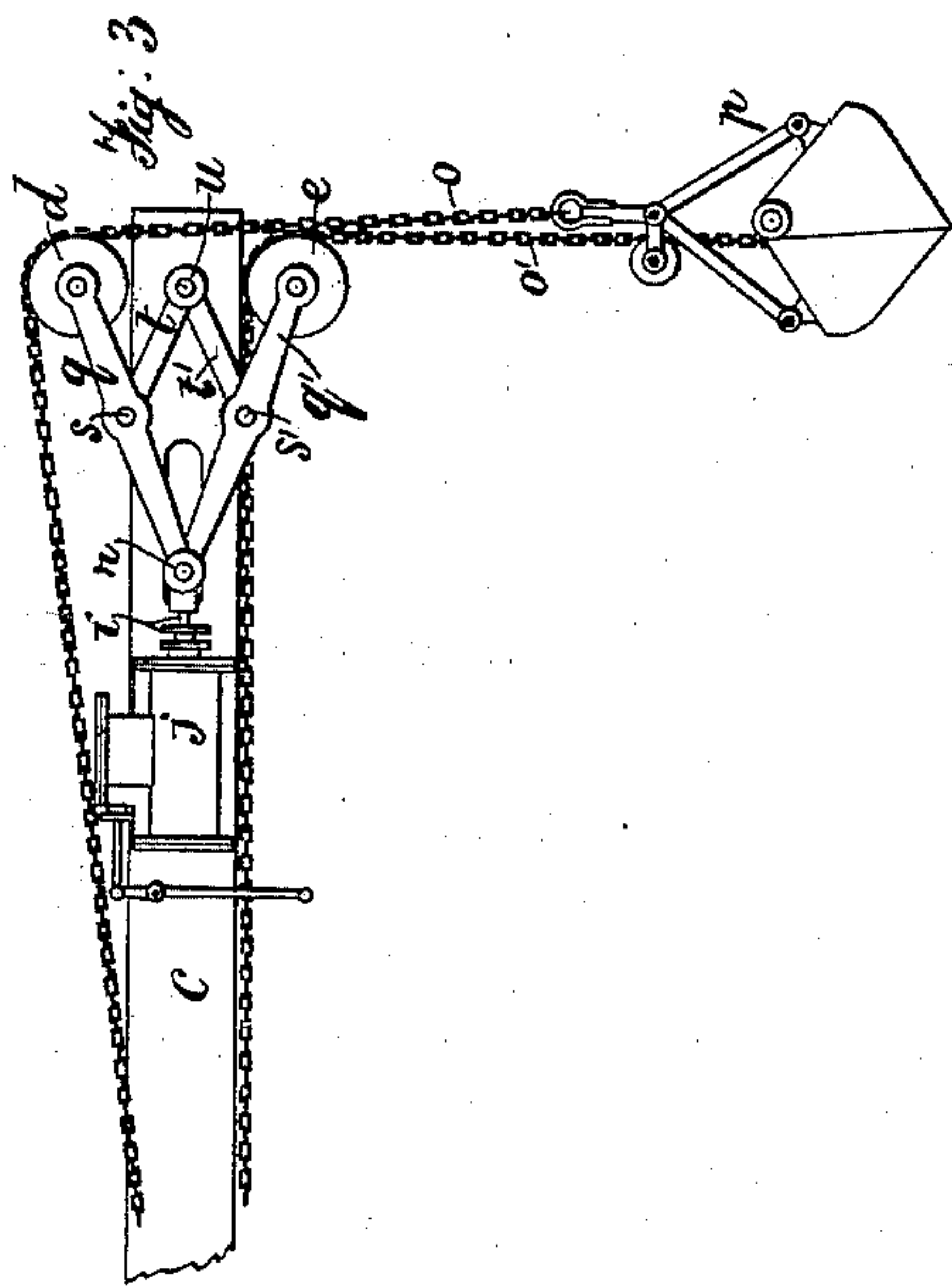
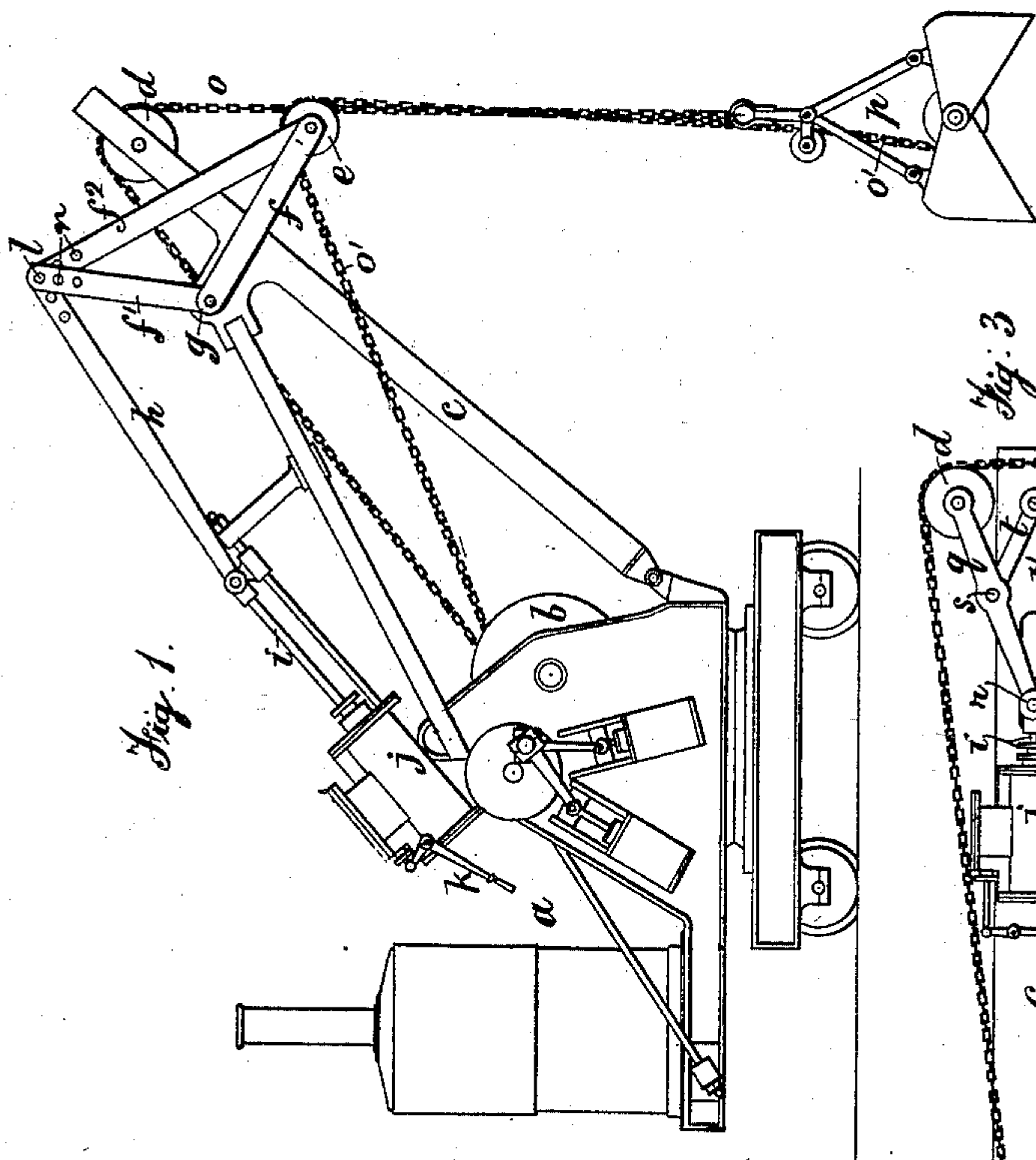
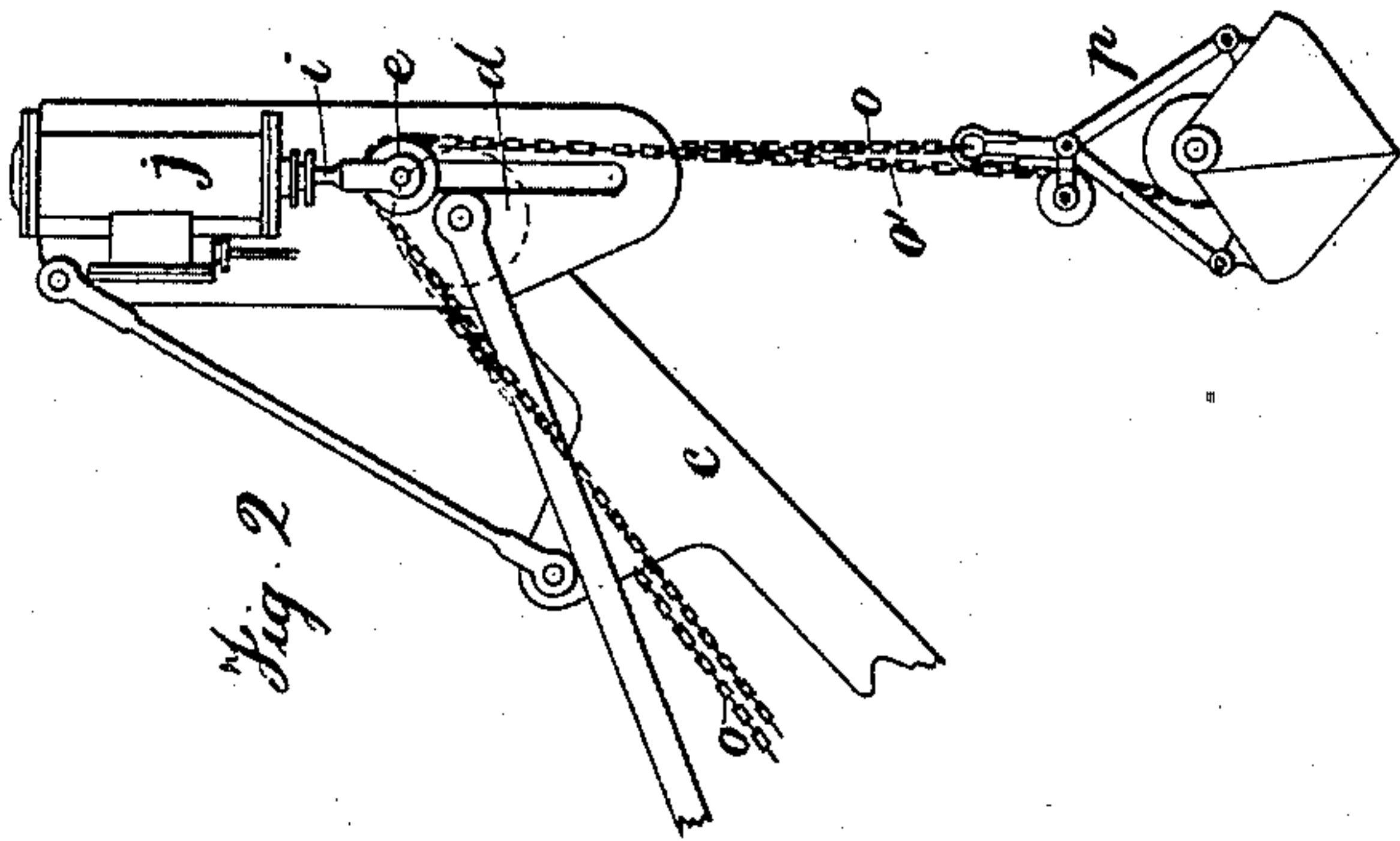


(No Model.)

J. H. MORGAN.

APPARATUS FOR OPENING AND CLOSING GRABS, BUCKETS, &c.
No. 426,600.

Patented Apr. 29, 1890.



Witnesses

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JOHN HOPKIN MORGAN, OF LIVERPOOL, COUNTY OF LANCASTER, ENGLAND.

APPARATUS FOR OPENING AND CLOSING GRABS, BUCKETS, &c.

SPECIFICATION forming part of Letters Patent No. 426,600, dated April 29, 1890.

Application filed February 28, 1890. Serial No. 342,094. (No model.) Patented in England November 2, 1888, No. 15,805; in France October 29, 1889, No. 201,625, and in Belgium October 30, 1889, No. 88,285.

To all whom it may concern:

Be it known that I, JOHN HOPKIN MORGAN, engineer, of the city of Liverpool, in the county of Lancaster, England, have invented
5 a new and useful Improvement in Apparatus for Raising, Lowering, Opening, and Closing Grabs, Buckets, and Like Appliances; (that the same has not been patented to me in any country excepting Great Britain, No. 15,805,
10 November 2, 1888; France, No. 201,625, October 29, 1889, and Belgium, No. 88,285, October 30, 1889;) and I do hereby declare the following to be a full, clear, and exact description thereof.

15 My invention relates to machinery for raising, lowering, opening, and closing grabs, buckets, and like appliances, in which two chains attached to the said grabs or their equivalents are operated conjointly, so as to
20 produce the desired action. Hitherto the chains have been manipulated by means of two barrels or hydraulic rams and drums onto and from which the chains were wound and unwound at the same or different speeds by
25 suitable gear at the required times, so as to produce the desired effects. Apparatus so constructed has been costly, complicated, and unreliable, and has required constant attention to keep it in proper working order.

30 My invention has for its object to effectively control the motions of the chains by simple, inexpensive, and reliable apparatus, so employed that only one winding-barrel or one hydraulic ram is required, so that the
35 liability of parts to become disorganized, the first cost of the apparatus, and the expenses of maintenance are greatly reduced.

Figures 1, 2, and 3 are each elevations of apparatus under my invention.

40 In Fig. 1, *a* represents an ordinary steam-winch, of which *b* is the winding barrel or drum, *c* is the jib, and *d* is the chain-pulley at the top of the jib. *e* is a chain-pulley carried on a bell-crank lever *f f' f²*, pivoted to the jib *c*
45 at *g*. *h* is a rod coupling the bell-crank lever to the piston-rod *i* of a steam-cylinder *j*, secured to the frame of the winch, and *k* is a lever for operating the slide-valve of the cylinder *j*. The links *f'* and *f²* of the bell-crank lever and
50 the rod *h* are connected together with a pin *l* and are made with holes *n*, so that the rela-

tive motion of the parts will be varied according to which holes the pin *l* is passed through. *o o'* are the operating-chains, both coiled round the winding barrel or drum *b*, while
55 one of them *o* passes over the pulley *d*, and the other *o'* over the pulley *e* to the grab *p*, of any suitable construction.

It will be obvious that if the chain *o* is used for raising and lowering the grab the said
60 grab may be opened and closed by varying the position of the pulley *e*, so as to cause it to approach or recede from the pulley *d*, and that this may be effected by admitting steam into one end or other of the cylinder *j*,
65 so as to give motion to the piston therein and with it to the rod *h* and bell-crank lever *f f' f²*. It will further be obvious that the grab will be raised and lowered in an open or closed position, according to the position of the pulley *e*, as both chains *o* and *o'*, being on the
70 same barrel or drum, are coiled and uncoiled at equal speeds. If the lift is not greater than the distance between the pivot *g* and the winding barrel or drum, the two chains *o* and
75 *o'* may be united and a single chain led from the said pivot to the winding barrel or drum.

It will be observed that the essential feature of my invention consists in the use of two pulleys, over which the two chains pass,
80 when such pulleys are capable of being caused to approach and recede from each other, and the chains are coiled and uncoiled at equal speeds from a winding barrel or drum.

In Fig. 2 the pulley *e* is coupled direct to
85 the piston-rod of a cylinder *j* instead of being carried on a lever.

In Fig. 3 the pulleys *d* and *e* are carried on two arms *q q'*, pivoted at *r* to the piston-rod
90 *i* of a hydraulic cylinder *j*, and at *s s'* to arms *t t'*, pivoted at *u* to a jib or cathead *c*. In this arrangement both pulleys travel synchronously to and from each other when motion is given to the piston in the cylinder *j*.

I claim—

95 1. In apparatus for raising, lowering, opening, and closing grabs or like appliances, the combination, with the grab, of chains attached to different parts of the grab, whereby equal motion of the chains will raise or lower
100 the grab without opening or closing it, while unequal motion thereof will open or close it,

hoisting mechanism by which the chains may be moved equally, pulleys over which the chains pass, and mechanism—such, for example, as a power cylinder and piston—connected with one at least of the pulleys and operative to vary their relative position, thereby causing unequal motion of the chains and opening or closing the grab, substantially as and for the purposes described.

10 2. In apparatus for raising, lowering, opening, and closing grabs or like appliances, the combination, with the grab, of chains attached to different parts of the grab, whereby equal motion of the chains will raise or lower
15 the grab without opening or closing it, while unequal motion thereof will open or close it, hoisting mechanism by which the chains may be moved equally, pulleys over which the chains pass, stationary bearings in which one
20 of the pulleys is journaled, movable bearings in which the other pulley is journaled, and

mechanism—such, for example, as a power cylinder and piston—connected with said movable bearings and operative to move the same, thereby causing independent motion of one of the chains and opening or closing the grab, substantially as and for the purposes described. 25

3. The combination, with the grab, of a supporting-jib *c*, a pulley *d* thereon, a rocking lever mounted on the jib, a pulley *e*, carried by the rocking lever, chains passing over said pulleys and attached to different parts of the grab, a drum to which the chains are connected, and a power-cylinder by which the rocking lever is operated, substantially as and for the purposes described. 30 35

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Witnesses:

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