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W. J. ALLEN, D. WILLIAMS & V. LECOQ.

LOWERING CRANE.

No. 577,815. Patented Feb. 23, 1897.

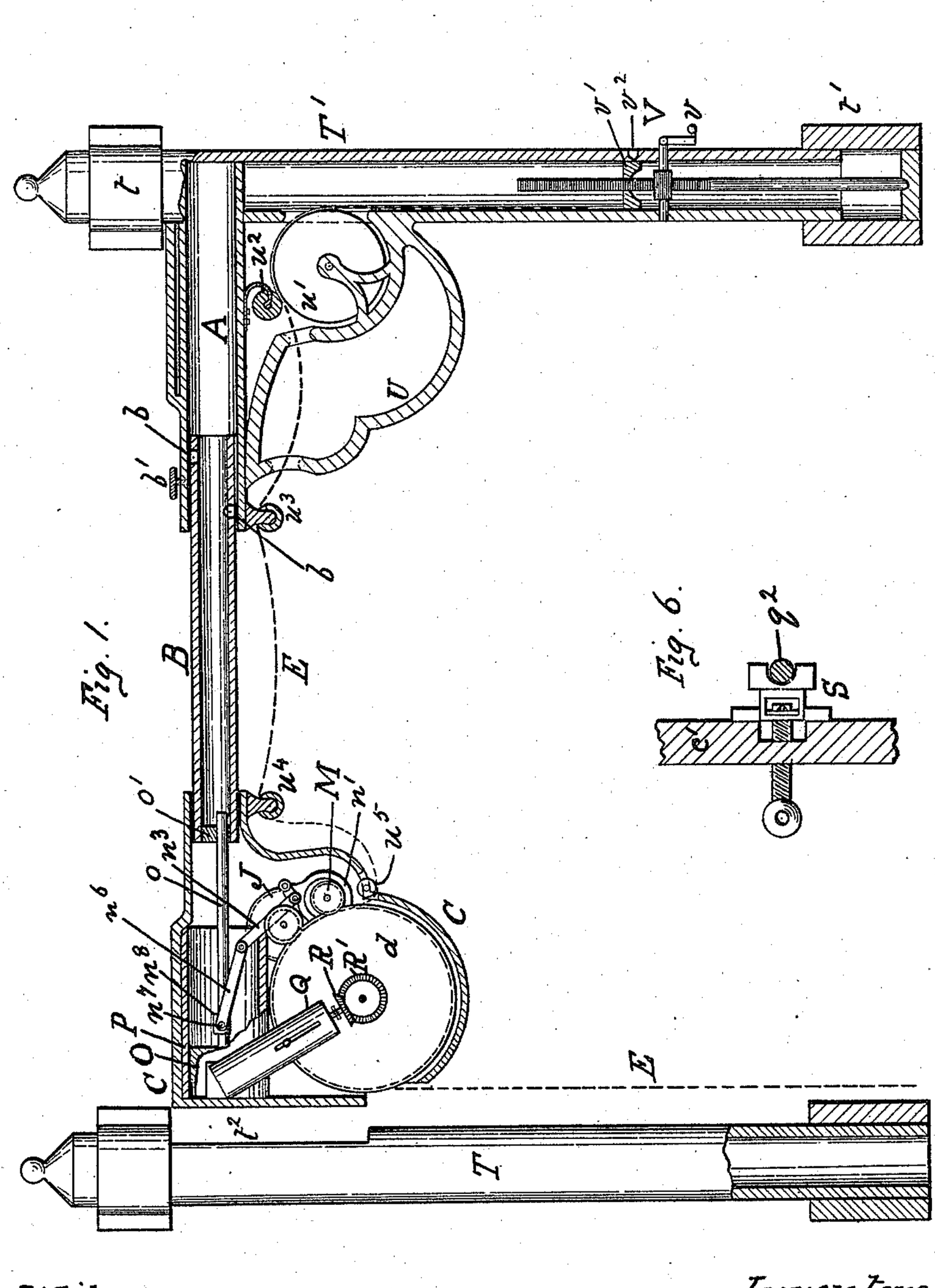

Fig. 1.

Fig. 6.

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No. 577,815. Patented Feb. 23, 1897.

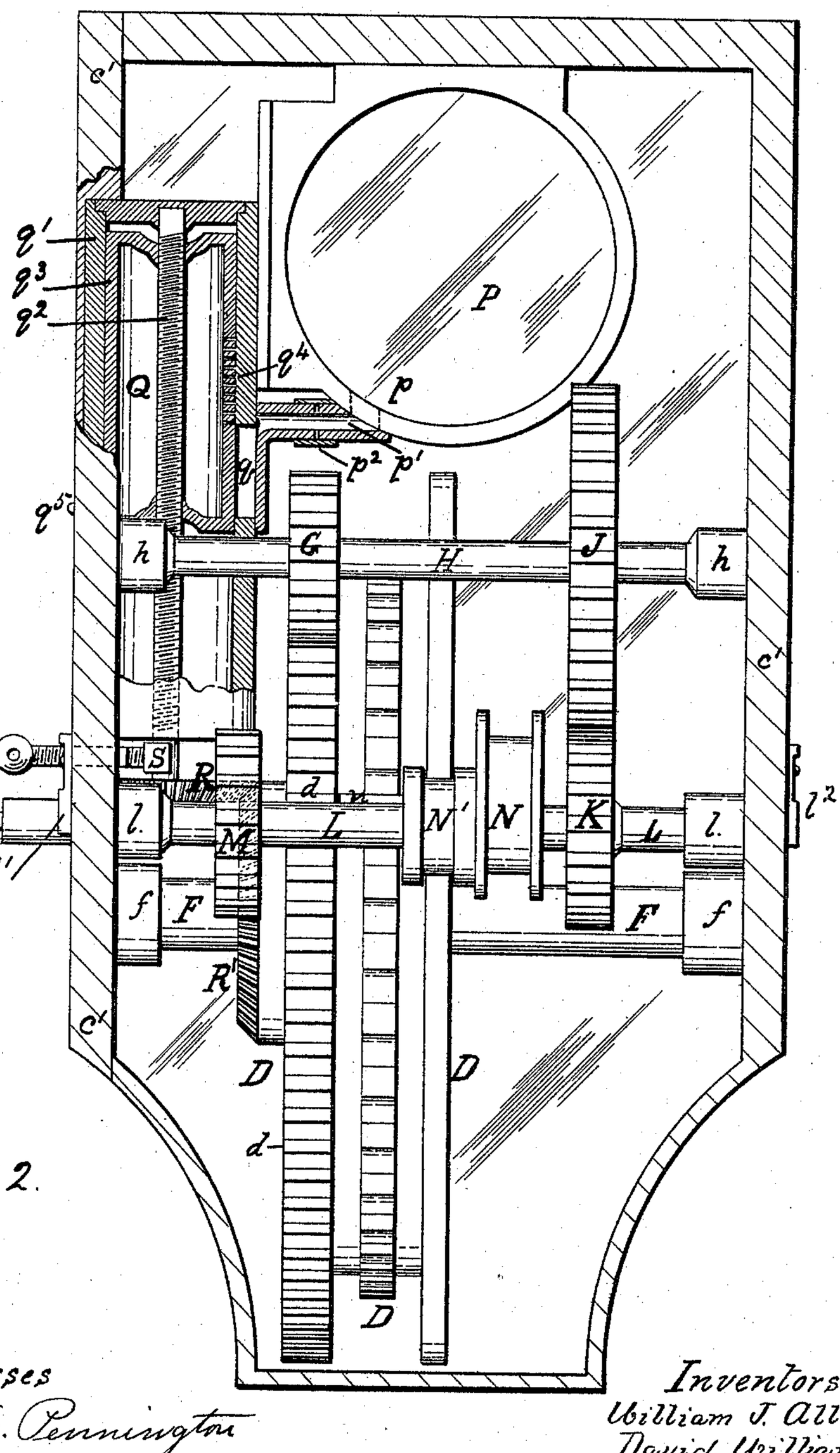

Fig. 2.

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(No Model.) 3 Sheets—Sheet 3.

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Fig. 5.

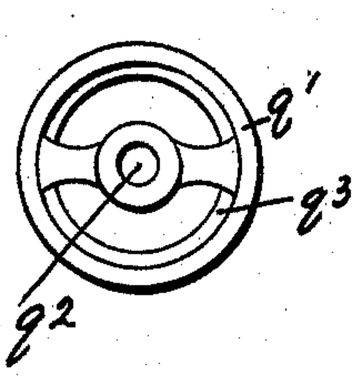


Fig. 4.

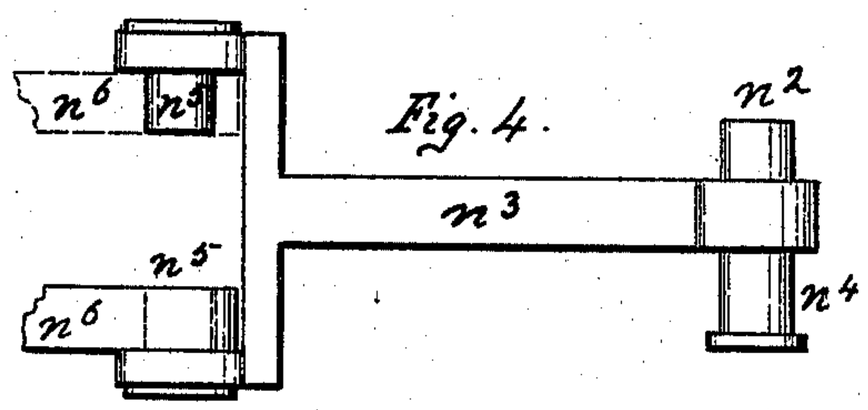
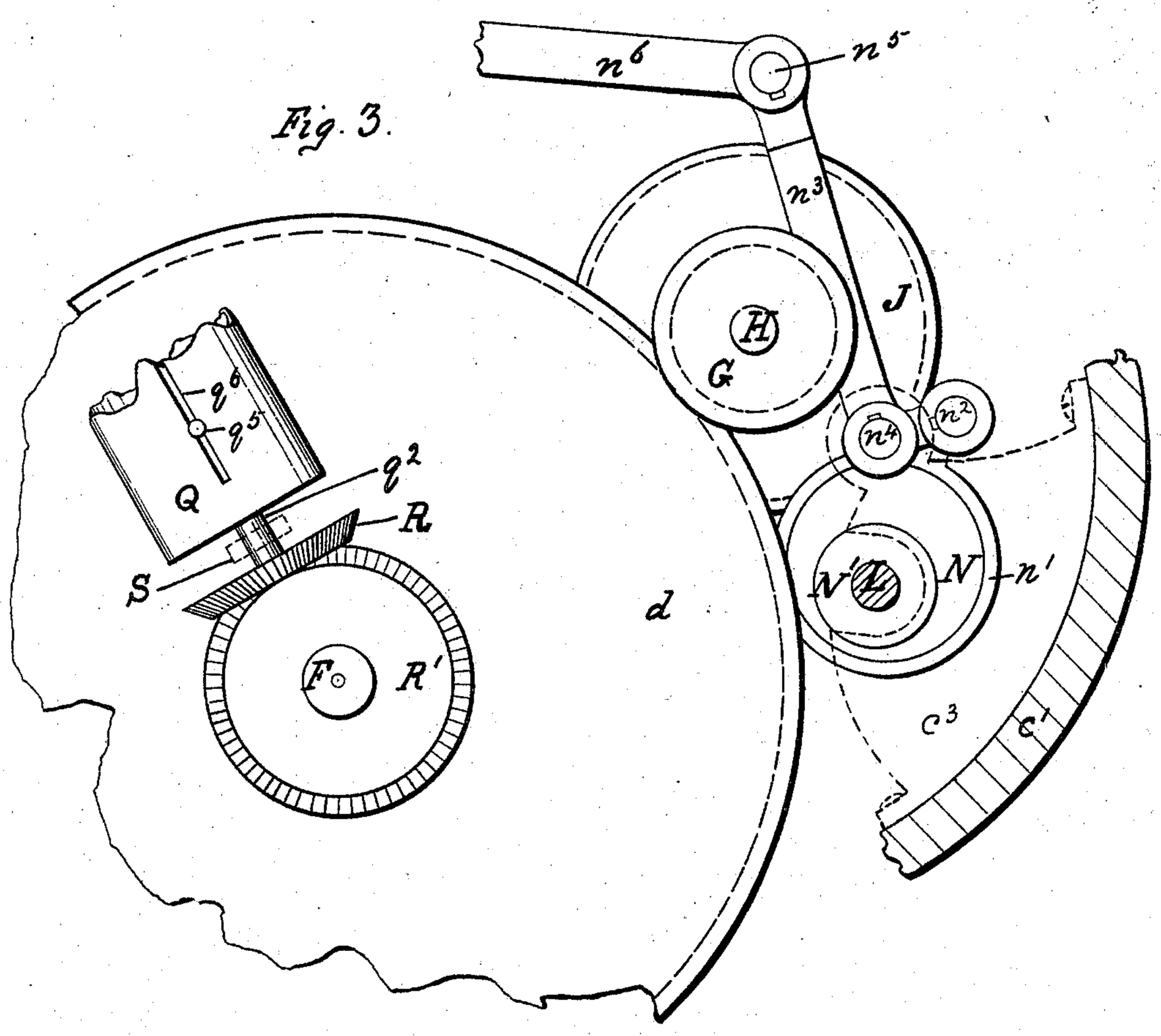


Fig. 3.



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UNITED STATES PATENT OFFICE.

WILLIAM JAMES ALLEN, OF BRITHDIR, AND DAVID WILLIAMS AND VICTOR LECOQ, OF NEW TREDEGAR, ENGLAND.

LOWERING-CRANE.

SPECIFICATION forming part of Letters Patent No. 577,815, dated February 23, 1897.

Application filed December 27, 1894. Serial No. 533,131. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM JAMES ALLEN, residing at Brithdir, in the county of Glamorgan, Wales, and DAVID WILLIAMS and VICTOR LECOQ, residing at New Tredegar, in the county of Monmouth, England, subjects of the Queen of Great Britain, have invented certain new and useful Improvements in Lowering-Cranes, of which the following is a specification.

Our invention relates to lowering-cranes which are specially though not exclusively applicable for use as fire-escapes.

The object of our invention is to obtain a lowering-crane which will permit of the object to be lowered to be passed to the ground in such a manner that no injury may be sustained by it either from striking against objects in descent, too rapid passage through the air, or from striking the ground violently.

In the accompanying drawings, Figure 1 is a front elevation of the crane in its normal position. Fig. 2 is an end view, part section and part elevation, of the head of the crane-jib, viewed from the post and with a few parts removed for clearness. Fig. 3 shows a side elevation of the gearing in the crane-head. Fig. 4 shows a plan of one of the levers. Fig. 5 shows a plan of the slide-valve top. Fig. 6 is a plan view of an adjustable bearing which is fixed in the side of the head of the jib.

In carrying our invention into effect we employ a crane similar to an ordinary wall-crane, which is capable of angular movement round its post, so as either to lie flat against the wall, generally under the architrave of a window, or to project at right angles thereto. The supports are preferably fixtures secured to the side of a building. The said crane has a telescopic and adjustable arm or jib, the inner tube or arm B of which slides freely, by means of the two friction wheels or rollers *b b*, which are fitted on the inner tube or arm B, within the larger tube A. *b'* is a binding-screw which may be used to lock the tube B in any desired position. The said tube or arm B carries at its free end a head or device, which will hereinafter be termed the "governor," or speed-varying device, C. This device C is shown in Fig. 1 with one side of its case removed and in Fig. 2 on a larger scale. The said device C is constructed as follows: Over a sprocket-wheel pulley D passes the lowering means, conveniently consisting of a rope or chain E, by means of which the bodies are lowered to the ground when required. The said pulley D is cogged on one side or flanged and is keyed to the spindle F, which is capable of rotation in the bearings *f f*, Fig. 2, fixed on the sides of the frame *c'*.

G is a cog-wheel fixed on the spindle H, which is carried by the bearings *h h*, fixed to the frame *c'*. The wheel G gears with the flange *d* of pulley D. Fixed also on the spindle H is a spur-wheel J, which gears with the pinion K, which is fixed on the spindle L, which turns in the bearings *l l*, fixed to the frame. On the spindle L is also a pinion M, which gears direct with the flange *d* of pulley D when the said spindle L is moved to the right in the direction of its length, so that the wheel K no longer engages with the wheel J. At both ends of the spindle are the catches *l' l²*, *l²* bearing against the end of the spindle L when the high-speed gear *d*, G, J, and K are in use and *l'* bearing against the other end of the spindle when the slow-speed gearing *d* M is in action. By the above-described construction a changeable gear is produced which is susceptible of being shifted or changed from high speed to low speed. On the spindle L is also an eccentric-wheel N, fixed to a guide-wheel N'. A feather-way is cut through N N', and the feather *n*, fixed in spindle L, permits N N' to slide on it. The guide-wheel N' engages with a bracket c^3, (shown in dotted lines in Fig. 3,) which is fixed to the curved part of the frame *c'*, whereby the eccentric-wheel N is maintained in one position whether the spindle L is moved either in or out—that is to say, to the right or left. On the eccentric N (see Fig. 3) is fitted the eccentric-strap *n'*, to the upper side of which is journaled the spindle n^2 of the L-shaped lever n^3. The lever n^3 is pivoted by its spindle n^4 to the bracket c^3, (shown by dotted lines,) so that the free end of the said lever n^3 is given an angular reciprocating motion by the rotation of the eccentric N. The lever n^3 (see Fig. 4) terminates at its free end in a fork-shaped

piece with inwardly-pointing spindles n^5 n^5. On these are journaled two levers n^6 n^6, which at their other ends are connected by means of spindles n^7 (see Fig. 1) to the sides of a boss n^8 on the piston-rod o of the piston O. (Shown in section.) The levers n^6 n^6 convert the angular reciprocating motion of the lever n^3 into a rectilinear horizontal reciprocating motion of the piston-rod o. The said piston-rod o (see Fig. 1) slides in the bearing o', fixed in the end of the arm B, (in some cases we allow the piston to slide in a bearing fixed in the open end of the cylinder,) and the other end of the said piston-rod is connected to a piston O, which slides in an air-tight manner in the cylinder P. (Shown partly in section in Fig. 1.) By this arrangement of parts a horizontal movement is given to the piston O by means of the rotation of the pulley D and the intermediate gearing hereinbefore described, and motion is given to the pulley D by a descending body causing the rope or chain E to travel.

In Fig. 2 is seen an end view of the cylinder P with the piston O removed. p is a passage shown by dotted lines near the closed end of the cylinder P. This passage communicates with a pipe p', the adjacent ends of the sections being united by means of a union p^2. The said pipe communicates with a port q, cut in the cylinder q' of a cylindrical slide-valve Q. The said cylindrical slide-valve is shown partly in section in Fig. 2. The cylinder q' is open to the air at its upper end. (See Fig. 5.) A screwed spindle q^2 runs through the axis of the cylinder and is retained in bearings in its top and bottom. On the spindle q^2 is a hollow cylindrical slide q^3, threaded at its top and bottom ends, so as to engage with the thread of the spindle q^2. This slide q^3 fits in an air-tight manner in the cylinder q', but is open at its upper and lower ends to the air, and a series of port-holes q^4 is cut in that part of the said slide that is in contact with the port q when the said slide is half-way on its travel. The port-holes q^4 are cut at such positions that the top and bottom ones coincide with the top and bottom of the port q when the said port-holes are opposite the said port. The slide q^3 being a little more than three times the length of the port q, a space slightly greater than the length of the port q is left above and beneath the port-holes q^4. Fig. 2 shows the slide q^3 almost at the top of its path and the port q closed by the lower part of the slide q^3. To the lower end of the spindle q^2 is keyed a bevel-wheel R, which engages with a bevel-wheel R′ on the main spindle F and is driven by it. The wheel R is pressed against the wheel R′ by means of an adjustable bearing S, (indicated in dotted lines in Fig. 3 and shown separately in Fig. 6,) which engages with the spindle q^2. To prevent the slide q^3 turning, a pin q^5 protrudes from the side of the slide q^3 and slides in a slot q^6, cut in the case q', Figs. 1 and 3, and also in the cover of C, the case q' being partly let into the cover c' of C, as is seen in Fig. 2.

In Fig. 1 the post T is fixed at the side of a window for symmetry, the same being fixed to the building or other structure, preferably, in an immovable manner, and into a recess t^2, cut in its side, the end of the head C may be moved. The other post T′ is securely held by the bearing-blocks t and t', made fast to the building, and is in rigid connection with the jib.

U is a case shown in section, which contains a guide-wheel u' and a jockey-wheel u^2. The wheel u' guides the chain or rope E to or from the post T′ through orifices cut in the case U and the post T′. The wheel u^2 keeps the chain or rope E on the wheel u'.

u^3 and u^4 are two guide-wheels which may be used to support the chain or rope E in festoons when in rest, or they may be used for it to run on, though it generally runs free of them when in use.

u^5 is a jockey-wheel to keep the chain on the pulley-wheel D.

V is a rack and pinion operated by a handle v, so that the apparatus may be raised so as not to cut off too much light from the window where it is placed when the crane is not in use.

v' is a guide for the rack. The rack-and-pinion device is also used to lower the crane in case of need for use.

The crane is held in its raised position by the handle of the winch being doubled over into the hole v^2 in the post T′. The chain or rope E may be conducted over suitable guide-pulleys into the room and coiled on a drum, if required. In the case of the chain or rope being an endless one a bight or loop is taken into the room. In the case of a tail rope or chain, as in Fig. 1, a body-strap may be fixed at each end. When body-straps are employed, in the case of an endless rope or chain, they are placed half the length of the rope or chain apart.

In order that the action of our invention may be readily understood, we shall proceed to describe its use as a fire-escape, and we shall assume that a tail-rope is employed. In this case the body of the person wishing to escape is fastened to the body-strap at one end of the rope, if it be at the top, and the jib is then placed at right angles to the wall. On jumping clear the weight of the body causes the rope or chain E to descend and the pulley D to rotate. The slide q^3 is in the position shown in Fig. 2 in starting and the port q closed by the lower part of the slide q^3 being over it, so that the pulley D can only move the piston O slowly, because it is working in a closed dash-pot. As the body descends the air is given freer ingress and egress, because the rotation of the spindle q^2 by the bevel-wheels R′ and R has brought down the said slide q^2, so that more and more of the port-holes q^4 are opposite the port q. When the body is half-way to the ground, the port-holes q^4 are all opposite the port q. Con-

sequently the speed of descent is at its greatest, air being freely admitted and expelled by the piston O. As the body nears the ground the speed is lessened by a smaller number of port-holes q^4 being over the port q. When the body is about to touch the ground, the speed of descent is at its minimum, because all port-holes q^4 are now past the port q and no air is admitted or expelled. The body-strap at the other end of the tail-rope is now in a position for the next descent, the pulley and apparatus working in the reverse direction, but going through the same cycle of operations and giving the same results as before.

The speed at which bodies are lowered to the ground will vary according as shaft L is in the position shown in Fig. 2 or is moved to the right, so as to bring wheel M into engagement with cogged flange d, as hereinbefore explained.

In describing the action of our invention we have referred to the employment of a rope, whereas in the drawings we have shown pulley D as a sprocket-wheel. It will of course be understood that with such a sprocket-wheel we employ a suitable chain, and that when we employ a rope we use a suitable form of rope-gripping pulley instead of the sprocket-wheel.

Having fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a lowering-crane, the combination with the lowering means, of connected mechanism actuated by the lowering means for governing the initial movement and permitting a progressive increase and gradual decrease in the movement of the lowering mechanism.

2. In a lowering-crane, the combination with a supporting-arm and a lowering means, of a governing device for the lowering means comprising means for initially impeding and finally interrupting the movement of the lowering means and permitting an uninterrupted intermediate movement.

3. In a lowering-crane, the combination with a support and a lowering means, of a governor comprising means for progressively increasing the movement of the lowering means and subsequently progressively decreasing the movement thereof, substantially as described.

4. In a lowering-crane, the combination with the support, of a lowering means, a governor comprising a cylinder and a piston working therein and connected with said lowering means, means for admitting fluid or releasing it from the cylinder, and means actuated by the lowering means for governing the action of said fluid admitting and releasing means, substantially as described.

5. The combination of means for lowering a load, a cylinder, a piston in said cylinder connected with said lowering means, and a valve for governing the admission of fluid to said cylinder, said valve consisting of a member adapted to move across a port of said cylinder and having a series of openings, substantially as described.

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DAVID WILLIAMS.
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