

No. 690,630.

Patented Jan. 7, 1902.

A. C. BATES.
ROCK DRILL.

(Application filed Apr. 6, 1901.)

(No Model.)

4 Sheets—Sheet 1.

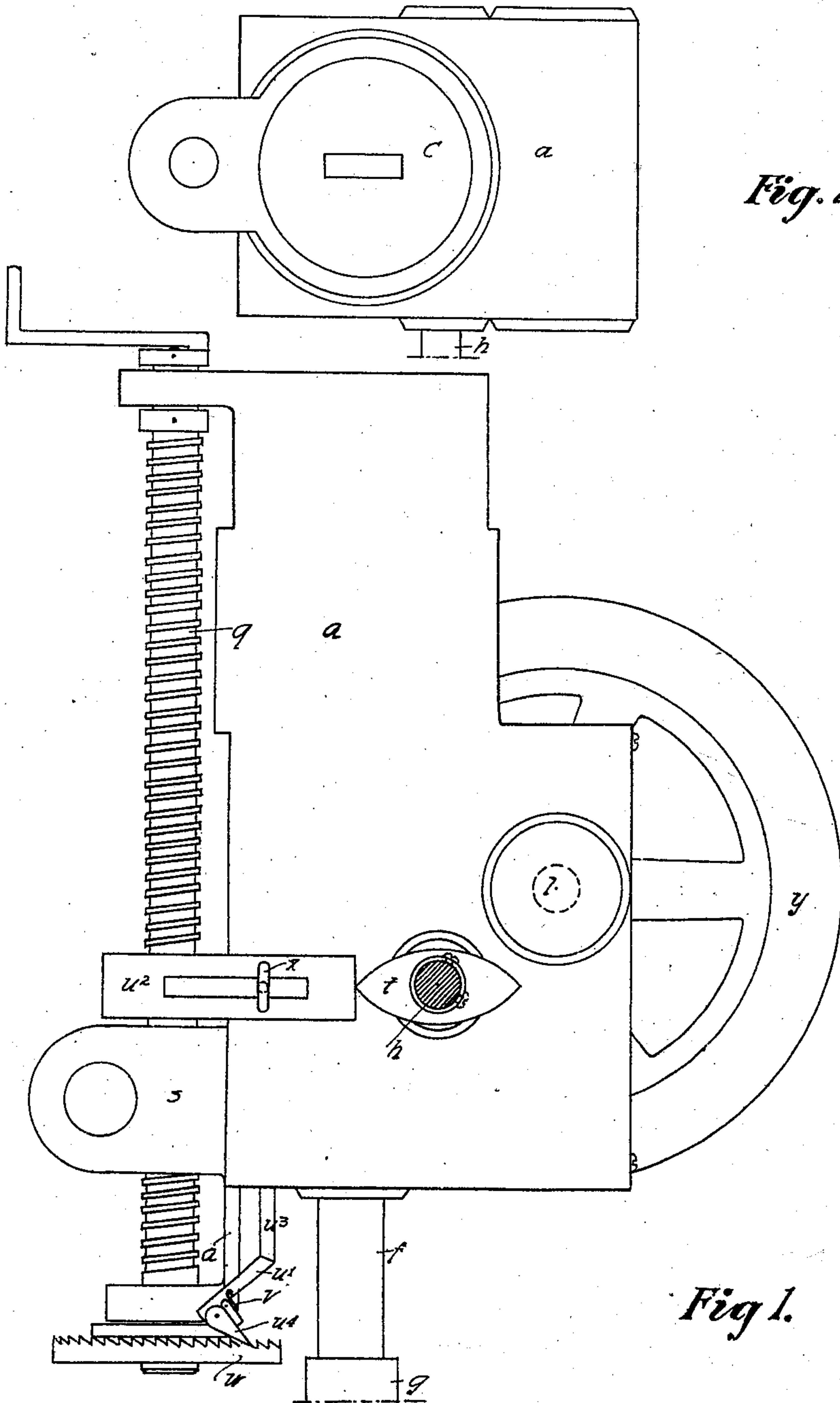


Fig. 2.

Fig. 1.

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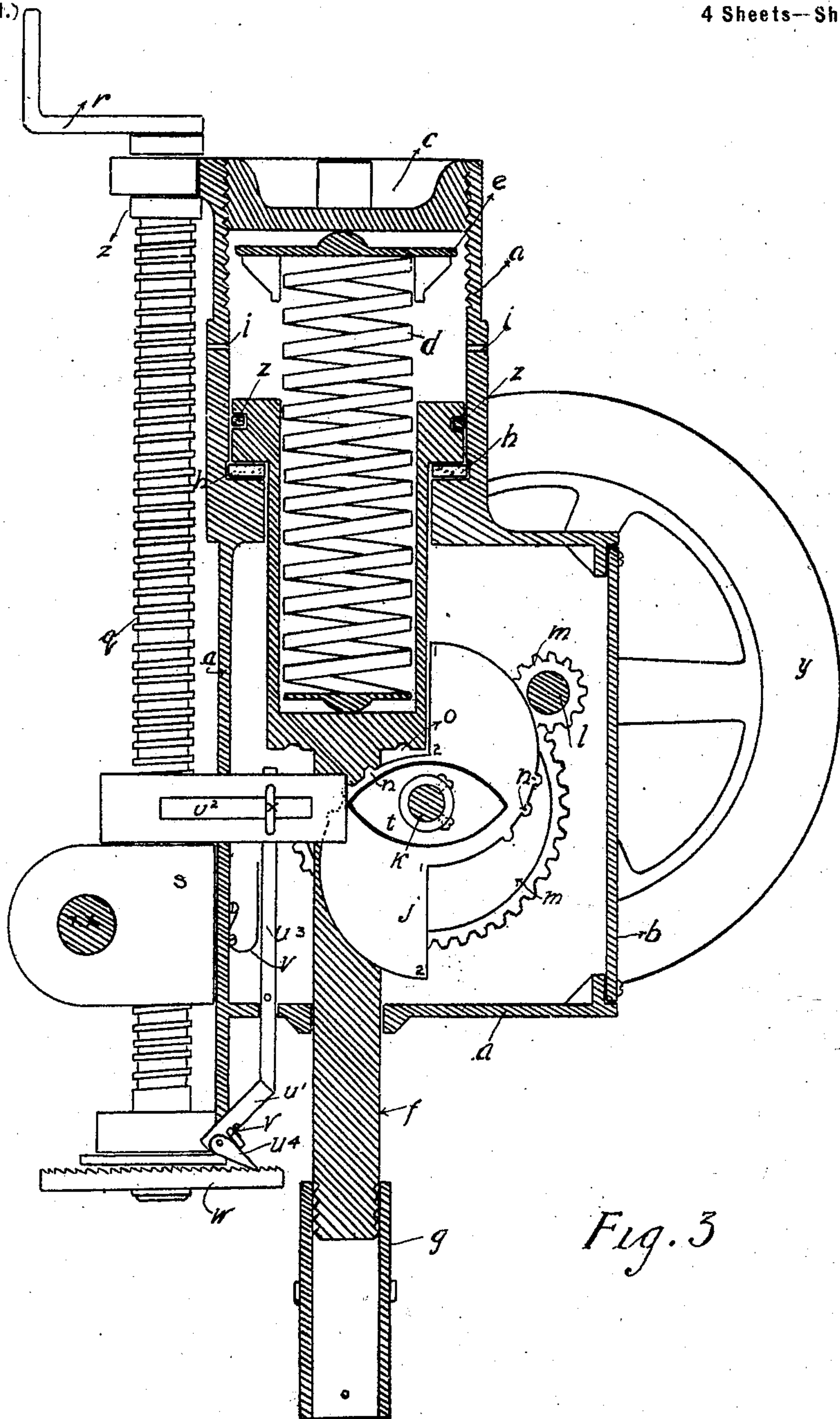


Fig. 3

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Fig. 4^a

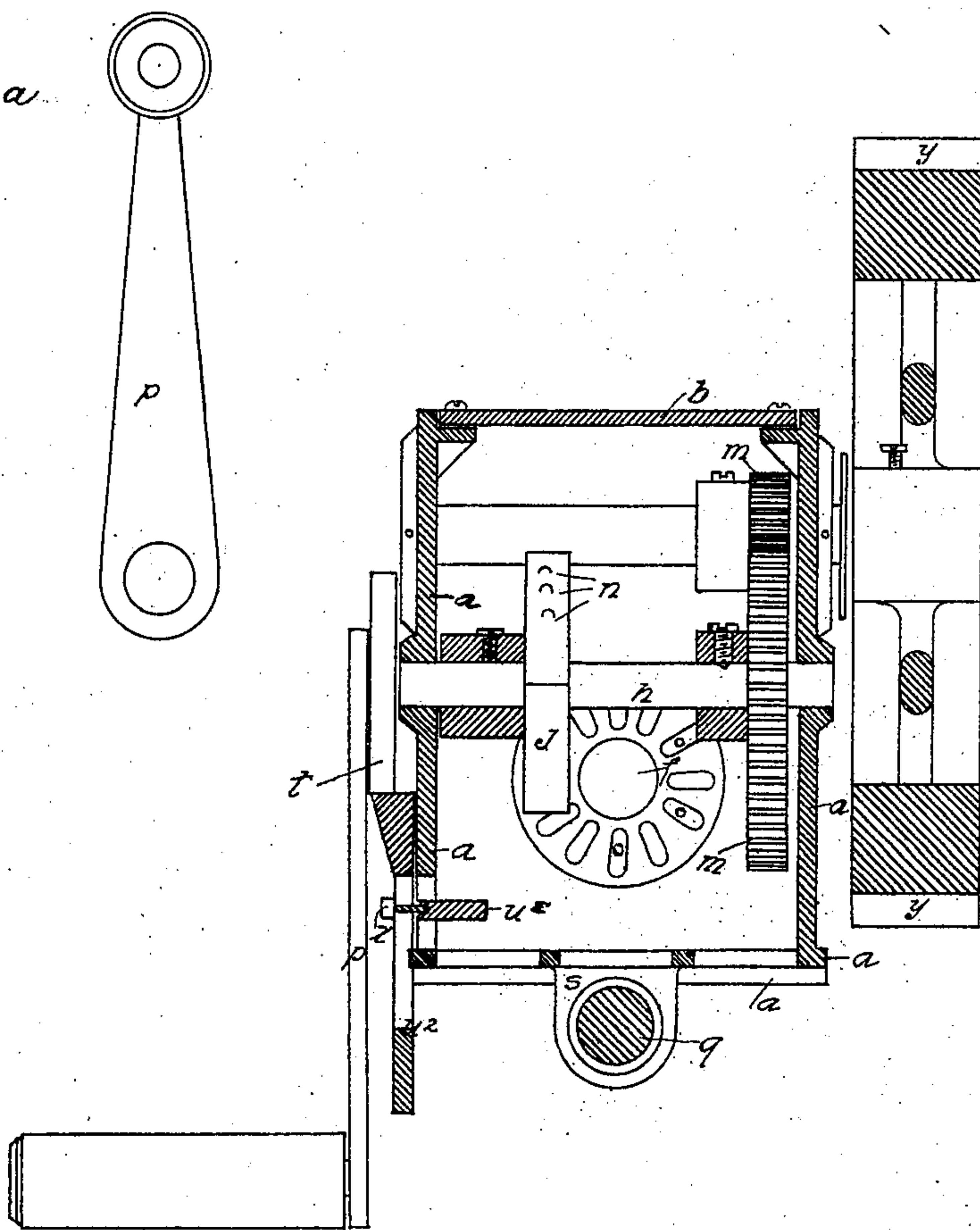


Fig. 4.

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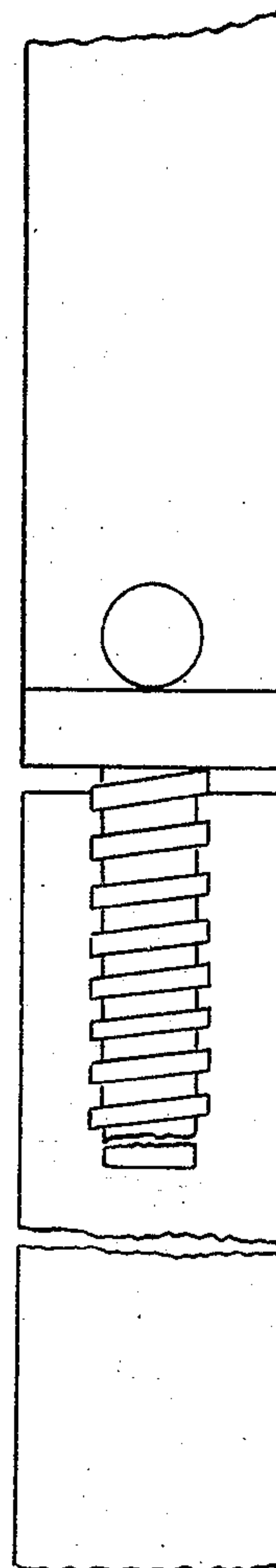
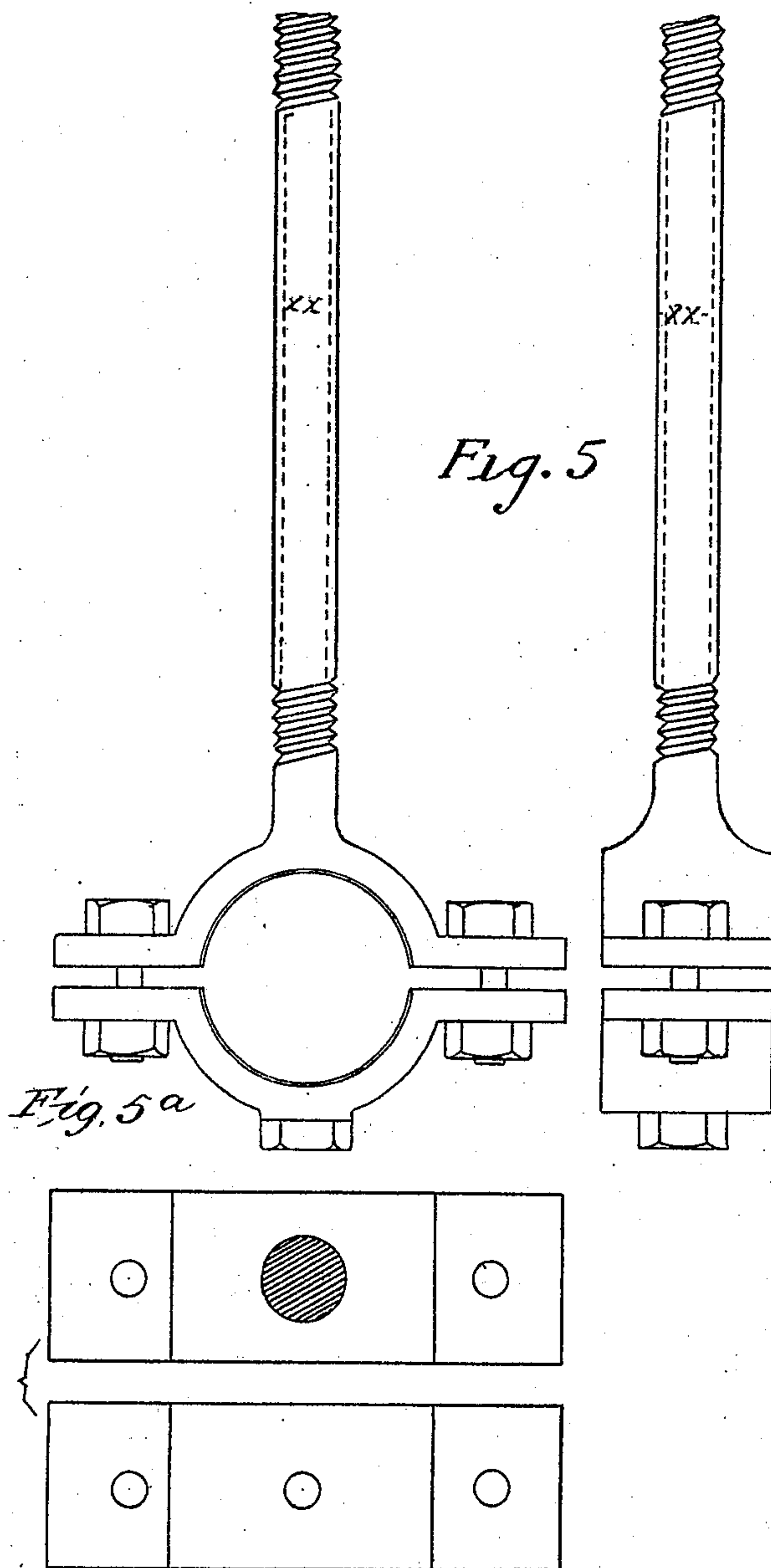


Fig. 6

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UNITED STATES PATENT OFFICE.

ARTHUR C. BATES, OF SAN FRANCISCO, CALIFORNIA.

ROCK-DRILL.

SPECIFICATION forming part of Letters Patent No. 690,630, dated January 7, 1902.

Application filed April 6, 1901. Serial No. 54,759. (No model.)

To all whom it may concern:

Be it known that I, ARTHUR C. BATES, a citizen of the United States, residing at the city of San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Rock-Drills, of which the following is a specification.

My invention relates to improvements in rock-drills.

The objects of the said invention are to provide a rock-drill whereby the jarring or straining heretofore experienced in the use of such machines is obviated and the drill is twisted automatically before the striking of a blow, as well as released from twisting should it stick in the drilled hole, and which mechanism may be adjusted so as admit of operation at any desired angle and accomplishes the art of drilling with ease and rapidity, such invention being illustrated in the accompanying drawings and set forth and pointed out in the following specification and appended claims, the said machine being preferably constructed of steel and iron.

As to the drawings, Figure 1 is a side elevation of the drill and frame. Fig. 2 is a plan view of the top of the drill-box. Fig. 3 is a longitudinal section through the drill-box with the side of said box and crank removed. Fig. 4 is a transverse section looking toward *c* of Fig. 3, through point *k*. Fig. 4^a is an elevation of the driving-crank. Fig. 5 shows the bolt attachment hereinafter mentioned. Fig. 5^a is a plan of the clamp. Fig. 6 shows the post, tripod, or frame-screw joint to raise or lower the drill to the desired position.

In the figures as shown in the accompanying drawings, reference thereto being had, *a* represents the frame of the machine. *b* represents the cover to the same secured thereto by screws. A cap to regulate the pressure on the spiral spring *d* is shown at *c*. The washer *e* in contact with said cap, having its outward side provided with a centrally-positioned knob, so accommodates itself with said cap as to keep the spring in its proper position. The plunger *f*, being a continuation of the spring-case, has its end threaded, so as to admit of the firm attachment thereto of the collar *g*, which secures the drill, by means of set-screws.

h represents packing for preventing the es-

cape of compressed air. The holes *i* admit air in the chamber-space between *h* and *i* when cam *j* in compressing the spring *d* has forced back the spring-case so that the lugs thereof are beyond the holes. Upon the release of the plunger *f* from cam *j* at point *l* compressed air is formed in the chamber-space aforesaid after the passing of the flange or head of the spring-case beyond such holes and toward the packing mentioned.

k represents the cam-shaft, and *l* the shaft of the balance-wheel *y*, and *m* shows spur-gearing for the movement of the balance-wheel, *n* spurs on cam *j* for twisting the drill attached to plunger *f*, such spurs being received in pockets *o* of the same.

p represents the crank-shaft and handle, *q* the feed-screw in Figs. 2 and 4, and *r* the feed-screw handle for changing the position of the machine.

At *s* is shown a carriage for the drill-box to move on and at *t* a cam for an automatic feed, the letter *u* as numbered showing parts of such feed, the spring *v* being for forcing the part *u* toward cam *t* and the pawl *u* engaging with the teeth of the wheel *w* for the revolution of such wheel.

x x show a threaded bolt to fit carriage *s*, and *z* set-screws and packing-rings for tightening parts. The bolt *x x* (shown in Fig. 5) is threaded so as to fit carriage *s*, as shown in Fig. 3, at place marked *x x*, and the drill-box is thereby adjustable, so that a hole may be drilled at any angle, such bolt being attachable to a post, tripod, or frame admitting of the drill being operated either in a tunnel or on the surface.

To operate the machine, it is first secured and adjusted in the tunnel, as desired. The crank *p* is then turned, causing shaft *k* to revolve and with it cams *j* and *t* and wheel *m*, cam *j* in its revolution from the inner point 2, as shown in Fig. 3, to the outer point 2, describing a semicircle and forcing back plunger *f* and compressing spring *d* until the latter point is attained, when the plunger being released the resilience of the spring forces the drill against the rock to be drilled, the operation being repeated by the coming into position of the remaining half of the cam-wheel, the turning of the latter also causing the sprockets *n* to enter the pockets *o*, im-

parting a twisting movement to the drill and the following disengagements of the sprockets being advantageous in the event of the drill becoming fixed in the aperture. The formation of a cushion of compressed air, as hereinbefore described, and the creation of air-pressure relieves a hand-operating or electric drill-machine from jarring at the time of impact of the drill, stops the vibration of the spring, and is particularly beneficial in removing the sudden strain on the arm of the operator or any other power for the working of the same heretofore experienced in the use of other machines for drilling rock. The revolution of the cam t alternately depresses and allows to rebound by the action of spring v , part u^2 of the feed attachment imparting a reciprocating motion to rod u and causing pawl w^1 to become engaged successively with the teeth of wheel w for the revolution of the latter and the consequent forward movement of the machine. It should be added that the cam-shaft may be operated by being geared to a counter-shaft, if desired.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a rock-drill a machine-casing having a forward and rear chamber, said forward chamber inclosing parts of its mechanism and said rear chamber being provided with vents for admitting air therein, a plunger provided with a recess for inclosing a spring to drive it forward and having a flange or head at the mouth of said recess adapted to fit closely against the walls of said rear chamber so as to permit of the formation of a cushion of compressed air between said flange or head and the forward inclosed part of said rear chamber surrounding the recessed portion of said plunger slidable therein, in combination with a cam-wheel having two parts for successively forcing back said plunger and compressing said spring and suddenly releasing the same, and having spurs on the rim thereof to act in conjunction with pockets in said plunger opposite thereto for twisting the same, a cam adapted consecutively to act upon and release a feed attachment provided with a pawl arranged to engage the teeth of a ratchet-wheel attached to a feed-screw for the forward movement of the machine, substantially as described.

2. In a rock-drill a machine-casing having a forward and rear chamber said forward chamber inclosing parts of its mechanism and said rear chamber being provided with vents for admitting air therein, a plunger provided with an open recess for inclosing a spiral spring to drive it forward the ends of said spring resting against metallic washers having their outer sides provided with centrally-positioned rounded knobs so as to permit of the proper adjustment of the spring, the forward washer being in contact with the inner inclosed end of said recess, the rear washer being in contact with the threaded movable

cap to regulate the spring-pressure said plunger having a flange or head at the mouth of said recess adapted to fit closely against the walls of said rear chamber so as to permit of the formation of a cushion of compressed air between said projections or lugs and the forward inclosed part of said rear chamber surrounding the recessed portion of said plunger slidable therein, in combination with a cam-wheel having two parts for successively forcing back said plunger and compressing said spring and suddenly releasing the same and having sprockets on the rim thereof to act in conjunction with pockets in said plunger opposite thereto for twisting the same, a cam adapted consecutively to act upon and release a feed attachment provided with a pawl arranged to engage the teeth of a ratchet-wheel attached to a feed-screw for the forward movement of the machine, substantially as described.

3. In a rock-drill a machine-casing having a front and a rear chamber, said front chamber containing a main shaft and a cam-wheel and gearing for the movement of a balance-wheel attached to a counter-shaft, a plunger for the working of a drill operating through the same, said plunger consisting of a shaft provided with a collar for holding a drill and having a recess in its rear end for holding a spring for driving said plunger forward, said plunger at the mouth of said recess having a flange or head presenting a straight surface to the inner sides of said rear chamber and slidable against said sides, the front wall of said rear chamber having an opening for the operation of the rear section of said plunger therein and the inner surface of said wall being inclosed by expansible packing so as to prevent the escape of compressed air from the cushion thereof formed on the release of said spring, between the said lugs and said packing opposite thereto, said rear chamber having vents in its sides and the rear wall thereof consisting of a threaded cap adjusted to the opening of said rear chamber for the shortening of said spring as may be desired, in combination with a cam-wheel having two parts for successively forcing back said plunger compressing said spring and suddenly releasing the same and having spurs on the rim thereof to act in conjunction with the pockets in said plunger opposite thereto for turning the same, a cam adapted to act upon and release a feed attachment provided with a pawl arranged to engage the teeth of a ratchet-wheel attached to a feed-screw for the forward movement of the machine, said feed attachment consisting of a centrally-pivoted bar, a rectangular block having a slot, a thumb-screw securing said block to said bar through said slot said bar having an angular branch and said pawl being pivotally connected therewith substantially as described.

4. In a rock-drill a machine-casing having a forward chamber and a rear chamber, a plunger with means for holding a drill, said plun-

ger moving through apertures of said chambers and actuated by a spring to drive it forward, said plunger provided with an open recess containing a spring having rear lateral extensions presenting a straight surface to the inner sides of said rear chamber and moving in contact therewith the front walls of the said front and rear chambers having an aperture for the movement of said plunger therein and the inner surface of said wall being inclosed by expansible packing so as to prevent the escape of compressed air from the cushion thereof formed on the release of said spring for the propulsion of said plunger between said extensions and said packing opposite thereto said rear chamber having vents in its sides and the rear wall thereof consisting of a threaded cap adjusted to the opening of said rear chamber for the shortening of said spring as desired, in combination with a cam-wheel having two parts for successively forcing back said plunger and compressing said spring and suddenly releasing the same and having spurs on the rim thereof to act in conjunction with the pockets in said plunger opposite thereto for turning the same, a cam adapted to act upon and release a feed attachment provided with a pawl arranged to engage the teeth of a ratchet-wheel attached to a feed-screw for the forward movement of the machine, said feed-screw having a handle for the backward movement of the same, and said machine having means for the regulation of the same and its adjustment to any angle or position desired, substantially as described.

5. In a rock-drill a machine-casing having a forward chamber and a rear chamber said forward chamber inclosing parts of its mechanism and said rear chamber being provided with vents for admitting air therein, a plunger provided with an open recess for inclosing a spiral spring to drive it forward the ends of said spring resting against metallic washers having their outer sides provided with centrally-positioned rounded knobs so as to permit of the proper adjustment of the spring and reducing friction arising from the turning movement of the plunger, the rear washer being in contact with a threaded movable cap to regulate the pressure of the spring, said plunger having outer projections at the

mouth of said recess adapted to fit closely against the inner sides of said rear chamber and so as to permit of the formation of a cushion of compressed air between said projections and the forward inclosed parts of said rear chamber surrounding the recessed portion of said plunger slidable therein, in combination with a cam-wheel having two parts for forcing back said spring and suddenly releasing the same and having spurs on the rim thereof to act in conjunction with pockets in said plunger opposite thereto for turning the same, a cam adapted to act upon and release a feed attachment provided with a pawl having a spring bearing against the same and arranged to engage the teeth of a ratchet-wheel attached to a feed-screw for the forward movement of the machine and said feed attachment consisting of a centrally-pivoted bar and spring, a rectangular block having a slot, a thumb-screw securing said block to said bar through said slot and said bar having an angular branch, said pawl being pivotally connected therewith substantially as and for the purpose described.

6. In a rock-drill a machine-casing having a front and a rear chamber and containing a plunger having a flange or head presenting a straight surface to the inner sides of said rear chamber and slidable against said sides, the front wall of said rear chamber having an opening for the operation of the rear section of said plunger therein and the inner surface of said wall being inclosed by expansible packing so as to prevent the escape of compressed air from the cushion thereof formed on the release of the spring contained within the recess in the rear section of said plunger between the said flange or head and said packing opposite thereto, and said rear chamber having vents in its sides for admitting air therein, such cushion being formed to prevent the jarring of the machine in the operation thereof all substantially as shown and described.

In testimony whereof I affix my signature in presence of two witnesses.

ARTHUR C. BATES.

Witnesses:

JAMES F. HOUGH,
GEO. W. STEWART.