

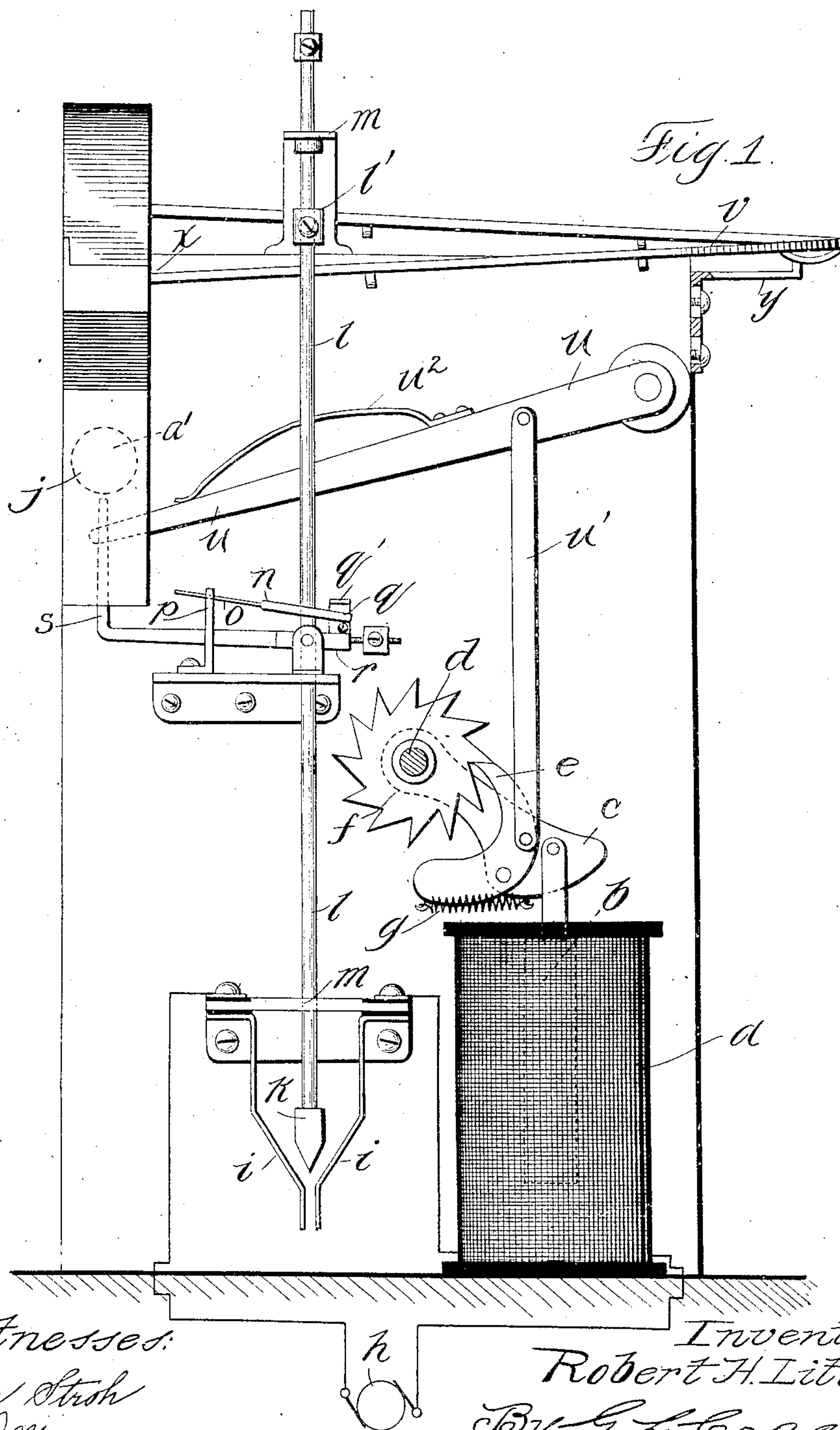
No. 843,286.

PATENTED FEB. 5, 1907.

R. H. LITTLE.
POWER TRANSMISSION MECHANISM.

APPLICATION FILED DEC. 11, 1905.

2 SHEETS—SHEET 1.



Witnesses:
Leon Stroh
W R Macdonald.

Inventor:
Robert H. Little
By G. L. Cragg
Attorney.

No. 843,286.

PATENTED FEB. 5, 1907.

R. H. LITTLE.
POWER TRANSMISSION MECHANISM.

APPLICATION FILED DEC. 11, 1905.

2 SHEETS—SHEET 2.

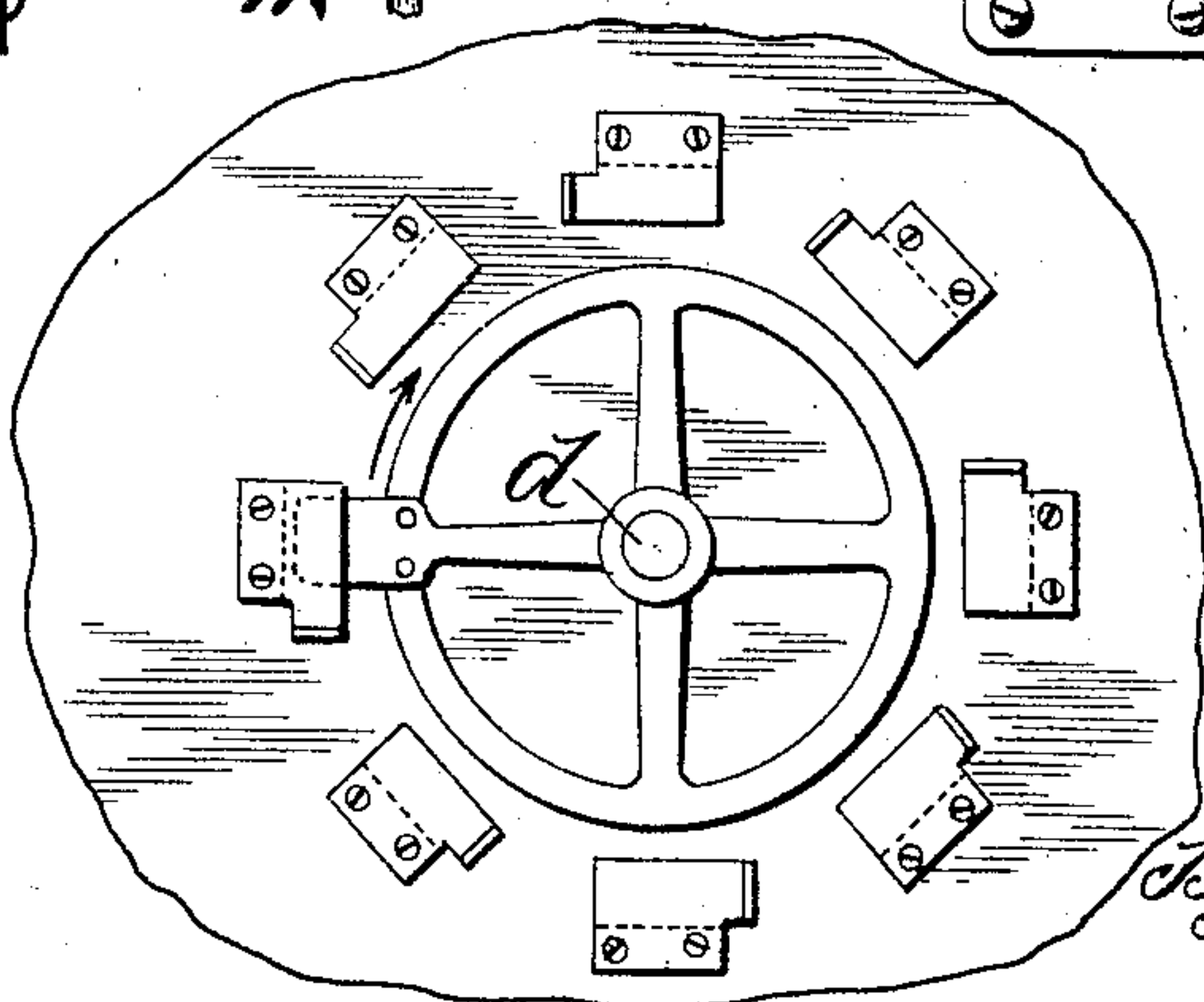
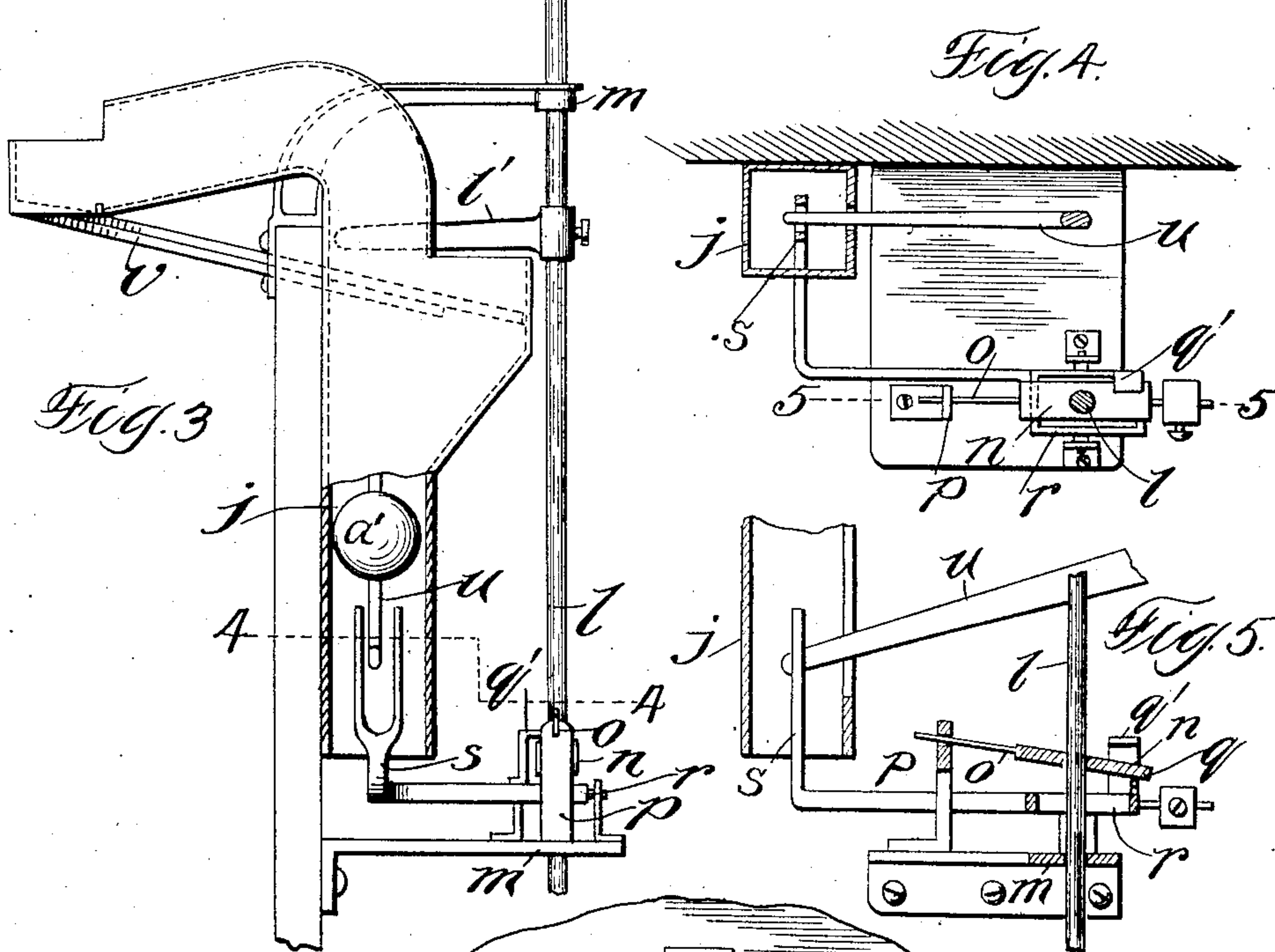
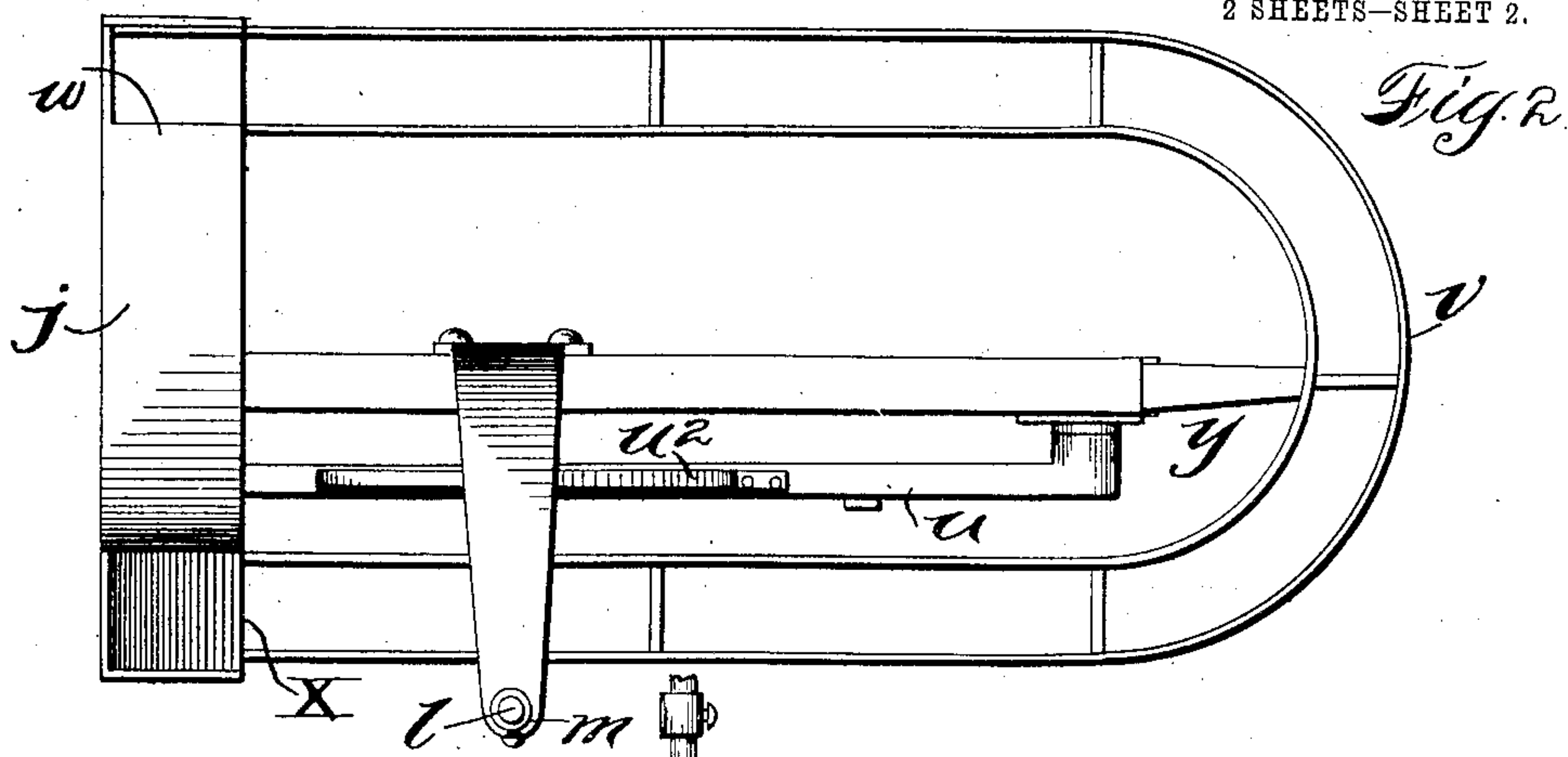


Fig. 6
Witnesses:
W. R. Macdonald.
Leon Strub

Inventor
R. H. Little
By L. L. Cragg
Attorney.

UNITED STATES PATENT OFFICE.

ROBERT H. LITTLE, OF CHICAGO, ILLINOIS, ASSIGNOR TO TALBOT & HOLST,
OF CHICAGO, ILLINOIS, A FIRM.

POWER-TRANSMISSION MECHANISM.

No. 843,286.

Specification of Letters Patent.

Patented Feb. 5, 1907.

Application filed December 11, 1905. Serial No. 291,203.

To all whom it may concern:

Be it known that I, ROBERT H. LITTLE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Power-Transmission Mechanism, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to power-transmission mechanism, and has for its object the provision of improved means whereby loads may be intermittently operated, the invention being of particular service where the load is operated by a load-bearing rotatable shaft. This apparatus is very useful, for example, in the operation of rheostats and the commutating switches of "flashers."

In the device of my invention I provide a motor for effecting the operation of the load, a switch governing the effect of the motor upon the load-actuating element, and a switch-controlling device intermittently operated by the motor. The motor I prefer to employ is a solenoid that desirably actuates a pawl engaging a ratchet-wheel upon the load-operating shaft. The switch that I prefer to employ is a loop-switch having two members in the form of spring-fingers normally separate and included in series with the motor-winding and a source of current, said switch including a plunger which is intermittently depressed through the agency of the switch-controlling device. Said switch-controlling device preferably comprises a ring-clutch surrounding a rod carrying the plunger, a swinging frame serving to engage the clutch, and a ball or weight engaged by a motor-driven part and intermittently moved to engage the frame and release the plunger. Thus the motor intermittently effects its own operation.

In order that sufficient time may elapse between the operations of the motor, a track is provided of a length suited to the intervals between operations, the motor thrusting the ball upon the track, along which it must run before it can operate upon the swinging frame. Each time the ball engages the swinging frame the plunger is depressed, being immediately elevated when the ball has

been thrown up by the motor, as the swinging frame is then permitted to assume its normal position and cause the ring-clutch to engage and elevate the rod of the switching device, the rod being thus elevated until the ball has again traveled its track and come into engagement with the swinging frame, when the operation is repeated. The swinging frame constitutes the preferred form of the releasing device, though I do not wish to be limited to the specific details of the switch-controlling mechanism illustrated.

I will explain my invention more fully by reference to the accompanying drawings, in which—

Figure 1 is a view in side elevation of apparatus constructed in accordance with the preferred embodiment of my invention, certain circuit connections being diagrammatically indicated. Fig. 2 is a plan view of the apparatus. Fig. 3 is an end view of a part of the structure. Fig. 4 is a sectional view on line 4 4 of Fig. 3. Fig. 5 is a view in cross-section on line 5 5 of Fig. 4. Fig. 6 is a view in elevation of one form of load, being in this instance the circuit-changing switch of a flasher.

Like parts are indicated by similar characters of reference throughout the different figures.

The motor *a* is desirably a solenoid whose core *b* is connected with the rocker-arm *c*, mounted in this instance to rotate upon and with respect to the power-transmitting shaft *d*. The motor is desirably placed in driving connection with the shaft through the agency of a pawl *e*, carried by the rocker-arm, and a ratchet or rack-wheel *f*, fixed upon the shaft. Each time the solenoid is operated the core thereof is elevated, causing the pawl to rotate the wheel *f* and its shaft a step. Upon the return of the core the pawl escapes the wheel against the tension of the spring *g*, that exerts a thrusting effort upon said pawl toward said ratchet-wheel.

The winding of the motor *a* is included in circuit with a source of electricity *h* and the springs *i* of a switch controlling the circuit containing said source. A plunger *k* forms a part of said controlling-switch, serving when depressed to electrically connect the spring-contacts *i*, said plunger being preferably made

of carbon. The plunger is carried by a plunger-rod *l*, that is directed in its travel by bearings *m* near its ends. A ring-clutch *n* surrounds an intermediate portion of the clutch-rod, normally frictionally engaging the rod *y*, having an extension or end portion *o* in engagement with a stationary stop *p* and its opposite end portion *q* engaging a movable or rotatable frame *r*, which in this instance is pivoted between its ends. Said frame *r* is also provided with an overlapping stop *q'*, which prevents the clutch *n* from being raised with the plunger-rod. The frame is further desirably provided with a bifurcated end *s*, projecting into the lower end of the chute *j*. A ball or roller *a'* constituting a rolling or traveling weight is designed to rest upon the frame to depress the same when thus engaged to effect the elevation of its other end and the consequent disengagement of the ring-clutch from the rod. A swinging arm *u* projects between the bifurcated portions of the end *s* in position to engage the ball when said arm is elevated and remove the same from the frame, whereupon the said clutch will again engage the switch-rod to elevate the same and open the circuit containing the motor. The arm *u* is articulated to the rocker-arm *c* by means of a link *u'* and in this preferred way is subject to the action of the motor. Thus each time the ball falls upon the bifurcated parts *s* of the frame the switch is operated to close circuit through the motor, whereafter the arm is immediately elevated by the motor to remove the ball, whereupon the swinging frame operates the ring-clutch to lift the plunger and open the circuit. Such movement of the swinging frame is not very great. I prefer to supplement its action in causing the ring-clutch to elevate the plunger by having the arm *u* strike the plunger-rod each time said arm is elevated, to which end the arm is provided with a leaf or cushion spring *u²* and the rod with a finger or bracket *l'*, so that the engagement between the arm and rod while positive need not be forcible. When the ball returns to the swinging frame or other clutch-releasing device the switch is again closed, the motor again operated, and the ball again removed, with the same result as before. Obviously the motor has actuated its load the predetermined step simultaneously with effecting the removal of the ball.

In order that the ball may be guided in its travel, the chute *j* is provided. In order that the length of the intervals between the engagements of the ball with the swinging frame may be made sufficient, a track *v* is provided in front of the exit *w* of the chute, said track conveying the ball away from said exit toward the mouth *x* thereof. If it is desired to decrease the lengths of intervals between the impacts, a number of balls may be used. A further regulation of the lengths of said inter-

vals may be secured by regulating the degree of inclination of said track, which adjustment may be obtained by means of the support *y*, that is adapted to be adjusted vertically in place.

It is obvious that changes may readily be made in the form of the invention shown without departing from the spirit of the invention. I do not, therefore, wish to be limited to the precise construction shown; but,

Having thus described my invention, I claim as new, and desire to secure by Letters Patent, the following:

1. The combination with a solenoid, of a shaft to which motion is to be imparted, a ratchet-wheel upon the shaft, a rocker-arm upon and rotatable with respect to the shaft, said rocker-arm being connected with the core of the solenoid, a pawl mounted upon the rocker-arm and engaging the ratchet-wheel, a spring connecting the pawl with the rocker-arm to engage said pawl with the ratchet-wheel, a switch comprising spring-fingers and circuit-closing plunger for connecting the fingers, a rod carrying the plunger, a bracket provided upon the rod, a swinging arm articulated to the rocker-arm, a spring carried by the swinging arm and serving to engage the bracket to elevate the plunger, a ring-clutch engaging the plunger-rod, a swinging frame engaging the said clutch, said frame having a bifurcated end between the bifurcated portions of which said swinging arm projects, a rolling weight adapted to rest upon the bifurcated end of said frame, a chute guiding said weight to the frame and a rack leading from an exit-opening of said chute to its receiving-mouth and serving to convey the rolling weight back to the chute after being discharged therefrom by the swinging arm, substantially as described.

2. The combination with a solenoid, of a shaft to which motion is to be imparted, a ratchet-wheel upon the shaft, a rocker-arm upon and rotatable with respect to the shaft, said rocker-arm being connected with the core of the solenoid, a pawl mounted upon the rocker-arm and engaging the ratchet-wheel, a switch including a circuit-closing plunger, a rod carrying the plunger, a swinging arm operated by the motor and adapted to engage the plunger, a clutch engaging the plunger-rod, a releasing device engaging said clutch, a rolling weight adapted to rest upon the releasing device, a chute guiding said weight to the releasing device and a track leading from an exit-opening of said chute to its receiving-mouth and serving to convey the rolling weight back to the chute after being discharged therefrom by the swinging arm, substantially as described.

3. The combination with a solenoid, of a shaft to which motion is to be imparted, a ratchet-wheel upon the shaft, a pawl oper-

ated by the solenoid and engaging the ratchet-wheel, a switch including a circuit-closing plunger, a rod carrying the plunger, a swinging arm operated by the motor and adapted to engage the plunger, a clutch engaging the plunger-rod, a releasing device engaging said clutch, a rolling weight adapted to rest upon the releasing device, a chute guiding said weight to the releasing device, and a track leading from an exit-opening of said chute to its receiving-mouth and serving to convey the rolling weight back to the chute after being inscharged therefrom by the swinging arm, substantially as described.

4. The combination with a motor, of a shaft to which motion is to be imparted, a ratchet-wheel upon the shaft, a pawl operated by the motor and engaging the ratchet-wheel, a switch including a circuit-closing plunger, a rod carrying the plunger, a swinging arm operated by the motor and adapted to engage the plunger, a clutch engaging the plunger-rod, a releasing device engaging said clutch, a rolling weight adapted to rest upon the releasing device, a chute guiding said weight to the releasing device, and a track leading from an exit-opening of said chute to its receiving-mouth and serving to convey the rolling weight back to the chute after being discharged therefrom by the swinging arm, substantially as described.

5. The combination with a motor, of a shaft to which motion is to be imparted, a ratchet-wheel upon the shaft, a pawl operated by the motor and engaging the ratchet-wheel, a switch including a circuit-closing plunger, a rod carrying the plunger, a swinging arm operated by the motor and adapted to engage the plunger, a clutch engaging the plunger-rod, a releasing device engaging said clutch, and a rolling weight adapted to rest upon the releasing device and be removed therefrom by the swinging arm, substantially as described.

6. The combination with a motor, of a load-actuating element, means permitting intermittent engagement of said motor and load-actuating element, means for effecting the operation of said element by said motor, and a traveling weight governed by the motor and controlling said latter means, substantially as described.

7. The combination with a motor, of a load-actuating element to be driven thereby, means effecting the intermittent operation of said element by said motor, and a traveling weight governed by said motor and governing said means, substantially as described.

8. The combination with an electric motor, of a load-actuating element to be driven thereby, switching mechanism controlling circuit of the motor and effecting intermittent operation of said motor and the element controlled thereby, and a traveling weight

governing said switching mechanism and governed by the motor, substantially as described.

9. The combination with an electric motor, of a load-actuating element to be driven thereby, a switching mechanism controlling the circuit of the motor and effecting intermittent operation of said motor and the element controlled thereby, said mechanism including a circuit opening and closing switch element, a releasing device permitting said switch to close and a clutching mechanism engaging said switch element to open said circuit, and a traveling weight governed by the motor and thrust thereby into engagement with the releasing device to close circuit through the motor, substantially as described.

10. The combination with an electric motor, of a load-actuating element to be driven thereby, a switching mechanism controlling the circuit of the motor and effecting intermittent operation of said motor and the element controlled thereby, said mechanism including a circuit opening and closing switch element, a releasing device permitting said switch to close and a clutching mechanism engaging said switch element to open said circuit, and a traveling weight governed by the motor and thrust thereby into engagement with the releasing device to close circuit through the motor, and an arm operated by the motor to remove said weight from the releasing device to stop the load-actuating element, substantially as described.

11. The combination with an electric motor, of a load-actuating element to be driven thereby, a switching mechanism controlling the circuit of the motor and effecting intermittent operation of said motor and the element controlled thereby, said mechanism including a circuit opening and closing switch element, a releasing device permitting said switch to close, and a clutching mechanism engaging said switch element to open said circuit, and a traveling weight governed by the motor and thrust thereby into engagement with the releasing device to close circuit through the motor, and an arm operated by the motor to remove said weight from the releasing device to stop the load-actuating element, a chute leading to the releasing device, and a track connecting the exit and the mouth of the chute for guiding the weight back to the releasing device, substantially as described.

12. The combination with a motor, of switching mechanism controlling its circuit, and a weight governed by the motor and governing said switching mechanism, substantially as described.

13. The combination with a motor, of switching mechanism controlling its circuit

and a weight governed by the motor and
governing said switching mechanism, and a
track leading from and to the switching
mechanism, upon which the weight is thrust
5 by the motor and upon which said weight
may travel, substantially as described.

In witness whereof I hereunto subscribe

my name this 18th day of November, A. D
1905.

ROBERT H. LITTLE.

Witnesses:

LEON STROH,
W. R. MACDONALD.