

(No Model.)

R. C. LAMBERT.
MECHANICAL MOVEMENT.

No. 550,277.

Patented Nov. 26, 1895.

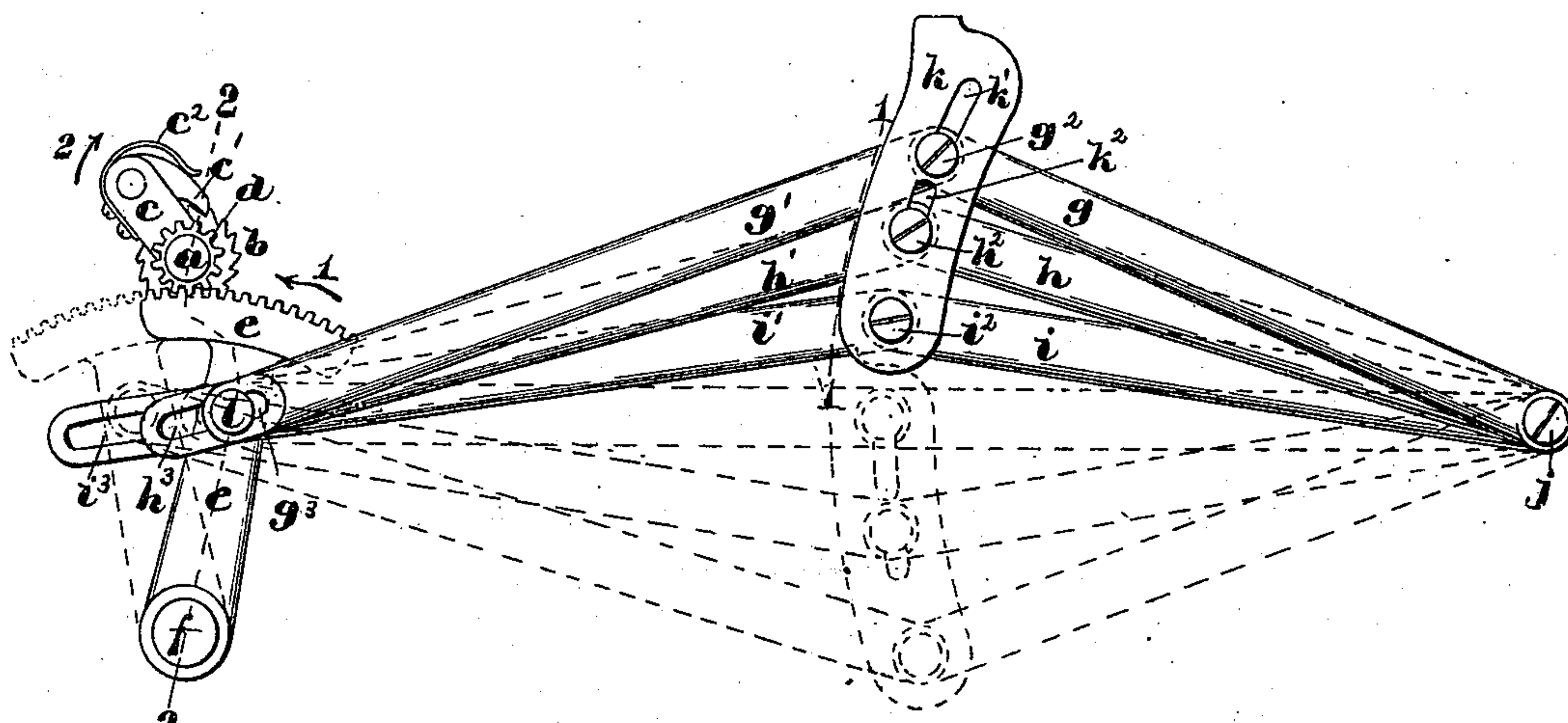


Fig. 1.

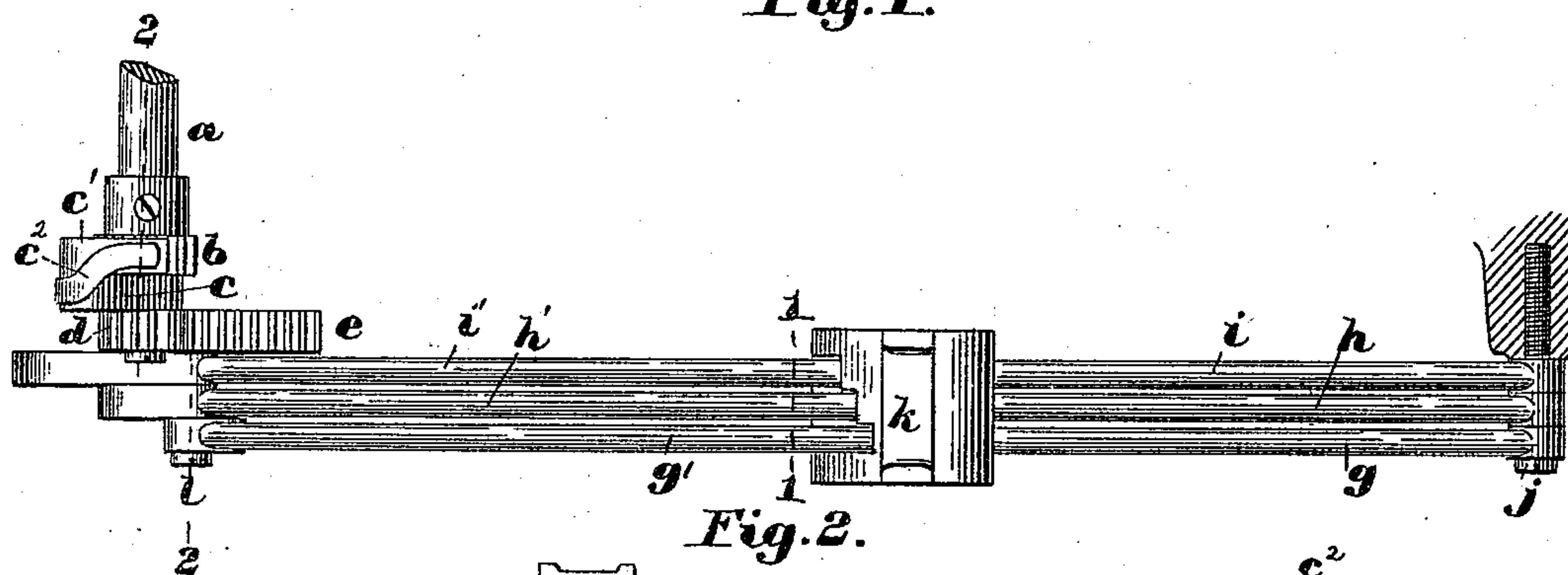


Fig. 2.

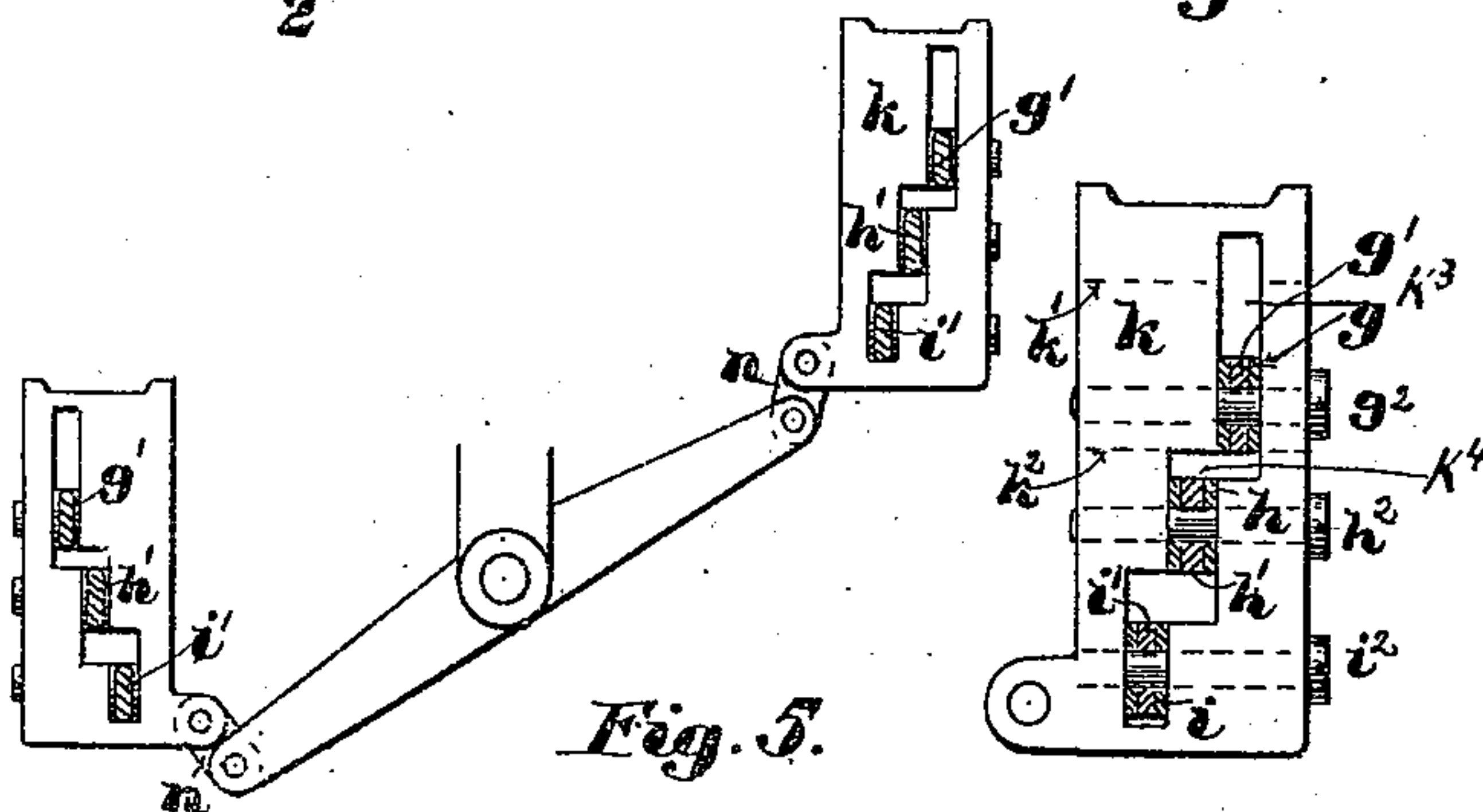


Fig. 3.

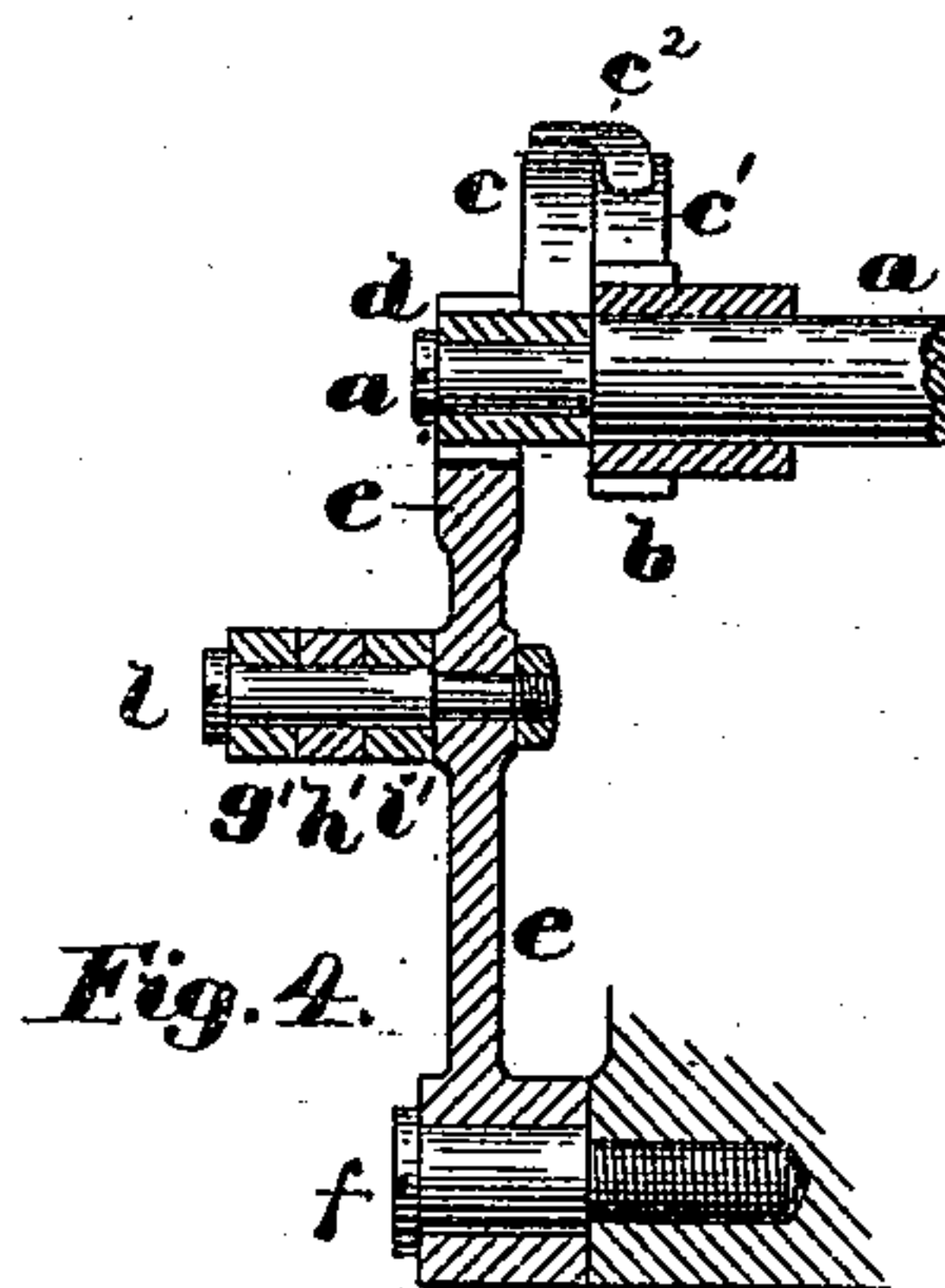


Fig. 4.

Witnesses:
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UNITED STATES PATENT OFFICE.

RICHARD C. LAMBERT, OF HOLBROOK, MASSACHUSETTS.

MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 550,277, dated November 26, 1895.

Application filed September 4, 1895. Serial No. 561,400. (No model.)

To all whom it may concern:

Be it known that I, RICHARD C. LAMBERT, of Holbrook, in the county of Norfolk and State of Massachusetts, have invented certain new and useful Improvements in Mechanical Movements, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention relates to a mechanical movement, is designed to increase the power transmitted by the exertion of a given amount of labor, and it consists in certain novel features of construction, arrangement, and combination of parts, which will be readily understood by reference to the description of the accompanying drawings, and to the claims hereto appended, and in which my invention is clearly pointed out.

Figure 1 of the drawings is a side elevation of my improved mechanism arranged for imparting an intermittent rotary motion to a shaft. Fig. 2 is a plan of the same. Fig. 3 is a vertical section on line 1 1 on Figs. 1 and 2, looking toward the right of said figures. Fig. 4 is a vertical section on line 2 2 on Figs. 1 and 2, looking toward the left of said figures; and Fig. 5 is a transverse section on line 1 1 on Fig. 1, and illustrating two sets of the mechanism connected together for the purpose of producing a continuous rotary motion of the shaft in the same direction.

In the drawings, *a* is a shaft to be rotated, having firmly secured thereon the ratchet-wheel *b* and loosely mounted thereon the radius-arm *c*, to which is firmly secured, so as to be movable therewith, the pinion *d*, the teeth of which are engaged by the teeth of the segment of a gear *e*, mounted upon and movable about a fixed pin or fulcrum *f*.

Three toggle-links *g*, *h*, and *i* are each mounted at one end upon the same fixed fulcrum-pin *j*, are pivoted at their opposite ends respectively by the pins *g*², *h*², and *i*² to the toggle-links *g'*, *h'*, and *i'*, and are by said pins connected to the operating coupling or treadle *k*, as will be more fully explained, the opposite ends of said toggle-links *g'*, *h'*, and *i'* being connected to the segment *e* by means of the common pin or stud *l*, passing through slots *g*³, *h*³, and *i*³ in said links and set in a fixed position in said segment.

The pin *i*², connecting the links *i* and *i'*, is

set in a fixed position in the treadle or coupling *k*, and the slot *i*³ in the end of the link *i'* is made of such a length and so located that when the toggles are in their raised positions, as indicated in full lines in Fig. 1, the inner end of the slot *i*³ will be in contact with the pin *l*, and a downward movement of the treadle or coupling *k* to straighten the toggle *i i'* will cause the segment *e* to be moved in the direction indicated by the arrow 1 a distance equal to the advance of the slotted end of the link *i'* without any help from the toggles *h h'* and *g g'*, and when the toggles have descended to their lowest positions, as indicated in dotted lines in Fig. 1, the outer end of the slot *i*³ will have just reached the pin *l* in its advanced position, as indicated in dotted lines.

The movement of the segment *e* in the direction indicated by the arrow 1 will cause a movement of the pinion *d* and arm *c* in the direction indicated by arrow 2 on Fig. 1, and by the engagement of the pawl *c'*, carried by said arm, with the teeth of the ratchet-wheel *b* cause said ratchet-wheel and the shaft *a* to be revolved a corresponding distance, said pawl being pressed into engagement with said ratchet-wheel by the spring *c*².

The pins *g*² and *h*² connecting the toggle-links *g* and *g'* and *h* and *h'*, respectively, are movable up and down in the slots *k*¹ and *k*² cut through the treadle or coupling *k* parallel with said pins, while the centers of said toggles *g g'* and *h h'* are movable vertically in the slots *k*³ and *k*⁴ cut through said treadle at right angles to said pins, as shown.

When the toggle *i i'* has become straightened and completed its throw of the segment *e* toward the left of Fig. 1, the treadle *k* will have traveled downward faster than the pins *h*² and *g*², so that the pin *h*² will be at the upper end of the slot *k*² and the pin *g*² will be at about the center of the slot *k*¹, and at the same time the inner ends of the slots *g*³ and *h* will be in contact with the pin *l*. A continuation of the downward movement of the treadle *k* causes the toggle *h h'* to straighten and in doing so to move the segment *e* about its axis in the direction indicated by the arrow 1 a distance substantially corresponding to the distance it was moved by the straightening of the toggle *i i'*, while the toggle *i i'* is thrown below its straightened position.

When the toggle $h h'$ has become straightened, the pin g^2 is at the top of the slot k' and the inner end of the slot g^3 in the link g' is in contact with the pin l , when the completion of the downward movement of the treadle k causes the toggle $g g'$ to be straightened, and thus complete the movement of the segment e about its axis in the direction indicated by the arrow 1 and a complete half-revolution of the shaft a .

It will be seen from the foregoing that each pair of toggle-links are made to exert their power to move the segment e in succession and as they are approaching their positions of greatest power.

When it is desired to produce a complete and continuous revolution of the shaft a in the same direction, it is only necessary to duplicate the series of toggles, the segment, pinion, its arm, the pawl, and the ratchet-wheel and connect the treadles k by the links $n n$ and the lever o , mounted upon a fixed fulcrum in such a manner that when one treadle and its toggles are depressed the other treadle and its toggles will be raised.

By the employment of the mechanism hereinbefore described for imparting rotary motion to a shaft either continuous or intermittently a great advantage is obtained in the great increase of power caused by the successive action of the series of toggles upon the segment as compared with a crank motion or a single toggle having a throw corresponding to the aggregate throw of the series of toggles after they come into action.

My invention is applicable to a variety of uses in the mechanic arts and is not necessarily limited to imparting rotary motion to shafts, as the series of toggles may be used to impart a reciprocating motion to a plunger or other object where a heavy pressure is required throughout the entire movement or nearly the entire movement.

While I have preferably shown and described a segment of a gear-wheel for operating the pinion and pawl-arm, it is obvious that a straight-toothed rack may be used instead of the segment with the same results, the rack in this case being an equivalent for the segment.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. The combination of a fixed fulcrum pin or abutment: a second pin, movable toward and from said fixed pin: a plurality of toggles each connected at one end to said fixed pin, and at its other end to said movable pin: and means for operating said toggles and causing them to act, in succession, upon the same movable pin.

2. The combination of a plurality of toggles, mounted at one end upon a common fixed pin or abutment, and provided at their other

ends with slots of different lengths: an object to be moved toward or from said fixed fulcrum pin, and provided with a pin to engage the slots of all of said toggles: and a coupling connecting the center joints of all of said toggles and maintaining them at different levels, relatively.

3. The combination of a revoluble shaft to be operated: a ratchet wheel fixed upon said shaft: a pawl to engage said ratchet wheel: a pinion and a pawl carrying arm firmly secured together and loosely mounted upon said shaft: a reciprocating toothed gear member engaging said pinion: a pin or stud set in said reciprocating gear member: a fixed fulcrum pin or abutment: a plurality of toggles mounted at one end upon said fixed fulcrum pin, and provided, at their other ends, with slots of different lengths to engage the pin or stud set in said reciprocating gear member: and a coupling connecting the center joints of said toggles and maintaining them at different levels, relatively.

4. The combination of a plurality of toggles mounted at one end upon a common fixed fulcrum pin or abutment, and provided at their other ends with slots of different lengths: an object to be moved toward and from said fixed fulcrum pin: a pin or stud set in said movable object and engaging all of said slots: and a coupling pivoted to the central joint of the lowermost toggle, and provided with slots to receive the central joint pins of the other toggles and to permit a greater movement of said coupling than is imparted to the toggles above the lowermost one.

5. The combination of a revoluble shaft to be operated: a ratchet wheel fixed upon said shaft and revoluble therewith: a pinion and a pawl carrying arm firmly secured together and loosely mounted upon said shaft: a pawl carried by said arm and engaging said ratchet wheel: a reciprocating toothed gear member engaging said pinion: a pin or stud set in said reciprocating gear member: a fixed fulcrum pin or abutment: a plurality of toggles mounted at one end upon said fixed fulcrum pin, and provided at their opposite ends with slots of different lengths, to receive the pin or stud set in said reciprocating gear member: and a coupling pivoted to the central joint of one of said toggles by a pin that is movable with said coupling, and connected to the central joints of the other toggles by pins that are movable in slots in said coupling.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 28th day of August, A. D. 1895.

RICHARD C. LAMBERT.

Witnesses:

N. C. LOMBARD,
GEO. A. SEWALL.