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Jacob G. Harroun's, Patented Jul 25 1871

Impd Method of Converting Rectilinear into Rotary Motion.

Fig. I.

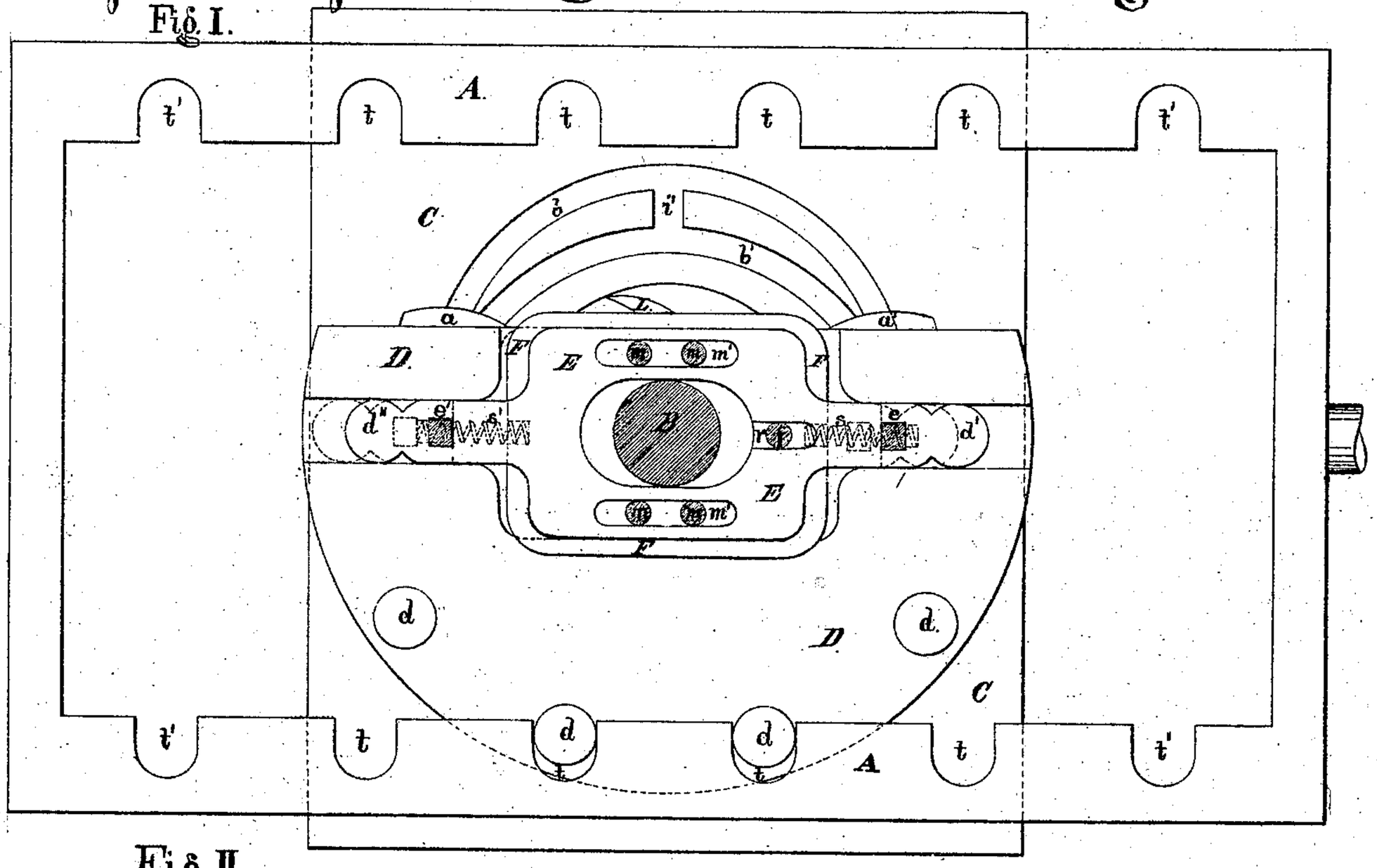


Fig. II.

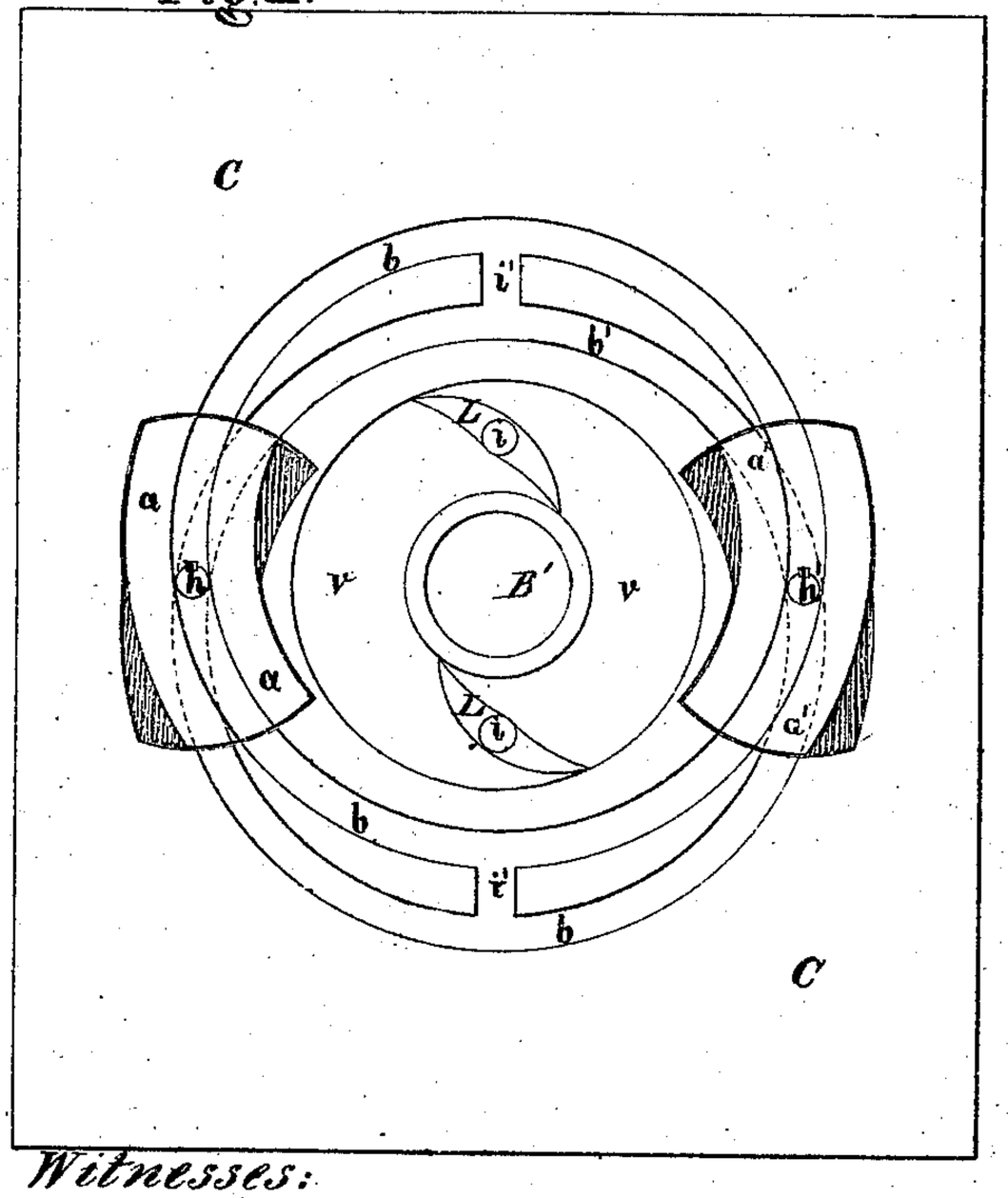
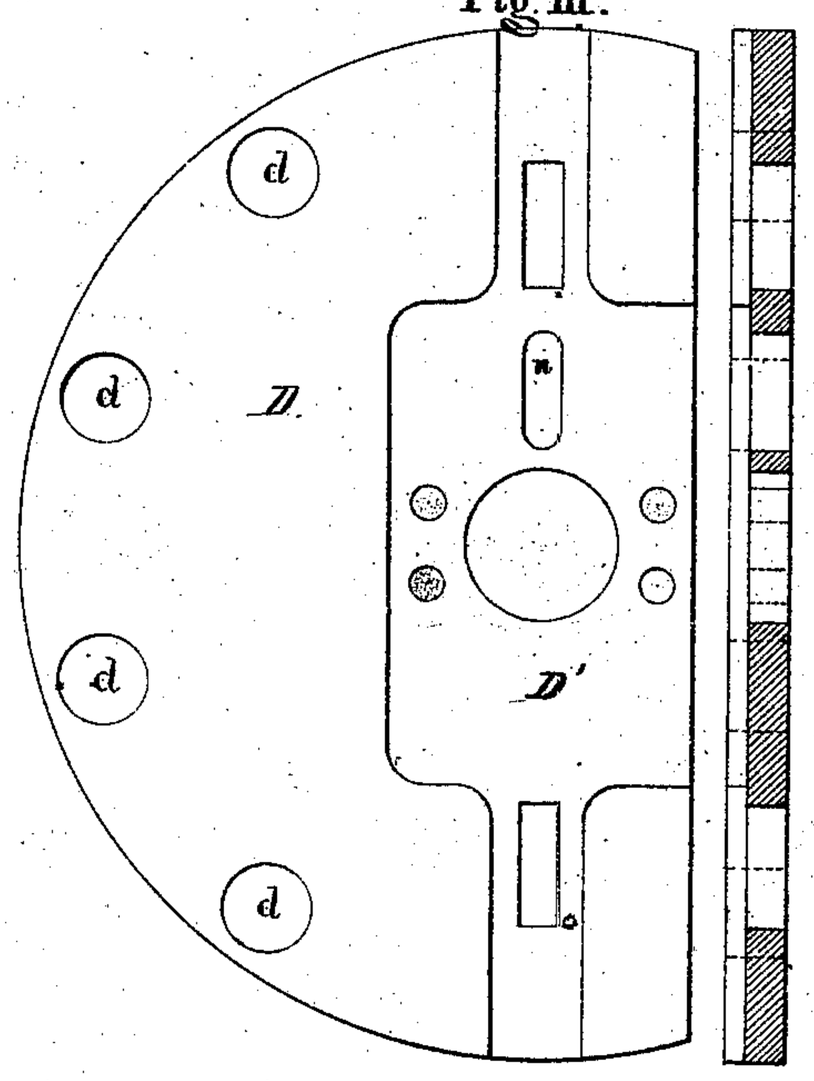


Fig. III.



Witnesses:
Geo Gotts.
Jno C Reddy

Inventor:
Jacob G. Harroun
by Fitch & Co.
his attys

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Fig. IV.

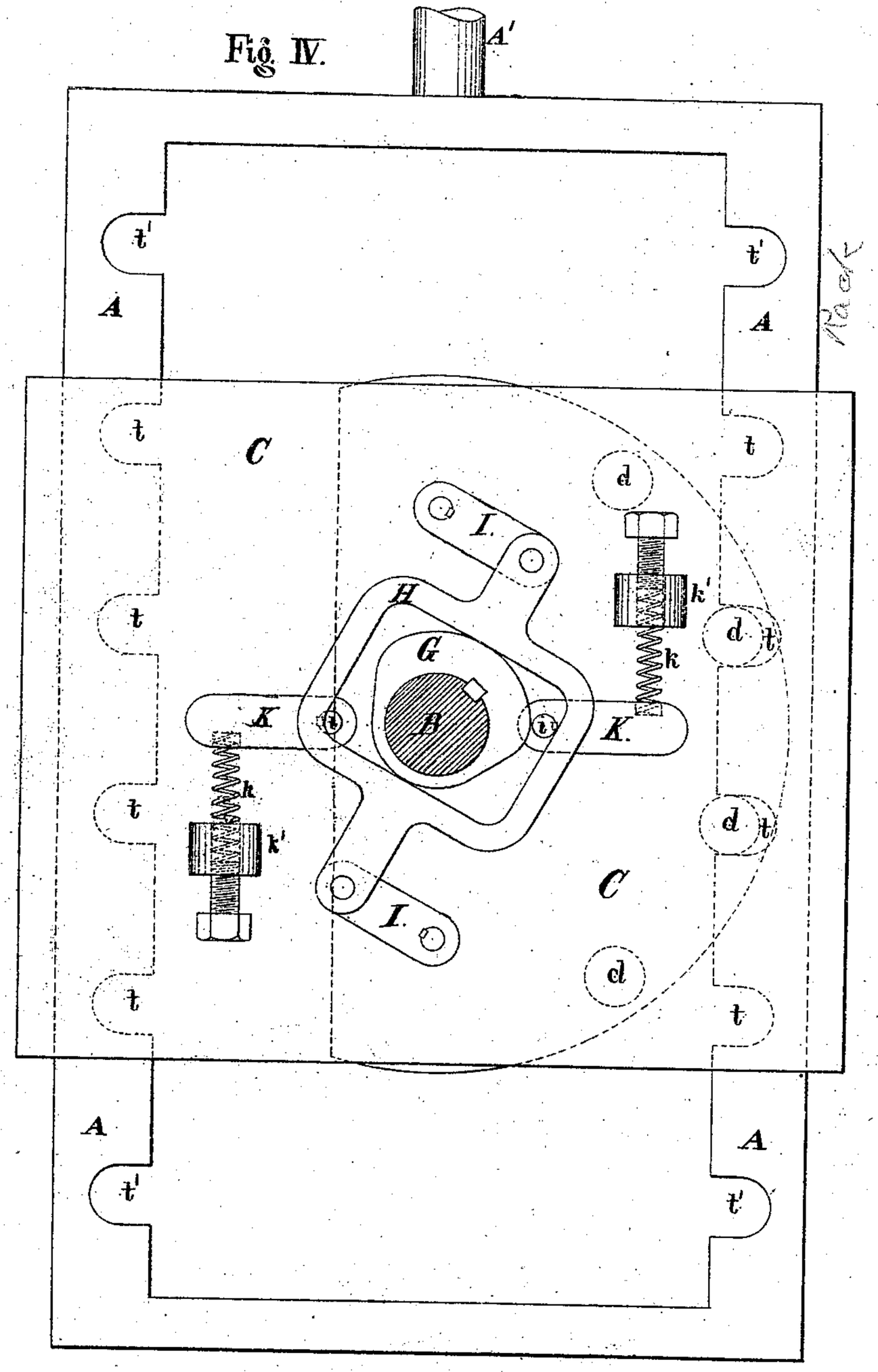
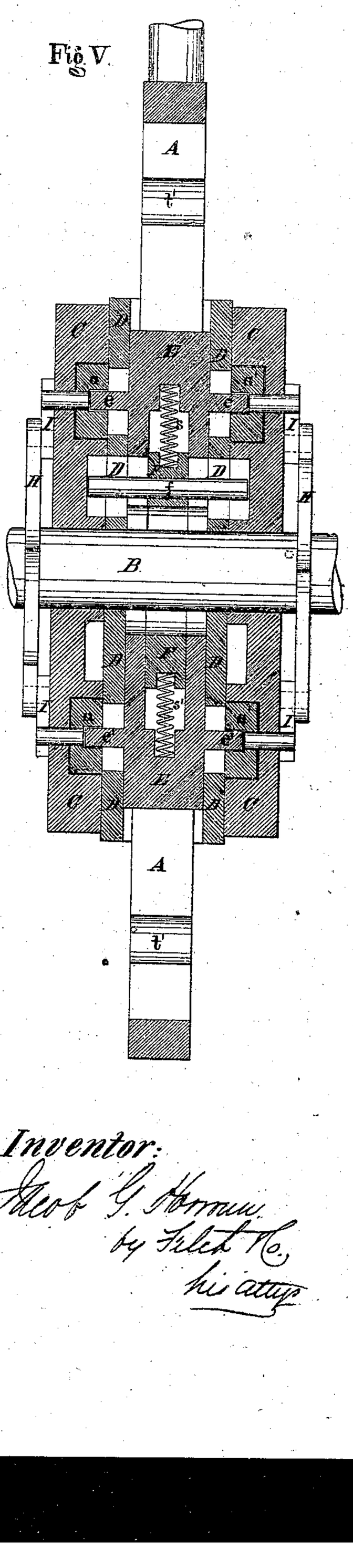


Fig. V.



Witnesses:
Geo Gott
Jno C. Reddy

Inventor:
Jacob G. Harroun
by Filed No.
his attys

UNITED STATES PATENT OFFICE.

JACOB G. HARROUN, OF SAG HARBOR, NEW YORK.

IMPROVEMENT IN METHODS OF CONVERTING RECTILINEAR INTO ROTARY MOTION.

Specification forming part of Letters Patent No. 117,280, dated July 25, 1871.

To all whom it may concern:

Be it known that I, JACOB G. HARROUN, of Sag Harbor, Long Island, in the State of New York, have invented an Improvement in the Method of Converting Rectilinear into Rotary Motion in Machinery, of which the following is a specification, reference being had to the accompanying drawing forming a part thereof.

My invention relates to the peculiar combination of devices hereinafter particularly described by which a part of the mechanism that is moving in a rectilinear direction is alternately connected with and disconnected from the part that is moved in a rotary direction, and that while the former may have a reciprocating motion it can communicate to the latter a continued motion in the same direction.

A is a double rack, designed to move in ways properly attached to it, and to have a rectilinear reciprocating motion, which is given to it from any motor, as from the piston of a steam-engine. On the inner edges of the sides of this rack or frame is a series of notches, *t*. D is the segment of a wheel, secured upon the shaft B. This segment is formed of two plates placed upon the shaft B a short distance apart, corresponding to the thickness of the sides of the double rack A. Into these two plates are fixed the pins *d*, which are placed at a distance apart corresponding to the notches *t*, so that they may mesh into and engage with the said notches. The two pins, *d' d''*, instead of being fixed into the two plates of the segment D, are fixed into and held in a frame, E, formed of two plates, and this frame is placed between the two plates of the segment D, in channels or recesses D', cut into the inner faces of the two plates forming the segment D. F is a solid block of iron, placed between the sides or plates of the frame E. In either end of this block is fixed a spiral spring, *s*, one end of which is let a little distance into the end of the block F, the principal portion of the spring extending out from the block to the pin *e* in the frame E. The center of the block, through which passes the shaft B, is cut away, leaving an oval space in the frame E, so that it may be moved laterally back and forth with the said frame E. *m m m m* indicate four steady-pins, two in each side of the block, that work in slots *m'* in the two plates of the frame E. It is evident that when this block F is forced toward either side of the segment away from the center the spring *s* will act upon the pin *e*, tending to carry the frame E in the same direction, and thus carry the pin *d'* or *d''* outward into circular range with the other pins *d*, and thus bring it into position to engage in the notch *t'* that may be at the moment opposite to it, and that, by reversing the motion of the block F and forcing it in the opposite direction, away from the center, the spring upon the opposite end will be, in turn, forced against the pin *e'*, Figure I, to throw the frame E to the opposite side of the segment D, thus withdrawing the pin *d'* from its notch in the double rack A and carrying the pin *d''* outward into circular range with the other pins *d*, and causing it to engage with the notch in the double rack A that is at the moment opposite to it. In order to give to the block F the required motion back and forth to move the frame E, with its pins, from side to side, as above described, a guide-bolt or pin, *f*, is fixed into one end of the block F, passing through the block and extending a short distance outward on either side of it, through openings or slots *r* in the frame E, within which the said guide-bolt may work. The said bolt also extends on each side outward through the slot *n* in the plates of the segment D, projecting beyond the said plates a little distance. Then a large plate of metal, C, is arranged upon each side of the segment D, the same extending outward on either side beyond the double rack A, and a bar being placed between the ends of the said plates on either side of the double rack A, to which the said plates are fastened by suitable bolts or screws, and also to a proper frame for the support of the general mechanism. The double rack A is thus allowed to move freely back and forth between the said plates C. On each of the inner faces of these two plates C and around the central opening B' is an annular channel, *v*. Fig. II represents the inner face of one of these plates, there being two of them, one on each side of the parts shown in Fig. I. In the inner faces of these plates C are also cut two circular grooves, *b* and *b'*, both a little eccentric, but in opposite directions to the center of the shaft B, and crossing each other at the points *h* and *h'*, Fig. II. When the plates C are in place the ends of the guide-bolt *f* will project into and traverse the annular channel *v* on either side. In each of these channels *v* are placed two segmental cams, L and L', held in the little shafts

i i', on which they have a slight rotary motion. These shafts pass through the plate C, and on the outer ends are short arms K, as seen in Fig. IV. A spring, *k*, held in the little block *k'*, and the pressure of which is made adjustable by a set-screw, acts against one side of these arms, tending to hold the cams L L' in the position seen in Fig. II. Now, it is evident that when the block F is rotated on the shaft B with the segment D the projecting end of the bolt *e*, being thus made to traverse the circular channel *v*, and moving from right to left in Fig. II, will come in contact with the cam L and be carried by it toward the upper side of the figure, and that said cam swinging a little on its shaft will allow it to pass. The block will thus be carried over to one side of the segment D, pressing the spring *e* against the bolt *e*, thus tending to force the frame E also to one side, thus withdrawing the pin *d''* from its notch in the double rack A, and forcing the pin *d'* into the notch on the opposite side of the double rack. Then the segment and block F continuing to rotate, the end of the bolt *f* will pass around to the opposite side of the channel *v*, when it will, in turn, be forced over to that side by the cam L', and reverse the position of the pins *d* and *d'* with reference to the double rack A. *e* and *e'* are guide-bolts or pins, fixed one into each end of the frame E, the ends extending out a little distance on each side of the frame. The ends of these guide-bolts fit into and move within the grooves *b* and *b'*. It is evident that when the segment D is rotated with the ends of the guide-bolts traversing the groove *b*, the frame E will be carried toward the side of the double rack A corresponding with the top of Fig. I, and thus cause the pin *d''* to engage with a notch, *t'*, in that side, and that when the position of the frame E is shifted so that the said guide-bolts traverse the grooves *b'*, then the said frame E will be thrown over onto the opposite side of the segment D, so that the pin *d'* will be made to engage with a notch, *t'*, on the side of the double rack A corresponding with the bottom of Fig. I. *a* and *a'* indicate the two switches, one on each side of the channels *b* and *b'*, at the points where these channels intersect. They are fastened to shafts *h* and *h'*, which extend through the plates C, and have short arms I, Fig. IV, on the outer end. These arms are coupled together by the link H, through which passes the shaft B having upon it the cam G, which rotates with the shaft, moving the link alternately from one side to the other. By means of this arrangement the rotation of the shaft G is made to shift the switches, so as to adjust them to the two channels *b* and *b'* alternately.

The operation of the mechanism described is as follows: Suppose the parts to be in the position shown in Fig. I, with the ends of the guide-bolts *e* and *e'* resting in the channel *b*, the switches *a* and *a'* being adjusted to that channel. Then, if the double rack A is moved to its limit, say in the direction from left to right, the segment D will, it is evident, be correspondingly rotated until the pin *d''* is brought opposite the notch *t''*, in the top left-hand corner of the double rack. In thus rotating the segment the ends of the guide-bolt *f* will, by the cam L, be pushed upward, carrying the block F in that direction, pressing the spring *s* against the bolt *e* in the frame E, thus tending to throw said frame E also toward the upper side of the double rack A; but the ends of the bolts *e e* moving within the channel *b*, the frame E, notwithstanding this pressure of the spring *s*, is carried to the left side of the center, so that the pin *d''* is brought into circular range with the other fixed pin in the segment, and made to engage with the notch *b''* in the lower left-hand corner of the double rack A. At the moment, however, that the double rack A has reached the limit of its motion to the right, the ends of the bolts *e* are brought opposite to the openings *i* and *i'*, cut through between the channels *b* and *b'*, and then the spring *s* will act to instantly throw the frame E upward and to the opposite side, the ends of the bolts *e e'* passing through the openings *i i'*, thus withdrawing the pin *d''* from its notch and pushing the pin *d'* into the corresponding notch on the opposite side. Then, it is evident that if the double rack A is moved in the opposite direction, and from right to left, the rotation of the segment D will be continued in the same direction in which it has been moving, with a corresponding movement and engagement of the parts upon the opposite side of the double rack, repeated until the pin *d'* is brought opposite the notch in the right-hand upper corner of the double rack A, when the frame E will, in turn, be shifted to the opposite side, the pin *d'* withdrawn from its notch and the pin *d''* caused to engage with the opposite notch. As the segment is rotated the switches *a a'* are, by the action of the cam G upon the link H and through it upon the arms I I', shifted at the proper time to be adjusted alternately to the circular grooves *b b'*. By the mechanism thus described it is plain that the reciprocating rectilinear motion of the double rack A is made to give a continuous rotary motion to the segment D and its shaft B.

What I claim as my invention, and desire to secure by Letters Patent, is—

The peculiar mechanism herein described, by which the pins *d* and *d'* are made to engage first with one side and then with the other side of the double rack A, substantially as and for the purpose specified.

Witnesses: JACOB G. HARROUN.
A. D. SMITH,
R. M. SWEEZY.