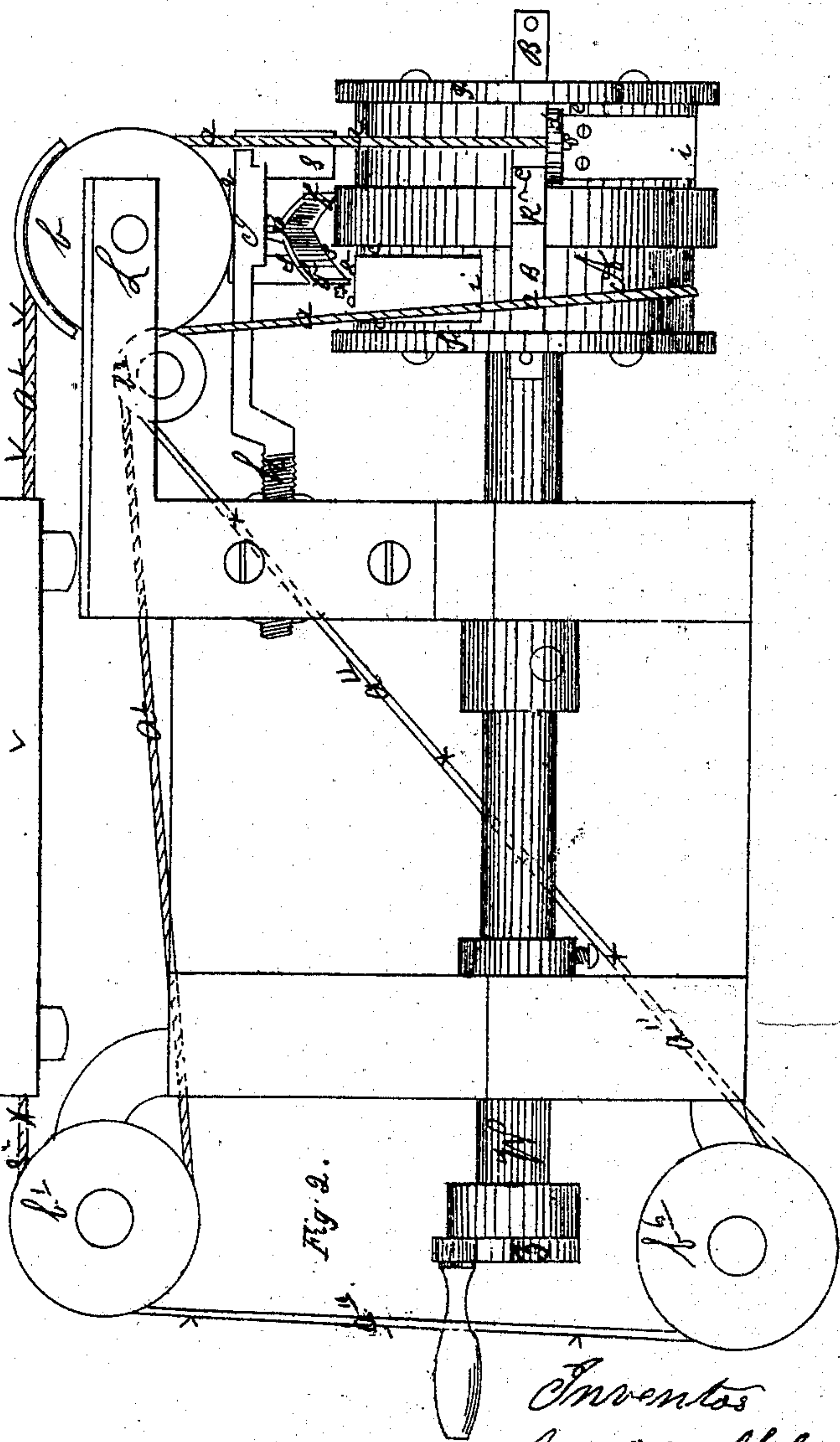
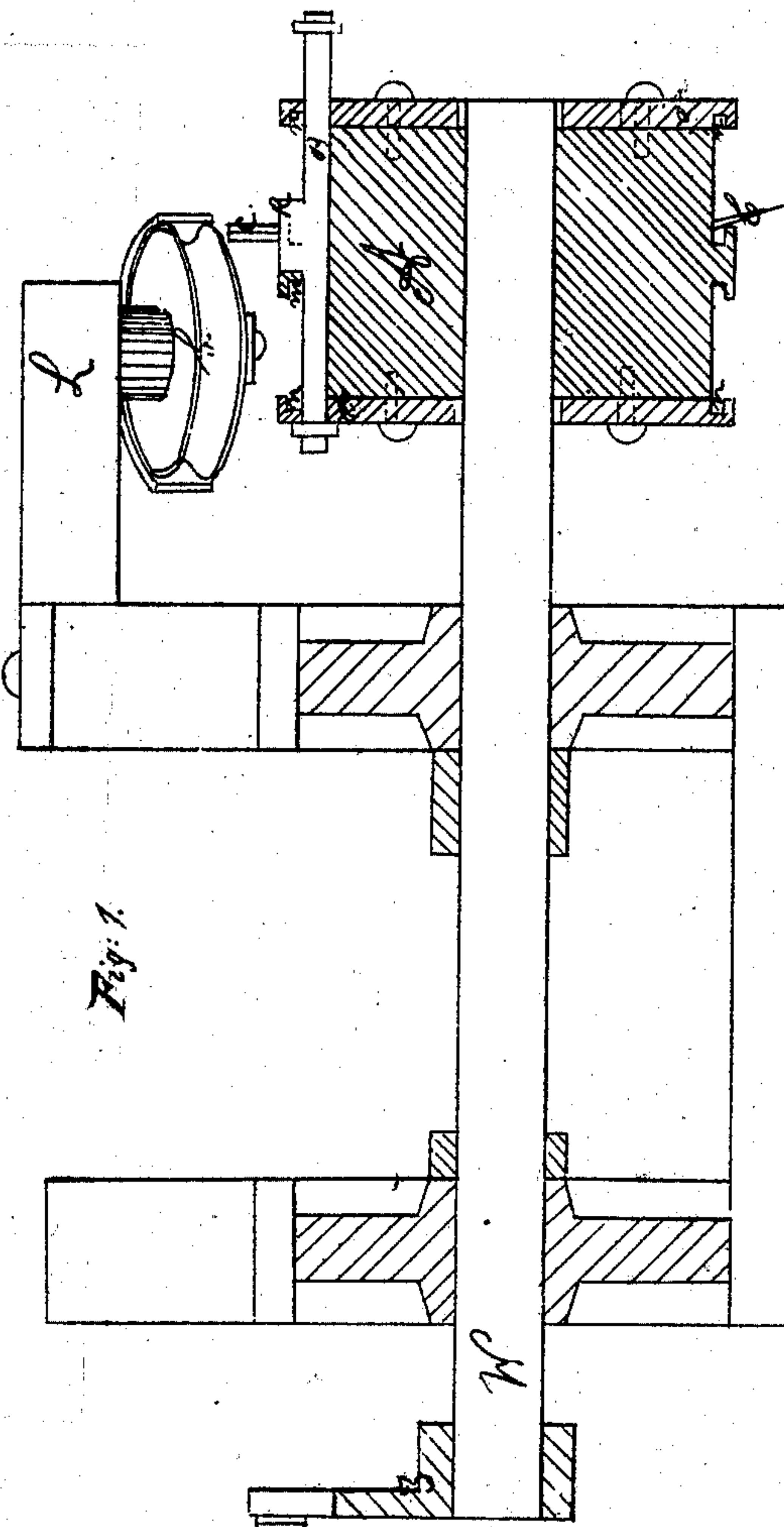
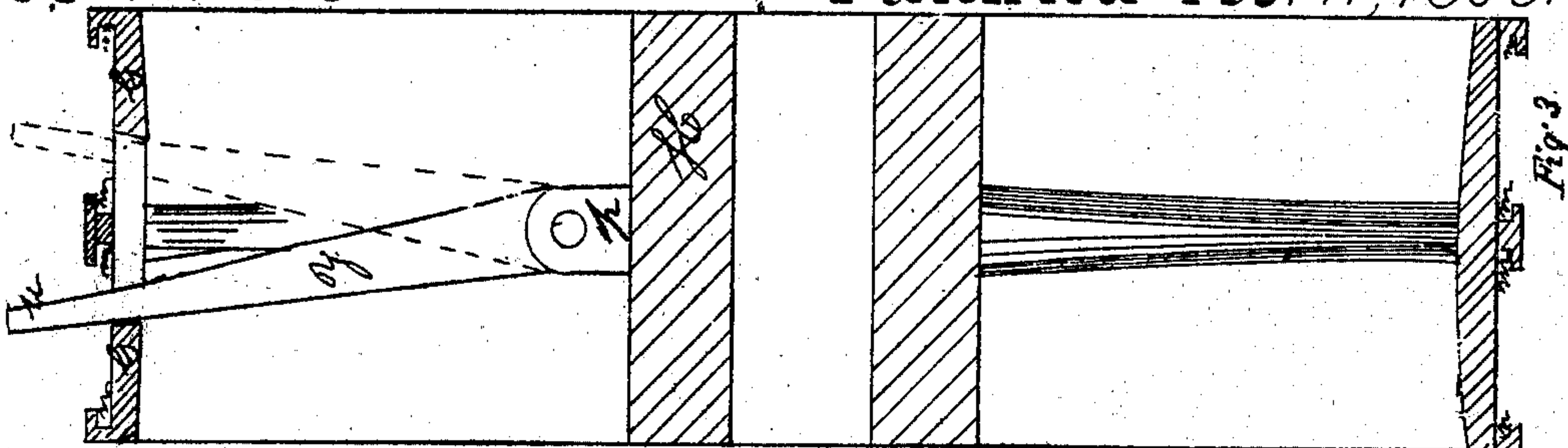


W. H. Abel.

Converting Motion.

N<sup>o</sup> 74265

Patented Feb. 11, 1868.



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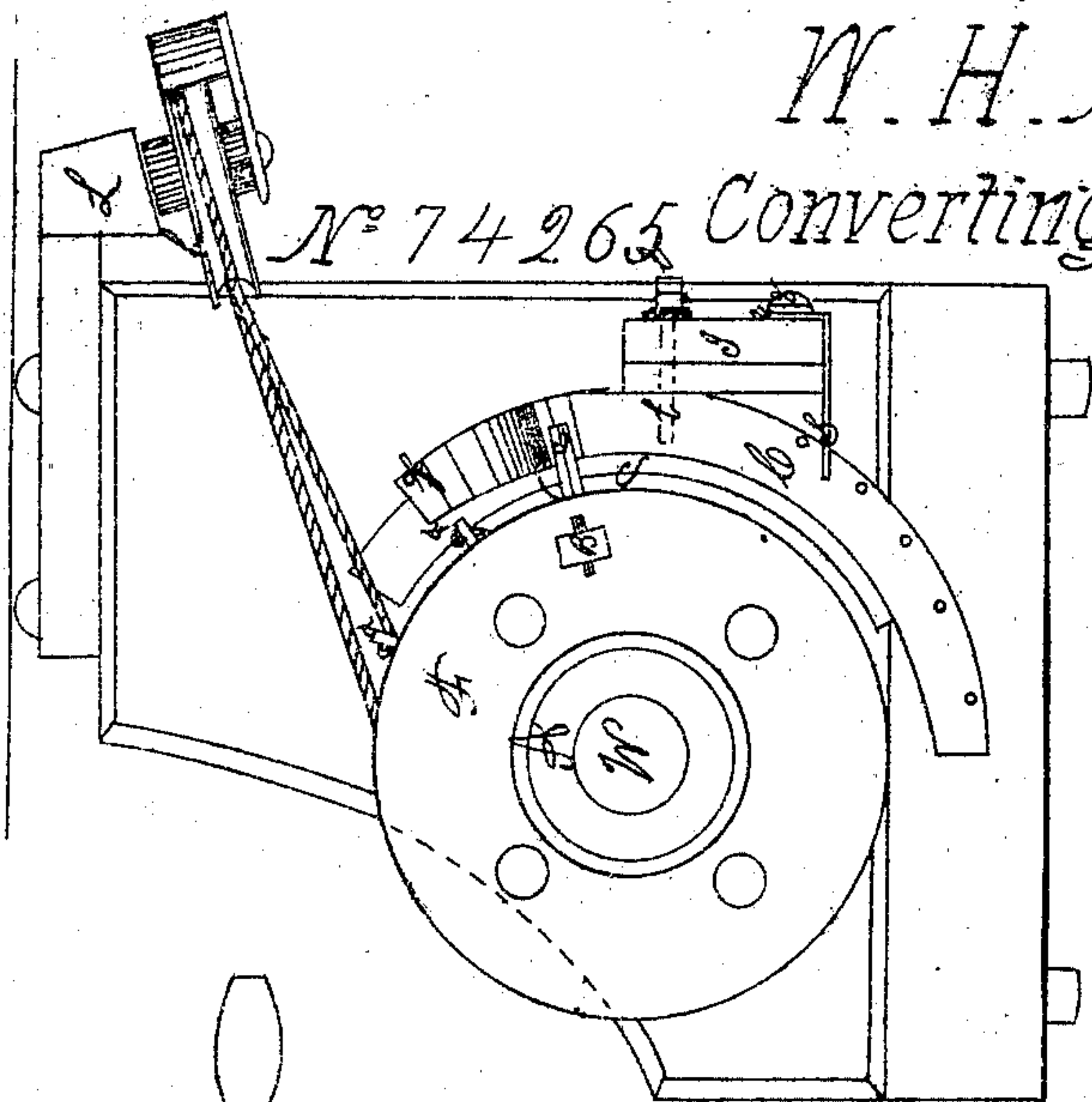


Fig. 5.

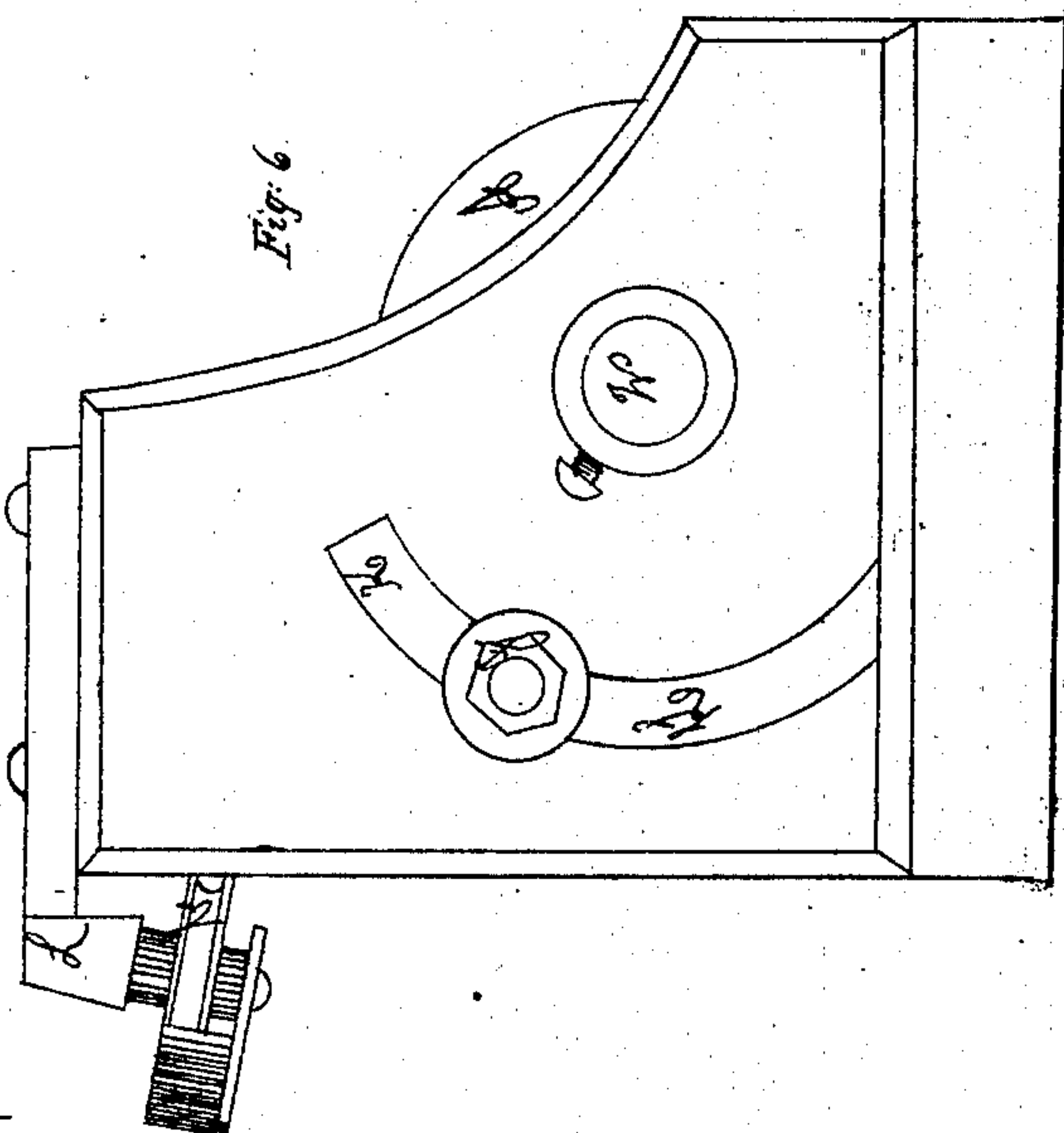


Fig. 6.

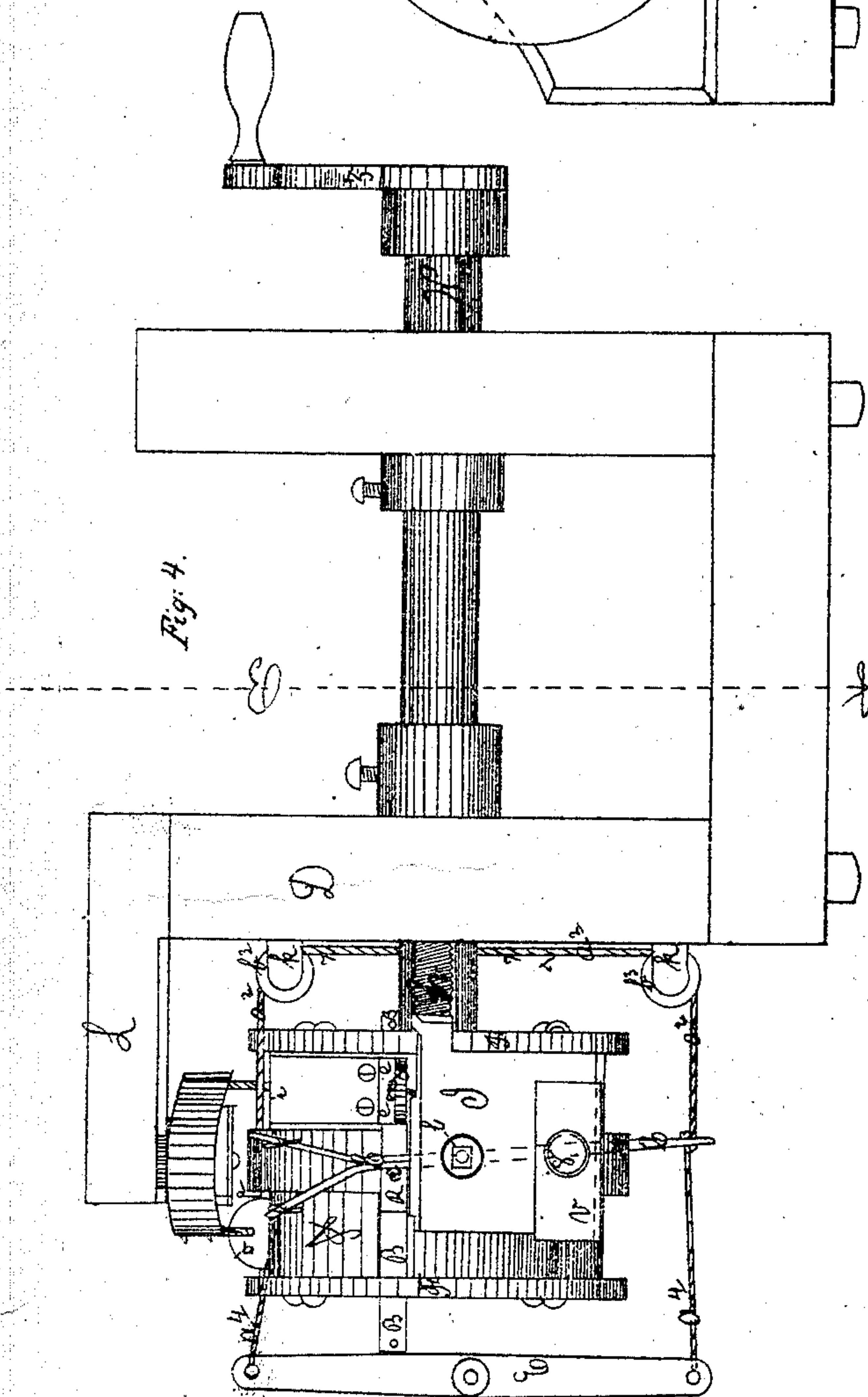


Fig. 4.

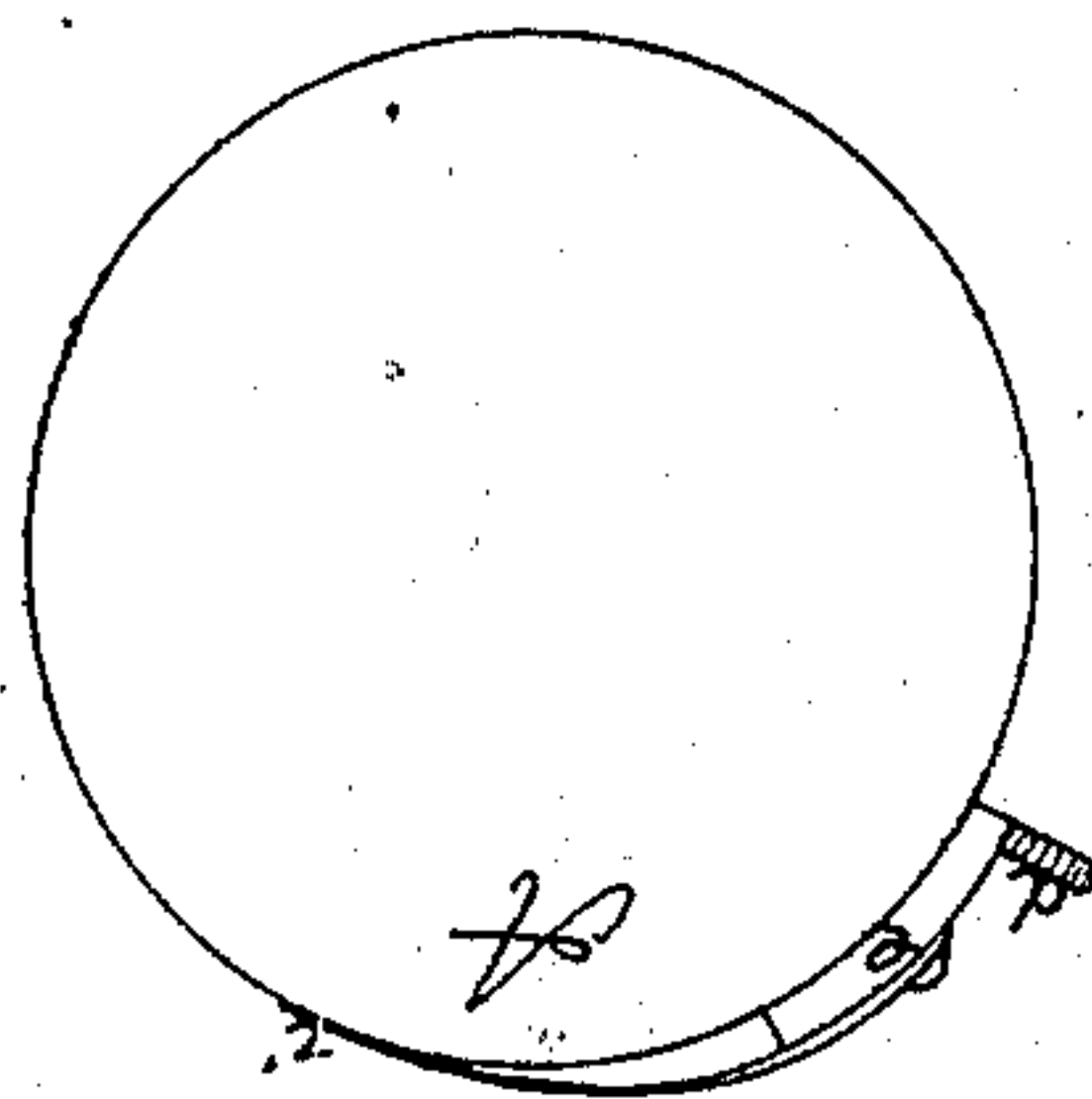


Fig. 8.



Fig. 7.

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WILLIAM H. ABEL, OF GREENVILLE, RHODE ISLAND.

*Letters Patent No. 74,265, dated February 11, 1868.*

## IMPROVED DEVICE FOR CONVERTING MOTION.

The Schedule referred to in these Letters Patent and making part of the same.

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, WILLIAM H. ABEL, of Greenville, in the county of Providence, and State of Rhode Island, have invented a new and improved Device for Converting Motion, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1, sheet 1, represents a longitudinal vertical section.

Figure 2, a plan or top view.

Figure 3, a central section of a pulley which has a tumbling lever, *y*, instead of a sliding shipper, B, as seen in figs. 1 and 2.

Figure 4, sheet 2, is a side, and

Figure 5 an end elevation.

Figure 6, a transverse elevation on the line A B of fig. 4.

Figure 7 is a plan, and

Figure 8 an edge view of one of the segmental slides, *e*, with a friction-spring attached, and shows its position on the cylinder A.

This invention relates to that class of devices which are employed for converting rotary motion into reciprocating motion, either rectilinear or curvilinear, and it may be employed for a traverse motion or a parallel motion, or in the place of a mangle motion, and thereby avoid the necessity and inconvenience of calculating the nice and accurate gears and mangle-pins, or segments of pins or teeth, which are requisite in all such geared works.

When my improved device is used for a traverse motion, as in a knitting-machine, to traverse the feed or thread-carrier along, over, or in close proximity with the needles, the cord or chain *a*<sup>1</sup>, (shown in red lines, fig. 2,) may pass round a grooved wheel, *b*, arranged on an arm, L, thence to and around a similar wheel, *b*<sup>1</sup>, back round a like wheel, *b*<sup>2</sup>, and off over the operating-cylinder, wheel, or pulley, A, and connected with the ear or ears *d* of the segmental slides *e*. The cords or chains *a*, which run around the pulley *b* only, and connect with the ears *e*, are shown in black lines. The feed-guide and thread-carrier or other suitable part of the knitting-machine feed, may be connected with the cord or chain *a*<sup>1</sup>, at *x* or at *v*, and the feeding-device made to traverse steadily any distance within the scope of the diameter of the wheel A, and the distance of such traverse may be considerably varied by releasing the nut *g*, fig. 6, and moving the stud *h* and plate I, in the curved slot *k*, upward to lengthen, and downward to shorten the motion, by carrying the pivoted oscillating lever C higher or lower, so as to bring the shipping-pin, *c*, projecting from the sliding shipper B, earlier or later into contact with the sides of the oscillating-lever, and upward against the forked or enlarged end *f*, all as clearly shown in figs. 2, 4, and 5.

Curvilinear reciprocating motion in this device is where the cord or chain *a* passes around the pulley *b*, or a much larger pulley, that will not be turned so far by the action of the pulley A, the circumferentially moving segmental slides *e* and shipper B; or the same motion may be reversed by the use of gears on the shaft of the pulley *b*, engaging with some other gear connected with the device to which said motion is to be given.

Horizontal or vertical reciprocating motion may be had from rotary motion in this device, either longitudinally or transversely with the machine or apparatus to which it is connected, or with which it operates, by connecting cords or chains, *a*<sup>2</sup>, (shown in red lines in fig. 4,) with the upper and lower portions or extremities of the oscillating-lever C, and running said cords or chains over pulleys *b*<sup>3</sup>, which rotate on pins projecting from stands, *k*, secured to one of the ends D, or supporting-frame, or at any other reasonable distance from the wheel A, and connected with some other support; or an oscillating-lever, E, may be operated with a slow, steady motion, or with a sudden and forcible motion, like the shuttle-motion of a loom for weaving, by connecting the extremities of the lever E and the lever C by cords or chains, *a*<sup>4</sup>, and by rotating the wheel A slowly or rapidly, according to the velocity or suddenness of the motion required. The object to be moved vertically may be attached to the cord *a*<sup>2</sup> at 7, or to that part of the said cord.

In constructing the cylinder A, (as shown in figs. 1, 2, 4, and 5,) the lateral annular grooves *m*, (shown in fig. 1, near the centre of its length,) may be formed in the substance of the wheel, and the similar grooves, *n*, at the ends of the cylinder, may be formed in the sides of disks or plates, F, which are fastened to the ends of the cylinder, or all the grooves may be formed in the substance of the wheel, as shown in fig. 3. The edges of the segmental slides *e* enter the grooves *m* and *n*, and move round the cylinder in said grooves. The inner



surface of each slide bears against the face of the cylinder. The tail, *i*, of each friction-spring also bears on the face of the cylinder as the slides move round, and prevent any slipping or sudden action of said slides in a wrong direction. The shipper *B* is fitted into the cylinder *A*, flush with the face or periphery, and the slides *e* pass over the shipper as they move round the cylinder. A projection, *R*, is formed on or fastened to the outer surface of the shipper *B*, and a radial shifting-pin, *c*, projects therefrom. This shifting-pin acts alternately against the sides of the oscillating-lever *C*, at each revolution of the cylinder *A*. Said lever is pivoted to the plate *I* of the stud *h*, and swings freely on its pivot *l* when acted upon by the pin *c*. The top end *f* of the lever *C* is forked, or it may be solid, and of the same form, so that when the cylinder *A* is rotated, and the shifting-pin passes round on one side of the lever *C*, and upward to and in contact with one fork thereof, the lever is swung sideways, the next revolution of the cylinder *A* carries the pin *c* to the opposite side of the lever, and upward in contact with the other fork, throwing the lever to the other side. To prevent the oscillating-lever being thrown too far each way by the action of the pin *c*, I employ an adjustable stop, *S*, (shown in figs. 2 and 5,) at each side of said lever, and a little below or above the pivot *l* thereof. And when the pin *c* forces or throws the top of the lever over in either direction, the lower portion of said lever comes in contact with one of these stops, which prevents excess of motion or oscillation of said lever, the vertical portion, or plate *v*, of said stops being fastened to the plate *I* by a screw, *8*. This alternate action of the pin *c* and the lever *C* operates the shipper *B*, first one way, then the other, throwing the portion *R* or projection into the path of one of the slides, *e*, and out of the path of the other slide, and *vice versa*, thus allowing first one slide to pass around the cylinder in the direction of its rotation, and the other slide in the opposite direction, and then the rotary motion or rotary sliding action of the slides to change at every revolution of the cylinder, each slide being stopped, at the changing-point at every other revolution, by the shipper *B* or the projection *R* thereof. The cords or chains *a*, having their ends connected with the ears *d* of the slides *e*, and passing around pulley *b*, or a series of similar pulleys, give a reciprocating motion to said pulley or pulleys and the cord *a*, or a suitable traverse motion, or other motion, as described, to the object or device connected with such cord or chain *a* or *a'*, and arranged to slide, traverse, swing, or oscillate as specified.

By the employment of grooved pulleys, properly located, as, for instance, the pulley *b'*, shown in red lines in fig. 2, the cord or chain *a''* may be carried from pulley *b'* around pulley *b''*, and thence at an angle (as shown) to pulley *b''*, and a proper device made to traverse on said angle, or any other angle between a longitudinal and transverse line, or any of the other motions herein specified, may be obtained or performed by the same or a similar connection and arrangement of pulleys and cords or chains connected with and actuated by the wheel *A* and oscillating-lever or levers and the connections shown and described.

In making my improved device on a large scale, I generally employ an arm-pulley, as shown in section in fig. 3, in which case the shipper *B* is substituted by the tumbling or rocking-lever *y*, which swings in a slot made through the rim *G* of the pulley, and is pivoted to an ear or stand, *p*, projecting from the side of the hub *H*, the outer end, *u*, of said lever being formed similar to the shifting-pin *c*, shown in figs. 1, 2, 3, and 4, and made to perform the same operation in connection with a similar but larger oscillating-lever, *C*, constructed and applied in the same or in a similar manner.

Motion is given to the cylinder *A* and all the other moving parts of the device and connections by means of the crank *z* on the shaft *W*, or by a belt or band running from some rotating driving-pulley on to a pulley placed on the shaft *W*, or by suitable gears arranged for that purpose.

The object of this invention is to convert a rotary motion into a reciprocating rectilinear or curvilinear motion, to take the place of toothed wheels and toothed or pin-segments, for a mangle-motion, to serve as a parallel or a traverse motion, either slow and steady, or sudden, and with greater or less force or velocity, and longitudinally or transversely, horizontally or vertically with the machine or apparatus, or on any angle between such longitudinal and transverse lines, or between a horizontal and a vertical line, all as clearly shown and described.

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

1. I claim the cylinder *A*, constructed substantially as shown and described, viz, with annular grooves *m* and *n*, and provided with slides *e*, shipper *B*, and pin *c*, or a tumbling-lever, *y*, or the equivalent thereof, said cylinder or pulley being applied to a central shaft, *W*, and arranged for operation substantially as and for the purpose or purposes set forth.
2. I claim the cord or chain *a*, applied to the slides *e* and pulley *b*, in the manner and for the purpose substantially as specified.
3. I claim the oscillating-lever *C*, constructed as shown and described, and arranged for operation substantially in the manner and for the purposes set forth.
4. I claim the supporting plate *I* and stud *h*, made adjustable by means of the slot *K* and nut *g*, as and for the purpose substantially as specified.
5. I claim the adjustable stops *S*, secured to the plate *I*, as and for the purpose specified.
6. I claim the combination of the cylinder *A* with slides *e* and shipper *B*, and the cord or chain *a*, pulley *b*, oscillating-lever *C*, plate *I*, stud *h*, and stops *S*, all arranged substantially as and for the purpose set forth.

WM. H. ABEL.

Greenville, R. I., August 12, 1867.

Witnesses:

WM. A. STEERE,  
E. S. BOWEN.