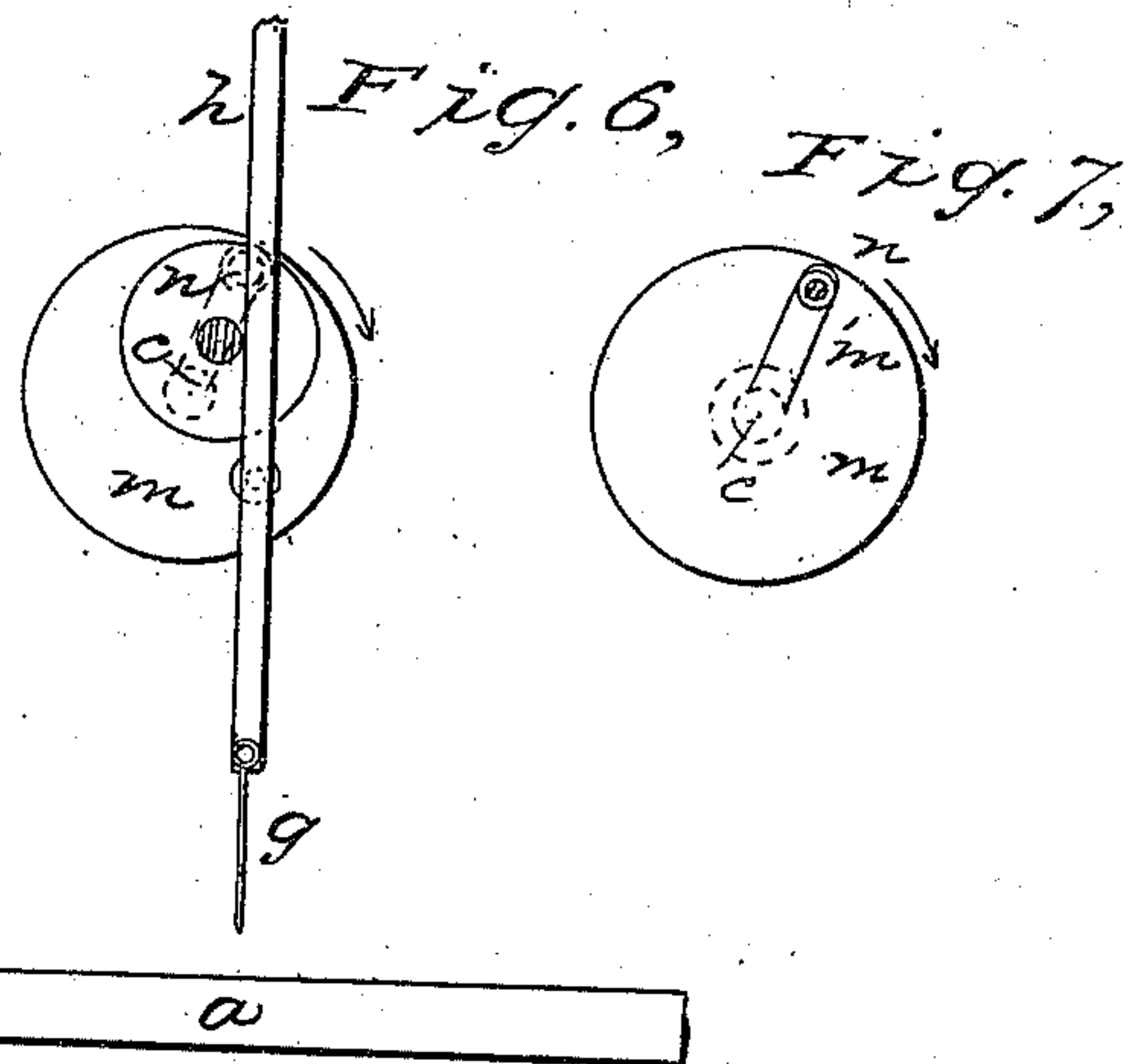
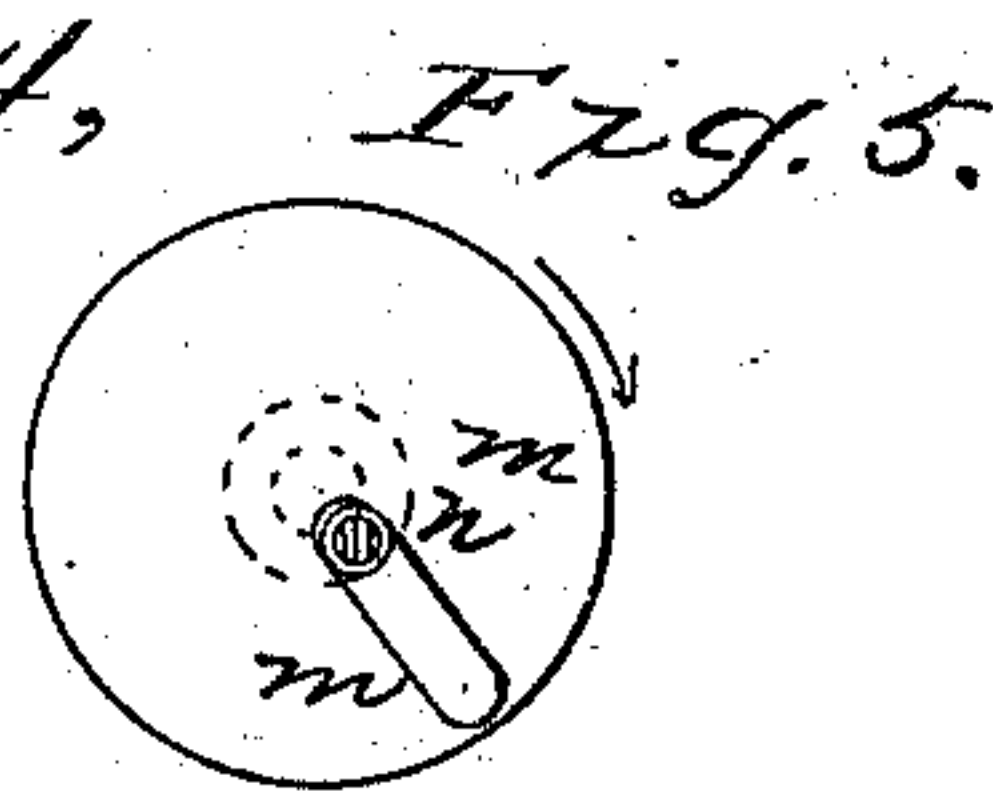
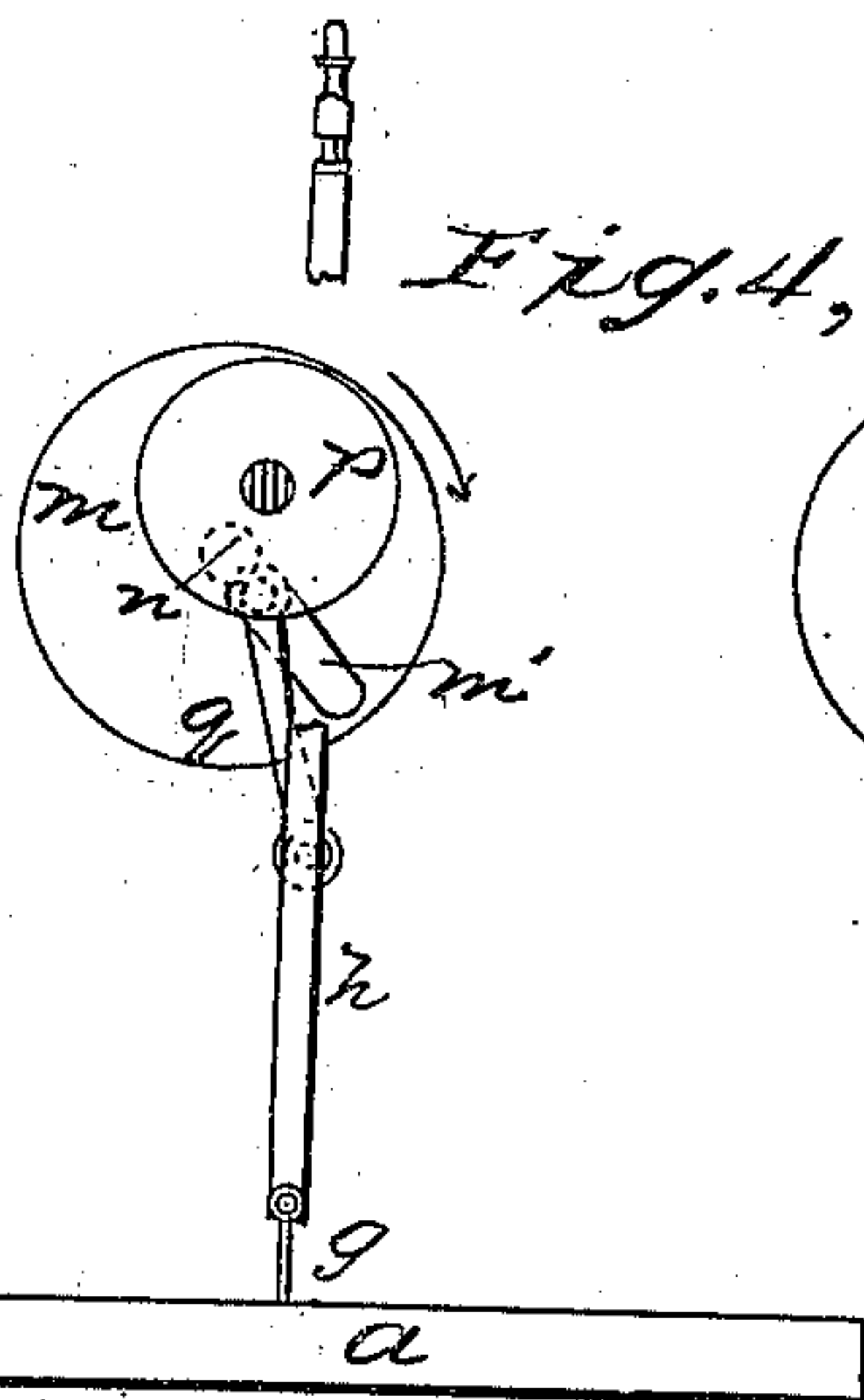
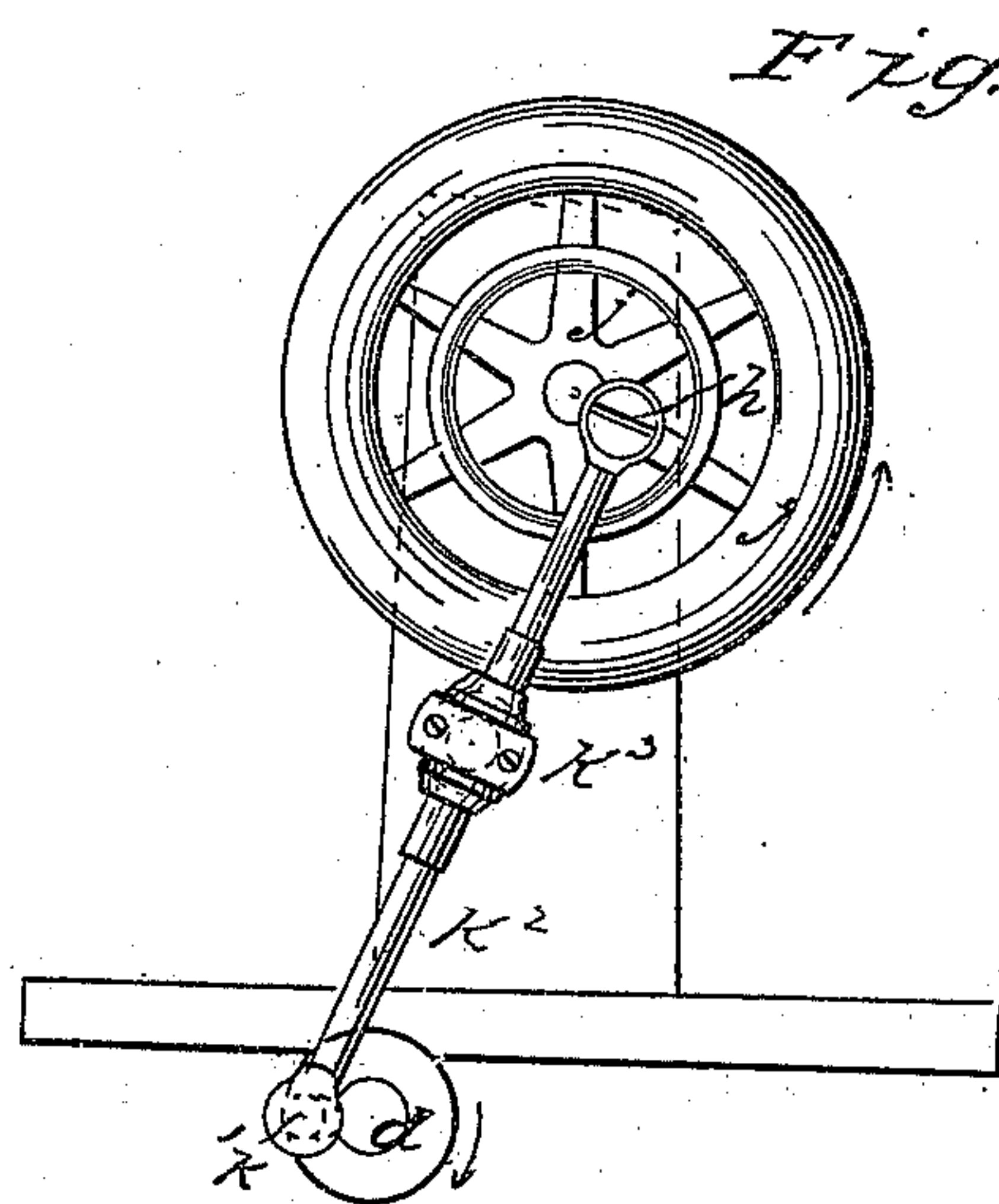
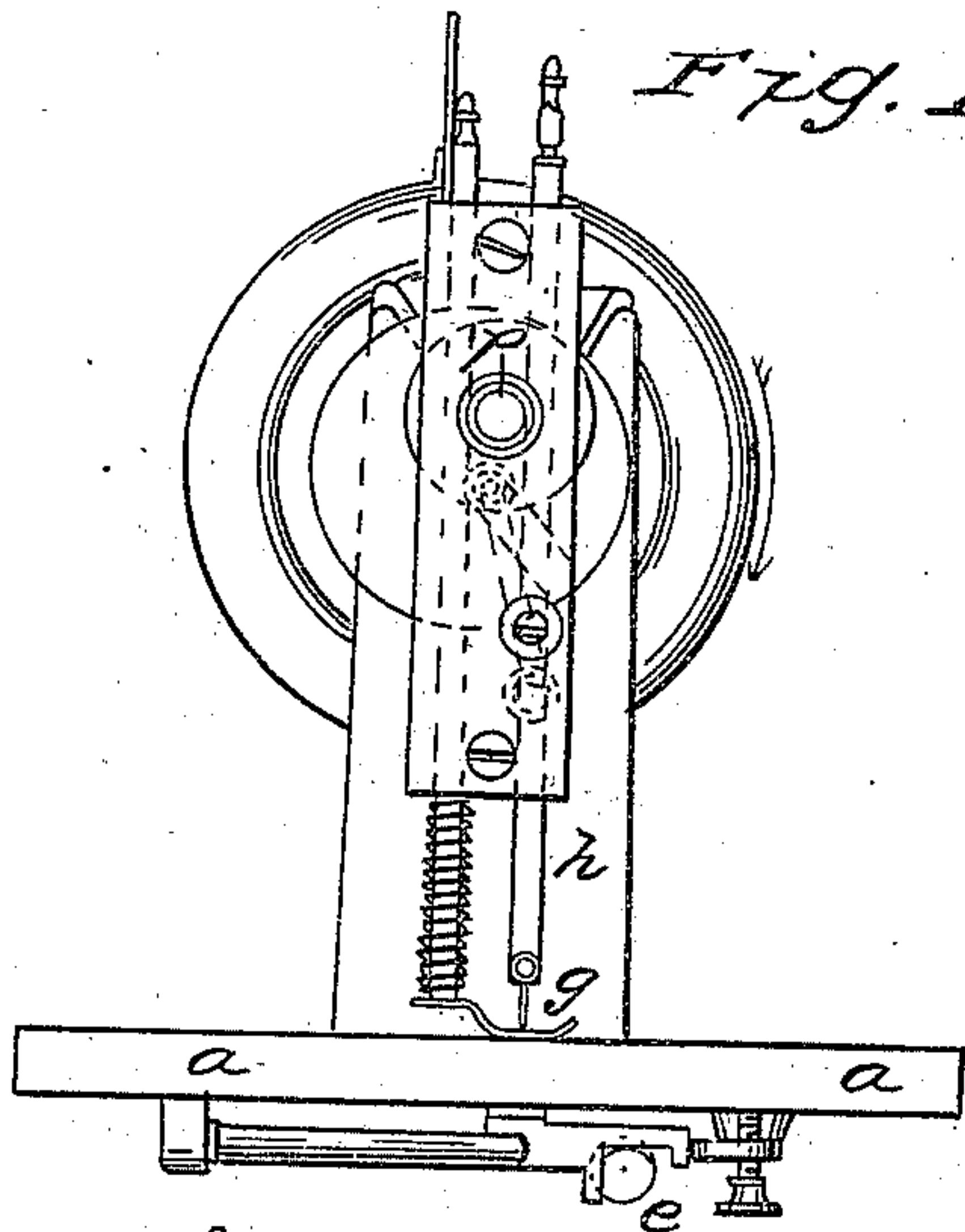
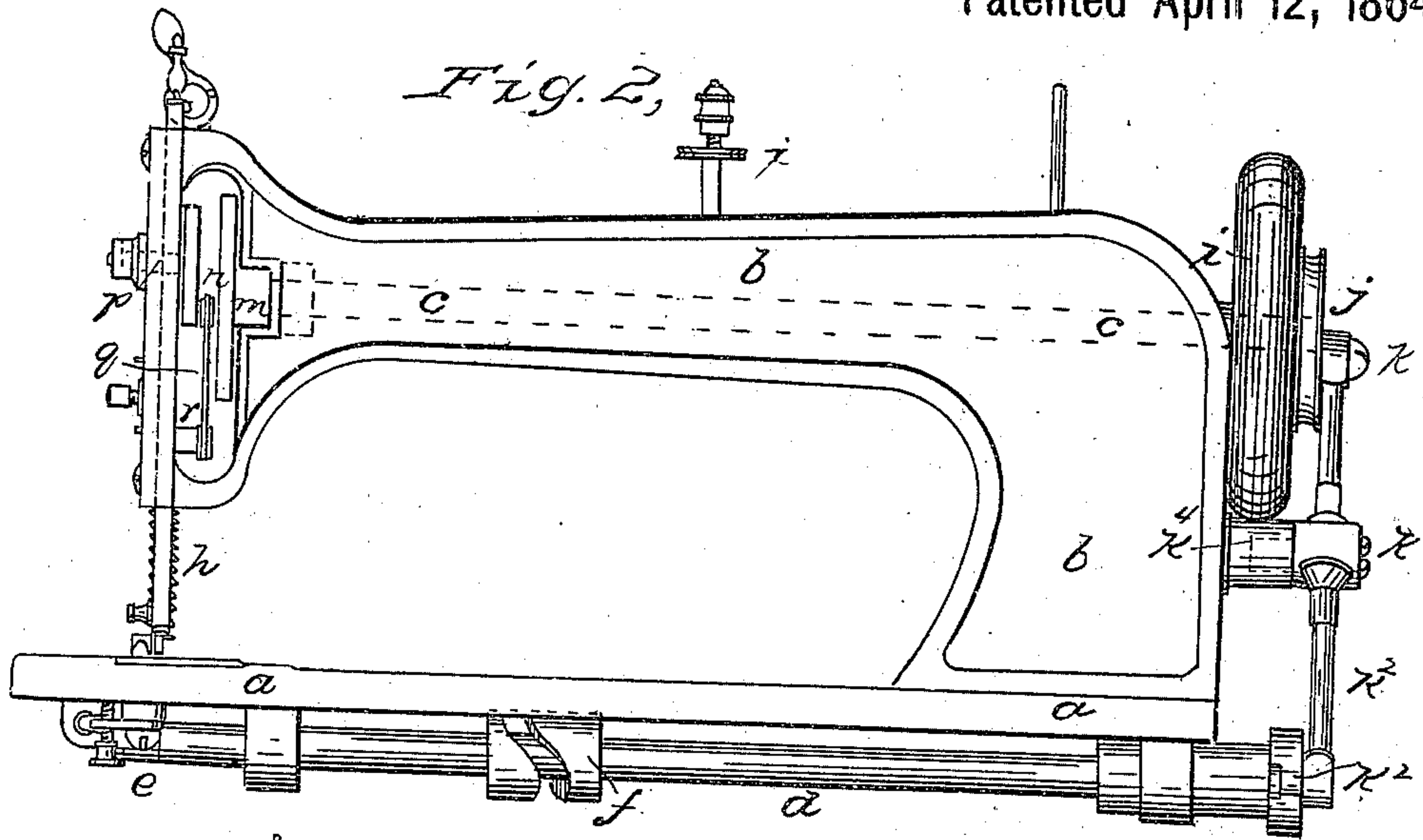


W. O. GROVER
Sewing Machine.

No. 42,285.

Patented April 12, 1864.



Witnesses:
James H. Pomeroy
James C. Wade

Inventor
W. O. Grover

UNITED STATES PATENT OFFICE.

WILLIAM O. GROVER, OF WEST ROXBURY, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. 42,285, dated April 12, 1864.

To all whom it may concern:

Be it known that I, WILLIAM O. GROVER, of the town of West Roxbury, county of Norfolk, and State of Massachusetts, have invented certain new and useful Improvements in Sewing-Machines; and I do hereby declare that the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figure 1 is a front elevation of the machine. Fig. 2 is a side elevation thereof; Fig. 3, a rear elevation; and Figs. 4, 5, 6, and 7, details of the needle-driving mechanism.

My improvement consists in a mechanism for connecting and causing to rotate simultaneously a needle-driving shaft and another shaft which actuates the feed apparatus and the shuttle or other contrivance employed for securing the loop of needle-thread.

In many sewing-machines the motions of the acting parts are obtained from two shafts, the one above and the other below the platform on which the goods are supported, and as these shafts must move turn for turn, without practical variation, in order that the proper relations may be kept up between the motions of the needle, the feed and the shuttle, or lower needle or hook, it has been customary to connect the shafts by cog-gearing. This gearing is noisy and weighty, and attempts have been made to do away with it by substituting a belt and two pulleys. This latter plan also involves difficulties, and I have devised a connection between the shafts by means of two crank-pins, a connecting-rod which also operates as a lever, and an oscillating fulcrum, the whole forcing one shaft to move revolution for revolution with the other, although the two may move at varying speed during portions of a single revolution.

In the drawings the bed-plate of the machine is shown at *a a*, the bracket at *b b*, the upper shaft at *c c*, and the lower at *d d*. This latter in the present instance carries two cams, *e* and *f*, the former actuating an ordinary feed and the latter by means of a bent lever or bell-crank (not represented in the drawings) giving motion in a customary manner to the shuttle-driver and shuttle; but this shaft may be applied to move a hook or an eye-pointed needle or a looper for a single-thread machine.

The machine is to have a proper feed apparatus, presser-foot, bobbin-supporters, tension apparatus, and, if necessary, a thread-controller. That shown in the drawings has a four-motion feed.

The needle is shown at *g*, the needle-stock at *h*, sliding in proper guides, and the tension for the upper thread at *i*. In this machine the upper is the driving shaft, or that to be actuated by the prime mover, and is provided with a fly-wheel and pulley, as at *j*; but the lower may be the driving and the upper the driven shaft.

Attached to the upper shaft is a crank-pin, *k*, and to the lower shaft is secured another crank-pin, *k'*. Both pins have about the same throw, and are connected by an ordinary connecting-rod, *k²*. This rod passes through and slides in a vibrating fulcrum, *k³*, which I prefer to make as a journal-box in two pieces, one of which has screwed to it a pin, which oscillates in a socket, *k⁴*. The requisites of the fulcrum or its equivalent are that it shall permit of the endwise motion of the connecting-rod, and shall at the same time cause it to oscillate upon points somewhere between its two ends. When the upper shaft is revolved in the direction of the arrow from the position shown in Fig. 3 it will raise the connecting-rod, and consequently the lower crank-pin, and will at the same time carry the upper end of the connecting-rod sidewise, twisting the lower end in the opposite direction in consequence of the confinement of the rod by the fulcrum, and thus revolving the lower shaft in the direction of the arrow. At and about those parts of the revolution when the connecting-rod lies in the plane passing through the centers of the two shafts, or nearly so, the motion imparted to the lower one will be due almost entirely to the oscillating motion of the rod upon its fulcrum. When the shafts are ninety degrees from that position of the rod the motion conferred upon the lower shaft will depend almost wholly upon the endwise motion of the rod.

By attentive observance of the contrivance it will be seen that the two shafts will vary slightly in velocity during each revolution; but they will nevertheless always make revolution for revolution, each crank-pin always bearing the same relative position to the other

at any given point in each and every revolution. This variation of velocity, when the proportions and arrangements of the parts are as shown in the drawings, is practically unimportant; but if great nicety be desired it may be compensated for by the shape of the cams which actuate the shuttle or lower eye-pointed needle. In single-thread machines, and those of the Wheeler & Wilson variety, a rotating hook may be placed upon the end of the lower shaft. This contrivance will not operate if the driven crank-pin be made fast, or, in other words, cannot change its distance from the center of the shaft unless there be a great amount of play in the connections. So great an amount would be objectionable. I have therefore so mounted the pin that it may vary its distance from the shaft with which it revolves. In the machine shown in the drawings this crank-pin is set in a slot extending in a radial line from the center of the shaft, (see Fig. 2,) and in this slot the pin is free to slide.

The oscillating fulcrum may be set nearer to one shaft than to the other, or the connecting-rod made longer or shorter, and a considerable variation of velocity of the driven shaft during any one revolution may thus be attained. This variation of velocity may be taken advantage of for imparting varying velocities of travel to the shuttle or other working parts driven by the driven shaft.

The upper shaft has secured upon its end a boss or face-wheel, *m*. A slot, *m'*, is formed in this boss, and into it extends a crank-pin, *n*, which is supported by and revolves with a shaft, *p*. This latter shaft is not opposite the upper shaft, but lies above it and in a different vertical plane. A connecting-rod, *q*, extends from the crank-pin *n* to a pin, *r*, upon the needle-stock *h*, the connection being such that the stock is forced to rise and fall as the crank revolves. When the upper or main shaft is revolved the slot *m'* will force the crank-pin *n* to revolve, and as the two shafts are eccentric the pin will during its revolution be forced to slide in the slot. As it slides it will vary its distance from the center of the main shaft, and the pin will have a rapid motion when at a distance from the main shaft (see Figs. 6 and

7) and a comparatively slow motion when it is close to the center of the main shaft. (See Figs. 4 and 5.) The distance between the center of the shaft and the center upon which the crank-pin revolves may be varied from the precise distance shown in the drawings. The throw of the crank-pin or length of the crank may also be changed, and also the length of the slot, and by such changes variations of velocity may be produced suiting the exigencies of any special machine or the judgment of any constructor.

The shafts are so located relatively to each other that the slow motion of the pin takes place when the necessities of the machine require a slow motion of the needle. The contrivance works smoothly and with little friction or wear of the parts, and the varying velocity of the pin with reference to the main shaft may be further diversified by curving the slot; but I, as far as my present experience enables me to judge, prefer a straight slot. The acting parts of the contrivance are a revolving slot, a crank-pin revolving upon a center eccentric to that upon which the slot revolves, and a connecting-rod or some equivalent therefor—such as a slot in the needle-stock—to transfer the motions of the crank to the needle, and by varying the relative positions of the centers of the shaft and the center of revolution of the crank-pin, and, if desired, the length of the crank, the variation of velocities of the shafts may be changed as circumstances may require.

What I claim as my invention is—

The connection, substantially such as is herein described, by which one shaft of a sewing-machine causes another to revolve with it, consisting of two crank-pins, a connecting-rod attached to both of them, and a fulcrum, all operating in combination, substantially as specified.

In testimony whereof I have hereunto subscribed my name on this 20th day of February, A. D. 1863.

W. O. GROVER.

In presence of—

JAMES H. BROWN,
JAMES E. WADE.