

W. Aiken. Knitting-Machine.

N^o 72771

Patented Dec. 31, 1867.

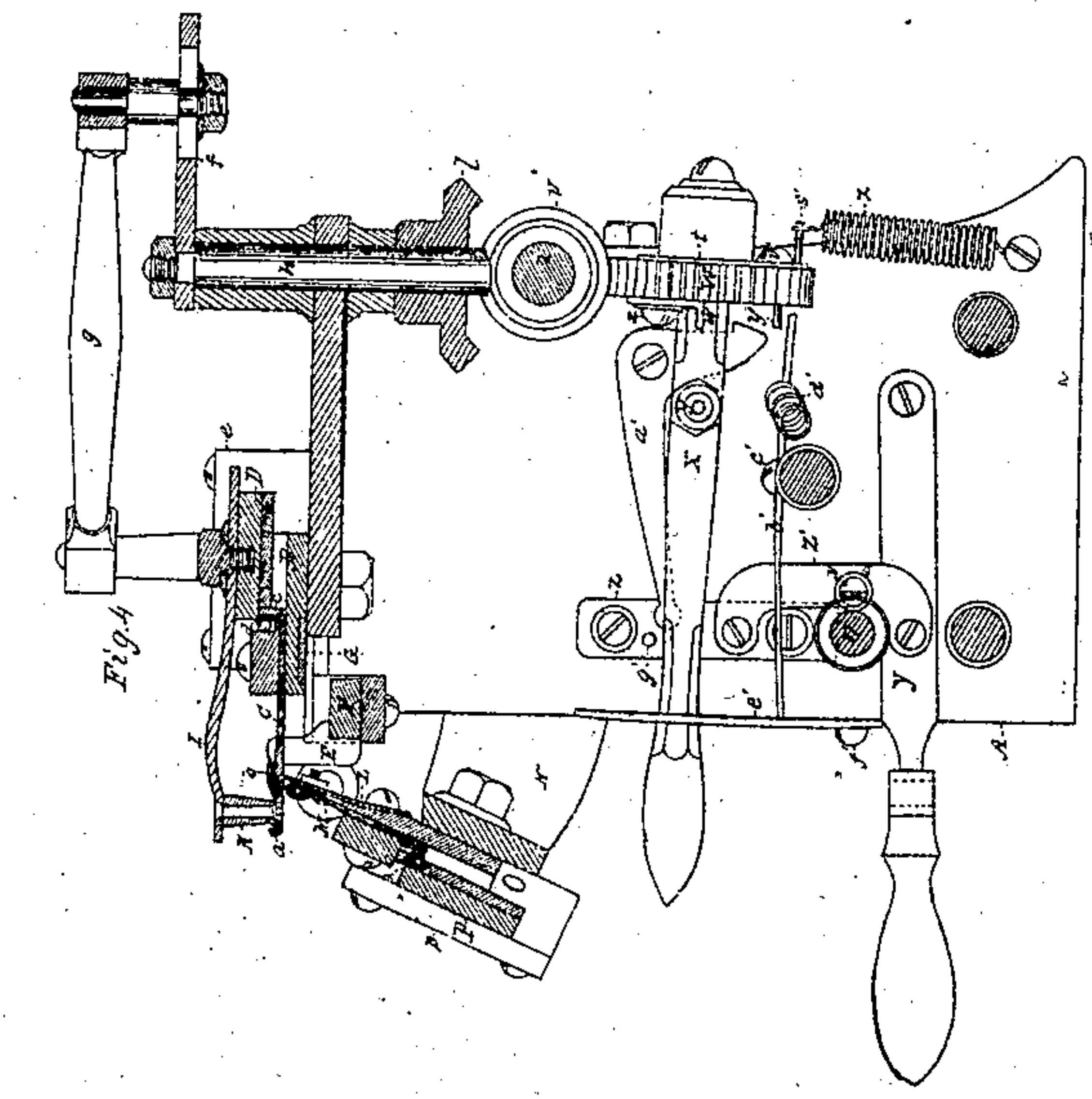


Fig. 4.

Fig. 7.

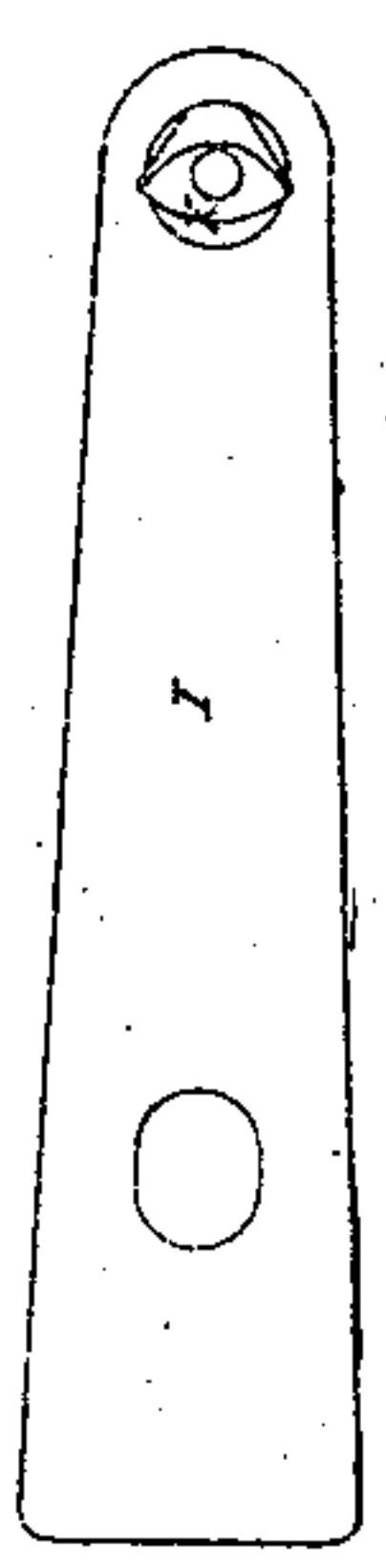


Fig. 6.

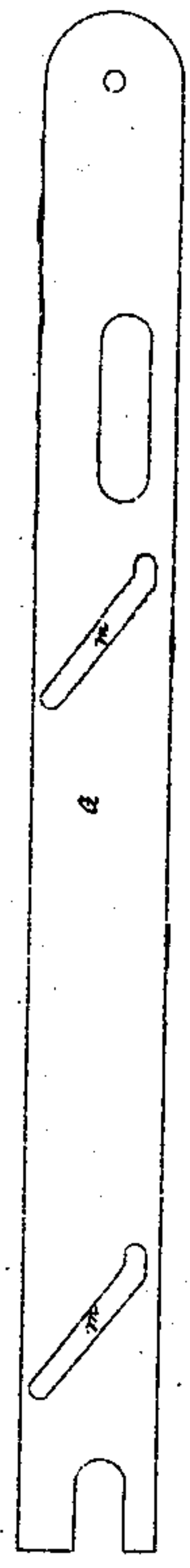


Fig. 8.

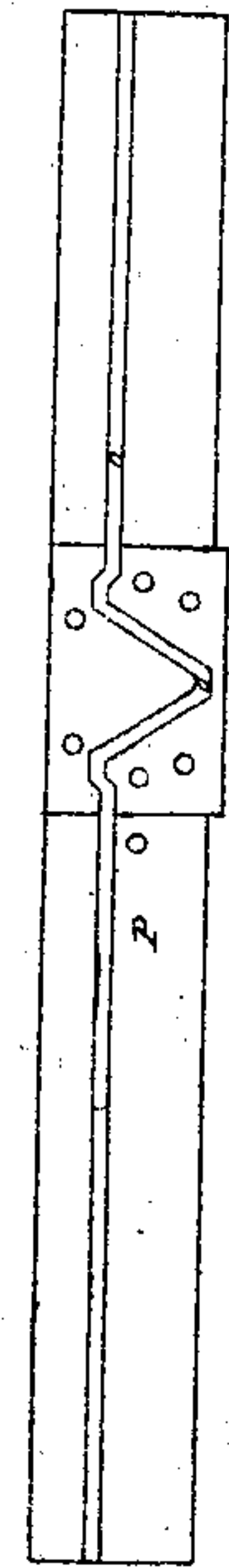


Fig. 5.

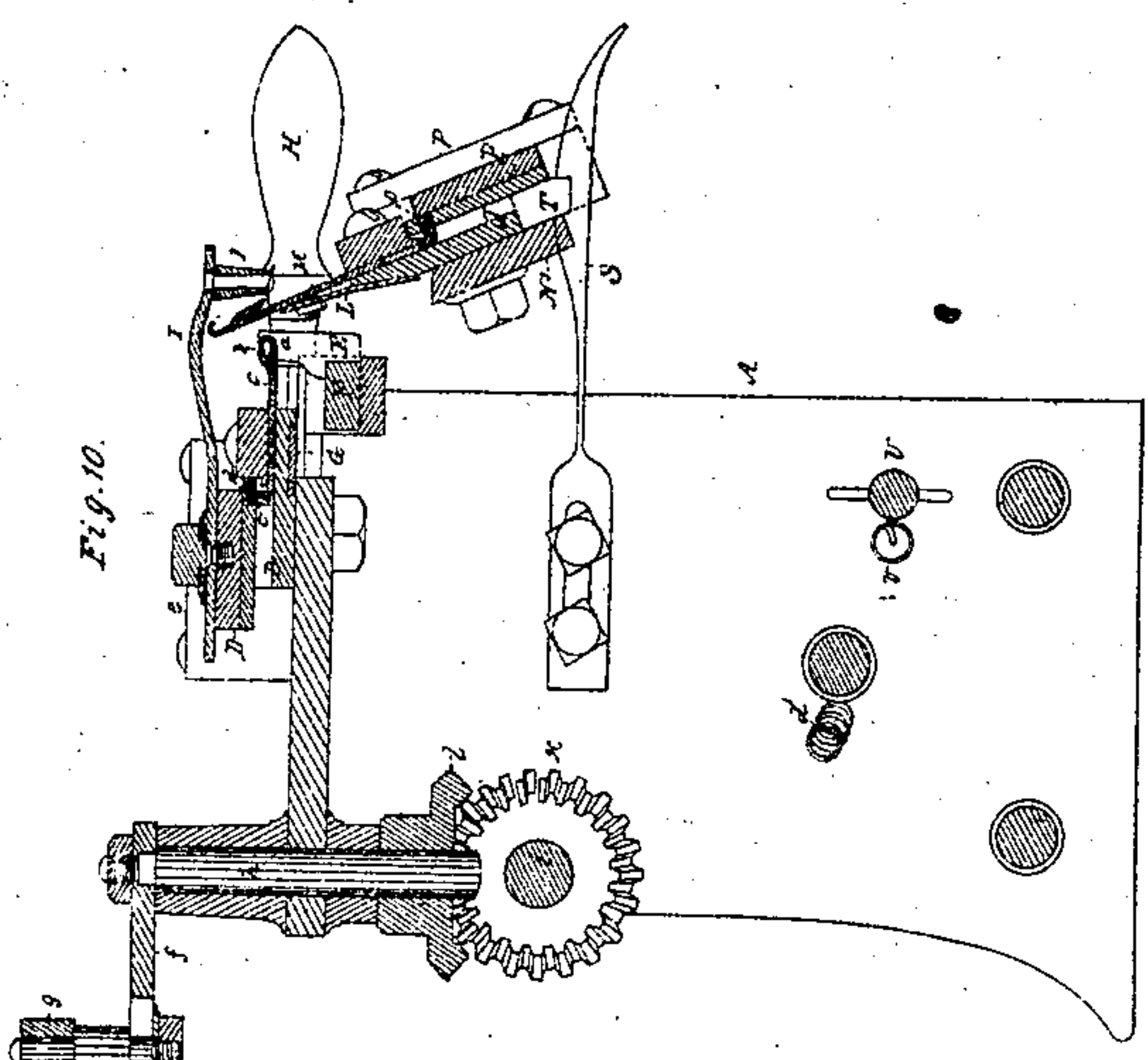
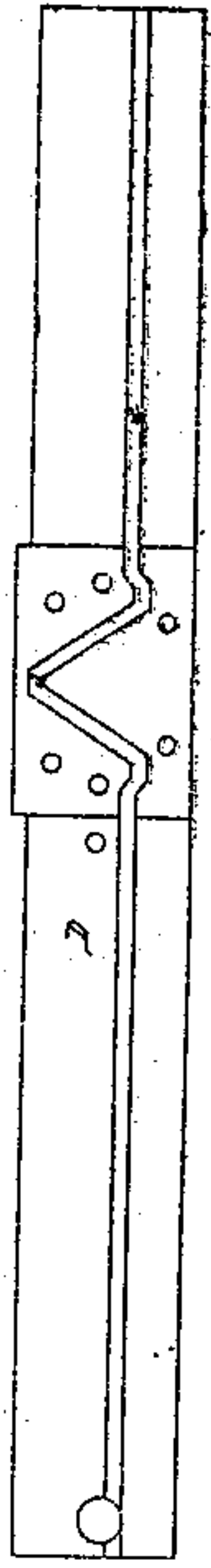


Fig. 10.

Witnesses
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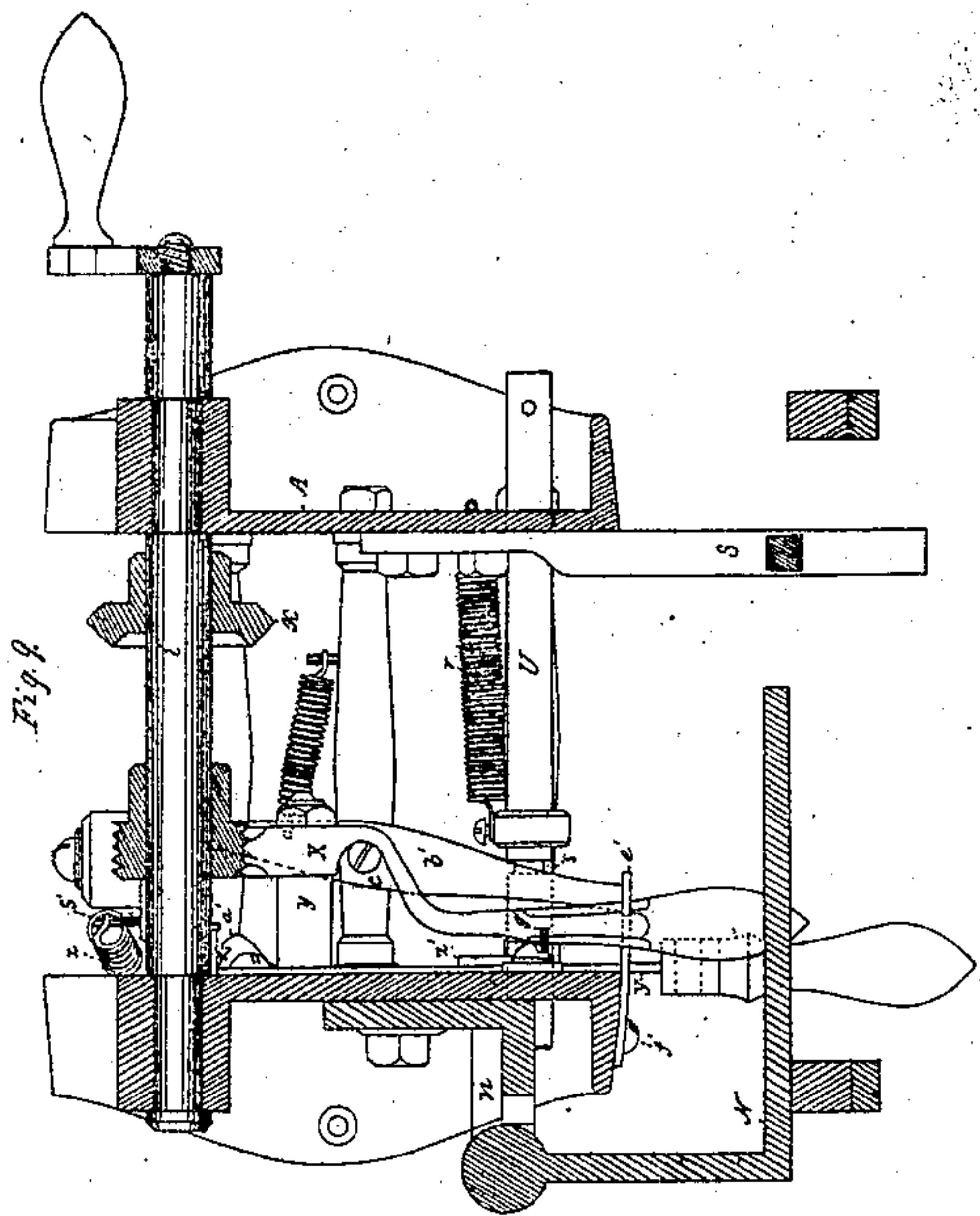


Fig. 1.

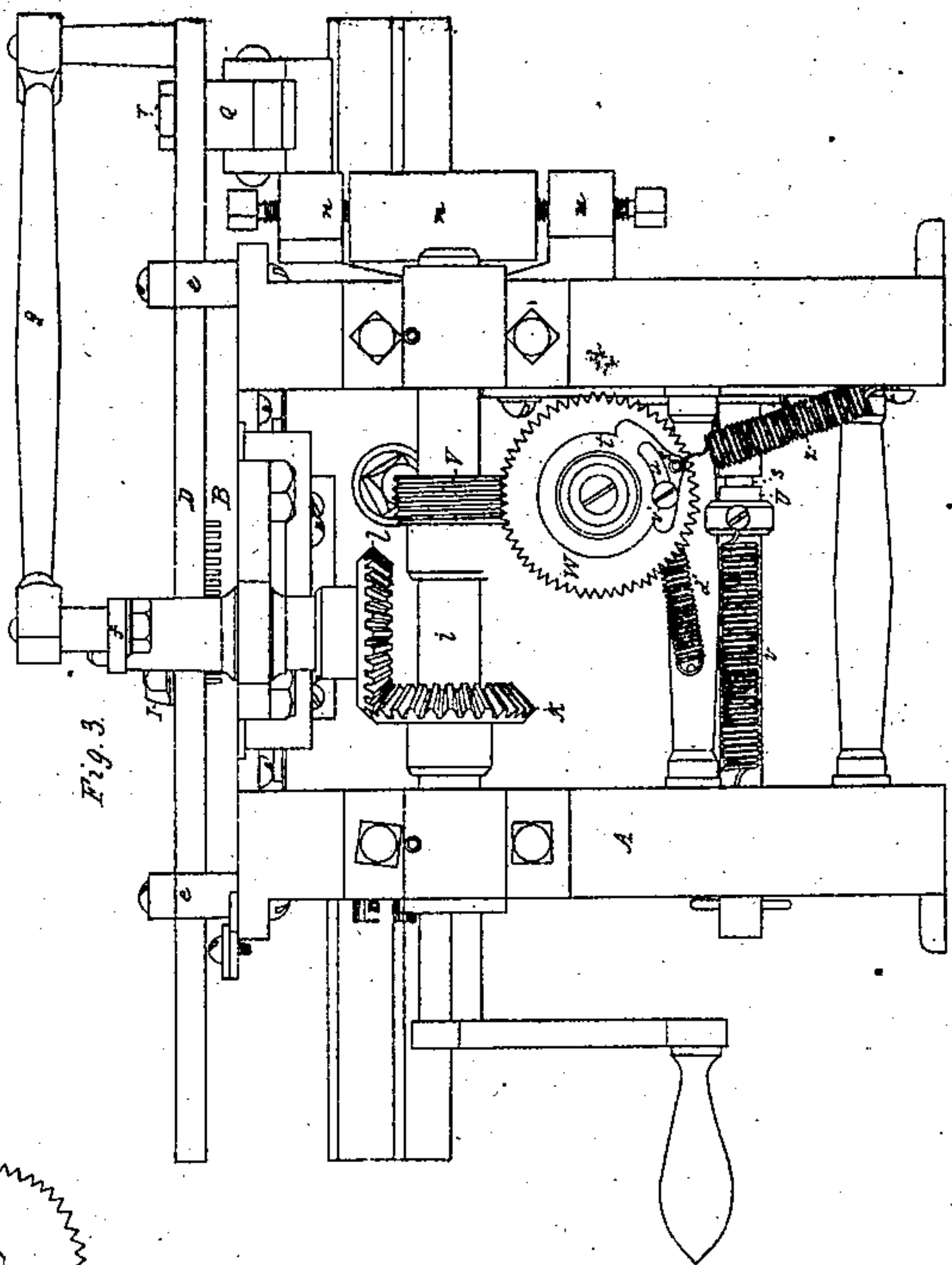


Fig. 3.

Fig. 11.

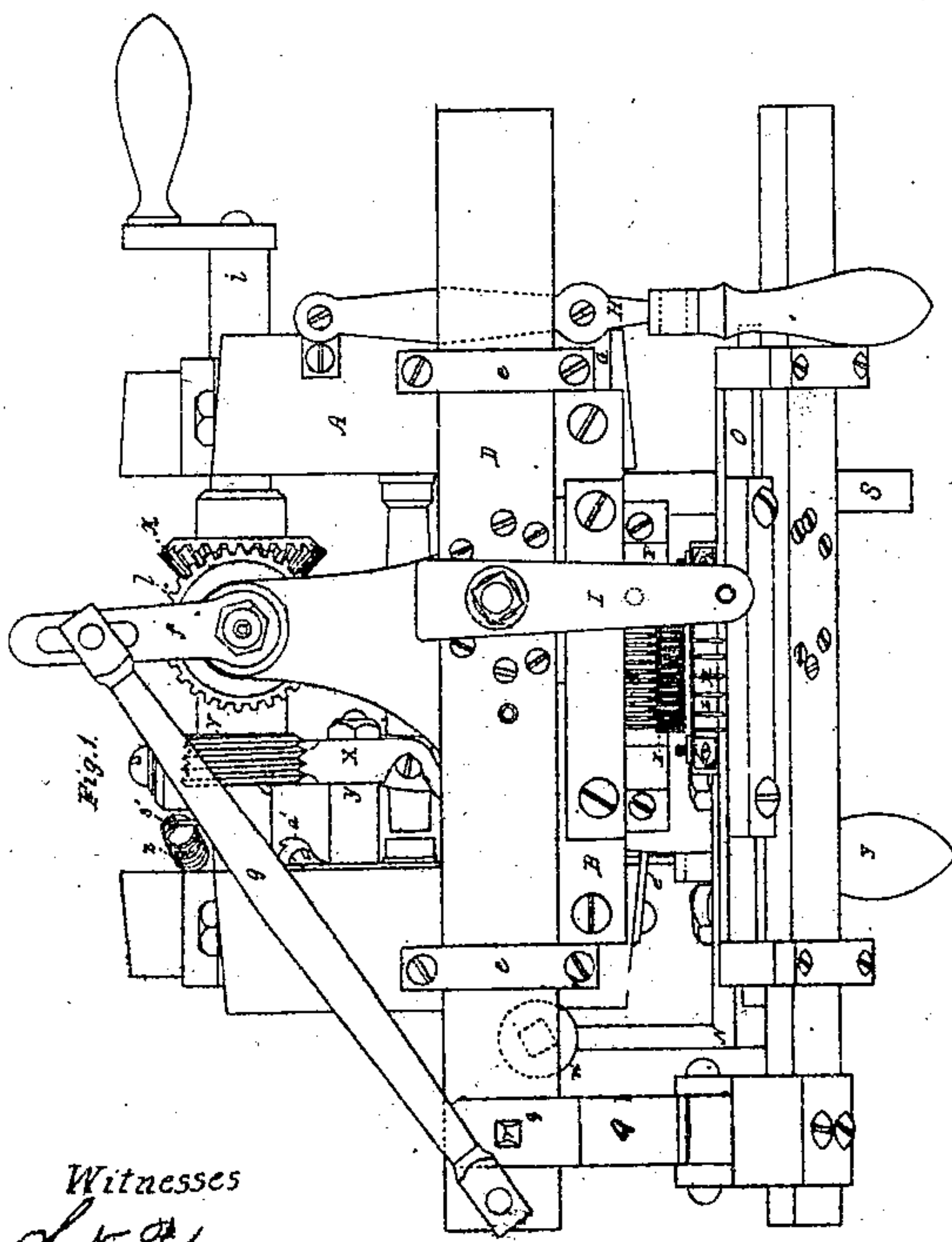
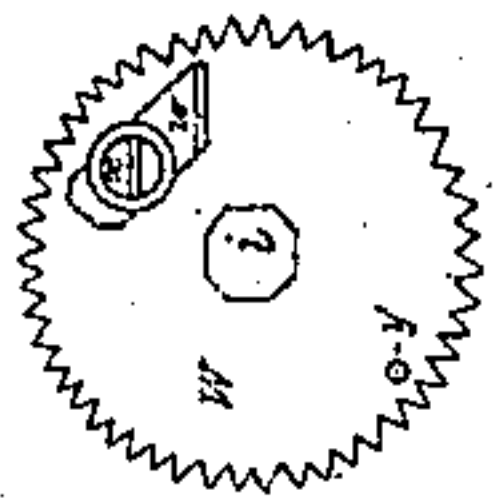


Fig. 2.

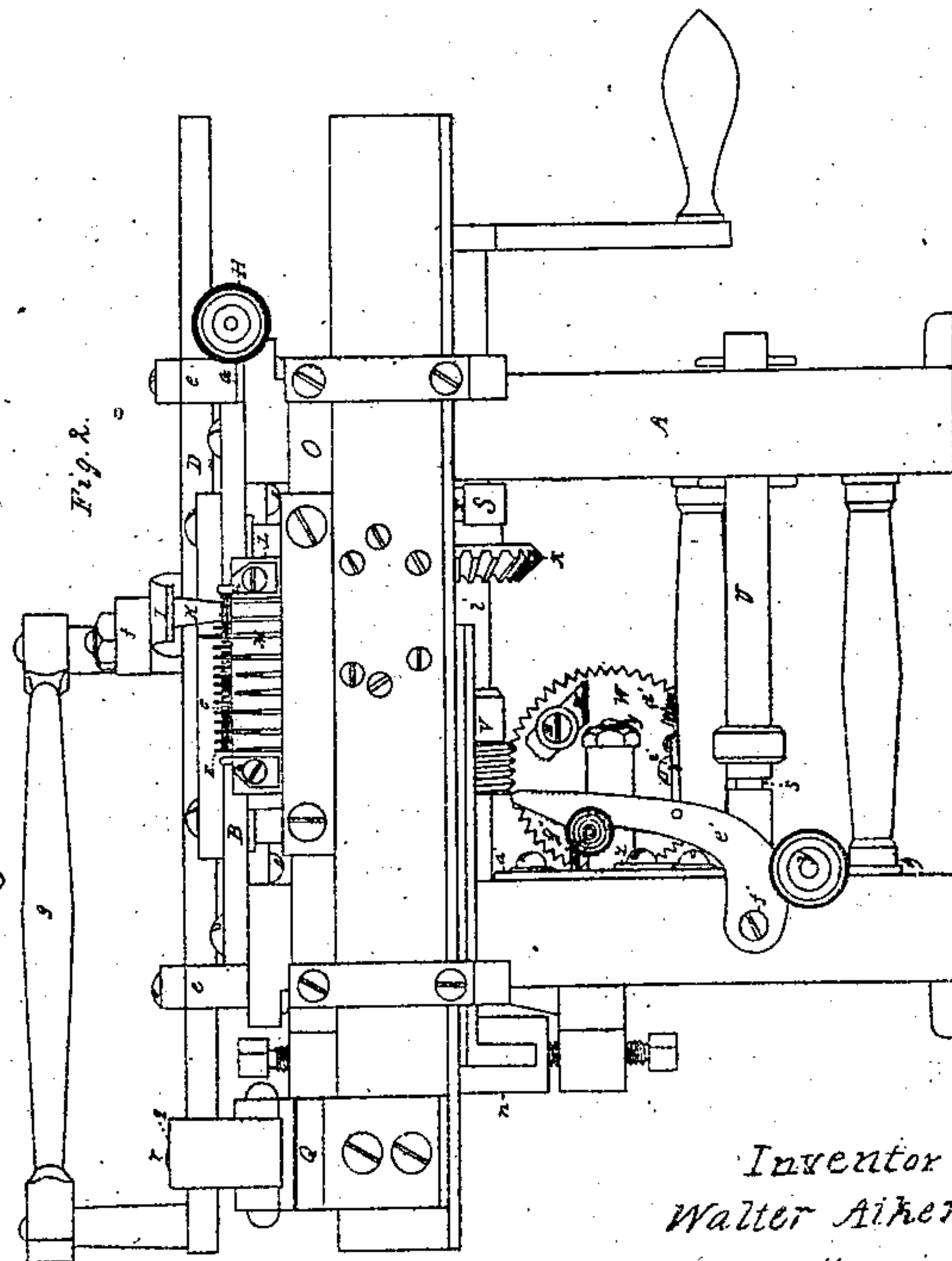


Fig. 4.

Witnesses
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UNITED STATES PATENT OFFICE.

WALTER AIKEN, OF FRANKLIN, NEW HAMPSHIRE.

IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 72,771, dated December 31, 1867.

To all persons to whom these presents may come:

Be it known that I, WALTER AIKEN, of Franklin, in the county of Merrimack and State of New Hampshire, have invented a new and useful machine for knitting a fabric composed either of plain or ribbed work, or both; and I do hereby declare the same to be fully described in the following specifications and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a front elevation, Fig. 3 a rear elevation, and Fig. 4 a transverse and vertical section, of it.

In such drawings, A denotes the frame of the machine, which, upon its top, supports the grooved needle-bar B, in whose transverse grooves the series of plain-work needles C is arranged, each of such needles being provided with a hook, *a*, a turning-latch, *b*, and a heel-projection, *c*. The said heel-projection enters the cam-groove *d* of the slide or cam bar D, an under-side view of which is given in Fig. 5. This bar D is supported by, and so as to be capable of sliding longitudinally in, stationary boxes *e*, erected on the top of the frame A. Its movements are produced by a crank, *f*, and a connecting-rod, *g*. The said crank projects from a vertical shaft, *h*, which receives rotary motion from a horizontal driving-shaft, *i*, by means of two bevel-gears, *k l*, applied to the two shafts.

A series of sinkers, E, arranged with the needles, as represented, projects upward from a frame, F, which is applied to the needle-bar so as to be capable of being moved horizontally and laterally thereof, the movements of such sinker-frame F being produced by a slide-plate, G, arranged to slide longitudinally within the needle-bar and being jointed to a lever, H. This slide-plate is shown in top view in Fig. 6, it having oblique grooves *m m* made in it to receive the studs projecting up from the frame F, the whole being common to machines for producing plain-work knitting.

I is the yarn-guide, fixed to and projected from the slide-bar D, and carrying the latch opener or lifter K, an under-side view of such latch-opener being exhibited in Fig. 7.

The machinery above described, with the addition of the presser-plate L, arranged back of the rib-needles M, constitutes well-known

mechanism for producing what is termed "plain" knitting or work.

In carrying out my invention, I hinge to the frame A, in manner as shown at *n*, a bent arm, N, to which a grooved needle-bar, O, is fixed. This bar is like the bar B, and receives in its grooves a series of rib-needles, M, made in all respects like the plain-work needles. These needles M are provided with a cam-bar, P, for operating them, an inner-side view of such cam-bar being shown in Fig. 8. Its cam-groove to receive the heel-projections of the needles is represented at *o*. The said cam-bar P is supported in guide-boxes *p p*, projecting from the arm N and the needle-bar O. Near one end of the cam-bar P a latch, Q, is hinged to the said bar, such latch having a hole, *q*, to receive a stud, *r*, extended up from the cam-bar D of the plain-work needles. Where the two bars are latched together by the latch being turned down upon the bar D, the latter bar, while in movement, will produce corresponding movements of the bar P, and thus cause such bar to operate the rib-needles.

A spring-catch, S, projecting from the frame A serves, by catching upon a projection, T, from the rib-needle bar, to hold the said bar in its proper position for the rib-needles to produce the ribbed work.

Fig. 9 is a horizontal section, and Fig. 10 a transverse section taken through the driving-shaft, and exhibiting the mechanism below and to the right of the planes of section.

Of such mechanism, U is a "shipper-shaft," which is to slide longitudinally in the frame A. It is provided with a retracting-spring, *v*, which is affixed to the frame, and also to the shaft. This shipper-shaft is to be supposed to carry a fork to straddle the driving-belt of the machine, and throw it on and off a pulley fixed on the driving-shaft *i*. The shipper-shaft has a notch or groove, *s*, made in it.

A worm, V, fixed on the driving-shaft, has a worm-gear, W, arranged underneath it, and upon one end of a lever, X, which turns in a vertical plane, the fulcrum of the lever being at *y*.

A helical spring, Z, is fastened at its lower end to the frame A, and at its upper end to a stud, *s'*, extended from an adjustable collar, *t*,

which encompasses the hub of the worm-gear W, and is provided with a curved slot, *u*.

A clamp-screw, *v'*, goes through the slot and screws into the worm-gear. By such means the stud *s'* may be adjusted in a circular path, and with reference to a projection, *w*, extended from the inner side of the worm-gear. (See Fig. 11, which is an inner-side view of such worm-gears.) The projection *w* is held to the gear by means of a clamp-screw, *x*, going through a slot made in the projection. There is also another stud or pin extended from the inner face of the worm-gear W, such pin being shown at *y'*.

A slide-bolt, *z*, applied to one side of the frame A and over the shipper-shaft, is jointed to a bent lever, *a'*, whose outer arm is arranged in the path of movement of the pin *y'*. Furthermore, another lever, *b'*, turning horizontally on a stationary fulcrum, *c'*, and provided with a retractile spring, *d'*, is jointed at the end of its longer arm to a latch, *e'*, applied to the frame A, and arranged with respect to the lever X in manner as represented. The latch *e'* turns on a screw, *f'*, inserted in the said frame.

A stud, *g'*, extends from the bolt *z*, and over the longer arm of the lever X. Another lever, Y, jointed with the bolt *z* by a connecting-bar, Z', serves to enable a person to raise or lower the bolt, as occasion may require, such bolt being to enter the notch or groove *s* of the shipper-shaft, and thereby hold the said shaft in a position for the driving-belt to run on the driving-pulley of the shaft *i*.

Selvage-fingers *h' h'* are applied to the presser, and used for the purpose for which they are generally employed.

The particular object of the above-described machine is to enable the ribbed-work heel of a stocking to be finished with plain work, especially in that portion of the heel which goes under the sole of the foot, where the stocking is in wear by a person.

In order to prepare the machine for knitting, first swing the rib-needles away from their position in front of the plain needles, and move the sinkers back. Next, the leg of a stocking, previously formed on another rib-knitting machine, is to be taken, and two-thirds of the stitches of the part from which the heel is to be knit are to be cast on the plain needles, there being one ribbed needle to every two plain needles. Next, the rib-needles are to be brought up in front of the plain-work needles, and the balance or remaining third of the stitches is to be cast on such rib-needles. Next, the sinkers should be advanced, and the latch Q should be put in engagement with the stud *r*. Next, the lever X should be moved so as to throw the worm-gear W into engagement with the worm V, and cause the said lever to be held in position by its catch *e'*. Next, the shipper-shaft U is to be moved to the left, so as to cause the driving-belt to pass upon the driving-pulley of the shaft *i*, and the bolt *z* to enter the groove *s* of the shipper-shaft. The

machine will then commence to knit the ribbed work of the heel.

The ribbed work of the heel being produced by the conjoint action of the two series of needles, as is well understood, we will suppose that the necessary amount of such ribbed work in a heel has been made and the machine has stopped working. The stoppage of the machine will be effected by the action of the stud *y'* on the lever *a'*, the stud being carried in contact with the hook of the said lever, and causing the lever to turn on its fulcrum and raise the bolt *z* out of the notch *s* of the shaft U, so as to enable the spring *v* to retract the shaft, and thereby move the belt-shipper so as to shift the driving-belt from the fast to the loose pulley. Next, the attendant is to throw the latch Q out of engagement with the stud *r*. Next, the loops of the ribbed needles should be removed from such needles. This may be accomplished by simply sliding the cam-bar of the rib-needles backward once and forward once. Next, the needle-bar is to be unlatched, and the said bar, with the bent arm supporting it, is to be swung around and away from the plain-work needles, so as to enable the attendant to get at them for the purpose of placing upon them the loops removed from the rib-needles. Next, the sinkers are to be slid back, and the loops previously taken from the rib-needles are to be cast on the plain-work needles, after which the sinkers are to be moved forward and restored to their normal positions. Next, the rib-needle bar is to be again restored to place, so as to bring the presser-plate of it directly in front of the sinkers. The machine will now be ready to knit the plain work. Next, the shipper-shaft is to be laid hold of and moved to the left. The machine will now be put in operation, and will continue to knit the plain work until the projection *w* of the worm-gear W may meet the lever *b'* and move it far enough to cast the latch *e'* off the lever X. The retractive force of the spring Z will now instantly draw the worm-gear W out of engagement with the worm, and by elevating the longer arm of the lever X will force such arm against the pin or stud *g'* of the bolt *z*, and thereby raise the bolt out of the notch or groove of the shipper-shaft. This shaft will at once be retracted, and the loom will be stopped. At the same time the worm-gear, by the action of the spring, will be brought back to its normal or starting position.

By means of the worm-gear and its adjustable and stationary studs I regulate not only the length of the portion of the plain work to be knit, but also the length of the ribbed work of the heel.

I claim as my invention, in the said knitting-machine, the following:

1. I claim the combination of the latch Q and stud *r*, or their equivalents, with the two cam-bars DP of the rib and plain-work needles.
2. I also claim the combination and arrangement of the swing-arm N, or its equivalent,

with the frame A and the supporting mechanism and cam-bar P of the rib-needles, the same being to enable such rib-needles, with their supporting mechanism and cam-bar, to be turned away from the plain-work needles, in manner as set forth.

3. I also claim the combination for holding and releasing the shipper-shaft and regulating the length of the plain and ribbed work of a stocking-heel to be produced, as described, such combination consisting of the worm V,

the worm-gear W, its studs and spring, the lever X, its latch *e'*, latch-lever *b'* and spring *d'*, and the bolt *z* and its operative lever *a'*, the shipper-shaft being provided with a notch or groove, or its equivalent, for reception of the bolt, as set forth.

WALTER AIKEN.

Witnesses:

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PARKER C. HANCOCK.