

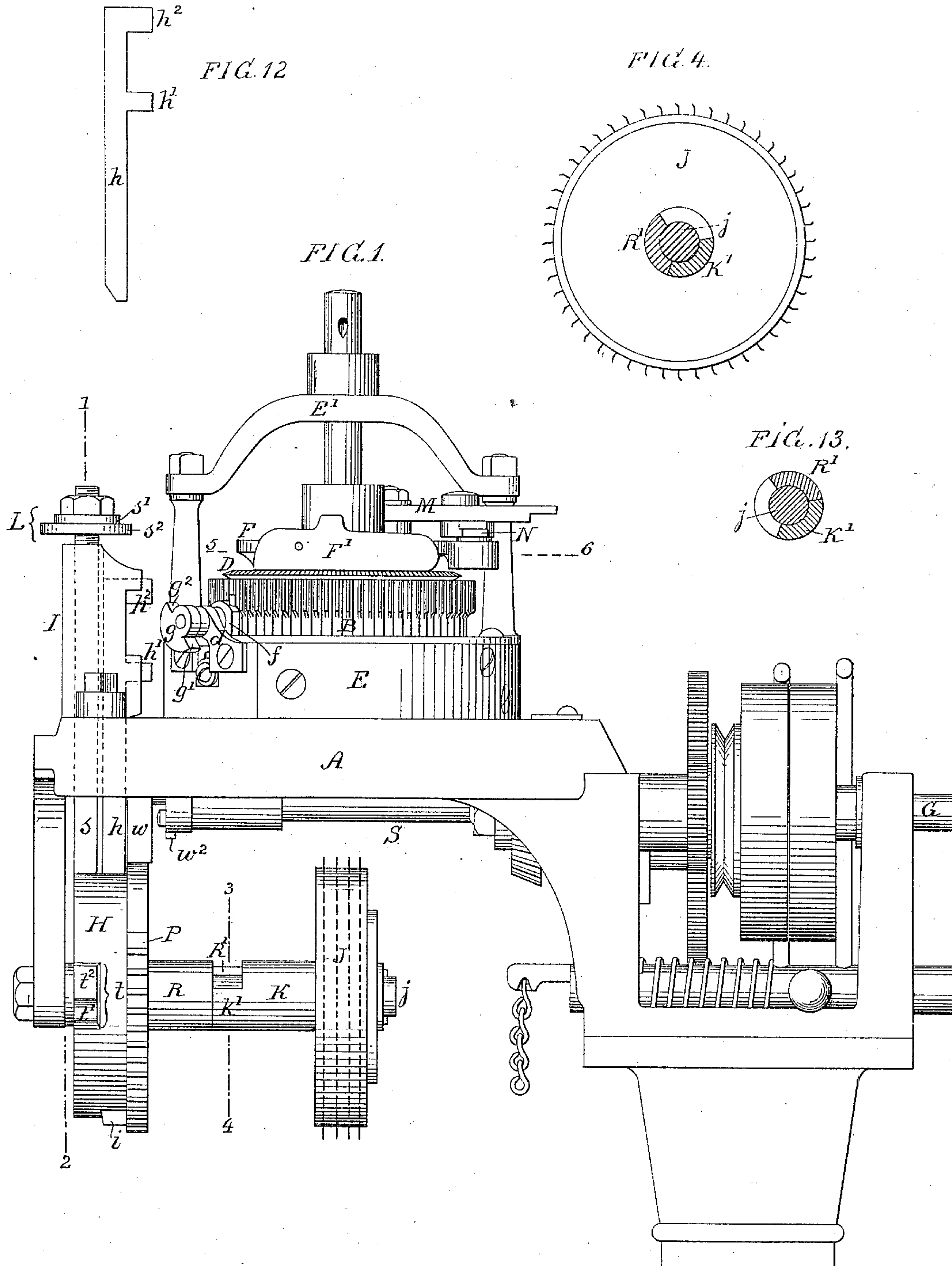
(No Model.)

3 Sheets—Sheet 1.

J. HEGINBOTHOM.  
KNITTING MACHINE.

No. 286,003.

Patented Oct. 2, 1883.



WITNESSES:

Harry Drury  
Hamilton D. Turner.

INVENTOR:

Joseph Heginbothom  
By his Attorneys  
Hosmer and Fry

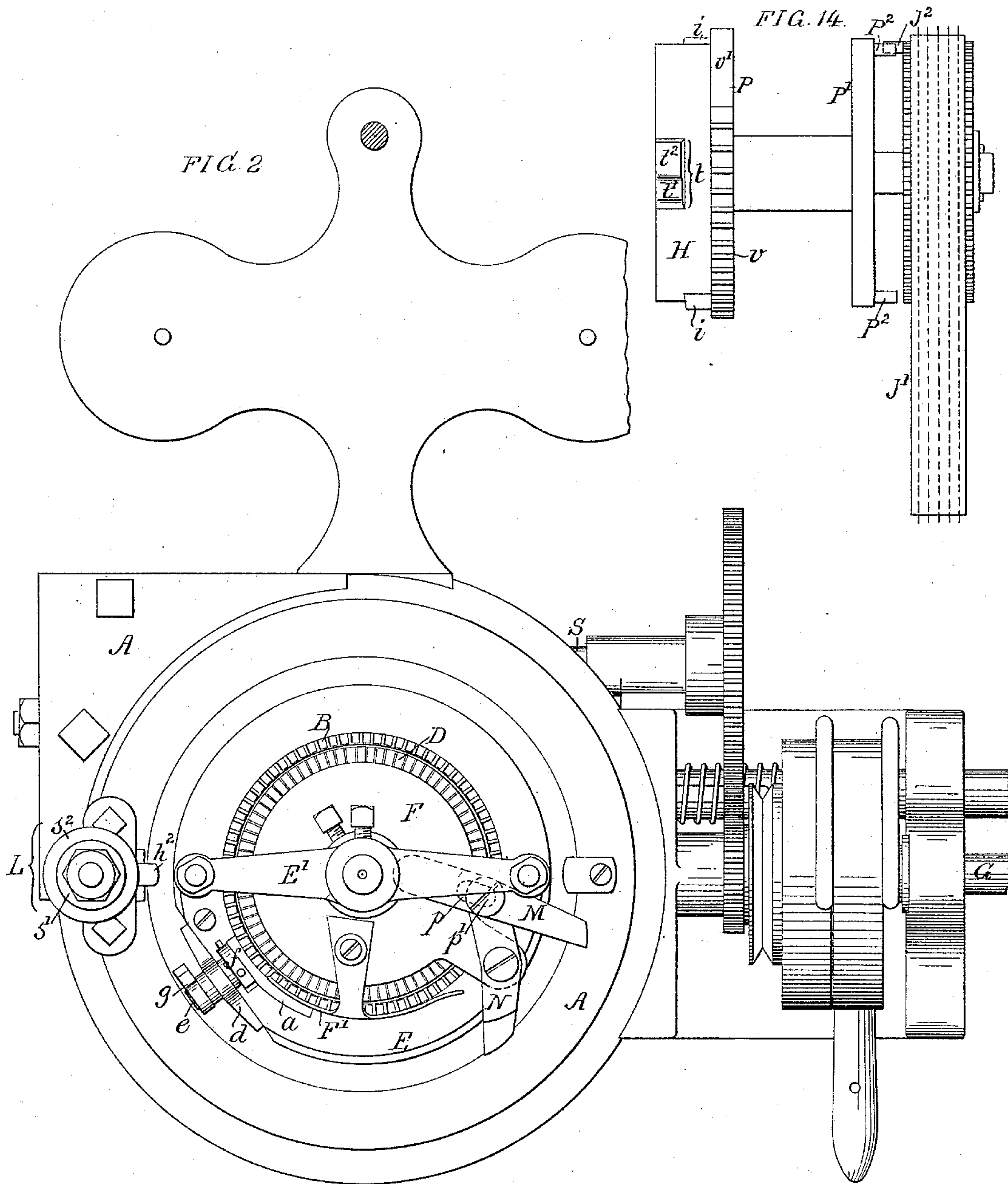
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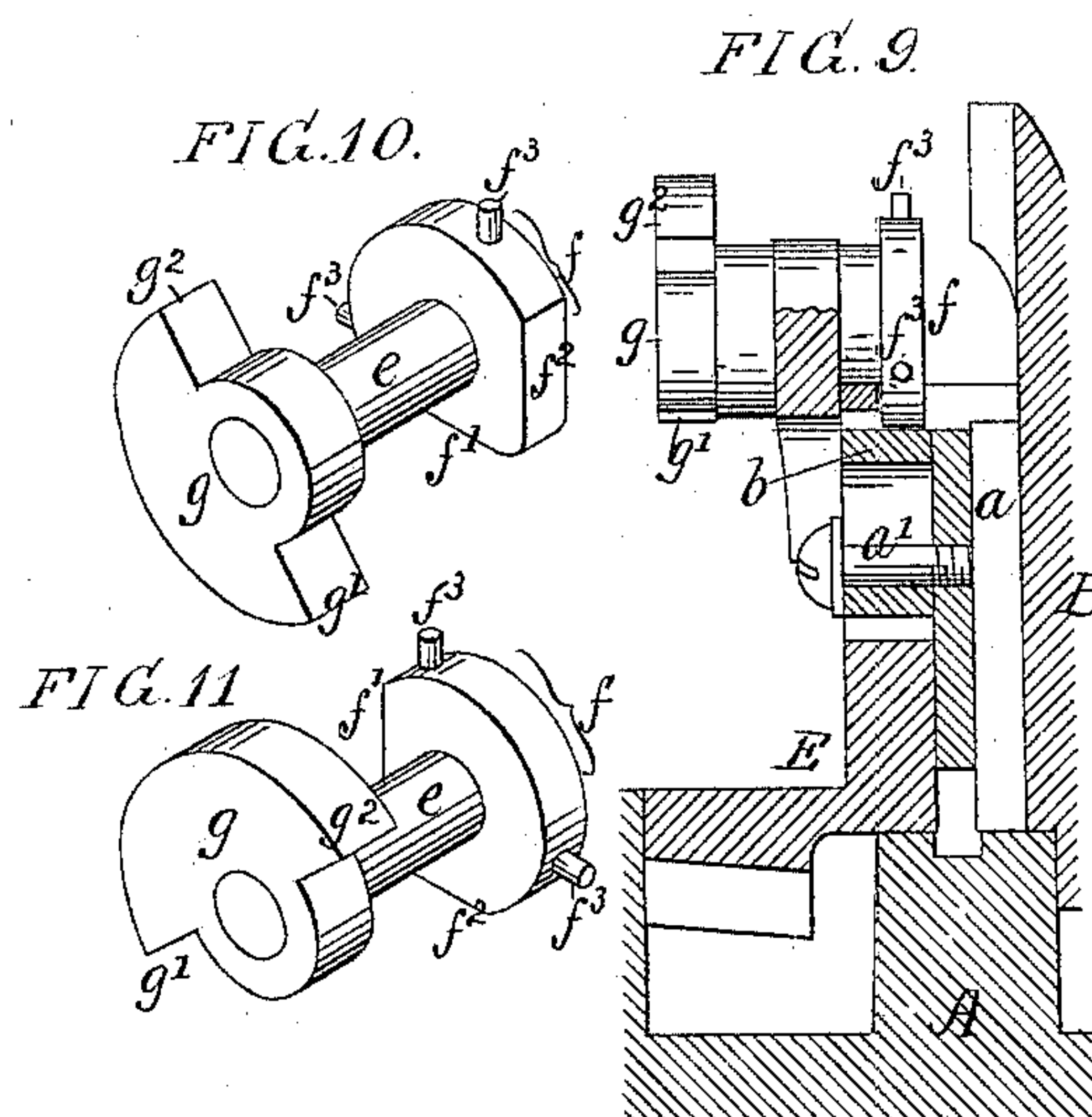
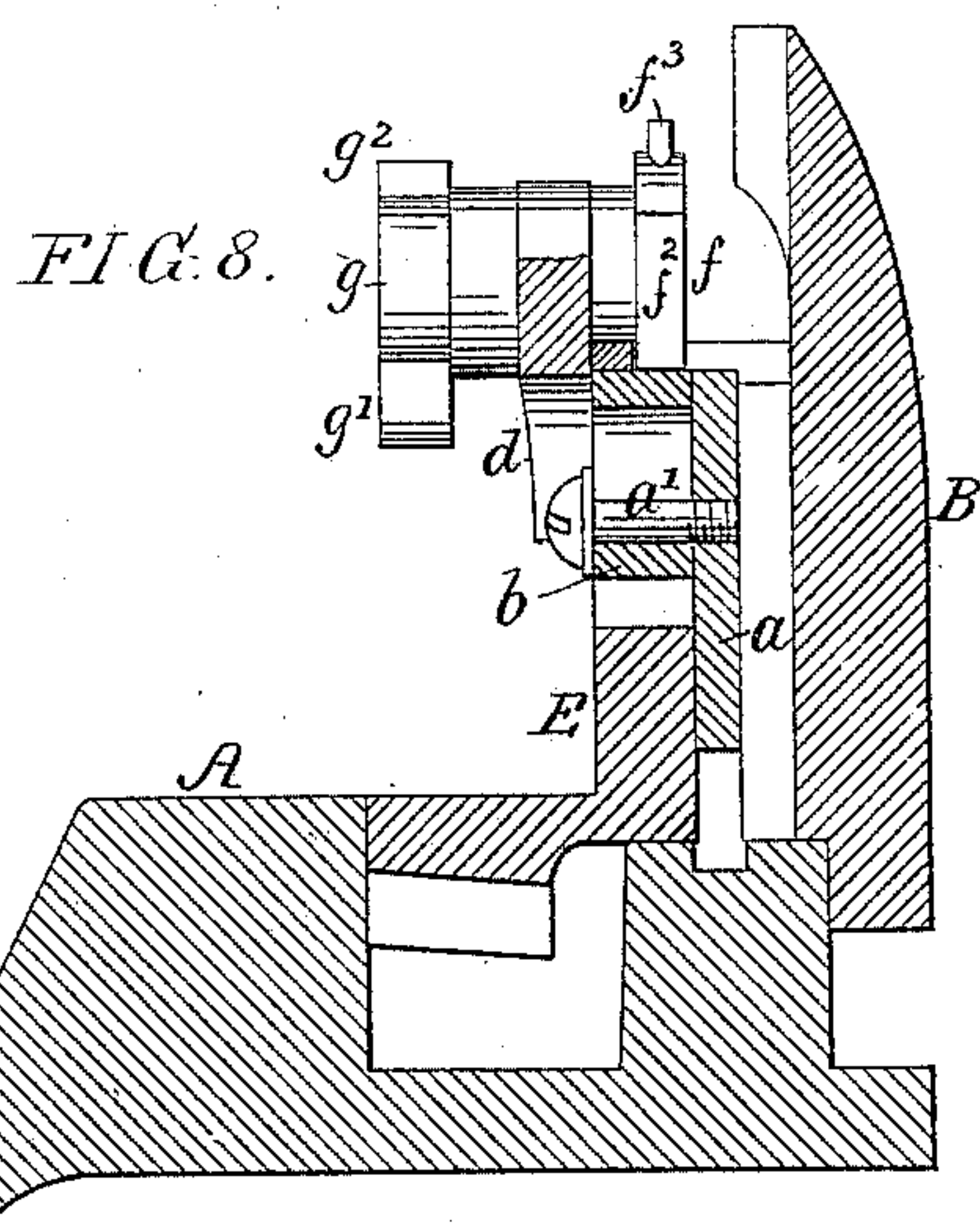
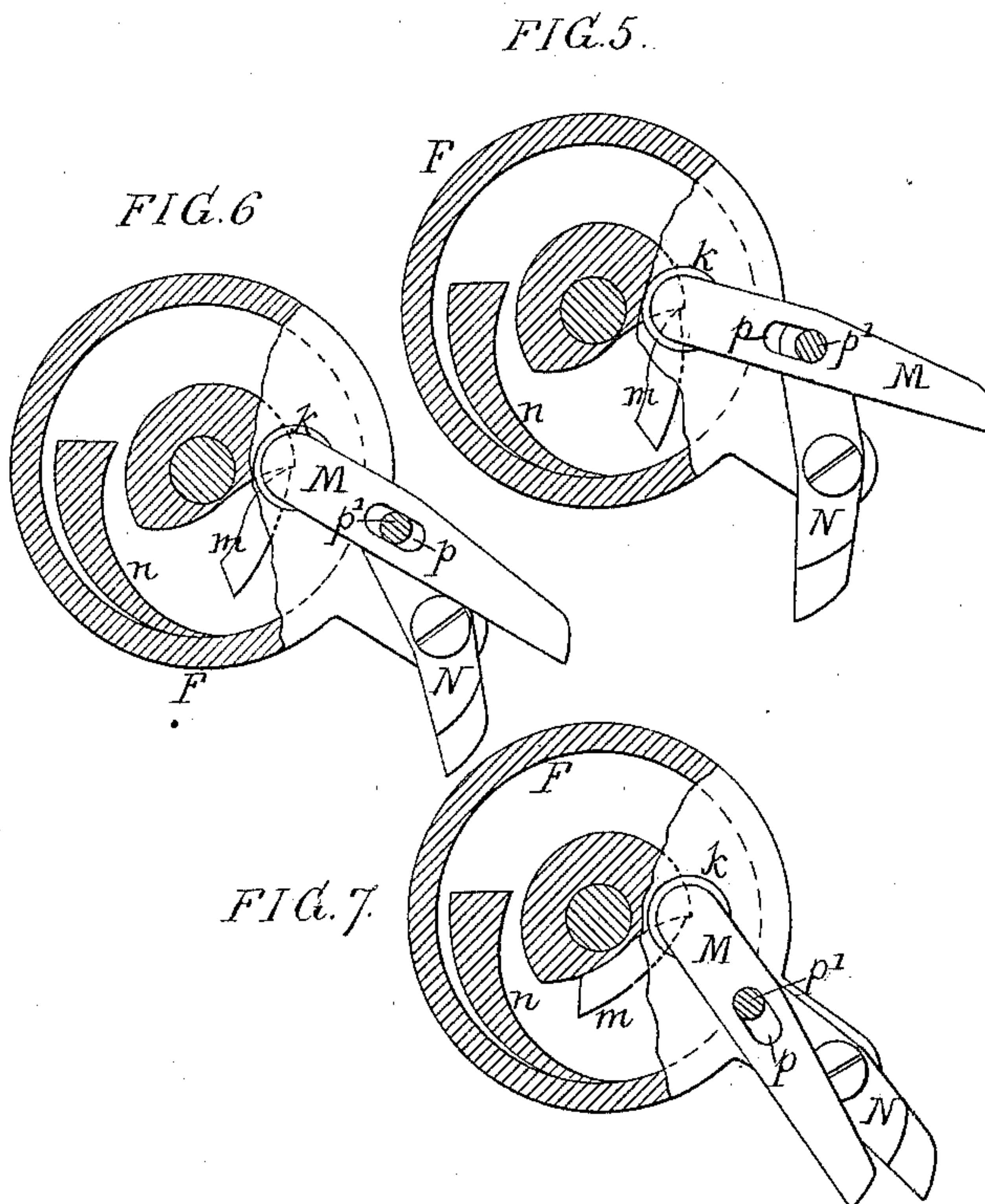
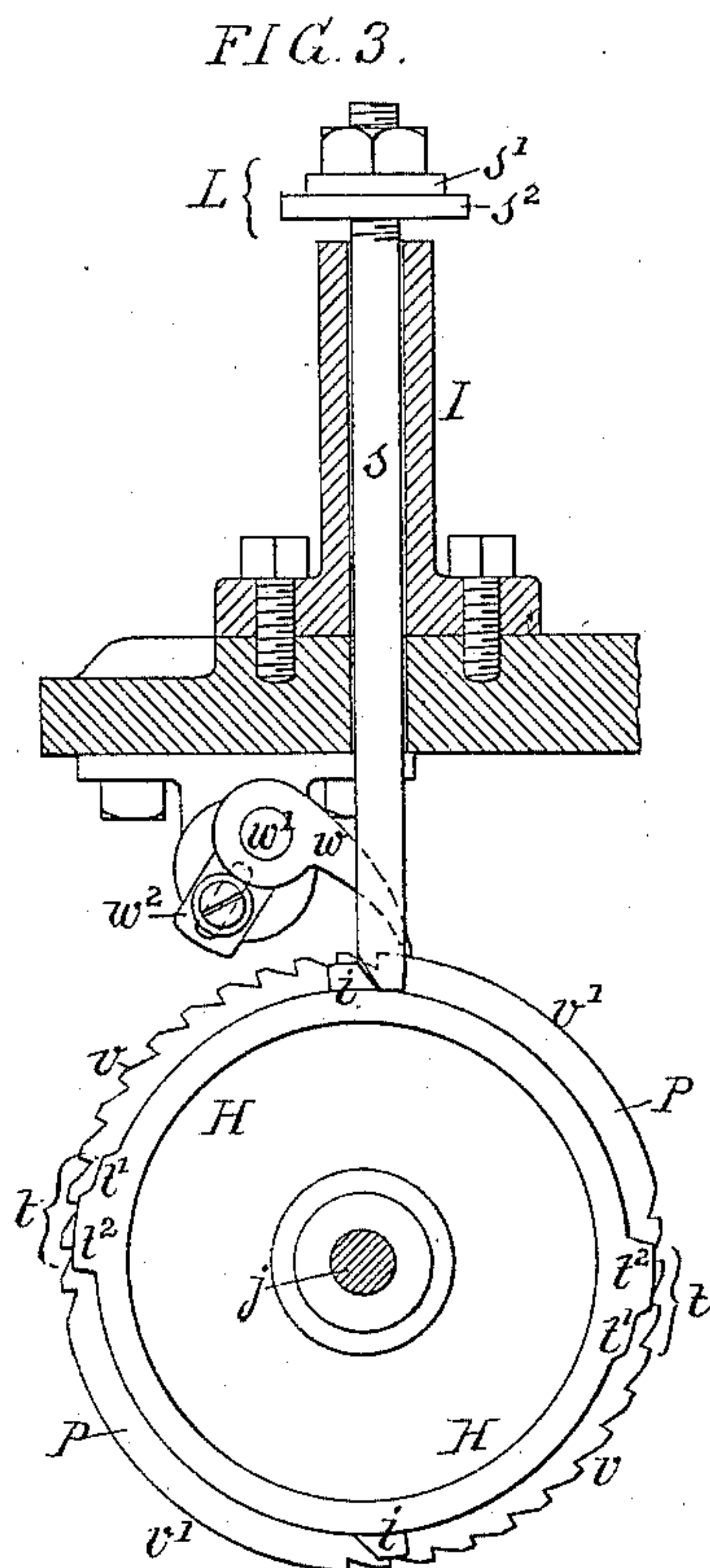
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3 Sheets—Sheet 3.

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WITNESSES:

Harry Drury  
Hamilton D. Turner.

*INVENTOR:*

INVENTOR:  
Joseph B.eginbotham  
By his Attorneys  
Howson and Sons



# UNITED STATES PATENT OFFICE.

JOSEPH HEGINBOTHOM, OF PHILADELPHIA, PENNSYLVANIA.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 286,003, dated October 2, 1883.

Application filed March 5, 1883. (No model.)

*To all whom it may concern:*

Be it known that I, JOSEPH HEGINBOTHOM, a citizen of the United States, and a resident of Philadelphia, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention relates to that class of knitting-machines for producing ribbed work, which employ two sets of needles, one set working horizontally and the other set vertically, the object of my invention being to so construct such a machine as to automatically effect the production of slack courses, welts, tucks, and various other kinds of stitches employed in making circular ribbed fabrics, such as are used for the tops of half-hose, cuffs for shirts, Cardigan jacket-sleeves, leggings, drawers, &c.

In the accompanying drawings, Figure 1, Sheet 1, is a front elevation of the machine; Fig. 2, Sheet 2, a plan view of the same; Fig. 3, Sheet 3, a transverse section on the line 1 2, Fig. 1; Fig. 4, Sheet 1, a transverse section on the line 3 4, Fig. 1; Figs. 5, 6, and 7, Sheet 3, views of the devices for operating the cam which acts on the horizontal needles, being sections on line 5 6, Fig. 1; Figs. 8, 9, 10, and 11, Sheet 3, and Fig. 12, Sheet 1, views of the devices for operating the cam which acts on the vertical needles; Fig. 13, Sheet 1, a view of the devices shown in Fig. 4 in a different position; and Fig. 14, Sheet 2, a view showing a modification of one of the features of the invention.

A is the fixed frame or bed of the machine; B, the fixed cylinder for the vertical needles, and D the fixed circular plate or dial for the horizontal needles. E is the rotating cam-ring for operating the needles of the cylinder B, and F the rotating cam-plate for operating the needles of the dial D, the ring E being driven by bevel-gearing from the driving-shaft G, and the cam-plate F being suspended from and rotating with the arch E' of the cam-ring E, all of these parts being common to circular-rib frames as usually constructed.

In Figs. 8 and 9, *a* represents the cam which effects the downward movement of the needles after they have received their thread from the guide F', Figs. 1 and 2. This cam *a* is free to slide vertically to a limited extent in the ring E, and is secured by a set-screw, *a'*, to a plate,

*b*, the latter being guided in a slot in the ring E, and having a slot for the reception of the set-screw *a'*, so that the cam *a* can be adjusted independently of the plate. To the ring E, adjacent to the plate *b*, is secured a bracket, *d*, and in this bracket is a bearing for a short shaft, *e*, which has at the inner end a cam, *f*, and at the outer end a tappet, *g*, the cam bearing upon the upper end of the plate *b*, and having two flat faces, *f'* and *f''*, one of which is farther from the center of the cam than the other.

During the ordinary operation of the machine the parts occupy the position shown in Figs. 1, 8, and 10, the face *f'* of the cam *f* bearing upon the plate *b*, and the cam *a* being elevated so as to draw the usual short loops on the needles. When it becomes necessary to draw a long loop for the slack course in the work, the shaft *e* is partially rotated, so as to cause the portion *f''* of the cam *f* to bear upon the plate *b*, as shown in Figs. 9 and 11, the plate and cam *a* being thus thrust downward and held in this position during one rotation of the head, so that a course of long loops will be drawn by the needles, the shaft *e* being restored to its original position as soon as the course is completed, so as to permit the rising of the cam *a* and the continuance of the usual stitches.

The tappet *g* has two arms *g'* and *g''*, and the movement of the shaft *e* is effected by the action on these arms of toes *h'* and *h''* on a rod, *h*, vertically guided in a standard, I, on the frame A, and acted upon by cams *i* on a drum, H, which turns on a stud, *j*, secured to a bracket beneath the bed A. When the machine is producing ordinary short stitches, the rod *h* is depressed, and the toes *h'* and *h''* just clear the arms of the tappet *g* as the latter is carried round by the ring E. When it becomes necessary to operate the shaft *e*, however, the rod *h* is elevated, so that its toe *h'* will strike the arm *g'* of the tappet and cause the turning of the latter from the position shown in Figs. 1, 8, and 10 to that shown in Figs. 9 and 11, the rod being allowed to fall just before the course of long loops is completed, and the upper toe, *h''*, of the rod being thus brought into the path of the arm *g''*, which is struck by the toe, and the tappet restored to its former position.

To prevent undue movement of the cam *f* in



either direction, I prefer to provide the same with projecting pins  $f^3$ , which, by contact with the top of the ring E, serve as stops for the cam. Any desired form of cam may be used, however, to actuate the cam  $a$ , and a single toe on the rod  $h$  may sometimes be employed for operating the tappet  $g$ ; but this would require an extended movement of the rod  $h$ ; hence the use of two toes,  $h'$  and  $h^2$ , on the rod is preferred. By the use of a cam,  $f$ , for depressing the cam  $a$ , the latter is locked in the depressed position, the cam  $f$  being in this respect an improvement on the lever, which has sometimes been used to depress the cam, for as soon as said lever is free from the influence of the toe or tappet which actuates the same it cannot resist the tendency of the cam to rise under the action of the needle-bits unless its movement is so stiff that the operation of the lever by the toe or tappet is rendered difficult.

On reference to Figs. 5, 6, and 7,  $m$  shows the cam for projecting the horizontal needles of the dial, and  $n$  the cam for retracting the same. The latter cam occupies a fixed position, being secured to or forming part of the plate F; but the toe of the cam  $m$  is secured to a spindle,  $k$ , which passes through the plate F, and has above the latter an arm, M, to a slot,  $p$ , in which is adapted a pin,  $p'$ , on a lever, N, hung to a bracket on the plate F. When the cam  $m$  is in the position shown in Fig. 5, the horizontal needles will be fully projected, and the formation of stitches on said needles will be proceeded with as usual. If the cam be moved to the position shown in Fig. 6, the needles will be only partially projected, and their loops will not slip back of the latches, so that when the needles are retracted said loops will not be cast off, but will be retained on the needles with the thread just applied thereto. If the cam  $m$  is adjusted to the position shown in Fig. 7, the horizontal needles will not be projected at all, but will retain their loops while plain work is being formed on the vertical needles.

To produce a welt on the fabric, both of the adjustments Figs. 6 and 7 are preferred, and to effect these adjustments automatically at the required times I use a rod,  $s$ , to the upper end of which is secured to a disk, L, having two portions,  $s'$   $s^2$ , the portion  $s'$  being somewhat less in diameter than the portion  $s^2$ . The rod  $s$  is guided in the standard I, and the lower end of said rod is acted upon by cams  $t$  on the drum H, each cam comprising two steps,  $t'$   $t^2$ .

When the machine is producing regular work, the parts are in the position shown in Figs. 1, 2, and 5. When the step  $t'$  of the cam  $t$  acts on the lower end of the rod  $s$ , the portion  $s'$  of the disk at the upper end of said rod is raised into the path of the arm M, the outer end of the latter striking the disk, and being moved to the position shown in Fig. 6. When the portion  $t^2$  of the cam  $t$  acts on the rod  $s$ , the latter is elevated, so as to bring the

portion  $s^2$  of the disk into the path of the arm M, the latter being thereby moved to the position shown in Fig. 7. These movements of the arm M, owing to the slot-and-pin connection of the same with the lever N, effected a movement of the latter from the position shown in Fig. 5 to that shown in Fig. 7. In the latter position the outer arm of the lever is in the path of the portion  $s^2$  of the disk L, when the latter drops to the position shown in Fig. 1, on the passage of the cam  $t$  from under the rod  $s$ , the said arm being struck by the portion  $s^2$  of the disk and restored to the position shown in Fig. 5, and a corresponding restoration of the arm M being effected, owing to the connection between the same and the lever.

By regulating the length of the steps  $t'$   $t^2$  of the cam  $t$  the cam  $m$  can be held in either of the positions Figs. 6 and 7 for any length of time desired; or the device may be constructed for simply changing the position of the cam  $m$  from that shown in Fig. 5 to that shown in Fig. 6, or from the position Fig. 5 to the position Fig. 7, and back again, when it is desired to produce tuck-work on the horizontal needles. The cam  $f$  may also be used to actuate the slides of tuck-cams carried by the ring E, the slides being either in the top or bottom cams, according to the character of the tuck desired. The work passes down from the needle-cylinder to the usual take-up and tension devices below, and is caused to pass in contact with the toothed wheel J, which thus has a rotating movement imparted to it, the wheel being secured to a sleeve, K, which can turn freely on the stud  $j$ .

Secured to or forming part of the drum H is a wheel, P, which has toothed portions  $v$  and plain portions  $v'$ , a sleeve, R, projecting from this wheel, and the rotation of the drum being effected partly by the action of the sleeve K upon the sleeve R and partly by the action upon the teeth  $v$  of a pawl,  $w$ , hung to a crank-pin,  $w'$ , on a shaft, S, which is driven by gearing from the driving-shaft G of the machine. The pin  $w'$  is carried by a plate,  $w^2$ , adjustable radially in respect to the shaft S, so that the throw of the pawl can be varied as desired. (See Fig. 3.)

The sleeve K has a projecting tongue, K', and the sleeve R a similar tongue, R', these tongues being of such dimensions, as shown in Fig. 4, that a limited movement of one sleeve independently of the other is permitted.

When the pawl  $w$  is in contact with the plain portion  $v'$  of the wheel P, the rotation of said wheel and the drum H is effected by the contact of the projection K' of the sleeve K with the projection R' of the sleeve R, as shown in Fig. 4. As soon as the pawl  $w$  engages with the teeth  $v$  of the wheel P, however, said wheel is rotated at a higher rate of speed, and the projection R' is carried away from the projection K', the sleeve K continuing to move with the wheel J. This increased speed of the wheel P, drum H, and sleeve R continues until the plain portion of the wheel again comes beneath the pawl, the tongues K'



and R' being then in the positions shown in Fig. 13, so that the movement of the wheel P ceases until the projection R' of the sleeve R is again acted upon by the projection K' of the sleeve K. In the present instance the cams *i* are arranged so as to act on the rods *h* just as the wheel P comes under control of the pawl *w*, the cams *t* acting just before the wheel passes from the control of the pawl, this arrangement being demanded by the character of work which the machine is intended to produce. Other classes of work, however, may require a different arrangement of the cams in respect to the teeth of the wheel; or the cams may in some cases be carried by a drum, to which a uniform rotary motion is imparted. Other means than the projections R' and K' on the sleeves R and K may be used for clutching the wheels J and P together, so as to permit of movement of one independently of the other. For instance, the two wheels might be connected by a chain or other pliable coupling, so that while the wheel P would be drawn around by the wheel, when not under the influence of the pawl J, a quicker movement of the wheel P would be permitted when said wheel was under the influence of the pawl.

In Fig. 14 I have shown a further modification of the device for actuating the wheel P. In this case the wheel P has a disk, P', with projecting pins P<sup>2</sup>, and to the wheel J is adapted a toothed belt, J', having a laterally-projecting pin, J<sup>2</sup>. As the belt J' is carried forward by the fabric the pin J<sup>2</sup> comes into contact with one of the pins P<sup>2</sup> and moves the disk P' and wheel P forward until the toothed portion of the wheel is brought under the influence of the pawl, which continues to act on the same until the blank space of the wheel is reached, the movement of the wheel then ceasing until it is again moved forward by the action of the pin J<sup>2</sup> upon one of the pins P<sup>2</sup>, the length of the dwell in the movement being dependent upon the length of the belt J' or upon the number of pins J<sup>2</sup> thereon.

I claim as my invention—

1. The combination of the movable cam of a knitting-machine with a shaft, *e*, having a cam, *f*, for acting on said movable cam, and a tappet, *g*, as set forth.

2. The combination of the movable cam of a knitting-machine, a shaft, *e*, having a cam, *f*, and tappet *g*, a rod, *h*, having a toe or toes for acting on said tappet, and means for adjusting said rod, substantially as specified.

3. The combination of the cam *a* with the sliding block *b* and means for securing the cam adjustably to the block, as set forth.

4. The combination of the cam-plate F and pivoted cam *m* with the arm M, the disk L, and means for adjusting said disk into or out of the path of the arm M, as set forth.

5. The combination of the cam-plate F, the pivoted cam *m*, and the arm M, with the disk L, having portions *s'* *s*<sup>2</sup>, and means for intermittently moving the disk, whereby the portions *s'* *s*<sup>2</sup> are brought in succession into the path of the arm M, as set forth.

6. The combination of the cam-plate F, the pivoted cam *m*, the arm M, and the lever N, connected to said arm, as set forth.

7. The combination of the cam-plate F, the pivoted cam *m*, the arm M, and lever N, arranged one above the other, the disk L, and means for intermittently moving said disk first into the path of the arm M and then into the path of the lever N, as set forth.

8. The combination of the wheel J or its equivalent, as described, having pins to be acted on by the fabric, the wheel P on the cam-drum, means for actuating said wheel independently of the wheel J, and devices, substantially as described, whereby the wheel P is brought directly under the influence of and is moved by the wheel J at stated intervals, all substantially as set forth.

9. The combination of the wheel J, having a sleeve, K, with projection K', the wheel P, having a sleeve, R, with projection R', and means for actuating the wheel P independently of the wheel J, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH HEGINBOTHOM.

Witnesses:

HARRY DRURY,  
HARRY SMITH.