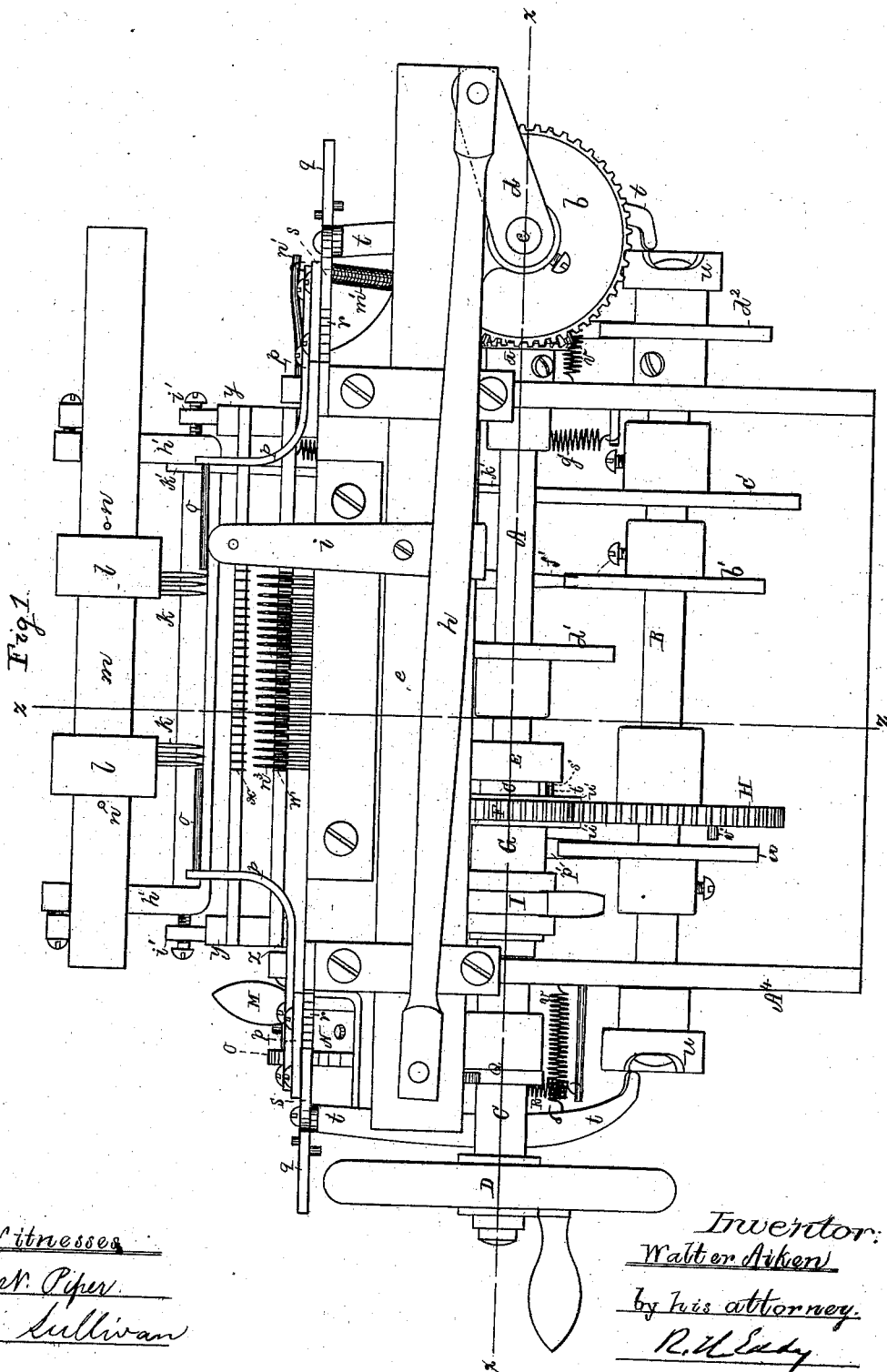


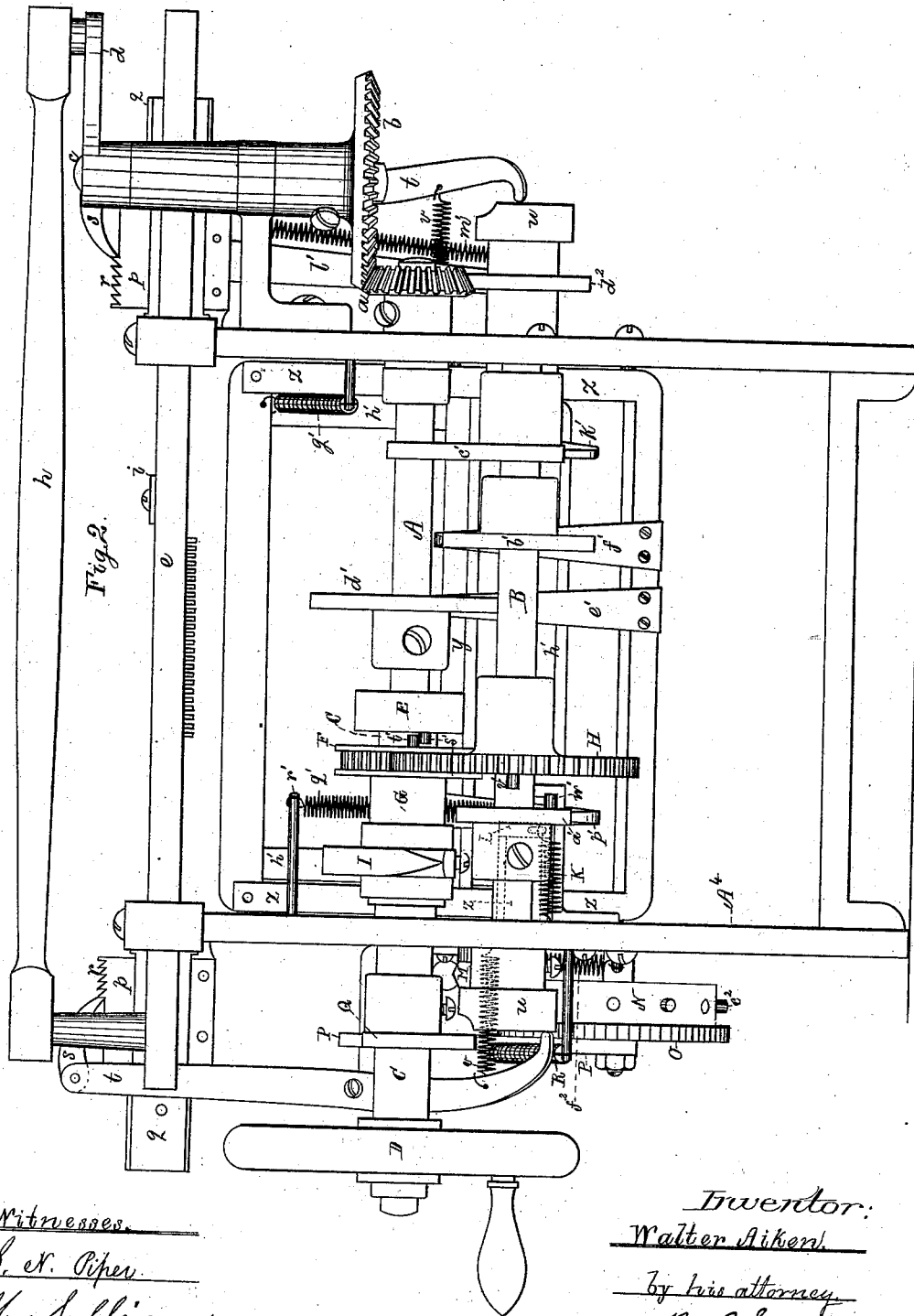
W. AIKEN.
Straight Knitting Machine.
No. 214,743. Patented April 29, 1879.



Witnesses
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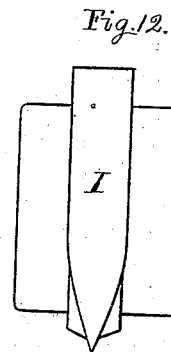
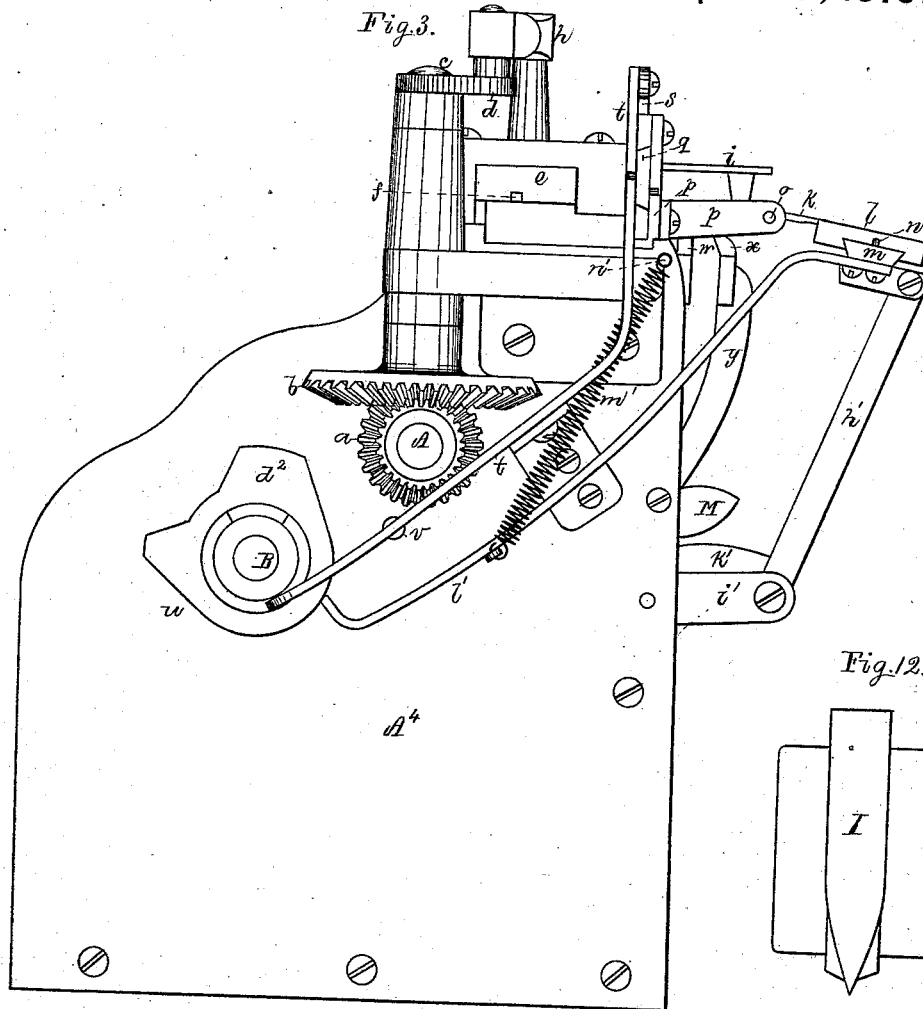


Fig. 11.

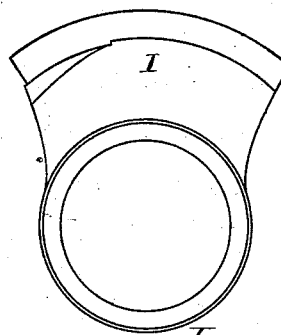
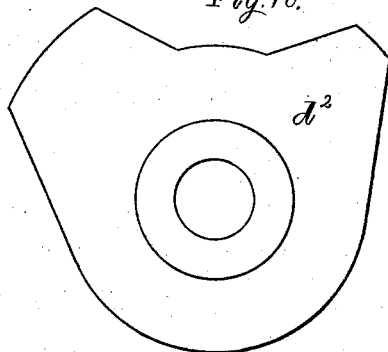


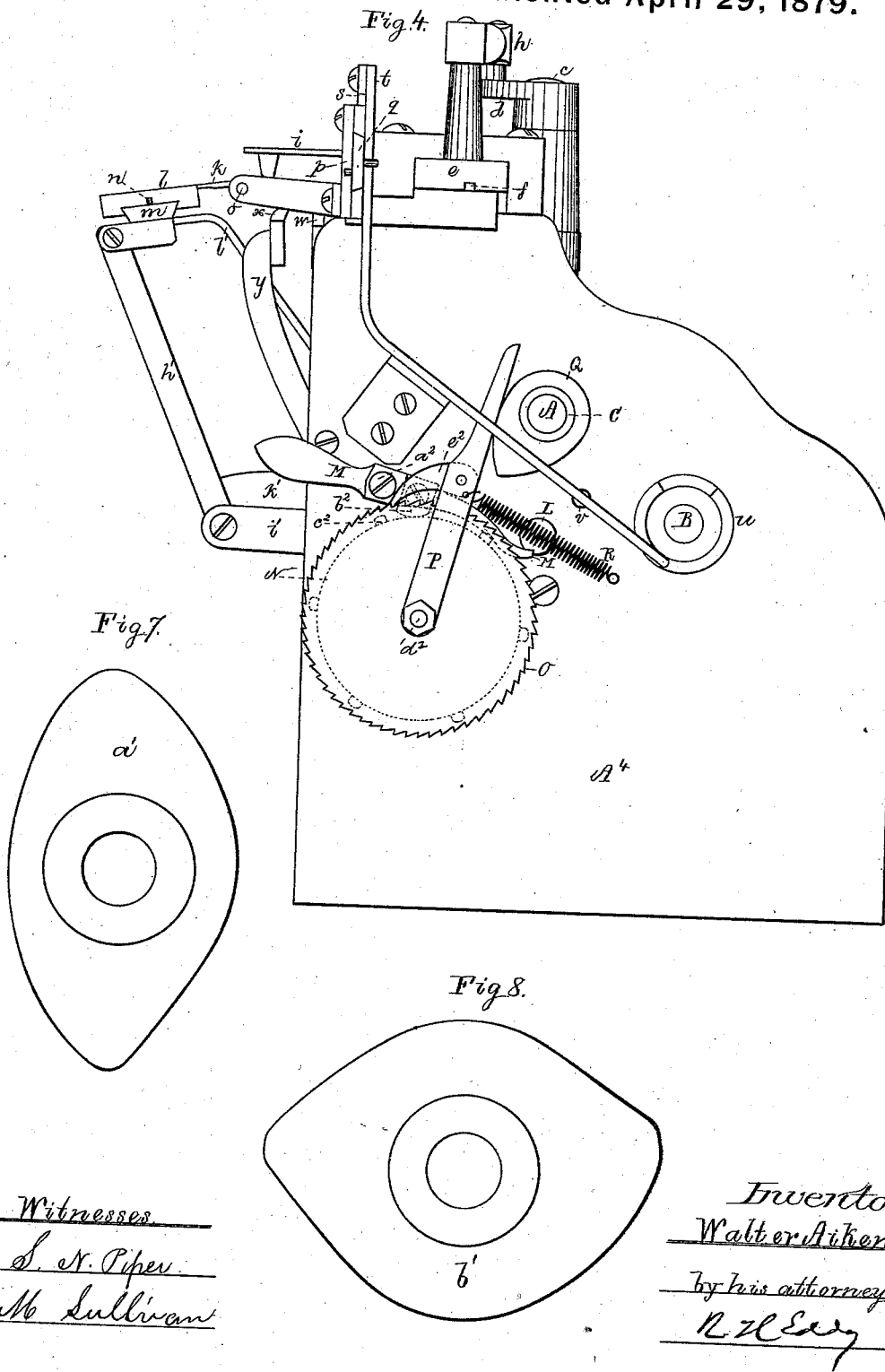
Fig. 10.



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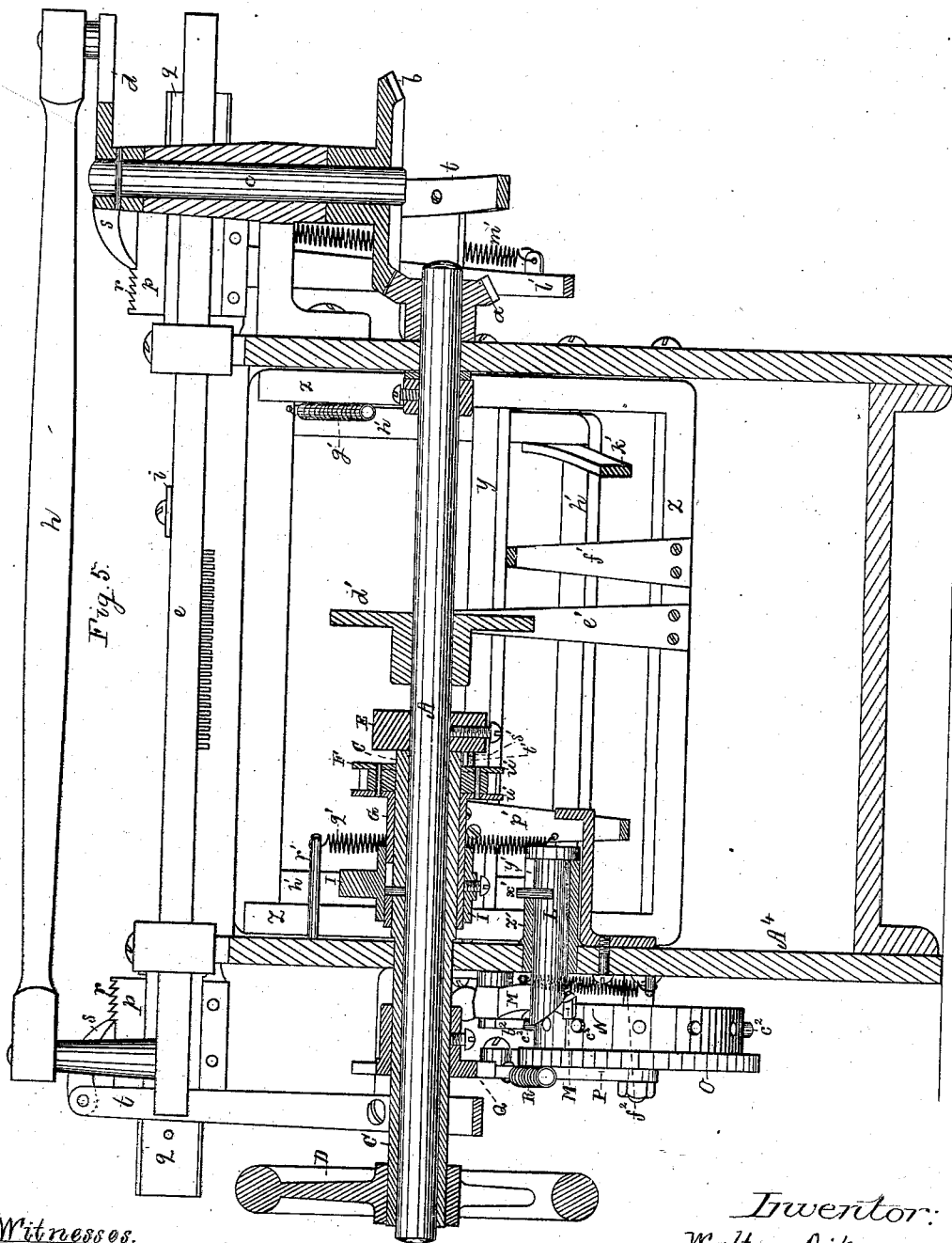
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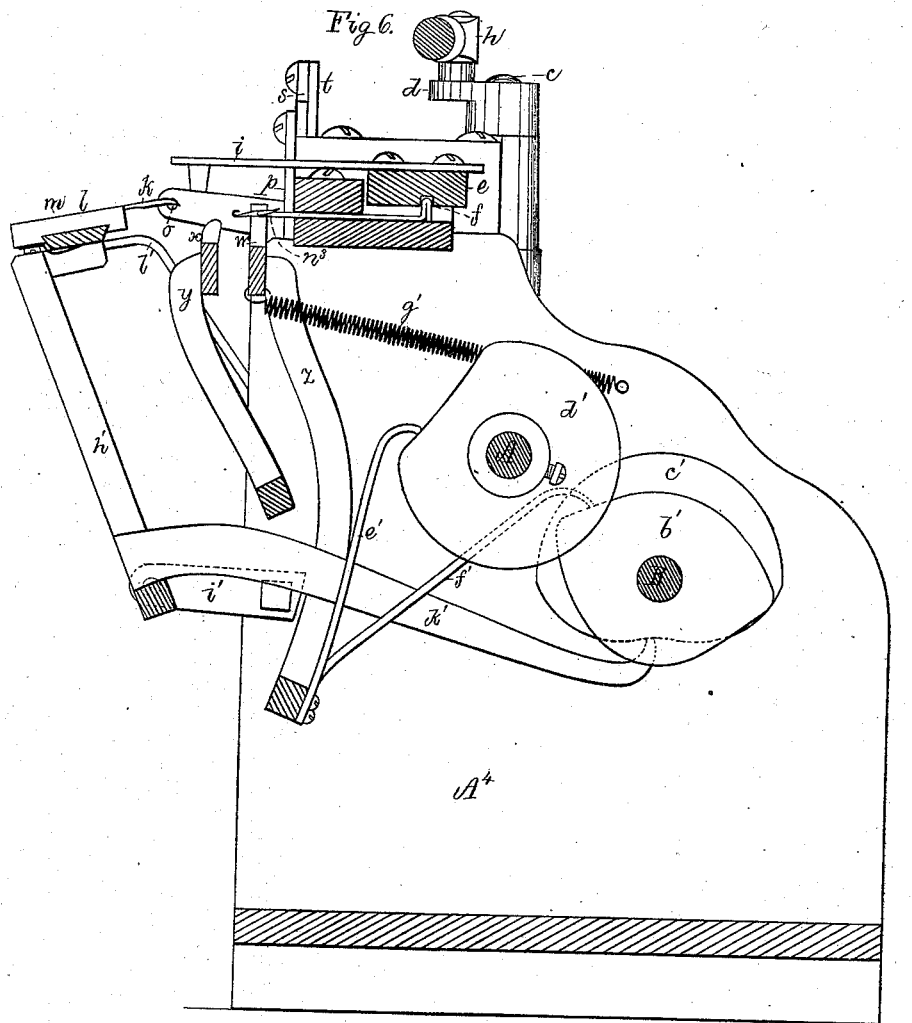
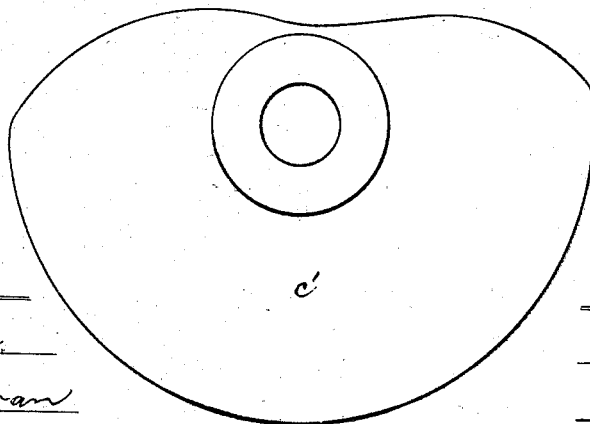


Fig. 9.



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R. H. Eddy

UNITED STATES PATENT OFFICE.

WALTER AIKEN, OF FRANKLIN, NEW HAMPSHIRE.

IMPROVEMENT IN STRAIGHT-KNITTING MACHINES.

Specification forming part of Letters Patent No. **214,743**, dated April 29, 1879; application filed December 24, 1878.

To all whom it may concern:

Be it known that I, WALTER AIKEN, of Franklin, of the county of Merrimac and State of New Hampshire, have invented a new and useful Improvement in Straight-Knitting Machines, applicable to the class of knitting-machines represented in the patent of W. H. Abel, dated February 27, 1877; and do hereby declare the same to be described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a top view, Fig. 2 a rear elevation, Figs. 3 and 4 end elevations, Fig. 5 a longitudinal and vertical section, and Fig. 6 a transverse section, of a knitting-machine embodying my invention, which consists mainly of the combination, in a straight-knitting and narrowing machine, of two shafts, and mechanism, substantially as described, for alternately revolving them at different speeds, said shafts being connected with and driving any proper operative mechanism for effecting the knitting and narrowing of parts of the work, as explained.

In the drawings, the frame of the machine is shown at A⁴ as having arranged within it, in manner as represented, two parallel shafts, A B, the first of which has fixed at one end of it a bevel-gear, *a*, to engage with another and larger bevel-gear, *b*, fixed on the lower part of a vertical shaft, *c*, that at its upper end is provided with a crank, *d*. To this crank and to the usual sliding bar *e*, which has in its lower surface the cam-groove *f*, Fig. 6, for operating the series of needles *n*³, a connecting-rod, *h*, is pivoted. While the shaft A is being revolved a reciprocating rectilinear motion will be imparted to the bar *e*, whereby the hooked or tongued needles *n*³ will be successively advanced and retracted in the usual manner and the yarn laid on them by a guide-arm, *i*, projecting from the bar *e*.

With the needles *n*³ two sets of loop-transferring points, *k*, are used, each set being projected from one of two slides, *l l*, sustained by and applied to a straight and horizontal bar, *m*, so as to be movable sidewise thereon. Projecting up from the bar *m* are stops *n n*, to limit the sidewise movement of each slide. To move the slides inward or toward each

other at the proper times are two arms, *o o*, extending, as shown, from two slides, *p p*. These slides are supported by and on horizontal rails *q q*, and there is at the top of each of the slides a toothed rack, *r*. With these racks pawls *s s* engage, such pawls being pivoted to the upper arms of two levers, *t t*, arranged as shown, such levers being worked one way by cams *u u*, fixed on the auxiliary shaft B, at its two ends, and the other way by springs *v v*, connected with the frame A⁴ and the lower arms of such levers.

Besides the loop-transferring points there are two sets of sinkers to operate with the main needles, such sets of sinkers being shown at *w* and *x* as projecting up from the upper bars of vibrating carrying-frames *y z*. The loop-transferrers and the sinkers operate with the needles *n*³ in the usual manner to effect the knitting and narrowing of the work or fabric.

In Letters Patent No. 205,167, dated June 25, 1878, and granted to me, I describe and claim a knitting-machine having a mechanism for throwing into and out of action at proper periods of time two shafts constituting parts of or for actuating the knitting and narrowing mechanisms of a straight-knitting machine.

A knitting-machine provided with my said patented invention, or what is an equivalent therefor, is herein described, such invention constituting one of its distinguishing characteristics, certain cams or devices for operating parts of the knitting and narrowing mechanism being applied to the two shafts—that is to say, besides the cams *u u*, as fixed on the shaft B, there are four other cams, *a*¹, *b*¹, *c*¹, and *d*², carried thereby, side views of which are given in Figs. 7, 8, 9, and 10, and there is fixed on the shaft A a cam, *d*¹, which is represented in side view in Fig. 6.

The cams *b*¹ and *d*¹ act against arms *e*¹ *f*¹, projecting from the back sinker-frame *z*, which has fixed to it and the frame A⁴ a spring, *g*¹, for retracting it and keeping its arms *e*¹ *f*¹ properly against their operative cams.

As it is necessary for the back loop-sinkers to be in their proper advanced positions while the needles are being retracted to form the loops against the front edges of such sinkers,

the cam d^1 has the form of a segment of a circle greater than a semicircle, it being so made in order to allow the rear sinker-frame to be drawn by its spring back, so as to carry its sinkers out of the way of the other or loop-transferring sinkers of the narrowing mechanism, in order that at the proper times they may be advanced to force the taken-up loops off the transferring-needles and upon the main needles. Thus while the narrowing mechanism is in action the cam d^1 is at rest, and the chord of its arc is in a position to allow of the rear sinker-frame being drawn back, Fig. 6, as above mentioned, though in fact in each revolution of the cam such frame will be so retracted.

The cam b^1 is formed so as in each revolution of it to twice effect the necessary advance of the main or rear sinkers to aid in forming loops, and to allow of such sinkers being moved back at the proper times out of the paths or way of the loop-transferring sinkers.

The bar m is hinged to a vibratory carrier, h' , which, pivoted to arms $v'v'$, projecting from the frame A^4 , has an arm, k' , extended from it, as shown, and against the periphery of the cam c^1 . The said cam and arm operate to advance the bar m . The cam d^2 and an arm, l' , projecting from the bar m , serve to effect the downward movement of the bar m requisite to cause the transfer-points of its slides to enter the loops to be transferred. The reverse movements of the bar m are effected by a spring, m' , fixed to a stationary stud, n^1 , and to the arm l' .

The loop-transferring sinkers x project up from a vibratory frame, y , having an arm, p' , extending from it against the periphery of the cam a^1 , a spring, q' , being extended up from such arm to a stationary stud, r' , arranged as shown. The cam, arm, and spring effect the necessary movements of the frame y and its loop-transferring sinkers.

From the above it will be seen that the cams u , a^1 , b^1 , c^1 , and d^2 , belonging to or for operating the narrowing mechanism, are carried by the auxiliary shaft B, and that there is fixed on the shaft A a cam or circular segment, d^1 , whose object is to keep the back-sinkers forward while the loops of the unnarrowed part of the fabric are being made, and to allow such sinkers to fall back out of the way of the others during their advance to transfer the loops of the transfer-points to the main or hooked needles.

The next part of the machine to be described is that for driving the two shafts A B at their different speeds at the necessary periods.

The shaft A (see Fig. 2) has, in line with and surrounding it, a hollow driving-shaft, C, having at its outer end a fly-wheel, D. The shaft A extends endwise into and bears in the shaft C, and is provided with a clutch-wheel, E, from whose sides a stud, s' , projects to engage with another such stud, t' , extending from the next adjacent side of a pinion, F, fixed on a tubu-

lar shaft, G. This shaft G slides on the shaft C, though applied thereto so as to revolve with it, the connection of the two being what is usually termed a "feather or spline attachment."

The pinion F has flanges $w'w'$ on its sides, they being to receive between them a gear, H, having a diameter double that of the pinion, and to engage with the latter. The said gear H turns freely on the shaft B, and has a stud, v' , extending from its side to engage with a stud, w' , extending from the next adjacent side of the cam a^1 .

Furthermore, there is fixed to the shaft G a cam, I, formed as shown in side view in Fig. 11 and in edge view in Fig. 12. Below the said cam is a slide-bolt, L, (see Figs. 2 and 5,) provided with a spring, K, for moving it endwise or advancing it. Such slide-bolt has a stud, x' , projecting up from it into a straight notch or slot, y' , made in a tubular guide, z' , in which the bolt is supported and slides. (See Fig. 5.) The bolt at its outer end is beveled, as represented, and rests against the inner arm of a lever, M, having its fulcrum arranged as shown at a^2 . This lever is furnished with a cam or tooth, b^2 , extending down from it directly over a series of pins, c^2 , projecting radially from the periphery of a wheel, N, which, provided with a ratchet-wheel, O, is supported on a stationary pivot, d^2 , which serves as the fulcrum of a lever, P, carrying a pawl, e^2 , to engage with the ratchet-wheel.

The lever M has a spring, f^2 , applied to it to draw it toward the pin-wheel N. At its upper part the lever P bears against a cam, Q, that is fixed to the shaft C. A spring, R, fixed to the lever P serves to draw it in contact with the cam.

In each revolution of the shaft G the lever P will have imparted to it a reciprocating movement, such as will cause it to advance and retract the pawl on the ratchet-wheel, whereby an intermittent circular motion will be imparted to the pin-wheel N. Each of the teeth or pins of the pin-wheel on being carried against the cam-tooth b^2 will force it and its lever upward, and keep them so raised until the said tooth or pin of the wheel may have passed the tooth b^2 . This upward movement of the lever by the pressure of the lever against the oblique end of the bolt L will cause the bolt to be moved inward, so as to carry its stud x' into a position for it to be met by the cam I in its revolution. In passing the stud, the cam, in consequence of the stud being held stationary, will be moved laterally, and will cause the shaft G and gear F to be correspondingly slid endwise, whereby the said shaft will be unclutched from the shaft A, and the gear H will be clutched to the shaft B, which will next be revolved at half the speed of the sleeve G and shaft C, the shaft A remaining stationary while the shaft B may be thus in motion.

On the cam-tooth of the lever having passed off the pin-wheel tooth the lever will be de-

pressed by its spring, and the bolt will be shot forward by its spring, so as to carry the stud of the bolt into a position which, in course of another revolution of the cam I, will cause the cam and the shaft G to be moved inwardly, so as to clutch the shaft G with the shaft A, and unclutch the gear H from the shaft B, which will next be stopped in revolution, and the shaft A will be revolved.

I do not herein claim the mechanism for alternately revolving the two shafts A B at different speeds, it being substantially like that described and claimed by me in my aforesaid patent.

What I claim as my invention is as follows, viz:

The straight-knitting and narrowing machine having the two shafts A B, and mechanism, substantially as described, for alternately revolving them at different speeds, and also having fixed on the auxiliary shaft B the cams for actuating the narrowing mechanism, and on the shaft A a cam, d^1 , to operate to effect the advance of the back sinker-carrier, and allow of it being moved out of the way of the loop-transferring sinkers in their forward movement, all being essentially as set forth.

WALTER AIKEN.

Witnesses:

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F. H. DANIELL.