

W. AIKEN.  
Straight Knitting-Machine.  
No. 217,569. Patented July 15, 1879.

Fig. 1.

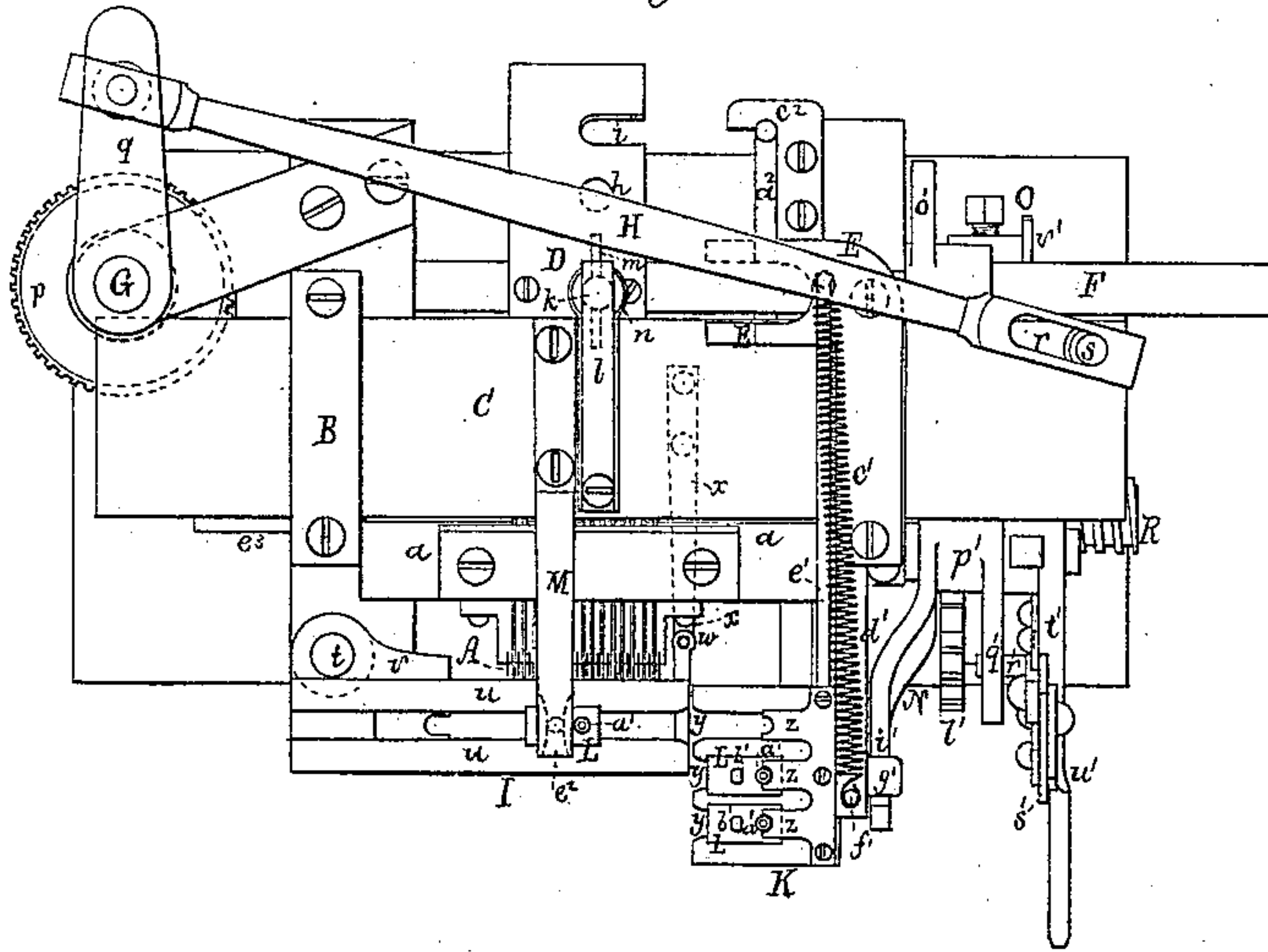


Fig. 8.

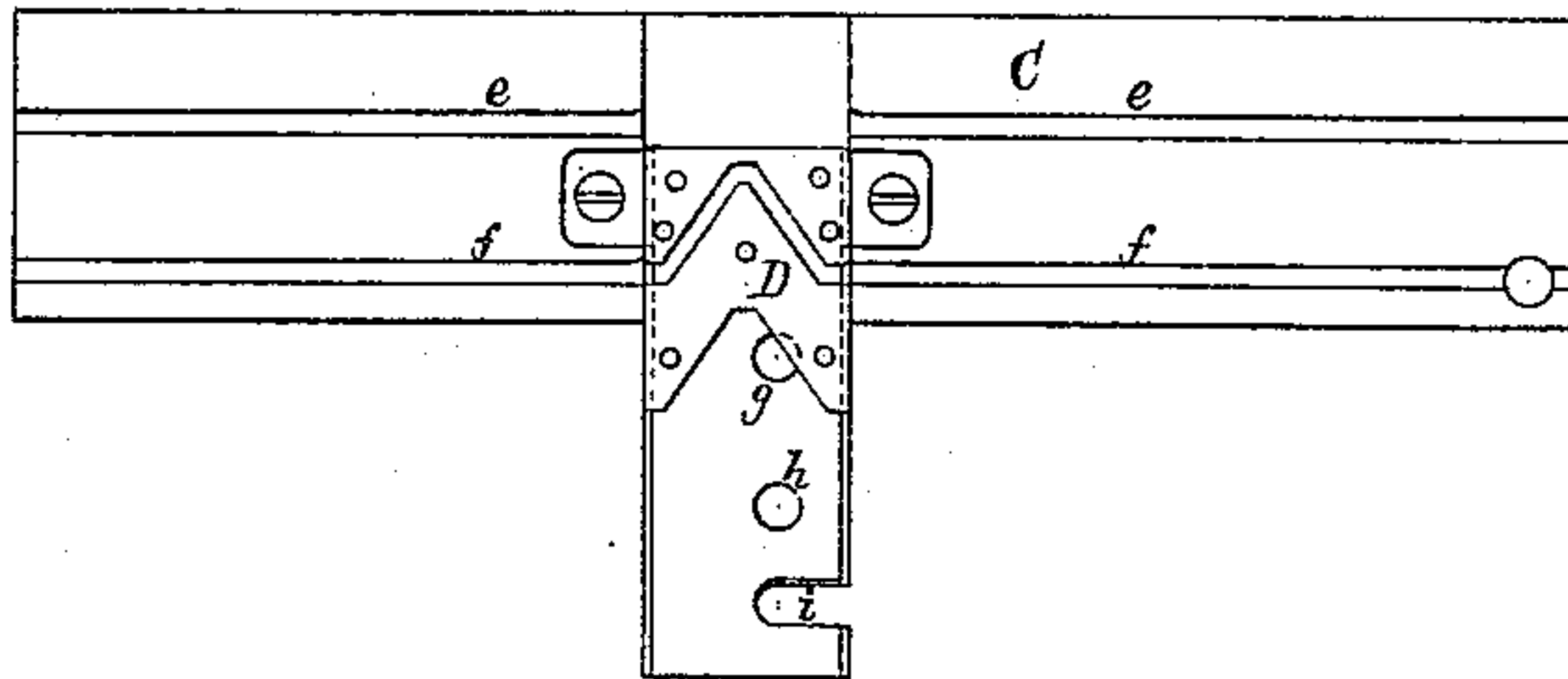


Fig. 6 Full size



Fig. 7. Full size.



Fig. 9.

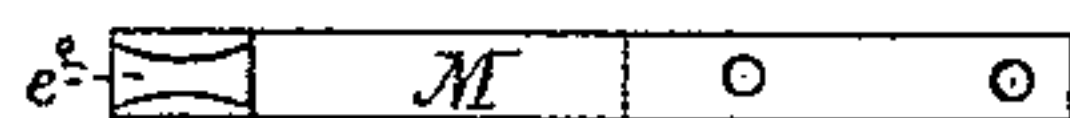
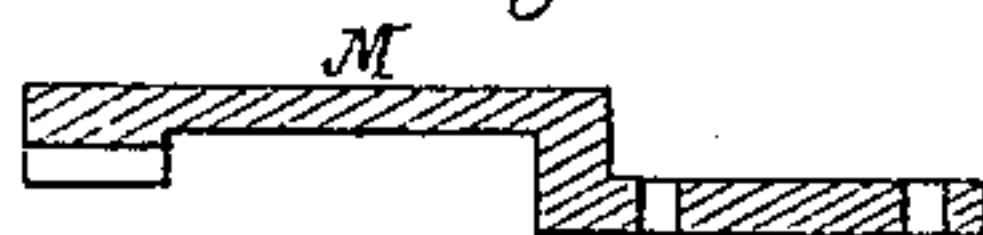


Fig. 10.



Witnesses

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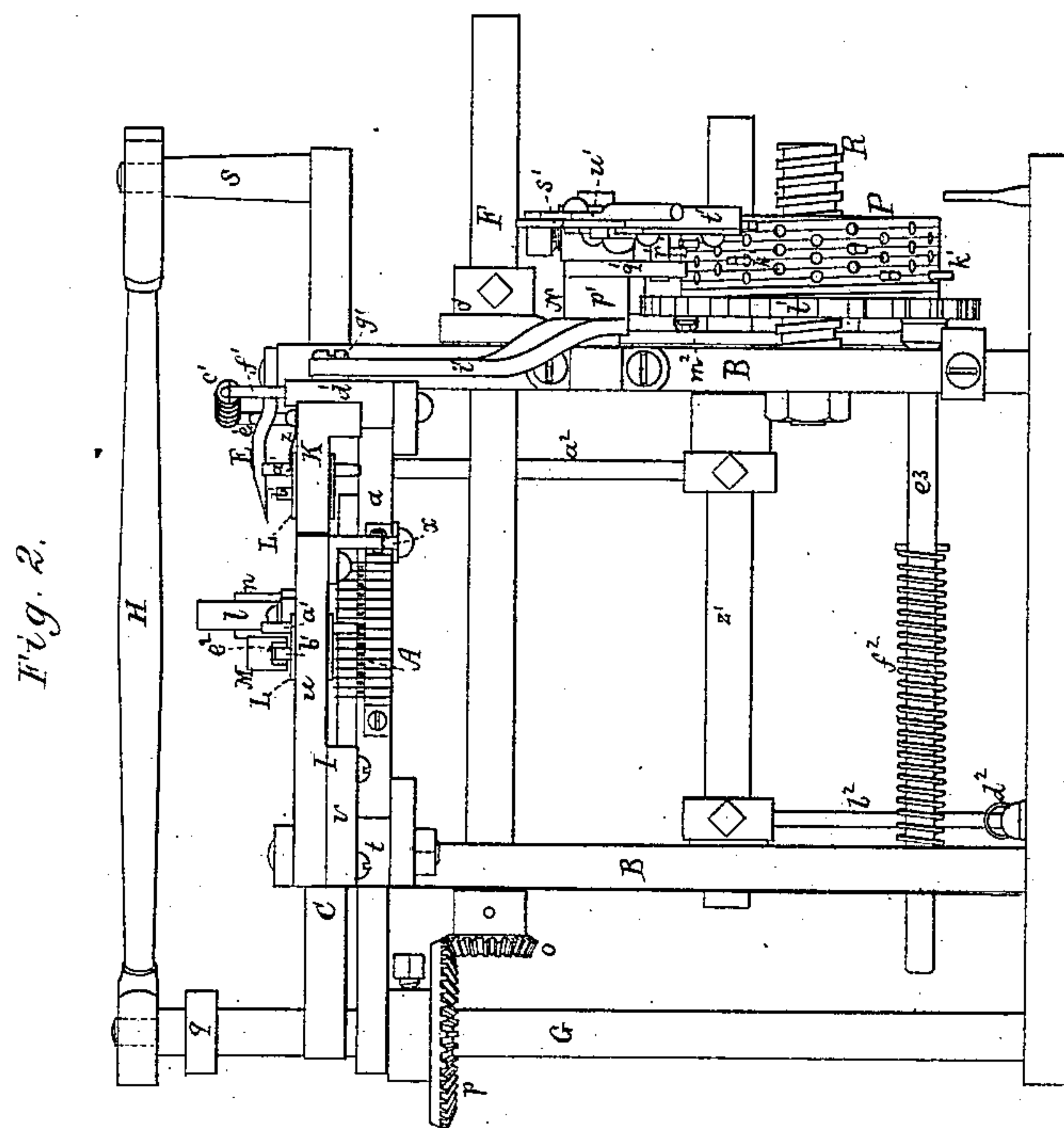
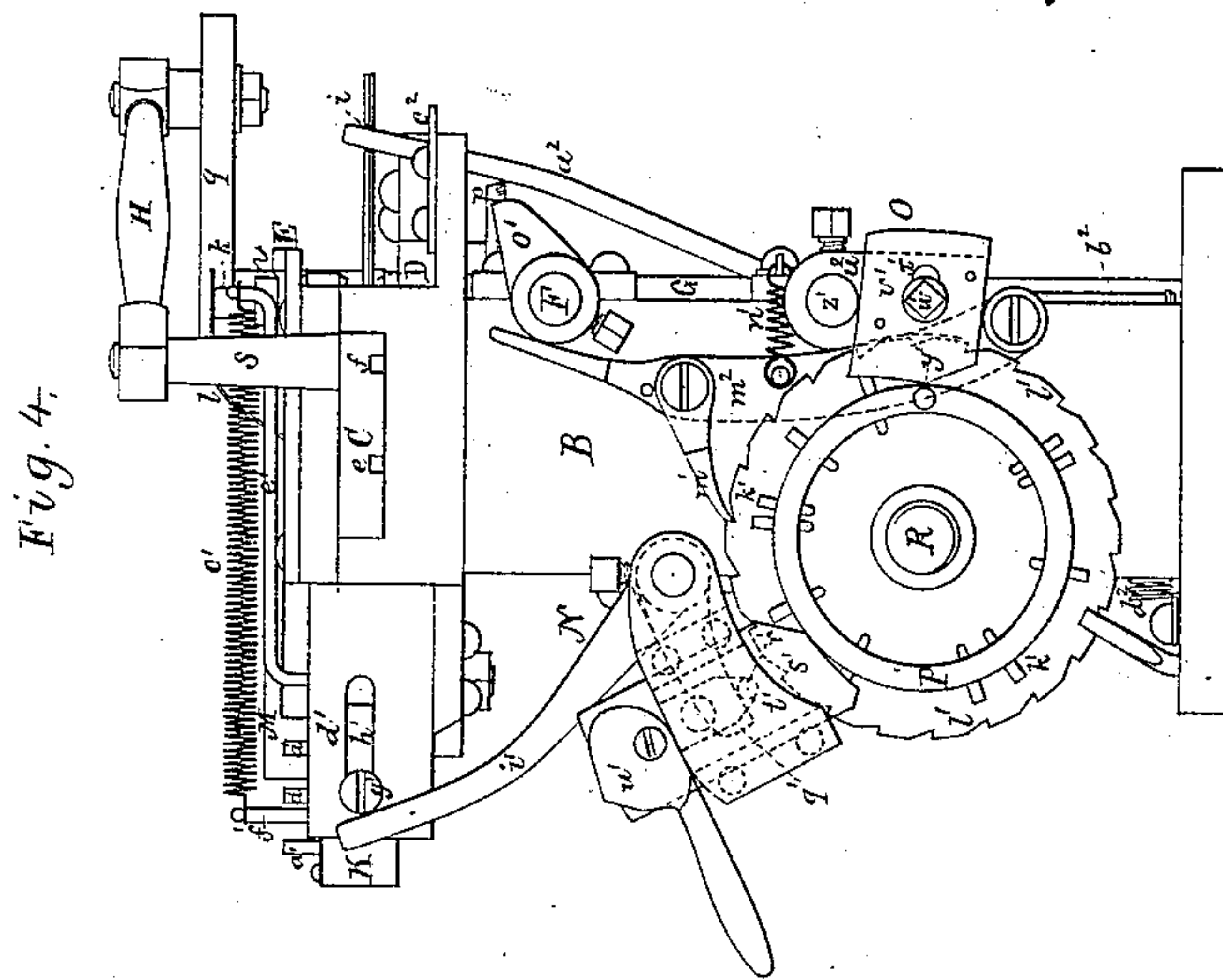
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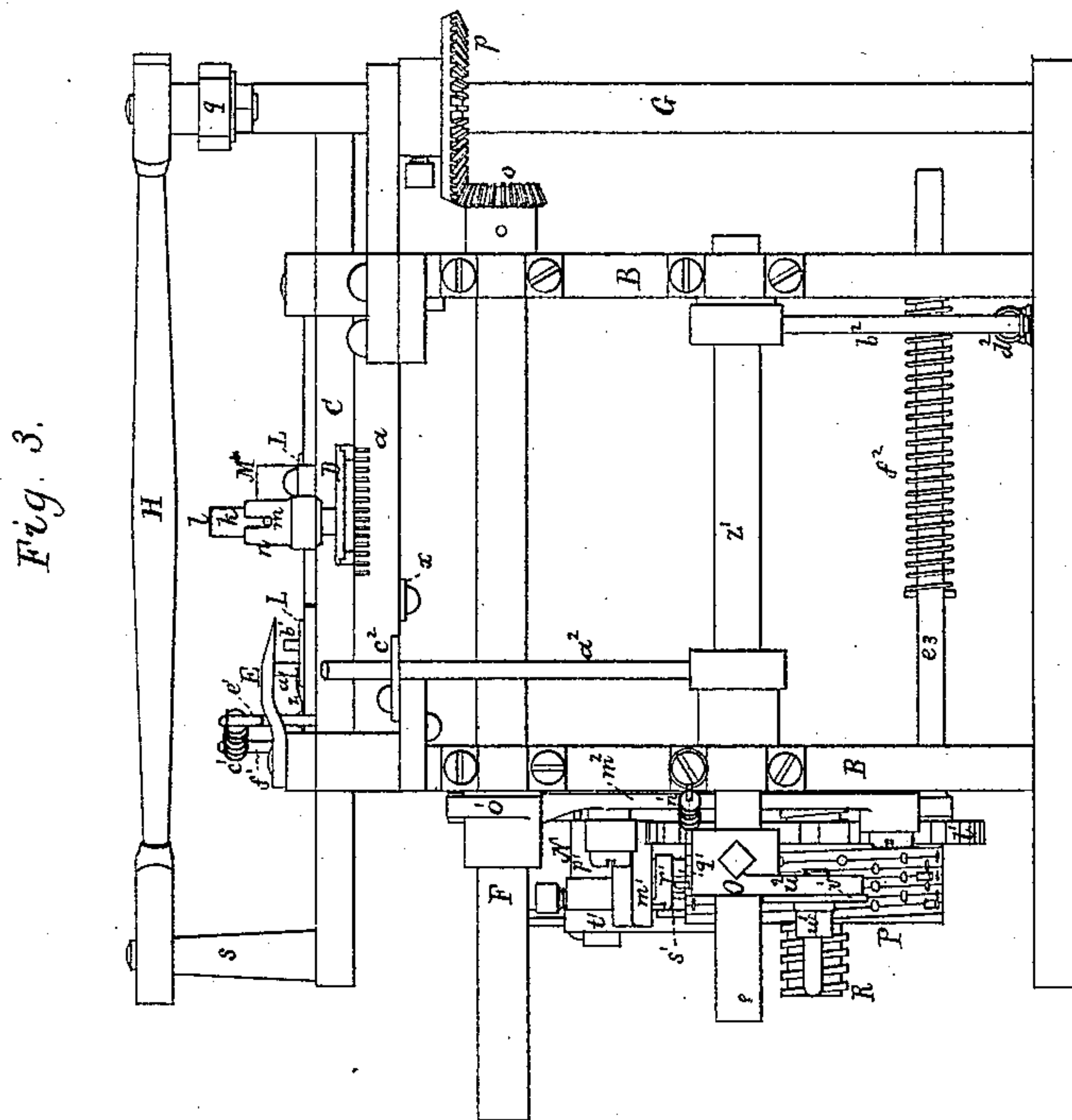
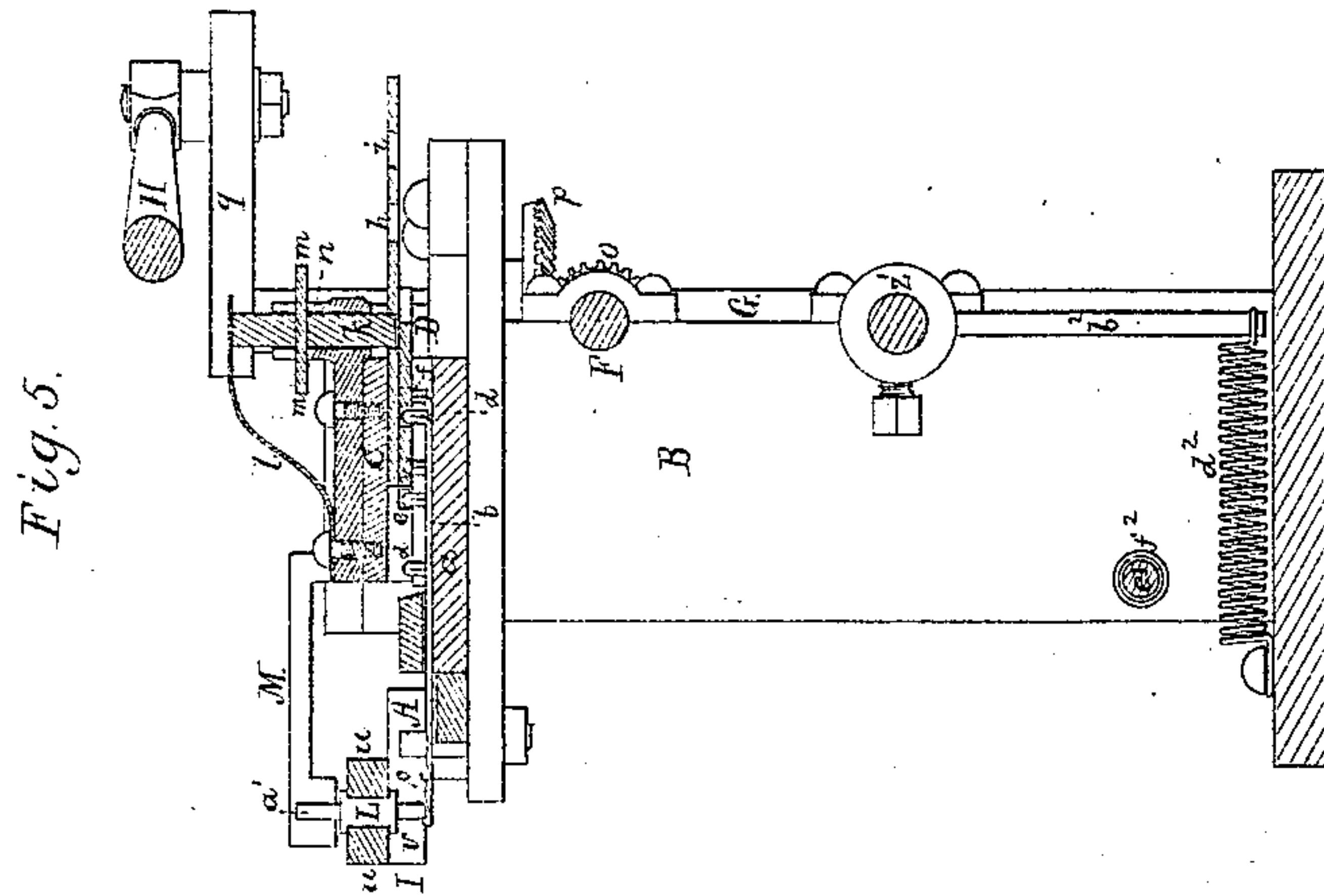
Witnesses.

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# UNITED STATES PATENT OFFICE.

WALTER AIKEN, OF FRANKLIN, NEW HAMPSHIRE.

## IMPROVEMENT IN STRAIGHT-KNITTING MACHINES.

Specification forming part of Letters Patent No. **217,569**, dated July 15, 1879; application filed March 10, 1879.

*To all whom it may concern:*

Be it known that I, WALTER AIKEN, of Franklin, of the county of Merrimack and State of New Hampshire, have invented new and useful Improvements in Straight-Knitting Machines; 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 front elevation, Fig. 3 a rear elevation, Fig. 4 an end view, and Fig. 5 a transverse section, of the machine. Fig. 6 is a side view of one of its single-studded needles. Fig. 7 is a side view of one of its double-studded needles. Fig. 8 is an under-side view of its movable needle-cam and its operative double-groove bar. Fig. 9 is an under-side view, and Fig. 10 a longitudinal section, of the arm for operating the yarn-carriers.

This machine is for the production of a fancy striped or checked knit fabric with yarns of different colors, such being determined by the number, length, and positions of the pins in the pattern-wheel.

My invention is fully set forth in the claims hereinafter presented.

The loop-comb is shown at A, it being of the ordinary kind, and secured to the grooved needle-supporter *a*, arranged in the frame B of the machine, in manner as shown. The latched needles are represented at *b c*, they being arranged in suitable guide-grooves of such supporter *a*. Each needle is of like length; but the needles marked *b* have but one projection or stud, *d*, while those marked *c* are double-studded, or have two such studs, as shown particularly in Fig. 7, such studs being to enter the double-groove bar C of the needle-cam D. This bar, arranged in the frame and adapted thereto to slide rectilinearly therein, as usual in knitting-machines, has made in it lengthwise from end to end of it, on its under side, two grooves, *e f*, to receive the studs of the needles. These grooves are apart from each other a distance equal to that between the two studs of each needle of the duplex-studded needles *c*.

The needle-cam D, instead of being fastened to the double-groove bar, so as to be immovable relatively thereto, is applied to it so as to

slide transversely therein, and it has in it two locking-holes, *g h*, and a recess or slot, *i*, all being as shown.

A bolt, *k*, to slide vertically, and to be pressed down by a spring, *l*, is secured to the double-groove bar C, such bolt being to enter either of the holes *g h*, in order to lock or latch the cam in either of its positions relatively to the bar C.

The bolt is studded, or has a pin, *m*, going through it. This pin not only serves, with the bolt-carrier *n*, to arrest the downward movement of the bolt, but, with a stationary inclined fork, E, arranged as represented, to effect the raising of the bolt, so as to unlock the needle-cam in respect to the double-groove bar C during one of the movements of such bar.

The driving-shaft of the machine is shown at F, it being connected with a vertical shaft, G, arranged as represented, by bevel-gears *o p*. To a crank, *q*, fixed on the upper part of the shaft G, a connecting-rod, H, is pivoted at or near one end, the rod at or near its other end being slotted, as shown at *r*, to receive the pivot of a post, *s*, projecting up from the double-groove bar C. On the driving-shaft being revolved, reciprocating rectilinear motions will be imparted to the said slide-bar.

In rear of and somewhat above the needles there is hinged to the frame, in manner as shown at *t*, the yarn-carrier race I, not only composed of two straight bars, *u u*, arranged parallel to each other at a short distance apart, but of a hinge-piece, *v*, from which such bars are projected, as shown. This race is pivoted to the frame for the purpose of enabling it (the said race) to be moved aside sufficiently to allow of access being had to the needles as occasion may require. Furthermore, the race is provided at its free end with a catch, *w*, to take upon latch *x*, fixed to the needle-supporter, the catch and latch serving to hold the race in position and open toward the carriage K of the series of yarn-carriers L L L. This carriage is adapted to slide horizontally and transversely of the machine, and is or should be furnished with three or any other suitable number of open slots or sockets, *y y y*, to receive and support the yarn-carriers, there being to the carriage, and extending over the slots, a set of springs, *z z z*, to bear upon the



tops of the yarn-carriers and hold them from accidentally being moved out of place. Each yarn-carrier is a flanged block having a tubular yarn-guide,  $a'$ , and a stud,  $b'$ , arranged with it, as shown.

The mechanism for retracting the carriage K consists of a long helical spring,  $c^1$ , fixed at one end to a long arm,  $e^1$ , projecting from the carriage, and at the other end to a short post,  $f^1$ , extending up from the carriage-sustaining bracket  $d^1$ .

The operative arm or device for moving each thread-carrier from the carriage into and through the race, and from the latter into the carriage, as circumstances may require, is shown at M, it being fixed to and projected from the double-groove bar C, and provided at its front end with a groove,  $e^2$ , arranged in it as shown, to receive a stud of either of the yarn-carriers. When the groove  $e^2$  is in line with all the studs of the yarn-carriers, the carriage may be moved so as to carry either stud into the groove of the arm, in order to enable the yarn-carrier of such stud to be moved out of the carriage and into the race.

A stud or screw,  $g'$ , extends through a slot,  $h'$ , in the bracket  $d^1$ , and has bearing against it an arm,  $i'$ , as shown, such arm being part of one of two actuators, N O, arranged with a pattern-wheel, P, in manner as represented. This pattern-wheel is supported by and revolves on a stationary screw, R, extending from the frame, there being in the circumference of the pattern-wheel two series of holes, arranged around the wheel in helix-paths, corresponding with the helix of the thread of the screw, as usual in some knitting-machine pattern-wheels. Pins  $k'$ , of different or proper lengths, inserted in the requisite number in such holes, and to project outwardly from the periphery of the wheel, operate the actuators as the pattern to be knit may require, such pattern being determined by the positions and number of such pins. One helical row of pins is for one and the other for the other of the two actuators, the construction and application of which will be hereinafter described.

The pattern-wheel is furnished with a ratchet-wheel,  $l'$ , with whose teeth a broad pawl,  $m^1$ , co-operates in intermittently revolving the pattern-wheel. This pawl is pivoted to a lever,  $m^2$ , provided with a retractive spring,  $n'$ , and bearing against a cam,  $o'$ , fixed on the driving-shaft, the pawl being moved at proper times by such cam and lever when the driving-shaft may be in revolution.

The yarn-carrier-carriage actuator N is composed in part of a lever, consisting of a short tubular shaft,  $p'$ , and two arms,  $q'$   $q'$ , projecting therefrom, as shown, the lower or shorter one resting upon a stud,  $r'$ , projecting from a slide-plate,  $s'$ , arranged to slide up and down in a bracket,  $t'$ , and provided with a cammed lever,  $u^1$ , to effect the raising of the slide, all being as shown. The lower edge of the slide, formed as represented, rests over one helical range of holes of the pattern-wheel, the pins

of which, while the wheel may be revolving, are to be carried in succession against the plate, so as to force it upward, and thereby cause the lever to move inward the yarn-carrier carriage.

The secondary or other actuator O is composed of a crank,  $u^2$ , and an adjustable plate,  $v'$ , the latter being applied to the side of such crank, and provided with a clamp-screw,  $w'$ , which goes through a curved slot,  $x'$ , in the plate and screws into the crank. The point of the plate is shown at  $y'$ . The plate is arranged directly against the other of the two helical rows of holes or pins of the pattern-wheel, the crank being fixed on a horizontal shaft,  $z'$ , arranged as shown, and provided with two arms,  $a^2$   $b^2$ , projecting in opposite directions from it. The upper arm is borne against a stop,  $c^2$ , by a helical spring,  $d^2$ , fixed to the lower end of the other arm and to the bed-plate of the frame of the machine.

A slide-rod,  $e^3$ , provided with an impelling-spring,  $f^2$ , and arranged in the frame in manner as shown, serves by its pressure against the pattern-wheel to prevent it from being accidentally revolved or from being moved too far by its pawl.

By the machine herein described I am enabled to produce a great variety of striped, checked, or figured knit fabrics, the pattern to be produced being determined by the number, lengths, and positions of the pins of the pattern-wheel.

The number of yarn-carriers to the carriage is not to be limited to three, as represented, as such will depend on the number of colored yarns that it may be desirable to employ in producing the work, the carriage being properly constructed for the reception of the requisite number of carriers.

The object of having some of the needles duplex-studded, as represented, is to enable them only to be operated at once by the cam in order for the production of checked work, the others in the meantime remaining drawn in. They do not operate until their time may come for them to be moved out. The two kinds of needles are to be arranged in the needle-supporter to suit the pattern to be produced.

In an ordinary working machine of this kind I usually construct the pattern-wheel about two feet in diameter by three or four inches in breadth of periphery, and have in it about eight hundred holes for the reception of pins, whereby I am enabled to produce a great variety of work. When the wheel may have been turned to the necessary extent to finish a piece of work, a stop-pin arranged in it may be brought against a suitable stationary post or stop, so as to arrest the movements of the machine or put in action a suitable stop-motion to accomplish such.

Having thus described my improved fancy-knitting machine, what I claim therein as of my invention is as follows, viz:

1. The combination of the yarn-carrier



straight race I, the series of yarn-carriers L, and their rectilinearly-movable recessed carriage K, and operative arm M, substantially as described, with a series of knitting-needles, *b*, their supporter, *a*, looping-comb A, operative cam D, and its double-groove bar C, provided with mechanism for operating it, as described.

2. The combination of the yarn-carrier-carriage actuator N, and the screw R and its perforated pattern-wheel P, provided with mechanism for intermittently revolving it, (the said wheel,) as described, with the yarn-carrier race I, and movable recessed carriage K and its retractive spring *c'*, and series of yarn-carriers L, their operative arm M, the series of knitting-needles *b*, their supporter *a*, and looping-comb A, operative cam D, and its double-groove bar C, provided with mechanism for operating it, substantially as described.

3. In combination with the frame and the yarn-carrier race I, pivoted thereto, latching devices *w x*, for enabling the said race to be either latched or held in position in front of the needles, or turned away therefrom, substantially as set forth.

4. The double-groove bar C, provided with mechanism for operating it, as described, and having the two grooves *e f*, the movable needle-operative cam D and its locking devices *l k g h*, arranged and applied substantially as described, in combination with the set of knitting-needles *b c*, of which some are single-studded and the rest double-studded, as described, such movable cam being to operate either the double-studded needles alone or all the needles at once, as occasion may require.

5. The combination of the double-groove bar C, provided with mechanism for operating it, substantially as described, the movable needle-cam D, having slot *i* and locking mech-

anism *l k g h m*, with mechanism for automatically unlocking the cam and moving it transversely of the double-groove bar, as set forth, the mechanism for unlocking the cam being the bolt, stud, or pin *m* and stationary inclined fork E, and the mechanism for moving the cam transversely of the double-groove bar being the shaft *z'*, the arms *a<sup>2</sup> b<sup>2</sup>*, spring *d<sup>2</sup>*, actuator O, stationary screw R, perforated pattern-wheel P, and its mechanism for intermittently revolving it, all being essentially as specified.

6. In a knitting-machine, the combination, substantially as described, consisting of the following elements or instrumentalities, applied and to operate essentially as set forth, viz: first, the loop-comb and the series of knitting-needles, of which some are single-studded and the rest double-studded, as described; second, the double-groove bar and its sliding cam and locking devices therefor; third, the yarn-carrier's race; fourth, the series of yarn-carriers and their movable carriage; fifth, the yarn-carrier operative arm; sixth, the unlocking mechanism of the sliding cam; seventh, the mechanism for reciprocating or moving the needle-cam double-grooved bar; eighth, the mechanism for retracting the thread-carrier movable carriage.

7. The mechanism for advancing the thread-carrier movable carriage, and for moving the movable cam relatively to or transversely of its operative bar, to carry such cam into position for operating either the double-studded needles only, or all the needles, as occasion may require.

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Witnesses:

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