

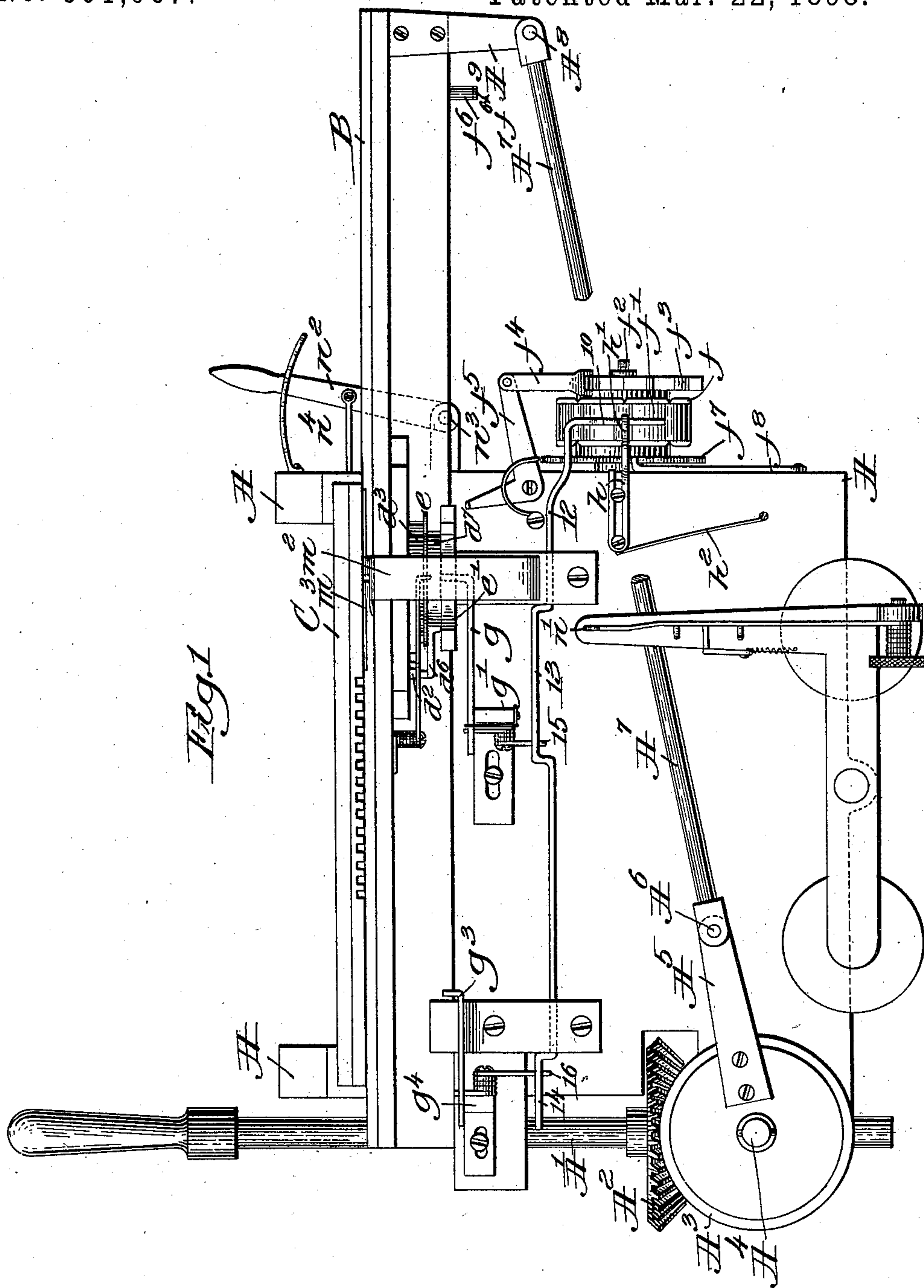
(No Model.)

4 Sheets—Sheet 1.

E. WALTON.
KNITTING MACHINE.

No. 601,067.

Patented Mar. 22, 1898.



witnesses:

Fred S. Grumbaf.
Thomas J. Drummond.

Inventor:

Edwin Watmore.
by Henry Gregory.
attys.

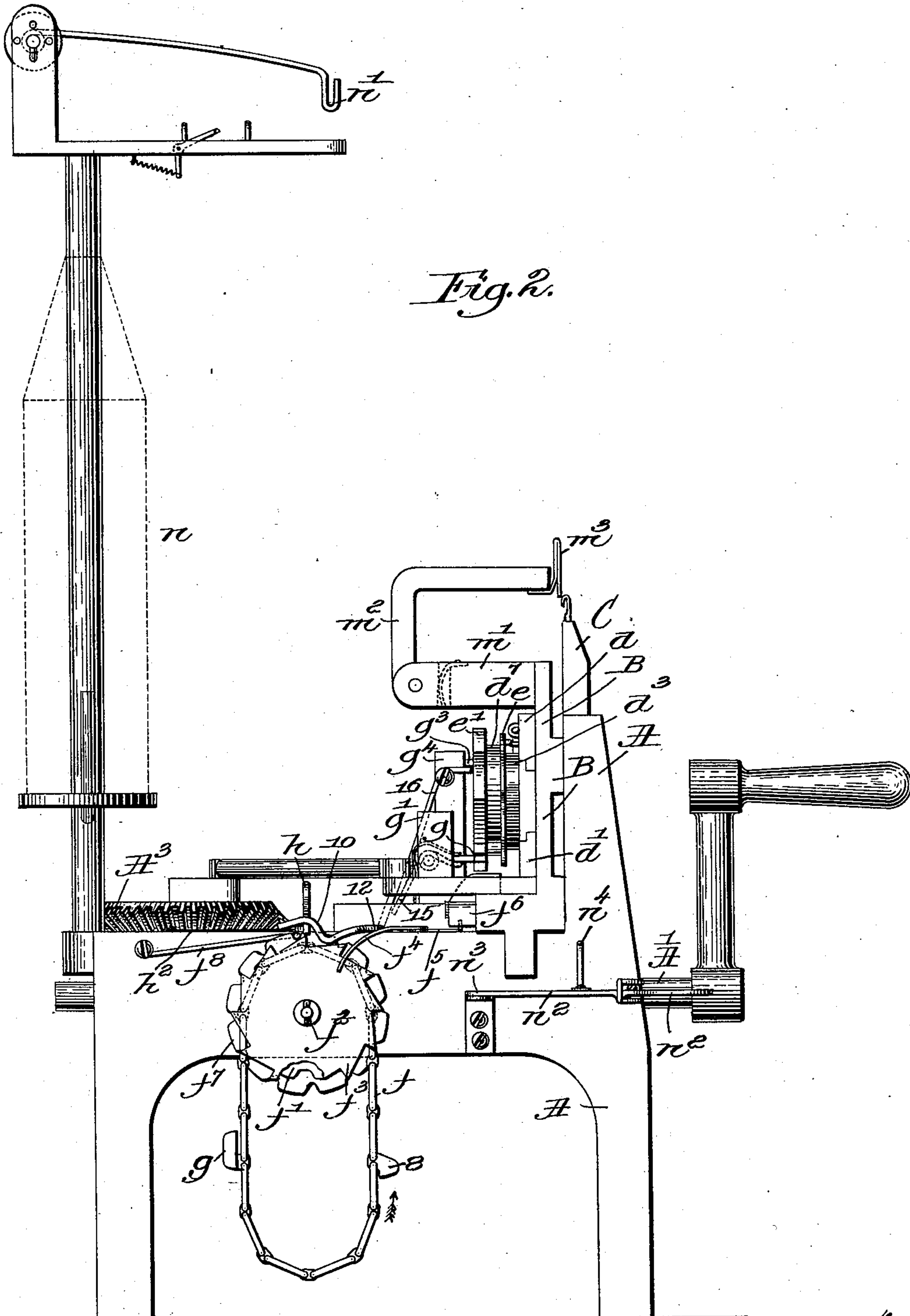
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Witnesses:
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Thomas J. Drummond

Inventor:
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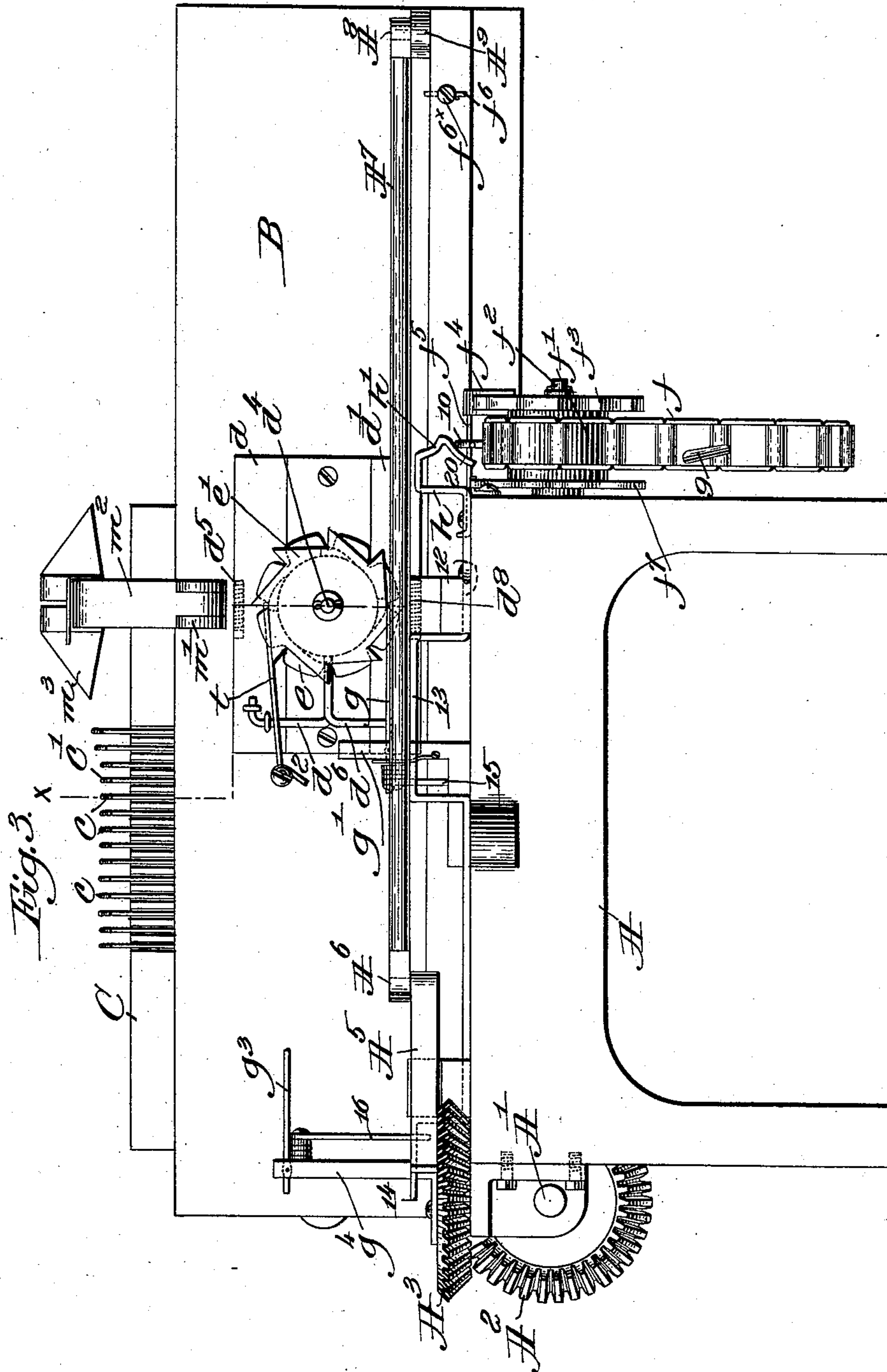
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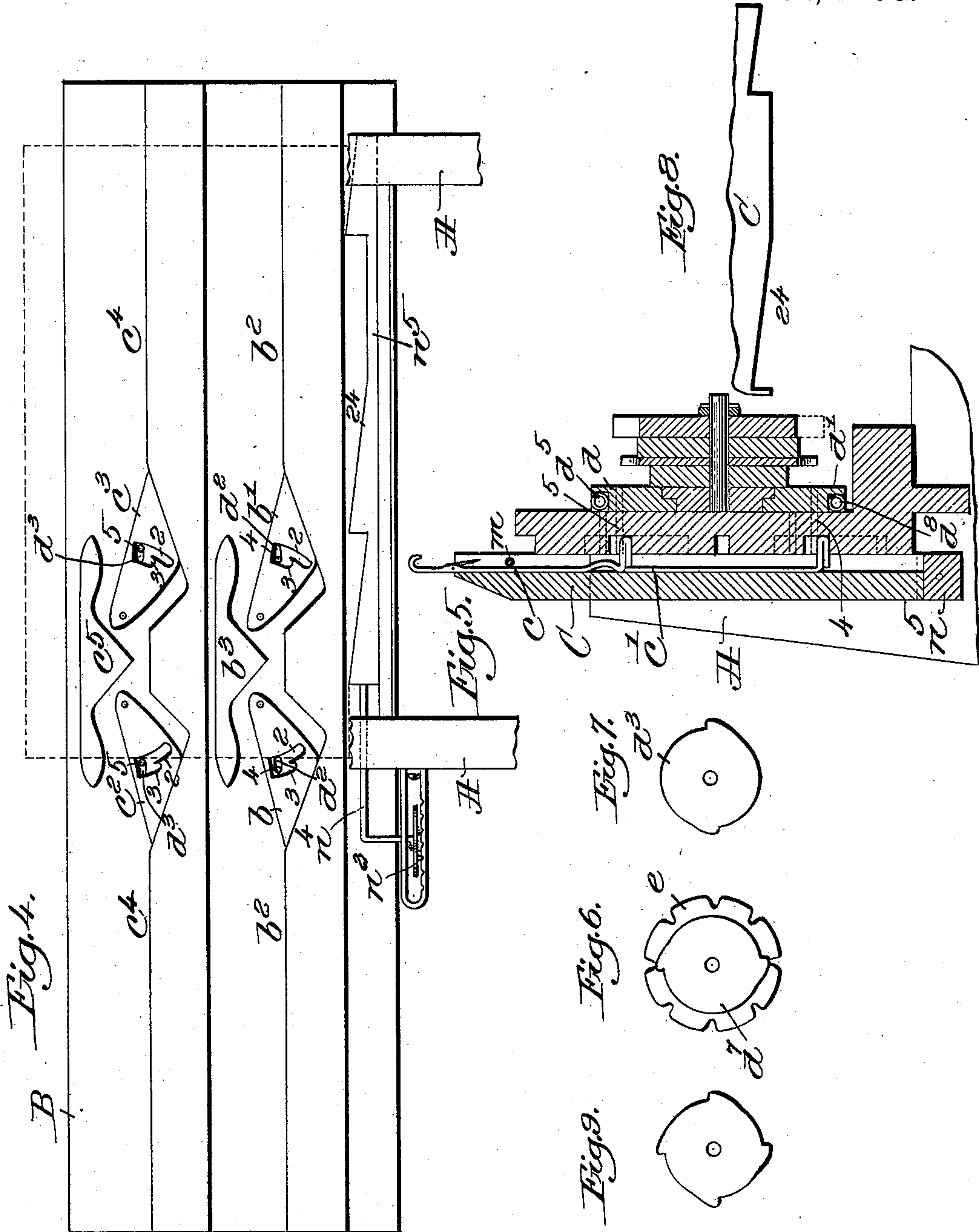
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No. 601,067.

Patented Mar. 22, 1898.



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UNITED STATES PATENT OFFICE.

EDWIN WALTON, OF WESTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF
TO WILLIAM W. MCLEOD, OF WELLESLEY, MASSACHUSETTS.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 601,067, dated March 22, 1898.

Application filed March 29, 1897. Serial No. 629,774. (No model.)

To all whom it may concern:

Be it known that I, EDWIN WALTON, of Weston, county of Middlesex, State of Massachusetts, have invented an Improvement in Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention has for its object the production of a novel knitting-machine using latched needles, the object being to so manipulate the needles that they may be made to knit either a plain stitch or a tuck-stitch, the
15 plain stitch being made on all the needles working one after the other in succession, while the tuck-stitch is made by knitting on all the needles in one stroke of the cam-carrier and on only a portion of said needles, as
20 each alternate needle, as will be described, on the return stroke, and then again on all the needles, and then on the second return stroke knitting on only those needles which at the first return stroke did not knit. To effect this
25 change of stitch, I have provided a machine in which I employ two lengths of needles, and I actuate these needles by two sets of cams on a cam-carrier, each set presenting two wings, and I have combined with these wings means
30 whereby at that stroke of the cam-carrier when plain course knitting is being done all the said cams are locked, so that they move all the needles to knit; but when a tuck-stitch is to be made one set of said cams will be un-
35 locked at one stroke, so as not to actuate the needles under its control, while at the next stroke in that direction the other set of cams will be unlocked, the unlocked cams not moving the needles then under its control, so as
40 to knit. The locking and unlocking of the cams is effected by a pattern-wheel moving with the cam-carrier, said pattern-wheel being moved intermittently when the cam-carrier is at each end of its stroke.

45 The particular features in which this invention consists will be hereinafter specifically set forth in the specification and defined in the claims following.

50 Figure 1, in plan view, shows a sufficient portion of a knitting-machine embodying my invention to enable the same to be understood;

Fig. 2, a right-hand end view; Fig. 3, a view looking at the said machine in the direction of the arrow 1, Fig. 1. Fig. 4 is an inner side view of the cam-carrier with its two sets of cams, 55 the upper set being shown as unlocked, so that they cannot knit or cannot draw down the set of shortest needles. Fig. 5 is a section on the irregular line *x*, Fig. 3; Fig. 6, a detail showing the cam *e* immediately behind 60 the ratchet-wheel and the detent-wheel. Fig. 7 shows the shape of the cam *d*³. Fig. 8 shows part of the lower end of the bed in which the needles slide, and Fig. 9 shows a modified form of cam to be described. 65

The framework A, of proper shape to sustain the working parts, has a suitable power-shaft A', which is provided with a bevel-pinion A², which engages a bevel-pinion A³, mounted loosely on a stud A⁴, and said bevel- 70 pinion has suitably attached to it a crank A⁵, having a crank-pin A⁶, over which fits one end of a link A⁷, attached at its other end to a pin A⁸, projecting from an arm A⁹, extended from the rear side of the cam-carrier B, 75 the rotation of the gear A³ reciprocating the said cam-carrier.

The needle-bed C is provided with a series of needle-grooves, (see Figs. 1 and 5,) in which grooves are placed two series of latched 80 needles *c* and *c'*, the needles *c'* being the longest, the butts of the longest needles being in line to be actuated by the lowermost set of cams *b b' b*³, while the butts of the shortest needles *c* are in position to be actuated by 85 the set of cams *c*² *c*³ *c*⁵.

The lowermost set of cams for actuating the longer needles is composed, as shown, of two pivoted cams *b b'* and a centrally-located starting-cam *b*³, said cams coöperating 90 with a ledge *b*², which is notched below them. The starting-cam *b*³ starts down the needles, the butts of which pass over the back or straight side of either of said pivoted cams *b* or *b'*, the butts of the needles started down 95 by the cam *b*³ then passing under one or the other of said cams *b* or *b'*, according to the direction of movement of the cam-carrier. The upper set of cams, they actuating the shorter needle *c*, is composed of two pivoted 100 cams or wings *c*² and *c*³ and a starting-down cam *c*⁵, the ledge *c*⁴, over which the butts of

the needles *c* pass under said cams, being notched below said cams. Each of the pivoted cams *b* and *b'* and *c*² and *c*³ have like slots 2, each slot having at one side of it a shoulder 3. The slots of the cams *b* and *b'* receive locking devices 4, while the slots of the cams *c*² and *c*³ receive locking devices 5. These locking devices are shown as studs connected, respectively, to two slide-bars *d* *d'*, said slot being extended through slots, as *d*² *d*³, in the cam-carrier. (See Fig. 4.) The slide-bar *d* has a finger *d*², the acting end of which rests against a cam *d*³, mounted on a stud *d*⁴, the shape of said cam being best shown in Fig. 7, said finger being kept pressed against said cam by a suitable spring *d*⁵, (see Fig. 3,) connected to said slide-bar *d* and to the said cam-carrier.

The locking devices 4 are carried by the slide *d'*, and said slide has a finger *d*⁶, which is made to rest against a cam *d*⁷, (see Fig. 6,) also loose on said stud, said two cams being connected together and to a detent-wheel *e*, and all connected with a ratchet-wheel *e'*. A suitable spring *d*⁸, connected at one end with the cam-carrier and at its other end with the slide *d'*, acts normally on said slide to keep the end of the finger *d*⁶ against said cam *d*⁷.

When either of the locking devices 4 or 5 stand opposite the shoulders 3 (referred to) of the pivoted cams or wings, as shown in connection with the cams *b* and *b'*, then said pivoted cams or wings, as the butts of the needles pass under them, will be locked or restrained from rising fully, and being so held or locked down they will act to depress the needles sufficiently to knit; but when the locking devices are located in the slots 2 of the wings, as shown by cams *c*² and *c*³, then the butts of the needles pass under the said wings, they being unlocked and free to rise, and will not act to draw down the needles to knit. In other words, when plain knitting is being done the locking devices are in position to be met by the shoulders 3 of the rising wings of the cams of both sets, and both sets of cams actuate the needles of both sets regularly, one after the other, at each stroke of the cam-carrier. If, however, the knitting is to be changed to show a tuck-stitch, I call into play a pattern surface or chain *f*, it hanging on a barrel *f'*, mounted on a stud *f*², said barrel having connected to it, as shown, a ratchet-wheel *f*³, which is engaged at each stroke of the cam-carrier by a pawl *f*⁴, carried by an elbow-lever *f*⁵, mounted on the bed-plate and having one of its ends in the range of movement of a projection *f*⁶, carried by the cam-carrier and pivoted on a stud *f*^{6x}. This barrel also has connected with it a detent-wheel *f*⁷, which is engaged by a spring detent-pawl *f*⁸.

The pattern-chain has a high link 8, which in the movement of the chain meets an arm 10 of, as herein shown, a rock-shaft 12, having portions 13 and 14, (see Fig. 1,) which act at times on levers 15 16, moving them simultaneously, so that the lever 15, acting on

a catch *g* at one side of its fulcrum on the post *g'*, lowers the acting end of said catch and causes it to descend, so that it will not be caught by a tooth of the ratchet-wheel *e'*, as the cam-carrier on which the said ratchet-wheel is mounted is moved to the right, viewing Fig. 3, and the lever 16 at the same time by acting on the catch *g*³, between its end and its fulcrum on a post *g*⁴, lifts the acting edge of said catch, so that the said ratchet-wheel will not contact during the stroke of the cam-carrier to the left. When the arm 10 of the rock-shaft was lifted, as described, by the high link 8, the said arm was locked in its elevated position by a spring-actuated holding-slide *h*, the arm resting on the shoulder *h'* of the holding-slide, the spring *h*² (see Fig. 1) holding the slide forward. During this time plain knitting will be done; but when the tuck-stitch is to be made for the purpose of ornamentation and to also give greater elasticity to the knitting the high link 9 comes into working position, and by its side it acts against the end 20 of the holding-slide *h* and pushes it back, so that the arm 10 of the rock-shaft 12 is released, letting the arm 10 drop again into position to be again at the proper time acted upon and lifted by the high part 8. When the arm 10 is down, the rock-shaft 12 no longer serves to keep the catches *g* and *g*³ in their inoperative position, and consequently said catches act at the end of each stroke of the cam-carrier to engage and turn the ratchet-wheel *e'* and its cams, before described. When the catch *g* operates, it turns the said ratchet-wheel and its attached cams *d*³ and *d*⁷ and operates one set of the locking devices—say those 5—coöperating with the cams *c*² and *c*³, putting them in the position, Fig. 4, so that when the said cam-carrier is moved to the left, Fig. 4, said cams *c*² and *c*³ will not actuate the shorter needles; but the cams *b* and *b'* are locked, and they will actuate the longer needles, and they will be drawn down to knit, the shorter needles, which are not drawn down at that stroke, receiving, however, thread. At the end of this stroke to the left the catch *g*³ will act to turn the ratchet-wheel and its cams *d*³ and *d*⁷ and will cause the locking device 5 to be put in position to lock the cams *c*² and *c*³, so that as the cam-carrier comes again to the right both sets of cams will be locked and both will act to draw down both the long and the short needles, so that they will all knit, and at the end of this stroke to the right the catch *g* will again act and turn the ratchet and its cams *d*³ and *d*⁷; but at this time the locking devices 4 will be so moved as to unlock the cams *b* and *b'*, so that as the cam-carrier is next moved to the left only the cams *b* and *b'* will actuate the short needles far enough to knit, the longer needles, however, taking thread, and as the cam-carrier reaches the end of its stroke to the left the catch *g*³ again acts and turns the ratchet-wheel and its cams to insure the locking device 4 to be put in position to again lock the cams *b* and

b' , so that on the return stroke of the cam-carrier to the right both sets of cams will act and cause both of the needles to work. In this way it will be seen when the tuck-stitch is being made that at each stroke of the cam-carrier toward, say, the right both sets of needles take thread and knit, but at each alternate stroke of the cam-carrier toward the left one set and then the other set of said needles will take thread and knit.

The needles are kept in the grooves of the needle-bed by a suitable cross bar or rod m .

The cam-carrier, as shown, has a bracket m' , on which is pivoted an arm m^2 , provided with a suitable latch-opener and yarn-presenting guide m^3 .

The knitting-thread may be taken from a suitable bobbin n , and thence to a take-up n' and to the guide m^3 .

When it is desired to knit a slack course, I may engage the lever n^2 , pivoted at n^3 , move it and cause the link n^4 , connected to the cam-slide n^5 , it having two or more cams or inclines, (see Fig. 4,) and cause said cam-slide to act on oppositely-beveled or cam-shaped projections 24 of the needle-bed B and lift the needle-bed, so that when the needles are thereafter drawn down the loops will be made longer in usual manner.

In case either plain knitting or tuck-stitch knitting is being done and it is desired to continue such stitch indefinitely without any regard to the pattern-surface the projection f^6 , pivoted at f^{6x} and which at each stroke of the cam-carrier to the right may actuate the levers f^5 to turn ratchet-wheel of the pattern-surface, may be turned up, as shown in dotted lines, Fig. 3, and then the operation of the pattern-surface will be stopped.

It is obvious that this machine may be provided with any suitable thread-guide adapted to present, under the control of a pattern-surface, a thread of any desired color, and that threads of different colors may be presented to either the long or the short needles when they are to knit to the exclusion of the other needles, and in this way stitches of different colors may be alternated in each course.

By changing the grouping of the long and short needles the combination of the groups of wales may be changed as desired; each new grouping presenting a fabric having a different appearance.

When both catches operate, as I have described, the tuck-stitch made will be that commonly designated by knitters as the "French tuck." Should I desire, however, to further modify the stitch, I may while the catch g is in operative position throw the catch g^3 entirely out of operation, and thereafter the needles which did not knit as the cam-carrier moved to the left, viewing Fig. 4, would be fed with thread for a second course and would not knit and at the next two courses all of the needles would knit. This would make what is called a "double tuck."

The cams d^7 and d^8 (see Figs. 6 and 7) have each two throw parts; but by providing each of said cams with four throw parts, as in Fig. 9, I may knit on all the short needles at one stroke of the cam-carrier and on all the long needles at the return stroke of the cam-carrier, and this knitting would be what knitters would call "one-and-one tuck work."

I may ornament, say, a knitted fabric, as the back of a glove, by making the wales of plain and of tuck stitches in groups more or less separated. To do this, I may take out some of the long needles, leaving the same to present two or more distinct groups, and in the grooves of the needle-bed from which I removed said long needles I may apply short needles, and then by knitting on the long and on the short needles at alternate strokes I may make groups of knitted wales differing in their stitches.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a knitting-machine, a needle-bed, having interspersed needles of different lengths, a cam-carrier having two sets of cams, each set presenting two pivoted or movable cams or wings, one set of such cams for each length of needle, means to reciprocate said cam-carrier to and fro, and locking devices to lock said pivoted or movable cams or wings, so that they may move all the said needles to knit, or to unlock said pivoted or movable cams or wings to permit the needles of only one length to knit during each full stroke of the cam-carrier, substantially as described.

2. In a knitting-machine, a needle-bed having interspersed needles of different lengths, a reciprocating cam-carrier having two sets of knitting-cams located in different planes, one above the other, each of said sets of cams presenting two pivoted or movable cams or wings, two sets of locking devices, each adapted to lock or leave unlocked the pivoted or movable cams or wings of either one of said sets of cams, and devices to automatically effect the unlocking of either of said cams at a stroke of the cam-carrier, following a stroke thereof at which all the said cams were locked and the needles were moved to knit, substantially as described.

3. In a knitting-machine, a needle-bed having needles interspersed therein, a reciprocating cam-carrier having two sets of knitting-cams located in different planes, each of said sets presenting two pivoted or movable cams or wings, two sets of locking devices adapted to lock both of said sets of cams or wings at one stroke of said cam-carrier, and to leave unlocked one of said sets of cams or wings at the return stroke of said cam-carrier, a ratchet-wheel and cams to operate said locking devices, combined with a pattern-surface, means to actuate it, and means between said surface and said ratchet-wheel to actuate the latter at the desired times, substantially as described.

4. In a knitting-machine, a needle-bed to
contain needles of different lengths inter-
spersed in any desired order, a cam-carrier
having independent cams for operating the
5 needles of different lengths, said cams hav-
ing slots and shoulders and locking devices,
and means to actuate said locking devices
whereby when the said cams are locked the
needles controlled by them are actuated to
10 knit, and when said cams are unlocked the

needles controlled by them do not knit, sub-
stantially as described.

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

EDWIN WALTON.

Witnesses:

GEO. W. GREGORY,
ADDIE F. DANIELS.