

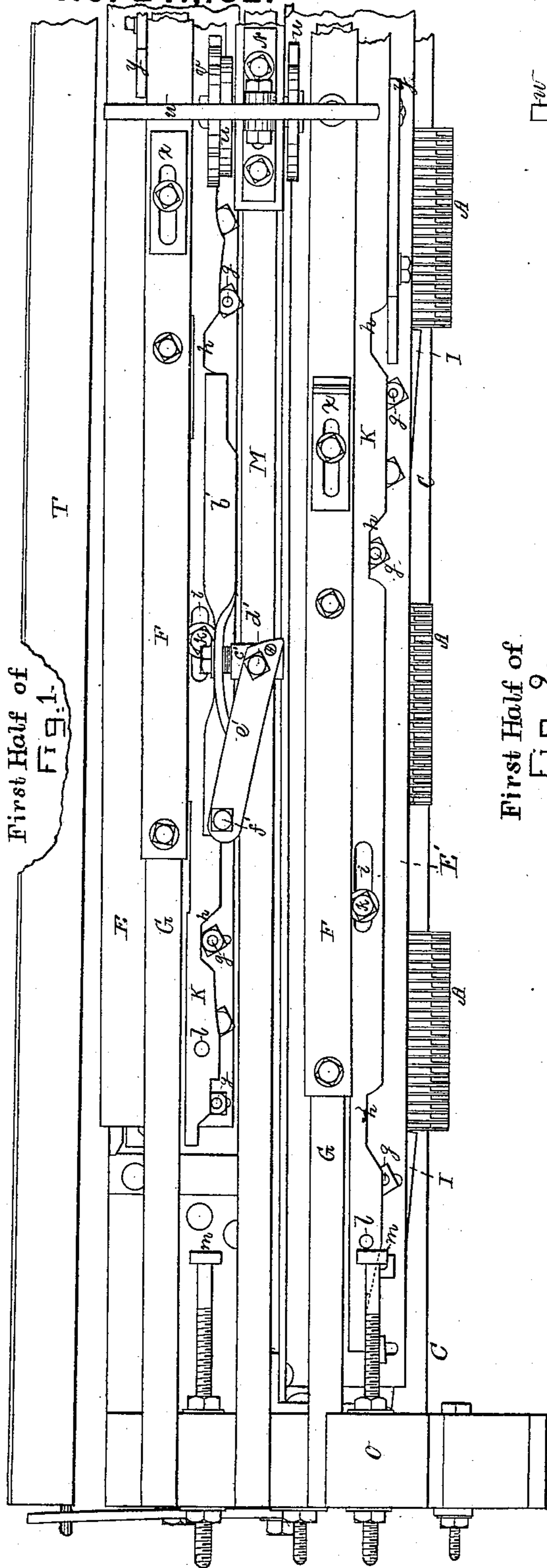
(Model.)

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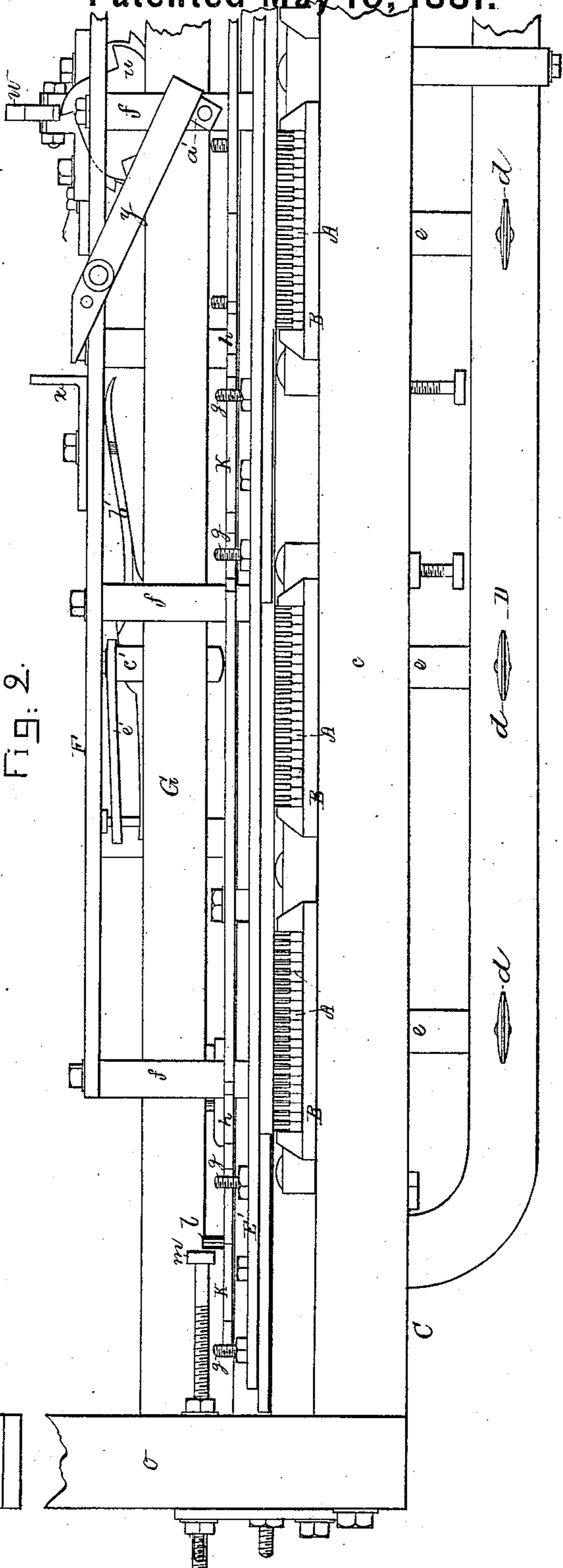
H. C. SHAW.  
Knitting Machine.

No. 241,162.

Patented May 10, 1881.



First Half of  
Fig. 2.



Witnesses.

S. N. Piper  
W. St. Lunt

Inventor  
Herbert C. Shaw.  
by R. H. Eddy atty.

(Model.)

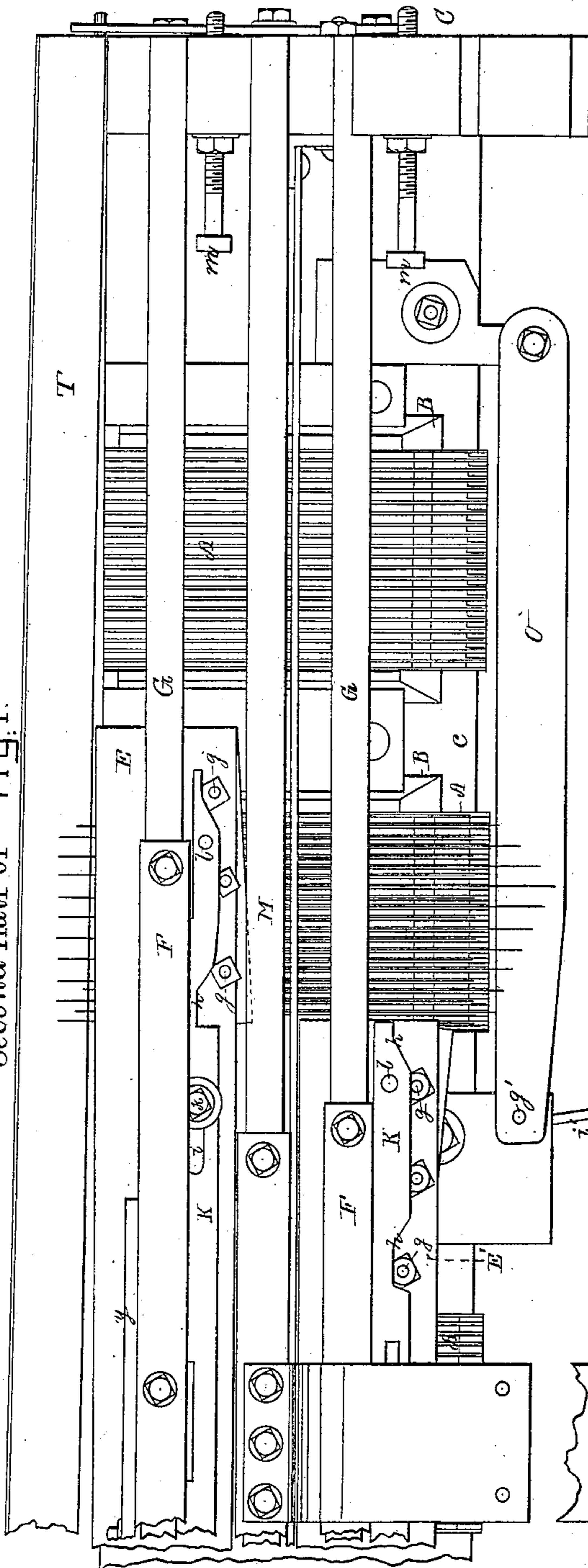
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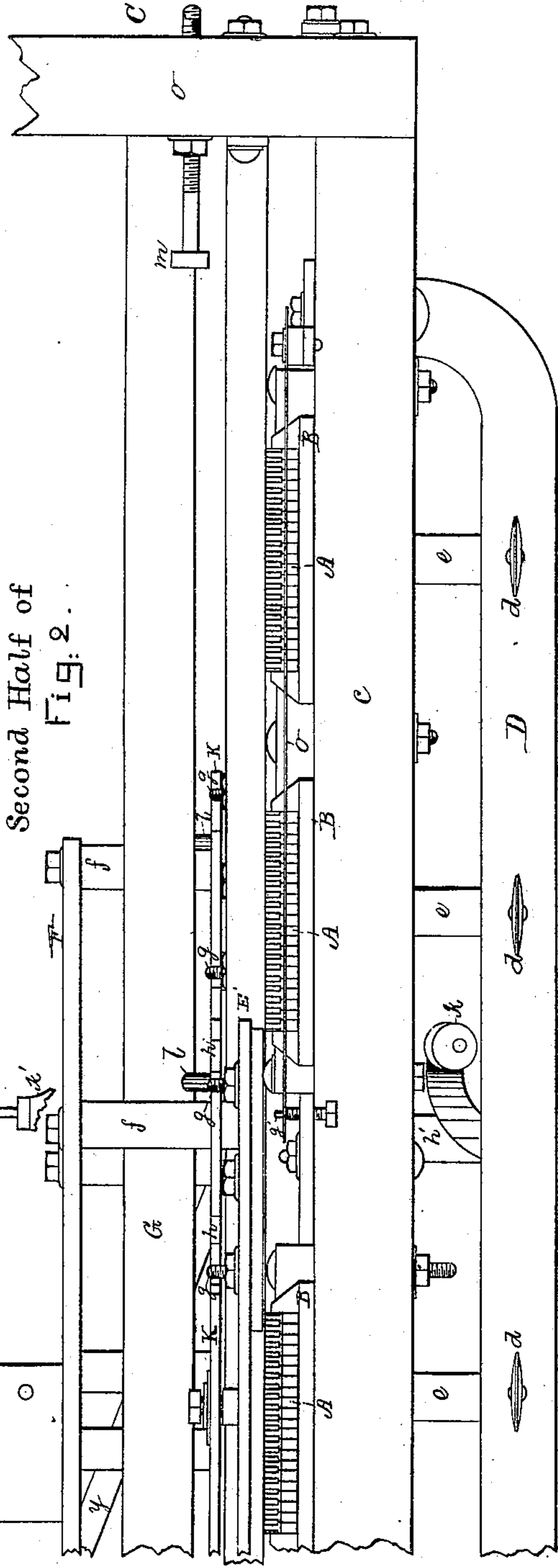
**Patented May 10, 1881.**

Second Half of Fig. 1.



Second Half of

27



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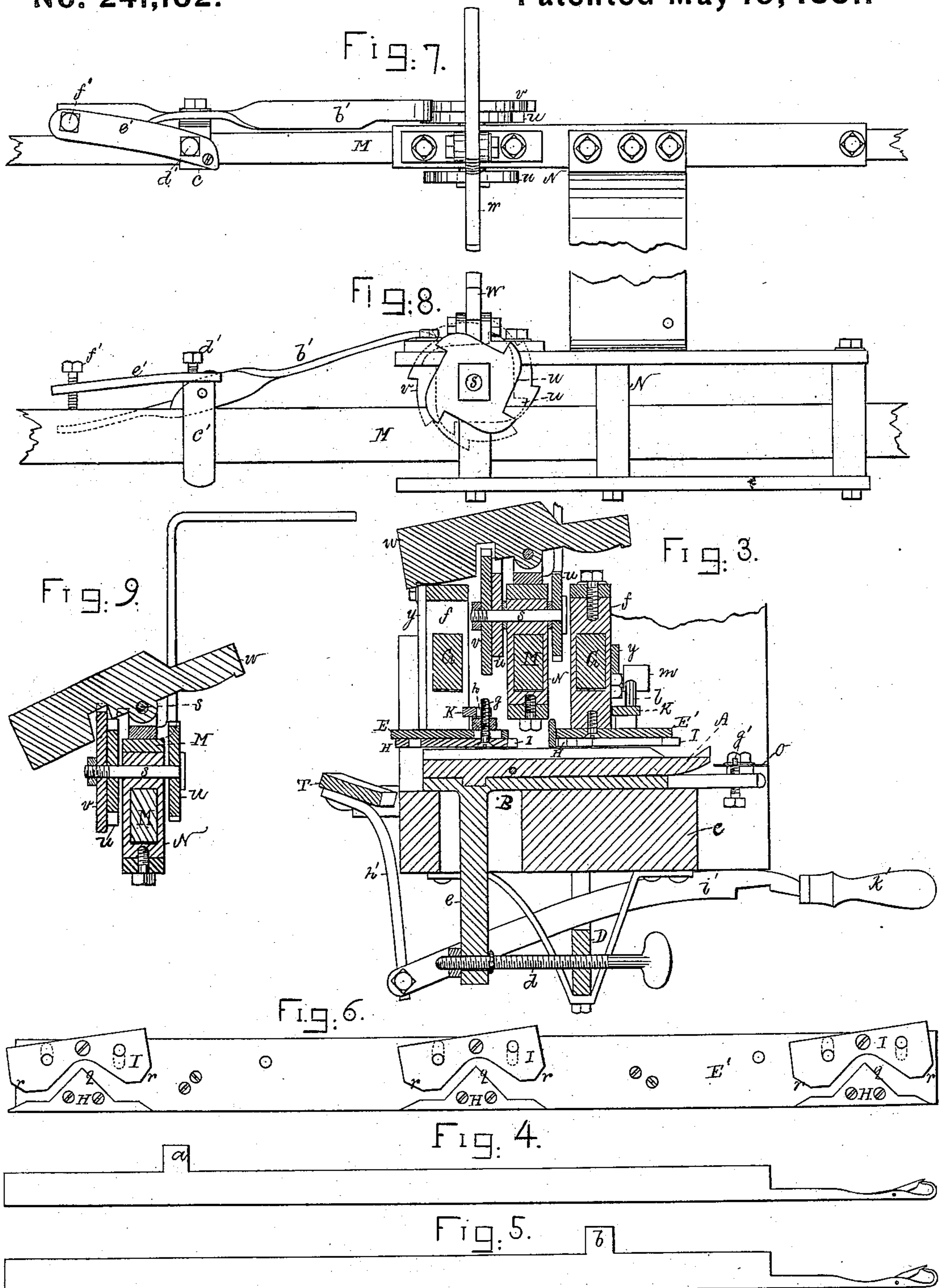
(Model.)

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# UNITED STATES PATENT OFFICE.

HERBERT C. SHAW, OF NEEDHAM, ASSIGNOR TO HIMSELF AND TORREY E. WARDNER, OF BOSTON, MASSACHUSETTS.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 241,162, dated May 10, 1881.

Application filed March 11, 1881. (Model.)

*To all whom it may concern:*

Be it known that I, HERBERT C. SHAW, of Needham, in the county of Norfolk and State of Massachusetts, have invented a new and useful Improvement in Machines for Knitting; and I 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, and Fig. 3 a transverse section, of those parts of a knitting-machine appertaining to my invention. Fig. 4 is a side view of one, and Fig. 5 a side view of the other, of the latch-needles used in each set of such needles. Fig. 6 is an under-side view of one of the cam-bars with its stationary and movable cam-plates. Such other figures as may be necessary to a proper illustration of the parts to be hereinafter described will be referred to and explained.

The nature of my invention is fully set forth in the claims hereinafter presented.

In the working of the needles of each set of needles either half the number thereof is stationary while the other half is being moved; consequently it requires two cam-bars with cams or cam-plates to the sets of needles. These cam-bars are alternately moved longitudinally, one being at rest while the other is in movement, and they are provided with mechanism for so moving them.

The needles, formed as shown in Figs. 4 and 5, have projections or studs *a b* to enter the cams of the bars; but the studs *a* of one-half the number of the needles of each set are at a greater distance from the hooks of their needles than are the studs *b* of the remaining needles from their hooks, such being as represented.

In the drawings six sets of the needle-carriers are shown at A A A A A A, they being properly made to receive the needles and guide them in their rectilinear movements. The needle-carriers of each set are supported in one of a series of sliding shoes, B. This shoe rests on the top of the base-bar *c* of the frame C, and is adapted thereto so as to be capable of being moved thereon rectilinearly and transversely of it, (the said base-bar.) Underneath the base-bar is a stationary bar, D. A screw,

*d*, screws through the said bar D, and is so connected with an ear, *e*, extending down from the shoe that in turning the screw one way the shoe will be caused to slide rearward, it being moved forward when the screw is being revolved the opposite way. This movement of the shoe and its set of needle-carriers and needles is to regulate the length of the stitch to be made—that is, to increase or diminish it, as occasion may require.

The mechanism herein described comprises part of a machine for knitting fancy, spotted, or check fabrics, particularly gloves, or portions thereof, with yarn of different colors, the yarn-carriers and the parts not included in my invention not being represented. Each set of the needles answers to knit the finger part of a glove, one set only being exhibited with sets of carriers appertaining to the remaining sets of needles; but in order to knit the body of a glove a single set of needles equal, or about equal, in width to the space occupied on the base-bar by two adjacent sets, as represented, is to be substituted for such sets, and to have a shoe and needle-carriers therefor suitable for supporting the said wider set of needles.

Each cam-bar has three stationary and three movable cam-plates applied to it, whereby it is rendered capable of working the sets of needles for glove-finger knitting, or those for glove-body knitting, as occasion may require. I use separate sets of cams to each cam-bar for the same reason that such are used in other machines of like character—viz., in order to save the necessity of moving the cam-bar the great distance it would have to be moved were but one set of cams employed with each bar.

The cam-bars are represented at E and E'. Each has a series of posts, *f*, extending up from it, and having fixed to them at their upper ends a bar, F. A stationary rail or bar, G, extends through each set of posts, which slide freely on the said bar, in order that the cam-bar may be moved longitudinally and rectilinearly.

The stationary cam-plates of the cam-bar are shown at H, and the movable ones at I, they being formed and arranged as represented. Each movable cam-plate is at its middle pivot-

ed to the cam-bar; and, furthermore, there project up from the movable cam-plates through slots in the cam-bar two studs or screws, *g g*, arranged as shown, they being to operate with  
 5 a slide-bar, *K*, provided with a series of trapezoidal notches, *h*, and adapted to slide longitudinally on the cam-bar. The longitudinal movement of the bar *K* relatively to the cam-bar is limited by slots *i* in the bar *K*, and screws  
 10 *k*, going through such slots and screwing into the cam-bar.

There project upward from the bar *K*, near its ends, two studs, *l*. Near the termination of each movement of the cam-bar one of such  
 15 studs will be carried into contact with the head of one of two screws, *m*, extending, as shown, from two posts, *o*, erected on the base-bar *c*. The effect will be that the notched bar will be stopped in its movement, and the cam-bar will  
 20 continue to advance a short distance farther, sufficient to cause the movable cam-plates of the cam-bar to swing or turn on their pivots in a manner to carry one side of the notch of each of said movable plates into parallelism  
 25 with the next adjacent side of the triangular projection *q* of the fellow stationary cam-plate, the other side of the notch being moved out of parallelism with the next adjacent side of the projection *q*. The object of so moving each  
 30 movable cam-plate relatively to the fellow stationary cam-plate is to insure the passage of the needle-studs into the space between the two plates without causing a sudden backward movement of each needle to rupture or break  
 35 the loop or loops of yarn that may be upon it. The weight and strain on the work when it is hanging from the needles frequently causes them to be drawn forward a little, and as each stationary and each movable cam-plate has to  
 40 be beveled at its ends, as shown at *r*, to insure the entrance of the needle-stud into the space between their plates, were that space of equal width throughout and both plates rigidly fastened to the cam-bar, as they usually are or  
 45 have been in various other machines of the kind, the little displacement of the needles by the work, as explained, would cause, on the cam-bar being moved, one of the bevels of the notched cam-plate to be carried into contact  
 50 with the needle-studs in a manner to cause the needles to be suddenly retracted, so as to draw the work against the needle-carriers, and break or burst the loops on the needles. By having the notched cam-plate movable relatively to  
 55 the fellow cam-plate, in manner as described, its bevel is carried out of the way of the needle-studs, which freely enter the spaces between the cam-plates until they may be met and acted on or forced forward by the stationary cam-plate. Thus the said sudden retraction of the  
 60 needles and consequent breakage of their loops are prevented by the movable cam-plate and its operative mechanism, as explained.

The next part of the mechanism to be de-  
 65 scribed is that for moving the cam-bars.

Between and parallel with the two cam-bar-support rails is an intermediate rail or station-

ary bar, *M*, on which a carriage, *N*, slides lengthwise thereof.

Fig. 7 is a top view, Fig. 8 a side elevation, 70 and Fig. 9 is a transverse section of the said carriage.

Arranged in and extending across the carriage *N* is a short shaft, *s*, carrying three toothed wheels, *u u v*, the larger or rearmost 75 one being a ratchet-wheel. The two wheels *u u* are alike, they being formed as shown in Fig. 8. Extending across the said wheels and carriage is a lever-catch, *w*, which, at or near its middle, is fulcrumed to the carriage. The 80 wheels *u u* are arranged so that as they are intermittently revolved they shall cause the lever-catch to be tilted first in one and next in the opposite direction.

On the bar *F* of each cam-bar there is fixed, 85 as shown, an adjustable projection or abutment, *x*, and there is fulcrumed to the outer edge of the bar *F* a lever, *y*, shaped as shown, the longer arm of the said lever resting on a projection, *a'*, from one of the posts by which 90 the bar *F* is supported.

A lever-pawl, *b'*, fulcrumed to a slider, *c'*, on the bar *M*, engages with the ratchet-wheel *v*. The said slide-bar has a clamp-screw, *d'*, for clamping it to the bar. Furthermore, there 95 projects from the slide and over the shorter arm of the lever-pawl an arm, *e'*, through which a screw, *f'*, is screwed down to the said arm, the same being to effect the proper adjustment of the pawl relatively to the ratchet-wheel. 100

On the carriage *N* being reciprocated on its support-bar the lever-catch *w* will be alternately tilted by the wheels *u u*. When in either of its extreme positions such catch will bear 105 against the abutment *x* of one of the bars *F* while the carriage is being moved one way, and on the carriage being moved the other way the catch *w* will bear against the next adjacent end of the lever *y* of such bar *F*, and consequently will reciprocate or move in opposite directions 110 with it—the cam-bar immediately below such bar *F*. In advancing toward the abutment the lever-catch *w* passes over the lever *y*, which gives way and allows it to so pass, and next assumes, by the gravitating power of its superior arm, its normal position. While one 115 cam-bar may be at rest the other will be in movement, and will be moved first one way and next in the opposite direction, whereby one half the number of needles of each set will be moved twice to receive yarn and form loops 120 thereof during each reciprocation of a cam-bar, the other half of each of the sets of needles being similarly operated by the other cam-bar while being reciprocated. 125

The bar for supporting the work during advance of the needles is shown at *O*. It is hinged or pivoted to the base-bar, so as to be capable of being turned out away from the work as occasion may require. The said bar, 130 near its free end, has a hole to receive a stationary stud, *g'*, which aids in holding the bar in place.

In rear of the sets of needles is a horizontal

bar, T, which is pivoted to the frame-work, so as to be turned up directly in rear of the needles or down below them. From such bar an arm, *h'*, extends, and is jointed to a notched latch, *i'*, provided with a handle, *k'*, and arranged as represented. When the bar T is up in its highest position the latch catches upon the bar D, and thus serves to hold the bar T in such position. The object of the bar T is to hold the needles forward or from slipping backward while work is being removed from or being applied to them.

In explanation of the operation of the needles of each set in producing a fancy striped fabric, I would remark that straight stripes are made in the work by feeding to the needles yarns of two different colors, one colored yarn being fed to the needles while one cam-bar may be in movement, and the other colored yarn being fed to the needles while the other cam-bar may be in operation. Yarns of like color fed to the set of needles when the cam-bars may be in motion will produce cross-stripes of such color—that is to say, a stripe will be made while each yarn may be so fed, and when another or different-colored stripe becomes necessary another colored yarn is to be substituted for that used in making the first-mentioned stripe.

Persons skilled in the use of knitting-machines for knitting fancy fabrics will easily understand that the machine hereinbefore described may be used to great advantage in the production of fabrics checked or striped in different colors.

The carriage N is to be reciprocated by any suitable mechanism, such usually being a crank and a connecting-rod as are generally employed to operate the cam-bar of a common straight-knitting machine. As most, if not all, persons skilled in the art of knitting by machinery, particularly the class of knitting mechanism to which my invention appertains, well know that each set of needles must have its separate yarn-carrier, and that such is to be arranged, applied, and operated in the common and well-known ways, and as such yarn-carriers constitute no part of my invention, I have not deemed it necessary or proper to de-

scribe them in my specification, or to represent them in the drawings. Yet it may be stated that the yarn-carriers may be connected with and reciprocated by the cam-bars or by devices connected therewith or applied thereto.

What I claim as my invention is as follows:

1. The combination of two or more separate sets of latch-needles provided with studs arranged in each set, as set forth, with carriers for supporting and guiding such needles, and with two cam-bars provided with cams, as described, and with mechanism for alternately reciprocating each of such cam-bars across the separate series of needles, as explained, one of such cam-bars being at rest while the other may be in movement, and all being arranged and to operate substantially as specified.

2. The combination of two or more separate sets of latch-needles provided with studs arranged in each set, as set forth, with carriers for supporting and guiding such needles, carrier-sustaining shoes, arranged, supported, and provided with mechanism for adjusting them, as explained, and with two cam-bars provided with cams, and with mechanism, as specified, for alternately reciprocating such bars, all being to operate substantially as described.

3. The combination of the two alternately-reciprocating cam-bars, connecting mechanism between the cam-bars and carriage N, the said carriage and its support-bar M, the three rotary toothed wheels *u u v*, the shaft *s*, lever-catch *w*, pawl *b'*, abutments *x*, tripping-levers *y*, and the bars F, all adapted and to operate substantially as set forth.

4. The combination of the movable abutment or back bar, T, provided with means of moving it into and supporting it in each of its extreme positions, with two or more sets of latch-needles, (arranged in carriers and provided with studs, as set forth,) and with two cam-bars having cams, as described, and also having means, as explained, for alternately reciprocating such cam-bars across the needles, all being arranged and to operate substantially as specified.

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Witnesses:

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W. W. LUNT.