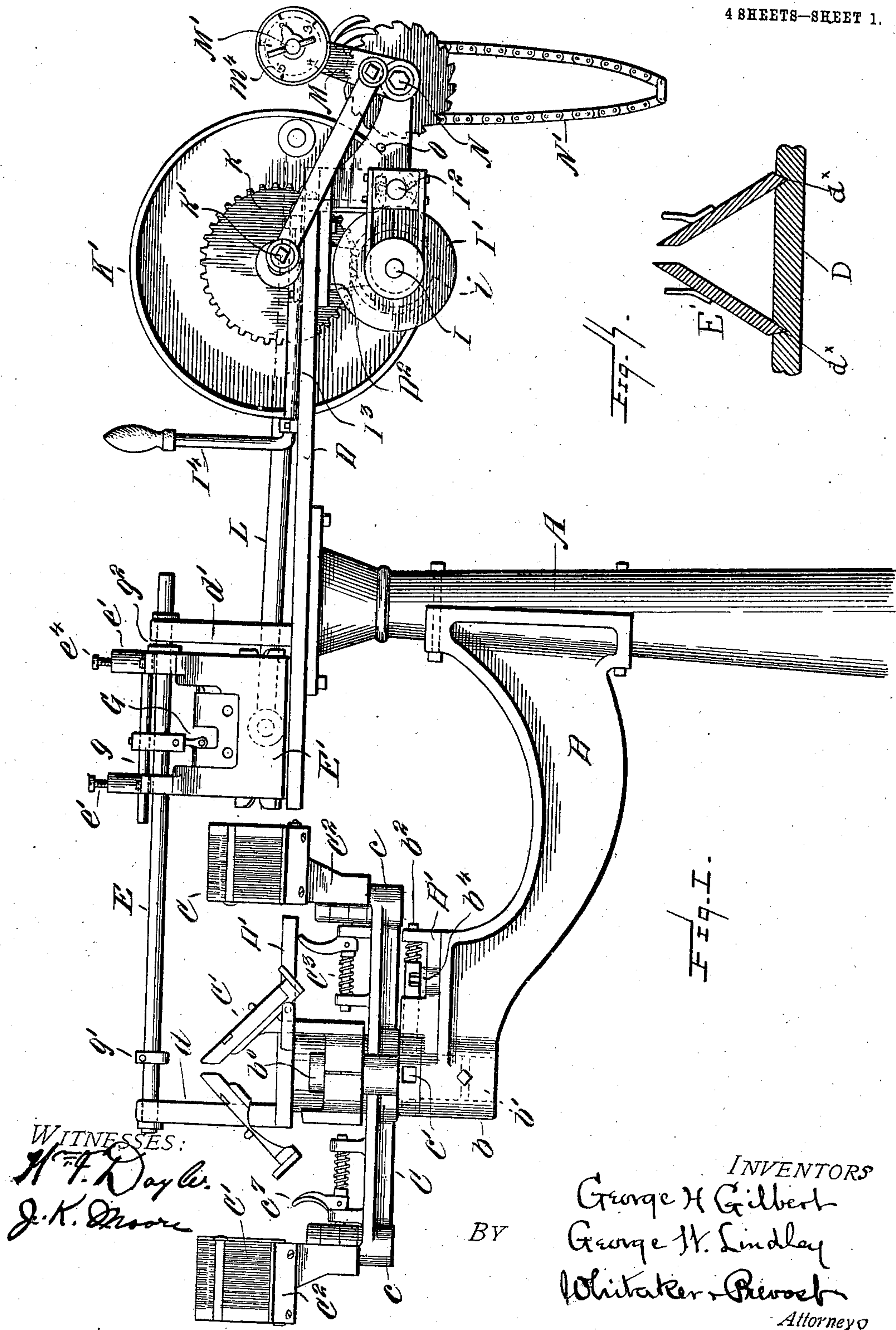


G. H. GILBERT & G. W. LINDLEY.
GLOVE FINGER KNITTING MACHINE.
APPLICATION FILED APR. 14, 1908.

996,015.

Patented June 20, 1911.

4 SHEETS—SHEET 1.



WITNESSES:

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J. K. Moore

BY

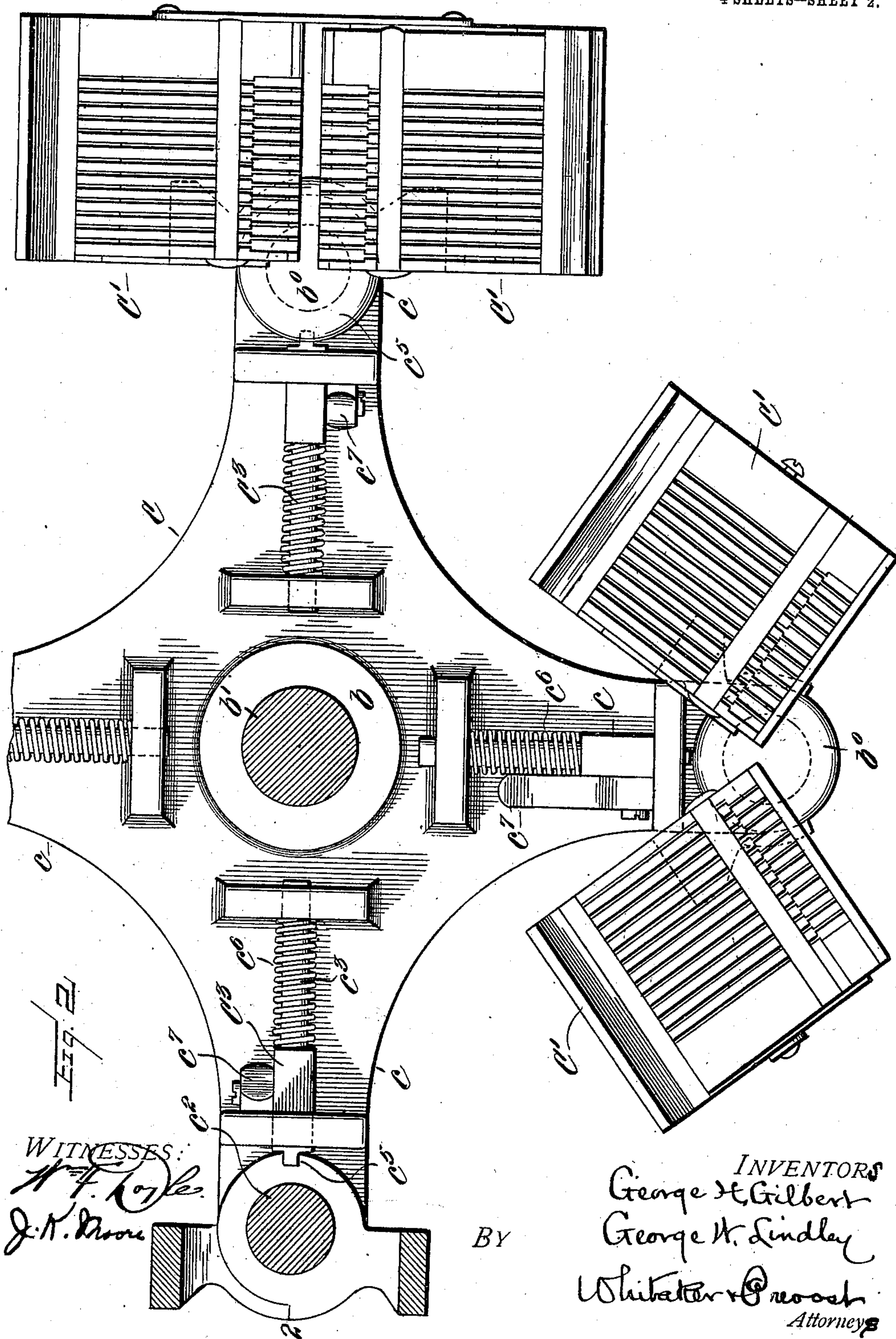
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4 SHEETS—SHEET 2.

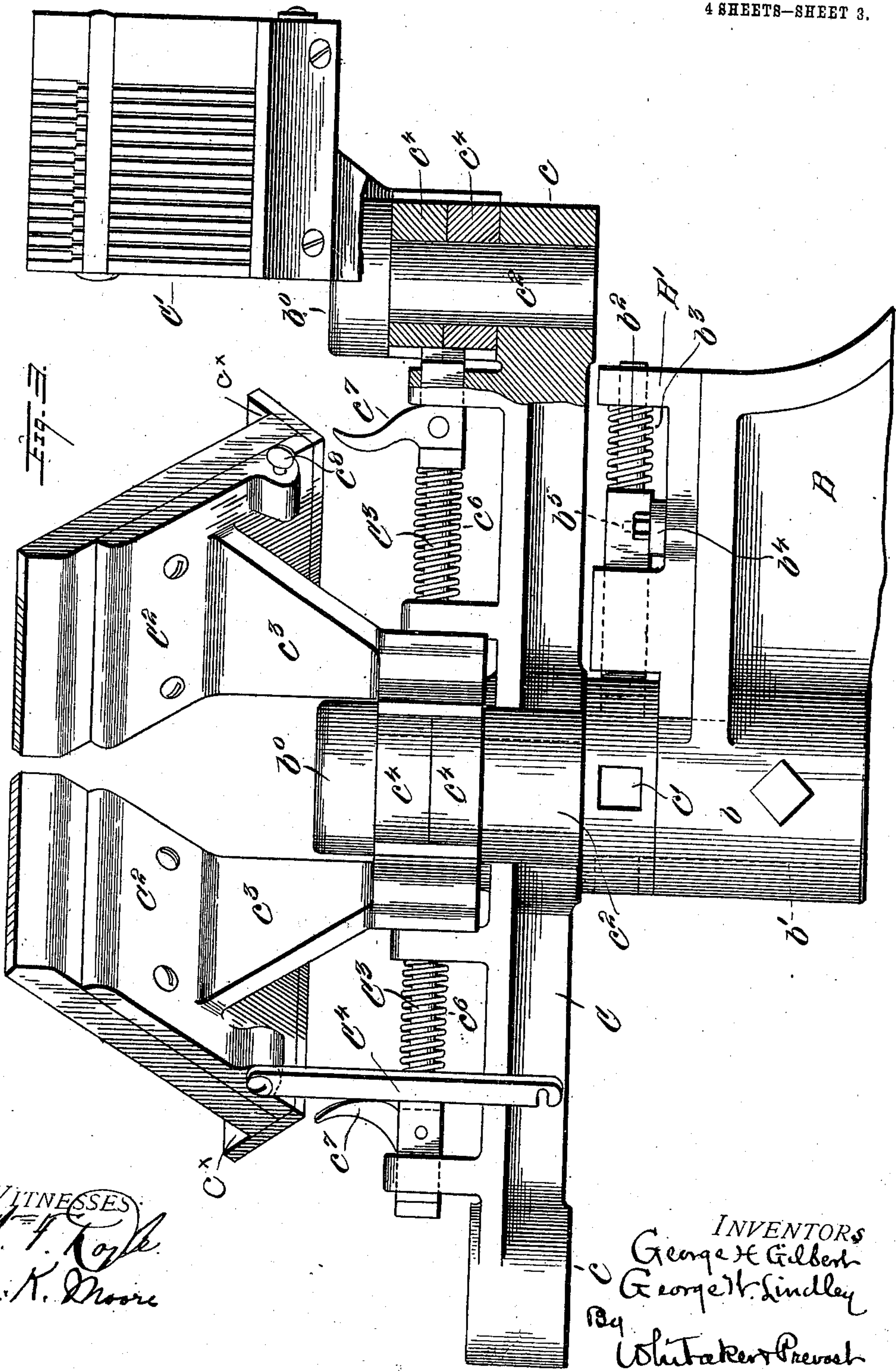


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4 SHEETS—SHEET 3.



WITNESSES
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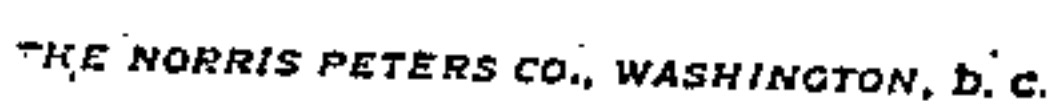
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APPLICATION FILED APR. 14, 1908.

4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

GEORGE H. GILBERT AND GEORGE W. LINDLEY, OF PHILADELPHIA, PENNSYLVANIA;
SAID LINDLEY ASSIGNOR TO JAMES LECKIE & SON COMPANY, OF CAMDEN, NEW
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GLOVE-FINGER-KNITTING MACHINE.

996,015.

Specification of Letters Patent. Patented June 20, 1911.

Application filed April 14, 1908. Serial No. 427,074.

To all whom it may concern:

Be it known that we, GEORGE H. GILBERT and GEORGE W. LINDLEY, citizens of the United States, residing at Germantown, in the city and county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Glove-Finger-Knitting Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our present invention is an improved device for knitting the fingers of knitted gloves.

The object of our invention is to provide a knitting machine whereby the previously knitted portion of the glove can be readily run upon the needles for knitting the fingers, and also combining therewith means whereby the machine is controlled to knit the fingers of the glove of the different lengths desired, and the proper length of each uniformly and automatically secured.

In the drawings we have shown one form in which we have contemplated embodying our invention and the same is disclosed in the following description and claims.

Figure 1 is a front side elevation of our machine. Fig. 2 is a top or plan view of the turn table carrying the finger knitting mechanisms, two of the needle beds of such mechanisms being shown. Fig. 3 is an enlarged view of the needle beds shown in Fig. 4, turned to position to have previously knitted web applied thereto. Fig. 4 is an underside view of the cam slide developed in a single plane. Fig. 5 is a sectional view of one of the friction devices for holding the thread guide in position. Fig. 6 is a vertical sectional view on the line of the pivoted knitting cam. Fig. 7 is a detail view showing grooves in the bed plate of the machine.

In these drawings A is a standard or support for the mechanical parts. To this standard or support is secured the arm B. At its upper end, this arm is provided with the boss *b* in which is rigidly secured a gudgeon *b'* shown in dotted lines in Fig. 1 and in the plan view in Fig. 2. On this gudgeon is journaled a spider C having four

arms *c, c, c, c*. On the outer end of one or more of the arms *c* is mounted a needle bed *C'* for carrying the desired number of needles for knitting the fingers of gloves. The spider has an upwardly extending boss or sleeve and on the upper end of the gudgeon or journal *b'* is rigidly secured the plate *D'*. This plate is a part of the bed plate of the machine and is in alinement with the main bed plate *D*. At the outer extremity of this plate *D'* is a standard *d* and on the bed plate *D* is a corresponding standard *d'*. These two standards support the rod *E* which supports the cam slide *E'* of the machine. The lower edges of the cam slide engage grooves or guides *d** in the main bed plate *D* and plate *D'* is provided with corresponding grooves to receive and guide the cam slide.

Between the inner end of the plate *D'* and the end of the main bed plate nearest the same is a space sufficient to permit such needle beds as are mounted on the spider to pass freely between the two. The needle beds are provided with depressions *c** corresponding with the grooves of the bed plate and form a part of the guide ways for the cam slide, when the needle bed is placed in alinement with the bed plate.

The spider *C* has a depending hub which rests upon the boss *b* and centrally beneath each arm *c* is provided with a recess *c'* to receive the locking bolt *b²*, movably mounted in a bracket *B'* secured to the bracket *B*. A spring *b³* is applied to the bolt *b²* tending at all times to force it toward the hub of the spider. The construction is such that when an arm *c* is brought into such a position that the longitudinal center of the arm is in alinement with the longitudinal center of the bed plate and the guiding depressions of the needle bed upon the arm of the spider, are in alinement with the guiding grooves of the bed plate, the bolt *b²* will be forced into the recess *c'* in the depending hub of the spider and lock it in that position. A lever *b⁴* is pivoted to the bracket *B'* and is provided with an upwardly extending pin *b⁵* engaging a recess or transverse groove in the lower side of the locking bolt *b²*. By moving this lever to withdraw the locking bolt from its recess in the hub of the spider,

the latter can at any time be given a quarter turn upon gudgeon b' .

The outer end of each of the arms c of the spider is formed as a boss and in one or more, preferably in each, is rigidly secured a gudgeon c^2 shown in dotted lines in Fig. 2. The needle beds are generically of the double inclined type well known and now used for knitting circular webs by the reciprocation of the cam slide. The needle beds are each secured to a bracket C^2 , see Fig. 3, which has an inwardly extending arm c^3 , the lower end and inner end of which is provided with a hub c^4 engaging the pin or gudgeon c^2 . These hubs are secured in any preferred manner, in this instance, by a collar b^0 . The hubs c^4 are of the form most clearly illustrated in Figs. 2 and 3. The hubs are placed upon the pin or gudgeon c^2 , one above the other, and each has a flange extending from the boss on which it rests to the collar b^0 . When the needle beds are in operative position these flanges meet as at 2, Fig. 2. On the opposite side of the hubs each is provided with a notch c^5 in vertical alinement, and this notch is engaged by the tongue of a locking bolt C^3 . This bolt is provided with a spring c^6 which tends to force the bolt toward the hubs. When this locking bolt engages these notches both parts of the needle bed are locked in position as shown at the right in Fig. 2. Each bolt is provided with a lever or projection c^7 by which it can be withdrawn from its locking position and the two needle beds can then be turned away from each other into the angular position approaching an alinement as shown at the bottom of Fig. 2.

The cam slide E' is made double to conform to the requirements of the needle beds and in this particular is of much the same general construction as other knitting machines of this type. On the underside it has, as shown in Fig. 4, two sets of cams, one for each needle bed of the pair employed for knitting a finger. The cams of each bed are constructed so as to operate the needles of its bed to take thread from the thread guide and knit a row of stitches when moved in one direction and to keep its needles from knitting on its return movement. In Fig. 4 in the series of cams shown at the bottom of the figure, f is a riser cam and F is the knitting or depressor cam. These cams effect knitting when the cam slide is moved in the direction of the arrow beneath the figure, the needles being raised to bring their latches above the loops on them and to take the thread by the riser cam f , and are depressed by the inclined side f' of the cam F . On the return movement the needles are depressed by the inclined side f^2 of the cam F and pass under the pivoted riser cam f without engaging the thread and knitting. The cams on the opposite side of the cam

slide, and shown at the top of the figure, are reversely arranged and effect knitting when the slide is moved in the direction of the arrows on each side of the slide.

On knitting the first course across the needle bed after the proper series of loops have been applied to the needles, the needles on the side on which knitting is to be done, are raised to carry their latches above the loops on them and are also depressed to cast off such loops and form a new loop, but on the other side, if the cams were all rigid the needles would be depressed. As each of such needles has a loop or equivalent, held in its hook the depression of the needles on the initial movement might, and in some instances would cause the breaking of the needles or the breaking or cutting of the material on them. This would very likely be the case had the needle when applying the previously knitted web been thrust through some bunchy or unyielding portion of the edge of the knitted fabric. In order to avoid such breakage the cams F are pivoted at f^3 and are held in operative position by the spring F' . The cam is pivoted at f^3 to a block F^3 recessed in the inner side of the slide and which is vertically adjustable to vary the length of the stitches, see Fig. 6. The part of the block below the upper end of the cam is reduced in thickness forming a shoulder against which the upper end of the cam contacts. This upper end of the cam is cut away at f^4 to permit the cam to swing upward somewhat on its pivot, the downward movement being limited by the outer side of the upper end of the cam coming in contact with the shoulder on the block F^3 .

The spring F' is of sufficient strength to maintain the cam in its operative position when the needles are knitting but will yield when subjected to any great increase of strain. In applying the previously knitted web to the needles the part forced down upon them engages the needles between their hooks and their latches.

On the knitting side of the slide, as before stated, the needles are raised to bring the latches above the portion of the web on them and on taking the thread will readily cast off as the closing of the latches will enable the needles to easily pass downward through the fabric on them. On the non-knitting slide on this first movement of the slide, the hooks engage with the material on the needles and offering a greater resistance than the knitting needles, the cam F swings upward preventing the breaking of the needles or of the material. The riser cam is also provided with a spring (not shown) of sufficient strength to return it to normal position after the needles have passed beneath it on the non-knitting movement in a usual and well known way.

The thread guide G is movably mounted on the rod E and is rigidly secured to a rod *g* which passes through openings in two housings *e'* secured to the slide E'. The housings contain each a block *e*², a spring *e*³ and a screw *e*⁴ for regulating the pressure upon the rod *g* to insure the proper amount of friction.

On the rod E are placed two collars *g'*, *g*² secured in position by set screws. These collars are so located in respect to the limit of the reciprocating movements of the cam slide, that when it is drawn to the position nearest the standard A, the rod *g* will engage one of said collars and be forced toward the other end of the slide in position to give the thread the proper lead to effect knitting by the cams that will be operative on the return movement. On reaching the opposite limit of movement, the rod *g* will engage the other collar and the guide will be shifted to the position for knitting with the cams of the opposite needle bed, the friction devices holding the rod *g* and the thread guide in the position to which they may be moved.

In brackets D² secured to the underside of the bed plate D, is mounted the power or driving shaft I. This shaft is provided with a gear *i* which meshes with a gear *k* on a counter shaft K. To this latter shaft is secured the crank disk K'. A pitman L connects the crank pin of said disk with the cam slide and gives the necessary reciprocating movement thereto.

The driving shaft I projects outwardly beyond the bed plate at the front of the machine and upon this part of the shaft is mounted a tapering disk *i*. Loosely mounted on the shaft in close juxtaposition to the disk *i* is the band pulley I' having a tapering recess to engage the disk and forming therewith a friction clutch. Mechanism is provided whereby an upwardly extending arm I⁴ may be moved to throw the two parts of the clutch together and put the knitting mechanism into operation. We also provide a means whereby the knitting mechanism will be stopped automatically when a finger has been fully knit. The time during which the knitting is continued is varied according to the length of the finger to be knitted. This means is controlled by the position of the shaft M'. An index disk *m*⁴ surrounds the shaft M' on the front side of the machine and a pointer is secured to the shaft. The index is marked with lines denoting the position that the shaft must assume in knitting each of the fingers or the thumb of the glove.

In operating the machine the operator is located at the front of the machine. Supposing that the machine is provided with four needle beds, the operator withdraws the locking bolt of the needle bed immedi-

ately in front of the operator and turns the beds outward to the position shown in Fig. 2 and applies thereto the knitted web of the hand for the knitting of the desired finger; the beds are then turned to normal position and the bolt C³ permitted to lock them. The bolt *b*² locking the spider is then withdrawn and the spider is given one quarter turn to bring the bed to which loops have been applied, into operative alinement between the bed plate D and plate D' and have the same locked in that position. The operator then turns shaft M' to bring the pointer to the mark indicating the length of finger desired and the arm I⁴ is drawn toward the front of the machine bringing the band pulley into frictional engagement with pulley I and putting the knitting mechanism in motion. The machine now knits the finger and during this interval of time the operator applies another knitted web to the needles of the needle bed immediately in front. When the machine has knitted the finger to the length determined by the controlling mechanism the machine stops. The spider is then turned to bring the needle bed to which a knitted web has been applied, into position and the operation is repeated.

It may sometimes be desirable to additionally secure the needle beds in operative relation after applying loops thereto. We have here shown a bar C⁴ for that purpose. This bar is pivoted at one end to one of the needle beds and at its opposite end is provided with a notch *c*⁷ which will engage the pin *c*⁸ on the opposite needle bed.

What we claim and desire to secure by Letters Patent is:—

1. In a knitting machine of the kind described, the combination with a cam slide and supporting and guiding means therefor, of a device pivoted to move in a plane parallel with that of the main bed plate of the machine, a needle bed mounted on said pivoted device, said pivoted device being adapted to be turned to bring the needle bed into and move it away from operative relation with the said cam slide.

2. In a knitting machine of the kind described, the combination with a cam slide and supporting and guiding means therefor, of a device pivoted to move in a plane parallel with the plane of the main bed plate of the machine, said pivoted device having provisions for supporting a plurality of needle bed plates, a plurality of needle bed plates, on said pivoted device, the said pivoted device being adapted to be moved to bring the said needle bed plates into operative position one after another.

3. In a knitting machine of the kind described, the combination with a cam slide and supporting and guiding devices therefor, of a device pivoted to move in a horizontal plane having provisions for support-

ing a plurality of needle bed plates thereon, a plurality of needle bed plates on said pivoted device, and means for locking said pivoted device from movement with any one of said needle bed plates in operative position.

4. In a knitting machine, the combination with a cam slide and supporting and guiding means therefor, of a pivoted spider, one or more needle beds mounted on said spider whereby said needle bed or beds may be moved into and out of operative position in relation to the said cam slide by a movement of said spider, substantially as described.

5. In a knitting machine, the combination with a plurality of double inclined needle beds, of a single double inclined cam slide, a pivoted device carrying said needle beds and adapted to be moved to bring said needle beds one at a time in position to have its needles actuated by said cam slide, and means for locking said pivoted device from movement with any one of its needle beds in operative position.

6. In a knitting machine, the combination with a spider pivoted to move in a plane parallel with the plane of the main bed plate of the machine, of a plurality of double inclined needle bed plates mounted on said spider, a double inclined cam slide for operating the needles of said bed plates, each needle plate of each pair of bed plates being pivoted on said spider and adapted to be turned on its pivot to bring the plates of a pair in substantial alinement and means for locking the said bed plates in operative position on said spider.

7. In a knitting machine for knitting the fingers of gloves, the combination with a pivoted spider, of double needle beds mounted on said spider, each part of said needle bed being pivotally mounted to permit said parts to be made to approach alinement to facilitate the placing of work on the needles of the beds, means for locking the beds in operative position on said spider and means for locking the spider with one of the needle

beds in operative position in the machine, substantially as described.

8. In a glove finger knitting machine, the combination with a cam slide, of a plurality of double needle beds movably mounted for permitting said needle beds to be moved one at a time into and out of operative relation to said cam slide, means when a needle bed is out of position permitting the two parts of the same to be moved to cause them to approach an alinement to facilitate the application of work to the needles of said beds, means for putting the knitting mechanism into operation and means for stopping the knitting mechanism when the desired length of finger has been knit whereby the operator is enabled to apply work to one needle bed while another is knitting, substantially as described.

9. In a machine for knitting the fingers of gloves, a cam slide having a vertically adjustable block, a depressing cam pivoted thereto and yieldingly held in operative position, substantially as described.

10. In a knitting machine, the combination with a spider pivoted to move in a plane parallel with the plane of the main bed plate of the machine, of double inclined needle bed plates pivoted upon said spider, whereby said bed plates may be turned into substantial alinement with each other, of a cam slide for operating the needles of one bed plate at a time, means for locking the bed plates of each pair in operative relation to each other and means for locking said spider from movement with any one of said double inclined bed plates in operative relation to said cam slide.

In testimony whereof we affix our signatures, in the presence of two witnesses.

GEORGE H. GILBERT.
GEORGE W. LINDLEY.

Witnesses:

CHARLES H. WEISS,
ZELIA WHITEMAN.