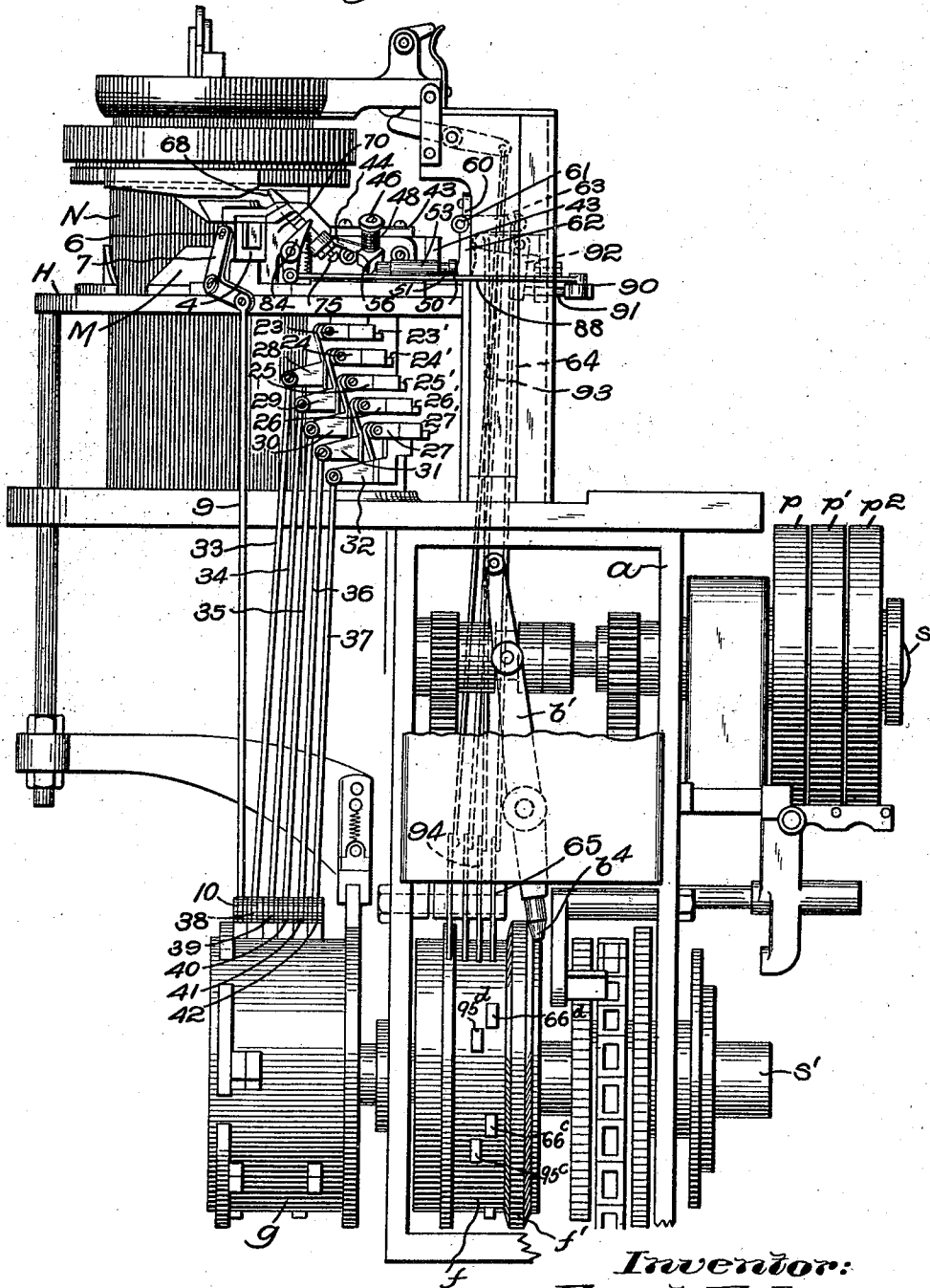


F. E. JONES.
GLOVE KNITTING MACHINE.
APPLICATION FILED JAN. 30, 1920.

1,428,332.

Patented Sept. 5, 1922.
6 SHEETS—SHEET 1.

Fig. 1.



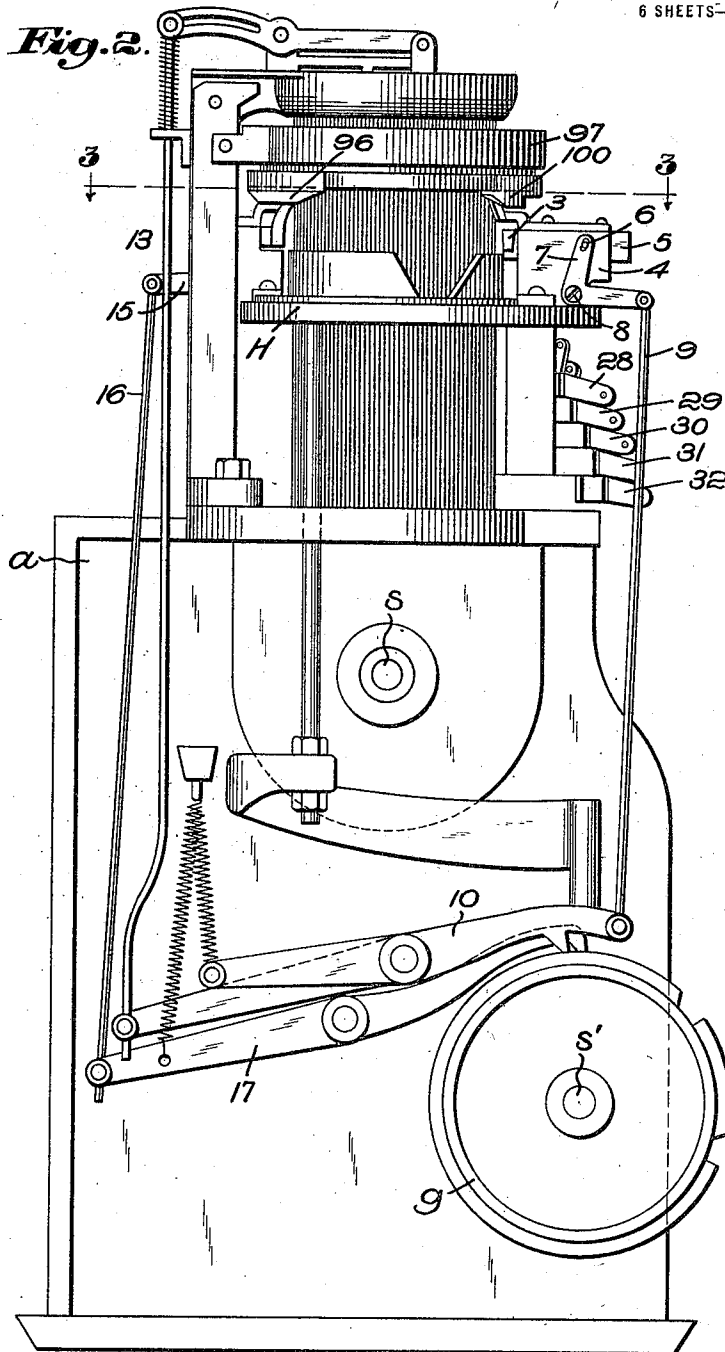
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6 SHEETS—SHEET 2.



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6 SHEETS—SHEET 3.

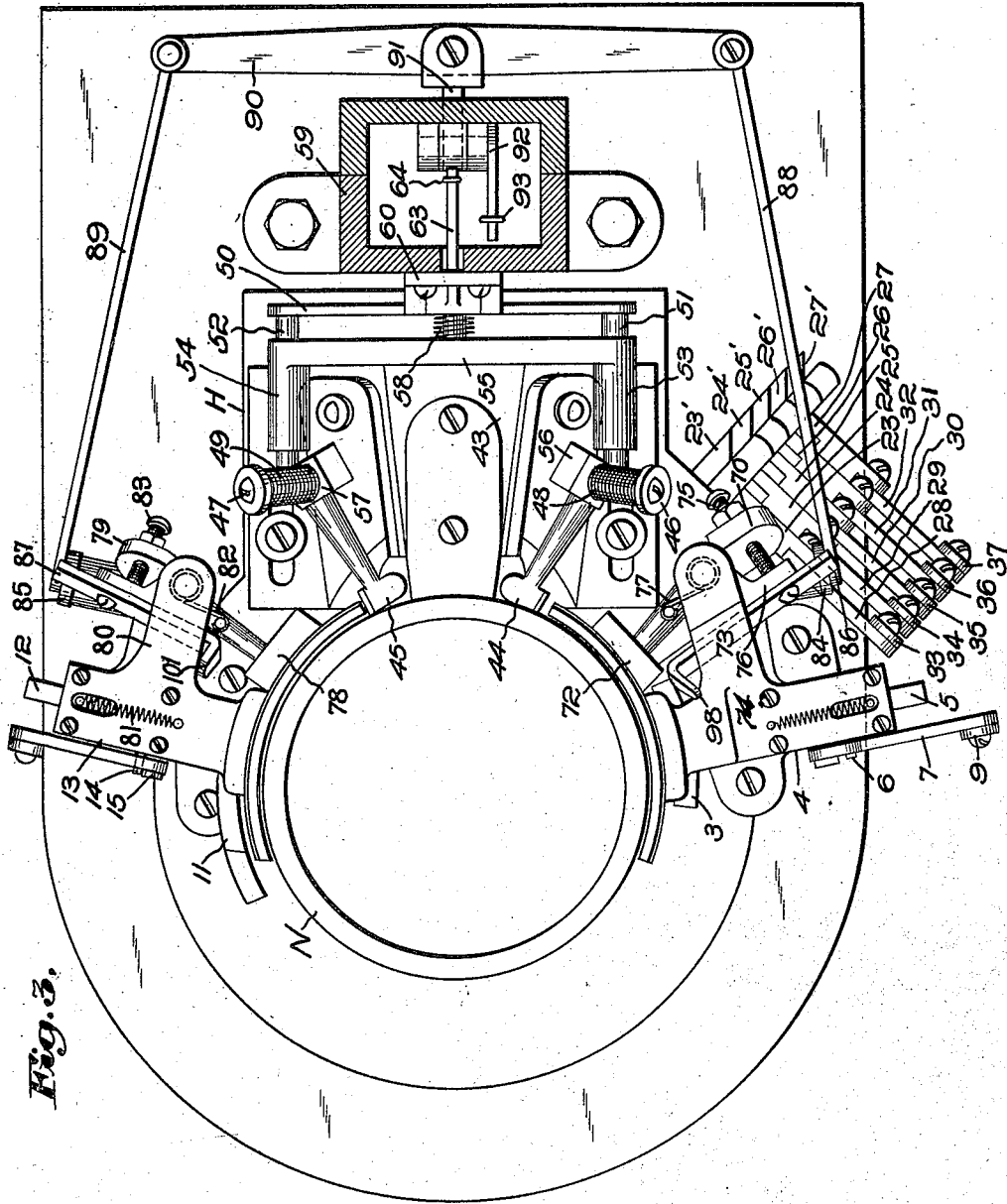


Fig. 3.

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1,428,332.

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6 SHEETS—SHEET 4.

Fig. 4.

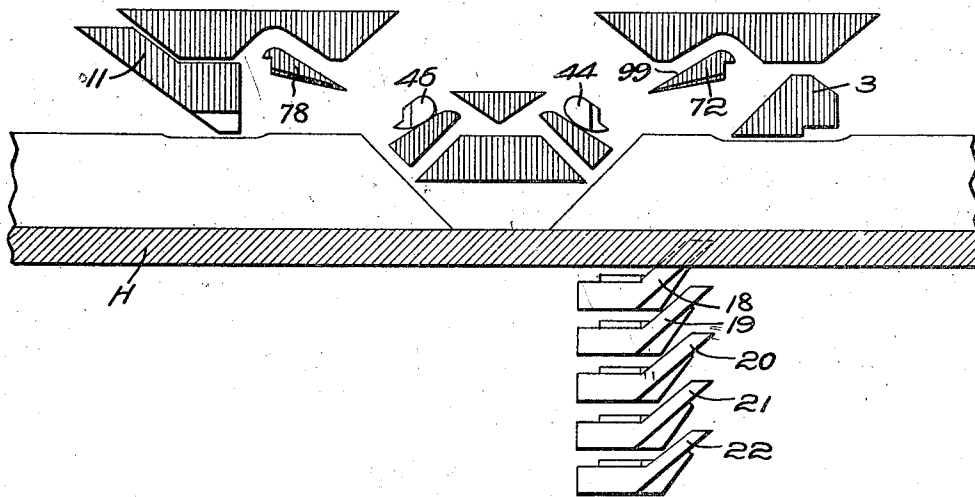
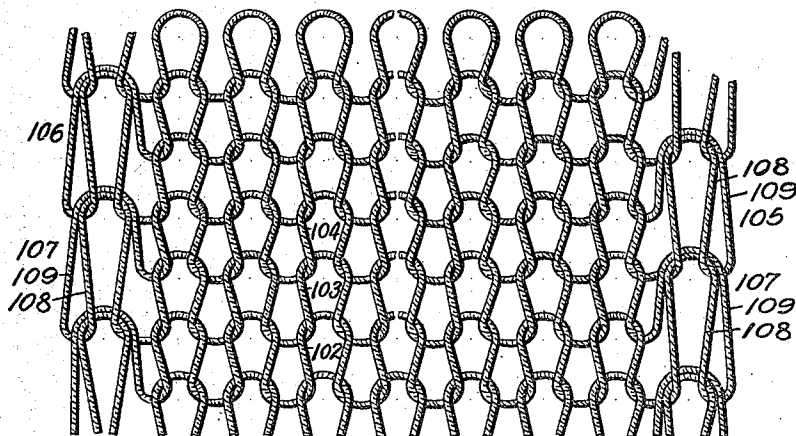


Fig. 5.



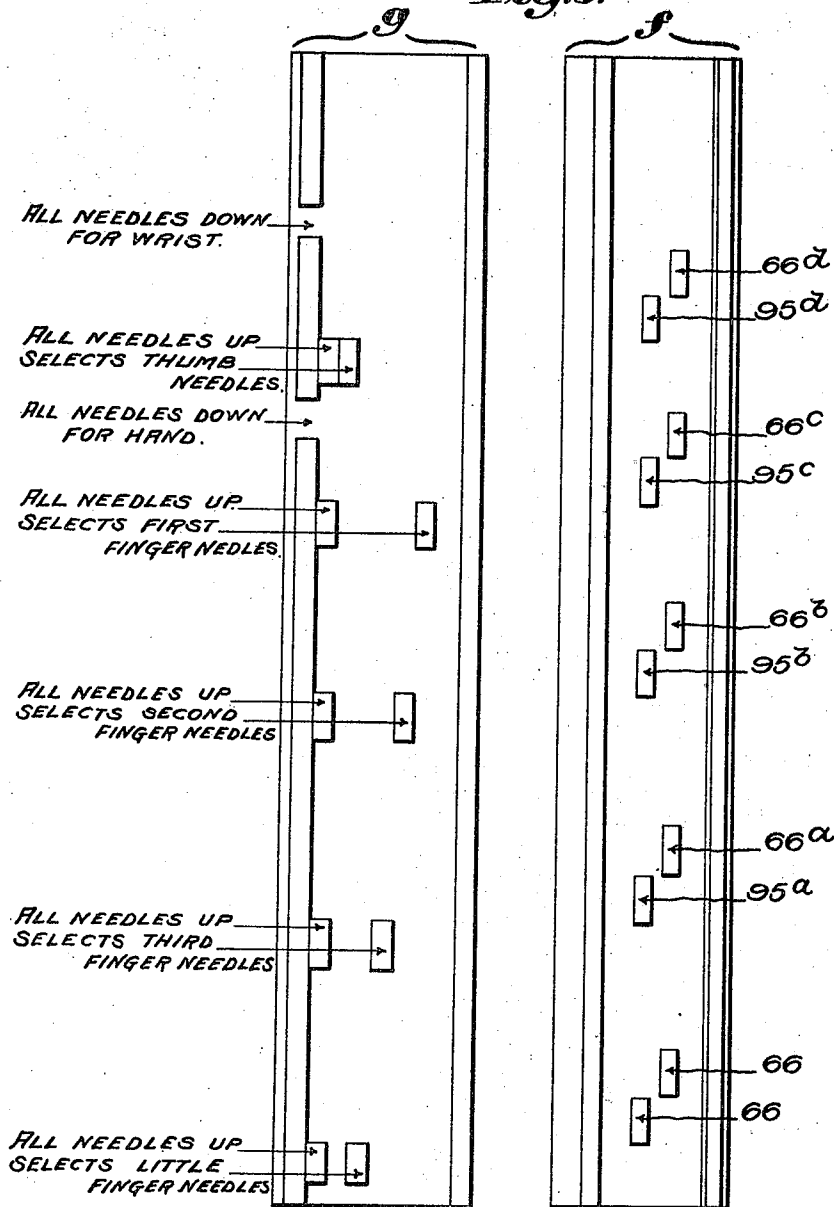
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1,428,332.

Patented Sept. 5, 1922.

8 SHEETS—SHEET 5.

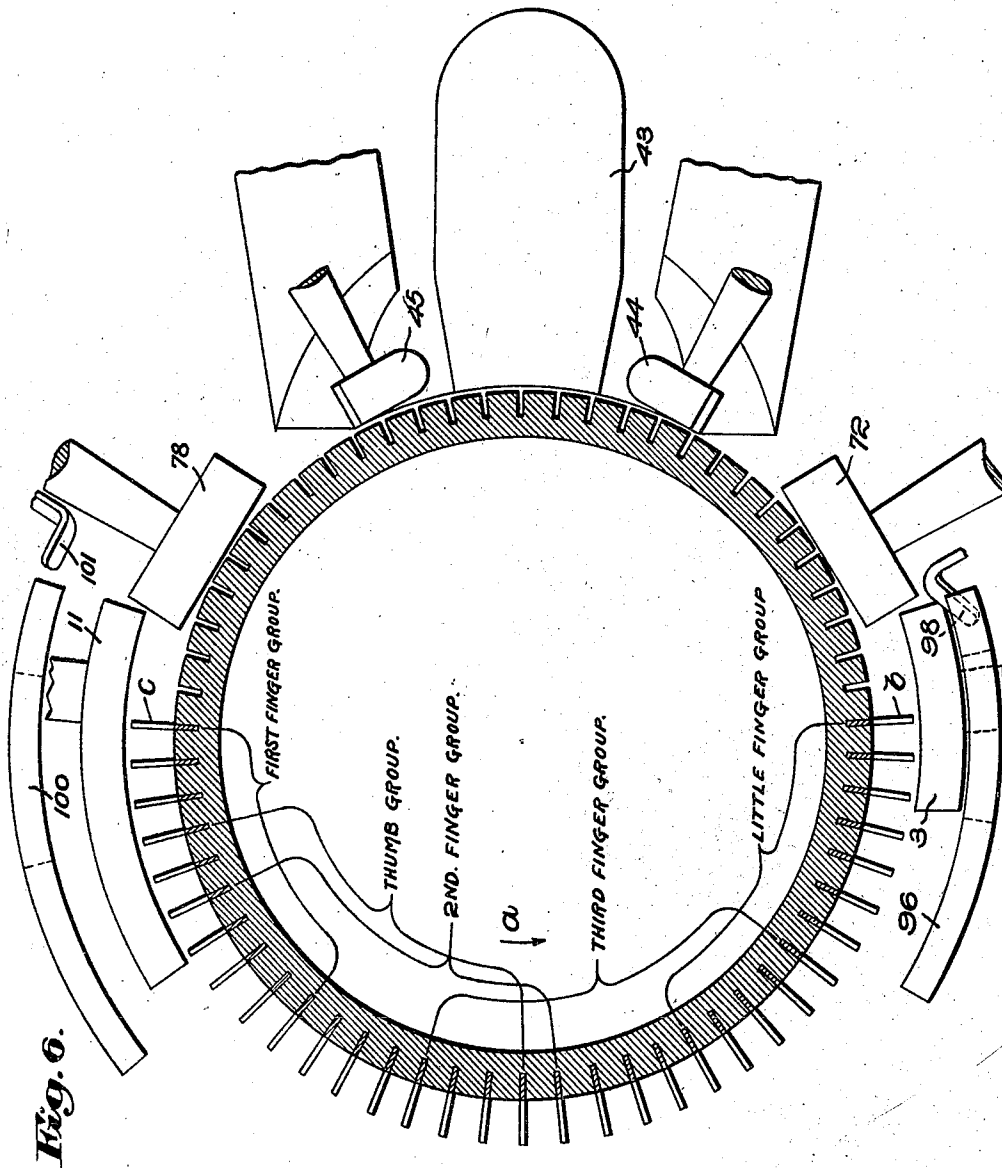
Fig. 5.



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Patented Sept. 5, 1922.
6 SHEETS—SHEET 6.



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UNITED STATES PATENT OFFICE.

FRANK E. JONES, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO HEMPHILL COMPANY, OF CENTRAL FALLS, RHODE ISLAND, A CORPORATION OF MASSACHUSETTS.

GLOVE-KNITTING MACHINE.

Application filed January 30, 1920. Serial No. 355,146.

To all whom it may concern:

Be it known that I, FRANK E. JONES, a citizen of the United States, and a resident of Pawtucket, in the county of Providence and State of Rhode Island, have invented an Improvement in Glove-Knitting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to knitting machines and more particularly to machines for knitting gloves or like articles composed wholly or in part of selvaged strips of fabric. The particular embodiment of the machine which I have elected merely for illustrative purposes to show in connection with the features of this invention, is a circular knitting machine wherein the needle cylinder and the cam ring are relatively reciprocated to form the hand, thumb and fingers of a glove blank, and the particular type of glove blank to which the present machine is especially adapted is that illustrated in the co-pending application of George P. Bosworth, Serial No. 262,645, filed Nov. 15, 1918, which shows a glove composed largely of selvaged strips. My invention, however, is in no wise limited in its application to use in connection with or for a glove of that type, but may be employed also in connection with other types of gloves or hand coverings composed wholly or in part of strips of fabric.

The present invention contemplates, in its broader aspect, the production of a machine for knitting gloves or like articles which are composed wholly or in part of strips of fabric having at their edges reinforcing loops or selvages.

Referring to the drawings:—

Fig. 1 is a front elevation of a knitting machine embodying my invention;

Fig. 2 is an end elevation of the same;

Fig. 3 is a horizontal section taken on the line 3—3 of Fig. 2;

Fig. 4 is a development of the knitting cams, non-knitting cams, needle-restoring cams and the narrowing and widening pickers preferably employed in the practice of my invention;

Fig. 5 is a diagram indicating the cams

upon the cam drums of the machine for controlling the operations of the various instrumentalities of the machine;

Fig. 6 is a diagram of the needles illustrating the relation of the various groups to the knitting cams, non-knitting cams and pickers; and

Fig. 7 is a diagrammatic plan view greatly enlarged of a section of one of the strips of fabric formed by the machine and illustrating the reinforcing groups or selvages peculiar to the present invention at opposite edges of said strips.

While, as already stated, my invention has been illustrated as embodying a knitting machine of the circular type wherein the needle cylinder and cam ring are relatively reciprocated, it is to be distinctly understood that within the purpose and scope of the invention other types of machines may be used, such as those known as straight knitting machines or of the type disclosed in the co-pending application of George P. Bosworth, Serial No. 233,301, filed May 8, 1918, wherein, in order that the proper needles may be acted upon by the knitting cams for the formation of the various strips or sections, means are provided for centering the particular group of needles to be acted upon by said knitting cams in cooperative relation therewith, this being accomplished in said application by angularly shifting the needle cylinder with relation to its actuating instrumentalities.

I have herein shown my invention as applied to that general class of circular knitting machines disclosed in the patent to Hemphill No. 933,443, dated Sept. 7, 1909, for circular, automatic, stocking machines, this type of machine being elected merely for convenience and which obviously is modified in various particulars to effect the knitting of a glove blank.

In view of the fact that the principal parts of the machine herein are substantially as shown in said Hemphill patent, I have, for convenience, designated such parts by the same reference characters as are employed in said patent. For instance, the machine frame is marked *a*, the rotative needle cylinder *N*, the non-rotatable cam car-

rier H, and the annular portion or ledge of said cam carrier is marked M. The pulleys for the driving belt are marked, respectively, p , p' , p'' in Fig. 1, and at s in Fig. 2 is indicated the main shaft on which said pulleys are mounted. The pattern shaft is indicated in Figs. 1 and 2 at s' ; f and g are the pattern or cam drums or barrels upon the said pattern shaft s' , and f' , is the pattern ring on the drum or barrel f which engages the member b^4 carried by the clutch shifting lever b' for the purpose of controlling the said lever, and in the disclosed embodiment of the invention for maintaining said lever in the position to produce reciprocating knitting throughout. The details of the mechanism controlled by the pattern ring f' through which the needle cylinder is reciprocated forward and backward for flat or reciprocating knitting, may be and preferably are the same as in said Hemphill Patent No. 933,443, and are unnecessary to be shown herein.

Although I shall describe in detail a machine embodying a movable needle cylinder and a stationary cam ring, it is obvious that the reverse mode of operation may be employed within the scope and purpose of this invention.

The machine in its present embodiment has a circularly arranged series of needles forming less than a complete circle, or, in other words, the needle carrier is not provided with its full capacity of needles, the number of needles employed herein being only sufficient to produce a strip the width of the front or back of the hand, these needles being all that are required for knitting integral with the front and back hand strip the several digit strips together with gussets intermediate the adjoining finger strips.

The form of glove blank which the machine herein shown and described is particularly arranged to produce is, as hereinbefore stated, substantially like that disclosed in the Bosworth application Serial No. 262,645, and consists of a strip of fabric including the front and back hand covering united by a plurality of digit strips substantially double the length of the fingers.

Assuming, therefore, that the knitting of said blank is to begin at the bottom of the wrist and, for example, at the back thereof, and assuming merely for simplicity of description that the wrist is of the full width of the hand, although it may, within the purpose and scope of the invention be fashioned by narrowing and widening in the knitting operation, it will be understood that in commencing the knitting all the needles that are used in knitting the hand at the front or back are in action and the knitting proceeds upon the usual knitting cams such, for example, as those shown in the said Hemphill Patent No. 933,443 for the forma-

tion by reciprocating knitting of the straight strip constituting the back of the hand.

Having reached the bases of the fingers, knitting proceeds upon the several finger strips, preferably one at a time, and in the order beginning with the little finger, although it will be obvious that said finger strips may be knitted in any other desired order or sequence, and by using a plurality of knitting cams, a plurality of said digit strips may be knitted simultaneously.

The knitting of said several strips may take place in the manner described in my co-pending application Serial No. 277,316, filed Feb. 15, 1919, wherein I provide as herein shown a needle throw-out cam 3, the operations whereof are not herein necessary more fully to be described. The said cam 3 is slidably mounted in a support 4 and has a stem 5 which is operatively connected to or acted upon by, as through a pin 6, a bell-crank lever 7 pivoted at 8 and connected, as shown in Fig. 2, with a rod 9, the lower end of which is pivotally connected to a lever 10 operatively associated with the pattern or cam drum g and controlled by suitable cams on said drum, as indicated in the diagram, Fig. 5.

After the completion of the four finger strips hereinafter described, I provide means for restoring to action all of the needles that are to be employed in knitting the front of the hand, or the back thereof if the knitting begin with the front. For this purpose I herein provide a needle-restoring cam 11 shown most clearly in Fig. 4. As herein shown, the cam 11 is provided with a stem 12 slidably mounted in a support 13 and having a pin 14 upon which acts a bell-crank lever 15 pivotally connected to an upright rod 16 which, in turn, is connected at its lower end to a lever 17 having its opposite end arranged in proximity with the pattern or cam drum g so as to be controlled by the proper cams thereon in a manner not necessary more fully to describe.

For selecting the proper groups of needles to form the several digit strips, means are provided which herein consist of five cams 18, 19, 20, 21 and 22, as shown most clearly in Fig. 4. These cams select, preferably through the proper butts upon needle jacks, those needles that are to be employed in knitting, respectively, the thumb and little finger, the third, the second and first fingers. When, as in the disclosed embodiment of the invention, the knitting begins at the bottom of the back of the wrist, the cams controlling the needles employed in knitting the fingers act before the cam 18 that controls the needles for knitting the thumb. Means are provided for controlling and operating said cams, which means herein embody five slides numbered, respectively, 23, 24, 25, 26 and 27, having wedge-shaped heads 23', 24', 130

25', 26' and 27'. The said slides are, respectively, pivotally connected to bell-crank levers 28, 29, 30, 31 and 32 which, as indicated most clearly in Figs. 1 and 3, are connected pivotally to upright rods 33, 34, 35, 36 and 37 extending downwardly to and pivotally connected to levers 38, 39, 40, 41 and 42 which extend into operative proximity to the cam or pattern drum *g* and are suitably controlled by cams thereon, as indicated in the diagram, Fig. 5.

The knitting cams, as indicated most clearly in Fig. 4, herein comprise four cams in a single group such, for example, as one of the groups of knitting cams in the Bosworth application Serial No. 263,284, filed Nov. 20, 1918. These cams are mounted upon a cam block 43 of any suitable type and herein carried by or supported upon the cam plate 8 in a manner generally similar to that shown in the said Hemphill Patent No. 933,443. Thus I provide a single knitting station at which all of the knitting is effected in the present disclosure of the invention.

In the manner described, or in any other suitable way, I provide means for bringing into action, or for maintaining in action, the desired needles for knitting the first digit strip. Following the knitting thereof, the other digit strips are produced in the desired order or sequence, said strips being of suitable width and length to provide coverings for the various fingers of the hand.

Means may be provided to fashion in and by the knitting operation each of said digit strips, and especially at the tips thereof, which means may be and preferably are, in so far as the narrowing operations are concerned, similar to those disclosed and broadly claimed in the patent to John Lawson No. 1,401,712, dated December 27, 1921 and which are herein represented as two narrowing pickers 44, 45 indicated most clearly in Fig. 3, the term "narrowing pickers" applying generally to devices rendered operative by engagement with said needles to automatically withdraw said needles from action and which pickers may be mounted at any suitable part of the mechanism but are herein shown as pivotally mounted upon inclined posts 46, 47 upon the cam block 43, coil springs 48 and 49 being provided tending to throw said pickers down into action. Said pickers may be of any suitable construction, as, for example, the general type of narrowing pickers shown in the said Hemphill Patent No. 933,443. The said narrowing pickers may be operated in a manner not herein necessary more fully to describe to throw out or withdraw from action while retaining its loop preferably a single needle at each end of a movement of reciprocation of the needle cylinder or reciprocating part. This action automatically continues until

the narrowing has been effected to the desired extent. Obviously the narrowing may be of any suitable character and extent. It may occur upon consecutive reciprocations or movements of the needle cylinder, or, if desired, it may occur only upon selected reciprocations. If, as preferably desired, a picker acts to throw out a needle at each end of a movement of reciprocation of the needle cylinder, it may be possible in a fine gage machine to provide as many as forty-six needles for the widest digit strip, say the thumb strip, and continue the narrowing until fifteen needles are thrown out on each side, thus leaving in action sixteen needles for the tip of the digit strip. These numbers, however, are given for illustration merely, and may widely vary in different strips and in different gages of machines.

There are times when it is desirable to withdraw the narrowing pickers from action and to hold them in such positions, and while any suitable means may be employed for this purpose, I have herein represented a strip or bar 50 horizontally positioned in the rear of the cam block 43 and having plunger-like members 51, 52 extending inward therefrom at right angles through suitable sockets 53, 54 in a frame 55. At their ends said members 51, 52 impinge against the body or pivotal portions 56, 57 of said pickers so as to swing said pickers upwardly into the inactive position thereof. A spring 58 shown most clearly in Fig. 3 tends to move said strip or bar 50 outward toward the supporting post 59 projecting upward from the frame of the machine. Thus when the plunger-like members 51, 52 are moved outward or toward the post 59, the narrowing pickers 44, 45 are brought into action.

I may provide any suitable means for acting upon and causing to operate the said means for rendering the narrowing pickers active. For this purpose I have herein represented the post 59 as having secured thereto a bracket 60 upon which is pivoted at 61 a suitable bell-crank lever, one arm 62 of which impinges against the outer side of the bar or strip 50. The said bell-crank lever is provided with a second arm 63 which, as shown most clearly in Figs. 1 and 3, is suitably connected to an upright rod 64, to the lower end whereof is suitably connected a lever 65 extending into operative relation to the cam or pattern drum *f* so as to be controlled by suitable cams thereon and which are indicated in the diagram, Fig. 5, by a vertical row of cams 66.

It will be noted, viewing Fig. 5, that the cam drum *f* is provided with a suitable series of cams vertically in line with the cam 66 and indicated at 66^a, 66^b, 66^c, 66^d, for suitably controlling the movements of the narrowing pickers during the formation of

the various strips of the glove, and more particularly to withdraw said pickers during the widening operations, respectively, for the tip of the third finger, the second 5 finger, the first finger and the thumb, said pickers at substantially all other times being in operation for the purpose hereinafter more fully described.

Having described one form or embodiment of means whereby the thumb and 10 finger strips may be and are narrowed in the knitting operation, I will now proceed to describe one form of means whereby I complete the fashioning of the thumb and 15 finger strips by correspondingly widening said strips. This I preferably effect by providing picker means, although I am not limited to the employment of such means and may provide any suitable means or instrumentalities for throwing needles into or out 20 of operation either singly or in groups of two or more at a time. However, to that end I herein provide a single widening picker that is a device arranged automatically to control 25 restoration of the needles that have been withdrawn by said narrowing pickers and in a reverse order to that in which such needles were withdrawn.

In the disclosed embodiment of the invention I have represented two pickers, one of 30 which controls the widening for one side of each of said digit strips and the other of which controls the widening for the opposite sides of said strips. These pickers may 35 be operated in any suitable manner as, for example, from the cam drum *f* or the cam drum *g*, but preferably I provide separate means for controlling said picking means which will be hereinafter more fully described. 40

In order to produce a neat and durable glove, it is desirable that the selvage edges of the various strips composing the blanks of the glove be even and relatively stronger 45 than the regular fabric of the strip in order to adequately support the stitches of the seams formed by uniting adjacent edges of said strips.

The present invention contemplates as 50 one of its functions the production of such selvaged or reinforced edges, and in the carrying out of the same I herein employ picker means and preferably the same picker means to which I have previously referred in connection with the formation of 55 the fashioned finger tips. The picker means which I use for this purpose include the narrowing pickers 44 and 45 hereinbefore described, and in addition the two widening pickers previously referred to as part of the 60 equipment for narrowing and widening or fashioning the finger tips, and said widening pickers are preferably located adjacent to and upon opposite sides of the knitting 65 cam block 43 and as close thereto as pos-

sible, and as the position wherein it is desired to place said pickers is substantially the same as that occupied by the cams 3 and 11 hereinbefore referred to, I have herein 70 combined in one the supports for said cams 3 and 11 and the pickers corresponding thereto. For instance, extending laterally from the bracket or support 4 of the cam 3 is an arm 70, as shown most clearly in Figs. 1 and 3, in the outer end of which is mounted, 75 and upon a suitably inclined stud 71, a picker 72. A projecting arm 73 extends laterally from the cap plate 74 provided to retain the slide 5 within the support 4, and engages the upper face of said picker 72 to 80 maintain the same upon its pivot and co-operates with the extension 70 to properly support said picker. An adjusting screw 75 is arranged in said arm 70 to engage an extension 76 of said picker whereby the upward 85 limit of movement of said picker may be varied. A spring 77 arranged above said picker is adapted normally to maintain the extension 76 thereof in contact with the adjustable stop screw 75. 90

In a similar manner a widening picker 78 is mounted upon the support 13 for the cam 11. That is, said picker is pivotally supported between an extension 79 of the cam 95 slide support 13 and an extension 80 of the cap plate 81 for said support. A spring 82 normally maintains said picker 78 in engagement with an adjustable abutment or screw 83, thus properly to position the operative end of said picker in the path of the 100 needle butts.

Where widening pickers are employed merely for fashioning the ends of the fingers, such pickers are normally retracted or withheld from their operative positions, 105 but in the present case where the same pickers are used to fashion portions of the strips and to form a selvage at each edge of the strip of fabric that is being knitted, it is desirable that said widening pickers 110 as well as said narrowing pickers be continuously in operation except at certain periods during the fashioning of the tips of said fingers. For instance, during the narrowing operation, the narrowing pickers only will 115 be in operation, the widening pickers at this time being withdrawn, and this condition will exist until the narrowing has been completed, when said narrowing pickers will be withdrawn from action and the widening 120 pickers which were withheld during said operation will be restored to action and the widening continue until the finger tip has been completed. The mechanism for withdrawing the narrowing pickers from operation at the proper time has heretofore been 125 fully described, and these operations are effected at the proper times in the operation of the machine, as when the tips of the thumb and the four fingers of the glove are 130

to be fashioned by means herein consisting of the cams 66, 66^a, 66^b, 66^c, 66^d.

To effect the withdrawal of the widening pickers 72 and 78 suitable means are provided herein consisting of levers 84 and 85 mounted, respectively, upon the arms 70 and 79 and arranged to engage portions 86 and 87 extending rearwardly from the pickers 72 and 78. Pivotaly attached to said levers 84 and 85 are connecting rods 88 and 89 adapted to pivotaly engage opposite ends of a draw bar 90 in turn attached to a plunger 91 slidably mounted in the supporting post 59. Mounted within the post 59 is a bell-crank lever 92, one arm of which engages the inner end of the plunger 91, while the opposite arm of said lever has attached thereto a wire or rod 93 extending downwardly and into engagement with a cam lever 94 similar to the usual yarn guide operating levers of said Hemphill Patent No. 933,443, said lever 94 being arranged to engage suitable cams 95, 95^a, 95^b, 95^c and 95^d arranged at suitable distance apart upon the periphery of the cam drum *f*, as clearly shown in Fig. 5. The springs 77 and 82 are arranged to normally maintain the levers 94 in contact with the periphery of the cam *f*.

The operations of the narrowing and widening pickers are substantially the same as in said Hemphill patent and unnecessary herein more fully to be described.

To form the selvages hereinbefore referred to during the reciprocatory movements of the needle cylinder, the knitting butt of the first needle of the series to approach the knitting cams, provided the needles are in their lower, operative position, will engage the first narrowing picker, or the one that is at that time upon the fore side of the knitting cams and be raised thereby to the upper or idle level, and this needle will remain in said upper position during the completion of that movement of said cylinder in the direction mentioned. The result of the raising of said needle is to prevent its passing through the knitting cams and receiving a new yarn and the casting off of the loop previously formed thereon, but instead, said needle will retain the loop previously formed thereon and as it passes by the usual yarn feeding instrumentalities, it being the first needle in the series, the yarn will be laid partially around the shank of said needle and thus form a partial loop thereon adjacent to the complete loop previously formed upon said needle, and these loops will remain upon said needle until said needle has started upon its return movement, during which movement said widening picker will act to cause said needle to be lowered to its operative position, and as said needle again approaches said knitting cams, the knitting butt thereof

will pass through said cams and effect the casting off of said complete and partial loops and the formation thereon of a new loop. During the latter movement of said needle cylinder the knitting butt of the first needle in the series of the restored group will engage the narrowing picker on the fore side of the knitting cams and be raised thereby to the upper or idle level, and as said needle passes the knitting cams and the yarn guide therefor, it will likewise receive a partial loop and carry said partial loop together with the complete loop previously formed thereon past its widening picker, and upon the return movement of the needle cylinder said needle with said complete and partial loops thereon will be moved to its lower position in order that it may be actuated by the knitting cams in the usual manner to effect the casting off of said partial and complete loops and the formation upon said needle of a new loop. These operations take place upon opposite sides of each strip that is being knitted upon the machine to form a selvage or reinforced edge thereon, such as I have described in my Patent No. 1,413,537 dated April 18, 1922.

During the formation of said selvaged strip, it is desirable that the widening pickers should engage only the needle that has just been elevated by its corresponding narrowing picker, but at the time said widening picker is to operate upon such a needle it may be that substantially all of the needles of the cylinder are in their elevated positions. Consequently, unless means are provided for actuating said widening pickers the very first of the elevated needles will be lowered. For instance, in Fig. 6 wherein is shown a plan view of the needle cylinder with the various groups of needles indicated in brackets and suitably designated, it will be noted that the needles do not extend entirely around the cylinder and consequently were all of the said needles raised to their uppermost positions and the needle cylinder were to be moved in the direction of the arrow *a*, the knitting butt of the first needle, as represented at *b*, would, in passing the widening picker 72, engage said picker and be lowered thereby. This, however, is not the needle that should be lowered.

At this time, assuming that all of the needles have been raised by the cam 3 to their elevated positions, and one group of said needles is to be restored to action by its proper group-selecting cam to knit its digit strip, and that the group to be thus operated is the second group of the series and marked "third finger group" in Fig. 6, the butts of the needles of said group will engage the cam provided therefor, in the present instance the cam 20 (see Fig. 4), which will have been moved into the proper

position to engage said butts, and these needles will be depressed by said cam. The first needle of said third finger group will be the needle that is to be raised by the narrowing picker 44 in the manner hereinbefore described, and this needle will be carried over the knitting cam and will pass around to or beyond the widening picker 78 which cooperates with said narrowing picker 44, the movements of the needle cylinder being sufficient in either direction to carry all of the needles of the several groups past said widening pickers 78 and 72.

During the operation thus described, it will be evident that with the first needle *b* in its upper position, the butt thereof will, unless means are provided to prevent, engage the picker 72 and be moved thereby to its lowered position where it will be functioned by the knitting cams. To prevent this taking place, a cam 96 has been provided, said cam being suitably formed and secured to the under side of the web holder ring 97 of the usual well known type and secured to the upper portion of the needle cylinder 21 so as to revolve with said needle cylinder. The construction of said ring and the manner of maintaining the same may be and substantially is the same as that disclosed in said Hemphill Patent No. 933,443, and therefore unnecessary more fully to be described.

The cam 96 is constructed and arranged to cooperate with a finger 98 attached to the picker 72 and extending upward therefrom into the path of said cam 96, which cam is arranged in such relation to the first needle *b* of the series of needles of the needle cylinder, as to cause said picker 72 to be depressed at the proper time to escape contact with the butt of said needle *b*. The cam 96 is, however, adapted only to engage said picker 72 and to depress the same just long enough to clear said first needle *b*, but upon the release of said picker by said cam the upper surface 99 thereof see Fig. 4 will engage the butts of the needles following the needle *b* and be held in its depressed position until all of the needles of the series have passed, assuming, of course, that there are no gaps in the series of needles due to certain groups thereof being depressed, but that all of the needles are in their elevated or idle positions, which is assumed to be the proper arrangement of said needles during the first movement of the needle cylinder in the direction of the arrow *a* prior to the knitting of any of the strips thereof. This movement of the needle cylinder may, if desired, be the movement whereby the proper group of needles is restored to operative position, but such restoration does not take place until after said needles have passed the picker 72.

Having passed the picker 72 which re-

mains in its depressed position until the needle *c* at the end of the series has cleared, and assuming that at this time the proper group-selecting cam 20 has been moved into a position to engage the butts of the needles of said third finger group, said needles will be depressed by said cam before the butts thereof reach the narrowing picker 44, the group of cams containing said cam 20 being herein placed immediately in advance of said narrowing picker.

When the first needle of said restored third finger group reaches the picker 44, it will be elevated thereby, as hereinbefore described, the remaining needles passing through and being functioned by the knitting cams. The entire group of needles will be moved by the needle cylinder past said knitting cams and beyond the picker 78 on the opposite side of said knitting cams from the first narrowing picker 44, but all except the restored group of needles will pass by said cam without being actuated thereby.

It is desirable to provide adjacent to the last needle of said series, namely, the needle *c*, a cam similar to the cam 96, to operate the picker 78 so that said needle *c* will not be depressed upon the subsequent return or reverse movement of the needle cylinder. For this purpose, a cam 100 has been provided, said cam being attached to the under side of the web-holder ring 97 but out of circumferential alignment with the cam 96, so as not to engage the finger 98 of the picker 72 during the rotation of the ring 97.

The cam 100 is arranged to engage a finger 101 attached to the picker 78, but in such a position that it will not engage the cam 96.

By reason of the cam 100 and the finger of its picker, the needle *c* which is the first of the series of needles to pass said picker on the return movement of the cylinder, that is, on the movement thereof in the opposite direction to that indicated by the arrow *a*, will not be depressed thereby, but instead the picker 78 will be depressed and remain so depressed until the gap in the series of needles, produced by the restoration of the third finger group, aligns with said picker, whereupon said picker will be permitted to return through said gap to its upper operative position in readiness to engage the butt of the needle of said third finger group which was elevated during the prior movement of the needle cylinder by the narrowing picker 44, and as said picker is adapted only to receive one needle butt, continued movement of said needle cylinder will cause said needle to be depressed or restored to action so as to be functioned by the knitting cams in the manner hereinbefore described. Upon the release of said picker 78 by said needle, said picker will be permitted to move upwardly until the upper surface

thereof engages the under edges of the butts of the remaining needles of the series, whereupon said picker will be retained in its slightly depressed position by said butts until the last needle, namely, the needle *b*, has passed thereby, whereupon the actuating spring of said picker will cause the same to return to its normal operating position in readiness for similar subsequent operations.

Although I have referred to the third finger group as being the group depressed or restored to action, I have done so merely for convenience and to more clearly illustrate the advantages of the cams 96 and 100. It will, however, be obvious that each individual finger group will be restored to action by its group-restoring cam and the above operations repeated, these operations taking place in any desired sequence or as hereinbefore described. It will, likewise, be obvious that during the knitting of the front and back hand strips wherein all of the needles of the series are employed, at which time all of said needles will be in their restored or lower positions, that the needles *b* and *c* will be actuated by the narrowing and widening pickers just as are the end needles of the various finger groups. For instance, with all of the needles in their lowermost positions, and assuming that the cylinder is moved in the direction of the arrow *a*, the needle *b* will pass below the widening picker 72 and engage the narrowing picker 44 to be raised thereby to its upper or idle position, thereby escaping the knitting cams to enable it to retain its previously formed loop and receive in addition thereto a partially formed loop by the laying around said needle of the yarn from the yarn guide. This needle passes around and beyond the picker 78, but upon the return movement thereof said needle *b* will engage said picker 78 and be depressed to its lower position, thus causing the same to pass through and be functioned by the knitting cams to receive and form a new loop and to cast off the complete and partially formed loops thereon. In like manner the needle *c* upon the reverse movement of the needle cylinder will be actuated by the narrowing picker 45 and the widening picker 72.

The cam drums *f* and *g* from which the various mechanisms hereinbefore described receive their motion, are secured to the pattern shaft *s'* to which motion may be and preferably is imparted in the manner characteristic of said Hemphill Patent No. 933,443, and therefore unnecessary herein more fully to be described.

As hereinbefore stated the machine constituting this invention is particularly adapted to knit selvaged strips of fabric, such, for instance, as that illustrated in

fabric of the picker and needle manipulations above described.

In said Fig. 7, 102, 103, 104, etc., indicate courses of knitting representing alternate movements of the needle cylinder. These courses are herein knitted from one continuous yarn which is so manipulated by said picking up and down of the end needles of the group upon which said strip is knit, as to form at opposite sides of the fabric the selvages 105, 106 substantially the same in construction and consisting of inter-engaged units 107 each having a complete loop 108 and a partial loop 109, both of which loops are approximately twice the length of the regular loops of the fabric, and these loops inter-engage with the similar loops of the next unit formed at the same side of the strip.

While I have herein shown and described for illustrative purposes one embodiment of my invention, and have disclosed and described in detail the construction and arrangement incidental to such disclosures, it is to be distinctly understood that the invention is limited neither to the mere details or relative arrangement of parts, nor to the specific applications shown, but that numerous substitutions and alterations may be made without departing from the principles thereof.

Claims:

1. In a glove knitting machine, means to knit by a main knitting thread a strip of fabric by reciprocating knitting, and means to form by said main knitting thread reinforcing loops along the edges of said strip, each of said reinforcing loops being respectively knitted with the loop that it reinforces into the same loop of an immediately preceding course.

2. In a glove knitting machine, means to knit a plurality of digit strips by reciprocating knitting, and means co-operating therewith to form a series of reinforcing loops of the main knitting thread along opposite edges of said strips, each of said reinforcing loops being respectively knitted with the loop that it reinforces into the same loop of an immediately preceding course.

3. A knitting machine having a series of needles, means to knit by the same knitting thread upon selected groups of said needles strips of fabric constituting portions of a glove, and means including needle withdrawing and needle restoring pickers to form selvages along the edges of said strips.

4. A knitting machine having a series of needles, means to knit by the same knitting thread upon selected groups of said needles strips of fabric constituting hand and digit coverings of a glove, fashioning means, and means including said fashioning means to form selvages along the edges of the hand and digit portions of said strips.

5. A knitting machine having a series of needles, means to knit upon selected groups of said needles strips of fabric constituting portions of a glove, and means including two sets of needles withdrawing and needle restoring pickers to respectively form selvages at opposite edges of said strips.

6. A knitting machine having means to knit the hand covering of a glove, means to knit as integral continuations of said hand covering and at the same knitting station a plurality of digit strips, and means including pickers to form selvages at opposite edges of said strips.

7. A circular knitting machine having means to effect the knitting of a strip of fabric, and means to effect the formation at opposite edges of said strip of selvages consisting of a series of inter-engaged loops approximating twice the length of the regular loops of said strip.

8. A knitting machine having means to effect the knitting of a parallel sided strip of fabric, and picker means to form selvages at opposite edges of said parallel sided strip.

9. A knitting machine having means to effect the knitting of a strip of fabric constituting the hand and digit coverings of a glove, and picker means to effect the formation at opposite edges of said strip of selvages composed of inter-engaged loops approximating twice the length of the regular loops of said strip.

10. A knitting machine having a series of needles, adapted to be reciprocated, means to effect knitting upon said needles of a strip of fabric, and means to function the terminal needles of said series to effect the formation of inter-engaged reinforcing loops of the main knitting thread at opposite edges of said strip, each of said reinforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

11. A knitting machine having means to effect the knitting of a strip of fabric, and means to form selvages at opposite edges of said strip, each of said selvages consisting of a series of inter-engaged reinforcing loops of the main knitting thread, each of said strip, each of said selvages consisting of knitted with the loop that it reenforces into the same loop of an immediately preceding course.

12. A knitting machine having means to effect the knitting of a strip of fabric, and means to form selvages at opposite edges of said strip, each of said selvages consisting of double inter-engaged loop approximating twice the length of the loops of said fabric.

13. A knitting machine having means to effect the knitting of a strip of fabric, and means to form selvages at opposite edges of said strip, said selvages consisting of double inter-engaged loop approximating twice the

length of the loops of said strip and formed from the yarn composing the loops of said fabric.

14. A knitting machine having a series of needles, means to knit a parallel sided strip of fabric upon said needles, pickers, means to effect coaction between said pickers and predetermined of said needles to knit selvages along opposite edges of said parallel sided strip, and means to function said pickers in the fashioning of portions of said fabric.

15. A knitting machine having instrumentalities to knit a strip of fabric, pickers adapted to cooperate to form selvages at opposite edges of said strip, means to withdraw certain of said pickers to effect the narrowing of said strip by the remaining pickers, and means to withdraw said remaining pickers to effect the widening of said strip by the first withdrawn pickers.

16. A knitting machine having a series of needles, knitting cams, adapted upon a relative reciprocatory motion between said needles and said cams to knit a strip of fabric, means to effect co-action between selected groups of said needles and said knitting cams to knit parallel sided strips of fabric, and picker means to act upon opposite end needles of said selected groups to knit selvages along the edges of said parallel sided strips.

17. A glove knitting machine having means to knit a plurality of integral parallel sided strips constituting hand and digit coverings, picker means to cooperate with said strip knitting means to knit selvages at opposite edges of said parallel sided strips, and means to actuate said picker means to fashion said digit strips.

18. A knitting machine having a series of needles, knitting cams to function said needles in the knitting of strips of fabric, pickers, means to withdraw all of said needles from co-action with said cams, means to restore selected groups of said needles, and means to prevent co-action between the withdrawn end needles of said series and certain of said pickers.

19. A knitting machine having a series of needles, knitting cams to function said needles in the knitting of strips of fabric, needle withdrawing and restoring pickers to co-act with said needles to form selvages at opposite edges of said strips, means to withdraw said needles from co-acting with said knitting cams, means to restore selected groups of said needles, and cams arranged adjacent to and movable with the end needles of said series to prevent co-action between said end needles and said restoring pickers, respectively.

20. In a glove knitting machine, an incomplete circular series of needles, knitting cams to function said needles in the knitting

of a strip or strips of fabric, means including pickers to co-act with certain of said needles to form selvages at opposite edges of said strip or strips, and cams movable with said needles to prevent co-action between the end needles of said series and said pickers at certain times in the operations of the machine.

21. A knitting machine having an incomplete circular series of needles, a set of knitting cams, a pair of needle withdrawing pickers at opposite sides of said knitting cams, needle restoring pickers arranged adjacent to and adapted to cooperate, respectively, with said needle withdrawing pickers to form selvage edges along opposite sides of said strip, needle withdrawal and needle restoring cams, a common supporting means for said needle withdrawing cam and one of said needle restoring pickers, and a common support for said needle restoring cams and the other of said needle restoring pickers.

22. A knitting machine having an incomplete circular series of needles, a revoluble carrier therefor, means to effect the knitting of a strip upon said needles, a pair of cams mounted upon said carrier at different distances from the axis thereof, means including pickers to effect the formation of selvages along the edges of said strips, and means to effect co-action, respectively, between said pickers and said cams to prevent the engagement of said pickers with the end needles of said series.

23. A knitting machine having a series of needles, means to function said needles in the knitting of a strip, means including pickers to effect the formation of selvages at opposite sides of said strip, individual picker-withdrawal means to prevent co-action between each picker and an end needle of said series, and means simultaneously to withdraw said pickers from co-acting with said needles.

24. In a glove knitting machine, two pairs of narrowing and widening pickers, one pair of each of said two pairs being fashioning pickers and the others being selvage forming pickers, means to render said narrowing pickers inoperative, means to separately withdraw said widening pickers, and means to effect the simultaneous withdrawal of said widening pickers.

25. In a glove knitting machine, means to knit digit strips, means including two sets of pickers to form selvages at opposite sides of said strips, and means also including said pickers to fashion the tips of said digit strips.

26. A knitting machine having means to knit from the same knitting thread a plurality of strips constituting hand and digit coverings, picker means to cooperate with said strip knitting means to knit selvages at

opposite edges of said strips, and means to actuate the picker means employed in forming said selvages to fashion said digit strips.

27. A knitting machine having a series of needles, knitting cams, adapted upon a relatively reciprocatory motion between said needles and said cams to knit a strip of fabric, means to effect coaction between selected groups of said needles and said knitting cams to knit strips of fabric at the same knitting station, and means to function opposite end needles of said selected groups during reciprocatory movements of said groups to knit selvages along the edges of said strips.

28. In a glove or hand covering knitting machine, means to knit a strip of fabric by reciprocating knitting, and means to form along the edges of said strip by the thread used in knitting said strip of fabric, reinforcing loops, each of said reenforcing loops being respectively knitted with the loop it reenforces into the same loop of a preceding course.

29. In a knitting machine, means to knit a strip of fabric by reciprocating knitting, and means to form reinforcing loops along the edges of said strips, by the thread used in knitting said strip, each of said reenforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

30. In a glove or like knitting machine, means to knit a plurality of digit strips by reciprocating knitting, and picker means cooperating therewith to form a series of reinforcing loops along opposite edges of said strip, each of said reenforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

31. In a gloove knitting machine, means to knit by a main knitting thread a strip of fabric by reciprocating knitting, and means to form by said main knitting thread reinforcing loops along at least one of the edges of said strip, each of said reenforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

32. In a glove knitting machine, means to knit a plurality of digit strips by reciprocating knitting, and means cooperating therewith to form a series of reinforcing loops of the main knitting thread along at least one of the edges of said strips, each of said reenforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

33. In a glove or hand covering knitting machine, means to knit a strip of fabric by reciprocating knitting, and means to form by the thread used in knitting said strip of fabric, reinforcing loops along at least one

of the edges of said strip, each of said reinforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

5 34. In a knitting machine, means to knit a strip of fabric by reciprocating knitting, and means to form reinforcing loops along at least one of the edges of said strip, by the thread used in knitting said strip, each of
10 said reinforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

35. In a glove or like knitting machine,
15 means to knit a plurality of digit strips by reciprocating knitting, and picker means co-operating therewith to form a series of reinforcing loops along at least one of the edges of said strip, each of said reinforcing
20 loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

36. A knitting machine having a series of needles, means to knit at the same knitting
25 station upon selected groups of said needles, strips of fabric constituting hand and digit coverings of a glove, picker means, and

means including said picker means to form selvages along at least one of the edges of said strips.

37. A knitting machine having a series of needles adapted to be reciprocated, means to effect knitting upon said needles, of a strip of fabric, and means to function the terminal needles of said series to effect the formation of interengaged reinforcing loops of the main knitting thread at at least one of the edges of said strip, each of said reinforcing loops being respectively knitted with the loop that it reenforces into the same loop of
40 an immediately preceding course.

38. A knitting machine having means to effect the strip of fabric, and means to form a selvage at at least one of the edges of said strip, such selvage or selvages consisting of a series of interengaged reinforcing loops of the main knitting thread, each of said reinforcing loops being respectively knitted with the loop that it reenforces into the same loop of an immediately preceding course.

In testimony whereof, I have signed my name to this specification.

FRANK E. JONES.