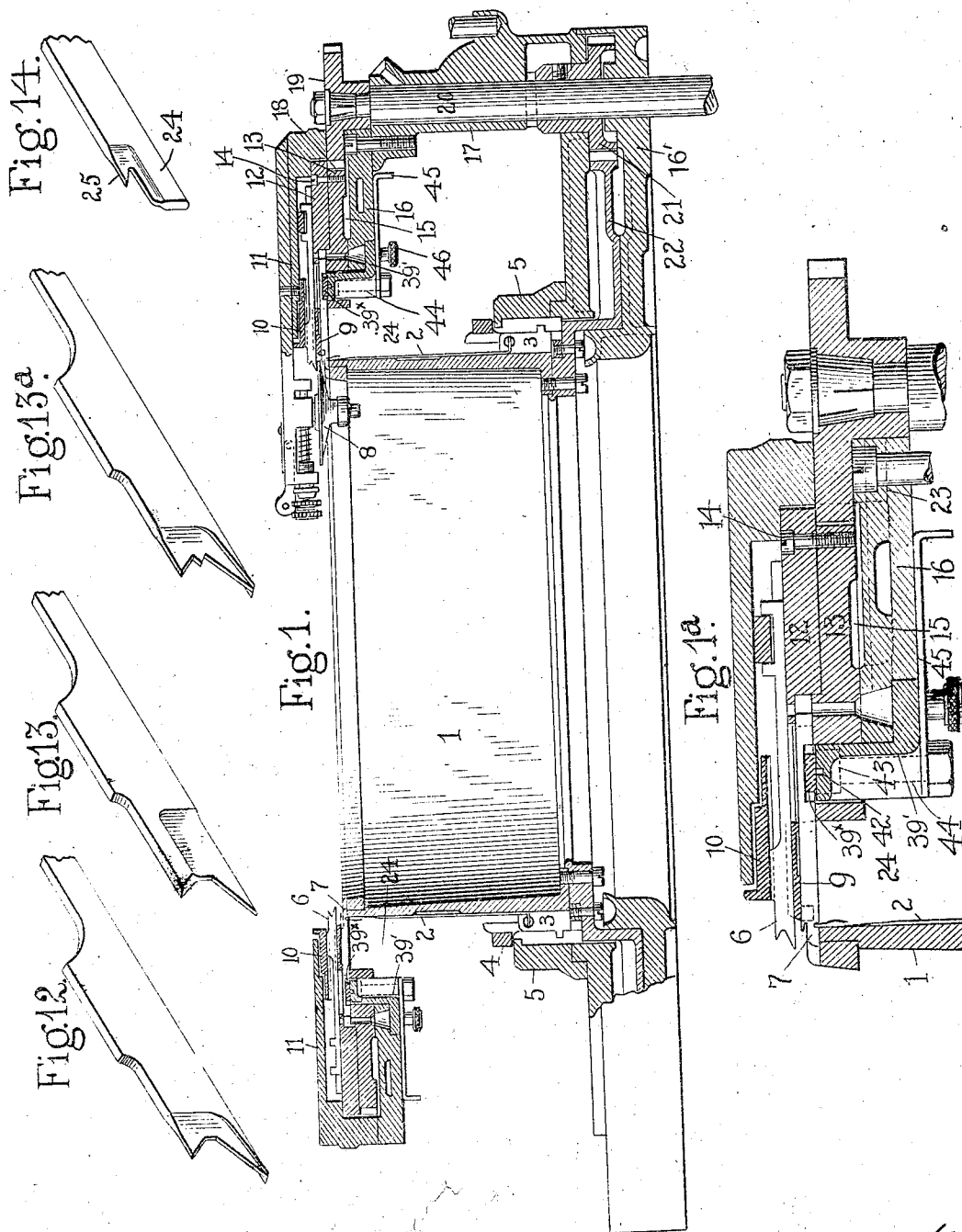


F. WILCOMB.  
KNITTING MACHINE.  
APPLICATION FILED FEB. 16, 1909.

Patented Sept. 16, 1913.

3 SHEETS—SHEET 1.

1,073,309.



Witnesses.  
Ewa L. Tolson.  
Bert M. Stahl.

Inventor  
Frank Wilcomb  
By Spear, Middleton, Donaldson & Co.  
Attys

Patented Sept. 16, 1913.

3 SHEETS—SHEET 2.

1,073,309.

Fig. 15.

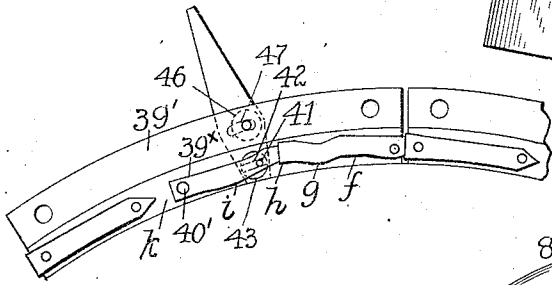


Fig. 2.

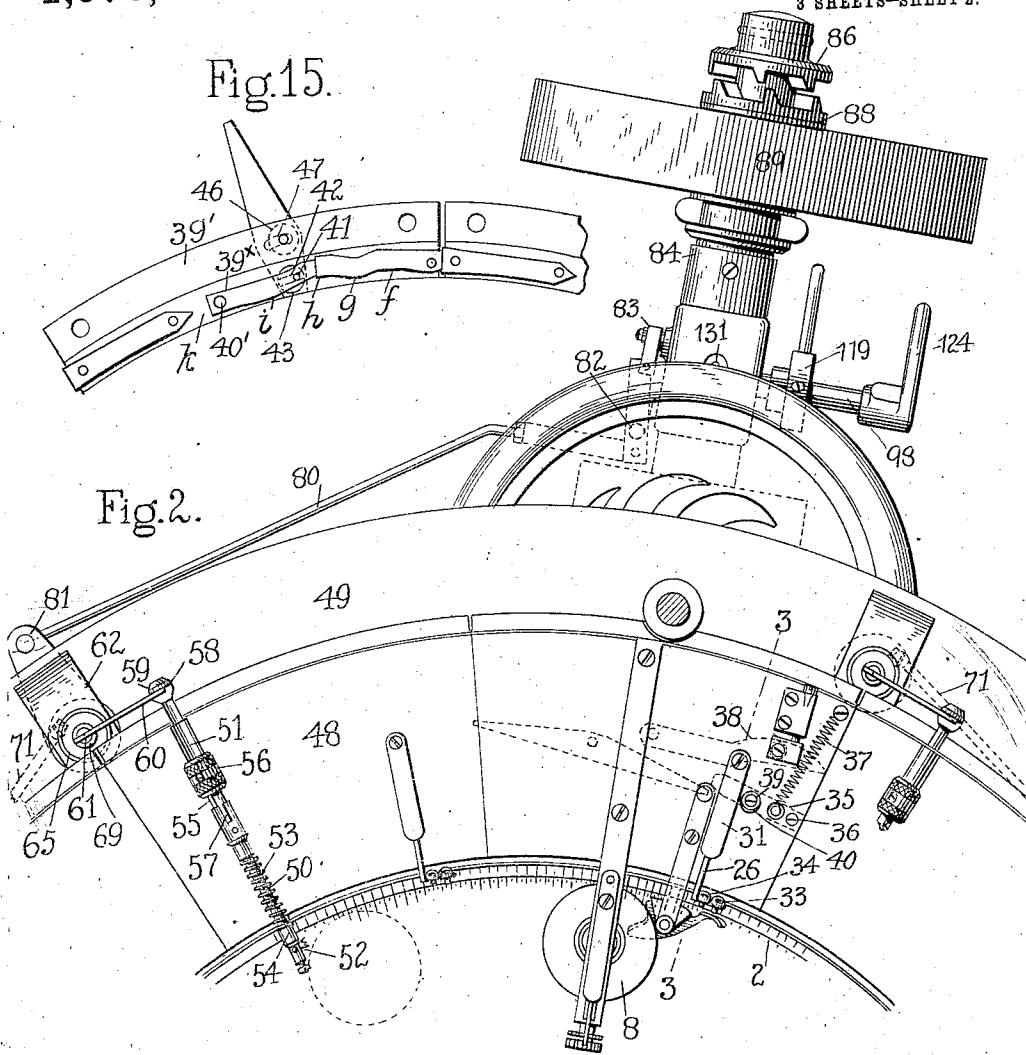
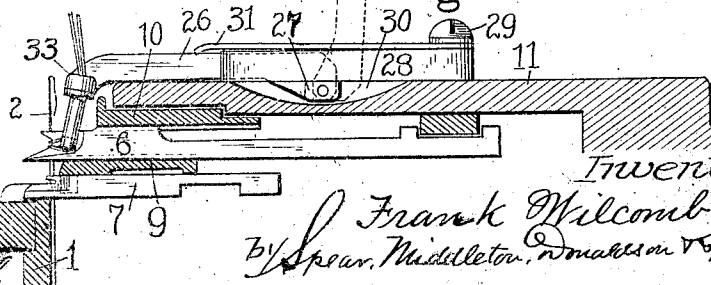


Fig. 3.



Attest  
E. A. Tolson  
Ben. McNeill

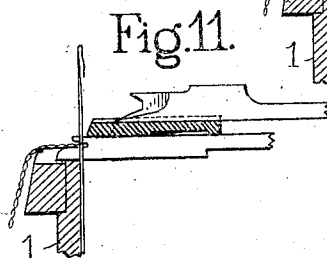
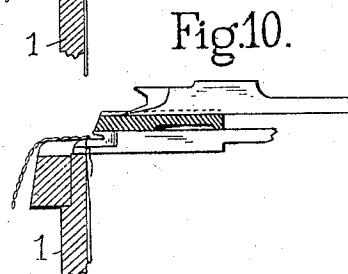
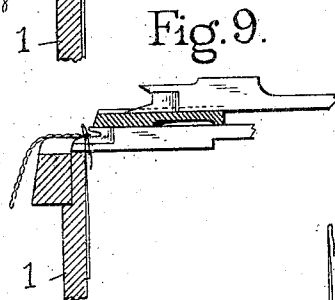
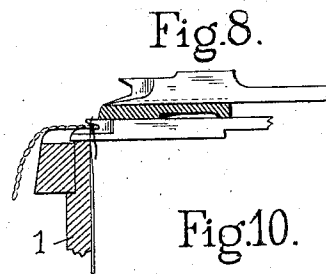
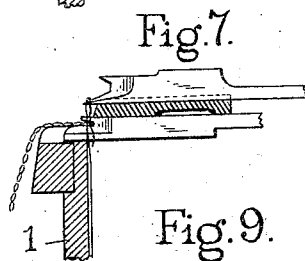
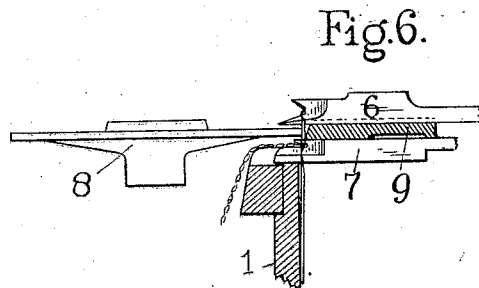
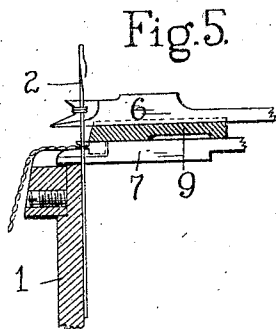
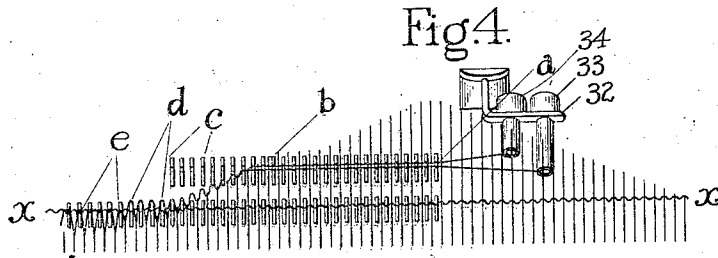
Inventor  
Frank Wilcomb  
by Spear, Middleton, & Mason

F. WILCOMB.  
KNITTING MACHINE.  
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3 SHEETS—SHEET 3.



Attest  
Ewd. A. Tolson.  
Bent M. Stahl.

Inventor  
Frank Wilcomb  
by Spear, Middleton, Donaldson & Spear  
ATTYS.

# UNITED STATES PATENT OFFICE.

FRANK WILCOMB, OF NORRISTOWN, PENNSYLVANIA, ASSIGNOR TO WILCOMB MACHINE COMPANY, OF NORRISTOWN, PENNSYLVANIA.

## KNITTING-MACHINE.

1,073,309.

Specification of Letters Patent.

Patented Sept. 16, 1913.

Application filed February 16, 1909. Serial No. 478,180.

To all whom it may concern:

Be it known that I, FRANK WILCOMB, citizen of the United States, residing at Norristown, Pennsylvania, have invented certain new and useful improvements in Knitting-Machines, of which the following is a specification.

The invention relates to the type of machine disclosed in my applications for Letters Patent of the United States filed November 19, 1906, No. 344,075, and February 4, 1909, 476,024, and it consists in the features and combination and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings Figure 1 is a sectional view of part of the head of a circular spring needle knitting machine embodying my invention; Fig. 1<sup>a</sup> is a part of Fig. 1 enlarged; Fig. 2 is a plan view of a part of the head of a multiple feed circular machine; Fig. 3 is a sectional view substantially on the line 3-3 of Fig. 2; Fig. 4 is a part front view and diagrammatic view of needles, sinkers, web holders and thread feeding devices, as viewed from within the needle circle; Figs. 5 to 11, inclusive, are views showing different steps in the knitting operation; Figs. 12 and 13 are views of different forms of my improved sinker; Fig. 13<sup>a</sup> is a view of a different form of sinker; Fig. 14 is a view of my web holder; Fig. 15 is a view of one of the sections of the web holder cam ring.

In these drawings, 1 is the needle cylinder, 2 the spring beard needle, 3 the jack, 4 the needle cage, 5 the cam ring, 6 the sliding sinkers, 7 the sliding web holders, 8 a presser wheel arranged within the needle circle, and 9 the presser ring exterior to the needle circle, this ring affording a surface for pressing when the needles are forced from their plane outwardly by the interior presser wheel. I make the front edge of this presser ring at a 10° angle to afford a better contact surface for the needle beard, this presenting an upwardly and outwardly inclined surface, to receive the beard, and prevent crimping of the head of the needle when drawn down. This presser ring is simply laid upon the radial web holders and is held in proper position thereby. It has depending teeth to guide the web holders and upwardly extending teeth to guide the sinkers. These sinkers are guided at their nose ends also

by a cover plate 10 which has depending teeth to engage and guide the sinkers, said cover plate, like the presser ring, being simply laid on and held in position both concentrically and against circumferential displacement by the engagement therewith of the radial sinkers.

Above the cover plate is the cam plate 11 carrying the cams for the sinkers.

The beds 12 and 13 for the sinkers and web holders, respectively, are attached to each other by screws 14. They run in a pocket 15 of the annular supporting frame 16 supported by a suitable post 17 and standards 62 to the base ring 16'. One of the beds, *i. e.*, the web holder bed, in this instance, is toothed on its periphery at 18 to be driven by a gear 19 on the upper end of the shaft 20, which also has a gear 21 for driving the gear 22 attached to the needle cylinder.

The sinker bed overlies the web holder bed, and covers the gear teeth thereof, and above this is the fixed cam plate. The web holder cam ring 39' is supported detachably in sections, Fig. 15 on the lower side of the frame ring extending up within the same, but being readily accessible for the removal of its sections without dismantling the machine.

The pocket in which the needle beds run is supplied with oil through a port 23, (dotted lines, Fig. 1<sup>a</sup>) from an oil cup of any suitable form or arrangement. The cover plate 10 has an upwardly extending edge at a slight distance from the inner edge of the cam plate and this forms a dam to prevent the passage of oil from this cover plate over the inner edge thereof and thence to the nose ends of the sinkers, needles, and fabric, and any oil which collects on this cover plate or runs thereupon from the upper surface of the cam plate will be free to pass back to the parts to be oiled through the crevice between the top of the cover plate 10 and the under side of the cam plate 11. Furthermore, any oil which reaches the inner edge or side of the web holder bed will fall away from the web holders through the free space 24, which is bridged by the web holders between the annular supporting frame and the cylinder, and therefore at this point also oil will be prevented from reaching the needles and fabric, and lint will also fall away through

2  
this space and be prevented from packing in the web holder grooves and reaching the fabric.

In my present invention I employ the web holders to serve as eveners for the new loops in order to make a perfectly even fabric while, at the same time, dispensing with dividing wheels as have been heretofore employed in spring needle knitting machines. This use of the web holders and their combined use with sliding sinkers, when this form of sinker device is employed, is illustrated in Figs. 4 to 11 inclusive.

The several steps in the knitting operation are as follows: Fig. 5 represents the web holders in position to hold the fabric against the up and down thrust of the needles, the sinkers being in the position for measuring off the yarn to the needles for the new loops; Fig. 6 represents the position of the parts during the pressing of the needle beard to pass through the old loops, the needle having partly retracted and the fabric being still held by the web holders in the same position as in Fig. 5, the new loop being held on the projecting nose of the sinker which, at this time, has partly retracted; Fig. 7 represents the sinker as having retracted more fully and about to free itself from the new loop, the needle having retracted further and the fabric being held as above described by the web holder; Fig. 8 represents the sinker as fully retracted, having freed the new loop which has been caught by the hook or nib of the web holder, the needle having further retracted from the position of Fig. 7 and in this action having evened the new loops over the top edges of the web holder nibs previous to drawing the said new loops into the fabric; Fig. 9 represents the parts with the sinker retracted and the web holder retracted to permit the evened new loop to be drawn into the fabric, the needle being in substantially the same position as in Fig. 8; Fig. 10 shows the needle fully retracted and the new loops (only one of which is shown) which have been previously evened or divided, over the top edges of the nibs, drawn into the fabric; Fig. 11 represents the needle as having fully advanced to the same position as in Fig. 5, and the sinker about to advance from its fully retracted position to measure off the yarn to the needles, as illustrated in Fig. 5.

In Fig. 4 is indicated the point *a* at which the sinkers measure off or sink the yarn to the needles, the point *b* at which pressing is done and the sinkers begin to retract, the point *c* at which the sinkers have retracted and have freed themselves from the new loops, and the point *d* at which these new loops are being evened by being drawn gently over the tops of the nibs of the web holders just prior to being drawn into the

fabric, which is represented by the wavy line *x-x* in said figure, and this figure also indicates the point *e* at which the new loops have been drawn into the fabric.

From the above it will be seen that I utilize the projecting nib of the web holder to perform the function of a dividing wheel on a bur wheel machine. This function is better obtained by the use of the web holder nib owing to the fact that the loops which have been formed by the sinkers are immediately caught across the nib of the combined web holder and stitch evener before they have time to render from one needle to another, and if they do render, they will be immediately evened again by being drawn across the web holder nib or evener before the loop is drawn into the fabric.

By my method of evening the new loops prior to drawing them into the fabric, I avoid any rendering of the loops from needle to needle after the loops have been practically drawn into the loops already formed. This enables me to use very tender yarn without rupturing, and no holes will appear in the fabric due to weak places in the yarn. Further, this method of evening the new loops over the tops of the web holder nibs assists in preventing small obstructions, such as lint, bunches, long and loose fibers and knots from appearing on the face of the fabric.

In practice I prefer not to draw the new loops extremely taut across the nib of the web holder, but just sufficient to insure a uniform length of yarn in the several new loops.

I do not limit myself to a sliding web holder in connection with the evening effect.

The web holder cam shown in Fig. 15 is so formed as to operate the web holder to secure the above effects, as will be readily understood by those skilled in the art. This cam has a recess *f* at the pressing point to allow the web holders to recede, though I prefer to have the back of the cam as shown to positively retract the web holder when the pressing is done; the evening is done at the point *g*; the needles cast off the loops at the point *h*, and the needles start to rise at the point *i*. A space is provided at *h* through which any web holder may be removed inwardly in a radial direction or replaced by a reverse movement. In addition, by this method of evening the loops, all the loops, after having been first evened, are drawn into the fabric very slowly as compared to the speed of measuring the yarn for forming the loop, as the distance the needle travels to draw the new loops from the eveners or web holders into the fabric is so short that a very low angle cam can be employed, enabling the loops to be drawn in gently and slowly, thus producing a better fabric as compared with the usual

methods, notwithstanding the fact that these evener web holders are employed by me in a machine designed for rapid production.

5 The use of the web holders which, in addition to their usual function of holding the fabric, serve also as eveners for the loops, renders the machine of simple and effective construction, and the slow movement and limited stroke, as compared with a loop wheel, is of advantage in my machine.

10 The web holder Fig. 14 is of special construction, my object being to provide a web holder for use where thinned nose web holders cannot be advantageously employed.

15 I construct my web holder of much greater thickness than those now used of substantially equal thickness throughout the body and the nose, and while a nose having a thinned portion is employed by me, the nose is reinforced and the construction is such that the guiding slot for the nose end may be of equal width with that for the body, so that the web holder will be properly guided and may be readily removed by drawing it forwardly, or inwardly, in the case of circular machines, from its guiding groove or slot.

20 I construct my web holder with a portion of equal and maximum thickness throughout, so that a portion at the nose end is of the same thickness as the stem and works in a groove in the cylinder top of equal width with that in the web holder bed. This form of web holder is shown in Fig. 14 in which the portion at the nose of equal thickness with the stem is indicated at 24. The nib or hook 25 and so much of the work end as contacts with the yarn and loops is thinned to suit the gage of knitting desired. In other words, my web holder has a thinned 40 nib and a work end thinned at the top, the bottom portion of the work end which runs in the guide groove being of full thickness. Only so much need be thinned as is necessary to allow space for the yarn or loops between the web holder and the needles.

50 In the case of spring needle machines, the construction described allows the loops to be evened, knocked over, or cast off on the top thinned portion of the work end, and whatever the style of machine may be in which the improved web holder is employed, the web holder itself is stronger, more durable, less liable to be bent at its nose end, and it has a stronger portion below the knitting plane than in former constructions, and when it is desired to remove the web holders or replace them, the web holder can be 60 drawn out longitudinally from or inserted lengthwise into the guiding groove, which is not possible with a web holder having a nose which is thinned throughout its work end and must be guided in a groove or slot of less width than the width of the main

slot, and thus presents an obstruction to the lengthwise removal or insertion of the web holders. Where I refer to the nib I mean the projection at the top of the end of the web holder, and where I refer to the work end I mean that portion lying beneath the fabric and embedded in the cylinder, that is that portion of the web holder lying below the notch. Another advantage of my web holder is that the thick portion at the work end reinforces and stiffens it so that it will not become distorted when tempered, nor will it become bent in use. I have also provided a sinker reinforced or stiffened at its nose by a portion of equal thickness with the stem as shown in Figs. 12 and 13. 70 75 80

I do not limit myself to any particular type of machine for the use of my improved sinkers and web holders.

85 I employ a thread carrier adapted to facilitate threading, and also to do plaiting. This consists of an arm 26 pivoted to a lug 27 depending from a bracket 28 which is held on the flat top of the cam ring or plate by a screw 29 and by the lug 27 fitting down in a recess 30 of the cam plate. The arm fits in a slot of the bracket, and is held down by a detent plate 31 having its forward end notched to engage the upper end of the thread carrier arm, said detent plate being held by a screw 29. The arm curves downwardly at its inner end, and has a laterally extending portion 32 carrying two thread guides 33, 34, to direct the two threads used in plaiting to the sinkers. In threading, the detent plate is swung aside, the thread carrier is raised to the position shown in dotted lines in Fig. 3, and after the guides have been threaded the thread carrier is lowered into position for use, and the detent is swung over into its holding position. The thread guides are of different lengths, so as to deliver the threads separated at different heights to the sinkers which, at their nose ends, have notches with wide vertically extending edges at their inner portions to receive and hold the threads one above the other. The two threads may be of different colors or qualities. By this manner of feeding the threads, and by the construction of the sinkers having notches with wide bearing edges at their apexes, the threads are kept properly separated until they have been properly spaced by the needles to form the loops, and so that the yarns will not cross each other in forming the loops, and in this way one yarn will appear mostly on the front and the other mostly on the back of the fabric. There is no place where the yarns can cross, with my improvements, from the time they enter the feed guides or tubes until they have been drawn into the fabric in the form of loops. 100 105 110 115 120 125

I do not limit myself to the form of sinker shown having a broad edge at the 130

apex of the notch, as other forms may be employed to provide an extended bearing surface to receive two threads which are side by side, whether these are close together or separated. For instance, the sinker may have a projecting part at the apex of the notch for this purpose, as shown in Fig. 13<sup>a</sup>. I have also provided means for preventing the sinkers (or needles as the case may be) from being projected by momentum beyond the working point of the cam which operates them during knitting, resulting in making longer loops than desired. This means consists of a follower bar or member 35 pivoted to the cam plate or ring at 36 and under tension of a spring 37, Fig. 2, tending constantly to draw the said controlling bar or follower toward the cam 38 which projects the sinkers. By this spring the controlling member is held snugly against the heel of the sinker (or needle as the case may be). When the machine is operated slowly by hand, and its proper position being thus determined, the controlling bar is locked in this position by a screw 39 passing down through an enlarged opening 40 in the cam plate and into the bar, Fig. 2, said screw having its head resting upon the upper face of the cam plate so that, when it is turned, it will be locked in position. Now when power is applied to the machine for rapid operation, the heels of the sinkers (or needles) can not be projected by momentum farther than the distance predetermined upon. The locking of the cam is employed in rapid machines, but in a slow moving machine reliance may be had solely upon the spring, no positive locking means being needed to prevent overthrow of the sinkers.

I do not limit myself to the particular knitting element, such as sinkers, with which my momentum controlling bar may be used, as other knitting elements, such as needles and web holders, may be controlled by a similar arrangement to prevent overthrow thereof beyond the proper distance due to rapid operation and steep cams. I provide also means for adjusting the web holder cams without dismantling any parts. As shown in Figs. 1 and 15 the cam 39<sup>x</sup> is pivoted at 40<sup>x</sup> and has a pin 41 near its other end projecting down into a groove 42 in the upper surface of the head 43 of a rock shaft 44, which is dropped down into a shouldered opening in the cam ring and is thus held below the cam. The rock shaft, at its lower end, has a handle arm 45 projecting outwardly for manipulation, and

when turned to properly adjust the cam it is fixed in position by a screw 46 passing through a curved slot 47 in the arm and into the cam ring.

I claim:—

1. In combination in a knitting machine, needles, a needle bed, yarn sinking means, web holders having work ends and upper nibs, and cam means for operating them to present their nibs for evening the loops across the tops prior to drawing the loops into the fabric, said web holders being arranged in a plane below the sinkers, substantially as described.
2. In combination in a knitting machine, needles, a bed therefor, yarn sinking means, sliding web holders having work ends and upper nibs, and operating means therefor to present their nibs for evening the loops across their tops prior to drawing the loops into the fabric, substantially as described.
3. In combination in a knitting machine, needles, a needle bed, independently operated sinkers, web holders having work ends and upper nibs, and cam means for operating the web holders to present their nibs for evening the loops across their tops, said web holders operating in a plane below that of the sinkers substantially as described.
4. In combination in a knitting machine, needles, a needle bed, sliding sinkers and sliding web holders, said web holders having work ends and upper nibs and cam means for operating the web holders to present their nibs for evening the loops across their tops, said sinkers and web holders operating in different horizontal planes substantially as described.
5. In combination in a knitting machine, needles, a needle bed, sliding web holders, a web holder bed having radial guiding grooves of equal width throughout their length, a web holder cam with a space adjacent the same for the passage of the web holders, said web holders having thin noses and reinforced or thickened lower portions to fit in the grooves of the web holder bed at their nose end, said web holders being removable forwardly through the space adjacent the web holder cam and through the guiding grooves at the nose end, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

FRANK WILCOMB.

Witnesses:

NINA S. RITTER,  
HERBERT W. BOYER.