

F. WILCOMB.
CIRCULAR KNITTING MACHINE.

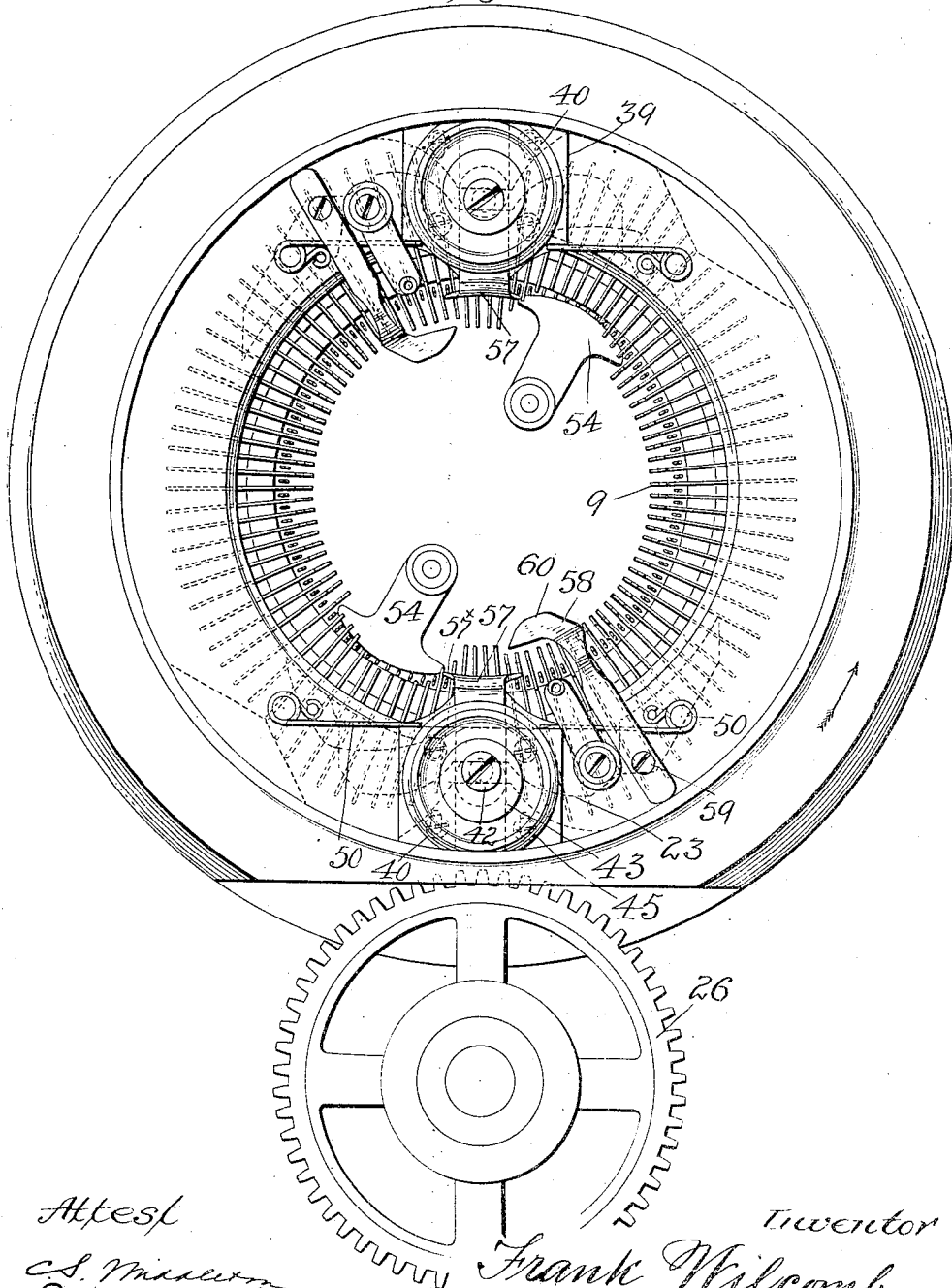
APPLICATION FILED NOV. 19, 1906. RENEWED NOV. 29, 1912.

1,054,067.

Patented Feb. 25, 1913

3 SHEETS-SHEET 1.

Fig. 1.



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3 SHEETS—SHEET 2.

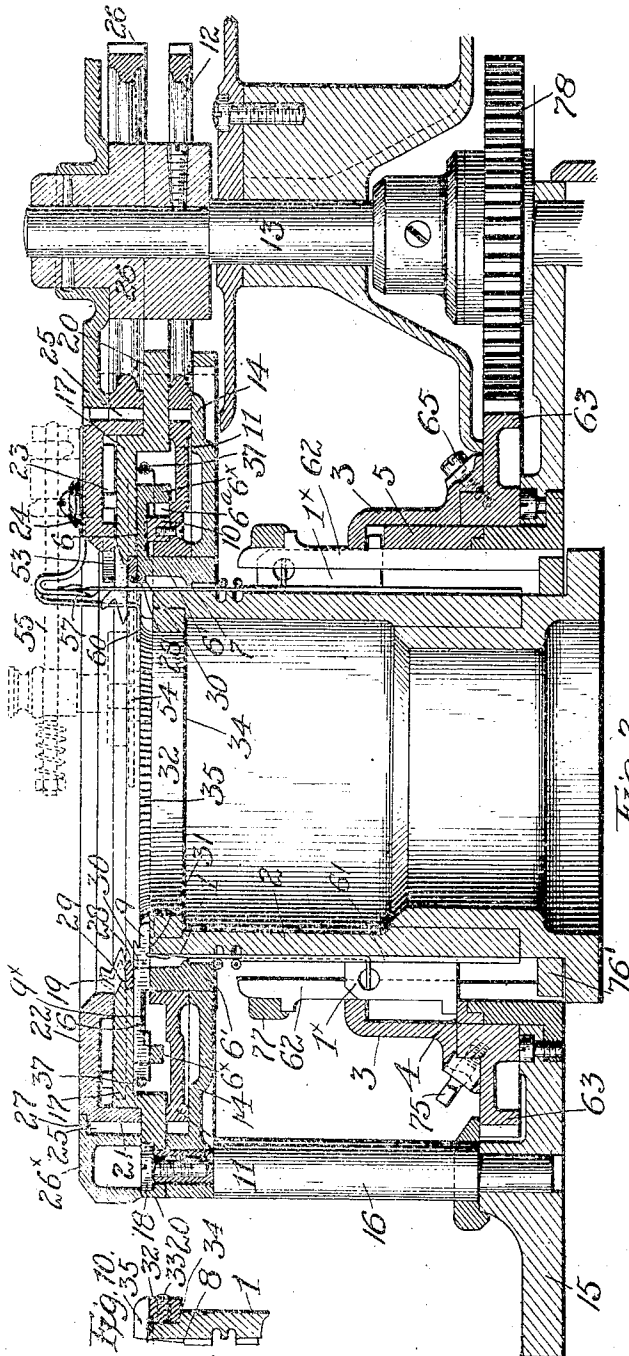


Fig. 2.

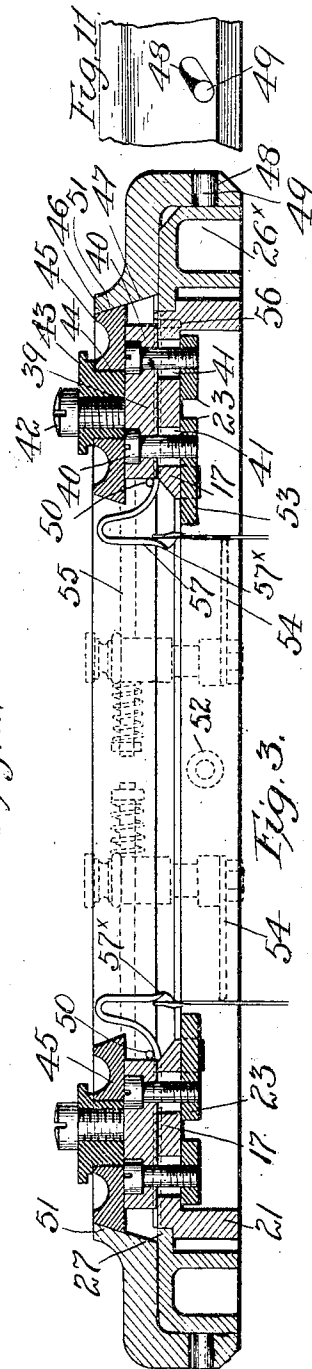


Fig. 3.

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3 SHEETS—SHEET 3.

Fig. 4.

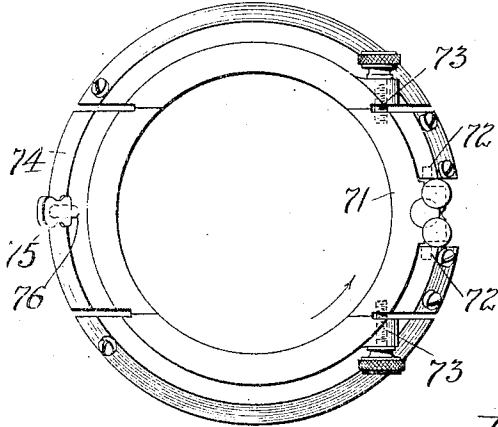


Fig. 5.

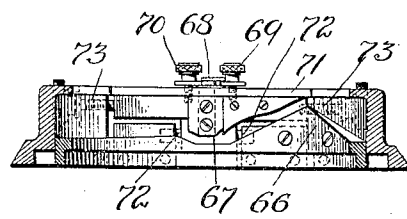


Fig. 6.

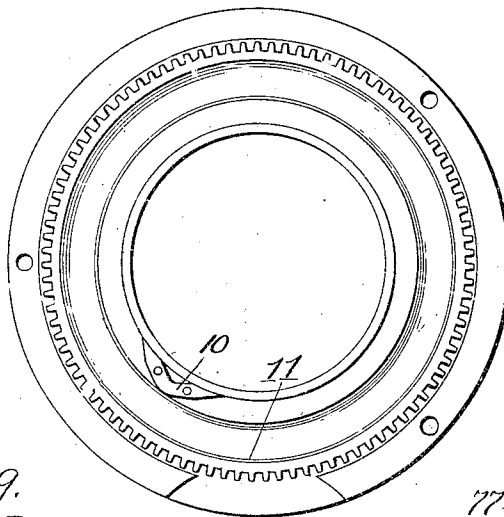


Fig. 14.



Fig. 9.

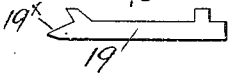


Fig. 7.

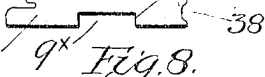


Fig. 8.

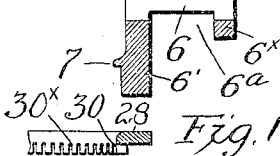
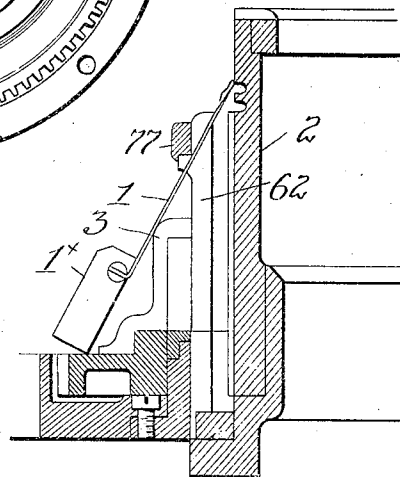


Fig. 12.

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Fig. 13.



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UNITED STATES PATENT OFFICE.

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

CIRCULAR-KNITTING MACHINE.

1,054,067.

Specification of Letters Patent.

Patented Feb. 25, 1913.

Application filed November 13, 1906, Serial No. 344,075. Renewed November 29, 1912. Serial No. 734,194.

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 Circular-Knitting Machines, of which the following is a specification.

My invention relates to circular spring needle knitting machines having independently operated spring beard needles, sinkers for feeding the yarn to the needles, and web holders for holding the loops from advancing and retracting during the upward and downward movements of the needles.

My present invention is a development of that disclosed in Letters Patent of the United States granted to me July 18, 1899, No. 629,116, in which a presser ring is employed outside the needle row and fixed circumferentially in respect thereto so as to afford a pressing surface for the needle beard when the needle is forced outwardly by a presser device traveling within the needle row.

My present invention concerns improvements in the construction and arrangement of this presser ring, the web holders and sinkers associated therewith, the construction and arrangement of the web holder and sinker beds, arrangements whereby the web-holders and the needles may be removed individually without disturbing any of the working parts or changing the adjustment of such parts, means whereby the sinker cams in a multiple feed machine may be adjusted simultaneously and also independently, means associated and traveling in unison with the presser device in the inside of the needle row for lining up and supporting crooked needles while the yarn is being fed thereto preparatory to the pressing and casting off action, means for pressing or smoothing and clearing down the web so as to avoid the use of take up means for pulling the fabric down through the cylinder, and my invention further concerns various features of construction and combinations and arrangement of parts hereinafter described and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a plan view of a knitting head embodying my invention. Fig. 2 is a central vertical sectional view of the same. Fig. 3 is a view enlarged of the upper part of the

knitting head showing certain features of adjustment for the sinkers. Fig. 4 is a plan view of the needle cam ring. Fig. 5 is a view of a vertical section of the needle cam ring. Fig. 6 is a plan view of the web holder, cam ring. Fig. 7 is a view of a web holder. Fig. 8 is a sectional view of the web holder bed, detached. Fig. 9 is a view of one of the sinkers. Fig. 10 is a detail relating to the cylinder and the web holder guide ring. Fig. 11 is a detail view relating to the means for adjusting the sinker cams. Fig. 12 is a detail view of a part of the presser ring for the needle beards. Fig. 13 illustrates the removal of a needle from the machine. Fig. 14 is a detail view in section of the guide ring for the web holders, which ring is adapted to be secured to the upper part of the cylinder.

In the drawings, 1 indicates the independently operating spring beard needles; 2 the needle cylinder, and 3 the cam ring carrying the needle cams 4, 5. At the upper end of the cylinder the web-holder-bed 6 is supported by a flange or shoulder 7 of said web-holder-bed resting on a shoulder 8 of the needle-bed or cylinder. This bed is radially grooved to guide the radially sliding, independently operating web-holders 9, which are operated by the cam 10 carried on a carrier ring or gear wheel 11, which is driven by the gear wheel 12 on the vertical driving shaft 13. This web-holder-cam carrier turns about the central portion 6' of the web-holder-bed, and it rests and turns upon the stationary frame plate 14 which is supported from the base ring 15 of the knitting head by posts such as indicated at 16. Above the horizontal or grooved part of the web-holder-bed and resting thereon, is the sinker-bed 17. This is also grooved, radially, to receive and guide sliding sinkers 19. This sinker-bed is provided with a rim 20 which at its outer edge rests upon the frame plate 14, and together with said frame plate is held to the supporting posts or standards by screws, one of which is shown at 18. The rim of the sinker-bed is depressed in relation to the grooved or slotted part of said bed and this provides a shoulder against which the depending flange 21 of the sinker cam ring 22 bears. The sinker cams are indicated at 23, carried by the horizontal or overhanging part 24 of said cam ring. This cam ring is toothed at 25, about

its periphery and is driven by the gear wheel 26 on the vertical drive shaft 13, before mentioned. It is retained in proper position by the cap plate 26*, secured to the rim of the sinker bed by screws, said cap plate having an overhanging flange 27 reaching over the edge of the sinker cam ring.

As in my previous patent, above referred to, the needles, during the pressing action for casting off the stitches, are forced outwardly so that the beards will be pressed against a ring. In the present improvement this ring is of special construction and arrangement. It is shown at 28 resting upon the top of the web-holder-bed and under a lip 29 of the sinker-bed, which construction holds it against vertical displacement. It has a depending flange 30 extending down within the inner circle of the web-holder-bed, the inner face of said depending flange affording a long bearing surface for the beard of the needle to travel on during the pressing action, thus preventing mispressing, the beard being held closed for a long period of time for the action of casting off the loops. This presser ring further can be hardened and ground on all exposed surfaces, and as it lies between the web holders and the sinkers it presents smooth unbroken surfaces for the sinkers and web holders to travel against, thus insuring accuracy in the positioning and in the movements of these elements which cannot be secured when the only guide and bearing is that afforded by milled slots or grooves. By this construction and arrangement of the presser ring as a bearing for the sinkers to slide on the result is that the sinkers will all be brought to a certain level which would not be the case where the sinkers travel in milled slots liable to vary in depth, and as regards the web-holders a broad unslotted surface is furnished to prevent the web-holders from rising with the fabric as the needles are pushed upwardly, the large wearing surface being of great importance in the circular type of machine. It will be noticed further that the presser ring is held in concentric relation by its depending flange bearing against the interior face of the web-holder bed, which face is concentric with the cylinder.

The depending flange is slotted at 30* Fig. 12 to permit the web holders to pass through, and this construction serves to hold the presser ring against circumferential displacement, the parts of the depending flange extending down between the web holders. The presser ring needs no holding devices other than means described, consisting of the web-holder-bed, and sinker-bed and its engagement by the web holders themselves. I also provide a smooth ground surface for the web holders to slide on and be supported or guided accurately in the same hori-

zental plane. This consists of the upper surface of the cylinder at 31, which is ground to a smooth, plain flat surface and affords a broad bearing for the web-holders to slide freely, preventing them from tilting and making the level of the web-holders much more even than would be possible where the web-holders rest on the bottom of milled or sawed slots which are not always of equal depth. The guiding slots for the web-holders are provided by a ring 32 separate and distinct from the cylinder but secured thereto by screws as at 33. This ring rests on a shoulder 34 on the interior of the cylinder and it has a portion 35 overlying the plain flat top of the cylinder, which overlying portion is slotted to provide the radial guiding walls of the web-holders. The annular ring has its slots cut slightly below the top of the cylinder Fig. 10 so that it serves merely to guide the web-holders against lateral displacement.

An important feature of my invention is that the web holders can be removed, without requiring the detachment of any part of the machine or disturbing the adjustment of any part. The web holders, at any time, can be removed from the machine by withdrawing them radially inward toward the center line of the cylinder, and this may be done with all web holders throughout the circle excepting those few engaged by the cam of the web-holders, and these of course can be radially removed by rotating the machine to the slight extent necessary to disengage these web holders from the cam. In order to secure this result the web holders are arranged to slide in their bed 6, before mentioned, and are freely removable inwardly therefrom. The web-holder-bed besides having the cylindrical portion or flange 6' is provided with the outer depending portion or flange 6*, these two flanges being connected by the main horizontal portion 6. This construction provides a chamber or recess 6* beneath the web-holder-bed and up into this space the web-holder cam 10 projects. The portion 6 of the web-holder bed is slotted clear through from top to bottom, said slotting also extending part way down the inner and outer ring 6' 6*, thus exposing the recessed portion 9* of the web-holder below the main or slotted portion of the bed to the action of the cam beneath.

The form of the web holder employed by me is shown more particularly in Fig. 7, from which it will be seen that instead of employing a projecting nib for the cam to act against, the web holder is provided with a recess on its under side, presenting a shoulder 36 for the web holder cam to act against. It will be seen from this form of web holder and the form of bed employed, that there is nothing to obstruct the free

passage of the web holders radially inward and when they are to be removed they are simply drawn inwardly by grasping their inner ends. The web holders are pressed normally inward, that is toward the center of the machine by an encircling spring 37 bearing against the rear ends of the web holders which are notched at 38 to receive said spring. The action of the spring is limited by coming against the outer side of the flange 6* of the web-holder-bed. By the use of this spring the web holders are rendered elastic or self adjusting and they therefore adapt themselves automatically to the length of the loops of the fabric whether the fabric be knitted loose or tight, and the web holders also are enabled to adapt themselves to inequalities of yarn, like knots, lumps &c. to avoid rupturing the yarn and make holes in the fabric and also to equalize the loops during the knitting operation.

When the needles have fabric on them the spring will force the web holders firmly against the fabric and with uniform pressure except where abnormal conditions exist such as lumps, knots and similar imperfections occur in the yarn or knitting. At such times even a single web-holder may be slightly affected by a knot and will not receive its full movement. The web-holders on either side of this particular one will receive less pressure from the spring since the single web-holder is holding it in a backward position. The pressure of the spring is distributed equally under normal conditions, to the web-holders, but under abnormal conditions the web-holder, exposed to resistance by reason of a knot &c. will be subjected to some additional pressure by the spring. Holes caused by cutting are less liable to occur than if the web-holders were forced to their extreme forward or inward movement by a cam in which case the web-holder must sever the yarn where knots or bunches occur. The web-holder cam 10, which operates the web-holders inwardly immediately after retracting them, ceases to push on the web-holder when it has barely engaged the fabric, the encircling spring being relied on to advance the web-holders far enough to draw the stitches taut on the stem of the needles.

It will be observed from the construction and relative arrangement of the presser cylinder, web-holder-bed, presser ring, and sinker-bed, that the parts are held in concentric relation by their engagement with one another. This concentric relation results from the fact that the web-holder-bed bears against the side of the cylinder, the presser ring is centered by the overhanging lip engaging the inner circle of the web-holder-bed holding it concentric, the outer edge of the presser ring forming a bearing surface for the inside circle of the sinker-

bed holding it concentric, and this sinker-bed becomes a bearing and guide absolutely concentric with the needle-row for the sinker cam ring to travel upon.

The sinkers serve the purpose of keeping the needles spaced properly during the advance or upward movement of the needle and also the downward movement of a needle except at the very short interval of time when the newly formed loops leave the nose of the sinker as the loop is being drawn into the fabric. The sinker has a long nose 19* which in the normal position of the sinker is advanced to form a guide for the needles as above explained. This lower extension or nose prevents the yarn, which has been fed to the needles to form new loops, from falling down or straightening out, in the case of wiry yarn, during the downward movement of the needle until such time as the beard is being pressed to pass through the fabric, insuring perfect uniformity in the lengths of the loops and avoiding the common fault of the yarn slipping through sidewise of the needle and making uneven loops. The sinkers are adjustable as to the limit of their inward or thread sinking movement, and the mechanism that I have provided for this purpose is of special advantage in a multiple feed machine, though it is not limited in its application to such machines.

The means in a multiple feed machine enable all the sinker cams to be adjusted simultaneously to supply more or less yarn, all the feeds receiving the same amount of adjustment and each being capable of independent adjustment. For this purpose, as shown in Fig. 3, the sinker cams 23 are carried by a block 39 slidably mounted on top of the cam carrying ring, being connected with said plate or block by the screws 40 passing through slots 41 in the cam ring. This plate or block has a stud or screw 42 on which is held eccentrically a button 43 having a cylindrical portion 44 which forms a bearing for a roller 45, having a beveled periphery at 46 and bearing on a race ring 47 supported on the fixed cap ring 26*, before mentioned. This race ring has inclined slots 48 through which project pins 49 from the fixed cap ring. The cam carrying plate or block is pressed normally outward by springs 50 supported on the cam carrying ring.

It will be understood that the sinker cams for each feed are held adjustably in the manner just described and therefore when the race ring is turned and its inclined race is thereby raised or lowered in respect to the rollers or wheels 45, that these wheels will move radially inward, if the race ring is lowered and outward if the race ring is raised, the former action being in opposition to the tension of the springs 50, while

the outward movement is due to the action of said springs when the race ring recedes.

It will be understood that when the cam ring 17 rotates the truck wheel 45 travels upon the race ring and that the adjustment may be effected while the machine is in operation. The truck wheel turns freely upon the cylindrical surface of the button 44 which is held rigidly to the cam carrying block or plate by the screw 42.

By the above described devices any number of feeds may be adjusted simultaneously for slack or tight work. Each feed is capable of independent adjustment, which is effected by loosening the screw 42 and turning the eccentric button 44 to shift the cam in or out in relation to the needles. The race ring will be held in any position to which it is adjusted by a thumb screw or other device indicated at 52. I have provided a guard cam at 53 forming in this, my present arrangement, an extension of the cam 23 of the sinkers. This guard cam projects out over the sinkers at the point where they advance to sink the yarn to the needles, and serves to hold the sinkers against any upward tilting movement.

As before stated, my present invention is an improvement over that shown in my patent above referred to, in which a presser operates within the needle row and forces the needles outwardly to press the beard against the presser ring. This presser is shown at 54, being carried yieldingly by an arm 55, supported upon the rotary cam ring. Associated with this presser and with the presser ring I employ means for holding crooked needles in a true concentric line during the period of time when the sinkers are feeding the yarn to the needle, to insure perfect uniformity in the lengths of loops and a better pressing action, which latter action follows closely that of feeding the yarn by the sinkers. For this purpose I provide a plate or arm secured to the sinker cam ring, by a pin 56 Fig. 3 said plate fitting partly within a groove in the upper face of the cam ring and a groove in the under face of the cam block or plate. The inner end of this plate is bent upwardly and thence downwardly, providing a broad flat support 57 on the inner side of the needle row so as to resist the thrust of the yarn against the needle during the formation of the loops. The ends of this support are turned inwardly at 57* slightly so as to engage the needles, although they may be standing considerably out of position.

From Fig. 1 it will be seen that the presser is arranged within the needle row so as to follow in its action the evening up of the needles and the feeding of the yarn thereto. The shank of this needle support forms a guide for the adjustable cam carrying block to move on. I also provide a

guard or fabric presser traveling slightly above the fabric and serving to push away any obstructions in the form of lumps of lint or to press down and smooth out any obstructions caused by the web gathering or puckering up when no weight or take up is used to draw the knitted fabric downward through the cylinder. This guard or presser consists of a piece 58 secured at 59 to the cam ring and extending down to a point just above the web holders, where it is provided with a flat foot at 60 Fig. 2 to smooth out the web and remove obstructions such as lumps &c. By the use of this web-presser the fabric requires no take up for drawing it down through the cylinder, this device together with the web holders serving to direct the fabric downwardly. This guard is in advance of the interior presser and it removes any bunches or lint and prevents it from reaching the presser and causing a jam here, and furthermore it removes all obstructions liable to cause bending or jamming of the sinkers, needles or web holders, and facilitates the work of renewing the knitting operation when, for instance, a part of the work has run off the needles or a hole has occurred in the fabric.

The needles 1 are attached to jacks 1*, the inner edges of which slide in the grooves 61 of the cylinder while their outer edges slide in grooves of a cylinder cage 62 hereinafter referred to. The needle jacks are operated vertically by cams carried by a cam ring which is formed of the gear section 63 and the cam ring proper 3 attached to the gear section by the screws 65. The needle cams comprise, as shown in Fig. 5 the up-throw cam 66 and the draw-down cam 67. The latter is adjustable, being connected to a post 68, having a slotted head, the slot of which is engaged by a flange on the adjusting screw 69. A jam screw 70 presses and holds the post down in the position to which it is adjusted. The cam ring is formed in sections, one section 71 which carries the draw-down cam being pivoted at 72 so that it may be tilted back in order that the needle and jacks may be inspected at any time by the operator. This tilting cam section is held in its closed position by the set screws 73, supported by the fixed sections and entering the tilting section. One section of the cam ring or cylinder is completely removable in order to permit the needles and jacks to be removed. This section is shown in Fig. 4 at 74, it being held in place by a button 75, which on being given a quarter turn will be in line with a slot 76 formed in the base of the said cam ring or cylinder so that the sections of the same may be removed. This cam ring holds the needle jacks in place and shields them from the accumulation of lint and dust. It will be noticed that the lines of division be-

tween the section of the cam ring are not radial but tangential to the circle of needles, and jacks and therefor the segments form a substantially continuous bearing surface without a break sufficiently large for the needle jack to enter and be caught thereby. This ring may be formed in one piece and slotted up afterward and even though crevices are left these will not receive the needle stems which must move radially in order to remove them. This tangential slotting also allows the tilting cam section to be pivotally mounted between parallel planes at the pivotal point.

Another feature of my invention relates to the construction and arrangement of parts enabling me to replace any needle in the machine without the necessity of removing the cylinder from the machine as is done with most hosiery machines and without pulling the needle upwardly as is done in most rib machines. In removing the needles in the machine built according to this invention it is not necessary to disturb any of the working parts and with this result in view I employ the needle cage 62 above mentioned. This cage is made up of tempered metal strips held in a ring 76' at the lower end of the cage and within the same and by a ring 77 at the upper end of the cage and inclosing the same. The cage may be supported by its ring 76', which is connected to the cylinder. The strips are spaced apart to conform radially to the grooves in the cylinder. They afford wide guiding walls for the needle jacks to work between. I have arranged the ring 77 so that during the operation of knitting the needle operating jack at the extreme of its upward movement is held accurately between the ring and the cylinder, this being at the time the yarn is being fed to the needle and the said needle jack is held accurately in its path by the encircling sectional cam ring in its lowest position as well as in its highest position. When now a needle or needle jack is to be replaced the section 74 of the cam ring is detached by turning the button or screw and the needle and jack are drawn radially until the needle stem comes in contact with the top encircling cage ring when it may be pulled downwardly and out from the machine as in Fig. 13. The new needle and jack are introduced by a reversal of these movements. The cam ring for the needles is driven through the gear 73 on the vertical shaft 13. This gear together with the gear 12 for operating the web holder cam ring may be adjusted in relation to each other and the sinker operating mechanism to properly time these parts, and the sinker driving gear may be adjusted also.

It will be understood that while I show a machine in which the needle cylinder is sta-

tionary the invention may be applied to the opposite type of machine. It will be understood also that all the features above described are embodied in the one machine.

It will be observed from Fig. 2 that the needle shanks are guided by both the cylinder grooves and the cage grooves and they are thus held accurately in position and it will be observed further that the needle jacks engage both the cylinder groove and the cage groove and are therefore guided and spaced accurately thereby. It will be seen that the ring 34 has a flange fitting the shoulder on the sinker bed and thus covers the grooves for the sinkers. It will be seen also that this flange of the covering cam ring is toothed beginning at a point below its upper surface, thus forming a shoulder while a ring 38 fits in this shoulder and covers the teeth. In this way the sinker grooves are closed against access of dirt and lint and further the teeth of the ring 34 are protected.

I claim:—

1. In combination, needles, a cylinder having a plain upper edge, web holders slidably mounted, movable radially across said plain edge and bearing thereon, and slotted guiding means for the nose ends of the web holders formed independently of the cylinder and supported thereby, substantially as described.

2. In combination, the cylinder having the plain unslotted upper edge, sliding web holders movable and bearing on said surface, and a ring supported on the inner side of the cylinder and having a slotted guiding portion for the web holders, substantially as described.

3. In combination, in a circular knitting machine, spring beard needles, a cylinder, sliding web holders, a presser inside of the needle circle to press the needles outwardly from their normal plane, and a presser ring outside the needle circle overlying the web holders and having a depending flange at the inner edge thereof slotted to receive the web-holders and extending down from its main horizontal portion between said web holders to guide the web holders and present a long bearing surface for the pressing action, and to guide the needles, said presser ring above the said flange presenting an unbroken edge for pressing, substantially as described.

4. In combination, in a circular knitting machine, spring beard needles, sliding web holders, a cylinder, a presser within the needle circle and a presser ring outside the needle circle overlying the web holders and having a depending flange slotted to guide the web holders, center the ring and afford a long bearing for the pressing action, substantially as described.

5. In combination, in a circular knitting

machine, spring beard needles, a cylinder, a presser ring outside the needle row, an interior presser for forcing the needles outwardly for pressing, radially sliding web-holders and a bed therefor, said presser ring overlying and covering the web-holders near their nose ends and presenting its plain under side as a bearing surface for said web-holders to slide against, substantially as described.

6. In combination in a circular knitting machine, spring beard needles, a cylinder, sliding web-holders, a web-holder-bed, an interior presser and a presser ring outside the needle circle, said ring resting with its horizontal main portion on top of the web-holder-bed covering the web-holders, near their nose ends and having a flange depending at its inner edge within the said bed and being centered thereby and slotted to guide the web-holders, substantially as described.

7. In combination, in a circular knitting machine, the needles, a cylinder, radially sliding web-holders, radially sliding sinkers, beds for said web-holders and sinkers and a ring interposed between the sinkers and web-holders covering the web holders near their nose ends, and presenting bearing surfaces for the said web-holders and sinkers to slide upon, substantially as described.

8. In combination, in a circular spring needle knitting machine, needles, a cylinder, a presser within the needle row, a presser ring outside the needle row, radially sliding sinkers and radially sliding web-holders, beds for the same, the said presser ring being interposed between the sliding web-holders and sliding sinkers, and covering the web holders near their nose ends, substantially as described.

9. In combination, in a circular knitting machine, needles, a cylinder, a web-holder-bed engaging part of the cylinder, a presser ring held concentric by the web-holder-bed, sinkers, a sinker-bed held concentric by the presser ring and having a shoulder, and a carrier for the sinker cam working against the said shoulder and held concentric thereby, substantially as described.

10. In combination, needles, a cylinder, radially sliding web-holders, radially sliding sinkers, a web-holder-bed, a sinker-bed, a presser within the needle row, a presser ring outside the needle row having a horizontal portion, said presser ring being retained in place by its horizontal portion interposed between the web-holder and sinker-beds and having a depending flange at its inner edge slotted to receive the web-holder by which said presser ring is held against circumferential displacement, substantially as described.

11. In combination, in a circular knitting

machine, needles, a cylinder, radially sliding web-holders, a web-holder-bed extending from the cylinders outwardly, spring means encircling the web holder bed for engaging the web holders; a cam carrier having a cam to engage the web-holders from beneath the bed, radially sliding sinkers, a sinker bed secured to the frame and extending inwardly above the web-holder-bed and having an intermediate shouldered portion, and a cam carrier moving on the sinker-bed and held concentric thereby, substantially as described.

12. In combination, in a circular knitting machine, a cylinder, needles, sinkers, a sinker cam, a truck wheel in connection with the sinker cam and a race ring having a beveled truck or race-way for the truck wheel with means for raising and lowering the said race ring, substantially as described.

13. In combination, in a circular knitting machine, needles, a cylinder, sinkers, cams for the sinkers, movable blocks carrying the said cams, an eccentrically pivoted button or cylinder carried by the block, a truck wheel journaled on said eccentric and a race ring with means for adjusting the same to move the truck wheel inwardly or permit outward adjustment thereof, the said eccentric permitting individual adjustment of the cam and means whereby the race ring is adjusted, substantially as described.

14. In combination, needles, a cylinder, sinkers, a cam ring, a block carrying the cams and adjustable on the said cam ring, a spring for moving the block outwardly, a truck wheel, and a race ring for adjusting the block inwardly, substantially as described.

15. In combination in a circular knitting machine, needles, a cylinder, web holders, an exterior presser ring, an interior presser, and a clearer plate arranged in advance of the interior presser to smooth down the fabric to pass thereunder, and clear the fabric in advance of the presser of obstructions, substantially as described.

16. In combination, in a circular knitting machine, needles, a cylinder, radially sliding sinkers and a guard extending over the sinkers at the point where they are advanced to sink the yarn to prevent the said sinkers from tipping upwardly, substantially as described.

17. In combination in a circular knitting machine, radially sliding sinkers, radially sliding web holders, a presser ring interposed between the sliding sinkers and web holders, and covering the sliding web holders near their nose ends, and inner presser means, substantially as described.

18. In combination in a circular knitting machine, with the sliding sinkers and web holders, the inner presser, and an outer ring

interposed between the sliding sinkers and web holders covering the web holders near their nose ends and having guiding teeth and a plain bearing surface, substantially as described.

19. In combination in a circular knitting machine with the needles and the exterior presser ring and presser, a clearer plate to smooth down and remove obstructions in advance of the presser, both said presser and clearer plate being on the inside of the needle row.

20. In combination in a circular knitting machine, the needles, the sliding web holders, the exterior presser ring superimposed in relation to the web holders, the interior presser, said sliding web holders being removable inwardly in respect to said presser ring and from below the same, substantially as described.

21. In combination in a circular knitting machine, needles, a cylinder, radially sliding web holders, radially sliding sinkers, beds for the sinkers and web holders, a presser within the needle circle, a presser ring exterior to the needle circle, said presser ring being interposed between the radially sliding sinkers and web holders, and having a horizontal portion overlying the web holders near their nose end and having also a depending slotted flange ex-

tending down between the web holders serving both to guide the same and afford a long bearing surface for the pressing of the needle beard, substantially as described.

22. In combination in a circular knitting machine, needles, a cylinder, web holders, a presser ring exterior to the needle circle, a presser interior in respect to the needle circle, and a guard operating on the inside of the needle circle to smooth down the fabric on the inner side of the cylinder adjacent the interior presser, substantially as described.

23. In combination in a circular knitting machine, the needles, sliding web holders, an exterior presser ring superimposed upon the web holders, an interior presser, sliding sinkers superimposed in respect to the web holders, and cams for operating the sinkers and web holders, said web holders being removable radially inward from their position beneath the presser ring and sinkers without disturbing the latter, substantially as described.

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

FRANK WILCOMB.

Witnesses:

WM. F. DANNEHOWER,
CHAS. KOHLER.