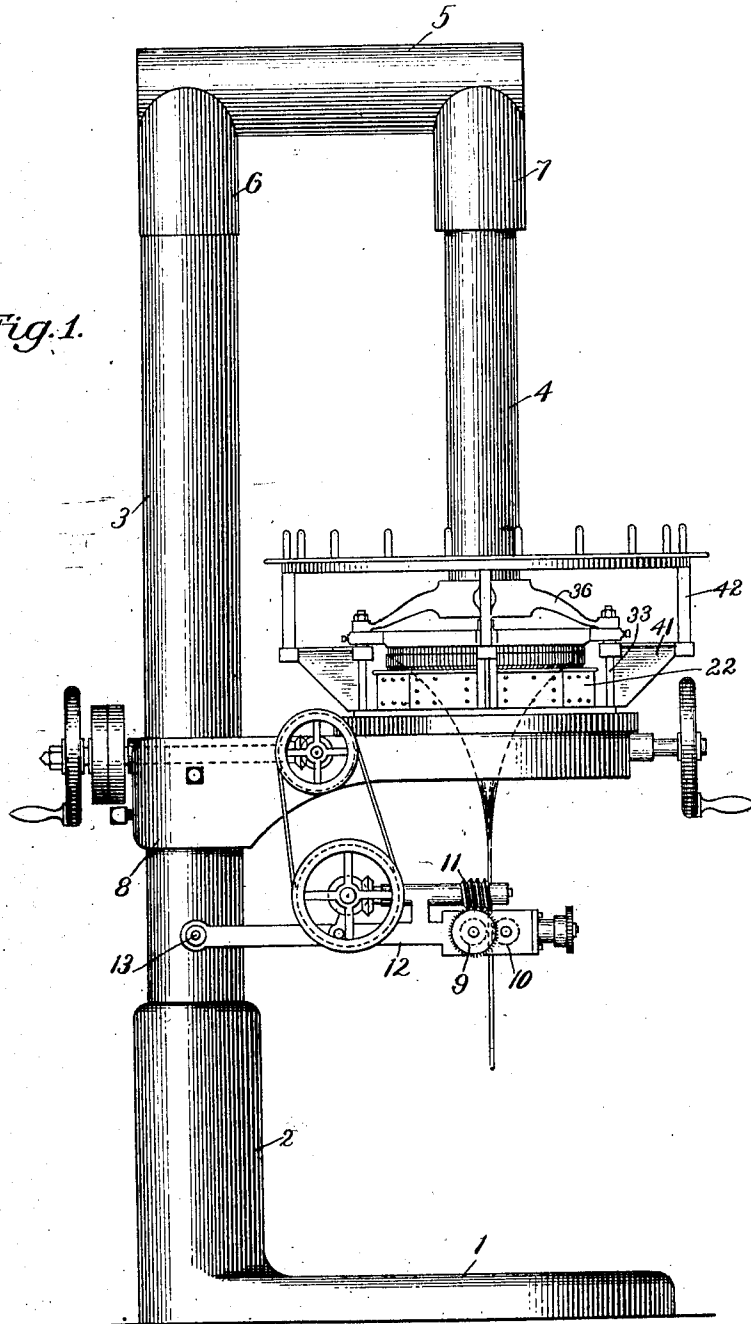


B. T. STEBER.
DIAL KNITTING MACHINE.
APPLICATION FILED OCT. 2, 1908.

Fig. 1.



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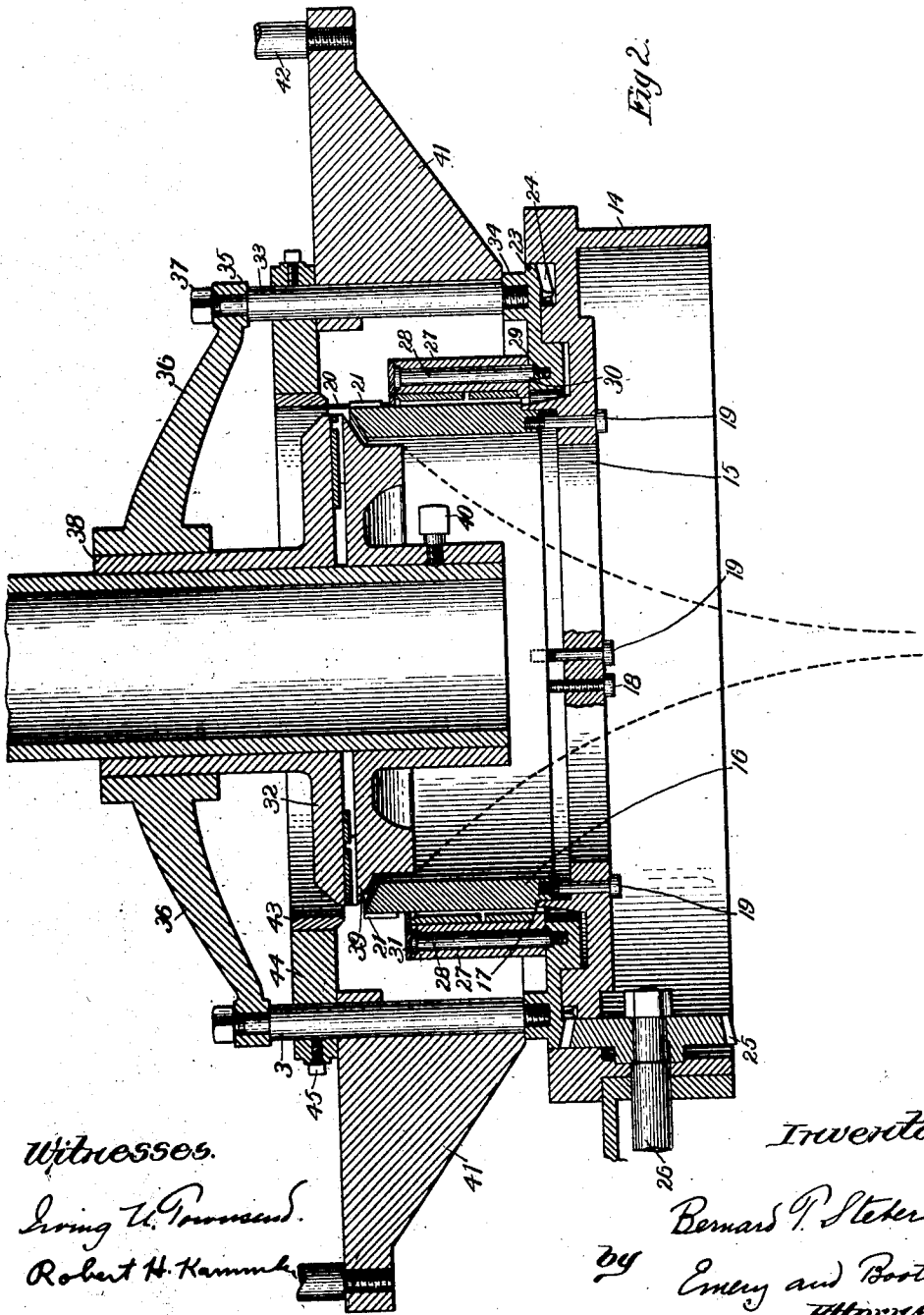
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by Emery and Booth Attys.

No. 885,304.

PATENTED APR. 21, 1908.

B. T. STEBER.
DIAL KNITTING MACHINE.
APPLICATION FILED OCT. 2, 1906.

2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

BERNARD T. STEBER, OF UTICA, NEW YORK, ASSIGNOR TO THE STEBER MACHINE COMPANY,
OF UTICA, NEW YORK, A CORPORATION.

DIAL KNITTING-MACHINE.

No. 885,304.

Specification of Letters Patent.

Patented April 21, 1908.

Application filed October 2, 1906. Serial No. 337,043.

To all whom it may concern:

Be it known that I, BERNARD T. STEBER, a citizen of the United States, residing at Utica, in the county of Oneida, State of New York, have invented an Improvement in Dial Knitting-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to circular knitting machines and particularly to circular dial knitting machines, although certain features thereof are of general application.

In order that the principles of the invention may be clearly set forth, I have in the accompanying drawings illustrated one type or embodiment of the invention, it being understood that the invention may be specifically embodied in types of mechanism widely varying from that herein disclosed.

In the drawings, wherein a type of the invention is disclosed,—Figure 1 is a side elevation of a circular dial knitting machine disclosing a preferred form of support for the cylinder mechanism and for the dial mechanism; Fig. 2 is a central vertical section, through the needle and cam cylinders and the needle and cam dials and disclosing a preferred form of supporting means for said parts.

Referring specifically to the drawings and to that single type of the invention therein disclosed, in Fig. 1, the base, whereon the mechanism is preferably supported, is indicated at 1, said base being preferably of cast metal and having rising therefrom and preferably integrally formed therewith a preferably tubular standard 2, the main column 3 being supported therein or suitably secured thereto, said base, standard and column constituting a rigid support. A depending column 4 is supported from the main column 3 and preferably in parallelism therewith in any suitable manner, but as herein shown by a horizontal connecting or cross portion 5, herein shown as having depending sleeves 6 and 7 positioned upon and preferably fixedly secured to said main column and depending column, respectively. For the sake of lightness each of the parts thus far enumerated, excepting the base, may be and preferably is of tubular material, it being understood that the main column and depending column may

be connected in any desired manner, and preferably to present a rigid or inflexible support for the parts carried by said depending column.

The construction of the base 1 is such, it being laterally extended underneath the operative parts of the mechanism, that the entire mechanism may be supported firmly thereby without fastening the said base to the floor.

Mounted upon the main column 3, is a bracket 8, extending laterally therefrom and either fixedly or adjustably secured thereto. In the present type of the invention I have indicated adjusting screws whereby said bracket may be adjusted with respect to said column, it being understood that any preferred type of adjustment may be employed, that the bracket may be carried by said column or that it might be integrally formed therewith.

I prefer to employ fabric tensioning means, which may be of any desired type but which is herein indicated as consisting of fabric contacting rolls 9 and 10, the former being herein shown as driven by a worm 11, driven by interposed gearing and belt connections, preferably from the main shaft of the machine, said rolls 9 and 10 being herein shown as carried by an arm 12, pivoted upon the main column at 13, whereby the weight of the parts further tends to maintain the fabric under tension. It will be understood, however, that the fabric tensioning devices herein shown, may be otherwise mounted and actuated, or that the other type of devices may be employed. In the construction shown, a clear space is provided beneath the body of the machine or beneath the tensioning devices, if the same be employed, wherein a receptacle for the fabric may be positioned, as upon the base 1. In the present type of the invention the space beneath the body of the machine is readily accessible from three sides, thus affording ready access to the parts.

If it be desired to employ a dial in connection with the needle cylinder mechanism, the same is preferably and in the present type of the invention, mounted upon the depending column 4. Such dial may be of any desired conformation and character, and may be designed to support therein dial needles either horizontal or inclined upwardly or downwardly and arranged either

within the circle of the cylinder needles or to surround the same or said dial may contain any desired type of yarn manipulating elements other than needles. In a circular dial machine it is highly desirable that the cylinder needles and the dial needles or yarn manipulating elements be so relatively positioned as that during the operation of the machine and the projection of said needles or yarn manipulating elements they shall not contact with each other. That is to say, assuming that needles are employed in the dial, the needles of the dial should be accurately aligned with the spaces between the needles of the cylinder. Great difficulty has been heretofore experienced in attempting to provide mechanism accomplishing this end, and particularly in machines of a fine gage or carrying a large number of needles which must necessarily be closely spaced.

In circular knitting machines the customary manner in which it has been attempted to maintain a cylinder and the corresponding element of the dial in operative relation, has been to provide engaging lugs upon said parts between which the fabric issuing from the mechanism passes. Such manner of support and other methods of support known to me are ineffective to maintain a true, perfect and lasting working relation between a cylinder and the corresponding element of the dial, as, for example, between the needle cylinder and needle dial. In previous types of machines so far as known to me the manner of supporting the dial has been such that in the operation of the machine the dial supporting means has worked loose and the needles or yarn manipulating elements thereof have no longer been maintained in accurate position with respect to the needles of the dial.

In the present type of my invention I maintain the needle cylinder stationary and support the needle dial upon the depending column 4. Inasmuch as said depending column 4 is in the present type of the invention rigid with the main column 3, and the said needle dial is fixedly secured upon the said depending column, it will be understood that the desired relation of the needles of the cylinder and dial will not be disturbed during the operation of the machine, and moreover it will be observed that the said needle dial is maintained clear of the needle cylinder for the free passage of the fabric. While in the present type of the invention I have disclosed the needle cylinder as stationary and consequently have described the needle dial as secured upon the depending column, it is to be understood that if it be desired to maintain the cam cylinder stationary and to rotate the needle cylinder the corresponding element of the dial may be secured to the depending column.

If a depending support for the needle dial of small diameter be employed, the periphery

of such support is so far removed from the heels of the needles when operated by the cams that the leverage or torque is such as to twist the column or distort it sufficiently so that the dial needles strike against the sides of the cylinder needles. This results in the destruction of the work and the smashing of parts of the machinery. Owing to the fact that the grooves of the dial needles are radially disposed, such grooves cannot be carried in sufficiently near the periphery of a support of small diameter to overcome the torque or large leverage referred to. Therefore I enlarge the diameter of the depending column to substantially one-third the diameter of the needle dial, thereby carrying the periphery of such depending column sufficiently near the heels of the needle to overcome the objections referred to.

In the present type of the invention, viewing Fig. 2, the bed plate of the machine is indicated at 14, such bed plate preferably being secured in any suitable manner to the supporting bracket 8, though if desired it may be formed integrally therewith and is preferably provided with a central opening 15. Since in the present type of the invention I contemplate maintaining the needle cylinder fixed and rotating the cam cylinder, the needle cylinder 16 is secured to the bed plate, as upon an upstanding annular rib 17, upon which is received the lower end of the needle cylinder, which is preferably reduced in diameter, as indicated, thus forming a shoulder that may contact with the upper edge of said positioning rib, the interior diameter of said annular rib 17 being such that the lower portion of the needle cylinder 15, closely fits therein, whereby motion of the needle cylinder on the bed plate is avoided, and the same may be truly and accurately positioned. While any desired means may be resorted to to maintain the needle cylinder in position, preferably the same is secured in a manner permitting vertical adjustment of the cylinder either at the time of assembling the parts, or in the subsequent operation of the machine to vary the length of stitches. For the purpose indicated the bed plate 14 at a point adjacent the central opening 15 therein, is provided with one or a plurality of stops or adjustable set screws 18, whereon the lower edge of the needle cylinder may be received, one of a series of screws 19, being preferably employed in conjunction with each set screw 18, herein shown as passing through vertical openings in the bed plate and screwed into the lower edge of the needle cylinder, whereby in the rotation of said screws 19 in the proper direction, the said needle cylinder may be drawn down against the ends of the set screws, the vertical position of which has previously been determined.

The needles indicated at 20 are carried in any suitable manner on the needle cylinder,

and preferably spaced or separated by lands 21. The cam cylinder 22 may be of any desired character or type. Since in the present type of the invention the needle cylinder has been represented as stationary, a movement of rotation is imparted to the cam cylinder, and for that purpose it is herein shown as suitably mounted upon a gear ring 23, having a gear 24 preferably formed therewith and meshing with a gear 25 preferably upon the main driving shaft 26, suitably mounted in the supporting bracket 8. Preferably the cam cylinder is formed of a series of segments 27, each of which carries its portion of the needle cams or needle tracks. Preferably each segment 27 is directly mounted upon and secured to a flat portion of the gear ring 23, and preferably in such a manner as to permit the segments when detached from said gear ring to be removed therefrom by radial movement alone, thus obviating any lifting movement thereof which displaces the needles.

In the present type of the invention the gearing is provided with a flush surface whereon said segments are received, said flush surface extending outwardly beyond and circumferentially of said segments, so that when the latter have been released from the gear ring, they may be slid radially outward upon the said flush surface until removed from needle engaging relation, whereby the vertical position of the needles need not be disturbed by the removal of a segment or segments. As a suitable means for securing said segments to the gear ring, I have herein shown vertically disposed screws 28, of which I preferably employ two for each segment, said screws being of such length as to vertically pass entirely through said segments and into screw threaded openings in the gear ring. Were said screws 28 to engage merely screw threaded openings in the gear ring, after removal of such screws, it would be extremely difficult to again secure them in said openings precisely as they were before. That is to say, the screw threaded engagement of the screw and the hole therefor, cannot be relied upon to provide a positioning means for said screws. Therefore, in the present type of the invention each screw hole is counterbored, as indicated at 29, for the reception of the lower end 30 of the body of each screw which accurately fits in such counterbored portion, the said screw holes preferably being formed in a thickened portion of the cam ring, the shoulder formed thereby being received upon a shoulder of the bed plate. In this manner each segment after its removal may be returned to the exact position previously occupied thereby and secured in such exact position, it being apparent that such exact positioning is highly desirable in the type of mechanism herein disclosed. Preferably upon the upper edge of the cam cylinder 22 is disposed an annular

gib or washer 31, preferably composed of segments which may correspond with those of the cam cylinder and which may be secured thereto by screws (not shown) or in any other desired manner. Said gibs as shown are preferably maintained in such close relation with the outer wall of the needle cylinder as to prevent the cylinder needles from flying out radially or becoming otherwise displaced.

In order to rotate the dial cam disk or cap synchronously with the cam cylinder in the present type of the invention means are provided rotatively to connect the gear ring 23 and the dial cam disk or cap 32, such means herein comprising preferably a plurality of vertical posts 33, screwed or otherwise secured in the gear ring 23 and preferably in a positioning rib 34 thereon, the upper end of said posts being shouldered, as at 35, to receive the preferably perforated outer ends of the spider arms 36, the upper ends of said posts 33 being screw threaded for the reception of nuts 37, whereby the vertical position of said spider may be fixed, if desired. It will be observed that the vertical position of the spider may be adjusted, if desired, either by adjustment of the posts 33, or of the spider arms upon the posts, as by suitable adjusting connections between said arms and posts, or in any other desired manner. The dial cam disk or cap 32 is fixedly secured to and as herein shown within the spider 36 by the sleeve 38, formed with the dial cam disk or cap, said sleeve being secured to the sleeve in any desired manner, so that said sleeve and spider may be rotated upon the depending column 4 synchronously with the cam cylinder.

The needle dial 39 is secured preferably to the lower end of the depending column 4 in any suitable manner, as by a set screw 40. Inasmuch as the depending column is of enlarged diameter the extended periphery thereof presents a sufficiently large surface for delicate adjustments by means of the set screw. Before said set screw 40 is brought into binding relation with the depending column the needle dial is carefully adjusted circumferentially and vertically, so as to bring the needles or yarn manipulating elements of the dial in proper relation to the needles of the cylinder, so as to be out of contact therewith. When this position has been secured the screw 40 is turned to maintain the needle dial in its desired relation, which will not be disturbed in the operation of the mechanism. Thus, a positive means is provided to maintain the needles or yarn manipulating elements of the dial in spaced relation to the needles of the cylinder.

A plurality of brackets 41 is preferably employed, which may be perforated for the reception of the posts 33, said brackets carrying studs 42, upon the upper end whereof

may be mounted in any desired manner a bobbin supporting ring or other device, thus rotating with the cam cylinder.

Preferably mounted upon the posts 33, is a yarn ring 43, having suitable provisions for supplying yarn to the needles, such ring preferably having a plurality of laterally projecting lugs adapted to be secured to the posts 33 by set screws 45, said lugs preferably and as herein shown resting upon the upper edge of the brackets 41. If the machine be used as a ribber, independent yarn guides or any other suitable form of yarn feeding mechanism may be substituted for the yarn ring 43.

Having thus described one type or embodiment of my invention, I wish it to be understood that although specific terms are used with reference to that embodiment herein illustrated, such terms are used in a generic and not a specific sense and for illustrative purposes merely, and that the scope of the invention is set forth in the following claims.

Claim.

1. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a needle dial, an overhead support whereto said needle dial is secured and by which it is wholly supported and positioned, a dial cam disk sleeved upon said overhead support, a gear ring to which said cam cylinder is secured and by which the same is rotated, upright posts secured to said gear ring, bobbin frame supporting brackets mounted upon said posts, a yarn feeding device mounted upon said posts, and a spider connecting said posts and said dial cam disk, whereby the cam cylinder, bobbins, yarn supplying devices and dial cam disk are synchronously rotated.

2. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a gear ring to which said cam cylinder is detachably secured, a needle dial, an overhead support to which said needle dial is secured and by which it is supported and positioned, a dial cam disk upon said overhead support and upright posts detachably secured to said gear ring, a spider mounted upon said posts and supporting said dial cam disk and a yarn feeding device also mounted upon said posts in operative proximity to the needles.

3. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a gear ring to which said cam cylinder is detachably secured and having a flush upper face, a needle dial, an overhead support to which said needle dial is secured and by which it is supported and positioned, a dial cam disk upon said overhead support, upright posts connected to said gear ring and operatively connected to and supporting said dial cam disk, said cam cylinder comprising a plurality of segments entirely encircling said

needle cylinder, said segments being directly mounted upon the flush upper surface of the gear ring, said flush upper surface extending beyond and circumferentially of said segments, and means to secure said segments to said flush upper surface of said gear ring, whereby each of said segments may be withdrawn from the needle cylinder by direct radial movement thereof without movement of the said upright posts.

4. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a gear ring to which said cam cylinder is detachably secured and having a flush upper face, a needle dial, an overhead support to which said needle dial is secured and by which it is supported and positioned, a dial cam disk upon said overhead support, upright posts connected to said gear ring and operatively connected to and supporting said dial cam disk, said cam cylinder comprising a plurality of segments entirely encircling said needle cylinder, said segments being directly mounted upon the flush upper surface of the gear ring and each being radially movable thereon, said flush upper surface extending beyond and circumferentially of said segments, and means passing vertically through the main web of said segments and into said gear ring, whereby said segments are secured in position.

5. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a gear ring to which said cam cylinder is detachably secured and having a flush upper face, a needle dial, an overhead support to which said needle dial is secured and by which it is supported and positioned, a dial cam disk upon said overhead support, upright posts connected to said gear ring and operatively connected to and supporting said dial cam disk, said cam cylinder comprising a plurality of segments entirely encircling said needle cylinder, said segments being directly mounted upon the flush upper surface of the gear ring, said flush upper surface extending beyond and circumferentially of said segments, said segments being devoid of a base supporting flange, thus permitting an extended radial movement of each of said segments upon the flush upper face of the gear ring, and screws passing vertically through the main web of said segments and into engagement with said gear ring.

6. A knitting machine comprising a bed plate, a needle cylinder stationarily mounted thereon, a gear ring mounted upon said bed plate and having a flush upper face, a cam cylinder comprising a plurality of segments mounted upon said gear ring and screws passing vertically through the main web of said segments and into threaded engagement with said gear ring, said segments entirely surrounding the needle cylinder and each being radially movable upon the flush upper

face of said gear ring, a needle dial, a dial cam disk, and means radially beyond said segments and distinct therefrom for supporting said dial cam disk.

5 7. A knitting machine comprising a bed plate, a needle cylinder stationarily mounted thereon, a gear ring mounted in said bed plate and having a flush upper face, a cam cylinder comprising a series of segments 10 mounted upon said gear rings and entirely surrounding said needle cylinder, counter-bored threaded sockets being provided in said gear ring and vertically disposed screws engaging said segments and received by said 15 threaded sockets, the lower body or unthreaded portion of said screws being received by said counterbored portion of said sockets, whereby said segments may be accurately positioned, a needle dial, a dial cam disk, and means radially beyond and distinct 20 from said segments for supporting said dial cam disk, the construction being such that each of the said segments may be radially moved with out movement of the support 25 for the dial cam disk.

8. A knitting machine comprising a bed plate, a needle cylinder stationarily mounted thereon, said bed plate having two annular 30 grooves for the reception of a gear ring, a gear ring seated in said grooves and provided with a flush upper face, a cam cylinder comprising a series of segments directly seated upon said gear ring with capacity for direct 35 radial removal thereof from the needle cylinder, a needle cam disk and vertically disposed posts secured to said gear ring and operatively connected to said dial cam disk to rotate the latter synchronously with the cam cylinder, said posts being distinct from 40 and unconnected with each of said cam cylinder segments, whereby each of said segments may be moved radially outward without movement of said posts.

9. A knitting machine comprising a main 45 column, a bracket laterally extending therefrom, a stationary needle cylinder and rotatable cam cylinder supported thereby, a rigid depending column extending from and supported by said main column, a needle dial secured to and wholly supported and positioned 50 by said depending column, a dial cam disk rotatably sleeved upon said depending column, a gear ring whereto said cam cylinder is detachably secured for rotation and upon which it rests, upright posts secured to said gear ring 55 and a spider secured to said dial cam disk and said posts, whereby said dial cam disk and cam cylinder are connected for synchronous rotation, said rotatable cam cylinder comprising 60 a plurality of segments entirely encircling the needle cylinder and each of them being unconnected with said upright posts, whereby radial movement of each of said segments is permitted without movement of said posts.

65 10. A knitting machine comprising a main

column, a bracket laterally extending therefrom, a stationary needle cylinder and rotatable cam cylinder supported thereby, a rigid depending column extending from and supported by said main column, a needle dial 70 secured to and wholly supported and positioned by said depending column, a dial cam disk rotatably sleeved upon said depending column, a gear ring whereto said cam cylinder is detachably secured for rotation and upon 75 which it rests, upright posts secured to said gear ring and a spider secured to said dial cam disk and said posts, whereby said dial cam disk and cam cylinder are connected for synchronous rotation, said main column 80 having a base laterally enlarged and extended underneath the cylinders and depending column to afford a sufficient support for the mechanism when unconfined to the flooring.

11. A knitting machine comprising an upright 85 column or support, a rigid column depending from and supported by said main column, a stationary needle cylinder and rotatable cam cylinder supported by said main column, a needle dial wholly supported and 90 positioned by said depending column, a dial cam disk sleeved upon said depending column, a gear ring to which said cam cylinder is secured and by which the same is rotated, upright posts secured to said gear ring, bobbin 95 frame supporting brackets mounted upon said posts, a yarn feeding device mounted upon said posts, and a spider connecting said posts and said dial cam disk, whereby the cam cylinder, bobbins, yarn supplying devices 100 and dial cam disk are synchronously rotated.

12. A knitting machine comprising a main upright column or support, a rigid depending 105 tubular column of relatively large diameter compared with that of the main column, a stationary needle cylinder and rotatable cam cylinder supported by said main column, a needle dial secured to and wholly supported and positioned by said depending column, a 110 dial cam disk sleeved upon said depending column, a gear ring to which said cylinder is secured and by which the same is rotated, upright posts secured to said gear ring, bobbin frame supporting brackets 115 mounted upon said posts, a yarn feeding device mounted upon said posts, and a spider connecting said posts and said dial cam disk, whereby the cam cylinder, bobbins, yarn supplying devices and dial cam disk are synchronously rotated, said main column having 120 a laterally enlarged base extending underneath the cylinders and depending column to afford a sufficient support for the mechanism when unconfined to the flooring.

13. A knitting machine comprising a stationary needle cylinder, a rotatable cam cylinder, a needle dial, an overhead support whereto said needle dial is secured and by which it is wholly supported and positioned, a dial 125 cam disk sleeved upon said overhead support. 1305

a gear ring upon which said cam cylinder directly rests and to which it is secured for rotation, upright posts secured to said gear ring, bobbin frame supporting brackets mounted upon said posts, yarn feeding devices mounted upon said posts, and a spider connecting said posts and said dial cam disk, whereby the cam cylinder, bobbins, yarn supplying devices and dial cam disk are synchronously rotated.

14. A knitting machine comprising a needle cylinder, a relatively rotatable cam cylinder composed of a plurality of removable segments, a gear ring having a flush upper face whereon said segments are directly mounted, said face extending beyond and circumferentially of said segments, and vertically disposed pins passing through the main tubular web of said segments and securing them to said gear ring, said segments being adapted to be withdrawn from the needle cylinder by direct radial movement of said segments and without vertical displacement of the needles.

15. A knitting machine comprising a main column or support, a bracket supported thereby, a stationary needle cylinder, and a rotatable cam cylinder supported from said bracket, a depending column extending from and rigidly or inflexibly supported by said main column, a needle dial secured to and wholly supported by said depending column and maintained thereon in proper circumferential relation with the needle cylinder, the diameter of said depending column being not less than substantially one-third the diameter of the needle dial, and a rotatable cam dial in cooperative relation with said needle dial, said segments being devoid of base securing flanges, whereby an extended radial movement of said segments upon the flush upper face of the gear ring is permitted.

16. A knitting machine comprising a main column or support having an enlarged base, a bracket supported thereby, a stationary needle cylinder and a rotatable cam cylinder supported from said bracket, a depending column extending from and rigidly or inflexibly supported by said main column, said depending column being hollow, a needle dial secured to and wholly supported by said hollow depending column and maintained thereon in proper circumferential relation with the needle cylinder, the diameter of said depending column being not less than substantially one third the diameter of the needle dial, the enlarged base extending sufficiently underneath the cylinders and depending column to afford a sufficient support for the mechanism when unconfined to the flooring.

17. A knitting machine comprising a main column or support, a bracket supported thereby, a stationary needle cylinder and a rotatable cam cylinder supported from said bracket, a depending column extending from and rigidly and inflexibly supported by said main column, said depending column being hollow, a needle dial secured to and wholly supported by said depending column and maintained thereon in proper circumferential relation with the needle cylinder, the diameter of said depending column being not less than substantially one third the diameter of the needle dial, and a rotatable cam dial in cooperative relation with said needle dial.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

BERNARD T. STEBER

Witnesses:

FRANK STEBER,
AGNES M. GEARY.