

A. M. PIGEON.
YARN FEED DEVICE FOR KNITTING MACHINES.
APPLICATION FILED MAY 25, 1911.

1,026,176.

Patented May 14, 1912.

5 SHEETS—SHEET 1.

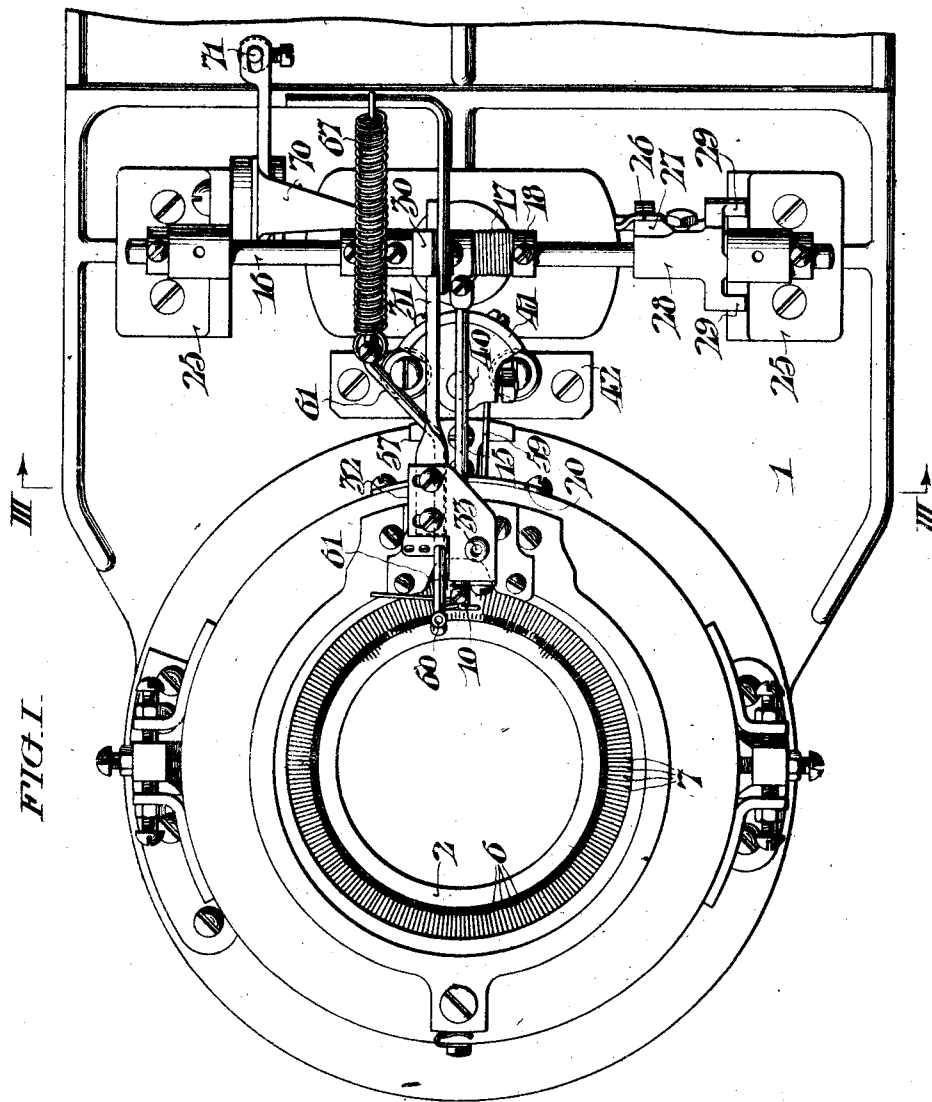


FIG. I.

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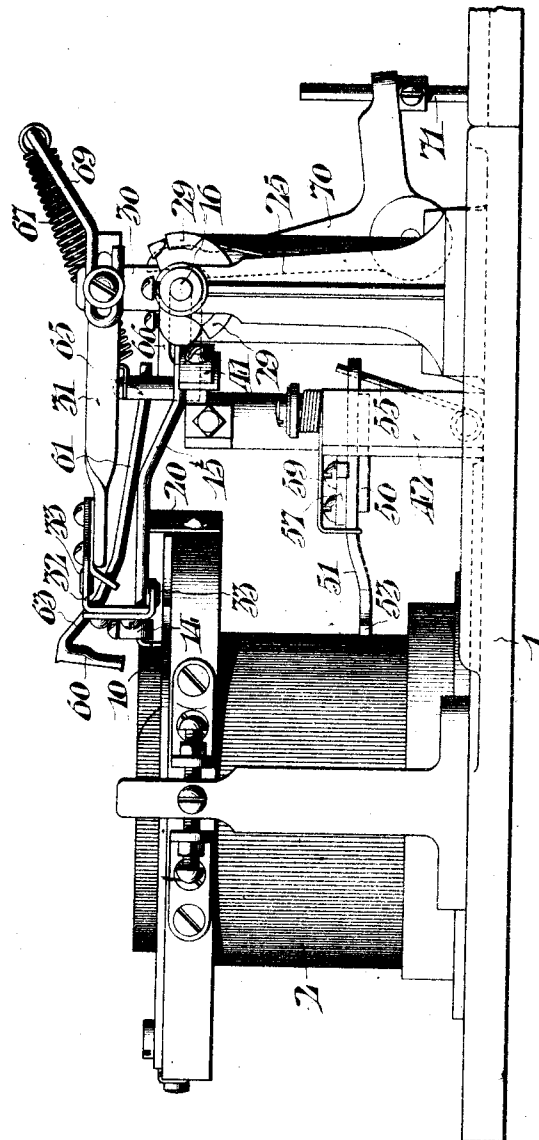
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5 SHEETS—SHEET 2.

FIG. II.



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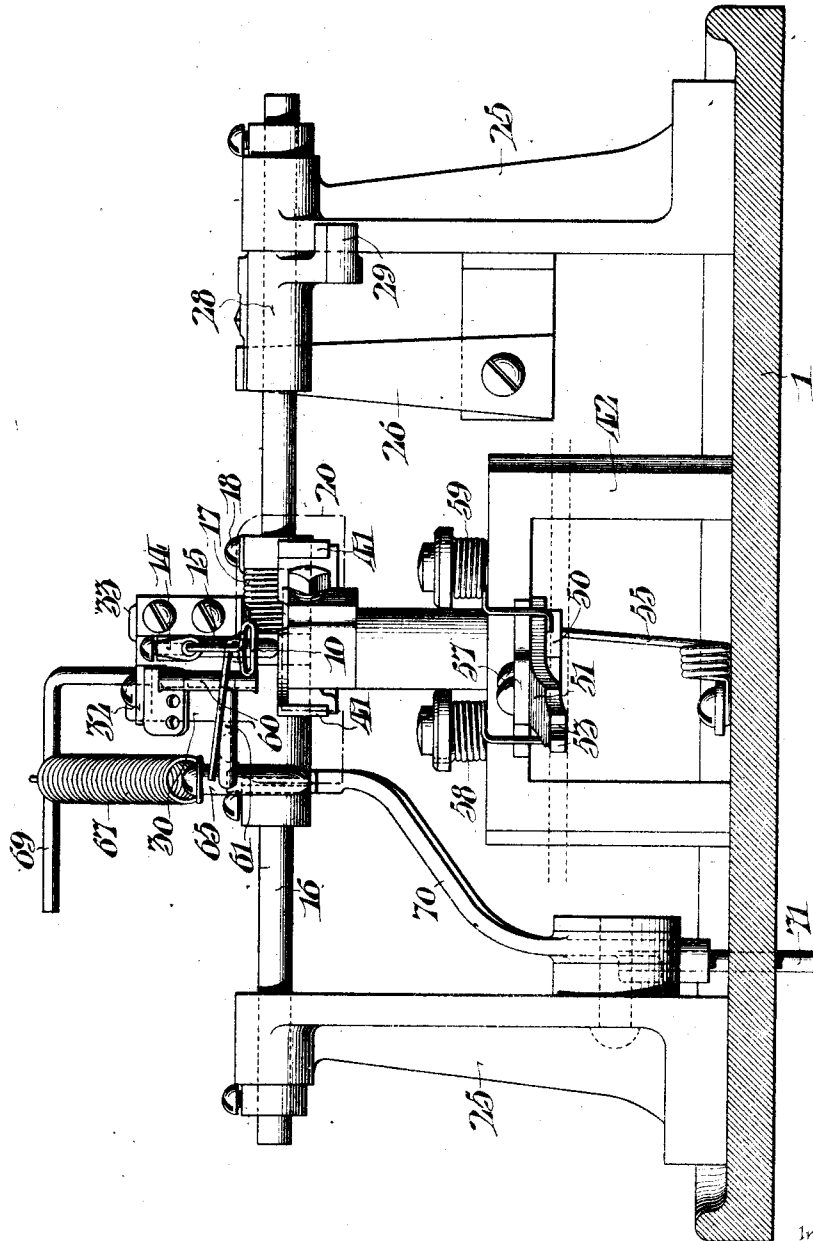
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FIG. III.



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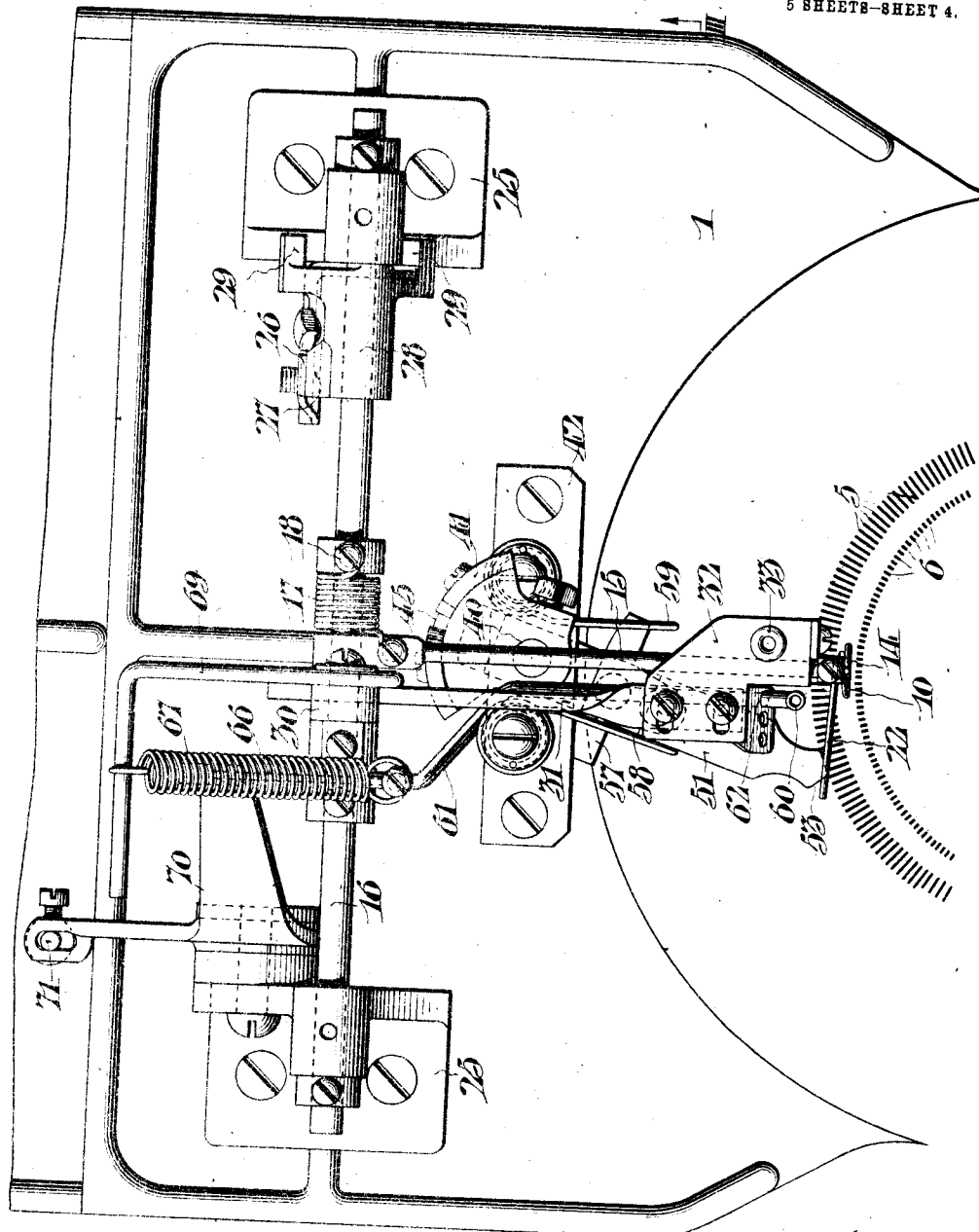
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5 SHEETS—SHEET 4.



Witnesses
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FIG. IV

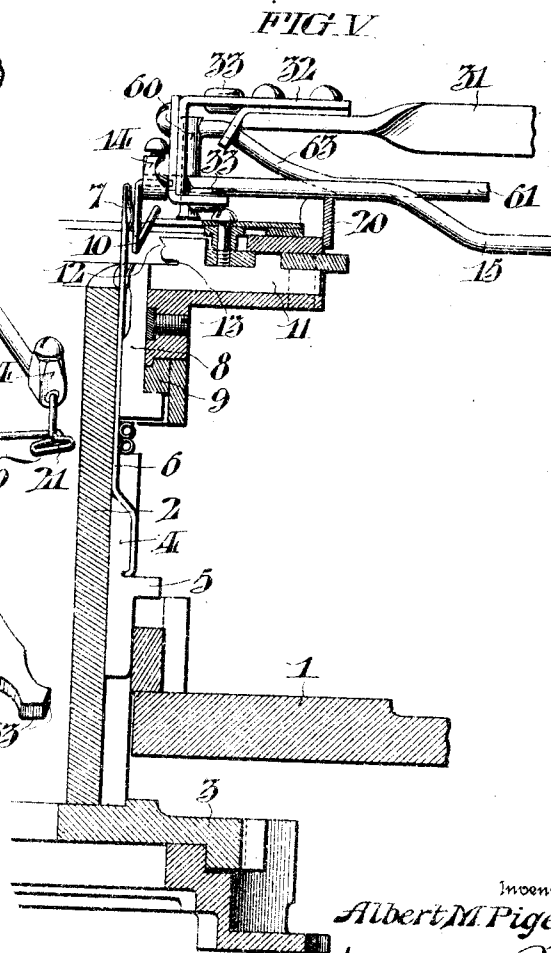
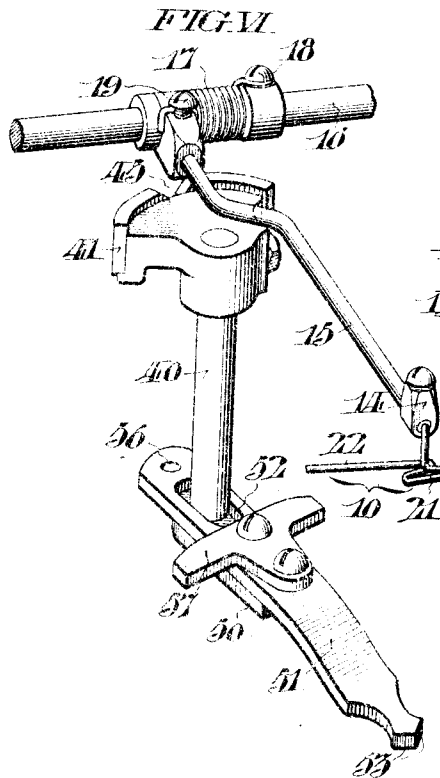
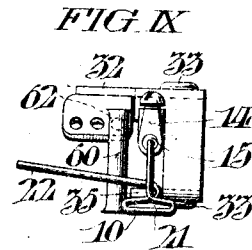
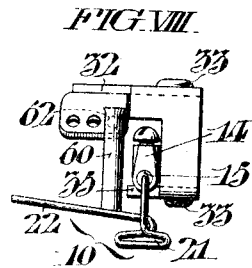
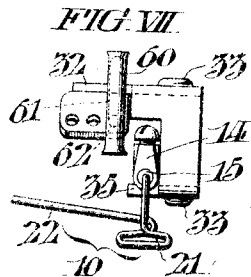
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

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YARN-FEED DEVICE FOR KNITTING-MACHINES.

1,026,176.

Specification of Letters Patent.

Patented May 14, 1912.

Application filed May 25, 1911. Serial No. 629,259.

To all whom it may concern:

Be it known that I, ALBERT M. PIGEON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Yarn-Feed Devices for Knitting-Machines, whereof the following is a specification, reference being had to the accompanying drawings.

10 The invention relates to knitting machines employing independently movable needles provided with butts adapted to be engaged by suitable devices for controlling the needles during the knitting operation, and
15 for rendering certain of said needles idle, whereby said needles may perform the operation of tubular knitting with capacity for the insertion of heel and toe pockets as usually practiced in stocking knitters.
20 The invention more specially relates to a machine of the type shown and described in my prior Patent No. 943,230, granted December 14th, 1909. In this patent is shown a circular knitting machine employing spring-
25 beard needles, which are controlled for circular knitting or reciprocatory knitting and more especially for use as a stocking knitter. Certain of the needles are formed with long butts, whereby the same may be thrown out
30 of action during the knitting of the heel and toe pockets. Also means are provided for controlling the active series of needles for narrowing and widening during the knitting of the heel and toe pockets. A yarn feeding device is provided which lays the yarn
35 in front of notched sinkers, which operate in the usual manner in connection with this type of machine. Means are also disclosed in the patent for moving the yarn feeding
40 device away from the needles and sinkers, so as to prevent the laying of the yarn in front of the sinkers, coöperating with the idle needles, this yarn feeding device is controlled by the upper ends of the needles.

45 An object of the present invention is to provide a more durable and efficient device for controlling the yarn feed.

To this end the invention consists generally in devices which are acted upon by the butts of the needles which are rendered idle.

50 A further object of the invention is to provide a feeding device for guiding the reinforcing yarn, which feeding device may be automatically controlled so as to render the
55 same effective or ineffective at proper intervals.

The invention further consists in the general simplifying of the yarn feeding elements, and the devices for controlling the same, whereby such controlling devices may, so far as possible, be placed beneath the supporting frame adjacent to the upper end of the needle cylinder, and whereby said controlling devices may be rendered durable, and efficient in performing the functions for
60 which they are designed.

These and other objects will in part be obvious and will in part be hereinafter more fully described.

In the drawings which show by way of
65 illustration, one embodiment of the invention, Figure I. is a plan view of the upper portion of a knitting machine embodying my improvements. Fig. II, is a side elevation of the same. Fig. III, is a sectional
70 view on the line III, III, of Fig. I. Fig. IV, is a plan view showing the control of the yarn feed by the needle butts. Fig. V, is a detail vertical section through the needle cylinder showing the yarn feed in side elevation. Fig. VI, is a perspective view of
75 the controlling cam for the yarn feed. Fig. VII, is a detail showing the yarn feed in operative position, and the reinforcing yarn guide in inoperative position with respect
80 to the yarn feed. Fig. VIII, is a similar view showing the reinforcing yarn guide, in operative position with respect to the yarn feed. Fig. IX, is a similar view showing the yarn feed moved away from the
85 needles, to withdraw the yarns from in front of the sinkers coöperating with the idle needles.

The machine shown in part in the several figures of the drawings, comprises a frame
90 1, having supporting devices for a needle cylinder 2, which may be of the usual construction, and, as hereinafter illustrated, said needle cylinder is rotated relative to the yarn feed and the controlling cams by a
95 gear 3, which may be connected to any suitable driving means. This needle cylinder may not only be rotated for circular knitting, but may be also oscillated or reciprocated for forming toe and heel pockets in
100 any well known manner.

Mounted within the needle grooves or channels in the needle cylinder are jacks
105 4, which are formed with butts 5, for controlling the needles 6, which are attached
110 to the jacks. It is obvious that from certain aspects of the invention, these butts may

be formed directly in the needles if desired. The needles are preferably arranged in two complementary series, one of which may be formed with long butts and the other with short butts, so that during the knitting of the heel and toe pockets, the long butt needles may be rendered idle. The needles as herein shown are formed with spring-beards 7, which are closed at proper intervals by depressing devices 8, which are operated in proper timing to the rotation of the cylinder through suitable cams 9. The yarn for feeding the needles is led through a yarn feed 10. Associated with each needle is a sinker, 11, which, as herein shown, is formed with the thread receiving notch 12, and the notch 13, which may operate to depress or hold the web down, on the shanks of the needles. The sinkers 11, may be moved toward and from the needles, by any well known devices.

The cams for operating the needles and the depressing members, and also the sinkers may be of the construction shown in the patent above referred to, and will not need further description in this connection.

The yarn feed 10, is mounted in a sleeve 14, carried by the outer end of a rod 15, loosely pivoted on the bar 16. A spring 17, surrounds the bar 16, and at one end is secured to a collar 18, rigidly attached to the rod 16. The other end of the spring 17, engages a screw 19, attached to the shank carrying the rod 15. This spring normally tends to throw the rod 15, downward. The downward movement of the rod is limited by the plate 20, (see Fig. II) secured to the supporting ring at the upper end of the needle cylinder. The yarn feed may be of any desired construction, but, as herein shown, is formed of a wire bent into a loop 21, from which said wire projects to form a supporting or threading finger 22.

The bar 16, carrying the yarn feed is mounted in brackets 25, secured to the frame 1 of the machine. This bar is mounted to rotate in said brackets and is held in various adjusted positions by a flat spring 26, which engages a V-shaped cam shoulder 27, formed on the collar 28, attached to the bar 16. The collar 28, is also formed with two stop lugs 29, which limit the oscillating movement of the bar 16, in the supporting bracket. Also mounted on the bar 16, is an upwardly projecting bracket 30, which carries an arm 31, which in turn supports a plate 32, having eyes 33, for the yarn, which is led to the yarn feed 10. The plate 32, is also formed with a laterally projecting finger 35, Fig. VII which extends underneath the rod 15, so that when the bar 16, is moved about its pivot the rod 15, will be moved with the arm 31, and thus carry the yarn feed entirely away from the needle cylinder.

When the needle cylinder is reciprocated for forming the heel and toe pockets, it is desirable to move the yarn feed away from the needles so as to withdraw the yarn from in front of the sinkers, coöperating with the idle needles. In my prior patent, devices have been provided for accomplishing this withdrawal of the yarn feed at the time stated, and these devices are operated from the shanks of the needles. In the present construction, I have provided means for withdrawing the yarn feed from the needles, which is controlled and operated from the butts of the idle needles. These devices consist generally in a vertical shaft 40, which carries a cam plate 41, at its upper end. The vertical shaft 40, is mounted to oscillate in a suitable bracket 42, carried by the frame 1. The cam plate 41, is formed with a central V-shaped notch 45. When the rod 15, is directed over the V-shaped notch, the spring 17, may throw the rod to its normal yarn feeding position. An oscillation of the shaft 40, in either direction will bring one of the inclined pieces of the V-shaped notch into engagement with the rod 15, and swing the same about the bar 16, compressing the spring 17. This movement of the rod 15, is sufficient to withdraw the yarn feed away from the needles and away from in front of the sinkers, so that as the sinkers move forward, they will not engage the yarn. The vertical shaft 40, is formed with a rigid arm 50, at its lower end. A sliding finger 51, is mounted on said arm, and is formed with a slot 52, through which the shaft 40, extends. This finger 51, is connected to the arm 50, so that said finger 51, may move radially relative to the axis of the shaft 40, but all angular movements of the finger 51, will impart a rotary movement to the shaft 40. The finger 51, at its forward end is formed with oppositely inclined surfaces 53, forming a V-shaped nose. The engagement of the finger 51, by the butts of the needles will swing the finger 51, one way, or the other, depending upon the direction of reciprocation of the needle cylinder. The swinging of the finger 51, will oscillate shaft 40, and through the cam plate 41, will raise the rod 15, carrying the yarn feed.

The finger 51, is provided at its top with a cam piece 57, which is adapted to engage the edge of the bracket 42. This engagement is effected by the action of a spring 55, which is secured to the bed plate 1. The free end of spring 55, is received within the aperture 56, at the rear of finger 51, and thereby exerts a rearward pull upon the latter, so that its cam piece 57, is at all times maintained in contact with the straight edge of the bracket 42.

When in its normal position, the finger 51, is maintained in a radial line with respect

to the cylinder by the co-action of the straight portion of the cam surface on piece 57, with the straight edge of bracket 42, under the influence of spring 55. When in this position (see Fig. II) the end of the finger 51, clears the surface of the needle cylinder by about a sixty-fourth of an inch.

When the finger 51, is engaged by the butts of the idle needles during the knitting of the heel and toe of the stocking, the projecting portions of the cam piece 57, in riding along the edge of the bracket 42, become effective in distending the said finger toward the needle cylinder. This causes the end of the finger 51, to move in a practically straight line parallel to the edge of bracket 42. This distending of the finger 51, and the straight path of its end, prolongs the period of engagement with the needle butts and thereby magnifies the motion of the rock shaft 40.

A spring 58, is attached to the bracket 42, and bears against one side of the finger 51, and normally tends to return the same to the central position. A spring 59, is located on the opposite side of the finger and returns said finger to central position when moved in the opposite direction.

In the operation of the above parts, the yarn feed is held in the normal position relative to the needles during the circular knitting. At this time, the butts of the needles are lowered as all the needles are in action, and therefore the finger 51, is in its central position which allows the yarn feed to remain in normal position. When the pattern mechanism controls the parts for operating the needle cylinder, so as to cause the same to reciprocate and also throw out of action the long butt needles, said long butt needles will be moved or raised into the path of the finger 51, so that as the cylinder is oscillated the butts of these needles will engage the V-shaped end 53, of the finger 51, and move the same in one direction or the other, depending upon the direction of movement of the needle cylinder, and in whichever direction said finger 51, is moved the yarn feed will be raised from the needles withdrawing the yarns from the path of the sinkers which cooperate with the idle needles. When the fashioning cams are drawn into action, so as to throw out certain of the active needles, one after the other, for narrowing the heel or toe pockets, the butts of the needles as they are rendered idle, one by one, will be moved into the path of the finger 51, and will engage said finger at an earlier period in the oscillation of the needle cylinder and cause the yarn feed to be moved from each needle which is idle and the sinker cooperating therewith. When the fashioning cams are again brought into such position as to throw the needles into action, to widen the heel and toe pockets, the butts of the

needles drawn into action will be removed from the path of the finger 51, and again said yarn feed will be properly controlled so as to feed a yarn to all the active needles and sinkers cooperating therewith, and will also be so controlled as to move away from the idle needles and sinkers cooperating therewith, so as to prevent the yarn from being carried about the shanks of the needles which are rendered idle by the sinkers which co-act therewith. By the above construction, it will be apparent that the yarn controlling devices are located substantially beneath the ring at the upper end of the needle cylinder, which gives free access to the yarn feed and the parts adjacent thereto. Furthermore, by this positioning of the controlling devices for the yarn feed, I am able to enlarge the parts thereof, so as to make the same much more durable and efficient in action. Then again, by the present devices wherein the butts of the needles engage and operate the controlling devices, all liability of springing the outer or free ends of the needles as in my patented construction, is avoided.

When knitting the heel and toe pockets, above referred to, it is often desirable to introduce a reinforcing yarn. As a means for feeding such reinforcing yarn, I have provided a yarn guiding device 60. Said yarn guiding device, as herein shown, is tubular in form, and is carried by the outer end of an arm 61, which arm slides through a guiding opening 62, in a plate carried at the outer end of the bracket arm 31. The outer end of the arm 61, is inclined outwardly as at 63, so that as the arm 61, is moved back and forth in the opening in the supporting plate therefor, the tubular yarn guide 60, will not only be moved away from the needle cylinder, and the yarn guide 10, but will be raised above the needle cylinder. The inner end of the arm 61, is carried by a post 65, which is mounted on a slide 66, slotted to engage the bar 16. A spring 67, engages the post 65, at one end, and engages an adjustable arm 69, at its other end. This spring normally throws the slide 66 to the right as viewed in Fig. II, and draws the yarn guides 60, into normal operative position.

A lever 70, is pivoted to one of the brackets 25, of the machine, and at its upper end is deflected laterally so as to engage the rear end of the slide 66. By swinging the lever 70, about its fulcrum, the slide 66, may be forced inward toward the needle cylinder against the tension of the spring 67, and the yarn guide 60, thus moved to inoperative position. Said lever 70, may be swung about its fulcrum through the action of a rod 71, which may be controlled by any suitable pattern mechanism. When the yarn guide 60, with the reinforcing yarn is moved to

normal feeding position, the yarn carried thereby will be drawn against the supporting finger 22, (see Figs. VI to IX), and by the movement of the needle cylinder will be carried down the finger into the guiding loop 21, of the main yarn feed. When the reinforcing yarn guide is moved to inoperative position, the yarn will be withdrawn from the guiding loop 21, and thus the reinforcing yarn guide 60, will be rendered ineffective. Additional yarn guides may be provided if desired. These guides would all cooperate with the one guide loop 21, of the main yarn feed.

It is obvious that minor changes in the details of construction and arrangement of the parts of the yarn feeding and controlling devices may be made, without departing from the spirit of my invention as set forth in the appended claims.

Having thus described my invention, I claim:

1. In a knitting machine, the combination of a series of independently movable needles provided with operating butts, and having the capacity of being thrown to idle position; a yarn feeding device; and means cooperating with the butts of the idle needles for moving the yarn feeding device away from said idle needles.

2. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and having the capacity of being thrown into idle position; sinkers having yarn engaging portions and cooperating with each needle; a yarn feeding device; and means for cooperating with the butts of the idle needles for moving the yarn feeding device away from said idle needles and the sinkers cooperating therewith.

3. In a knitting machine, the combination of a series of independently movable needles provided with operating butts, means for moving certain of said needles to a different level to render the same idle; a yarn feeding device; and means cooperating with the butts of the idle needles for moving the yarn feeding device away from the idle needles.

4. In a knitting machine, the combination of a series of independently movable needles provided with operating butts, means for moving certain of said needles to a different level to render the same idle; sinkers cooperating with each needle; a yarn feeding device; and means for moving the yarn feeding device away from said idle needles and the sinkers cooperating therewith.

5. In a circular knitting machine, the combination of two complementary series of needles; means for positioning one series of needles at a different level from the other series of needles; said needles being movable independently and provided with operating butts; a yarn feeding device; and

means cooperating with the butts of the needles of one of the series for drawing the yarn feeding device away from the needles in said series.

6. In a circular knitting machine, the combination of two complementary series of needles, means for positioning one series of needles at a different level from the other series of needles, each of said needles being movable independently and provided with operating butts; a sinker cooperating with each needle; a yarn feeding device; and means cooperating with the butts of the needles of one series for moving the yarn feeding device away from said needles and the sinkers cooperating therewith.

7. A knitting machine including in combination a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feed; an arm supporting said yarn feed; a spring for normally holding said yarn feed in operative position relative to said needle; and devices controlled by the butts of the idle needles for moving the yarn feed away from the idle needles.

8. In a circular knitting machine, the combination of a series of independently movable needles provided with operating butts, and capable of being moved to idle position; a yarn feed; a spring normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for moving the same away from the needles; a shaft carrying said cam plate; and a finger carried by said shaft and engaging the butts of the idle needles for oscillating the shaft to move the yarn feed away from the idle needles.

9. In the circular knitting machine, the combination of a series of independently movable needles provided with operating butts, and capable of being moved to idle position; a yarn feed; a spring normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for moving the same away from the needles; a shaft carrying said cam plate; a finger carried by said shaft and engaging the butts of the idle needles for oscillating the shaft to move the yarn feed away from the idle needles; and means for distending the said finger to magnify the movement of the same.

10. In a circular knitting machine, the combination of a series of independently movable needles provided with operating butts, and capable of being moved to idle position; a yarn feed; a spring normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for moving the same away from the needles; a shaft carrying said cam plate; a finger carried by said shaft and engaging the butts of the idle

needles for oscillating the shaft to move the yarn feed away from the idle needles; means for extending the said finger; and springs for moving said finger to normal central position.

11. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feed; a spring for normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for raising and lowering the same; a vertical shaft on which said cam plate is mounted; a finger carried at the lower end of said shaft and movable radially relative thereto, said finger having a V-shaped outer end adapted to engage the butts of the idle needles.

12. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feed; a spring for normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for raising and lowering the same; a vertical shaft on which said cam plate is mounted; a bracket for supporting the said shaft; a finger carried by the lower end of said shaft and movable radially thereto; said finger having a V-shaped outer end adapted to engage the butts of the idle needles; a cam piece carried by the said finger and adapted to engage the bracket for supporting the said vertical shaft to extend the said finger and thereby prolong the period of engagement of the said finger with the idle needle butts; and a spring for maintaining the engagement between the said cam piece and said supporting bracket.

13. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feed; a spring for normally holding the yarn feed in operative position relative to the needles; a cam plate for engaging the yarn feed for raising and lowering the same; a vertical shaft on which said cam plate is mounted; a bracket for supporting the said shaft; a finger carried by the lower end of said shaft and movable radially

thereto, said finger having a V-shaped outer end adapted to engage the butts of the idle needles; a cam piece carried by the said finger and adapted to engage the bracket for supporting the said vertical shaft to extend the said finger and thereby prolong the period of engagement of the said finger with the idle needle butts; and a spring for maintaining the engagement between the said cam piece and said supporting bracket; and springs for normally returning said plate to central position.

14. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feeding device; a reinforcing yarn guiding device; said yarn feeding device including means for guiding the reinforcing yarns; means for moving said reinforcing yarn guiding device from inoperative to operative position; and a device for moving said yarn feeding device with the reinforcing yarn away from the idle needles.

15. In a knitting machine, the combination of a series of independently movable needles provided with operating butts and capable of being moved to idle position; a yarn feeding device; a reinforcing yarn guiding device; means for moving said reinforcing yarn guiding device from inoperative to operative position; and means for moving said yarn feeding device away from the idle needles, said means including devices engaging the butts of the idle needles.

16. In a knitting machine, the combination of a series of needles; a yarn feed; a rod supporting said yarn feed; a bar carrying said rod; brackets in which said bar is pivotally supported; a collar attached to said bar; stops carried by said collar and engaging said bracket for limiting the movement of the bar; a cam carried by the collar; and a spring cooperating with said cam for holding the yarn feed in operative and in-operative positions.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this eighth day of May 1911.

ALBERT M. PIGEON.

Witnesses:

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E. L. FULLERTON.