

1,034,032.

A. M. PIGEON.
KNITTING MACHINE.
APPLICATION FILED OCT. 12, 1909.

Patented July 30, 1912.

4 SHEETS-SHEET 1.

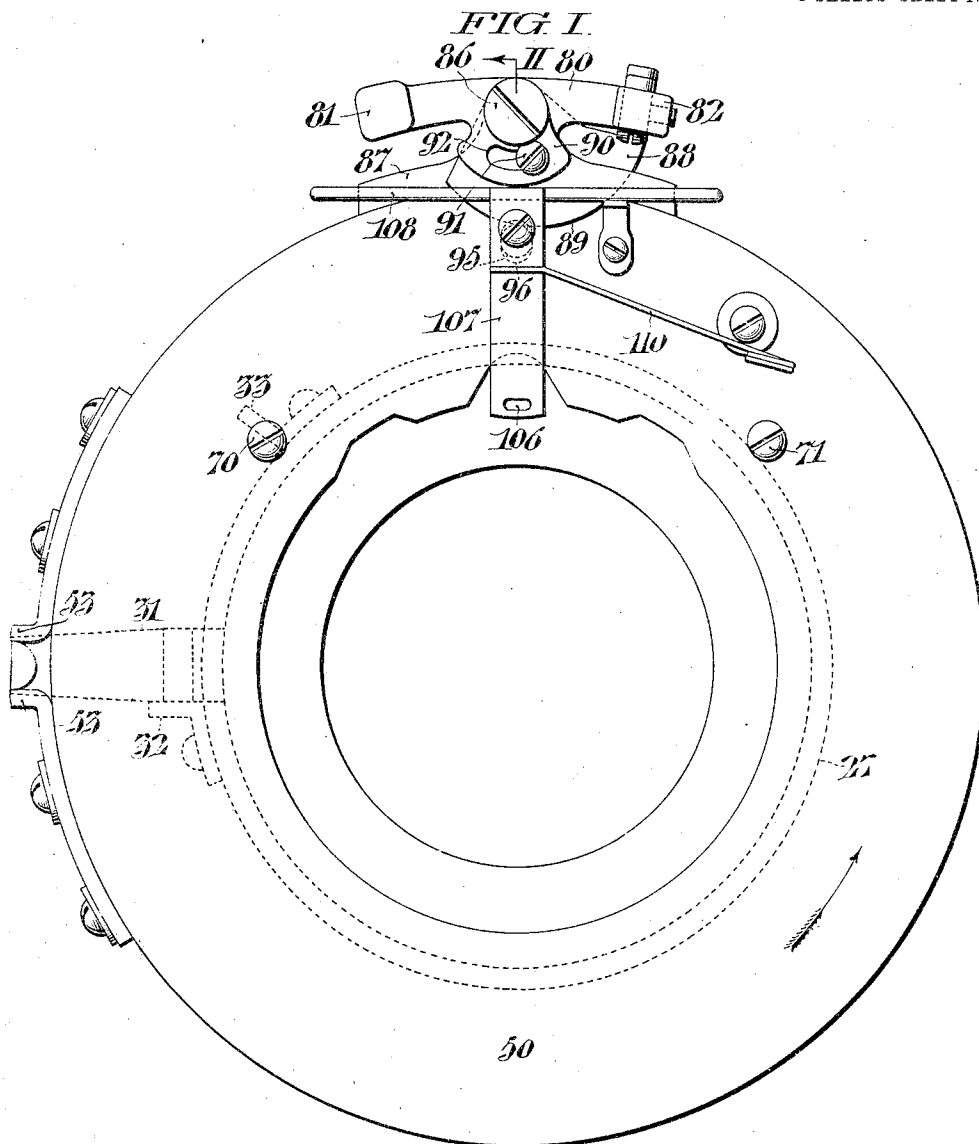
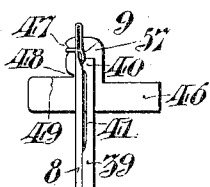


FIG. VI.



WITNESSES:

John C. Bergner.
James H. Bell.

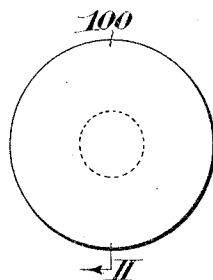
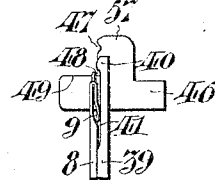


FIG. VII.



INVENTOR:

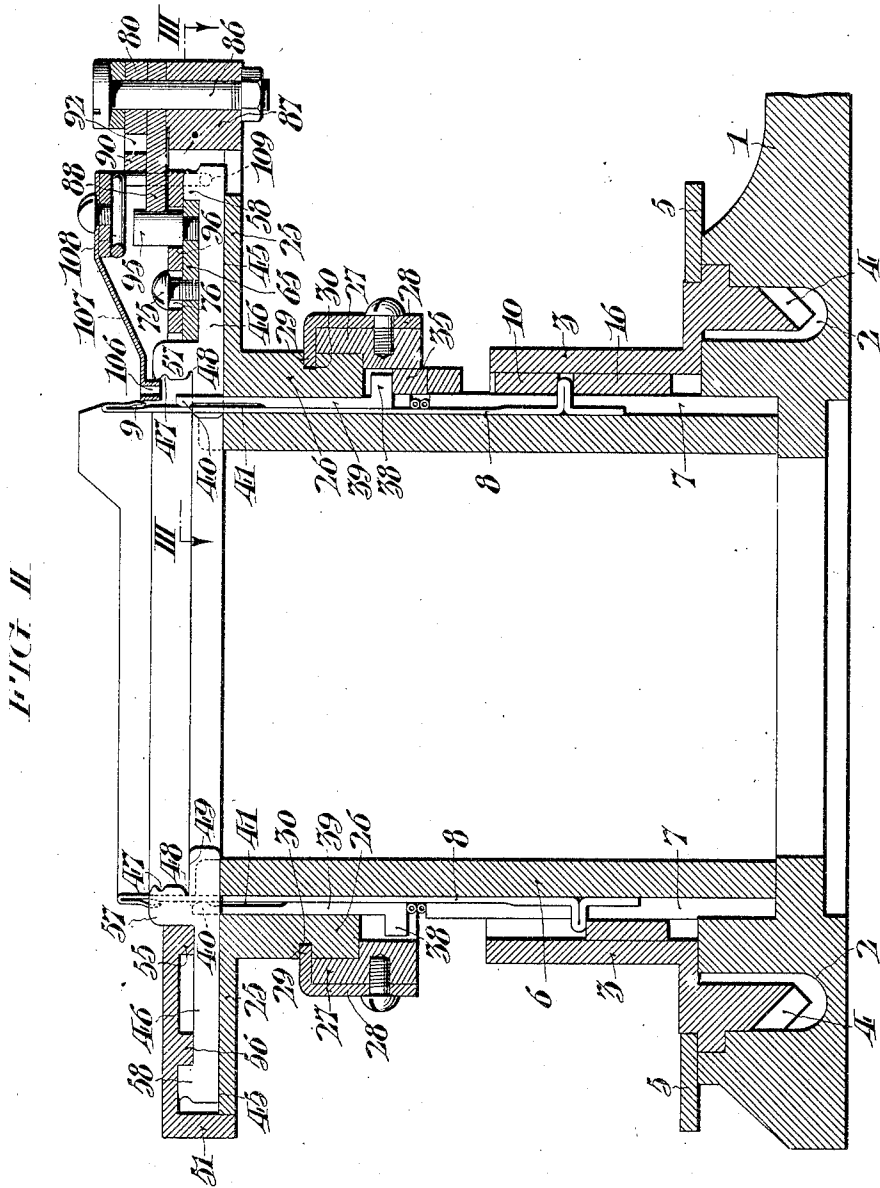
Albert M. Pigeon,
by his Attorneys
May + Paul

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4 SHEETS—SHEET 2.



WITNESSES:

John C. Bergner
James H. Bell

INVENTOR:

Albert M. Pigeon,
by his Attorneys
Fuller & Paine

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4 SHEETS—SHEET 3.

FIG. III

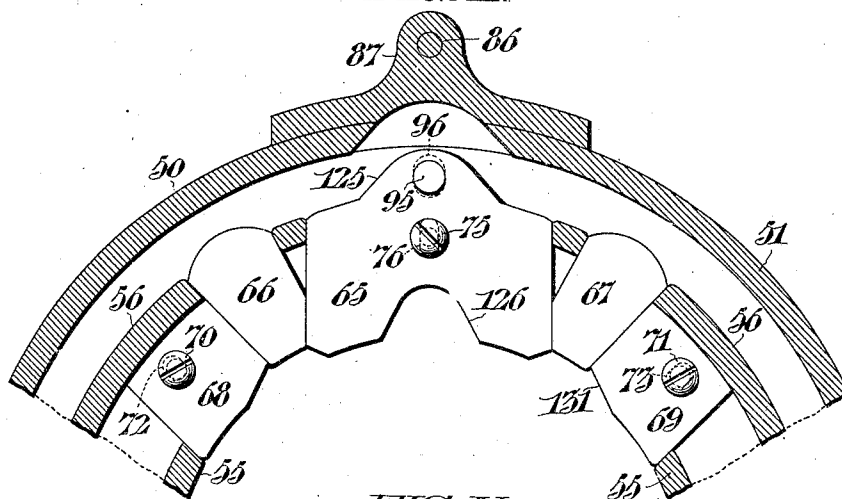


FIG. IV

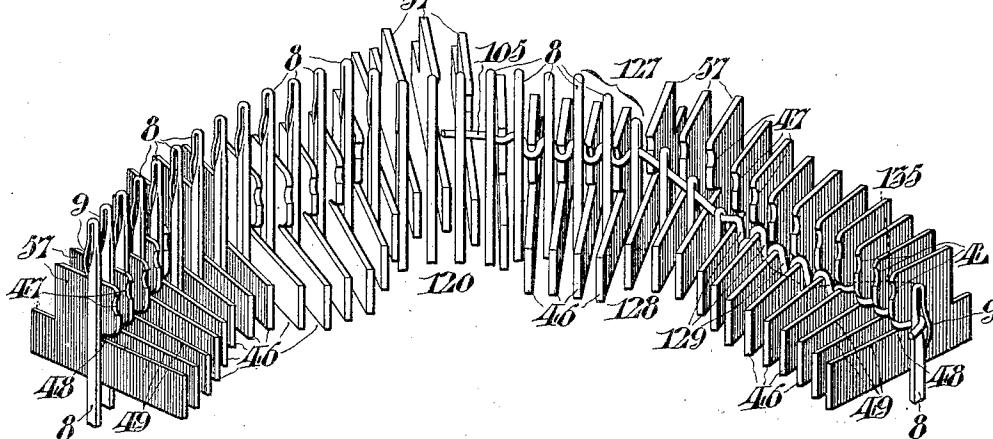
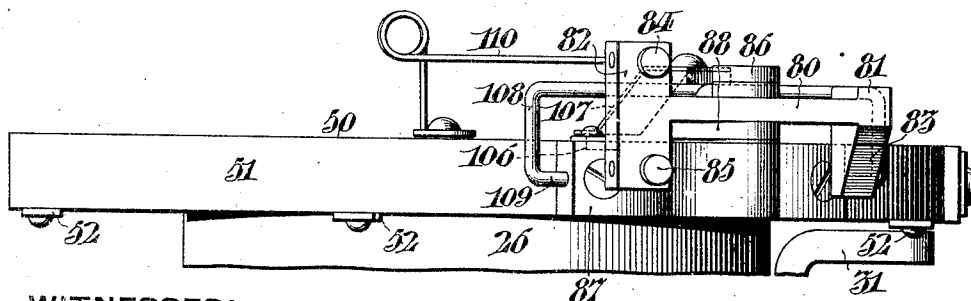


FIG. V



WITNESSES:

John C. Berger.
James H. Bell.

INVENTOR:

Albert M. Pigeon,
by his Attorneys
Fleming & Kemp

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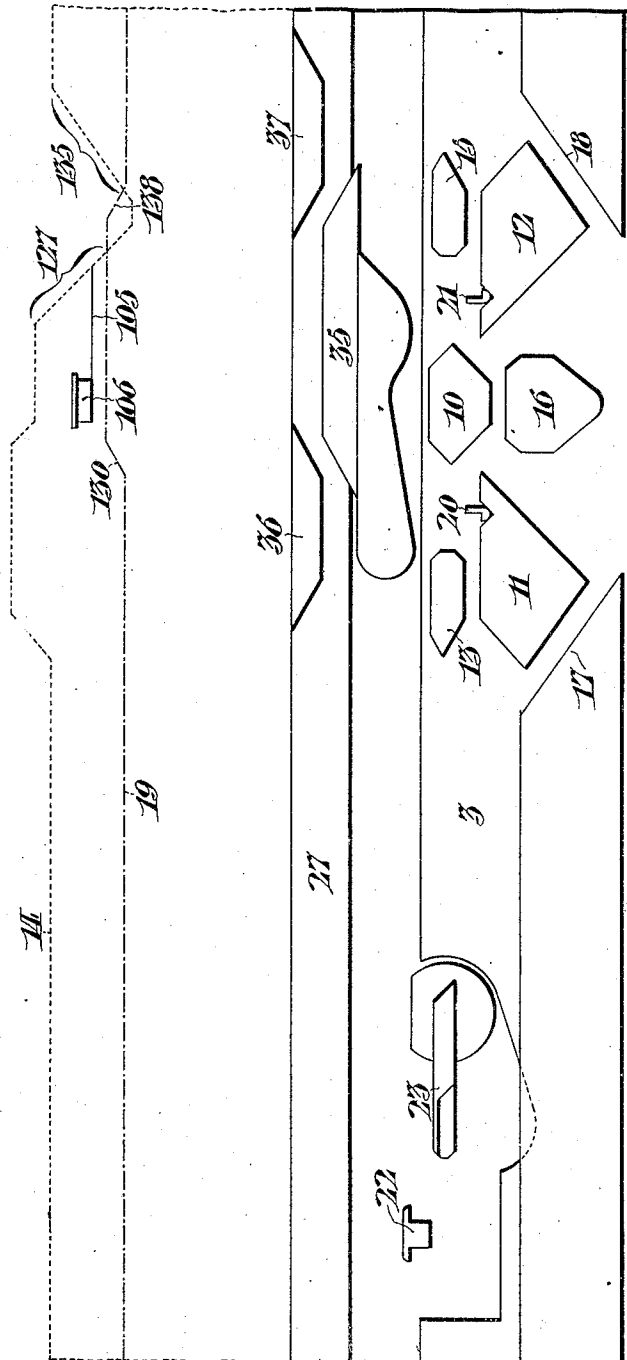
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4 SHEETS-SHEET 4.

FIG. VIII.



WITNESSES:

John C. Bergner.
James B. Bell.

INVENTOR:

Albert M. Pigeon.
by his Attorney
Wiley & Paine

UNITED STATES PATENT OFFICE.

ALBERT M. PIGEON, OF PROVIDENCE, RHODE ISLAND.

KNITTING-MACHINE.

1,034,032.

Specification of Letters Patent.

Patented July 30, 1912.

Original application filed September 19, 1908, Serial No. 453,774. Divided and this application filed October 12, 1909. Serial No. 522,259.

To all whom it may concern:

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

My invention relates to knitting machines employing independently movable spring beard needles, and comprises means for independently actuating said spring beard needles and also beard pressers with which they are associated, and thread feeding mechanism, combined to perform the operation of tubular knitting with capacity for the insertion of heel and toe pockets as usually practised in stocking knitters. In this general aspect my machine has been fully described in an application for United States Letters Patent filed by me September 19th, 1908, and bearing Serial Number 453,774, (since issued as U. S. Letters Patent No. 943,230, under date of December 14th, 1909) of which application the present one is a divisional.

It is important to provide machines of the type thus referred to with means for sinking the loops between the needles, in order to facilitate the formation of the series of loops which is to be interknit with the course last formed upon the needles. It is also important in connection with all knitting machines employing independently movable needles, to provide web holders whereby the fabric as it is knit is held down as the needles advance through the formed loops.

My invention accordingly comprises, and the present application is especially directed to those parts of my machine which perform the combined functions of sinking the loops and also of holding down the web.

It is characteristic of my invention that there is provided a series of movable sinkers alternating with the needles, but operating independently of them, which sinkers are provided with the parts which perform the loop sinking function, and also with parts which perform the web holding function. The machine is also provided with mechanism for imparting to said sinkers the movements requisite to enable them to perform successfully both these functions.

In my construction, as I have illustrated

it in the drawings, the loop sinking function, and the web holding function, are each performed by separate notches, with which each sinker is provided at appropriate levels; and the entire series of sinkers is successively thrust forward and back and again forward in order to enable the upper notches at the time of the first projection, to operate as loop sinkers, and to enable the lower notches at the time of the second projection, to operate as web holders. Coincidentally with these motions, and in correspondence with them, other parts of the mechanism are so controlled as to cause the yarn which is to form the new set of loops, and which has been properly sunk between the needles at the time of the first advancement of the sinkers, to be drawn down to a lower level when these sinkers are again retracted, so that, as the new loops are knit into the already formed web, the said web will be engaged by and held down by the web holding notches at the time of the second advancement of the sinkers.

In the accompanying drawings, Figure I, is a plan view of a spring beard knitter of the circular type, showing a sufficient portion of the machine to illustrate my invention. Fig. II, is a vertical section of the knitter taken on the line II, II, in Fig. I. Fig. III, is a partial plan section as indicated by the arrows III, III, in Fig. II. Fig. IV, is a perspective view of a portion of the series of needles showing their relation to the loop sinkers at the region of the formation of the stitches. Fig. V, is an elevation of the sinker ring and parts carried thereby looking diagonally from the upper right hand corner of Fig. I. Figs. VI, and VII, show two different relative positions of the needles and sinkers. Fig. VIII, is a development of the needle cam cylinder and the beard presser cam ring.

In the said figures, 1, designates the bed of a circular knitter having an annular depression or groove 2, in which is centered the revolving cam cylinder 3, whose toothed lower periphery 4, is received in groove 2, and held in place by an annular ring 5. The cylinder 3, is rotated by a suitable pinion which is of well known construction, and not shown in the drawings, hence obviates any further description herein. A needle cylinder 6, is mounted on the bed 1, in stationary relation thereto and provided

with vertical needle grooves 7, in which the needles 8, are guided in their reciprocatory motion. The cam cylinder 3, carries the usual center and stitch cams 10, 11, and 12, respectively and is also provided with guard cams 13, 15, and 16, and raising cams 17, 18, as clearly shown in Fig. VIII.

When used for oscillatory knitting, as for the formation of heel and toe pockets, the machine may be provided with the raising pickers 20, and 21, and the drop picker 22, and also a pivoted raising and lowering cam 23, all of well known construction, and forming no part of the present invention.

Secured to the top of the needle cylinder 6, is a circular plate 25, having an annular depending flange 26, to the lower end of which is movably secured the presser cam ring 27. Said ring 27, is suspended from the flange 26, of plate 25, by means of angle pieces 28, whose lateral projections 29, engage a peripheral groove 30, on the said ring. A bracket 31, extending from the needle cam cylinder 3, engages angle lugs 32, and 33, secured on the ring 27, which is thereby rotated about the flange 26, of plate 25, in unison with the cam cylinder. The distance between the lugs 32, and 33, corresponds to the lost motion necessary to allow the shifting of the presser cams in proper relation to the knitting cams, when the machine operates in the opposite direction as in oscillatory knitting. Ring 27, is provided with a raising cam 35, and guard and depressing cams 36, and 37, which actuate the butts 38, of the beard pressers 39. The said pressers 39, correspond in number to the needles 8, and are received and guided within the needle grooves 7, of the cylinders 6, and terminate at their tops, in nibs 40, which slide along the shanks of the needles, to press their beards 9, during stitch formation, as will be described later. The pressers 39, are also provided with depressions 41, which permit the beard 9, of the needles to re-open after their curved portions have passed below the nibs 40.

The irregular dotted line 14, shown at the top of Fig. VIII, outlines the path of the upper ends of the needles under the effect of their actuating cams. The dot and dash line 19, illustrates the corresponding path of the upper ends of the beard pressers.

The annular plate 25, is provided with radial grooves 45, which receive and guide the sinkers 46, which, in their motion, penetrate the wall of the cylinder 3, at its upper end, in slots, which correspond to and register with the radial grooves 45, of the plate 25. The sinkers 46, correspond in number to that of the needles and also of the beard pressers, and are spaced in alternate relation with them, about the periphery of the needle cylinder.

The construction of the sinkers is clearly

shown in Fig. II, and also in Fig. IV, (the rear portion being cut away). Each sinker has a head 57, projecting upward from its horizontal body, and on the operative face of the head are formed two notches, an upper loop-sinking notch 47, and a lower web-holding notch 48. The body of the sinker projects well forward of the head in the form of a ledge (or nose), 49, which assists in feeding the tubular web as it is formed. Upon the rear upper corner is formed the cam-engaging projection 58. The cams which actuate the sinkers, are carried upon the lower face of a plate 50, having a depending peripheral flange 51, which encircles the edge of the annular plate 25, and is thereby guided in its motion. The cam plate 50, is held in place by disks 52, which are secured to its flange 51, and overlap the lower edge of the plate 25, as shown in Fig. V. Lugs 53, on the periphery of plate 50, engage the bracket 31, on cam cylinder 3, causing the said plate to rotate with the said cylinder. Plate 50, comprises the two concentric circular ridges 55, and 56, which are spanned by the projections 57, and 58, of the sinkers 60, whereby the movements of the sinkers are controlled (see Figs. II, and III).

The sinker actuating cams comprise a movable center cam 65, which is supplemented adjacent to its sides by the fixed cams 66, and 67, and also the cams 68, and 69, which are adjustable by means of screws 70, and 71, which pass through slots 72, and 73, respectively in plate 50. The duplication of these supplemental cams is of course only necessary in an oscillatory machine, where the pair on one side of the center cam is effective for the rotation of the machine in one direction, and the other pair for the reverse direction.

The center cam 65, is adapted to move radially to control or vary the length of the stitch, and for this purpose is suspended from the plate 50, by a screw 75, whose shank plays within a slot 76, in the said plate and whose head overlaps the said slot on its upper surface. The said cam 65, is guided in its motion by the fixed cams 66, and 67, which engage its edges. A rocker arm 80, having the two lateral extensions 81, and 82, is fulcrumed about a bolt 86, on a bracket 87, secured to the edge of plate 50. A sector plate 88, having an eccentric cam edge 89, is also pivoted about the bolt 86, and is adjustably secured to a projecting wing plate 90, on the arm 80, by means of a screw 91, whose shank passes through a slot 92, in wing 90, and terminates in the said cam plate 88. The cam edge 89, engages a pin 95, which is secured in the center cam 65, and moves within a slot 96, in plate 50. Thus it will be seen that motion of the rocker arm 80, will cause cam 65, to be

pushed inwardly against the centrifugal force tending to drive it out, thereby projecting or retracting the sinkers more or less, as the case may be.

5 The motion of the rocker arm 80, is controlled by a roller cam 100, whose level may be regulated by any suitable pattern mechanism, well known in the art, and which engages the lateral arms 81, and 82, already
10 mentioned. As seen from Fig. V, the extent of the inward throw of the cam 65, is effectively controlled by contact of the bevel 83, in the lateral projection 81, of arm 80, for different vertical positions of roller cam
15 100. This permits varied tension of the yarn fed to the needles, and is effective for fashioning purposes. The lateral projection 82, of arm 80, carries adjustable screws 84, and 85, which when engaged by the
20 roller cam 100, restore the cam 65, to the position to actuate the sinkers, to produce normal tension upon the thread during the greater part of the knitting of the tube. If desired the screws 84, and 85, may project
25 to different degrees beyond the lateral extension 82, into the path of roller cam 100, to produce loops of different lengths, in the production of fashioned hosiery. The thread 105, may be fed from a suitable bobbin carrier (not shown), to the eye 106, in
30 the end of the guide 107, which is secured to a wire yoke 108, whose ends 109, are pivoted within the terminals of the bracket 87. A coiled spring 110, secured to plate
35 50, serves to maintain the thread guide in its normal position.

The operation of the machine is as follows:—As the machine rotates in the direction of the arrow in Fig. I, the thread is
40 fed to the needles within the recess formed by the series of sinkers, as indicated at 120, in Fig. IV, and occasioned by the action of the incline 125, of cam 65, on the projection 57, of the said sinkers. This feeding occurs
45 on the level of upper notches 47, of the sinkers, and at the time when the needles are at their upper position, as is clearly shown in Fig. IV, so that their beards are at a considerable distance above the thread.
50 Further rotation of the machine produces projections of the sinkers occasioned by the co-action between their projections 58, and the incline 126, on the internal end of cam 65. This causes the thread 105, received
55 within the notches 47, to be forced under tension against the shanks of the needles below their beards, sinking the loops to the desired extent, whereupon, the needles begin to descend and receive the thread under
60 their beards, as is indicated at 127, in Fig. IV. This position is carefully illustrated in detail in Fig. VI, where the thread has already been received under the beard of the needle, and the nib 40, of the presser
65 39, has just engaged the beard to close it.

It will be seen from Fig. VIII, that the pressers 39, are raised in advance of the descent of the needles as indicated at 130, so that their nibs are ready to engage the beards, to close them as they descend. After
70 the thread is well under the beards of the needles, the sinkers again recede as indicated at 128, in Fig. IV, under the action of the cam 67, which results in the disengagement of the notches 47, on the said sinkers,
75 from the thread 105, to allow the thread to be passed to the lower notch. As the needles continue to descend to their stitch forming level, the thread is arrested by the ledges 49, of the sinkers as shown at 129,
80 in Fig. IV. At this point the sinkers are again projected by the incline 131, of cam 69, to their normal course of travel, thereby engaging the thread with their lower notches 48, thus acting as web-holders for
85 the remainder of the revolution of the machine. The beard pressers 39, remain in their upper position until the needles have descended to their stitch forming level, below the ledges 49, on the sinkers 46, as
90 shown in Figs. VII, and VIII. This allows the old loops formed on the previous revolution of the machine to be cast over the top of the needles. Thereupon, the needles again ascend to their idle level as shown by
95 the incline at 135, in Figs. IV, and VIII, and at the same time, the pressers again drop to their inactive level, as indicated at 138, in Fig. VIII.

From the foregoing description it will be
100 seen that the sinkers perform three distinct functions. First, they sink the thread between the needles, by receiving it in their upper notches and pressing it against the shanks of the said needles. Second, they
105 assist in the stitch formation, holding the thread on their ledges while the needles are pulled down to form the loops, and feeding the web forward as it is thus formed. Third, they act as web holders, by engag-
110 ing the web, with their lower notches after the stitches have been formed.

Having thus described my invention, I claim:—

1. In a knitting machine provided with
115 individually movable needles, means for causing said needles to successively advance, and means for feeding yarn thereto; a series of yarn sinking and web holding instruments, alternating with said needles, and
120 held to reciprocating movement in a plane transverse to the needles; and having separated but integral portions, one to sink the yarn, and the other to hold the fabric down, notwithstanding the advance of the needles;
125 and means to operate said instruments.

2. In a knitting machine provided with
individually movable needles, means for causing said needles to successively advance;
and means for feeding yarn thereto; a series
130

of yarn sinking and web-holding instruments, alternating with said needles, and held to reciprocating movement in a plane transverse to the needles, and means for imparting reciprocatory motion to said instruments, whereby after sinking the yarn between the needles they are successively retracted to permit the yarn to pass to a lower level and again advanced to hold down the web prior to the advance of the needles with which they are associated to again receive yarn.

3. In a circular knitting machine provided with vertical reciprocating spring beard needles, a circular series of sinkers alternating with the needles, said sinkers being provided with web holding notches; a cam groove in engagement with said sinkers; a cam interposed therein, whereby said sinkers are given two successive reciprocations for each rotation of the machine, the first reciprocation causing the sinker to engage the yarn and sink it between the needles, and the second reciprocation causing the web holding notch of the sinker to engage the knit web and hold it down notwithstanding subsequent advancement of the needles.

the needles.

4. In a circular knitting machine provided with vertical reciprocating spring beard needles, a series of horizontally reciprocating sinkers mounted in alternation with the needles; each sinker being provided with a web holding notch; and means for imparting reciprocation to both needles and sinkers, whereby the sinkers are successively withdrawn to permit the feeding of yarn to the needles, advanced to sink the yarn between the needles, again retracted as the needles are depressed with the yarn under their beards, and again advanced to effect engagement of the web with their web holding notches, whereby said web is held down as the needles again rise to their normal level.

In testimony whereof, I have hereunto signed my name, at Providence, Rhode Island this fifth day of October 1909.

ALBERT M. PIGEON.

Witnesses:

OSCAR A. PIGEON,
GEORGE KOLLSTEDT