

(No Model.)

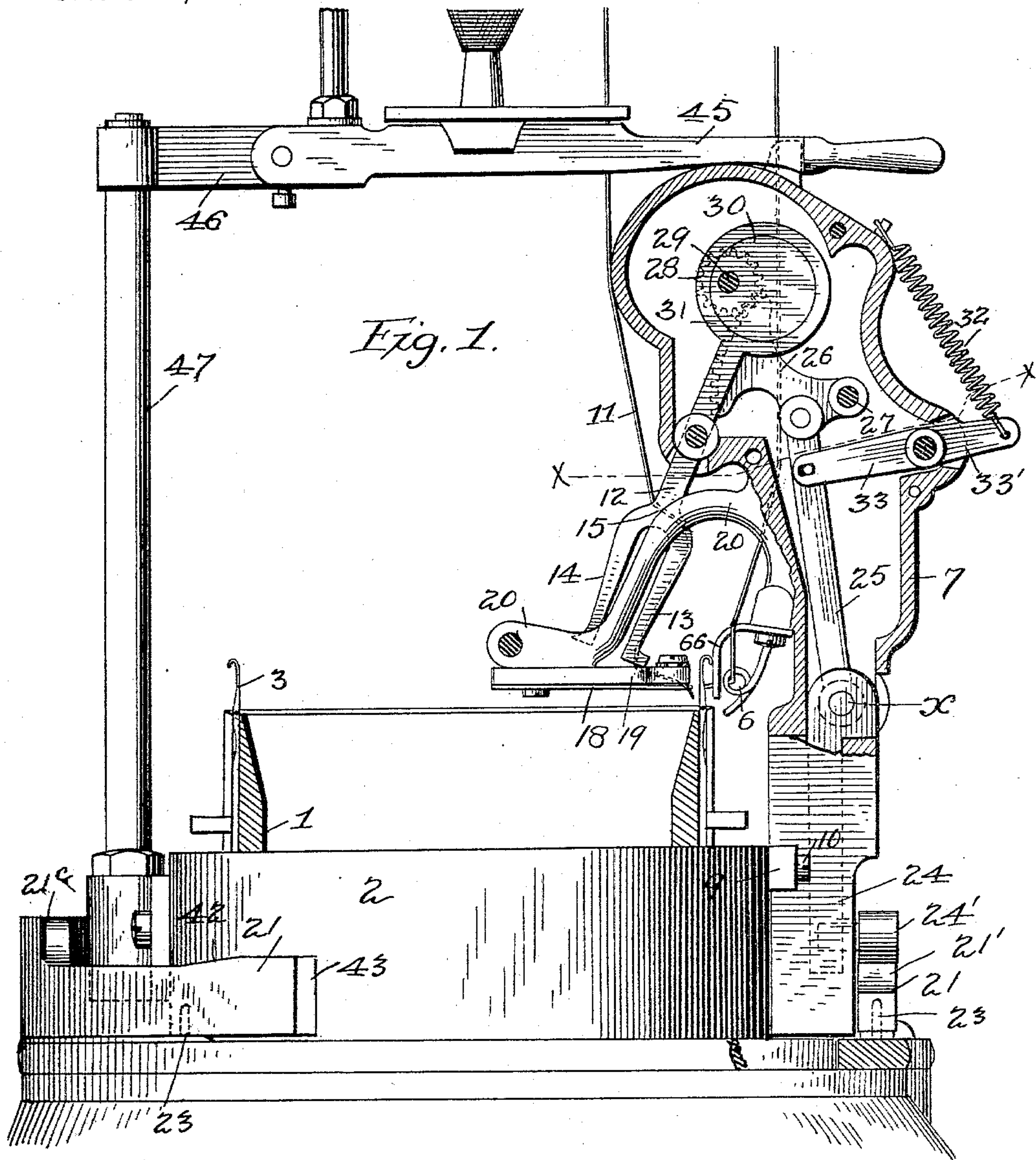
3 Sheets—Sheet 1.

F. WILCOMB.

FEEDING MECHANISM FOR KNITTING MACHINES.

No. 597,794.

Patented Jan. 25, 1898.



Attest  
C. S. Middleton,  
R. E. Ourand

Inventor  
Frank Wilcomb  
by *Walter M. Adams*  
Attys.

(No Model.)

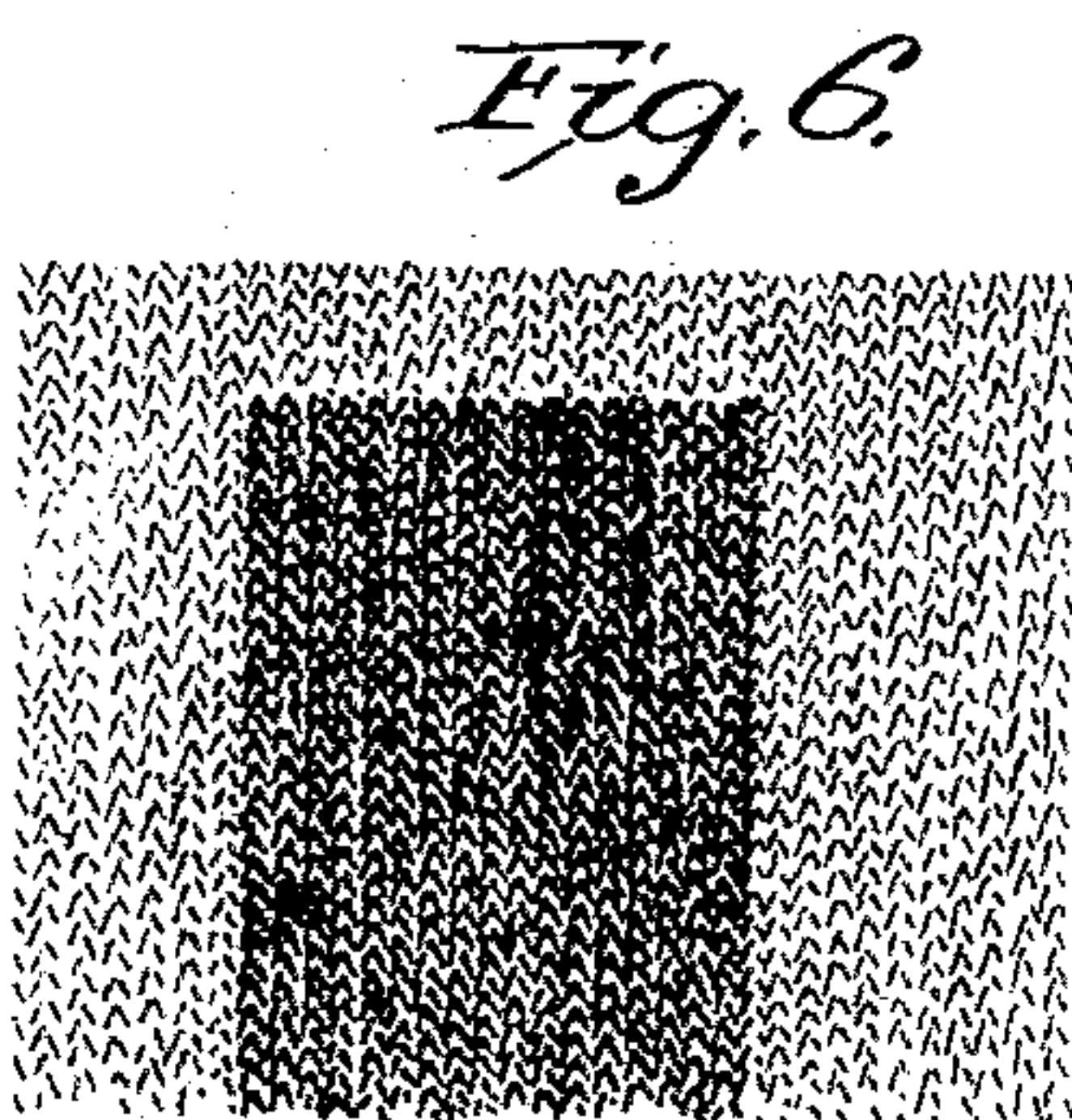
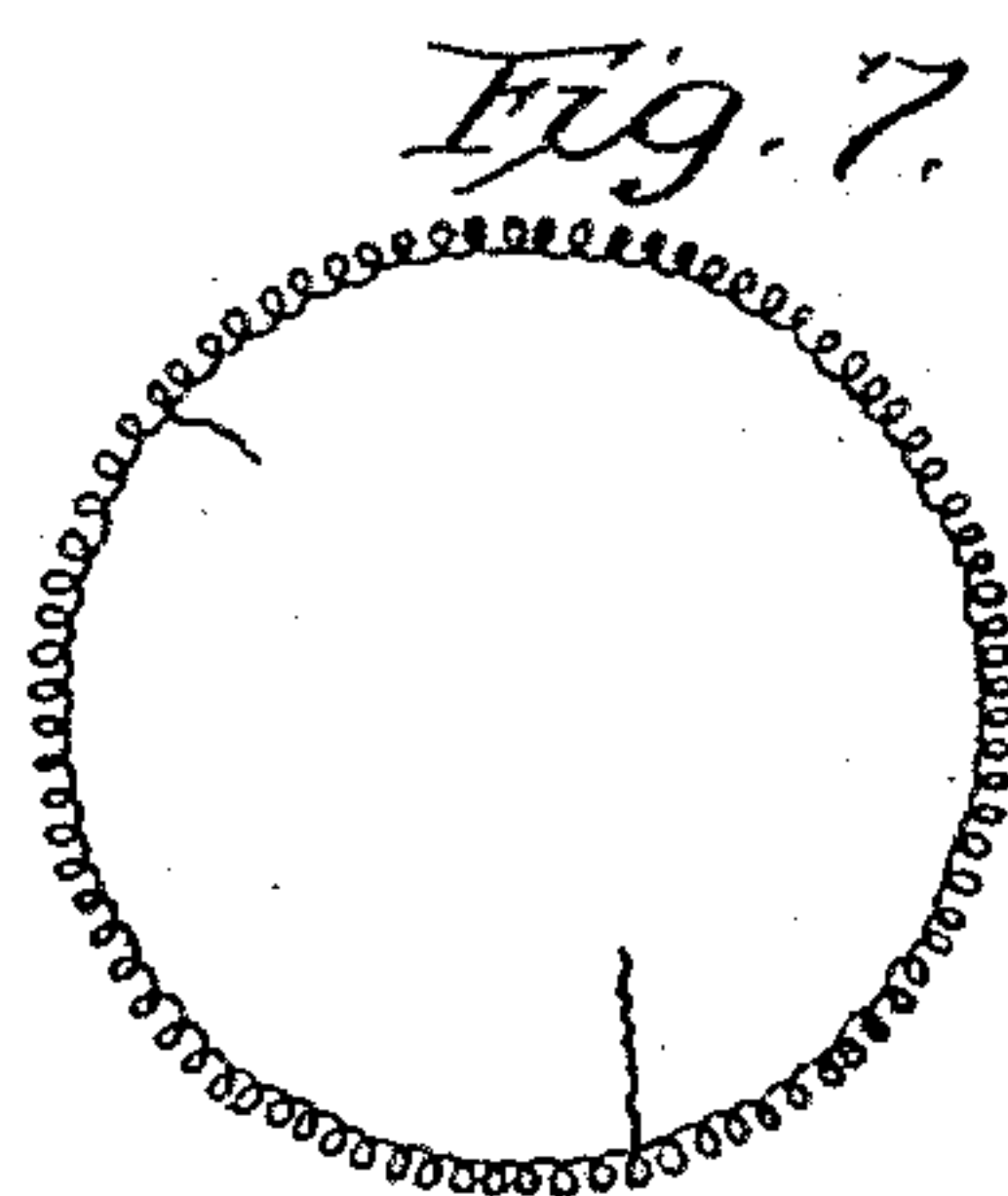
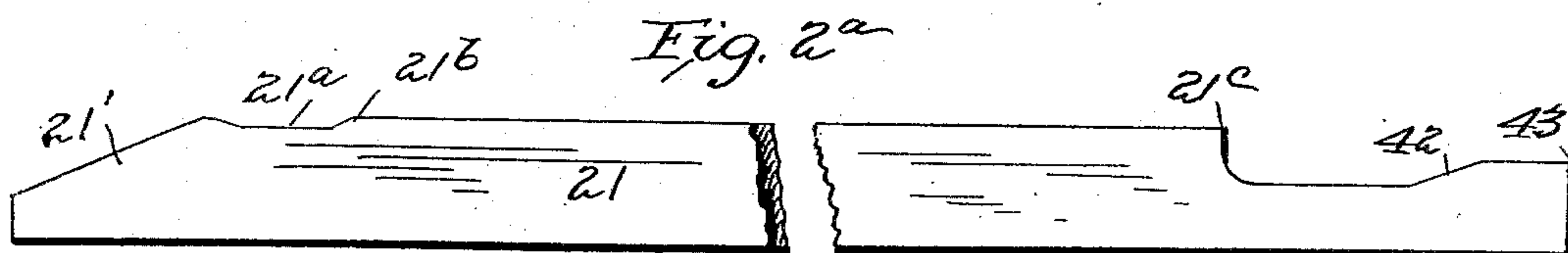
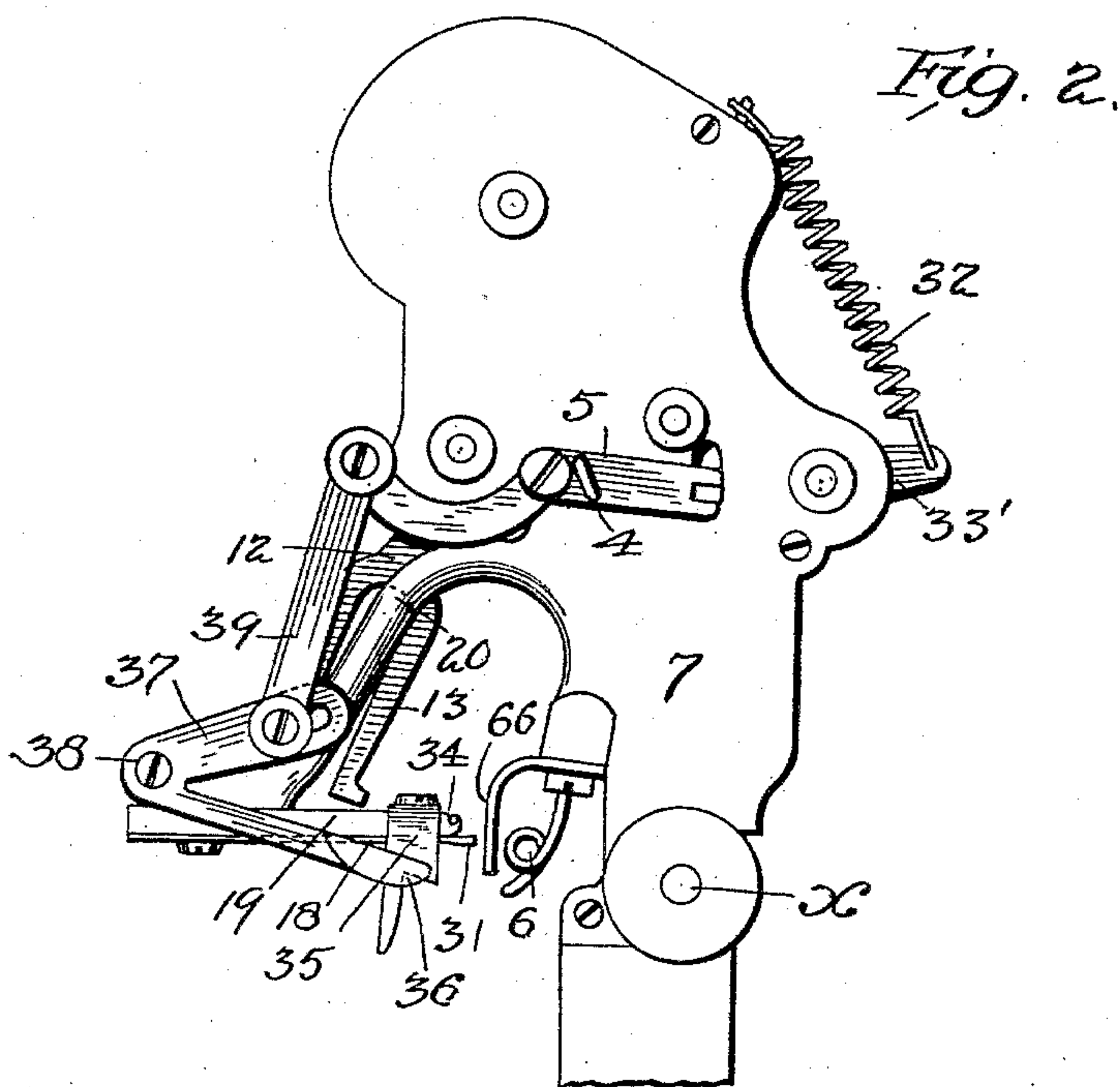
3 Sheets—Sheet 2.

F. WILCOMB.

FEEDING MECHANISM FOR KNITTING MACHINES.

No. 597,794.

Patented Jan. 25, 1898.



*Attest*  
*C. S. Middleton*  
*R. E. Ourand*

*Inventor*  
*Frank Wilcomb*  
*by Walter D. Adams*  
*Attys*



(No Model.)

3 Sheets—Sheet 3.

F. WILCOMB.

FEEDING MECHANISM FOR KNITTING MACHINES.

No. 597,794.

Patented Jan. 25, 1898.

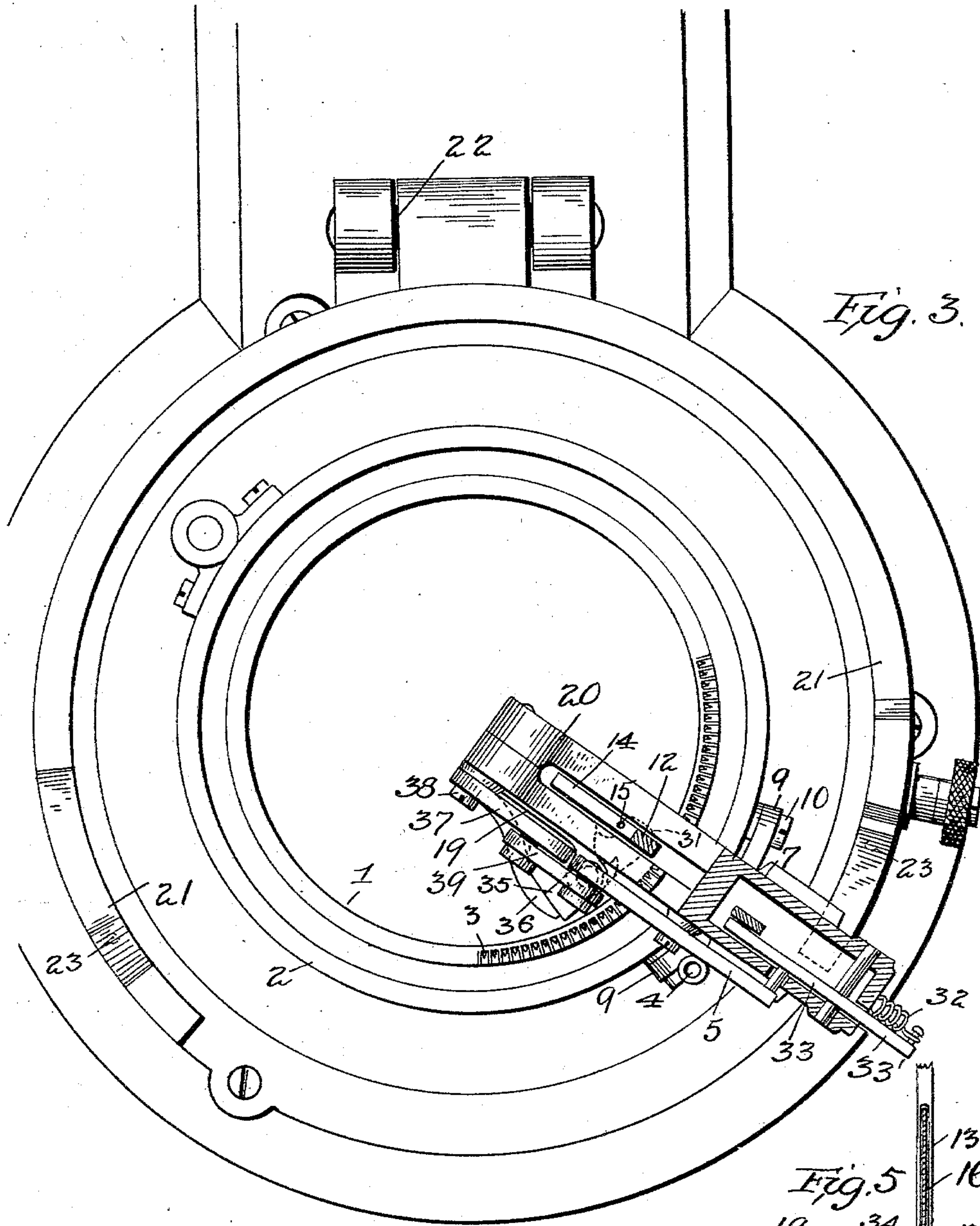


Fig. 3.

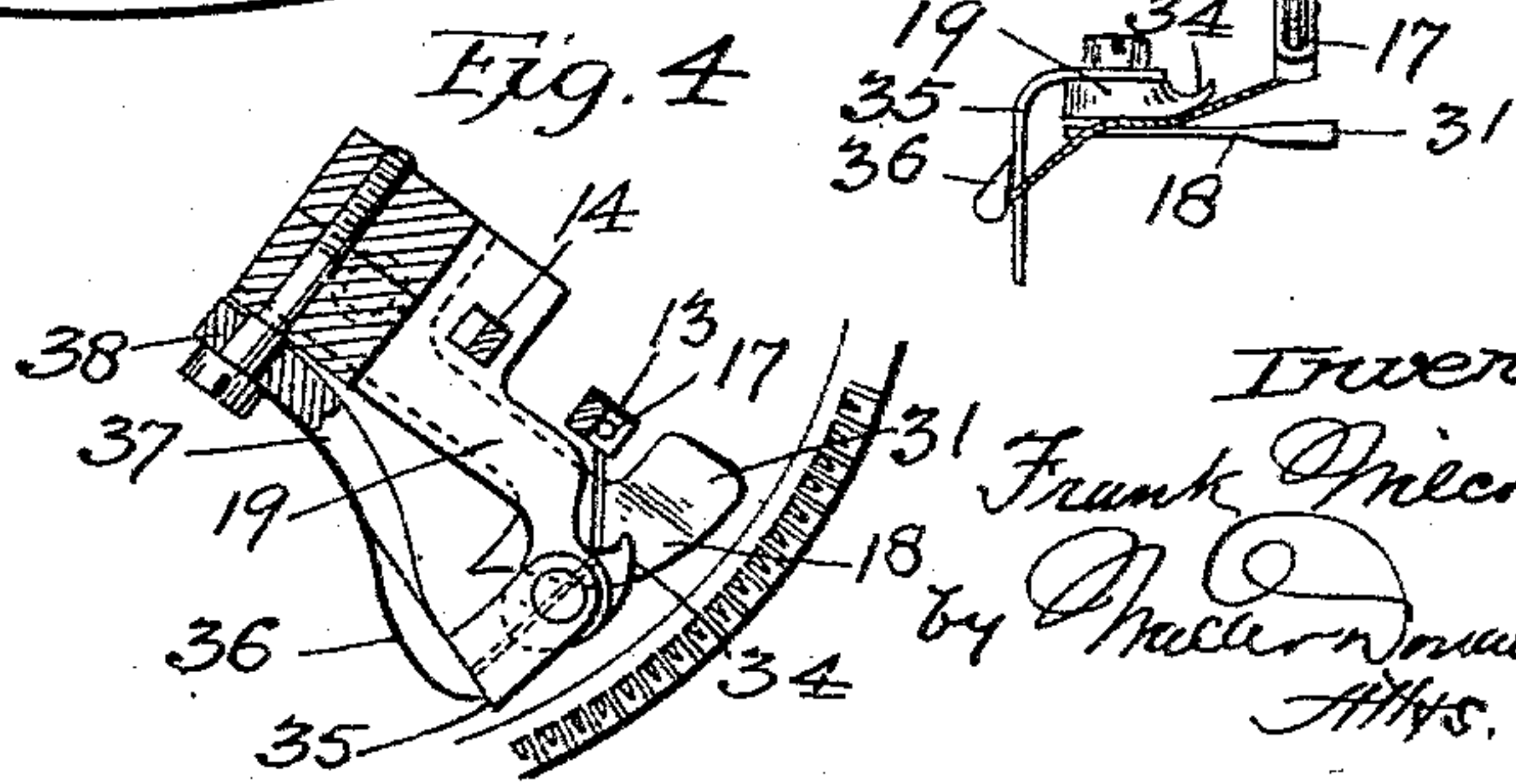


Fig. 4

Fig. 5

Attest  
C. S. Middleton  
R. C. Curand

Inventor  
Frank Wilcomb  
by *[Signature]*  
Atty.



# UNITED STATES PATENT OFFICE.

FRANK WILCOMB, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR OF ONE-HALF TO AMSDEN H. SMITH AND GEORGE H. LUMB, OF SAME PLACE.

## FEEDING MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 597,794, dated January 25, 1898.

Application filed July 24, 1895. Serial No. 557,022. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK WILCOMB, a citizen of the United States, residing at Pawtucket, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Feeding Mechanism for Knitting-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to an improved feeding mechanism for knitting-machines designed to produce a reinforced knitted fabric.

I aim to produce a reinforced fabric in which the ends of the splicing-threads will project on the inner side of the fabric a sufficient distance to insure the loose ends being securely bound by the stitches; further, to produce a fabric in which the reinforced part will bear a definite predetermined relation or proportion to the rest of the fabric and the line of demarcation between the plain and the reinforced part will be clearly defined and regular, and also to produce a fabric in which the reinforcing-thread will appear regularly on either the face or inner side, as desired, presenting what is known as "plated" work and giving to the fabric a highly-finished appearance without any "cloudy" or mottled effect whatever.

My invention is applied to a circular seamless-stocking machine for knitting plain work; and the operation of my invention includes holding the loose ends of the reinforcing-thread on the inner side of the row of needles well down to the top of the needle-cylinder, passing the thread from this point out between the needles and feeding the same thereto from the outer side while the loose end is held within the needle-row, releasing the loose end when the reinforcing-thread is caught into the fabric, knitting the desired course, then withdrawing the reinforcing-thread from the outer side of the fabric to the inner side, clamping or holding the thread on the inner side of the fabric, and then breaking or cutting the thread between the clamp or holder and the fabric.

My machine includes a holder or clamp for holding the end of the reinforcing or splicing thread on the inside of the fabric, a carrier for carrying the thread to the outer side of

the needle-row and holding the thread in proper position to be fed to the needles with the main thread, said carrier having operating means to return it with the thread to the inner side of the fabric after the course of reinforcing has been knit and to direct it to the clamp or holder, and, further, the machine includes a cutting device adapted to sever the splicing-thread between the holder or clamp and the needles.

My invention, besides the features above mentioned, includes other features hereinafter pointed out.

In the accompanying drawings, Figure 1 is a sectional view through a portion of an ordinary circular-knitting machine, the mechanism for carrying out my invention being shown partly in section and partly in side elevation. Fig. 2 is a detail side view showing the cutting mechanism and clamp. Fig. 2<sup>a</sup> shows the cam-surfaces. Fig. 3 is a sectional plan view. Figs. 4 and 5 show details. Figs. 6 and 7 show the fabric.

In the drawings, 1 is the needle-cylinder, 2 the cam-ring, and 3 the latch-needles, all of ordinary form. The main yarn is fed through an eye 4 on the lever 5, hereinafter described, and an eye 6, secured to the box 7, attached to the main cam-ring 2 by the ears 9 and screws 10, said box carrying all the working parts of my improvements, which are thus adapted for ready attachment to any ordinary machine. From the eye 6 the yarn is fed to the needles in the ordinary manner past an ordinary main guide 66. (Shown in Figs. 1 and 2.) The splicing-thread 11 is fed from the bobbin through a carrier-lever 12, pivoted within the box 7 and operated through mechanism hereinafter described. The carrier-lever is forked, having arms 13 14, the one marked 13 having the opening 15 and groove 16 for the splicing-thread and the thread-eye 17 at its extremity to deliver the thread to the needles. This carrier-lever stands in inclined position when the reinforcing-thread is idle and not being fed to the needles, so that said thread will be held within the needle-row. The loose end of the splicing-thread when the carrier is in this position out of work is held in a holder or clamp consisting of a spring-plate 18, bearing upwardly against



an extension or foot piece 19 of a bracket 20, formed with or secured to the boxing 7. This bracket has an open center in which the guide and its carrier oscillate. The two parts of the bracket 20, Fig. 3, are held together by the screw 38. The foot-piece 19 is secured to this bracket, Figs. 1 and 2, and the same screw which holds the foot-piece to the bracket also serves to hold the spring-plate 18 in place. The foot-piece 19 carries at its end the stationary cutter 35, which is held by a screw on the upper side thereof. When the splicing-thread is to be thrown into action, a divided cam-ring 21, pivoted to the base at 22, is swung over to rest on the base and surround the needle cam-ring, the said divided cam-ring engaging pins 23 on the base to center it and hold it in accurate position. This ring operates the splicing mechanism through a bar 24, sliding in the box 7 and having a roller 24' to engage the upper cam-surface of the cam-ring 21, a link 25 connecting the bar with a segment-lever 26, pivoted at 27 in the box, the segment of which meshes with a pinion 28 on an axis 29, which has fixed thereto an eccentric disk 30, the strap 31 of which forms the upper end of the swinging carrier-lever for the splicing-thread. When the cam-roller 24' rides up the cam-surface 21' of the cam-ring, the carrier-lever is moved from its position shown on the inside of the needle-row, carrying the thread-eye up over the needle-hook and then down on the outer side of the needle-row to hold the splicing-thread in a definite and predetermined relation to the main yarn, and the movement may be so adjusted that the splicing-thread will lie against the needle either above or below the main thread. This upward, outward, and downward movement of the carrier is effected from the cam 21, as before stated, moving the slide-bar, which actuates the eccentric through the connections, and this eccentric gives to the swinging lever its peculiar movement described, for which purpose the carrier-lever must have a sliding connection at its pivoted point with the box. As the action of the carrier-lever is positive and is derived from the cam 21, the thread-eye will guide the thread positively to the needles and to the same needle each time, thus the reinforced part of the fabric will have a distinct and regular line of division between it and the plain part, and, further, as the splicing-thread is fed in a positive and definite relation to the main yarn the face of the fabric will have a perfectly smooth and even appearance and present the effect known as "plated" work. In order to better feed the splicing-thread to the needles, the cam-ring 21 has a depression 21<sup>a</sup> immediately following the rise 21', so that the thread-eye after being fully depressed by the rise 21' will be raised slightly by the depression. The pivot-pin of the carrier-lever 12 is mounted in the box 7 and has a boss at its middle portion through which the carrier-lever slides. The

loose end of the splicing-thread during the outward and downward movement of the carrier is still held by the clamp before described, and it is retained by the clamp until the thread-eye has carried the thread out between the needles and down below their hooks and has carried the thread around the needle-row a short distance by the continued movement of the cam-ring with the splicing mechanism carried thereby, and in this continued movement the needle, across which the splicing-thread has first been laid, has drawn down to catch the splicing-thread and has cast off its old loop. The carrier-fork completes its downward movement when said needle takes the thread, and the second prong of the forked carrier therefor descends upon the projection 31 of the clamp-plate, thus releasing the loose end of the thread, which will now remain extending loosely on the inside of the fabric. As the guiding-eye is slightly in advance of the point at which the end of the splicing-thread is held by the clamp, said eye will, as stated, lay the yarn along the outside of several of the needles before the clamp will reach such a point in relation to the needle first receiving the thread as to cause the end of the thread extending between this needle and the clamp to be dragged, pulled, or broken. The splicing-thread is caught by the first needle at a considerable distance from its loose end, and there is no liability of the loose end of the threads pulling through the stitch which has caught it into the fabric. The final downward movement of the pronged carrier to release the clamp takes place when the cam-roller of the slide-bar reaches the rise 21<sup>b</sup>, following the depression 21<sup>a</sup> in the cam-ring. The revolution of the cam-ring with the splicing mechanism feeds the needles in succession until the point 21<sup>c</sup> of the cam-ring is reached, where there is an abrupt shoulder allowing the slide-bar, under the action of the spring 32 and lever 33, pivoted thereto and to the box, to fall quickly, thus returning the forked carrier to the inside of the needle-row and withdrawing the reinforcing-thread from the feeding-point. This action always takes place at precisely the same point and at the same needle in the row, so that the line of ending of the reinforce is regular and well defined, as indicated in Figs. 6 and 7. In this return movement the splicing-thread is laid across the upper face of the spring clamping-plate, and in the continued movement of the needle cam-ring with the splicing mechanism this splicing-thread, extending between the thread-eye and the needles, is caught between the spring clamping-plate and the foot or extension of the bracket before described, and to insure this action the said foot has a spur 34 curved upwardly on its outer side to present a flaring crevice, into which the splicing-thread will easily pass and be directed between the clamping-plate and the foot, to be held thereby.



Between the clamping means and the needles a cutting device is arranged, consisting of a stationary blade 35 and a movable blade 36 on a bell-crank lever 37, pivoted at 38 on the bracket and operated through a link 39 from the lever 5, pivoted to the outside of the boxing and operated from the slide-bar through the lever 33 before described, which has a pin extending through a slot in the boxing and into a fork on the lever 5. The spring 32, before mentioned, is attached to the extension 33' of the lever 33 and to the outside of the boxing. This movable blade of the cutting mechanism is closed while the cam-roller is on the lower part of the cam-ring 21 immediately following the abrupt shoulder, but it is opened or moved away from the stationary blade at the rise 42 of the cam-ring, and this is so located that when the cutter is opened the continued rotation of the cam-ring and splicing mechanism will lay the splicing thread between the cutters, and when the cam-roller falls off of the cam-ring at 43 the cutters, coming quickly together, will sever the splicing-thread at a point between the needles and the clamp, so that the loose end of the splicing-thread will be held as before by the clamp and on the inner side of the needle-row ready for the next action, which takes place when the roller reaches the front end of the cam-ring 21 again.

It will be seen that the same cam-ring and same slide-bar are used to operate both the splicing-thread carrier and also the cutters. When the cutters are operated, a movement of the thread-carrier takes place, but this is only slight and is without effect. When the cam-roller drops from the cam-ring, all the parts are returned to position inside the needle-row by the spring 32. The cam-ring 21 may be thrown out of position when the splicing mechanism is to be out of work by simply tilting it back and away from the machine. This ring may be replaced by other rings having differently-disposed cam-surfaces to secure different reinforcing portions of fabric.

The upper part of the box 7 is pivotally connected with the lower part at  $x$ , so that it may be tilted back and away from the machine when the splicer is out of action, and when in action the upper part of the box is held by a latch-lever 45, which is pivoted to a lug 46 of a standard 47, and this lever carries the bobbin, so that this also may be tilted to one side. The whole device may be readily attached to or detached from any ordinary machine. The pivot  $x$  does not go through from side to side of the box, but only through the adjacent walls of the upper and lower parts of the box. This leaves the interior of the box at the joint free for the vertically-moving operating-bar. The pivot of this bar with the link 25 is arranged to axially aline with the pivots  $x$  when the splicer is out of work, so that the upper part, carrying the link and other operating parts, may be swung aside.

By using a lever 12 with a longer arm 13, having the guide-eye, to feed the splicing-thread at a point below the main yarn the fabric will have a plated appearance on its face, and this thread being in this instance of superior quality will add greatly to the high finish of the fabric. On the other hand, by having a lever with a shorter arm to cause the thread-eye to lower only sufficient to feed the splicing-thread at a point above the main yarn the splicing-thread will appear mostly on the inner face of the fabric, and this thread may be of inferior quality, and in both instances the reinforced portion will present a regular surface free from cloudy or mottled effects, this being due to the fact that the feed is positive and to a definite point and is not dependent on the drag of the main yarn on the splicing-thread, which has the effect of twisting and feeding the threads irregularly and also of wearing away the splicing-thread and making a regular or well-defined line of demarcation between the spliced portion and main part of the fabric impossible of attainment.

I am aware that it has been suggested to feed the splicing-thread from the outside of the needle-row by having the same in contact with the main yarn and depending on the drag of the main yarn to carry the splicing-thread into the fabric; but this arrangement is open to the most serious objections, all of which are overcome by the method and machine above described.

When it is desired to give the plated effect to the inside of the fabric, the arm carrying the thread-eye for the splicing-threads is not quite so long, and the thread is thus fed to the needles in a plane higher than the main yarn.

The construction of the forked carrier allows needles to be raised above the knitting-cams when narrowing and widening for seamless-stocking work.

The swinging bobbin-support and the pivoting of the splicing mechanism permit the cylinder and needles to be removed.

It is important that the clamping device shall hold the end of splicing-thread until it is caught into the fabric, else the end would pull through the needles and drag along without being caught by the needles. The thread-eye goes to the lowest point first to insure laying the thread low enough to be caught by the needles, then lifts by reason of the depression 21<sup>a</sup> of the cam-ring to remove the pressure from the clamp, which will hold the end of the thread until enough yarn is pulled into the fabric to leave a long end on the inside of the fabric. This action is especially desirable in machines where the needles in retracting have a dwell. I am also aware that it has been suggested to feed a splicing-thread part way around the fabric and then, carrying the thread across the tube or fabric, introducing it again at that point, leaving the splicing-threads extending from side to side



of the fabric. These threads are afterward cut away by hand with shears. The bobbin of splicing-yarn is shown in Fig. 1 as supported on the lever 45. The splicing-thread guide carries the splicing-thread inside of the needle-row and below a horizontal plane passing through the needle-hooks.

It will be seen that the boxing 7 is hollow and is composed of side plates connected by walls at front and rear, and the parts forming the box may be held together by any suitable means, such as the screws shown in Fig. 2.

I claim as my invention—

1. In a knitting-machine, the needles with operating mechanism, and means for feeding the yarn thereto, and a thread eye or guide for the splicing-thread arranged to travel substantially in the arc of a circle from a plane below the needle-hook inside the needle-row, over the needle-hooks, and downward in front of the needle-row to a plane below the needle-hooks, to feed the splicing-thread to the needles positively and independently of the main thread and in a predetermined relation thereto and means for operating the thread-eye, substantially as described.

2. In combination, the needles with operating means and with a main-yarn feed, a thread eye or guide for the splicing-thread, a carrier therefor with means for operating the same transversely of the needle-row and from one side of the needles to the other and means for holding the thread on the inner side of the needles below the plane of the needle-hooks, said guide carrying the thread to a point below the plane of the needle-row on the outside thereof substantially as described.

3. In combination, the needles with operating means and with a main-yarn feed, a thread eye or guide for the splicing-thread, a carrier therefor with means for operating the same transversely of the needles from one side to the other, means for holding the splicing-thread on the inside of the needle-row and a cutting device arranged inside of the needle-row below the plane of the needle-hooks to cut the splicing-thread, substantially as described.

4. In combination in a knitting-machine, the needles with operating means, a main-yarn feed, a guide for the splicing-thread, means for moving the same over the needles, from side to side and for giving the guide a vertical movement in relation to the needles and holding means for the splicing-thread on the inside of the needle-row below the plane of the needle-hooks.

5. In combination in a knitting-machine, the needles with operating means, a main-yarn feed, a splicing-yarn guide with means for moving the same across the needle-row from side to side substantially in the arc of a circle, a clamp or holding means for the splicing-thread below the plane of needle-hooks and means for operating the clamp to open the same, substantially as described.

6. In combination in a knitting-machine, the needles with operating mechanism, the main-yarn guide, a splicing-thread guide, with carrier for moving the same across the needle-row from side to side, means for operating the carrier, the clamp or holder on the inside of the needle-row for the splicing-thread, and means for operating the clamp moving with the thread-carrier and carried by the guide-carrier to open the clamp as the guide places the splicing-thread in position, substantially as described.

7. In combination in a knitting-machine, the needles with operating means, the splicing-thread guide with means for operating the same across the needle-row, the clamp on the inside of the needle-row for the splicing-thread and the arm for operating the clamp, said arm with the thread-guide forming a fork and the lever carrying the same, substantially as described.

8. In combination in a knitting-machine, the needles with operating means, the main-yarn guide, the splicing-thread guide with means for operating the same across the needle-row and arranged to withdraw the thread to the inside of the needle-row below the plane of the needle-hooks and the clamp arranged to receive the thread when the guide retracts inwardly, said clamp being also below the plane of the needle-row, substantially as described.

9. In combination in a knitting-machine, the needles with operating mechanism, the main-yarn guide arranged permanently on one side of the needle-row, a splicing-thread guide with operating means for moving the same from one side of the needle-row to the other, a clamp to hold the thread on the inside of the needles, and a cutting device between the clamp and the needles with means for operating the same, substantially as described.

10. In combination, the needles with operating mechanism, the main-yarn guide, the splicing-thread guide, with means for operating it over the needle-hooks substantially in the arc of a circle, the clamp-plate and an arm connected to and moving vertically with the thread-guide to operate the clamp, substantially as described.

11. In combination, the needles, the main-yarn guide, the splicing-thread guide, the carrier therefor comprising the pivoted lever with the strap, and the eccentric with means for operating the same to operate the carrier transversely and vertically of the needle-row, substantially as described.

12. In combination, the needles, the main-yarn guide, the swinging carrier having the splicing-thread guide, the eccentric for operating the same and means for operating the eccentric comprising the pinion, the rack-segment, the cam-ring and the slide-bar with a connection from the slide-bar to the segment, substantially as described.

13. In combination, the needles with their



cam-ring, splicing mechanism including the swinging guide for the splicing-thread with a carrier for said guide and cutting mechanism for said thread, the cam-ring, the operating connections between the same and the said carrier and cutting mechanism, and a clamp for the splicing-thread and means on the carrier for operating the clamp, substantially as described.

10 14. In combination, the needles with their cam-ring, splicing mechanism including the swinging splicing-thread carrier, a clamp and cutters, said clamp being arranged to be operated by the swinging carrier, a cam-ring  
15 and connections therefrom to the splicing mechanism including the sliding bar, substantially as described.

15 15. In combination, the needles with their cam-ring, the main-yarn guide, and splicing mechanism extending above and within the vertical plane of the needles and carried by a pivoted box, said box being adapted to contain the actuating connections of the splicing mechanism with means for holding the box in  
20 position, said box being arranged to swing lat-

erally from the cylinder to remove the splicing mechanism from over the cylinder.

16. In combination, the needles, the means for operating the same, splicing mechanism, the pivoted box therefor, the latch-lever for holding the box in position, the bobbin-stand on the lever, said lever being pivoted, substantially as described. 30

17. In combination a needle-cylinder, its needles and a cam-cylinder, splicing mechanism comprising a box for carrying the same and having a pivoted portion adapted to swing laterally from the cam-cylinder and devices for holding said pivoted portion in position, said devices and said box being mounted upon opposite sides of the cam-cylinder, whereby the same may be swung away from the machine to permit the removal of the needle-cylinder. 35 40

In testimony whereof I affix my signature 45 in presence of two witnesses.

FRANK WILCOMB.

Witnesses:

RALPH A. WILBUR,  
LOUIS H. WILBUR.