Feb. 14, 1933. A. S. RIVIERE 1,897,986

MULTIPLE NEEDLE SEWING MACHINE

Filed Jan. 5, 1931 5 Sheets-Sheet 1

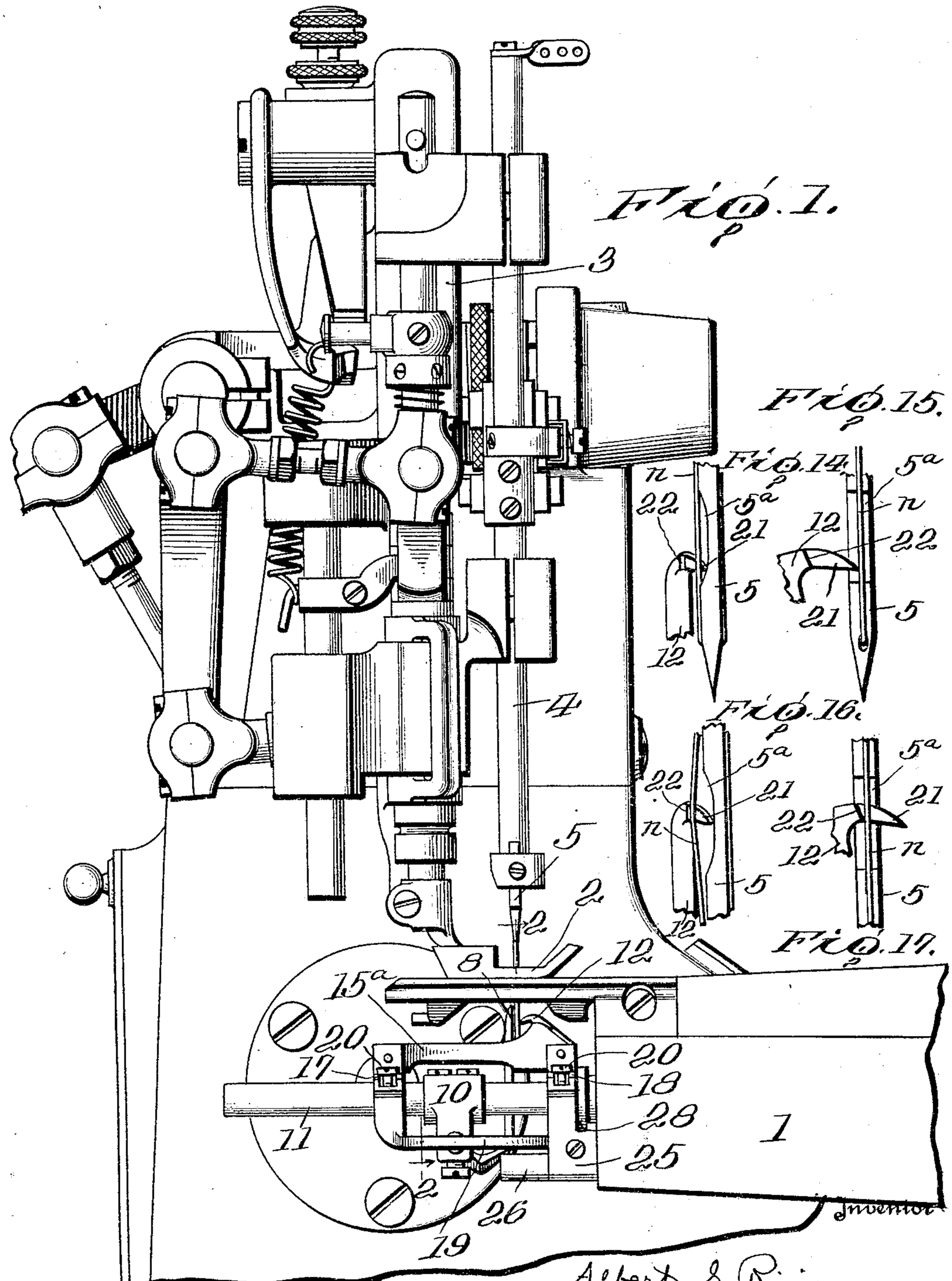

FIG. 1.

FIG. 15.

FIG. 14.

FIG. 16.

FIG. 17.

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MULTIPLE NEEDLE SEWING MACHINE

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Fig. 1.

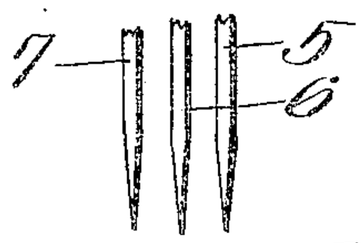


Fig. 2.

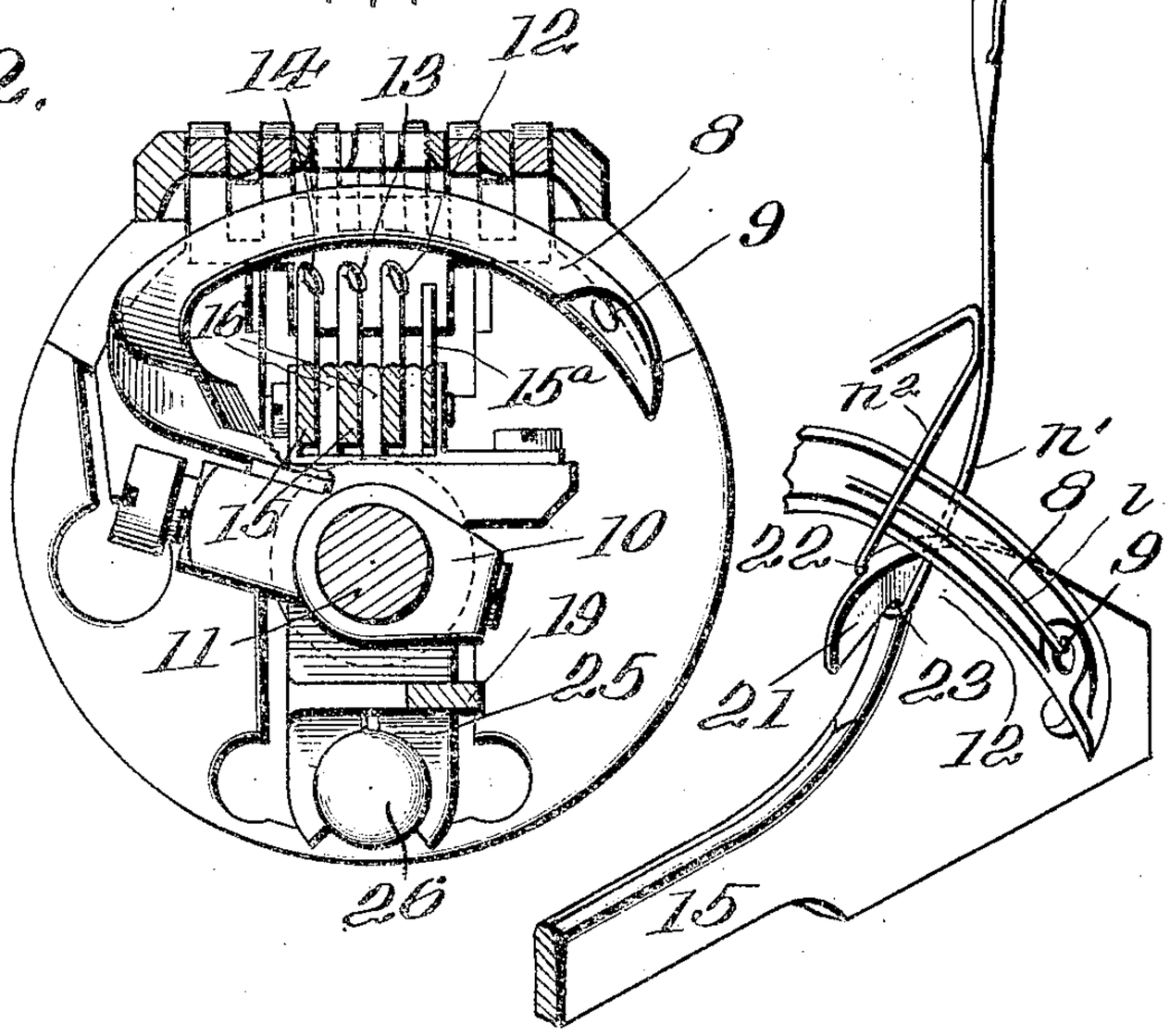
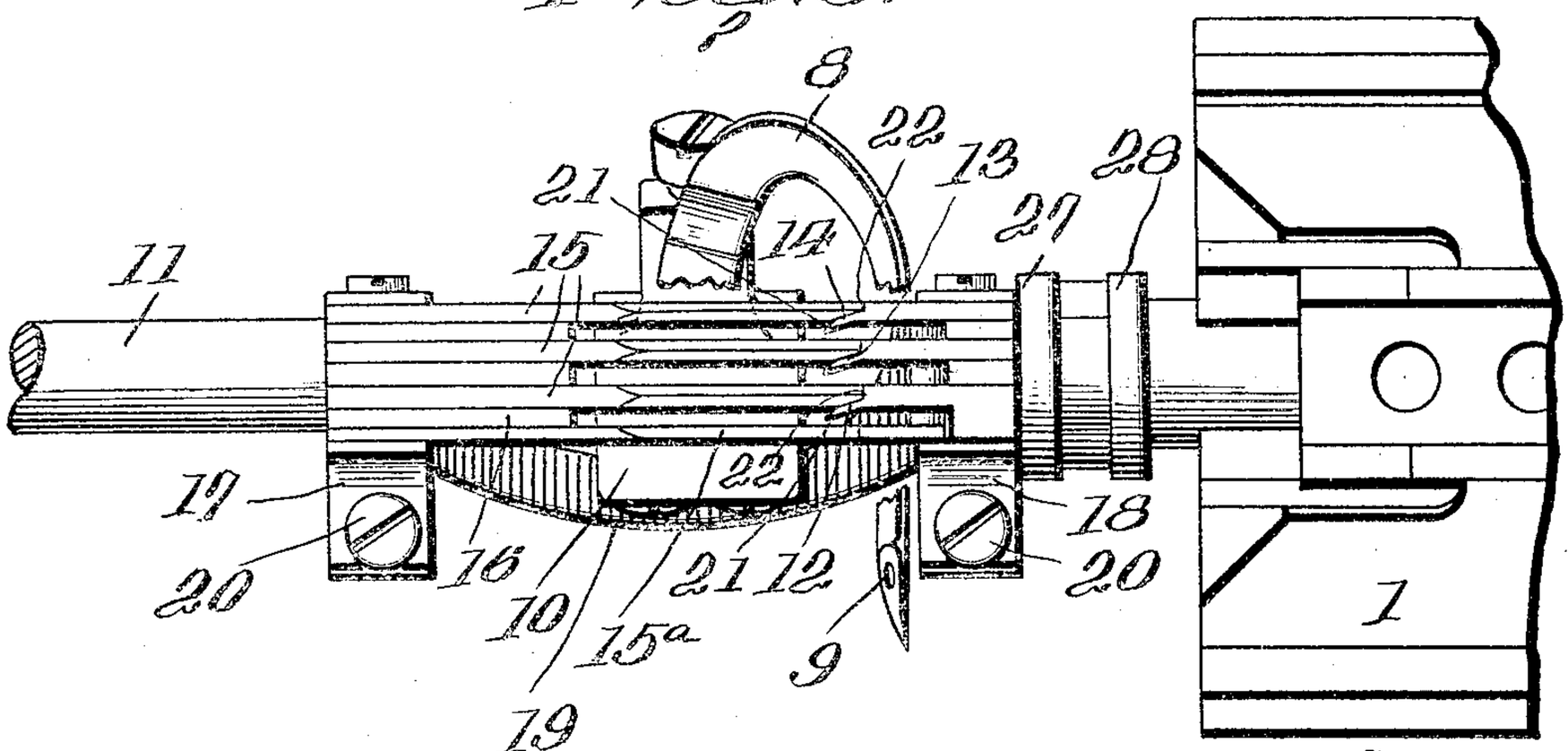


Fig. 3.



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MULTIPLE NEEDLE SEWING MACHINE

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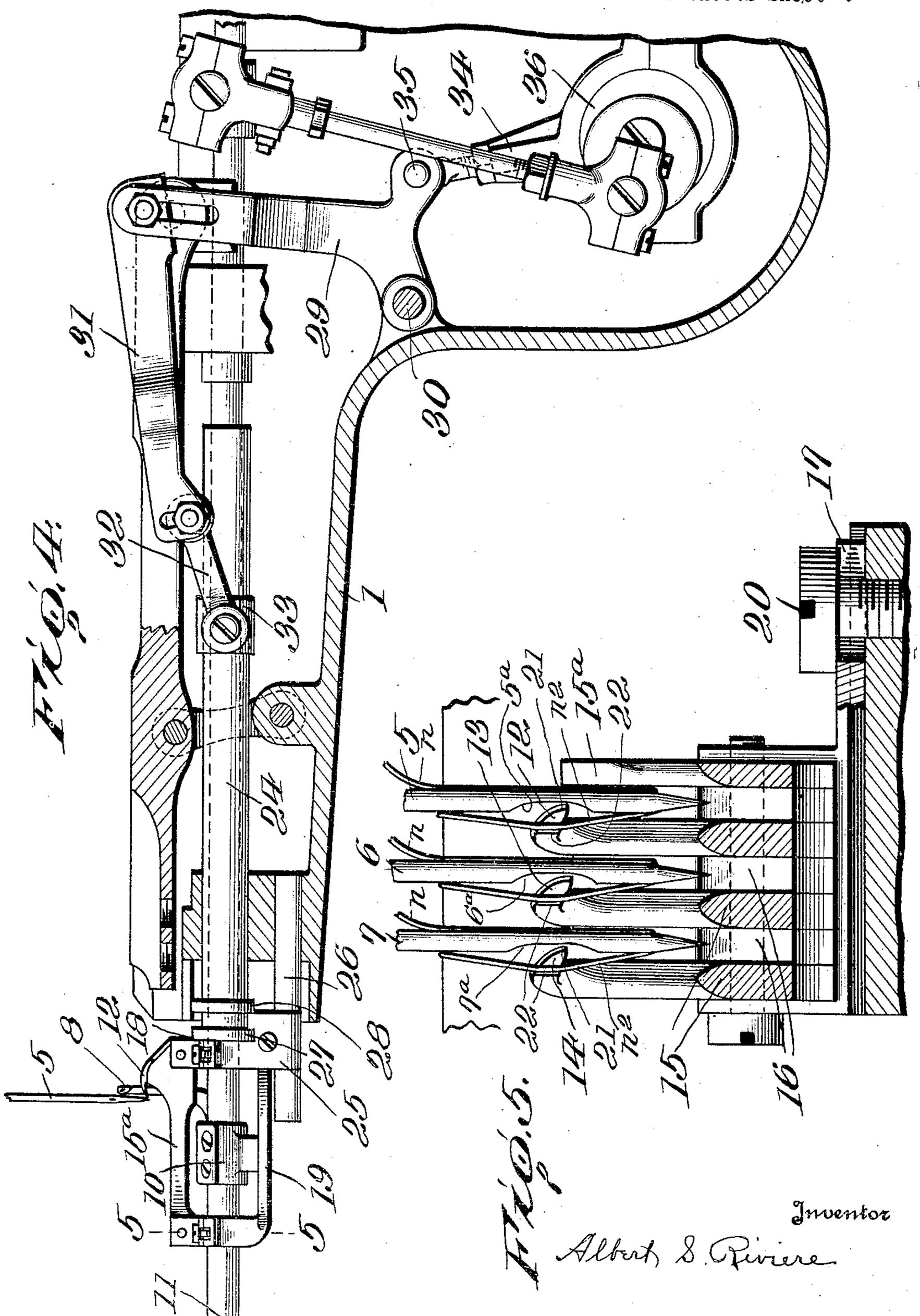

FIG. 4.

FIG. 5.

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MULTIPLE NEEDLE SEWING MACHINE

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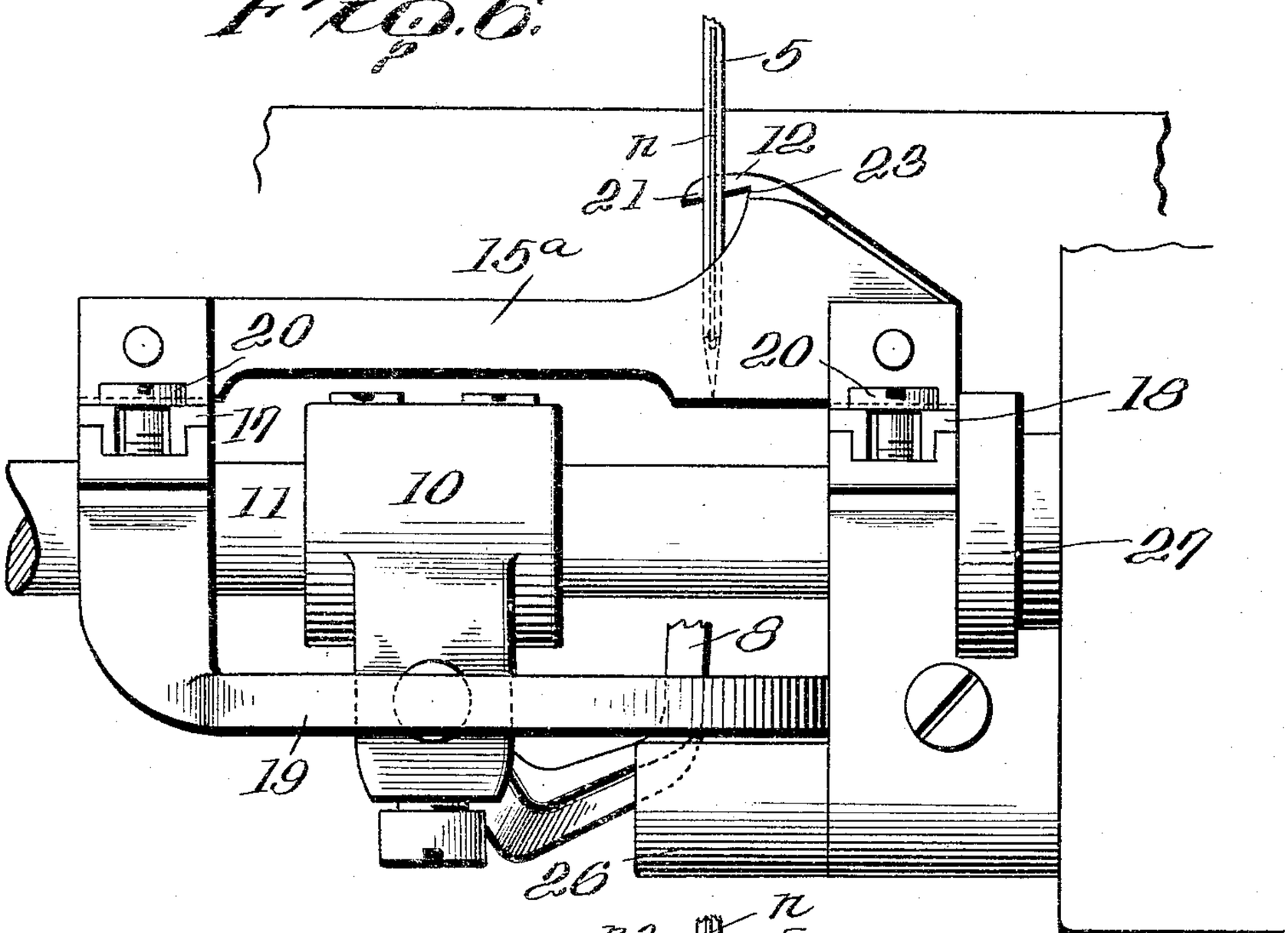
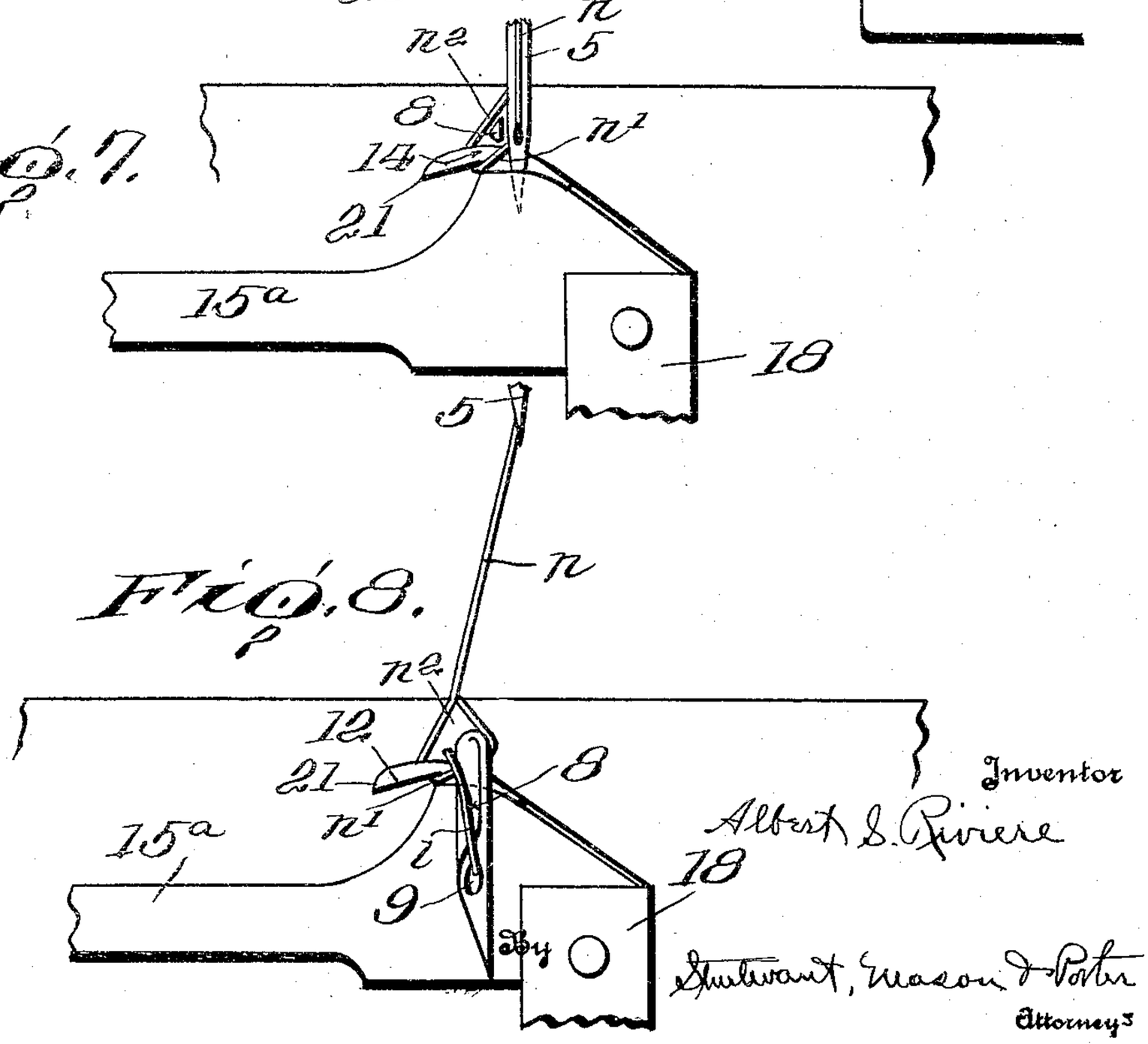
Fig. 6.





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MULTIPLE NEEDLE SEWING MACHINE

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Fig. 9.

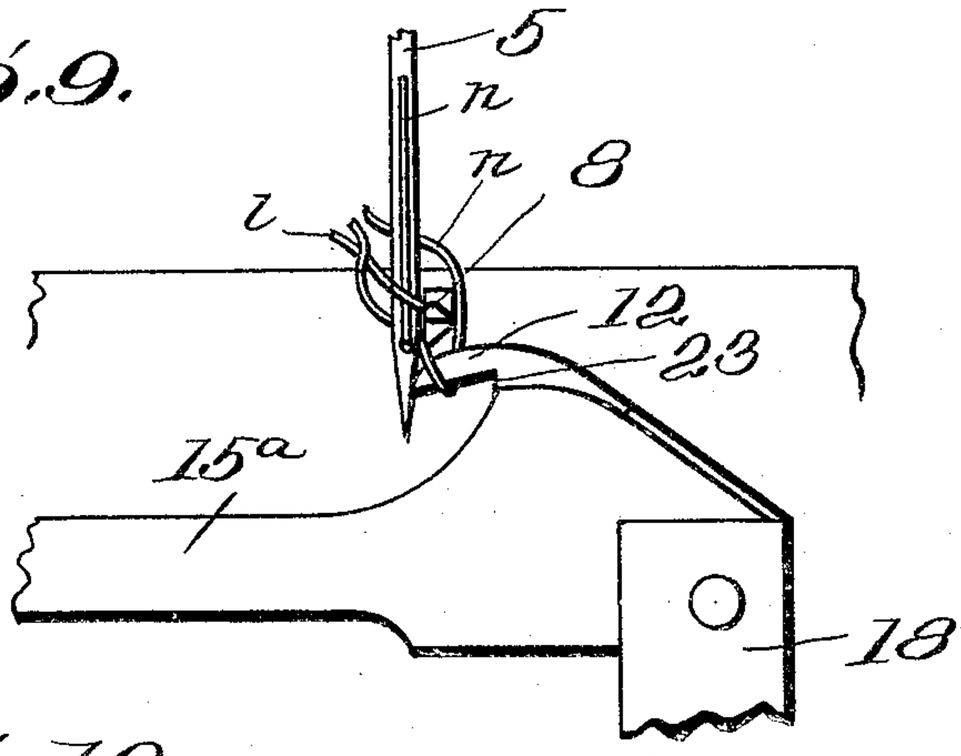


Fig. 10.

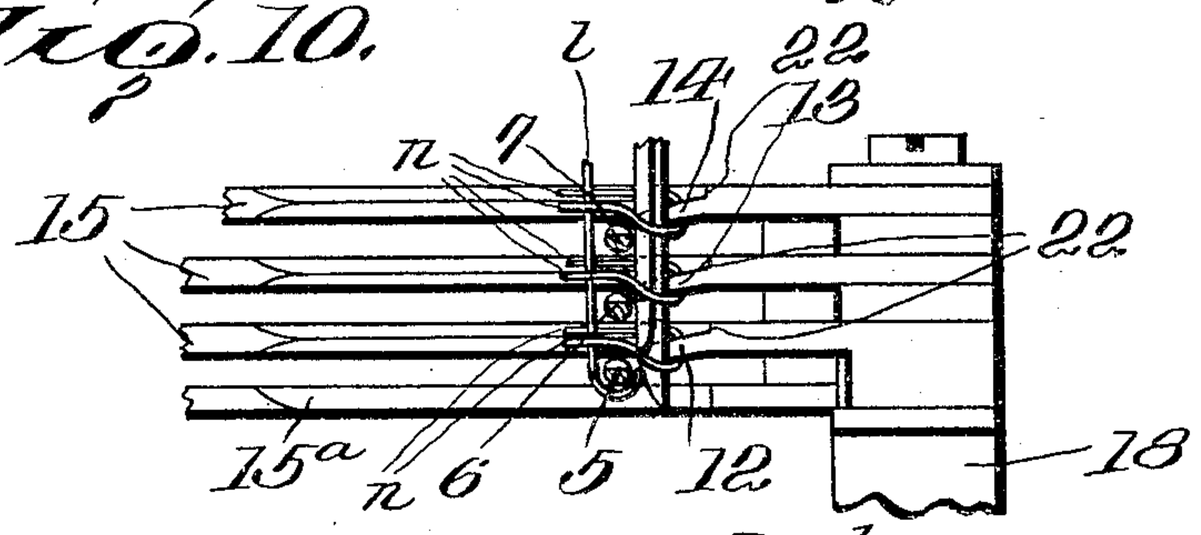


Fig. 11.

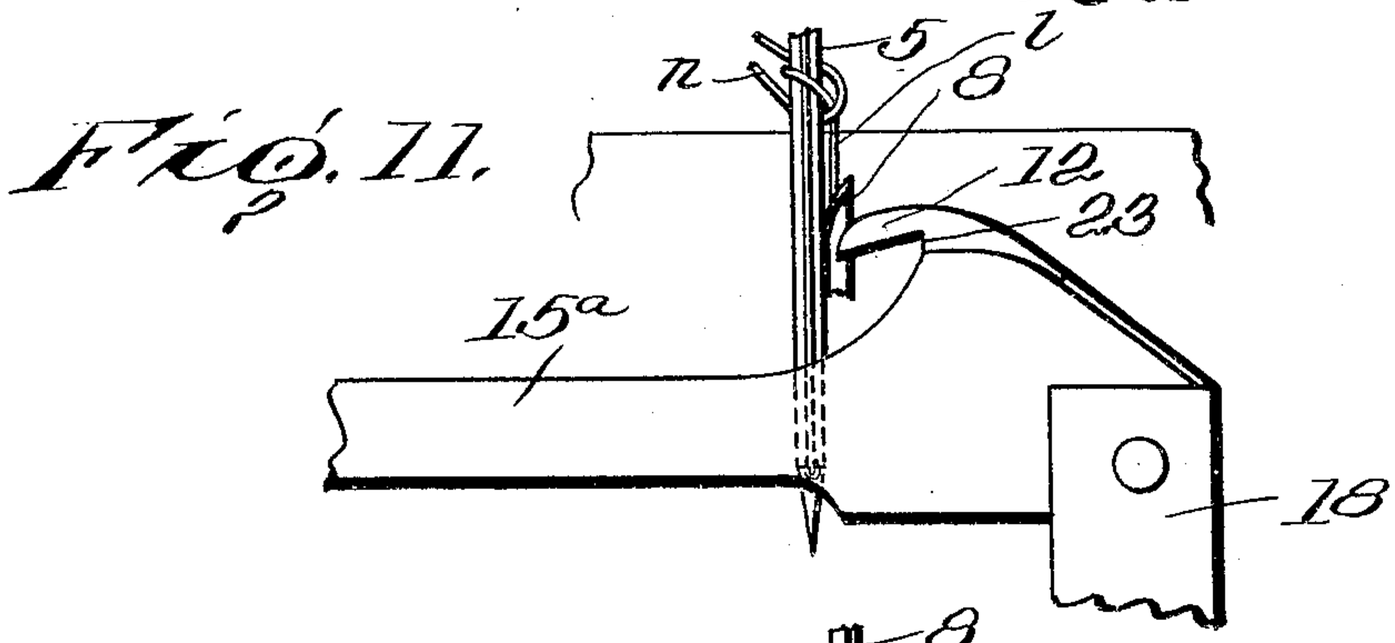
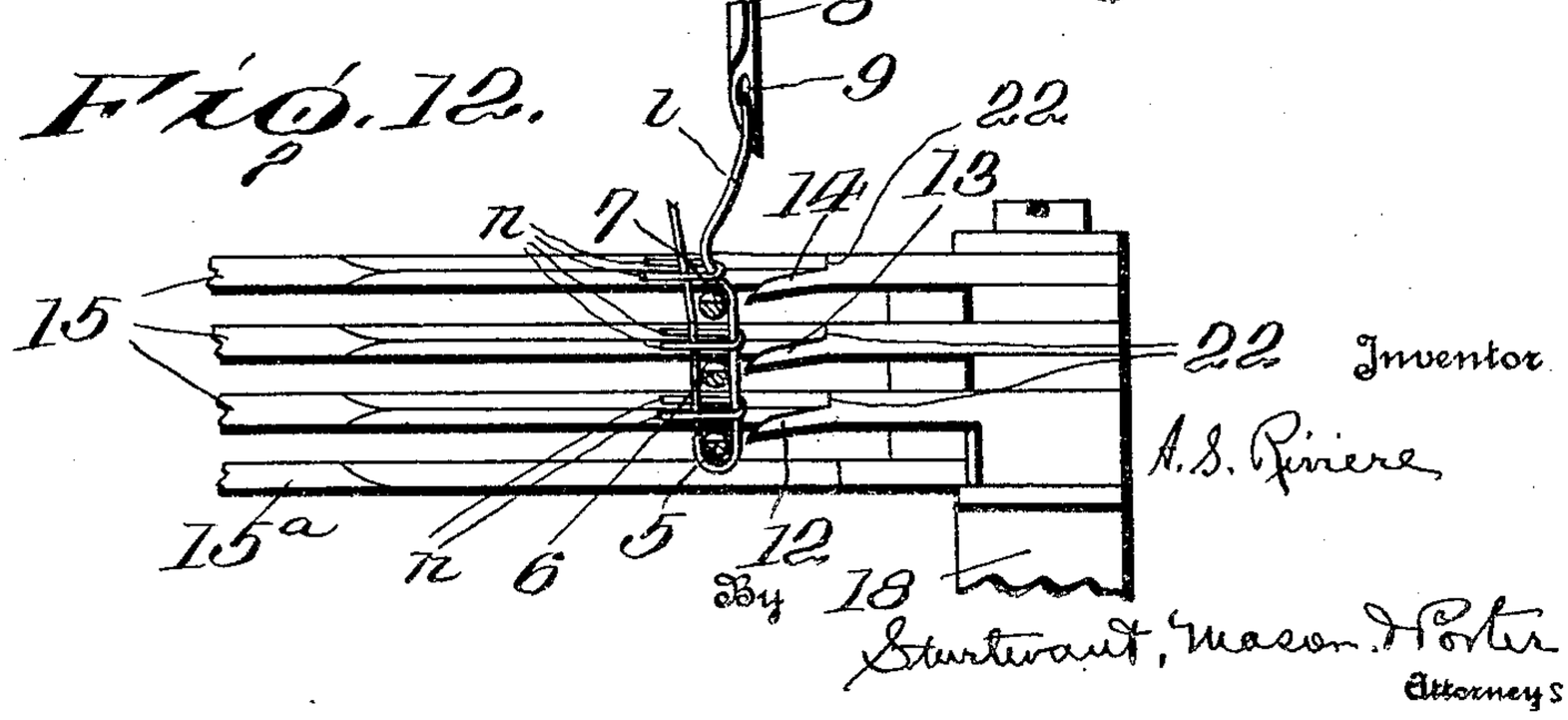


Fig. 12.



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Patented Feb. 14, 1933 1,897,986

UNITED STATES PATENT OFFICE

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MULTIPLE NEEDLE SEWING MACHINE

Application filed January 5, 1931. Serial No. 506,796.

The invention relates to new and useful improvements in a sewing machine, and more particularly to the stitch forming mechanism of the machine.

An object of the invention is to provide a stitch forming mechanism including a needle and a thread carrying looper with means for engaging the needle thread loop for spreading the same and positioning said loop at one side of the needle for the looper to enter.

A further object of the invention is to provide a stitch forming mechanism of the above type wherein the means which engages the needle thread loop retains said loop and holds the same back on the looper to insure the needle on its next descent to enter the looper thread loop.

A further object of the invention is to provide a stitch forming mechanism including a plurality of needles and a single thread carrying looper for cooperating with all of said needles with means for engaging the needle thread loops of the respective needles for positioning said loops for the entrance of the looper.

A further object is to provide a stitch forming mechanism of the above type wherein the needle thread loop engaging means retains the loops and holds said loops positively positioned on the looper until the points of the needles have passed well into their respective thread triangles.

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

In the drawings which show by way of illustration one embodiment of the invention:—

Figure 1 is a view of a portion of a sewing machine embodying the improvements and certain parts being omitted and certain parts being removed for the sake of clearness, the parts being viewed from the end of the overhanging arm.

Fig. 2 is a sectional view on the line 2—2 of Fig. 1.

Fig. 3 is a plan view of the parts shown in Fig. 2 with the looper broken away and the needles omitted.

Fig. 4 is a sectional view longitudinally through the work supporting arm showing a portion of the mechanism and the means in particular for imparting movement to the thread retainers.

Fig. 5 is an enlarged sectional view on the line 5—5 of Fig. 4.

Fig. 6 is an enlarged side view showing the relation of the needle to the thread retainer at the time when the retainer is entering the needle thread loop.

Fig. 7 is a view showing the relation of the needle and retainer at the time when the point of the looper is just entering the needle thread loop.

Fig. 8 is a view similar to Fig. 7 but showing the looper as having moved all the way into the needle thread loop.

Fig. 9 is a view similar to Fig. 8 but showing the retainer as moving the needle thread loop on the looper while the point of the needle on its next descent is passing into the thread triangle therefor.

Fig. 10 is a plan view of the parts shown in Fig. 9.

Fig. 11 is a view similar to Fig. 9 but showing the needle all the way down and the looper well to the rear end of its stroke.

Fig. 12 is a view of the parts shown in Fig. 11.

Fig. 13 is a perspective view showing the retainer as holding the needle thread loop while the needle has risen above the material and the looper as having moved well into the needle thread loop.

Fig. 14 is a detail showing the needle and retainer at the time when the point of the retainer is just entering between the needle and its thread.

Fig. 15 is a side view of the same.

Fig. 16 is a view similar to Fig. 14 with the retainer into the needle thread loop so that the shoulder engages the strand of the loop.

Fig. 17 is a side view of the same.

The invention is directed to an improvement in a stitch forming mechanism which includes a thread carrying needle and a thread carrying looper. The invention is particularly adapted for a multiple needle machine, but from certain aspects it has advantages in connection with a single needle

and a single looper. When used with a multiple needle machine as illustrated in the drawings the needles are set abreast with the eyes of the needles on a line parallel with the work support. A single thread carrying looper is provided which is adapted to enter each of the needle loops in succession. This form of stitching mechanism is well known in the art. The improvement has to do with a retainer. There is a retainer for each needle. This retainer moves forward into the needle thread loop just as the needle reaches the lower end of its stroke. The needle is scarfed to permit the point of the retainer to pass between the thread and the needle without requiring the bowing or throwing out of the needle loop. The retainer moves in a direction at an angle to the path of movement of the looper and carries the loop which it enters to one side of a plane containing the needles. This retainer is preferably provided with a shoulder engaging the strand of the needle thread loop running to the previous stitch and carries said strand away from the needle thus opening or spreading the needle thread loop for the entrance of the looper. All of the loops are simultaneously spread and retained by these retainers while the needles move upward and out of the material. The looper moves on to the end of its stroke into these retained and spread needle thread loops. The retainers are timed so as to hold the loops and they are shaped so as to force the loops well back onto the looper, and this insures that the needles on their descent will properly enter their respective thread triangles.

Referring more in detail to the drawings, the invention is shown as applied to a feed-off-the-arm machine which includes a cylindrical work supporting arm 1 off of the end of which the material is fed by the usual feed dog. The material is held on the work support by a presser foot 2. It is to be understood that the invention however can be used in connection with other types of sewing machines, and the one shown is purely for the purpose of illustrating one embodiment of the invention. The presser foot is carried by the overhanging arm 3 of the machine. Mounted on this overhanging arm is a needle bar 4 which is reciprocated in the usual manner, and said needle bar is shown as provided with three needles 5, 6 and 7. Each needle is cut away or scarfed above the eye as indicated at 5^a, 6^a and 7^a respectively. Co-operating with these needles beneath the work support is a thread carrying looper 8. The looper is provided with an eye 9 and carries a thread. It is mounted on a looper carrier 10. The looper carrier is fixed to a shaft 11 mounted in suitable bearings on the work supporting arm 1. As herein illustrated this looper carrier is not only oscillated but is moved endwise for giving the looper its needle avoiding movement. This is a common expedient in the art, and further description thereof is not thought necessary.

Cooperating with the needle 5 is a needle loop retainer 12. Cooperating with the needle 6 is a needle loop retainer 13, and cooperating with the needle 7 is a needle loop retainer 14. Each of these loop retainers is shown in the form of a supporting bar 15. Said supporting bars, as shown in Fig. 2, are spaced from each other by spacing blocks 16. Said bars are joined to a supporting head 17 at one end thereof, and to a supporting head 18 at the other end thereof. This makes up a unitary structure which is secured to a carrier 19 by clamping screws 20, 20. Each head has an extension which is slotted and these clamping screws extend through the slots and the heads of the screws overlie the sides of the slots and thus clamp the retainer unit to the carrier. These slots extend in a direction substantially at right angles to the longitudinal axis of the retainer unit and this permits the unit to be shifted laterally on the carrier therefor. It will be noted that each retainer is provided with a retainer finger 21, which is shaped so as to enter a thread loop. Said retainer has a shoulder 22 which is slightly in advance of the shoulder 23 or base of the projecting finger. The retainer finger 21 as clearly shown in Fig. 3, slightly overhangs the slot in the retainer unit between the bars 15 referred to above. The needle with which the retainer is associated passes into this slot and the retainer is moved in an endwise direction along the side of the needle and between the needle thread and the body of the needle. This occurs just before or just as the needle reaches the lower end of its stroke. The needle thread is indicated at n and the strands of the needle thread loop at n^1 and n^2. The looper thread is indicated at l. When this retainer moves along side of the needle and into the needle thread loop the shoulder 22 will engage the strand n^2 of the needle thread loop, while the strand n' will move along the under face of the finger to the shoulder or base 23 thereof. This positions the needle thread loop at one side of the needle and separates the strand n^2 from the strand n' so as to facilitate the entrance of the looper into the needle thread loop.

As noted above, there is a retainer for each needle when a plurality of needles are used. The needles are set abreast, that is in a plane at right angles to the line of feed. They are also set with their points in a line parallel with the plane of the work support. The looper moves in a line while passing into the needle thread loops which is at right angles to the line of feed. The needle loop retainers are moved in a direction substantially parallel to the line of feed and in lines substan-

tially at right angles to the plane of the needles and also the path of movement of the looper while entering the needle thread loops. The eyes of the needles are disposed in a line and the strands of needle thread loops lie in the plane of the needles. These retainers move forward into the needle thread loops, shift the needle thread loops laterally of the needles and open the needle thread loops in the manner referred to above, and thus the needle thread loops are positioned so that the looper point enters said needle loops in succession one after another, while the needles are moving upward and out of the material. Each retainer finger from the shank thereof toward its point is curved toward the needle path and the points thereof can pass close to the needle as it passes through the scarf and between the needle thread and the needle. The retainers are timed so as to remain in the needle thread loops, while the needles are rising and returning and the points have moved well down into their respective thread triangles. The looper in the present embodiment of the invention has been given a needle avoiding movement and the needle thread loops are around both the looper and the retainers and are positively held by the retainers positioned well back on the looper and away from the path of the needles. This is what insures that the points properly enter their respective thread triangles. As the needles descend the points pass along side of the bars 15 so that the bar serves as a needle guard or deflector for properly positioning the needles so that the retainers will pass the needles and enter their respective thread loops.

There is a bar 15^a at the right of the thread retainer unit, as viewed in Fig. 2, which serves as a guard or deflector for the needle 5. The thread retainer unit has a bodily back and forth movement in a direction parallel with the line of feed. In the present machine this is accomplished by means of a sleeve 24 surrounding the looper shaft 11 and freely movable endwise thereof. The carrier 19 for the retainer unit is mounted on the looper supporting shaft 11, and said carrier is provided with a depending bracket portion 25 which freely engages a rod 26 carried by the work supporting arm 1; the carrier thus sliding back and forth on the looper supporting shaft 11 and the rod 26 is held from any tilting movement. The sleeve 24 is provided with spaced collars 27 and 28 and a lug on the bracket 25 engages between these collars, thus it is that the sleeve is attached to the carrier 19 which supports the retainer unit. The sleeve 24 is moved endwise by means of a rocker 29, which is pivoted at 30 to the frame of the machine. This rocker carries an arm 31 which is adjustably and rigidly attached thereto, and the arm 31 is connected by a link 32 to a collar 33 fixed to the sleeve 24. The link and arm move slightly beyond a dead center line and this gives a dwell to the retainers at the forward end of their stroke. The rocker 29 is oscillated by an eccentric strap 34 which is pivoted at 35 to the rocker 29. This eccentric strap cooperates with an eccentric 36 on the actuating shaft for the parts within the arm. The mechanism described in detail for operating the thread retainers may be greatly varied according to the type of the machine to which the invention is applied. It is essential, however, that the retainer move back and forth in a single path at one side of the needle with which it cooperates and that it be timed in the manner described above.

In Figs. 14 and 15 the needle is shown as just reaching the lower end of its stroke and the retainer is about to pass into the scarf and between the needle thread and the body of the needle.

In Figs. 16 and 17 the retainer is shown well in between the thread and the needle. This is the position of the retainer as shown in Figs. 5 and 6.

In Fig. 7 the needle has risen until the eye thereof is practically on the level with the looper. The needle thread loop is on the retainer with the strand n^2 thereof against the shoulder 22 and the strand n^1 thereof against the shoulder or base 23 of the finger. The loop is not only shifted laterally but has been opened and positioned for the entrance of the looper, and in this figure the point of the looper is just entering the first needle thread loop. The looper will pass into the loops in succession, and in Fig. 8 the looper is shown at the forward end of its stroke. The needle thread loops are still retained by the retainer.

In Fig. 9 the needle is on its descent and the points of the needles are well below the looper. The needle thread loop is still surrounding the looper and the retainer. The needle thread loops are held well back on the looper by the retainers, and this insures that the needle points will enter their respective thread triangles.

In Figs. 11 and 12 the looper is shown as having reached the rear end of its stroke and about to partake of the lateral movement to bring it forward, and the needle thread loop and the retainers are also at the rear ends of their strokes.

From the above description it will be noted that the eyes of the needles are substantially on a line and the needles are well up on their stroke while the looper is moving into the needle thread loops held by the retainers. This permits the needles being given a relatively short stroke, and does not require any nicety of timing so that the looper will with certainty enter each needle thread loop. The needle thread loops are around the retainer as well as the looper and any reeving movement of the needle thread will not bind

the looper thread against the side of the looper and this enables a yarn thread which may be very soft and fuzzy to be used as the looper thread. In as much as the needle loops are held by the loop retainers while the needles are rising, the extent of movement given the looper can be reduced and the only critical timing of the looper necessary is to insure that the looper is properly positioned for the needle points to enter their respective thread triangles. By a short travel both of the needle and the looper as noted, the reeving of the thread through the eyes of the needles and of the thread through the looper, is greatly reduced and practically eliminated.

It will be understood that a cover thread laying mechanism may be used in conjunction with the stitching mechanism above described. Only parts of the stitching mechanism are illustrated in the drawings. Any suitable cover thread laying mechanism may be used and the stitch forming mechanism may be used without any cover thread laying mechanism.

It is obvious that changes in the details of construction and arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a sewing machine, the combination of a needle, a looper cooperating with the needle, and means for engaging the needle thread loop for positioning said loop for the entrance of the looper, said means including a retainer movable in a path substantially at right angles to the path of movement of the looper, said retainer being shaped and timed so as to hold the needle thread loop well back on the looper when the needle point is entering its thread triangle.

2. In a sewing machine, the combination of a needle, a looper cooperating with the needle, and means for engaging the needle thread loop for positioning said loop for the entrance of the looper, said means including a retainer movable in a path at an angle to the path of movement of the looper and provided with a point adapted to pass between the needle thread loop and the body of the needle on the down stroke of the needle and a shoulder in rear of the point and on the side of the retainer away from the needle adapted to engage one strand of the needle thread loop for carrying the same away from the other strand so as to place the loop for the looper to enter.

3. In a sewing machine, the combination of a plurality of needles, a thread carrying looper cooperating with all of said needles, and means entering the needle thread loop of each needle for simultaneously positioning said loops at one side of the plane of the needles whereby the looper may move in succession through said loops while held by the positioning means.

4. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line substantially parallel with the plane of the work support, a single thread carrying looper adapted to cooperate with all of said needles, a needle loop retainer for each needle, and means for moving said retainers in a direction substantially at right angles to the plane of the needles into the needle thread loops for positioning the same at one side of the plane of the needles for the looper to enter.

5. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line substantially parallel with the plane of the work support, a singe thread carrying looper adapted to cooperate with all of said needles, a needle loop retainer for each needle, and means for moving said retainers in a direction substantially at right angles to the plane of the needles into the needle thread loops for positioning the same at one side of the plane of the needles for the looper to enter, each retainer being provided with a shoulder positioned so as to separate the strands of the loop and hold the loop open for the looper to enter.

6. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line substantially parallel with the plane of the work support, a single thread carrying looper adapted to cooperate with all of said needles, a needle loop retainer for each needle, and means for moving said retainers in a direction substantially at right angles to the plane of the needles for engaging the needle thread loops and positioning the same for the looper to enter, said retainers being shaped and timed so as to hold the needle thread loops back on the looper until the points of the needles are well into their respective thread triangles.

7. In a sewing machine, the combination of a plurality of needles set abreast, a thread carrying looper movable in a direction parallel to the plane of the needles into the needle thread loops, a retainer for each needle having a thread engaging shoulder adapted to engage one strand of the needle thread loop and positively carry the same forward with the retainer, a carrier for said retainers, and means for moving said carrier for causing the retainers to move in a direction at right angles to the plane of the needles and into the needle thread loops for carrying said needle thread loops laterally of the plane of the needles and presenting the same for the looper to enter.

8. In sewing machine, the combination of a plurality of needles set abreast, a thread

carrying looper movable in a direction parallel to the plane of the needles into the needle thread loops, a retainer for each needle having a thread engaging shoulder adapted to engage one strand of the needle thread loop and positively carry the same forward with the retainer, a carrier for said retainers, and means for moving said carrier for causing the retainer to move in a direction at right angles to the plane of the needles and into the needle thread loops for carrying said needle thread loops laterally of the plane of the needles and presenting the same for the looper to enter, each retainer having shoulders for supporting the strands of the needle thread loop for opening the same for the entrance of the looper.

9. In a sewing machine, the combination of a plurality of needles set abreast, a thread carrying looper movable in a direction parallel to the plane of the needles into the needle thread loops, a retainer for each needle, a carrier for said retainers, and means for moving said carrier for causing the retainers to move in a direction at right angles to the plane of the needles and into engagement with the needle thread loops for carrying said needle thread loops laterally of the plane of the needles and presenting the same for the looper to enter, each retainer operating to hold the needle thread loop of the needle with which it is associated back on the looper to insure the point of the needle descent entering its respective thread triangle.

10. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line parallel with the work support, a thread carrying looper movable in a direction parallel with the plane of the needles into the needle thread loops, a retainer associated with each needle and movable across the plane of the needles for engaging the needle thread loops and shifting the same laterally of the plane for the looper to enter, and a needle guard associated with each retainer.

11. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line parallel with the work support, a thread carrying looper movable in a direction parallel with the plane of the needles into the needle thread loops, a retainer associated with each needle and movable across the plane of the needles for engaging the needle thread loops and shifting the same laterally of the plane of the needles for the looper to enter, said retainers being secured together to form a unit, a carrier for said retainer unit, and means for reciprocating said carrier.

12. In a sewing machine, the combination of a work support, a plurality of needles set abreast with their points in a line parallel with the work support, a thread carrying looper movable in a direction parallel with the plane of the needles into the needle thread loops, a retainer associated with each needle and movable across the plane of the needles for engaging the needle thread loops and shifting the same laterally of the plane of the needles for the looper to enter, said retainers being secured together to form a unit, a carrier for said retainer unit, and means for reciprocating said carrier, said retainer unit being adjustably attached to the carrier whereby it may be shifted to different set positions.

13. In a sewing machine, the combination of a work support, a needle, a looper cooperating with the needle beneath the work support, and a retainer adapted to enter the needle thread loop as the needle reaches the lower end of its stroke for retaining said loop while the needle rises and for shifting said loop laterally of the needle for positioning the same for the looper to enter.

14. In a sewing machine, the combination of a plurality of needles, a looper cooperating with all of said needles, a retainer for each needle adapted to enter the needle thread loops and position the same for the looper, and a plurality of needle guards associated with said retainers and disposed beneath and in advance of said retainers for positioning the needles so that the retainers with certainty will pass between the needle thread and the needle with which it is associated.

15. In a sewing machine the combination of a needle, a looper cooperating with the needle, a loop retainer adapted to enter the needle thread loop and having a shoulder for engaging said needle thread loop for positioning the needle thread loop for the looper to enter, said shoulder being disposed on the side of said retainer away from the needle.

16. In a sewing machine the combination of a work support, a feeding mechanism, a needle, and complemental stitch forming mechanism including a loop retainer adapted to pass between the needle thread loop and the body of the needle on the down stroke of the needle for entering the needle thread loop, and a threaded looper adapted to enter the retained needle thread loop on the retainer, said looper and retainer cooperating with the needle beneath the work support.

17. In a sewing machine the combination of a work support, a needle, means for reciprocating the same, a complemental stitch forming mechanism including a loop retainer, a thread carrying looper, and means for operating the retainer and looper whereby said retainer is moved between the needle thread and the needle and thus entered into the needle thread loop before the needle starts on its upward movement, said retainer and looper cooperating with the needle beneath the work support.

18. In a sewing machine the combination of a work support, a needle, a looper cooperat-

ing with the needle, and a retainer adapted to enter the needle thread loop as the needle reaches the lower end of its stroke for retaining said loop while the needle rises for the entrance of the looper into said needle thread loop, said retainer and looper being positioned and cooperating with said needle beneath the work support.

In testimony whereof, I affix my signature.

ALBERT S. RIVIERE.