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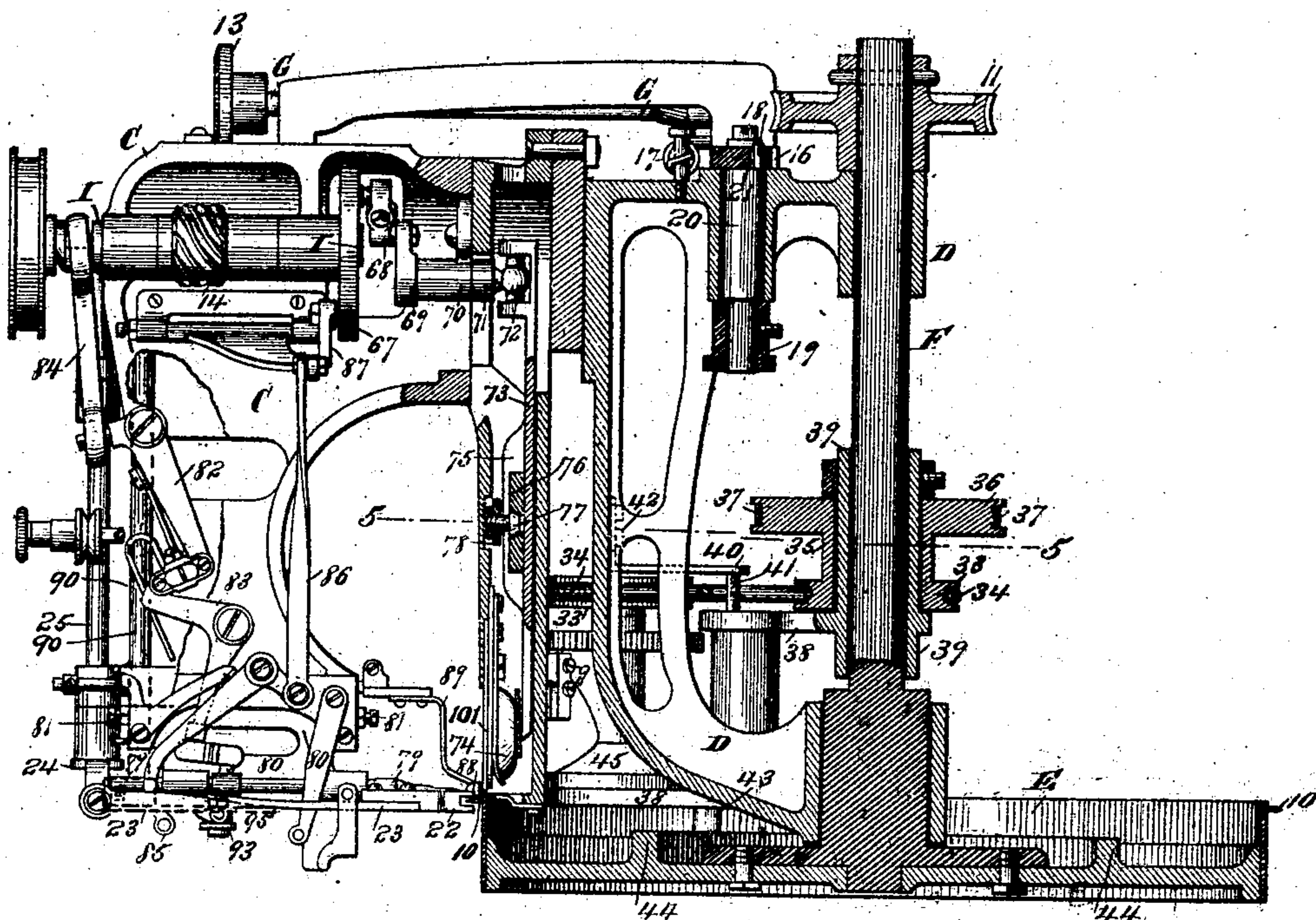
8 Sheets—Sheet 1.

S. ARNOLD.
MACHINE FOR SEWING LOOPED FABRICS.

No. 543,795.

Patented July 30, 1895.

Fig. 1.



Attest.
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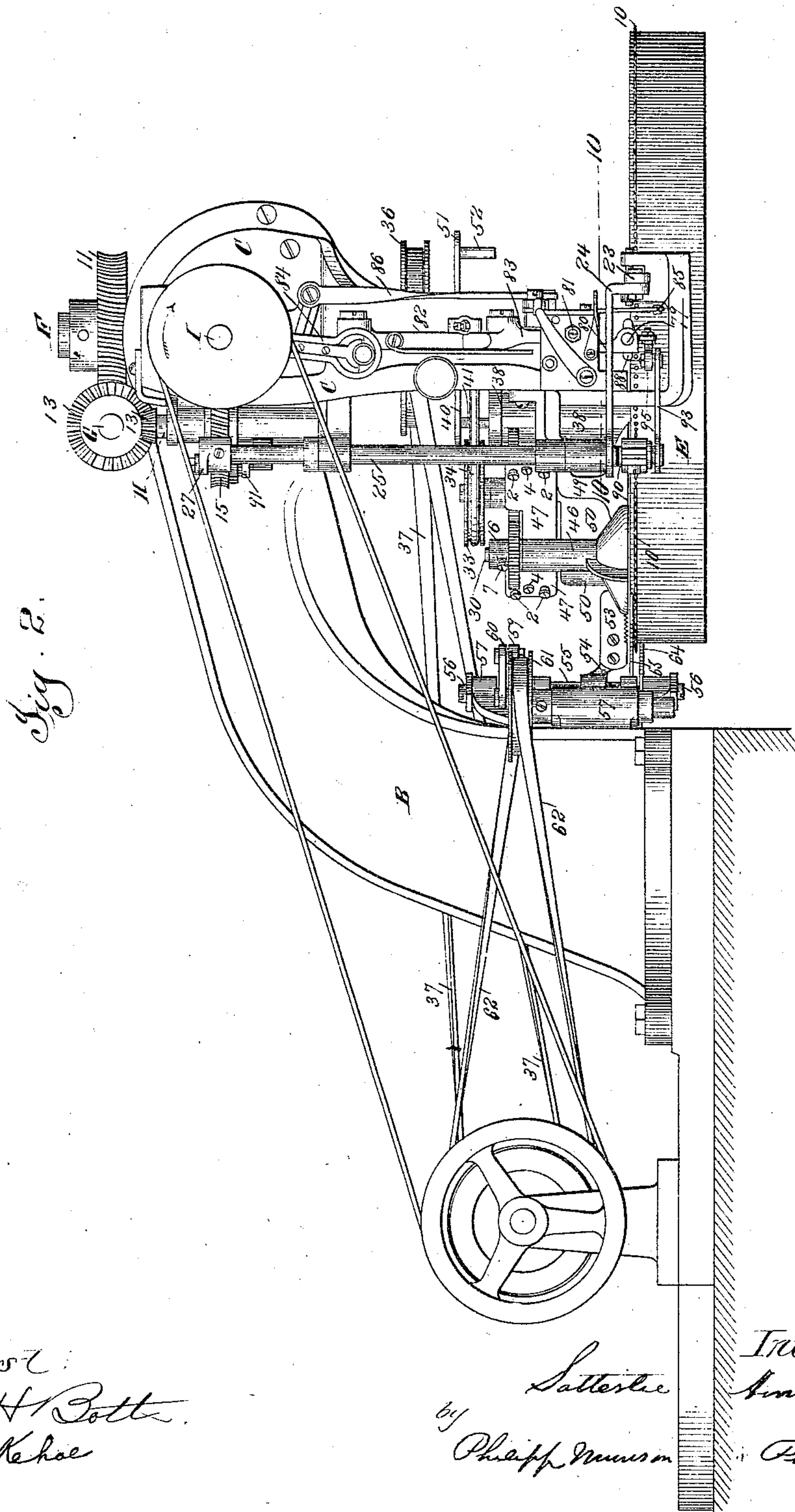
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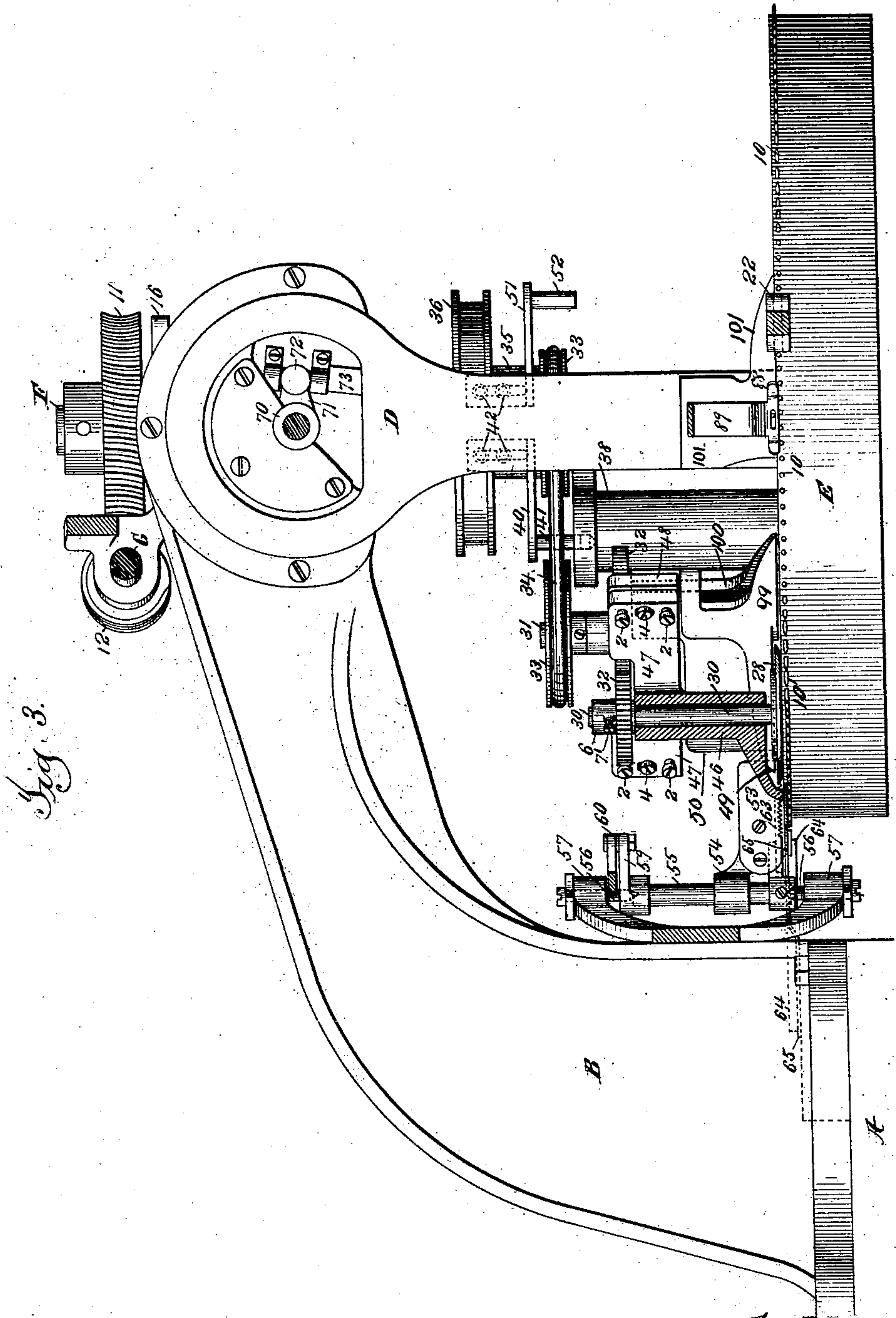
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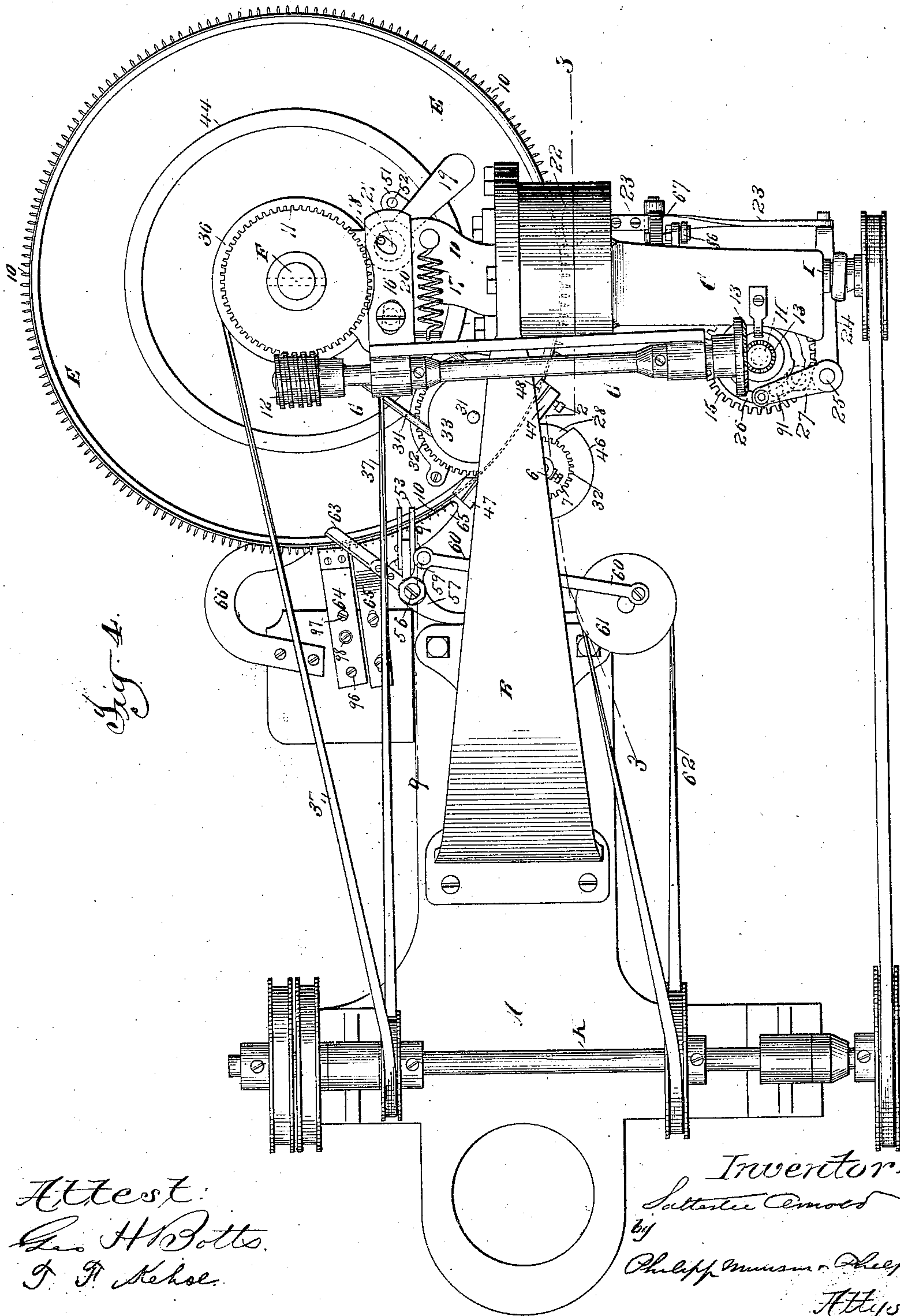
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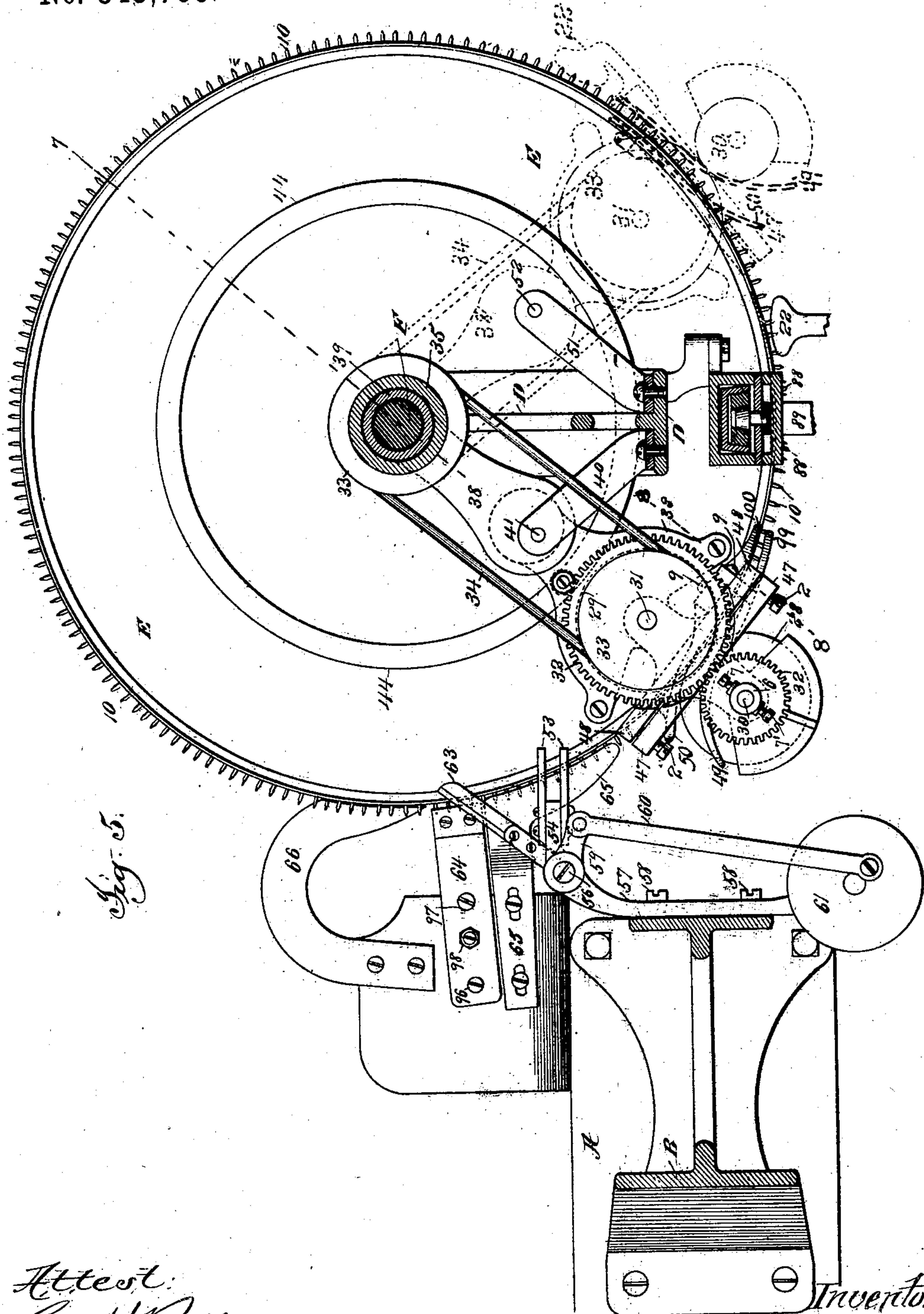
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S. ARNOLD.
MACHINE FOR SEWING LOOPED FABRICS.

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Patented July 30, 1895.



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(No Model.)

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S. ARNOLD.

MACHINE FOR SEWING LOOPED FABRICS.

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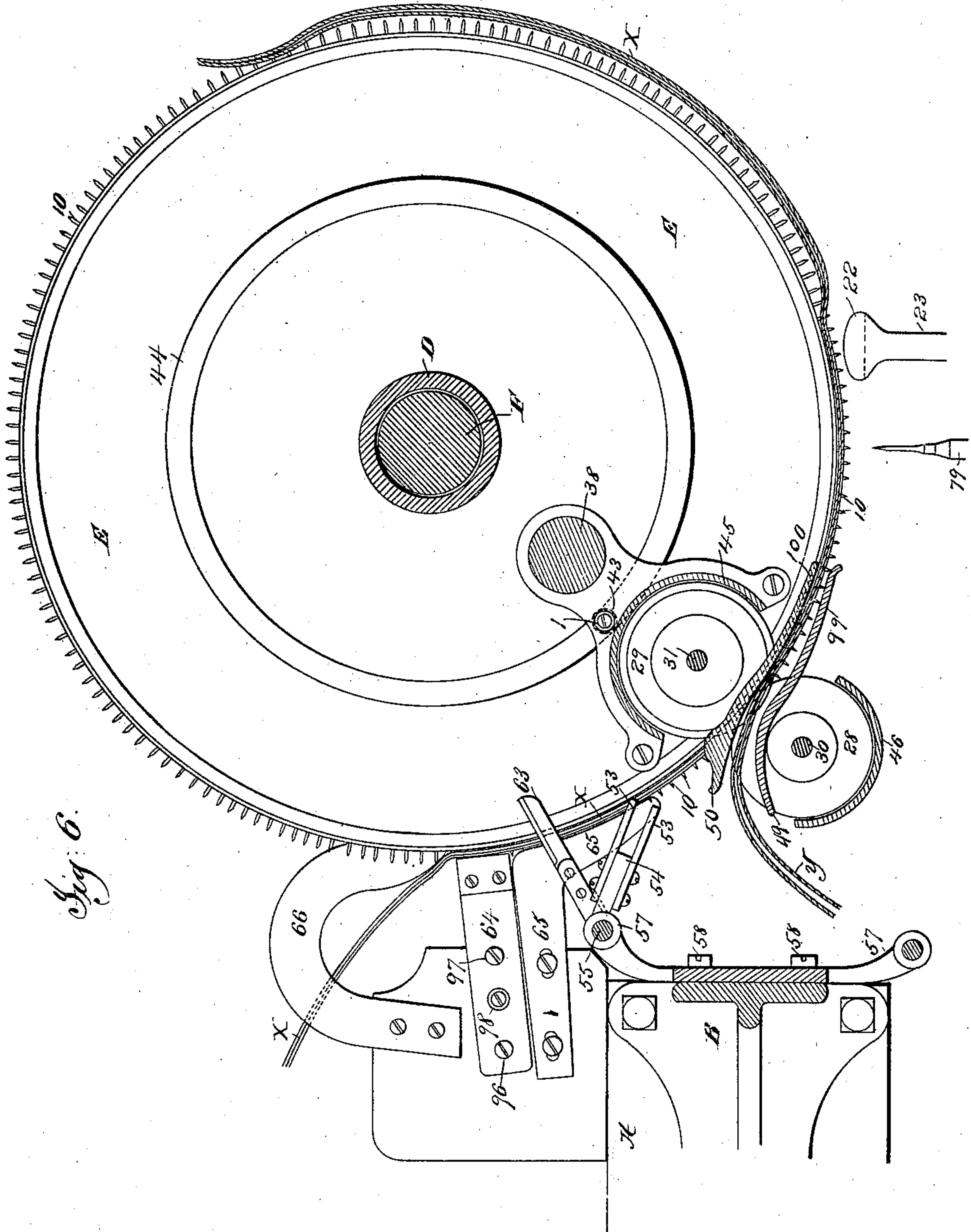


Fig. 6.

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(No Model.)

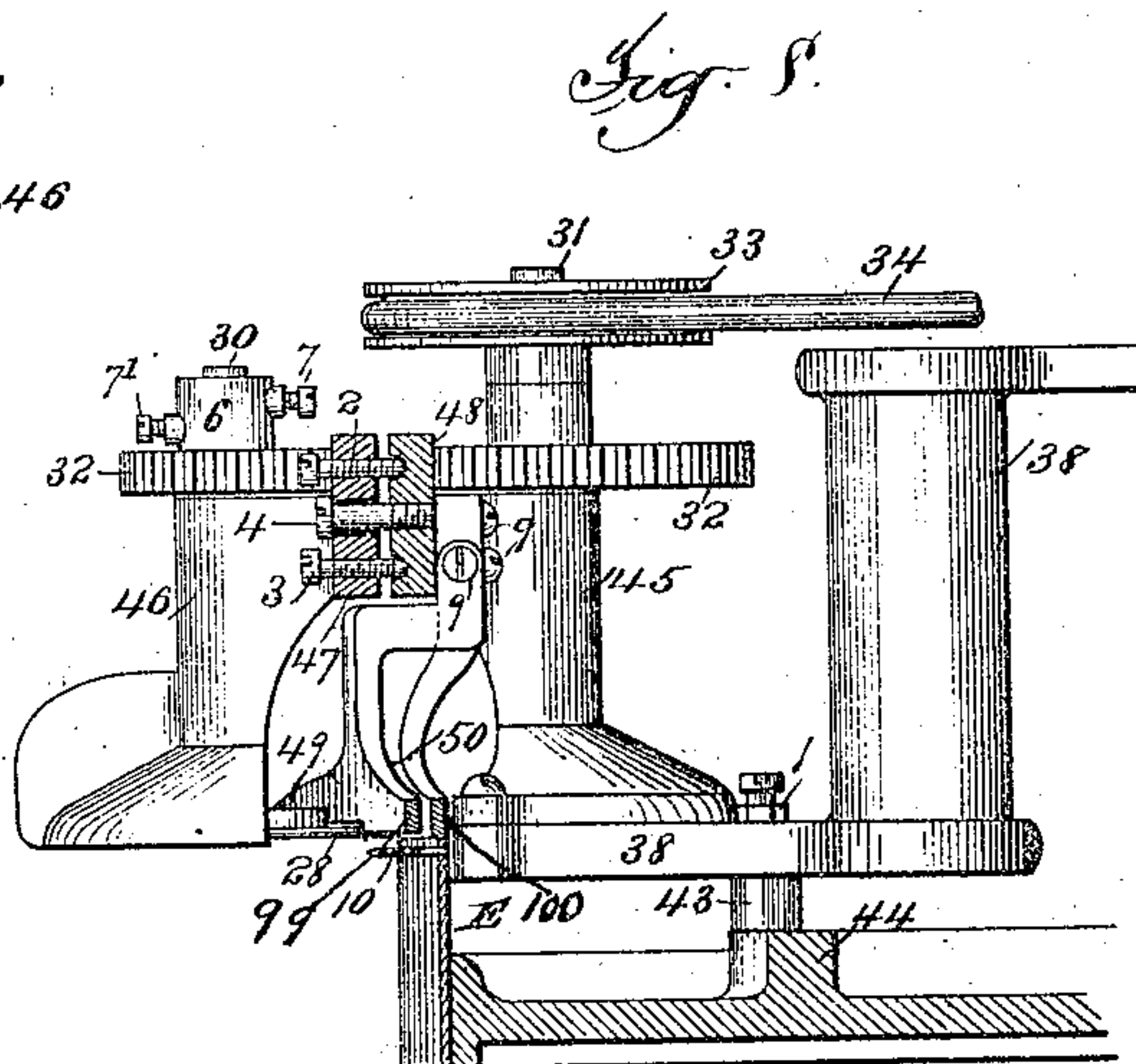
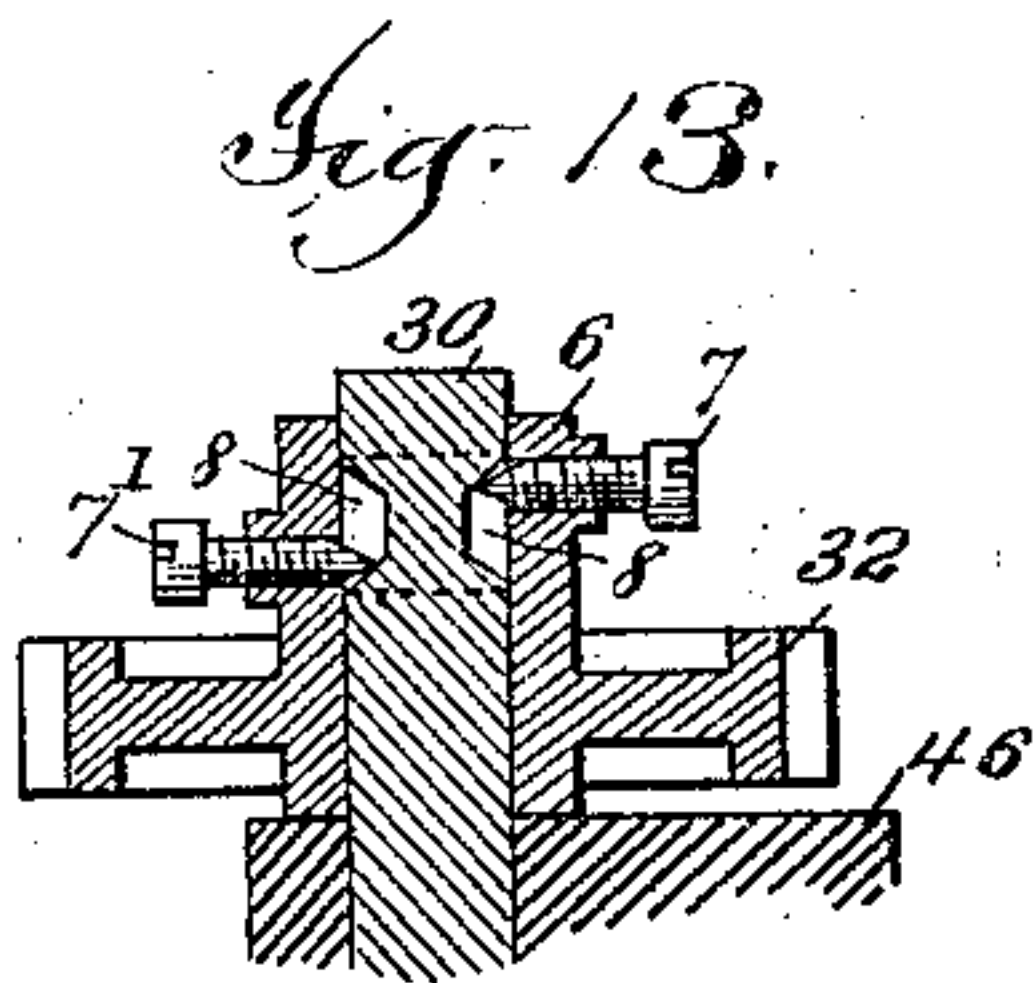
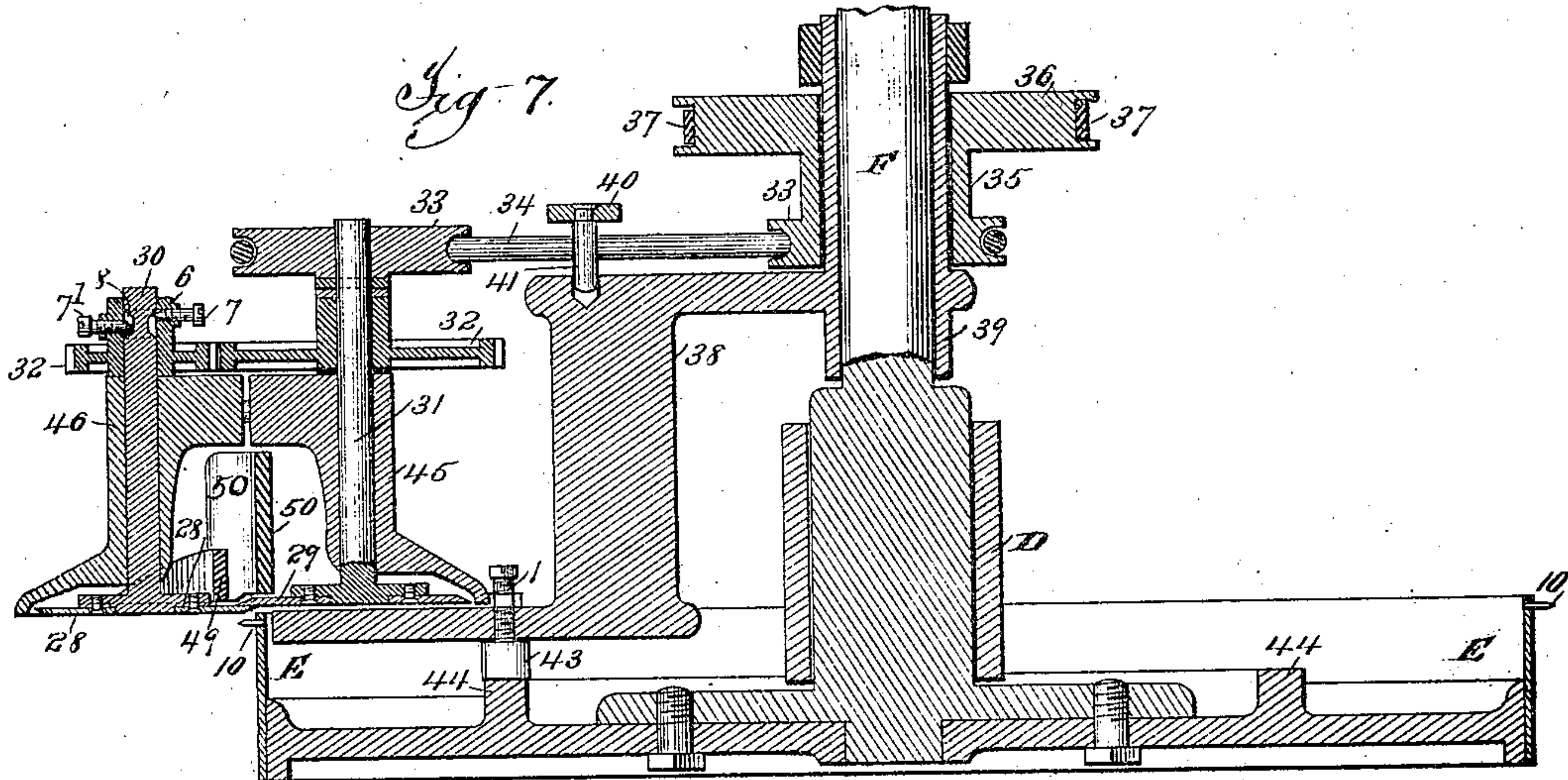
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S. ARNOLD.

MACHINE FOR SEWING LOOPED FABRICS

No. 543,795.

Patented July 30, 1895.



Attest:
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(No Model.)

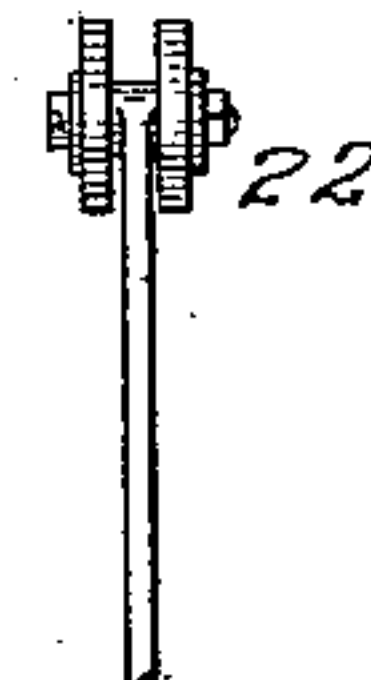
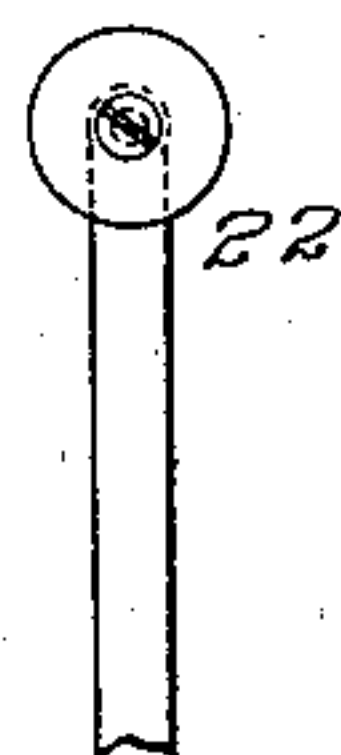
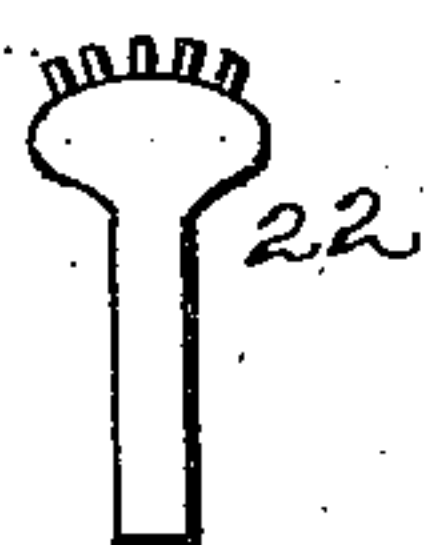
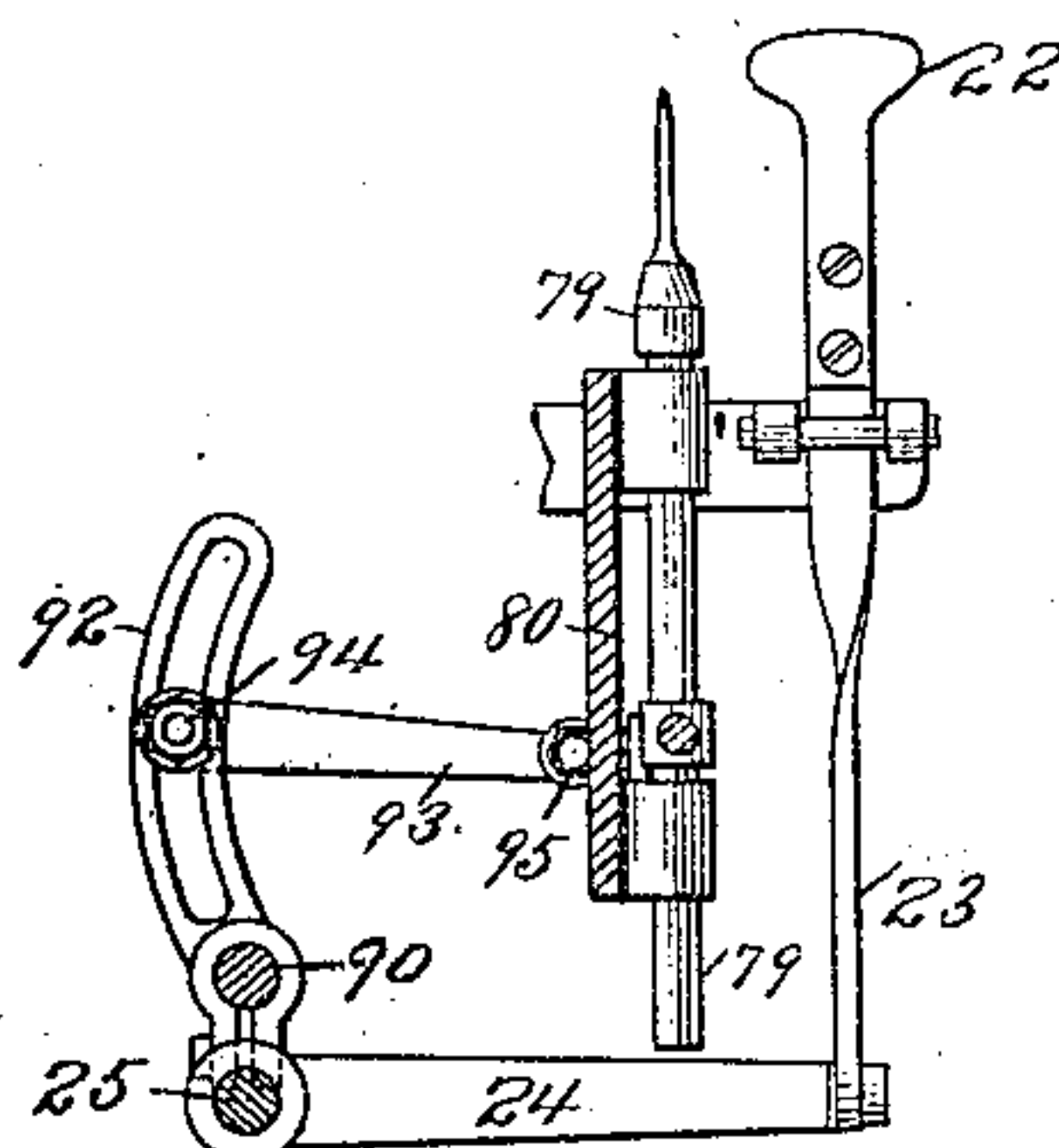
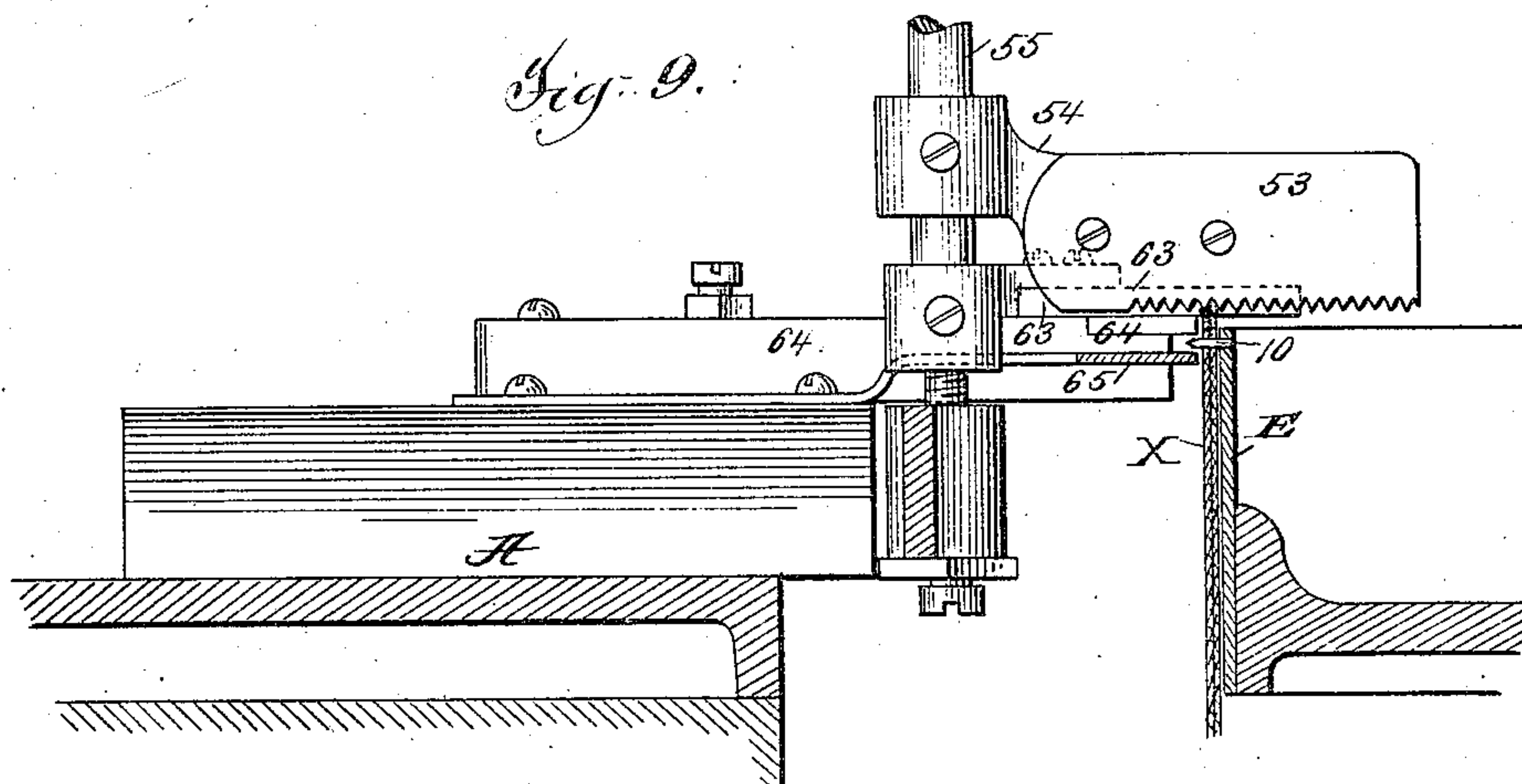
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S. ARNOLD.

MACHINE FOR SEWING LOOPED FABRICS.

No. 543,795.

Patented July 30, 1895.



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UNITED STATES PATENT OFFICE.

SATTERLEE ARNOLD, OF BROOKLYN, NEW YORK, ASSIGNOR TO ANNA M. ARNOLD, OF SAME PLACE.

MACHINE FOR SEWING LOOPED FABRICS.

SPECIFICATION forming part of Letters Patent No. 543,795, dated July 30, 1895.

Application filed August 7, 1891. Serial No. 401,976. (No model.)

To all whom it may concern:

Be it known that I, SATTERLEE ARNOLD, a citizen of the United States, residing at Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Sewing-Machines; fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to sewing-machines, and especially to that class of machines in which the work is carried by a wheel provided with pins or points on which the work is impaled, the object of the invention being generally to improve the construction of this class of machines, and especially to provide a machine for uniting knit fabrics requiring less skill on the part of the attendant and by which the work shall be done more rapidly and with less labor and a close smooth seam be secured without employing the slow and expensive process of registering-loops, as in the looping or turning-off machines in common use for uniting knit fabrics.

In carrying out my invention I employ a large wheel provided with pins or points, upon which the work is impaled and by which it is advanced, and I combine therewith an impaler by which the work is automatically pressed on the pins before the seam is made, it being necessary for the attendant therefore only to stretch the work upon the impaling-pins to the desired tension and secure it at two points on the pin-wheel, the proper position of the work for sewing as the different parts successively approach the needle thus being assured without care on the part of the operator. With this pin-wheel and impaler I preferably combine a trimmer, by which the excess of material above the seam is removed, preferably after the seam is made, and means for uncurling the edges of the fabric, so as to automatically secure the proper position of the edges of the fabric for trimming and sewing. I provide also a rubber, scraper, or napper, by which the edges of the fabric are rubbed, so as to remove any loose material and raise a nap upon the edges, and a shearer, by which the nap raised by the rubber is trimmed off, so as to aid in forming a smoother finished seam. The wheel is pref-

erably rotated continuously, as fully pointed out hereinafter, and certain constructions, including such a continuously-rotating wheel, in combination with other features, form parts of the invention independently of the impaler, as well as improved devices forming parts of the machine embodying the general features of the invention in their preferred form.

With the pin-wheel and co-operating devices above described I may employ a sewing mechanism of any suitable form for uniting the fabrics without registry of the loops, as it is evident that the wheel and co-operating devices may be applied to many of the forms of such mechanism now in use. I prefer, however, to use a sewing mechanism of substantially the construction of my Patent No. 378,645, dated February 28, 1888, in which the needle-bar has a movement in the line of feed when the needle is out of the work, so as to form a retrograde stitch.

For a full understanding of my invention a detailed description of a machine of the preferred form embodying the same will now be given, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a sectional front elevation of the machine. Fig. 2 is a side view. Fig. 3 is a sectional side elevation, the section being taken on the line 3 3 of Fig. 4. Fig. 4 is a plan view. Fig. 5 is a horizontal section on the line 5 5 of Fig. 1 and showing in dotted lines the trimmer in advance of the needle. Fig. 6 is a horizontal section taken above the pin-wheel and showing the operation of the pin-wheel and co operating devices. Fig. 7 is a section of the trimmer and its adjusting and operating devices, taken on the line 7 7 of Fig. 5, showing the vertical adjustment of the trimmer. Fig. 8 is a section on the line 8 8 of Fig. 5, showing the horizontal adjustment of the trimmer. Fig. 9 is a detailed section of the rubber on the line 9 9 of Fig. 4. Fig. 10 is a detail on the line 10 10 of Fig. 2. Figs. 11 and 12 show modifications of the impaler, and Fig. 13 is a detail of the vertical adjustment of the trimmer.

Referring to said drawings, the frame of the machine consists of the bed-plate A, upon

which is mounted the overhanging frame B, extending toward the front of the machine, where it is provided with two depending arms C D, the former supporting the sewing mechanism and the latter the feeding or pin wheel and co-operating devices, which are located upon opposite sides at the front of the machine, the pin-wheel rotating in a horizontal plane and being supported by the overhanging frame B at such a distance from the bed-plate A as to lie outside the latter, so that the work may readily be placed upon and carried by the wheel.

The parts to which my invention especially relates will first be described in detail. The pin-wheel E consists of a large wheel preferably arranged horizontally and provided on its periphery near the upper edge with a series of radial pins 10, extending preferably through the whole or a large part of the circumference of the wheel, these pins being set at any suitable distance apart, so as to hold the fabrics to be united in proper position, the rim of the wheel thus forming a pin-plate by which the goods are carried. This wheel E is carried by a vertical shaft F, mounted in bearings in the arm D and provided at its upper end with a worm-wheel 11, which meshes with a worm 12 carried by the shaft G, which is mounted transversely of the machine in bearings on the arm C D, this shaft being driven from a vertical shaft H through beveled gears 13, the shaft H being in turn driven by the main operating-shaft of the sewing mechanism I through worm 14 and worm-gear 15.

The main operating-shaft K may be driven in any suitable manner, but is shown as operated by a belt-and-pulley connection from the main driving-shaft K, mounted in the frame A at the rear of the machine.

The connections between the driving-shaft and pin-wheel are preferably constructed to be broken at will, so that the latter may be thrown out of operation. Any suitable means may be provided for this purpose. I have shown a simple construction in which the shaft G is carried by a slotted bar 16, sliding on the head of the machine and held in position with the worm 12 in engagement with the gear 11 by spring 17. The plate 16 is moved against the tension of the spring 17 to throw the worm and gear out of mesh by a pin 18, acting within the cam-slot 21, formed in the plate 16, said pin being carried on a vertical stud or shaft 20, actuated by a handle 19.

For the purpose of automatically pushing the work onto the impaling-pins, so that it is held firmly in proper position as it approaches the needle, I provide an impaler, which engages the work, preferably upon both sides of the impaling-pins, and forces it upon and down to the base of the pins, so that it is held in proper position for sewing. This impaler is preferably of the form shown, consisting of a head 22, slotted so as to engage

the work on opposite sides of the pins, this head preferably being movable to and from the pin-wheel. Any suitable means may be provided for supporting and actuating the impaler. As shown, it is carried by a bar 23, sliding in supports in the arm C and pivotally connected at its rear end to an arm 24 on a vertical shaft 25, mounted in bearings on the rear side of the arm C, this shaft 25 being operated by a cam-groove 26 in the upper side of the worm-gear 15 by a crank-arm 27, provided with a bowl or roller running in the cam-groove. The impaler is preferably provided with a curved or inclined guiding-surface on the side from which the work approaches the impaler, so that the work is properly deflected or guided and danger of its catching as it passes the impaler is avoided. As shown, the impaler is curved on the opposite side also; but this is not important.

While I prefer to use an impaler moving to and from the pin-wheel a stationary impaler may be used, and it is evident that the form of the impaler may be varied widely. Thus, if desired, two rollers may be used, as shown in Fig. 11, and these may be carried by the reciprocating bar 23, but will preferably be mounted in a fixed position, the rollers revolving by contact with the moving fabric.

Other modifications will readily suggest themselves. A series of blunt pins carried by a reciprocating head, as shown in Fig. 12, may be found satisfactory.

A trimmer is preferably mounted above the wheel on the opposite side of the needle from the impaler, and is constructed as follows: The trimmer proper consists of two rotary cutters 28 29, carried, respectively, by shafts 30 31, connected by gears 32, so that the shaft 30 is driven from the shaft 31 and preferably at a higher rate of speed, as shown, so as to make a draw cut. The shaft 31 is driven by means of a pulley 33 and belt 34 from a sleeve 35, mounted loosely on the shaft F of the wheel E, this sleeve being driven by any suitable means, preferably from the driving-shaft K by a pulley 36 and belt 37, as shown.

The rotary cutters and their operating mechanism may be mounted in a fixed position upon the frame of the machine in any suitable manner as such cutters are commonly mounted; but, for a purpose presently to be described, I prefer to mount them, as shown, in a swinging-bracket 38, carried by a sleeve 39 on shaft E inside the sleeve 35, previously described. This swinging-bracket with the trimmer is held in the proper position by means of an arm 40 on the arm D, provided with a pin 41, adapted to hold the latter in place, this arm 40 being preferably made movable vertically upon the arm D by a slot and set-screw 42, as shown in Fig. 3, so that the pin may be withdrawn to release the bracket 38 and allow it to be swung upon the shaft F. Any other construction may be used, however, for the purpose of securing and releasing the bracket. The arm 40 may

be a strong spring-arm secured in a fixed position on the arm D, but which may be sprung upward to release the pin when the bracket is to be moved.

5 The bracket 38 is supported outside the shaft F by a bowl or roller 43, moving freely upon a rib 44 upon the upperside of the pin-wheel E, this bowl 43 being preferably made adjustable by a bolt and set-nut 1, as shown, 10 so that the vertical position of the bracket and trimmer may be adjusted, as desired, to secure the trimming of the seam on the proper line. The shafts 30 31 and cutters 28 29 may both be mounted in fixed bearings in 15 the bracket 38, as such cutters are commonly mounted; but, for the purpose of adjusting the lap of the cutters to secure the proper action and compensate for wear I prefer the construction shown, in which the shaft 31 is 20 mounted in a fixed bearing 45, secured to the bracket 38, and the shaft 30 is mounted in a bearing 46, adjustable as follows: The bearing 46 is supported by an ear 47, carried thereby and adjustably secured to an ear 48, carried by the bearing 45. The adjustment is 25 secured by a pivotal connection at each end of the ears formed by three screws, the upper screws 2 at each end being threaded in ear 47 and resting in recesses in the adjacent 30 face of ear 48, so as to form pivots on which the bearing 46 swings in a vertical plane, these pivot-screws being preferably in line with gears 32, so that the meshing of the latter is not affected by the movement of bearing 46. The lower adjusting-screws 3 also are 35 threaded in the ear 47 at each end and rest on the surface of ear 48. The central adjusting-screws 4, between screws 2 and 3, are tapped through and loose in ear 47 and 40 threaded in ear 48.

By withdrawing screws 3 and tightening screws 4, or vice versa, the bearing 46 may be swung on pivots 2 and any desired adjustment of the lap of the cutters secured. It 45 is desirable also that a vertical adjustment should be provided by which the distance between the cutter-blades may be varied, so as to secure the proper contact-pressure. For this purpose I provide the means shown in 50 detail in Figs. 7 and 13. The shaft 30 is mounted to slide through the bearing 46 and gear 32. The hub 6 of gear 32 carries two adjusting-screws 7 7', which are tapped through the hub 6 from opposite sides and 55 engage the upper and lower sides of grooves or recesses 8, these sides being beveled in opposite directions to form cam-surfaces, where they are engaged by the screws 7 7'. The shaft and gear are held against upward movement during the operation of the cutters by 60 the blades, and the shaft is adjusted vertically to press the cutter-blades together and compensate for wear by loosening the screws 7' and tightening the screw 7. By reversing this—loosening the screw 7 and tightening the screw 7'—the pressure may be decreased and thus an exact adjustment obtained.

The surplus material above the seam removed by the trimmer is thrown off by a shedder formed of two plates 49 50, mounted just 70 above the cutters 28 29 and extending in the line of movement of the pin-wheel and outward from its periphery. These plates 49 50 are secured to the ear 48, previously described, by screws 9, as shown, or in any other suitable 75 manner, so that the shedder may readily be removed. The plates 49 and 50 are extended on the opposite sides of the cutter-blades, so as to form guides between which the edges of the fabrics are held as they pass 80 to the cutters, these guides 99 100 forming an uncurling device by which the curling or turning over of the edges of the fabric above the seam is prevented and the proper presentation of the fabrics to the trimmer secured. 85 An uncurling device is preferably used in connection with the impaler and sewing mechanism, and may be found sufficient to prevent the curling at the trimmer without the use of the guides 99 100, just described, this consisting, in the construction shown, of a plate 101, 90 placed edgewise just above and parallel with the wheel, opposite to or a little behind the impaler, and having an inclined surface operating to uncurl the edges as the fabrics approach the impaler and sewing mechanism. 95

As above stated, I prefer to place the trimmer in the position shown in full lines in the drawings, so as to trim off the surplus portion 100 of the material after the seam is made; but, if preferred, the trimmer may be placed on the other side of the needle and the surplus material trimmed off before the seam is made.

My improved trimmer mounted to swing concentrically with its driving-shaft is adapted 105 to be used in either position, and for the purpose of securing it in advance of the impaler I have shown an arm 51, provided with a pin 52, similar to the arm 40 and pin 41, previously described, the arm 51 being mounted 110 upon the arm D by a slot-and-screw connection 42, as in the case of arm 40, but extending in the opposite direction from arm 40, so as to hold the trimmer in position upon the opposite side of the needle. This arrangement 115 of the trimmer is shown in dotted lines in Fig. 5. As it is necessary that the fabric be impaled upon the pins before trimming, the impaler is mounted in advance of the trimmer, and when the trimmer is positioned 120 as just described, so as to trim before the seam is made, I may employ a stationary impaler, as previously described, and mount it upon the trimmer-frame, as shown in dotted lines in Fig. 5. 125

When the trimmer is to be secured in position in advance of the needle, the shedder 49 50 must be removed; but a shedder of similar form may be secured upon the opposite end 130 of the plate 48, so as to guide the surplus material outward from the pin-wheel, as shown in dotted lines in Fig. 5. It will be seen from the drawings that to swing the trimmer it is necessary only to remove the pin 41, so as to re-

lease the trimmer and to remove the bracket by which the rubber and shearer and their operating parts, to be described hereinafter, are carried.

5 My swinging trimmer may be used, also, to trim the material at one operation after it is placed upon the pins and before the sewing operation is commenced, the trimmer being moved by hand for this purpose. The trimmer is swung about the wheel to a proper position, and is then swung by hand about the pin-wheel toward the needle or in the opposite direction, thus trimming off the material above the seam before the machine is set in operation. For thus operating the trimmer, also, it is necessary to remove the shedder.

For the purpose of rubbing down the seam, removing the surplus material left by the trimmer—such as any loose cut loops of knit goods—and raising a nap upon the edge of the united fabrics I provide a rubber, scraper, or napper, which consists, preferably, as shown, of two or more knife-blades 53, which are provided with teeth on their under sides, which engage the edges of the fabrics. The knife-blades 53, forming the rubber, are carried by an arm 54 on a shaft 55, mounted on screw-pivot bearings 56 in a bracket 57, carried by the arm B and removably secured thereto by screws 58, or in any other suitable manner. The arm 54 is preferably adjustable on shaft 55, as shown, so as to secure the proper action of the rubber. The shaft 55 is rocked by a crank 59 and pitman 60 from a crank-disk 61, driven from the main driving-shaft K or other part of the mechanism in any suitable manner. As shown, the disk forms a pulley and is driven by a belt 62 from the shaft K.

While I prefer to form the rubber of toothed blades, as shown, it is evident that its construction may be varied. A brush of any suitable construction or a file may be used with good results, but this construction is preferable both on account of the better result produced and the ease with which the toothed blades are kept in proper condition. The movement, also, may be varied and a rotating rubber employed, which may be of any suitable form and operated by any of the means in common use with rotating brushes in looping-machines, but the reciprocating rubber is preferred.

The long nap raised by the rubber is preferably trimmed off to form a smooth and finished inner edge of the seam, and for this purpose I provide a shearer, which consists, in the form shown, of an oscillating blade 63, carried by the shaft 55, previously described, so as to oscillate with the rubber 53 and act upon the fabric just after the latter, this blade 63 co-operating with a stationary blade 64, mounted on the base-plate A. The arm by which the blade 63 is carried is preferably made adjustable upon the shaft 55, as shown, so as to permit the blade 63 to be adjusted relatively to blade 64, and a fine adjustment of the contact-pressure is secured by the ad-

justment of the stationary blade 64, which is provided with pivot-screw 96 and adjusting-screws 97, 98, corresponding, respectively, to screws 2, 3, and 4 in the construction shown in Fig. 8 and previously described.

The material is held upon the pins 10 during the action of the rubber and shearer by means of a curved guide 65, which is mounted upon the base-plate A and preferably made adjustable, as shown, to permit its position to be varied in accordance with the thickness of the goods to be sewed, and the completed goods are removed from the pin-wheel after passing the shearer by the shedder 66, which may be of any suitable form to guide the material from the pin-wheel.

With the mechanism thus far described as the preferred construction embodying my invention a sewing mechanism of any suitable form for uniting the fabrics without registry of the loops may be employed; but I prefer to employ therewith a sewing mechanism constructed and arranged to form a retrograde stitch, as in my Patent No. 391,352, dated October 16, 1888, and I have shown a sewing mechanism of substantially the general construction shown in that patent, employing in connection therewith, however, the improvements of my application, Serial No. 318,646, filed July 25, 1889. Referring especially to Figs. 1, 3, 4, 5, and 10, this sewing mechanism will now be described. The main operating-shaft I, previously described, is supported in the upper part of the arm C, and is provided at its inner end with a crank-disk 67, connected by a link 68 with one of the cranks 69 of the crank-shaft 70, the other crank 71 of which is connected by means of a link 72 with the upper end of the looper-rod 73, which carries at its lower end the looper by which the needle-thread is carried around the stationary shuttle 74. This construction is substantially that of my Patents Nos. 331,006 and 331,007. The looper-rod is provided near its middle with side flanges 75, embracing a guide-block 76, pivoted on a conical stud 77, the shank of which passes through a stationary bridge-piece 78 and is secured therein by a check-nut in any position to which it may be adjusted in the bridge-piece 75, the head of the stud being slotted to permit its adjustment by a screwdriver. The needle-bar 79 is reciprocated horizontally in a vertically-swinging frame 80, pivoted on center screws 81 in arm C, the needle-bar being operated by means of the link-connected primary and secondary operating-levers 82, 83, which are actuated from an eccentric on shaft I through pitman 84. The take-up consists of levers 85, operated from a cam-groove on the crank-disk 67 through a pitman 86 and rock-shaft, provided with a crank-arm 87 having a bowl running in said groove. The presser-foot consists of a plate 88, slotted for the needle, as usual, and carried by a spring-bar 89, mounted on the frame, so that the presser-foot is held in position outside of the pin-wheel E and

just above the pins, so that the stitch is taken in the proper relation thereto, as shown clearly in Fig. 3. As before stated, the needle-bar frame 80 is pivoted to swing in a vertical plane, and this frame is actuated so as to move the needle backward in the line of feed a short distance when the needle is out of the work, in order to form the retrograde stitch previously referred to. Any suitable construction may be used for the purpose of producing this movement of the frame, but I prefer that shown. A vertical shaft 90 is mounted on the rear side of the arm C, adjacent to the shaft 25, and is oscillated by means of a crank-arm 91, having a bowl running in a cam-groove on the lower side of the worm-gear 15, all as shown in Figs. 1, 2, and 4. This shaft 90 carries at its lower end a slotted rock-arm 92, in which a pitman 93 is adjustably secured by means of set-screw 94, this pitman 93 being secured at its opposite end to the needle-bar frame 80 by a pivoted adjustable connection 95, as shown in Fig. 10, so that the throw of the needle-bar frame may be varied by adjusting the pitman 93 in the slotted rock-arm 92 without changing the central position of the needle-bar frame. The thread-pull and other devices for controlling the thread are of a common construction and need not be described.

The special form of operating mechanism, the devices for guiding the looper-rod, and the connections for swinging the needle-bar frame form no part of the present invention, but are of substantially the construction claimed in my application above referred to.

The operation of the machine, so far as it involves the features of my invention, will be understood from a brief description in connection with the drawings, especially Fig. 6. The fabrics to be united are placed upon the pin-wheel E by securing the advance end of the fabric to the pins slightly in advance of the impaler and then stretching the fabric to the desired tension and securing the fabric to the pin-wheel upon the opposite side of the wheel just in advance of the shedder 66, or at any point desired, in accordance with the length of the fabric to be sewed. If the work consists in sewing together knit and woven fabric or fabrics of different elasticity, as in securing the cuffs to the body portions of shirts and drawers, it is evident that both fabrics may be adjusted as desired by stretching them separately upon the pin-wheel, so as to secure the desired tension and relation of the fabrics and then impaling them on some or all of the pins sufficiently to support them and hold them in place for the impaler, which presses them upon and down to the base of the pins as they are advanced to it by the pin-wheel, so that the proper position of the fabrics for sewing is assured. By the use of a wheel having its pins set quite closely together, and preferably substantially as shown, I am able to properly support knit and other elastic fabrics and hold them in proper

position throughout, so that the lines of sewing and trimming may be formed on true right or curved lines, according to the manner in which they are placed upon the wheel, and the edges may be trimmed closely to form a flat seam. If the pins are placed wide apart, the fabrics will not be supported properly, but will sag between the pins, so that the lines of sewing and trimming will be irregular when the fabrics are removed from the wheel. The exact distance apart at which the pins are set will vary somewhat with the character of the goods; but with the common knit goods it will be found that the best results are attained by setting the pins at a distance apart of from a sixth to a half inch, although this distance may be increased somewhat with fairly good results. In placing the fabrics upon the pin-wheel no attention need be paid to the stitch of the fabric in relation to the pins, my construction thus differing essentially from the ordinary looping-machine, in which the points are so arranged that successive loops are impaled upon the points and the movement of the needle registers with the points, so that it is necessary to provide different machines for fabrics of different mesh. My machine is adapted to sew fabrics of any mesh, the range of adjustment of the stretch being unlimited, it being necessary only to secure the ends of the fabric to the pins so that the fabric will be held in proper position, and the operator is not required to impale the fabric upon each one of the pins in proper position for sewing, as this is automatically done by the impaler. It is evident that with my improved machine, in which the fabrics are united by sewing without registry of the loops instead of by looping, I am able to use with knit fabrics a feeding mechanism having a continuous movement, which is impossible with looping-machines in which an intermittent movement is necessary. By the use of feeding mechanism having this continuous feeding movement I am enabled to place my punctures much closer together than is possible with an intermittent feeding mechanism, so that the number of stitches may be very largely increased, a feature of great importance in uniting knit fabrics without registry of the loops. The work having been placed upon the pins and the machine set in operation, the work is fed forward slowly by the pin-wheel, and just before the successive portions of the fabric reach the needle they are pressed inward to the base of the pins by the impaler, as shown in Fig. 6, so that they pass the needle secured in proper position. As the seam is formed and the fabric X fed forward past the needle the surplus material Y above the edge of the pin-wheel is trimmed off by the cutters 28 29, forming the trimmer, and the shedder, formed of the plates 49 50, guides the surplus material from the cylinder as it is trimmed off, all this operation being shown clearly in Fig. 6. After

passing the trimmer the edge of the united fabrics is acted upon by the rubber, so as to knock out any loose half or cut loops and nap up the fiber, the material being held in position during this operation by the curved guide 65. The operation of this rubber differs essentially from that of the brush now in common use in looping-machines, in which the brush does not act as a napper, because this is impossible without risk of injuring the registered loop, the brush simply operating to remove the outside broken loop without affecting the fabric. In my machine, in which knit fabrics are united by sewing without registry of the loops, as distinguished from uniting the registered course loops, a different result is produced by the rubber, the loops upon the edges of the fabrics outside of the line of stitches, whether whole or secured half-loops, being rubbed and the fabrics raised to form a nap. From the rubber or napper the fabric still held by the guide 65 is sheared off by the co-operating shear-blades 63 64, thus forming a close smooth inner edge of the seam, and the fabric is then guided to one side and thrown off the pin-wheel by the shedder 66. The operation is the same with the trimmer adjusted to the opposite side of the needle and held in position by the arm 52 in advance of the needle or swung above the wheel to trim prior to sewing, the surplus material then being removed before the seam is made, the rubbing and shearing operations remaining the same.

The operation of the needle will be understood from a brief general description. The stitches are set so closely together that the movement of the work while the needle is within the same is very slight, so that a continuous feeding movement is possible, even with goods of close mesh, and the stitch is formed and the fabrics secured together just above the pins without registry of the loops as the work is carried past the needle by the pin-wheel. With the retrograde sewing mechanism shown, in which a seam is formed by a combined open stitch and short grip-stitch, as fully set forth in my Patent No. 378,645, the work is carried past the needle by the pin-wheel to form the open stitch. When the needle is withdrawn from the work at the completion of this stitch, the swinging needle-bar frame will be actuated by the connections heretofore described, so as to carry the needle a short distance in the direction of the feed, thus forming a short retrograde grip-stitch, the needle then being returned to normal position when withdrawn from the work and another open stitch being formed. The pin-wheel, in combination with the retrograde movement sewing mechanism, provides a positive feed, and I am able to secure the proper function of the retrograde stitch and form a much closer seam than otherwise. I am thus able also to use the retrograde stitch with knit fabrics without employing a looping-cylinder, and this stitch serves to form a strong,

tight seam, irrespective of the line on which the knit fabrics are cut. It will be seen that the pin-wheel is driven by the worm-gear 11 and worm 12 by a slow movement relatively to the sewing mechanism, and this form of feed enables the movement of the pin-wheel to be readily varied in the construction of the machine, as desired, and a slow speed attained without a complicated gearing. By means of the handle 19 and sliding plate 16 the driving mechanism for the pin-wheel may readily and quickly be thrown out of operation when desired for any purpose.

It will be understood that I do not limit myself to the specific form of devices shown, as many modifications may be made therein without departing from my invention.

By the term "radial pins" in the specification and claims I do not mean that the pins must be set at right angles to the axis or in radial planes, but I have used this term to cover pins projecting outward from the periphery of the wheel, although not strictly radial.

What I claim is—

1. The combination with a sewing mechanism, of a rotating pin-wheel upon which the fabric forming the work is supported and by which it is advanced, and an impaler constructed and arranged to press the fabric over the points of any of the pins upon which it is not impaled, as the fabric is advanced to the impaler by the pin wheel, substantially as described.

2. The combination with a sewing mechanism, of a rotating pin wheel upon which the fabric forming the work is supported and by which it is advanced, and an impaler having a curved or inclined surface deflecting the fabric and constructed and arranged to press the fabric over the points of any of the pins upon which it is not impaled, as the fabric is advanced to the impaler by the pin wheel, substantially as described.

3. The combination with a sewing mechanism, of a rotating pin wheel upon which the fabric forming the work is supported and by which it is advanced, an impaler constructed and arranged to press the fabric onto any of the pins upon which it is not impaled, and means for moving the impaler toward and from the wheel to press the fabric onto the pins, as it is advanced to the impaler by the pin wheel, substantially as described.

4. The combination with a sewing mechanism, of a pin plate upon which the fabric forming the work is supported and by which it is advanced, and an impaler constructed and arranged to press the fabric over the points of any of the pins upon which it is not impaled, as the fabric is advanced to the impaler by the pin plate, substantially as described.

5. The combination of a main shaft and stitch forming mechanism, a horizontal continuously rotatable material carrying cylinder provided with closely set peripheral supports, as shown, for holding said material in posi-

tion to be operated upon by the stitch forming mechanism, a suitable trimmer, and intermediate operative mechanism whereby the fabric is fed, the stitches placed therein, and the edge of said fabric trimmed, substantially as described.

6. The combination with the main shaft and stitch forming mechanism, of a horizontal continuously rotatable material carrying cylinder for holding said material in position to be operated upon by the stitch forming mechanism, a trimmer, suitable intermediate operative mechanism whereby the fabric is fed, the stitches placed therein and the trimmer operated, and means for directing the material from the stitch forming mechanism to the trimmer, substantially as described.

7. The combination with a main shaft, of a horizontal continuously rotating material carrying cylinder provided with closely set peripheral supports, as shown, a needle arranged to reciprocate above said cylinder and in an approximately parallel plane therewith, a suitable trimmer, and operative mechanism whereby the fabric is fed, the stitches placed therein and the edge of the fabric trimmed.

8. The combination with a sewing mechanism, of a continuously rotating pin-wheel upon which the fabric forming the work is supported and by which it is advanced, and an impaler constructed and arranged to press the fabric over the points of any of the pins upon which it is not impaled, as the fabric is advanced to the impaler by the pin-wheel, substantially as described.

9. The combination with a sewing mechanism, of a continuously rotating pin wheel upon which the fabric forming the work is supported and by which it is advanced, an impaler constructed and arranged to press the fabric onto any of the pins upon which it is not impaled, and means for moving the impaler toward and from the wheel to press the fabric onto the pins, as it is advanced to the impaler by the pin wheel, substantially as described.

10. The combination with a sewing mechanism, of a continuously traveling pin plate upon which the fabric forming the work is supported and by which it is advanced, and an impaler constructed and arranged to press the fabric over the points of any of the pins upon which it is not impaled, as the fabric is advanced to the impaler by the pin plate, substantially as described.

11. The combination with a sewing mechanism, of a continuously rotating work-carrying pin wheel on which the fabric forming the work is impaled, a trimmer for cutting off the surplus fabric and a rubber for rubbing down and napping the cut edges, substantially as described.

12. The combination with a sewing mechanism, of a rotating work-carrying pin wheel on which the fabric forming the work is impaled, said sewing mechanism and pin wheel being constructed and combined to unite knit fab-

rics without registry of the loops, a trimmer for cutting off the surplus fabric, a rubber for rubbing down and napping the cut edges, and a shearer for trimming off the napped edges, substantially as described.

13. The combination with a sewing mechanism, of a rotating work-carrying pin wheel on which the fabric forming the work is impaled, said sewing mechanism and pin wheel being constructed and combined to unite knit fabrics without registry of the loops, an impaler pressing the fabric onto the pins before the seam is made, a trimmer for cutting off the surplus fabric, and a rubber for rubbing down and napping the cut edges, substantially as described.

14. The combination with a sewing mechanism of a continuously traveling feeder for advancing the fabrics to be united, a trimmer for cutting off the surplus fabric, and a rubber for rubbing down and napping the cut edges, substantially as described.

15. The combination with a sewing mechanism of continuously traveling feeder for advancing the fabrics to be united, a trimmer for cutting off the surplus fabric, and a reciprocating rubber formed of one or more toothed blades for rubbing down and napping the cut edges, substantially as described.

16. The combination with a sewing mechanism, of feeding mechanism for advancing the fabrics to be united, said sewing and feeding mechanism being constructed and combined to unite knit fabrics without registry of the loops, a trimmer for cutting off the surplus fabric, a rubber for rubbing down and napping the cut edges, and a shearer for trimming off the napped edges, substantially as described.

17. In a sewing machine having an overhanging frame, the combination with a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, of a sewing mechanism and means for moving the needle bar of the sewing mechanism in the line of feed or approximately so when the needle is out of the work to form a retrograde stitch, substantially as described.

18. In a sewing machine having an overhanging frame, the combination with a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, of a sewing mechanism, means for moving the needle bar of the sewing mechanism in the line of the feed or approximately so when the needle is out of the work to form a retrograde stitch, and an impaler pressing the fabric on to the pins before the seam is made, substantially as described.

19. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work carrying wheel supported by and rotating beneath said frame and having means, as closely set radial pins, for holding the material in position to be operated upon by the sewing mechanism, and a trimmer for

cutting off the surplus fabric, substantially as described.

20. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying wheel supported by and rotating beneath said frame, a trimmer for cutting off the surplus fabric, and a rubber for rubbing down and napping the cut edges, substantially as described.

21. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying wheel supported by and rotating beneath said frame, a trimmer for cutting off the surplus fabric, a rubber for rubbing down and napping the cut edges, and a shearer for trimming off the napped edges, substantially as described.

22. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, an impaler pressing the fabric onto the pins before the seam is made, a trimmer for cutting off the surplus fabric, a rubber for rubbing down and napping the cut edges, and a shearer for trimming off the napped edges, substantially as described.

23. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, a trimmer for cutting off the surplus fabric, and an impaler pressing the fabric onto the pins, substantially as described.

24. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, a trimmer for cutting off the surplus fabric, and means for uncurling the edges of the fabric before trimming, substantially as described.

25. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal continuously rotating work-carrying pin wheel supported by and rotating beneath said frame, and means for uncurling the edges of the fabric before sewing, substantially as described.

26. The combination with a sewing mechanism, of a rotating work carrying pin-wheel, a trimmer for trimming off the surplus fabric, and an impaler pressing the fabric onto the pins before trimming, substantially as described.

27. In a sewing machine having an overhanging frame, the combination with a sewing mechanism, of a horizontal rotating work carrying pin-wheel supported by and rotating beneath said frame, a trimmer for cutting off the surplus fabric, and an impaler pressing the fabric onto the pins before trimming, substantially as described

28. The combination with a mechanism for uniting fabrics, of a rotating work-carrying wheel, and a trimmer mounted to swing concentrically with said wheel, substantially as described.

29. The combination with a mechanism for uniting fabrics, of a rotating work-carrying wheel, a trimmer mounted to swing concentrically with said pin wheel, and means for securing the trimmer in position on either side of the uniting mechanism, substantially as described.

30. The combination with a rotating driver, of a trimmer mounted to swing concentrically therewith, cutters carried by said trimmer, and driving connections between said cutters and driver, substantially as described.

31. In a sewing machine, the combination with a rotating work-carrying wheel, of a driving shaft for said wheel, a trimmer bracket loosely mounted on said shaft, cutters carried by said trimmer bracket, a rotary driving mechanism mounted concentrically with said shaft, and connections between said driving mechanism and cutters, substantially as described.

32. The combination with horizontally rotating pin wheel E and shaft F by which it is carried, of bracket 38 loosely mounted on said shaft and carrying rotating cutters, as 28, 29, a driven sleeve 35 on said shaft, and driving connections between said sleeve and cutters, substantially as described.

33. The combination with horizontally rotating pin wheel E and shaft F by which it is carried, of bracket 38 loosely mounted on said shaft and carrying a trimmer, and an adjustable support between the bracket and wheel, whereby the bracket may be adjusted on the shaft to carry the trimmer toward and from the wheel substantially as described.

34. The combination with a cutter and cutter frame, of a support, one or more pivot screws carried by the cutter frame and bearing against said support, and adjusting screws, one of which is threaded in the frame and bears against the support and the other tapped through the frame and threaded in the support, substantially as described.

35. The combination with rotary cutters 28, 29, their shafts and bearings therefor, of pivot screws 2 and adjusting screws 3, 4, substantially as described.

36. The combination with rotary cutters 28, 29, their shafts and bearings therefor and gears 32 connecting said shafts, of pivot screws 2 in line with the gears and adjusting screws 3, 4, substantially as described.

37. The combination with rotary cutter 28, its shaft 30, bearing 46 and a cutter inside cutter 28 with which the latter coacts, of gear 32 on said shaft resting against bearing 46 and provided with hub 6, means for driving said gear 32 and adjusting screws 7, 7' threaded through hub 6 and engaging oppositely inclined cam surfaces on said shaft, substantially as described.

38. The combination with rotary cutter 28, its shaft 30 and a cutter coacting with the rotary cutter, of gear 32 on said shaft held against movement longitudinally of the shaft to prevent the rotary cutter moving away from the coacting cutter and having hub 6, and adjusting screws 7, 7' threaded through said hub and engaging oppositely inclined cam surfaces on said shaft, substantially as described.

39. The combination with rotary cutters 28, 29 and shafts 30, 31, of bearings 46, 45, gears 32 connecting said shafts, one of said gears having hub 6, and adjusting screws 7, 7' threaded through the hub 6 and engaging op-

positely inclined cam surfaces on the shaft, substantially as described.

40. The combination with pin wheel E and its shaft F carrying gear 11, of shaft G carrying worm 12 by which gear 11 is driven, and means for moving shaft G to throw the pin wheel in or out of operation, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

SATTERLEE ARNOLD.

Witnesses:

J. J. KENNEDY,
C. J. SAWYER.