

H. E. HAWES.
SEWING MACHINE.
APPLICATION FILED JAN. 15, 1891.

999,718.

Patented Aug. 1, 1911.

4 SHEETS—SHEET 1.

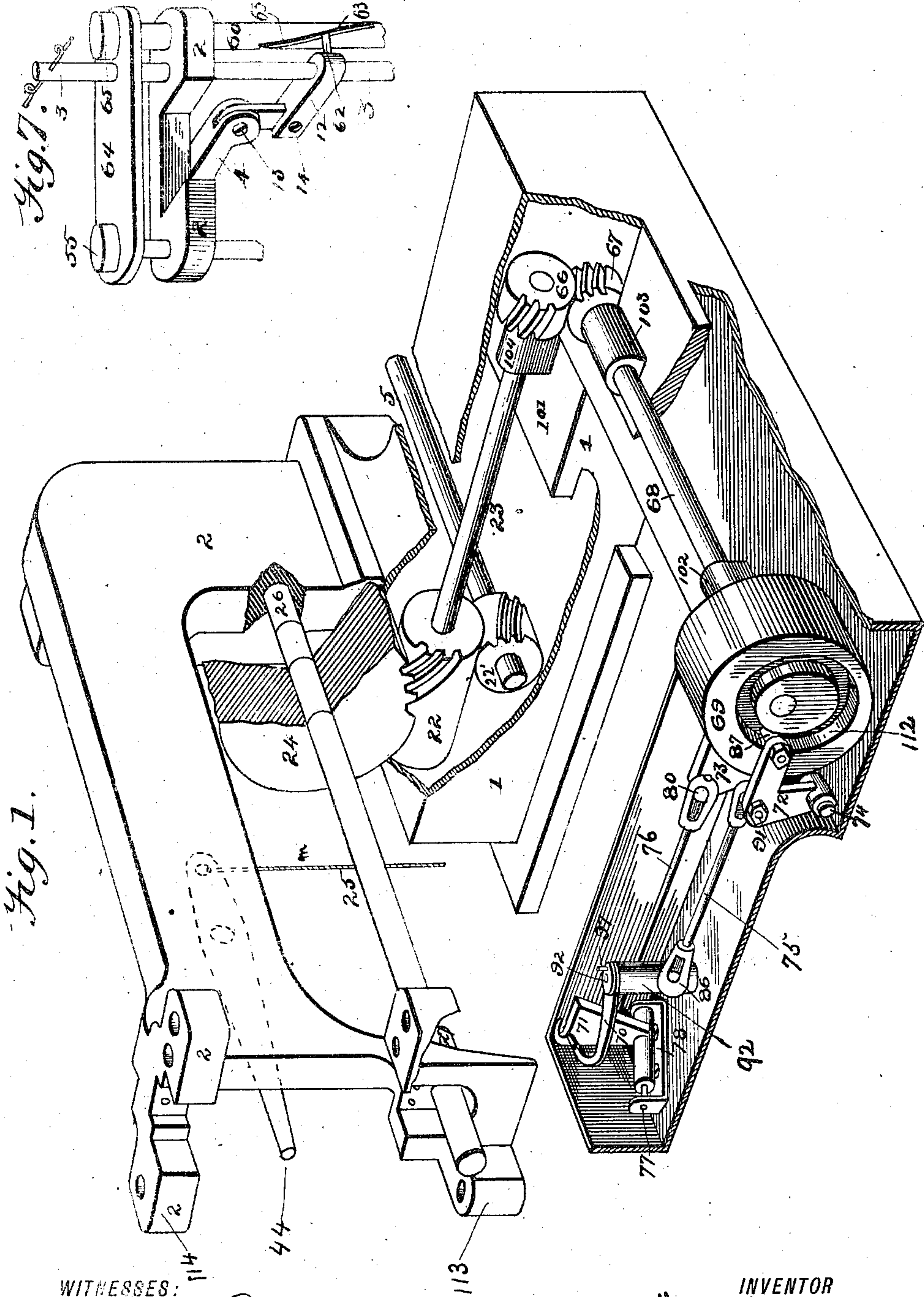


Fig. 1.

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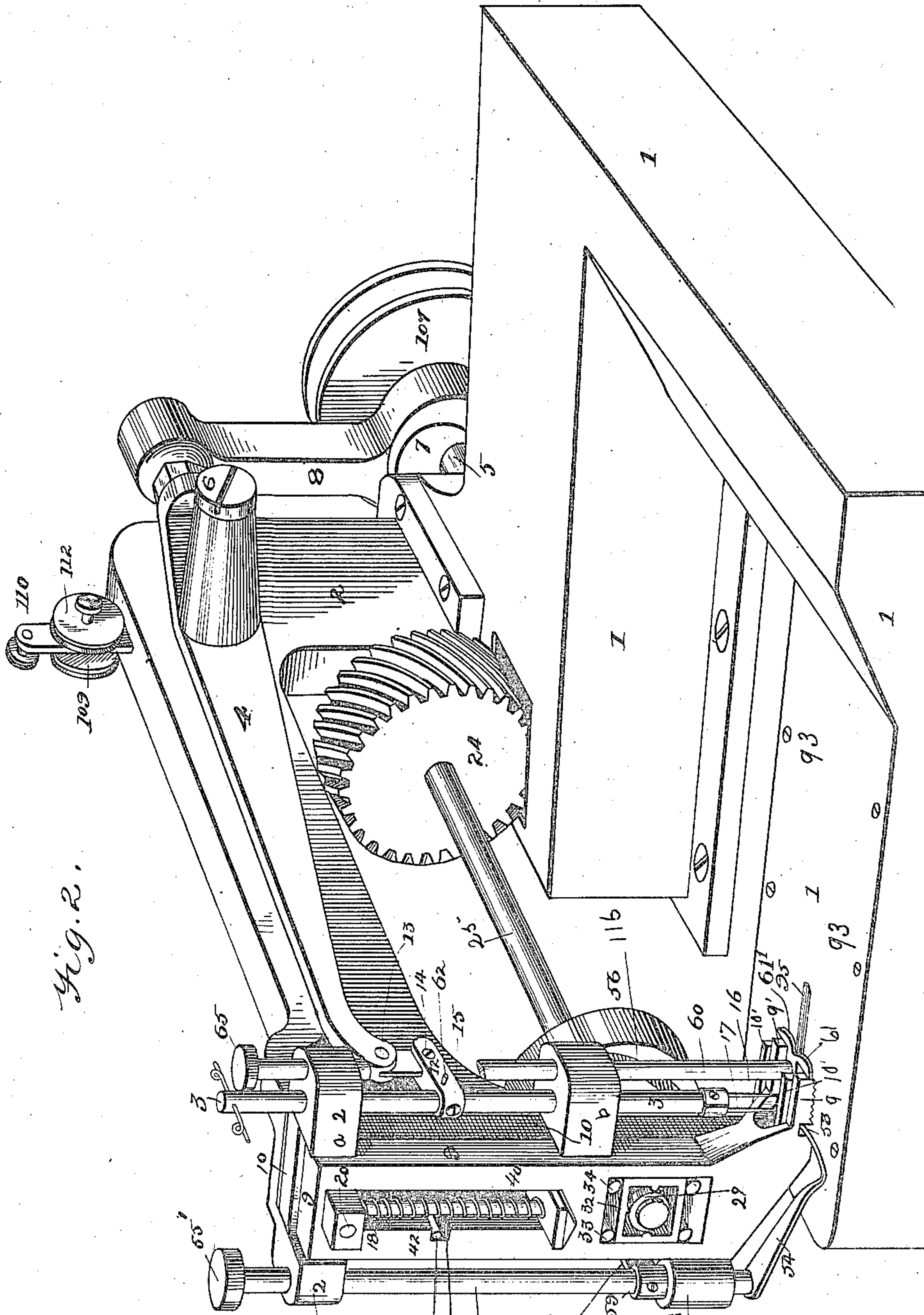


Fig. 2.

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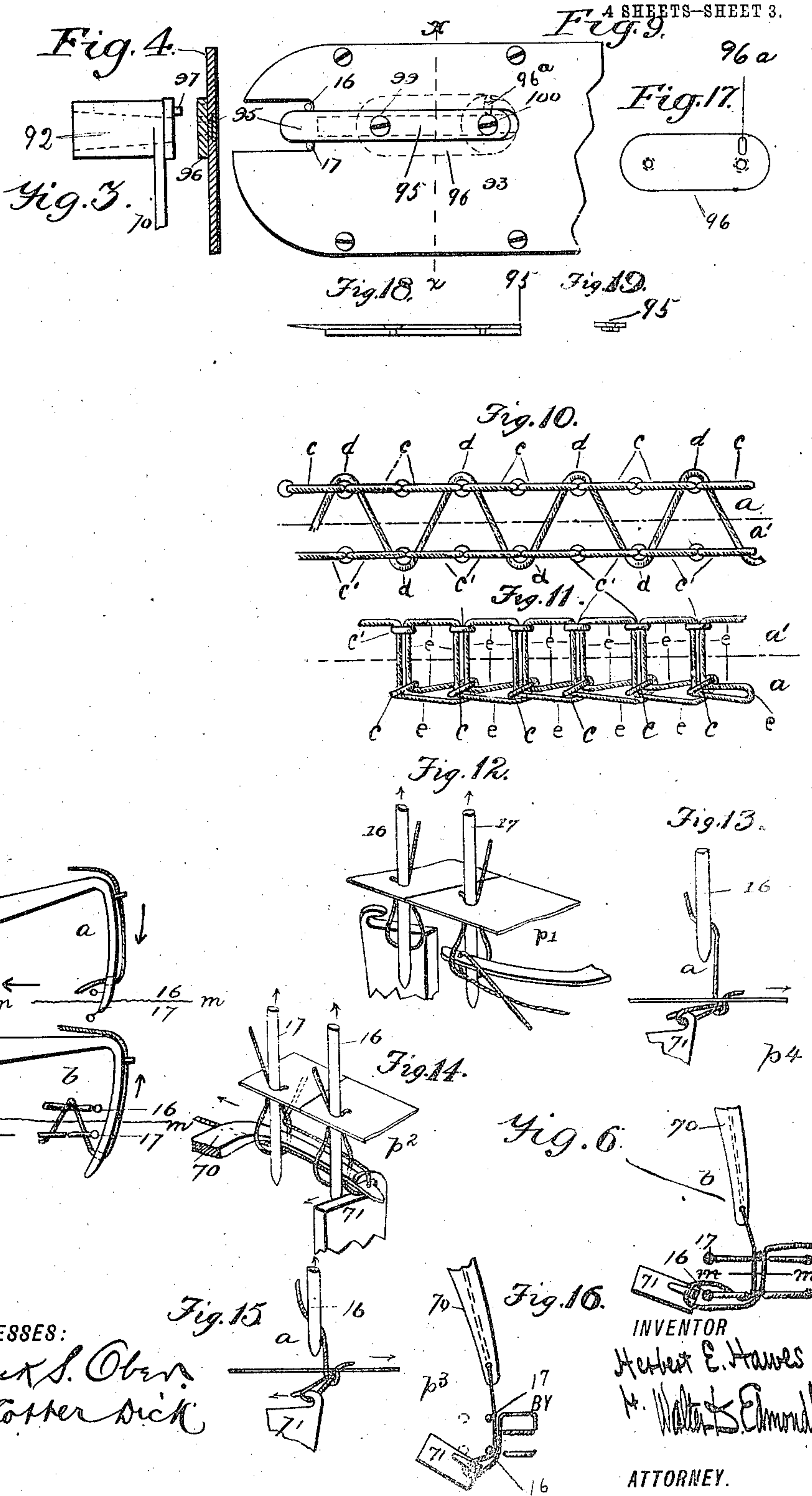
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WITNESSES:

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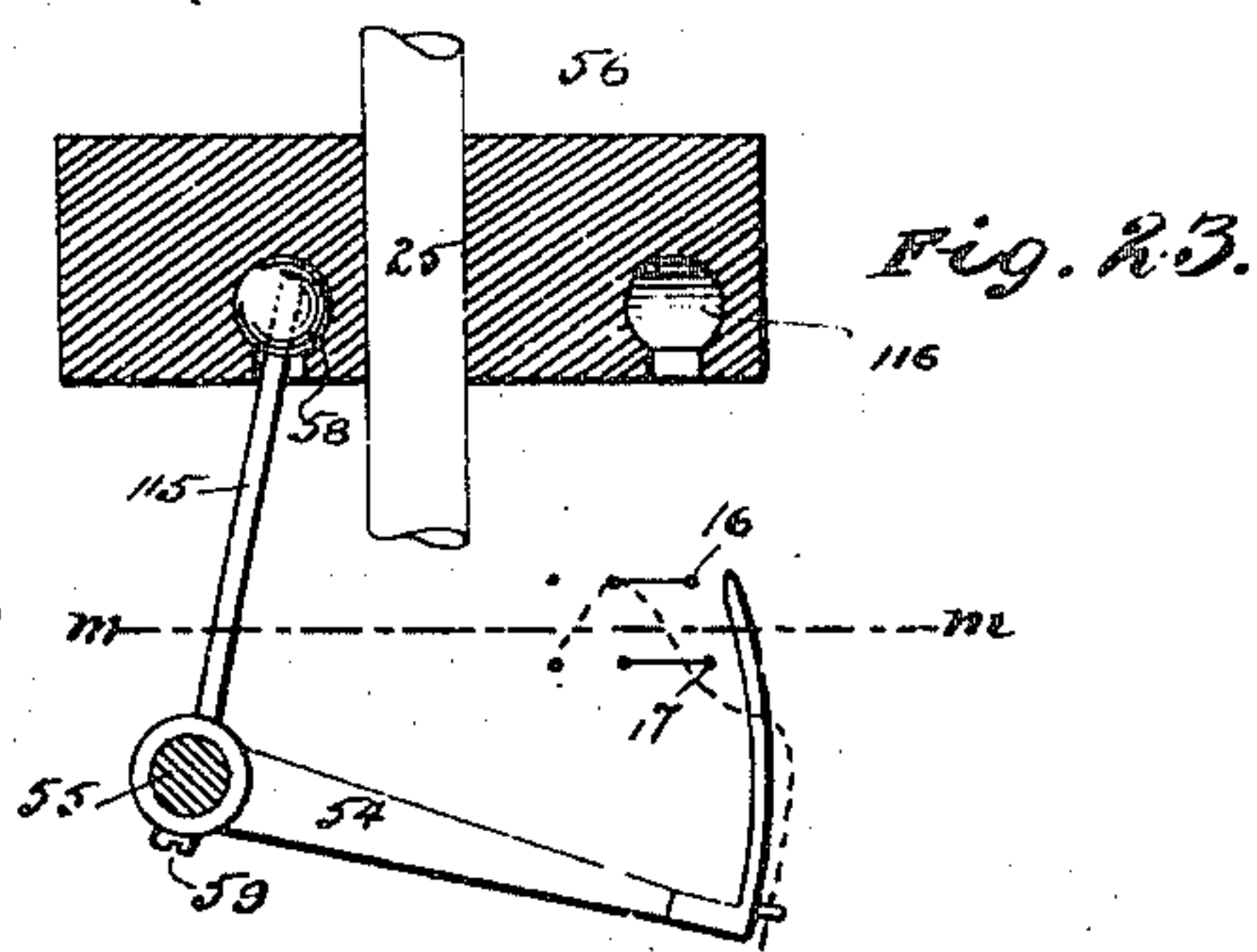
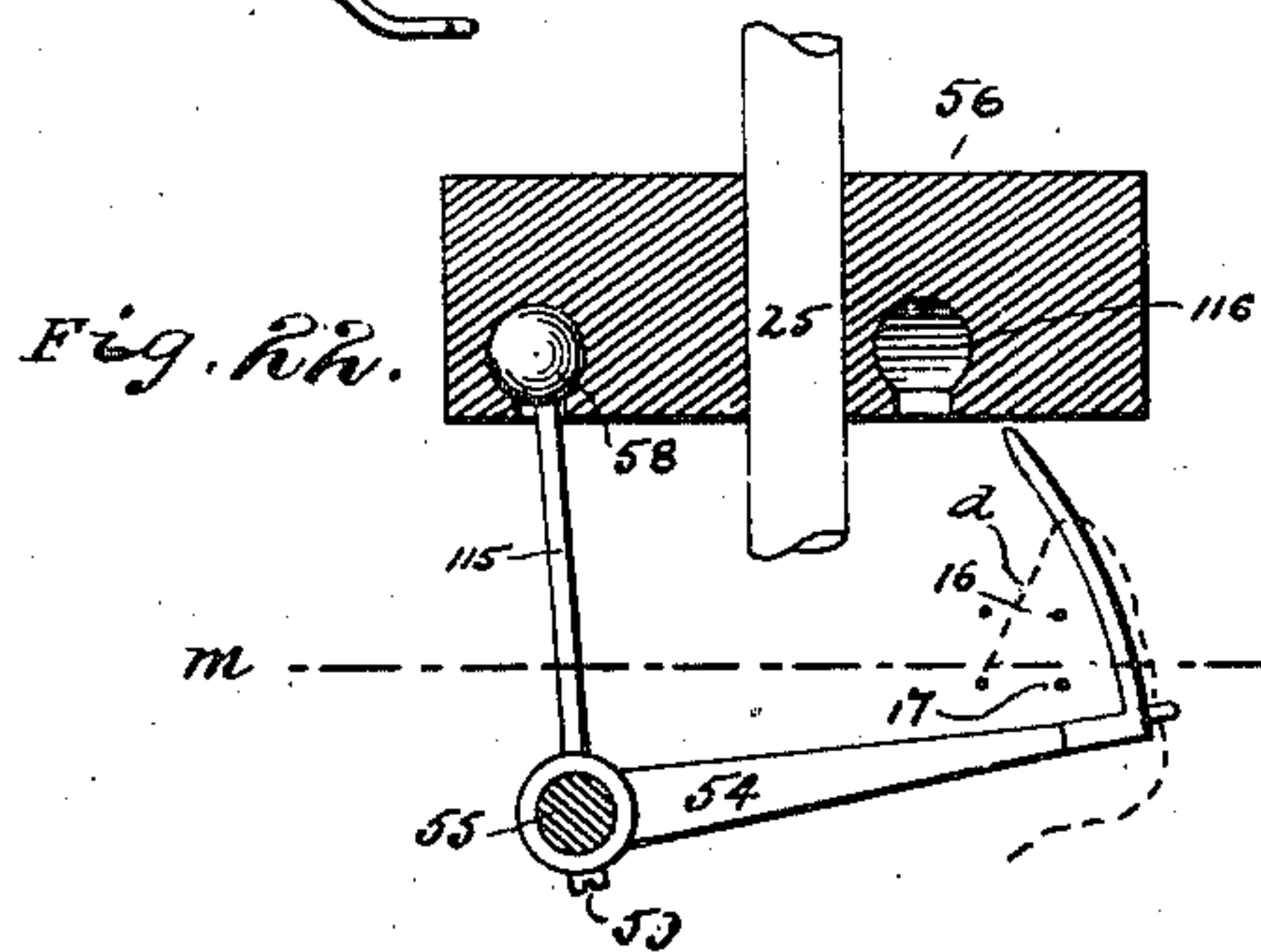
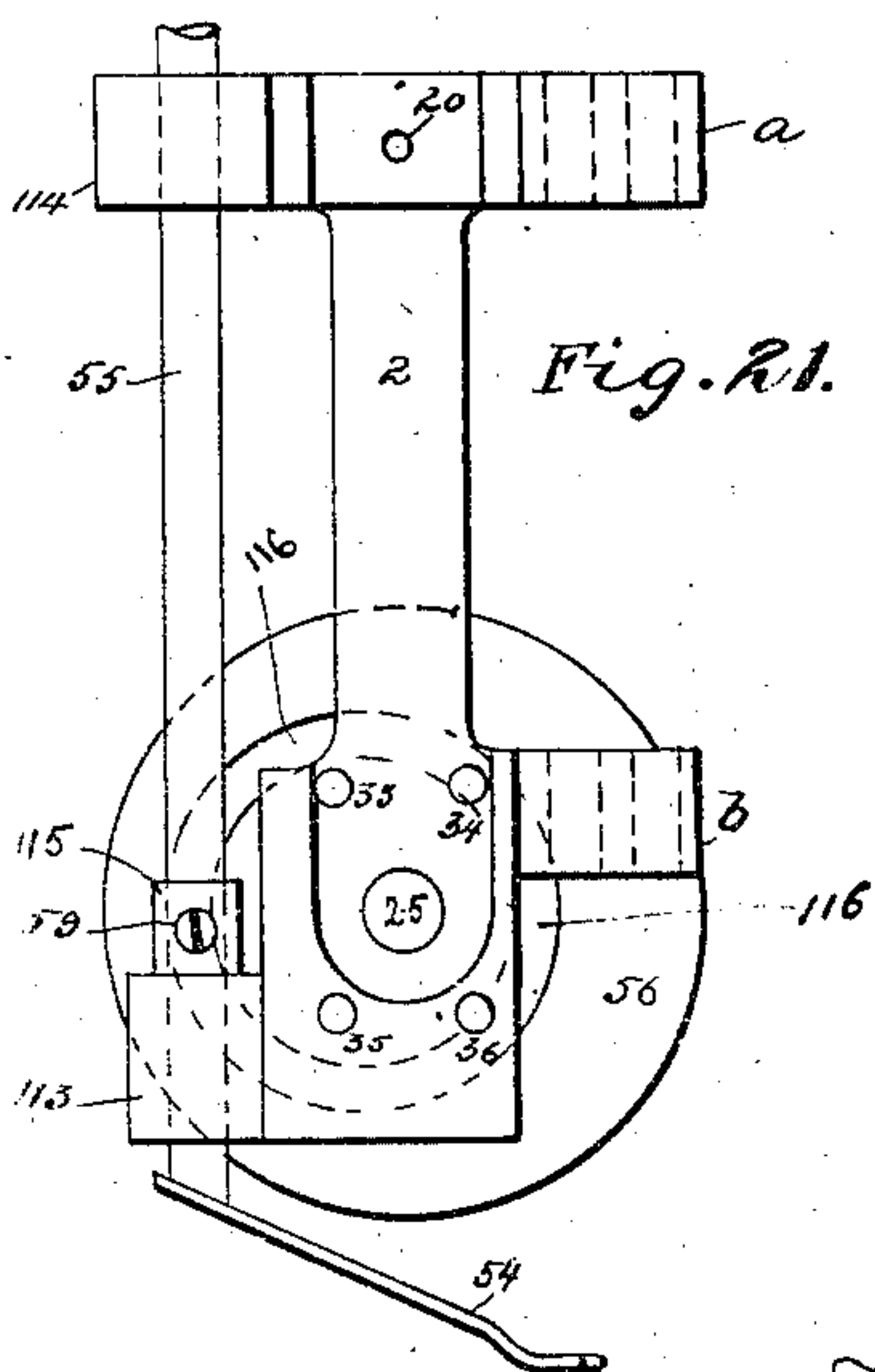
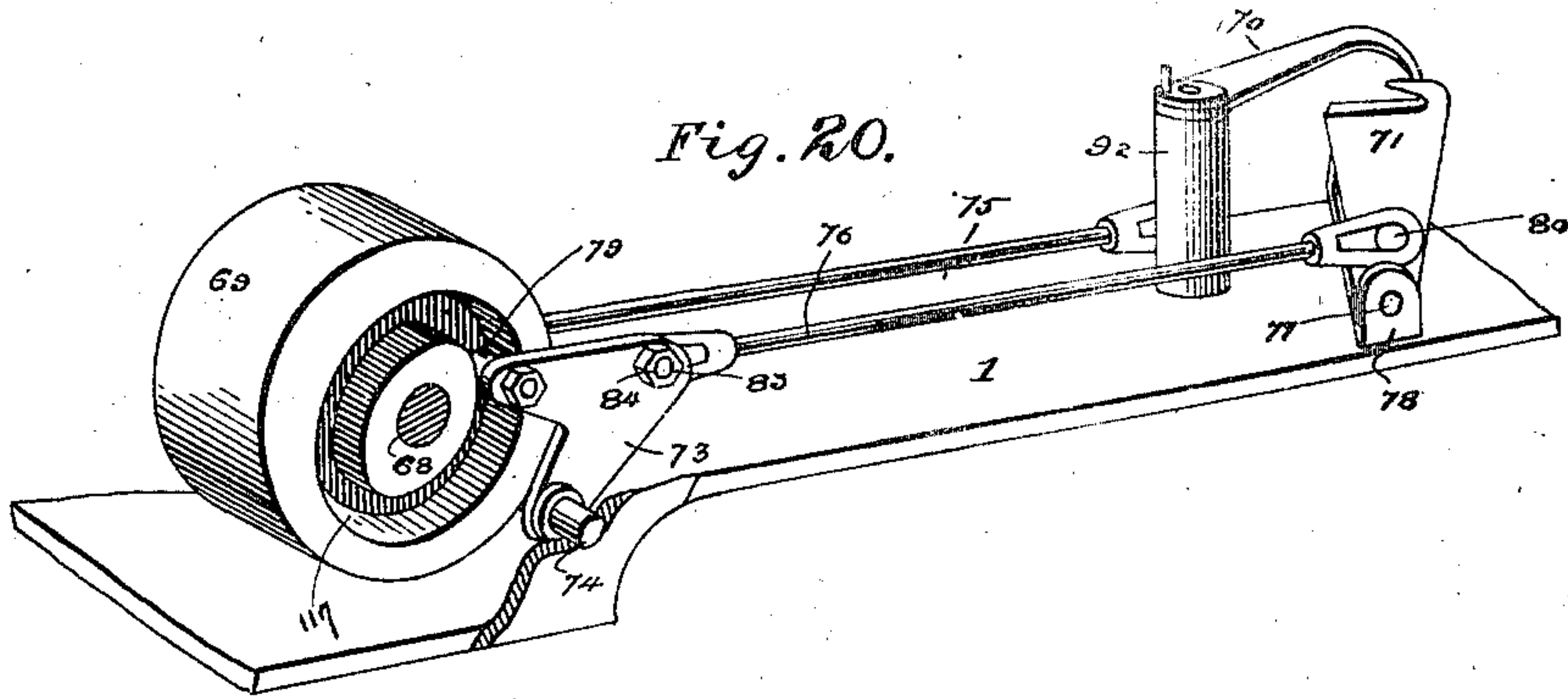
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999,718.

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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

HERBERT E. HAWES, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO PHILIP C. PECK, OF NEW YORK, N. Y.

SEWING-MACHINE.

999,718.

Specification of Letters Patent.

Patented Aug. 1, 1911.

Application filed January 15, 1891. Serial No. 377,798.

To all whom it may concern:

Be it known that I, HERBERT E. HAWES, a resident of the city of Brooklyn, county of Kings, and State of New York, have invented new and useful improvements in sewing-machines, being in this instance more particularly mechanism for uniting or sewing together the abutting adjacent edges of knitted or woven fabrics or other materials, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, in which—

Figure 1 is a perspective view of certain operative parts of a sewing machine containing my improvements, showing particularly those parts required to convey power and the required movement to the under looper and transfer hook hereinafter described. Fig. 2, is a perspective view of other portions of said machine showing mechanism whereby power and the required motion are conveyed to the needles, upper looper, presser feet, feed mechanism, etc. Fig. 3, is an enlarged plan of stud which actuates sliding plate. Fig. 4, is an enlarged cross sectional view of cloth plate, stitch plate and supplementary stitch plate and connections taken on dotted line *x. x.* of Fig. 9. Fig. 5, is an enlarged plan of end of upper looper and its thread showing their relation to needles 16 and 17, during one portion of their movement. The said upper looper in this figure being shown in a reversed position from that illustrated in Fig. 2, as hereinafter more fully described. Fig. 6, is an enlarged plan of portion of the under looper, threads, transfer hook, and needles, illustrating their relative position in relation to each other at a certain stage in the stitch. Fig. 7, is an enlarged detail, a perspective view of device whereby oscillating movement is given to the smoothing bar 60 and its foot 61. Fig. 8, is another enlarged plan of end of upper-looper showing its relation to the needles and the stitch at a different stage in its movement from that illustrated in Fig. 5. The upper looper here is also shown in the same position as in Fig. 5, that is in a position reversed from that shown in Fig. 2, and illustrating the application of such a looper in a different arrangement of the parts of said machine as will be hereafter described. Fig. 9, is

an enlarged top view of the cloth plate, stitch plate, and sections of the needles, showing their relation to each other. Fig. 10, is an enlarged plan view of the upper side of my improved seam as produced by my said machine. Fig. 11, is an enlarged plan view of the under side of my improved seam. Fig. 12, is an enlarged view of the lower portion of the needles, and of the end of the under looper and of the transfer hook, and threads at a certain stage of the stitch. Fig. 13, is an enlarged view of end of needle 16, and transfer hook and threads at another stage of the stitch. Fig. 14, is an enlarged view of the ends of the needles, and of the under-looper, and end of the transfer hook, and threads at another stage of the stitch. Fig. 15, is an enlarged view of the end of needle 16, end of transfer hook and threads at another stage of the stitch. Fig. 16, is an enlarged plan of the end of the under-looper, transfer hook, threads and needles, at another stage of the stitch. Fig. 17 is a plan view of my supplementary retaining plate showing the slot. Fig. 18 is a central longitudinal vertical section of my stitch forming plate. Fig. 19 is a vertical cross section of Fig. 18, taken in a transverse plane at right angles to the longitudinal axis thereof and passing through the center of connecting screw 99 of Fig. 9. Fig. 20 is a perspective detail view of the horizontal oscillating under-thread (the first auxiliary thread) carrying needle or looper and a vertical oscillating transfer hook showing that face of the double cam 69, which is the reverse of that shown in Fig. 1, and showing the cross-shaft 68 in section cut off at the line of juncture thereof with said double cam and said Fig. 20, also showing the angular rocker 73 and pitman 76, connecting latter with said transfer hook. Fig. 21 is a detail front view of the forward end of the machine head plate, a perspective view of which is shown in Fig. 1, and also showing side view of upper looper carrying superior or second auxiliary thread and of the vertical upper looper shaft. Figs. 22 and 23 are views partly plan and partly in section of the upper looper and its connections, each figure showing a central horizontal section of its actuating cam, and also the upper looper in the same position as illustrated in

Fig. 2 and in a reverse position from the alternative form of construction illustrated by Figs. 5 and 8.

The object of my invention is to improve sewing machine mechanisms generally and particularly those designed to sew together the edges of loosely knitted or woven fabrics and to this end to provide devices whereby the manipulation and handling of such materials while being sewed into tubular garments such as drawers and the like and their subsequent removal from the sewing mechanisms may be facilitated, also the edge of the material at the line of juncture more perfectly and smoothly prepared and brought into position to receive the seam, also to provide means for securing a smooth and uniform loosely sewed seam, and the preventing of puckering of the materials by irregular and undue tension upon the thread.

My present inventions relate more particularly to the hereinafter particularly described and claimed means for facilitating and perfecting the seaming of the raw cut edges of knit goods or the like.

Figs. 10 and 11 illustrate forms of seams such as may be produced by the aid of my said improvements.

An organized sewing machine containing my said improvements also comprises many of the usual and well known features of sewing machines, as the same are at present well understood by those skilled in the art of constructing them. I assume that these common features are so well known as to require no description here in order that my present inventions may be understood.

Referring to the drawings, 2. is an ordinary sewing machine head plate, presenting such obvious mechanical changes as are required to adapt it to the specific use of my invention.

1., is the bed plate of the machine which, is so constructed as to present several novel features which will be hereinafter more fully described.

3., is an ordinary needle bar to which vertical reciprocating movement is conveyed in the usual way through the needle arm 4., operating upon an arm-stud 6., and connected with main shaft 5., by pitman 8., and eccentric 7. Power being applied to the shaft the needle bar is reciprocated in the usual manner and is provided with a pair of needles 17, and 16, each eyed near its point, and each carrying a thread provided with the usual spools and instrumentalities for securing proper tension, and which two needles carry the "main pair of threads" *c. c'*, Figs. 10 and 11.

One of the features of my invention consists in combination with other parts of the peculiar shaped and positioned bed plate which I construct in the form of a project-

ing and over-hanging bed or arm, which may be designated as U shaped, the surface of the bed being so formed and arranged in relation to the working parts of the machine that the manipulation and stitching of the materials to be united is very greatly facilitated and expedited. These results are obtained by so constructing the mechanism and parts of the machine that the free or unsupported end of the bed plate 1, shall extend in a direction away from the operator and parallel to the direction toward which the materials are fed, as hereinafter described, the feed mechanism being adapted to move the material toward said free end.

Below the surface of the bed plate 1. I arrange a horizontal oscillating under-thread (or first auxiliary thread) carrying needle or looper 70 and a vertical oscillating transfer hook 71. The under looper 70 is rigidly secured to a vertical shaft 92 adapted to be rotated about its vertical axis see Fig. 1. where top surface of bed plate is removed and also side boxings of U shaped arm to show arrangement of mechanism within. The under looper is provided with a vertical eye at its extremity through which is carried the under or first auxiliary thread already referred to (see Figs. 6 and 16). The requisite horizontal oscillation is communicated to the under looper 70 through the said pivoted vertical shaft from the main source of power, from main shaft 5., through proper gearing, preferably miter worm gears 22., to cross shaft 23 supported in suitable bearing 104, thence through appropriately placed gears 66 and 67, also preferably miter worm gears, through cross shaft 68 supported in suitable bearings 102, and 103, to double cam 69. This double cam is provided with irregular cam groove or channel 112, as shown in the face thereof fronting the observer in Fig. 1. It is also provided with another similar irregular cam groove or channel on the opposite face thereof 117 Fig. 20. An angular rocker 72, which may be designated the under looper rocker, oscillates upon a pivot rocker shaft 74, and provided at one end with a projecting stud carrying an ordinary cam roller 87 which operates within the cam groove in the usual manner as shown in Fig. 1. Said rocker 72 is also connected with the vertical shaft 92 by a pitman 75. Ball and socket connections between the rocker and said shaft being preferably used as shown in the drawings whereby movement is allowed between the united parts relatively to each other in several directions. The main shaft being rotated it will be apparent from the foregoing that an oscillating curved movement in a horizontal plane will be communicated to the eye of the looper 70. In the afore mentioned cam groove 117 Fig. 130

20 on the opposite side of the double cam 69, travels another stud provided with roller 79 Fig. 20 which is secured to another angular rocker 73, which may be called the transfer hook rocker, and which like looper rocker 72 also oscillates upon rocker shaft 74 and connected with vertically swinging transfer hook 71, by means of a pitman 76. similar to 75, and likewise having ball and socket joint connections of attachment.

As the transfer hook 71 is fixed to shaft 77 horizontally pivoted in suitable bearings (see 78) as shown in Fig. 1, it will be understood that the rotation of the main-shaft 5 will, by reason of the mechanism aforementioned, convey to said transfer hook an oscillating motion in a vertical plane.

It will be observed that the axis of the horizontal shaft 77 is pivoted obliquely to the direction of the feed for the reason which will be hereinafter described.

54 is an upper looper which carries the aforesaid superior or "second auxiliary thread" through a horizontal eye in the end thereof Figs. 5 and 8, and carries said thread backward and forward across the line of the feed movement directly behind the needles as shown in said last mentioned figures. The required movement is conveyed to 54 as follows:—54 is fixed to vertical upper looper shaft 55, Fig. 2, Figs. 21–23 which partially revolves around its vertical axis within suitable bearings 113, and 114 in head 2. Rigidly attached to shaft 55 is a stud 115 which connects with cam 56 by ball roll 58 (Figs. 22 and 23) fitted within an irregular cam groove 116 contained in the cam 56. The stud 115 is inserted within the ball roll 58 so as to slide inwardly and outwardly thereof to an extent sufficient to accommodate the changes of position caused by the revolution of the cam.

Motion being communicated from the main shaft 5 through appropriate gears (preferably miter worm gears) 22' 22 and 24 to the feed shaft 25, the cam 56 is caused to rotate and to communicate by means of the connections above described, the required movement to the upper looper 54. It will be observed that the eyed extremity of this upper looper 54 is not shown in Fig. 2 but passes beneath the feed feet through an appropriate slotted opening or looper space 53.

The method of making the connections which I have just described is so very obvious to any person skilled in the art that I do not deem it requisite to a complete understanding thereof to further illustrate by drawings or describe the same more than I have done.

The required forward movement of the materials to be united may be secured in any convenient manner, as by any of the numerous well known forms of feeding devices suitably disposed with relation to the goods

and combined with means for imparting thereto the requisite movement; but it is important that the feeding mechanism employed should contact with and actuate the fabrics evenly, equally and simultaneously on both sides of the line of union. The drawings illustrate particularly the use of special feeding instrumentalities which I have to this end invented and which are more fully described in my co-pending application for Letters Patent, Serial No. 605690, filed January 31, 1911, consisting of a pair of feed bars 9 and 10 (Fig. 2) having bifurcated feeder feet which straddle the line of union of the goods to control the fabric from above simultaneously, on both sides of that line, are suitably connected by appropriate mechanism with the main shaft of the machine so as alternately to move the goods in the required direction, and to the requisite extent. The bars 9 and 10 are provided with slots as shown in Fig. 2 through which loosely pass pivot blocks 18, Fig. 2, loosely journaled upon a pivot 20 rigidly secured to head 2. 33, 34, 35 and 36, Figs. 2 and 21, represent guide pins likewise secured in said head and disposed to pass through lower slots in said bars, as shown in Fig. 2 and in my said application.

To assist in smoothing out and presenting the abutting edges of the materials in proper position to be perforated by the needles, I have devised a smoothing bar. This bar is illustrated in Fig. 2 by 60 a portion of its length between those parts of the head 2 which are lettered *a*, *b*, being broken away and removed to show the operation of other parts behind. This smoothing bar is journaled vertically in the head 2 having its axis parallel with needle bar 3 and has secured to its lower end a V shaped plate 61' which presses upon the upper surface of the materials as they approach the feed feet. It will be observed that said V-shaped plate presents a plurality (in this instance two) of operative edges disposed angularly relatively to the direction of the feed and converging toward each other and to a point on the line of juncture of the edges of the abutting fabrics being the medial line between the needles, whereby the rough edges of the fabric are progressively bent over and folded down toward the line of juncture prior to being secured finally in this desired position by the stitches.

The bar 60 with its attached plate 61' is caused to partially rotate horizontally about its vertical axis by means of the pin 62 projecting from the clamp 12, which connects the needle arm 4 with the needle bar 3, and which pin travels upward and downward according to the motion of the needle bar within the helical slot 63 cut in the bar 60 (see Fig. 7). Vertical movement is given when desired, to the smoothing bar 60 by means

of the foot lever 44 acting on the feed bars 9 and 10 which in turn when sufficiently raised abut against and serve to raise the inserting plate 64 shown in Fig. 7 but not shown in Fig. 2, which is kept in position by and travels up and down upon looper shaft 55 smoothing bar 60 and needle bar 3 as shown in Fig. 7 normally rests upon the top of the head 2 over feed bars 9 and 10 and which, when sufficiently raised by said feed bars, as aforesaid, lifts under and against the smoothing bar head 65 and thereby raises the latter.

To facilitate the movement of the materials and prevent their gathering or puckering I have devised a stitch forming plate 95 of novel construction and operation. The surface of the cloth plate 93 is provided with a longitudinal opening within which fits and reciprocates the said stitch forming plate 95 (see Fig. 9). The longitudinal sides of said plate are flanged as shown in Fig. 19 and are made to fit correspondingly shaped grooves in the cloth plate 93 (see Fig. 4). To keep the reciprocating stitch forming plate 95 in position there is secured to its under side and under the cloth plate a supplementary or retaining plate 96. The stitch forming plate 95 extends as shown in the drawings between the needles 16 and 17 in the direction of the movement of the feed and at this end thereof it is tapered on its under side Fig. 18 to facilitate the withdrawal from the stitch. The supplementary or retaining plate 96 is provided with slot 96^a within which engages and slides a stud 97 carried on the upper end of the under looper 70. Thus the oscillation of the under looper causes the stitch forming plate to reciprocate.

The machine is connected in the usual manner with any suitable source of power by means of the driving wheel or pulley 107. The materials to be united are next placed upon the cloth plate so that the edges to be sewed together shall abut against each other. As will of course be understood the materials to be united are so placed in position under the needles that each needle will when brought down perforate a different one of the butting edges and the line of juncture of the materials should extend in the direction of the stitch plate and directly over it.

I have not shown in the drawings the threads or bobbins or tensions except to a limited extent as these are all so well understood that any person skilled in the art will understand the operation of my machine without specific illustrations of them. On the top of the head 2 I have shown common tensions 109, 110 and 112 for the three upper threads said threads being carried to the said tensions by suitable guides in the usual manner. The thread which is used by the

under looper 70 is carried thereto through suitable arrangement of guides within the bed plate and also supplied with suitable tension in the ordinary way. The spools or bobbins carrying the threads may be in any convenient place relatively to the machine.

The materials having been brought into position as aforesaid, power is applied and motion communicated to the various parts of the machine. The needles carrying the main pair of threads are caused to descend and perforate the materials on each side of the line of juncture. As soon as the needles have reached the limit of their downward motion, the continued operation of the machine causes them to rise again through the material whereby two loops of the main threads are formed on the under side of the materials as shown in Fig. 12. The under looper 70 immediately advances through these loops bearing the first auxiliary thread and its advance movement is caused as follows: The requisite power is transmitted from the main shaft 5 through the gearings hereinbefore described causing the double cam 69 to rotate. The cam groove or channel in which the looper roll 87 works is so shaped and placed relatively to the looper rocker 72, the looper and the connecting parts, as to give the desired movement to the thread carrying eye of the looper at the requisite moment of time required to cause latter to pass through both the under loops of main thread carrying with it the first auxiliary thread as is shown in Fig. 14. The shape and position of the said cam groove are determined in the usual well known way and they will vary according to the size, position, and shape of the various detail parts hereinbefore described and required to produce the movement specified. The under looper having carried the first auxiliary thread through the two loops of the main thread, as aforesaid, is caused immediately to retract or withdraw from the loops on the same line of movement upon which it entered them. This retrograde movement of the under looper is caused by the continued rotation of the cam 69 as will be readily understood and the said under looper leaves behind it within said two loops of main thread a loop of the first auxiliary thread due to the interlocking of said first auxiliary thread with the transfer hook 71 as shown in Figs. 6, 14, 13, 15 and 16, which illustrate among other things this retention of the first auxiliary thread by the transfer hook at different stages of the movement. After the under looper is passed through the loop of main thread and retrograded through the same, as aforesaid, the needles have, by the continued action of the machinery been simultaneously withdrawn upward through the materials whereby, as will

be well understood, the loops made by the two main threads, as aforesaid, have been diminished in size until tightened on the under side of the materials against and so as to embrace the loop of the first auxiliary thread which has been constructed as aforesaid. By means of the cam groove shown on the opposite side of the double cam 69 in Fig. 20 of the drawings the required movement is communicated to the transfer hook 71 through the transfer rocker 73 and the other connecting parts already described. The period and extent of the required movement of the transfer hook being determined by the shape of said cam groove, and its position relative to the other parts of the mechanism in the same way as the movement and periodicity of the under looper is determined as aforesaid.

The position of the transfer hook and the path of its movement is such as to insure its engagement with the first auxiliary thread at the moment when the under looper begins its withdrawal or retraction through the loops of main thread, hereinbefore described, the retracting movement of the under looper causing, as will be well understood a loop of first auxiliary thread to be thrown out on its upper side as shown in Fig. 14 into which the end of the transfer hook passes as shown in Fig. 14 and on the continued retraction of the under looper retains said loop of first auxiliary thread as shown in Figs. 15 and 16. The said loop of first auxiliary thread is carried backward and obliquely toward the line of juncture of the materials so as to occupy the position shown in Fig. 6 and in which needle 16 may pass through it on its next descent and is so carried by the combined movement of the transfer hook 71 and the forward movement of the materials caused by the feed motion imparted as aforesaid to the goods. The extent of lateral motion of the materials thus produced is as will be well understood comparatively slight being sufficient only to bring them into position for the next stitch.

The upper looper 54 carries the superior auxiliary thread in a horizontal eye near its extremity as shown in Figs. 5 and 8.

It is apparent that the upper looper shaft 55 with its connections might perhaps preferably be mounted upon the opposite side of the feed bars from that shown in Fig. 2 whereby it would be brought into closer connection with its actuating cam 56 in which case of course the upper looper would be reversed in position and would enter under the feed bars from the opposite side from that shown in Fig. 2. Figs. 5 and 8 represent the upper looper in the latter position and Figs. 21, 22 and 23 represent the upper looper in the position shown in Fig. 2. For the purpose of illustration I have deemed it better to illustrate the upper looper in the

position shown in Fig. 2, as it enables all the mechanical parts to be more fully presented in one perspective view, but in either case the principle of operation of my upper looper would be practically identical.

The upper looper cam 56 already described contains a cam groove or channel so shaped as to cause the upper looper shaft 55, through its already described connections, to oscillate horizontally about its vertical axis a certain limited distance in opposite directions and intermediately to remain quiescent, whereby at each revolution of the cam the end of the upper looper 54 is caused to advance toward the needles and across the line of juncture of the materials and to remain quiescent in that position until the next feed movement has commenced, and then to retract away from the needles and again across the line of juncture of the materials to its original position, where it again remains quiescent until its next forward movement, as aforesaid. By this means, as will readily be perceived, the thread-carrying over-looper is caused to cross the line of juncture of the materials at and during the time in which the needles are elevated out of the material; to hold the second auxiliary thread across the line of juncture of the materials during the forward movement of the feed and until the needles have again descended and penetrated the materials; to then retract at the next feed movement leaving the thread caught or interlocked between the two main threads and the upper surface of the materials. This step in the process is partially illustrated in Figs. 5 and 8, in which Fig. 5 represents the upper looper at the commencement of its forward movement or advance over the line of juncture of the materials *m. m.* and Fig. 8 represents the same as the looper is beginning to retract on the next stitch.

The result of the movements of my machine which have thus far been described may now be summarized as follows: The main threads have been carried through the materials and formed into a pair of loops on the under side thereof. Through this pair of loops a loop of the first auxiliary thread has likewise been passed. Said pair of loops of main thread carrying said loop of first auxiliary thread have also been moved forward a certain distance by the feed movement and the end of said loop of first auxiliary thread has been caught and held against the feed movement and also carried backward obliquely and is now in position to be passed through on the next descent of the needles, as shown in Fig. 6 in which the threads or stitches on both sides of the cloth are shown as though the materials were entirely transparent, the second auxiliary thread being suppressed. On the upper surface of the material the second auxiliary

thread has been carried across the line of juncture and is being held also waiting the descent of the needles. As the main shaft revolves the continued movements of the parts of my machine cause the needles to descend, but this time on descending the needle 16 passes through the end of the said loop of the first auxiliary thread as shown in Fig. 6, and by the same movement the main threads are caused to descend upon and bind the second auxiliary thread to the upper surface of the materials as before described.

It is a well known fact that the movement of materials to be united with abutting edges under the impulse of the feed and affected by the action of the needles and the natural curl in the edge of the materials themselves, result in the materials being presented to the needles in undesirable positions. It is of the greatest importance, not only to the appearance, but also to the security of the seam that the materials should be perforated by the needles while lying flat, and in as nearly as possible the same plane so that the line of juncture may be correctly maintained. I have devised, for the purpose of bringing the materials in the proper position under the feed bars and the needles the smoothing plate 61 attached to the foot of smoothing bar 60. The means whereby this smoothing bar is caused to rotate horizontally about its axis has already been described. The effect of the smoothing plate is to press upon the upper surface of the materials along the line of their abutting edges and by reason of its shape and its peculiar oscillation from right to left coincidentally with sufficient pressure, to completely smooth out and straighten all inequalities in the materials as they are drawn and pass beneath it and thus present them in the desired position and condition to be operated upon by the needles and other parts of the mechanism described. It will be understood that the weight of the smoothing bar and plate will usually afford the requisite pressure, but that this may be increased in any convenient way as for instance by a suitably applied and adjusted spring.

The effect of the usual tensions necessarily used upon the threads is such as to cause some materials to become more or less unduly drawn together or puckered along the edge of juncture after losing the support afforded by the needles. For the purpose of obviating this tendency and of producing a juncture of the materials in which the length of thread in each stitch shall be exactly what is required to unite the abutting edges and hold them in exact juncture without being so unduly shortened as to produce a hard and rigid seam, I have devised the stitch plate 95. The means whereby the re-

quired reciprocating motion is communicated to this plate have already been described. The operation of the plate is as follows: The position of this plate is such that it underlies centrally the line of juncture of the materials and projects forward of the needles and between them. The needles 16 and 17 descend on each side of the plate and close to it, as shown in Fig. 9. As the materials move forward under the action of the feed the completed stitches are carried along, embracing the plate, which being of rigid material holds the stitches apart at their proper relative distance, and prevents the materials being drawn together under the stress of the thread tensions. The length of the projecting portion of the stitch plate is sufficient to accommodate a series of several stitches and to carry its restraining influence to the point on the seam at which the stitches are beyond risk of disturbance by the tension of the threads. The movement of the materials caused by the feed would of itself in many cases be almost or quite sufficient to withdraw the stitches from the plate, which is tapered at its forward extremity, as shown in Fig. 18, for the purpose of facilitating withdrawal, but in order to prevent any chance of their disarrangement, and to secure a complete and effective withdrawal of the stitch plate from the stitches I have given to said plate the reciprocating motion already described, and this motion is so timed that the plate is reciprocated backward so as to withdraw it from the stitches only at those moments in which the needles are in the materials and thus in addition to the general support aforesaid also securely hold them from any disturbance through any stress caused by the backward movement of the plate.

Owing to the peculiar form of the bed plate already alluded to and the position of the needles feed and edge preparing mechanisms relative thereto, it will be observed that the materials as they are united by my process are proportionately fed off of the bed plate and cloth plate and out of the way of the operator. This arrangement of the parts is of great convenience particularly in those cases in which the making of a seam results in the production of articles of substantially tubular form, such, for instance, as hose, shirts and drawers or other underwear.

Wherever I have used the expression "stitch-forming mechanism" I mean to include by such terms the various take-ups and tensions requisite to maintain the thread in operative relation to the sewing devices and the goods which are being operated upon.

While I have described and shown in the drawings one species of stitch-forming mechanism and also one species of feeding

mechanism, I wish it understood that my inventions are not limited to use with these, but may be utilized also with other forms of stitching and feeding mechanisms.

5 It will also be understood that, without departing from my present inventions, other forms of stitches and seams other than those shown in the drawings and hereinbefore described might be produced.

10 What I claim as new, and desire to secure by Letters Patent is:

1. In a sewing machine the combination with a stitch-forming mechanism comprising one or more needles, a reciprocating
15 stitch plate or last 95, movable forward in the direction of the feed of the work, and backward directly opposite to the direction of said feed, and means for so moving the same forward when the needle or needles are
20 out of the goods and also for so moving the same backward when the needle or needles are in the goods.

2. In a sewing machine the combination with a stitch forming mechanism comprising one or more needles and a feeding mechanism, of a tapered stitch plate or last and means for moving the same backward in a direction directly opposite to that of the feed of the work while the needle or needles
30 are in the work and forward in the direction of the feed while the needle or needles are out of the work.

3. The combination with a stitch forming and feeding mechanism of a non-feeding
35 stitch-slacking tongue or finger extending longitudinally in the direction of the seam across which a series of two or more consecutive stitches are formed, and means for reciprocating said tongue in the direction
40 of the seam.

4. In a sewing machine the combination with a stitch forming mechanism comprising one or more needles and a lower thread carrier cooperating therewith, of a feeder,
45 a bed or throat plate provided with an opening or slot and a tongue horizontally movable in the direction of the feed of the work and the length of the seam, and arranged to work in said slot, and across which
50 tongue a series of two or more consecutive stitches are laid, and means for so laying such stitches.

5. In a sewing machine mechanism in combination with a stitching mechanism and
55 with a feeding mechanism a longitudinally reciprocating stitch plate or last 95, embraced by, and supporting a series of two or more consecutive stitches against disarrangement from thread tension, and means
60 for reciprocating said stitch plate in directions parallel with the direction of the horizontal movement communicated by said feeding mechanism to the materials stitched,
65 substantially as and for the purposes described.

6. In a machine for seaming or sewing together the abutting edges of materials while lying in substantially the same plane, a stitching mechanism, a feeding mechanism, a smoothing plate or foot pivotally supported above the line of juncture of the unsewed material, and extending on both sides of said line and means for horizontally oscillating or rocking said plate, and thus
70 approaching one side thereof toward said line and simultaneously and correspondingly withdrawing the other side of said foot from said line and alternately reversing said movement.

7. In a machine for seaming or sewing together the abutting edges of materials the combination with a feeding mechanism and a stitch-forming mechanism comprising two eye-pointed needles, of a bed-plate having one free end, a stitch-slacking tongue or
80 finger extending longitudinally in the direction of said free end of said bed-plate and an edge preparing device disposed so as to operate in advance of the eye-pointed needles.

8. In a sewing machine the combination of a stitch forming mechanism employing two substantially parallel needles each carrying a separate thread, a carrier disposed, and means for actuating it, to insert a loop
95 of underneath cross binding third thread through each of the two opposite loops of said needle threads on the under side of the materials being sewed, and mechanism for holding said first mentioned loop until entered by one of the aforesaid needles at
100 their next downward movement through the materials, and, on the upper side of said materials, an oscillating carrier disposed, and means for actuating it, to lay a fourth
105 or binding thread back and forth over the line of juncture of the goods and under the threads of the double series of loop stitches produced by the said needles and their respective threads, substantially as and for
110 the purposes described.

9. In a machine for seaming, or sewing, together the abutting edges of materials, the combination, with a feeding mechanism and a stitch-forming mechanism comprising
115 two reciprocating eye-pointed needles, of a bed-plate having one free end, a stitch-slacking tongue disposed and supported medially between said needles and extending longitudinally in the direction of said
120 free end of said bed-plate, and means for reciprocating said tongue in the direction of the seam.

10. In a machine for seaming, or sewing, together the abutting edges of materials, the combination, with a feeding mechanism and a stitch-forming mechanism comprising
125 two reciprocating eye-pointed needles, of a bed-plate having one free end, an edge preparing device disposed so as to operate in
130

advance of said eye-pointed needles, and means for horizontally oscillating said edge-preparing device.

11. In a machine for seaming, or sewing, together the abutting edges of materials, the combination, with a feeding mechanism and a stitch-forming mechanism comprising two reciprocating eye-pointed needles, of a bed-plate comprising a stitch-slacking tongue extending centrally between said needles and longitudinally in the direction of the seam, and means for reciprocating said tongue in the direction of said seam.

12. In a machine for seaming, or sewing, together the abutting edges of materials, the combination, with a feeding mechanism and a stitch-forming mechanism comprising two reciprocating eye-pointed needles, of a bed-plate having one free end, an edge-preparing device disposed and supported so as to operate equally on both said abutting edges in advance of said eye-pointed needles, and means for horizontally oscillating or rocking said edge preparing device.

13. In a machine for seaming or sewing together the abutting edges of material to form tubular goods, a recurvate or U-shaped horn comprising two oppositely disposed portions connected together by a third thereto transversely disposed portion, one end of one of said oppositely disposed portions being free and said portion supported by said transverse portion, a head disposed transversely of said oppositely disposed portions and extended to overhang said free end, a pair of eye-pointed needles carried by said head, means to reciprocate said needles, means independent of said needles to feed the goods toward said free end, means carried by said head to lay a cross-binding thread above and across said abutting edges of materials, and means carried by said horn to lay a cross-binding thread beneath and across the abutting edges of said materials.

14. In a machine for seaming or sewing together the abutting edges of materials to form tubular goods, a recurvate or U-shaped horn comprising two oppositely disposed portions connected together by a third

thereto transversely disposed portion, one end of one of said oppositely disposed portions being free and said portion supported by said transverse portion, a head disposed transversely of said oppositely disposed portions and extended to overhang said free end, a pair of eye-pointed needles carried by said head, means to reciprocate said needles, means to feed the goods toward said free end, a stitch slacking tongue disposed between said needles and extending in direction of said feed, means carried by said head to lay a cross-binding thread above and across said abutting edges of materials, means carried by said horn to lay a cross binding thread beneath and across the abutting edges of said materials, a movable edge preparing device disposed in advance of said needles and means to vertically move said edge preparing device.

15. In a machine for seaming or sewing together the abutting edges of materials to form tubular goods, a recurvate or U-shaped horn comprising two oppositely disposed portions connected together by a third thereto transversely disposed portion, one end of one of said oppositely disposed portions being free and said portion supported by said transverse portion, a head supported by one of said oppositely disposed portions and extended transversely thereof to overhang said free end of the other of said portions, a pair of eye-pointed needles carried by said head, means to reciprocate said needles, means to feed the goods toward said free end, a stitch slacking tongue disposed between said needles and extending in direction of said feed, an edge preparing device disposed in advance of said needles, means carried by said head to lay a cross-binding thread above and across said abutting edges of materials, and means carried by said horn to lay a cross-binding thread beneath and across the abutting edges of said materials.

HERBERT E. HAWES.

Witnesses:

HOWARD J. HILDT,
WM. C. DICK.