

(No Model.)

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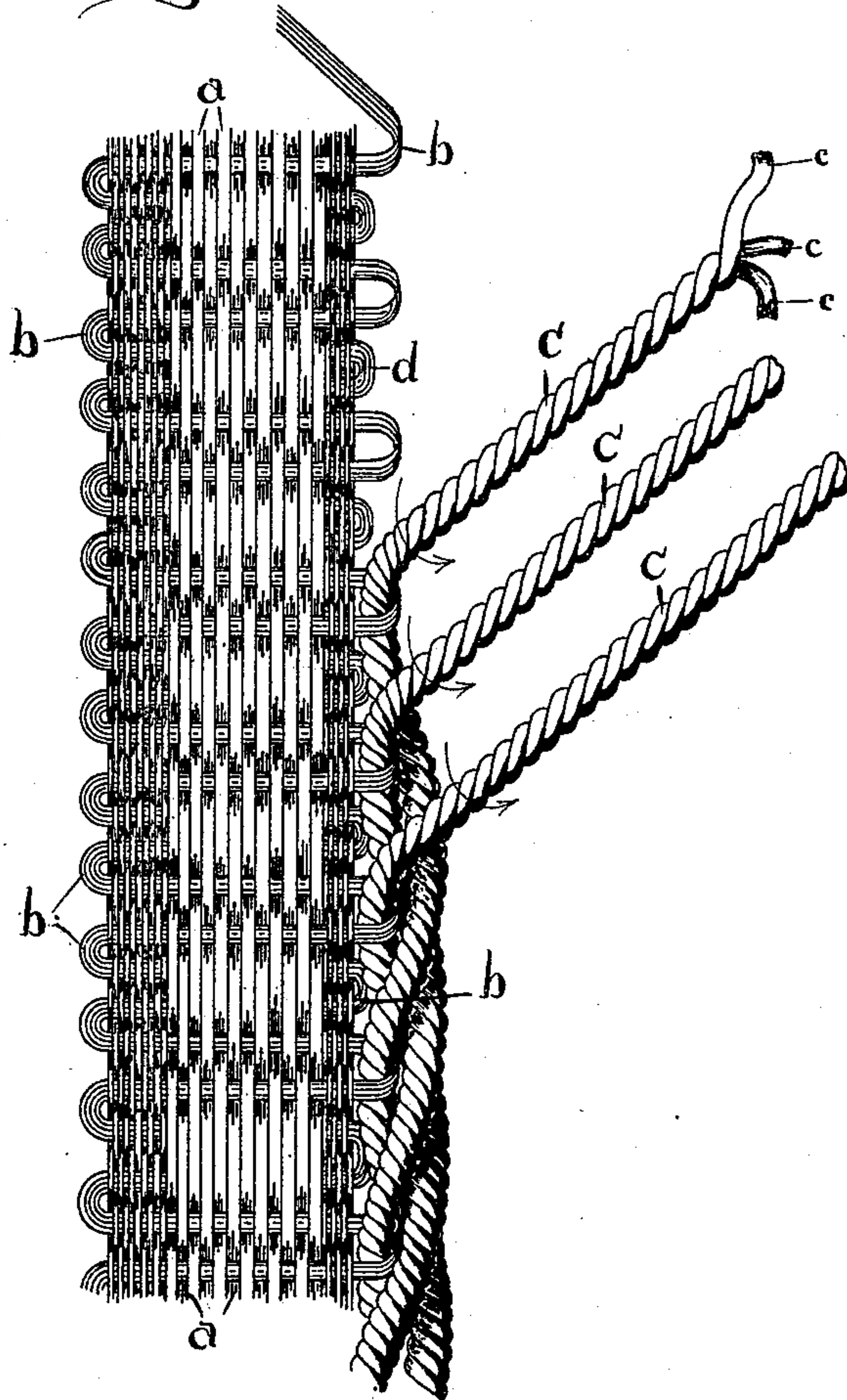
L. P. WARNER.

FABRIC AND APPARATUS FOR MAKING SAME.

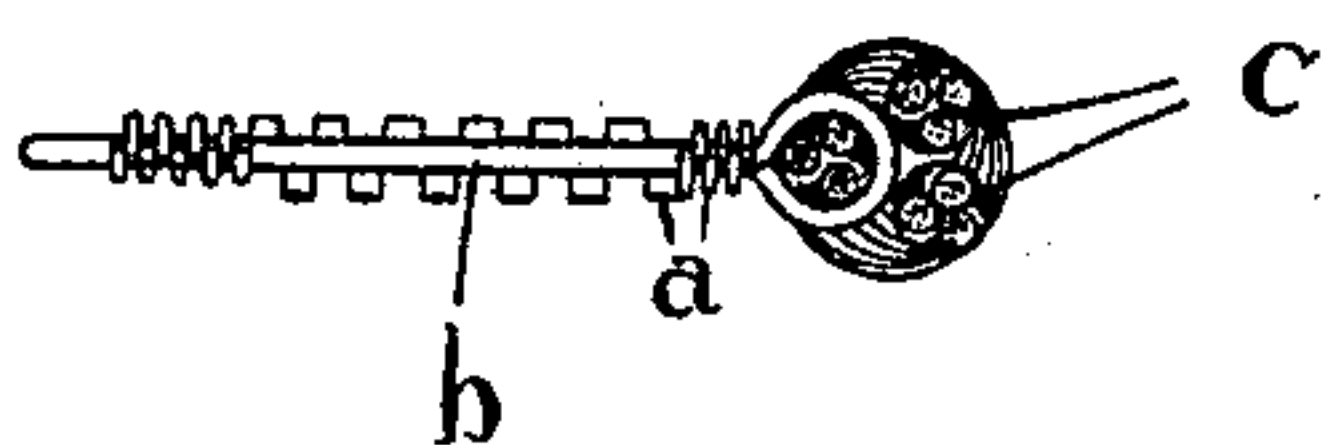
No. 587,349.

Patented Aug. 3, 1897.

*Fig. 1.*



*Fig. 2.*



Witnesses.

*G. Willard Rich.*  
*G. A. Roda*

Inventor

*Louis P. Warner*  
*by Churchill*  
his Attorney.

(No Model.)

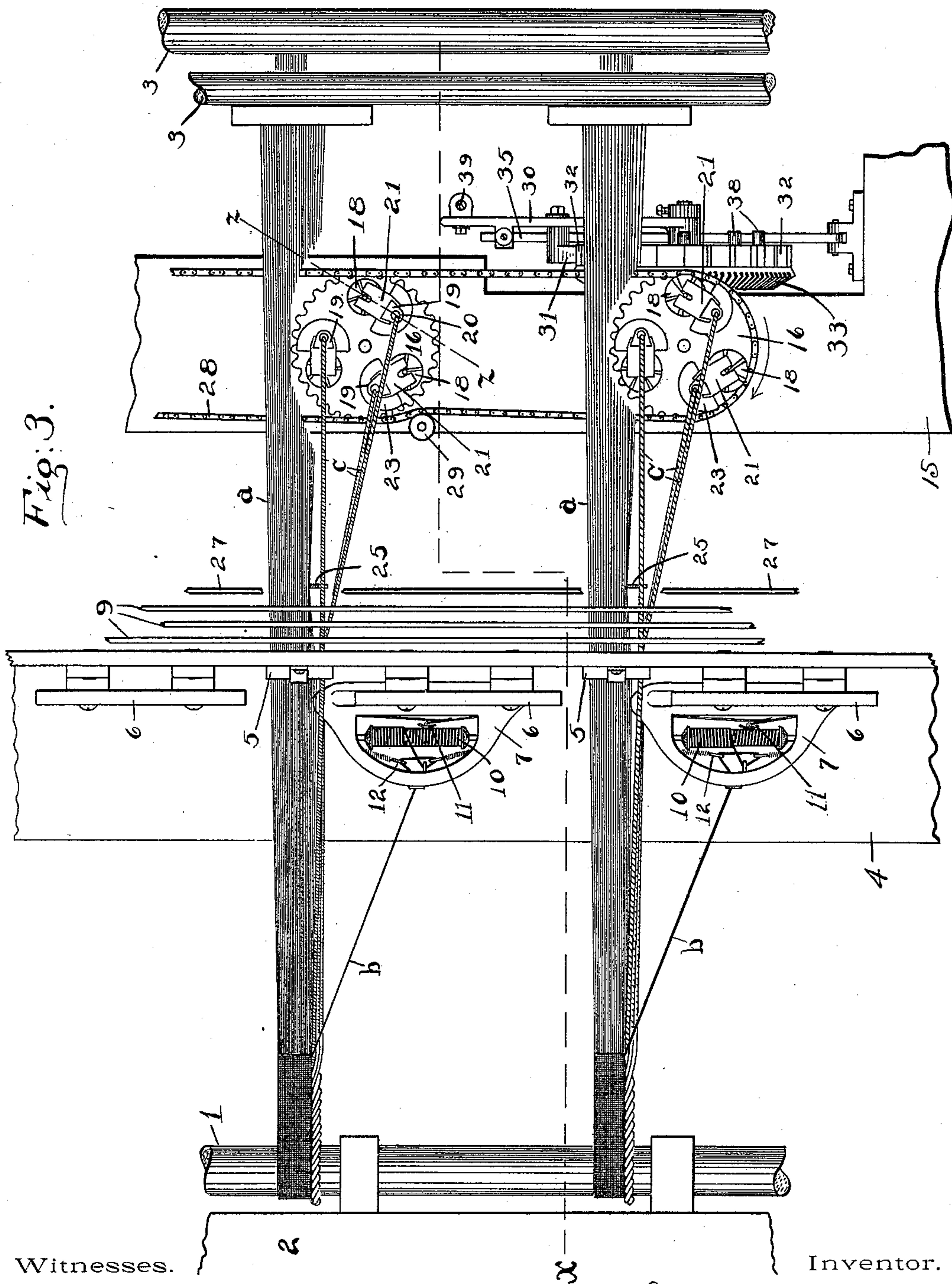
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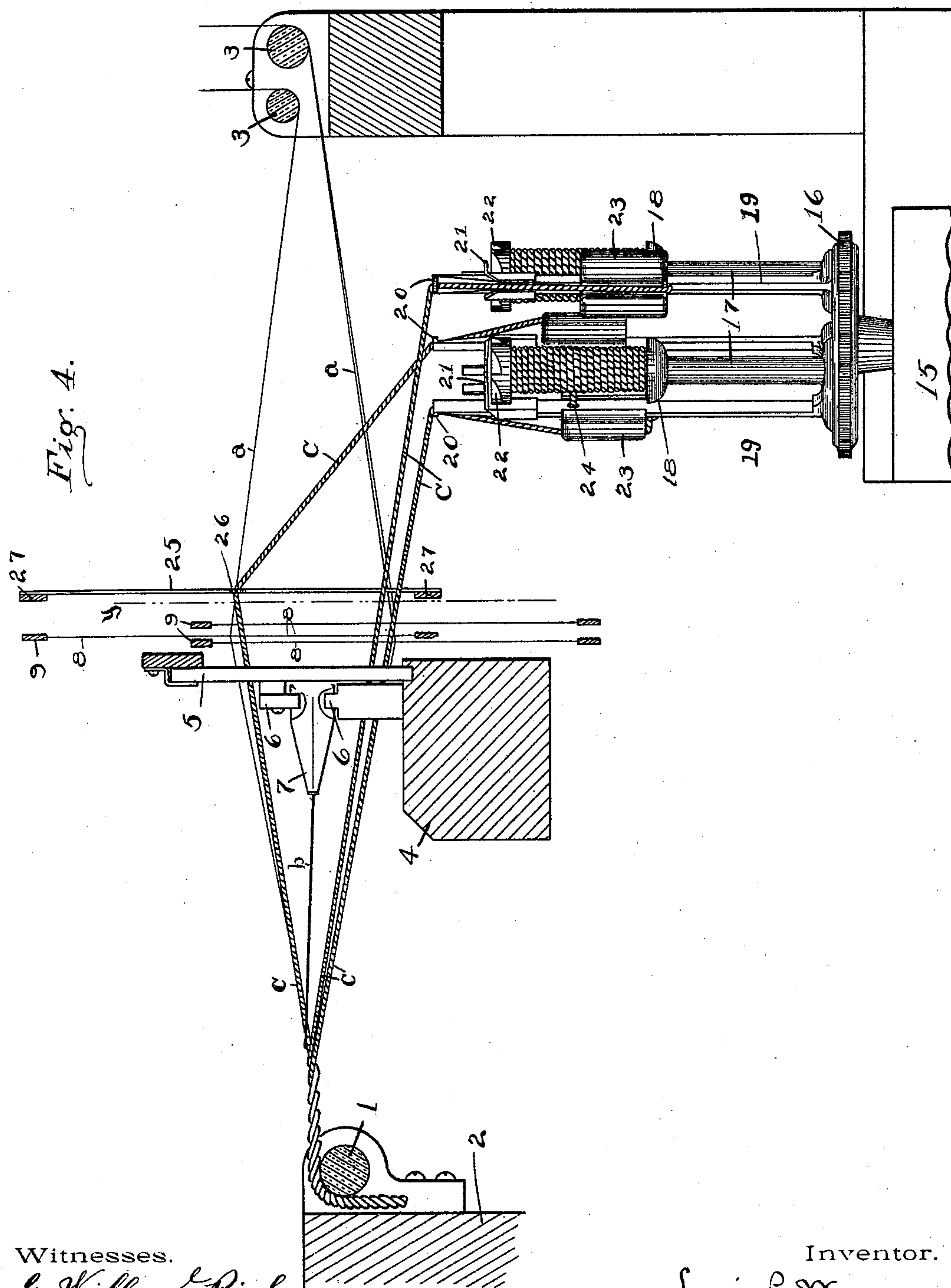
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(No Model.)

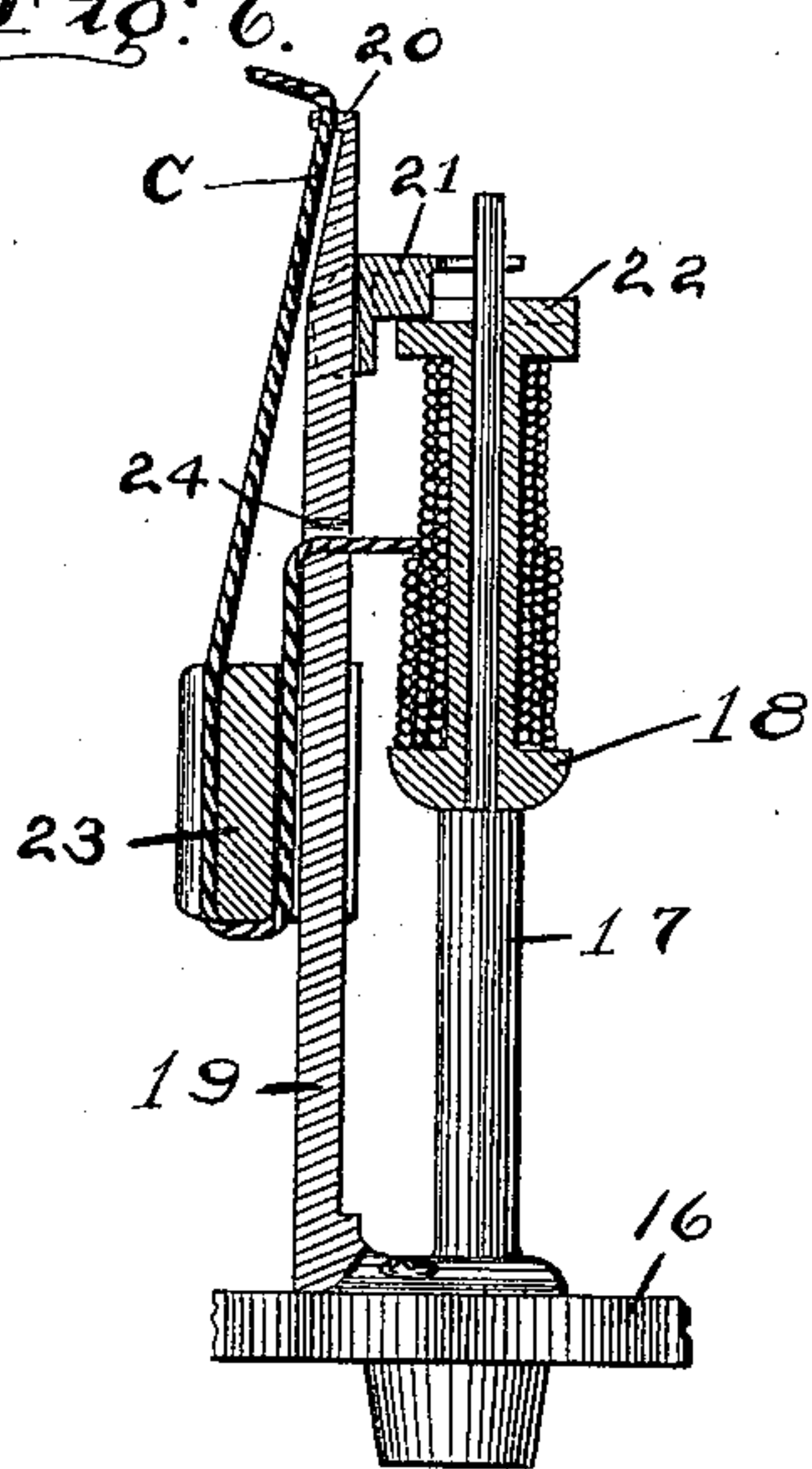
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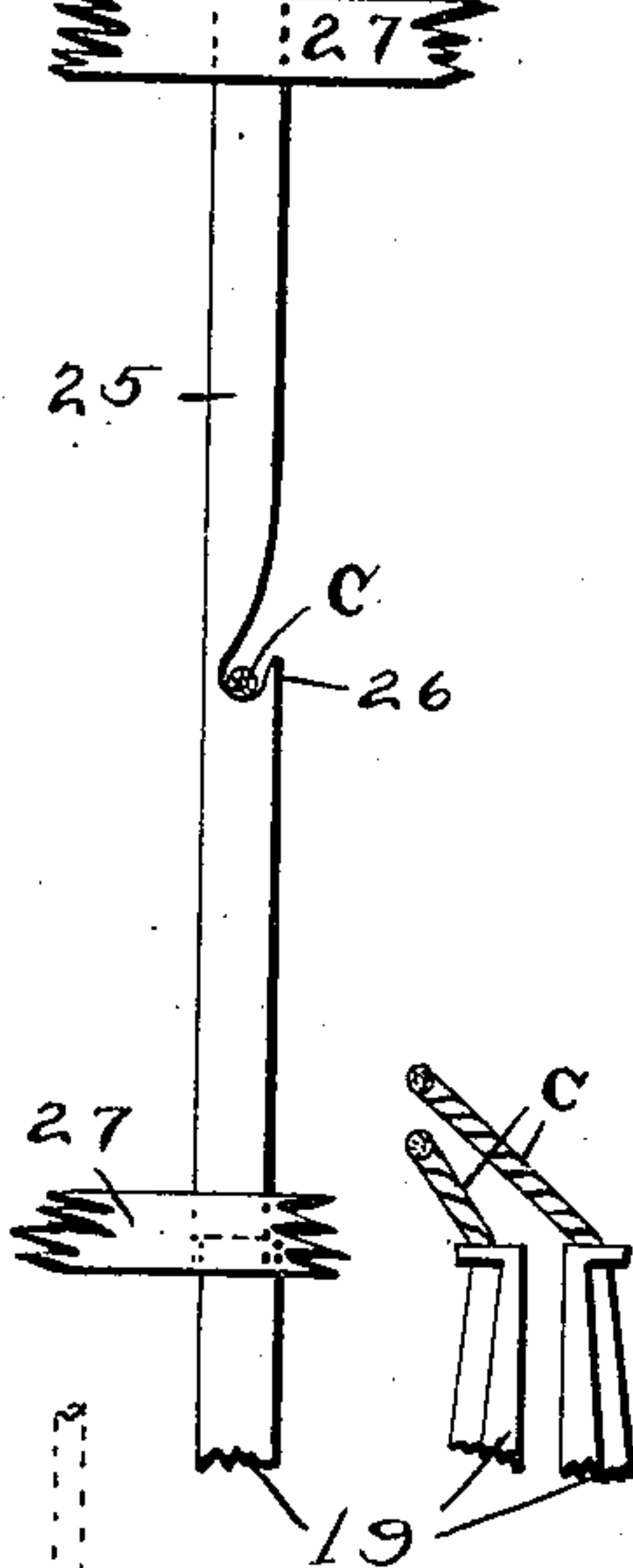
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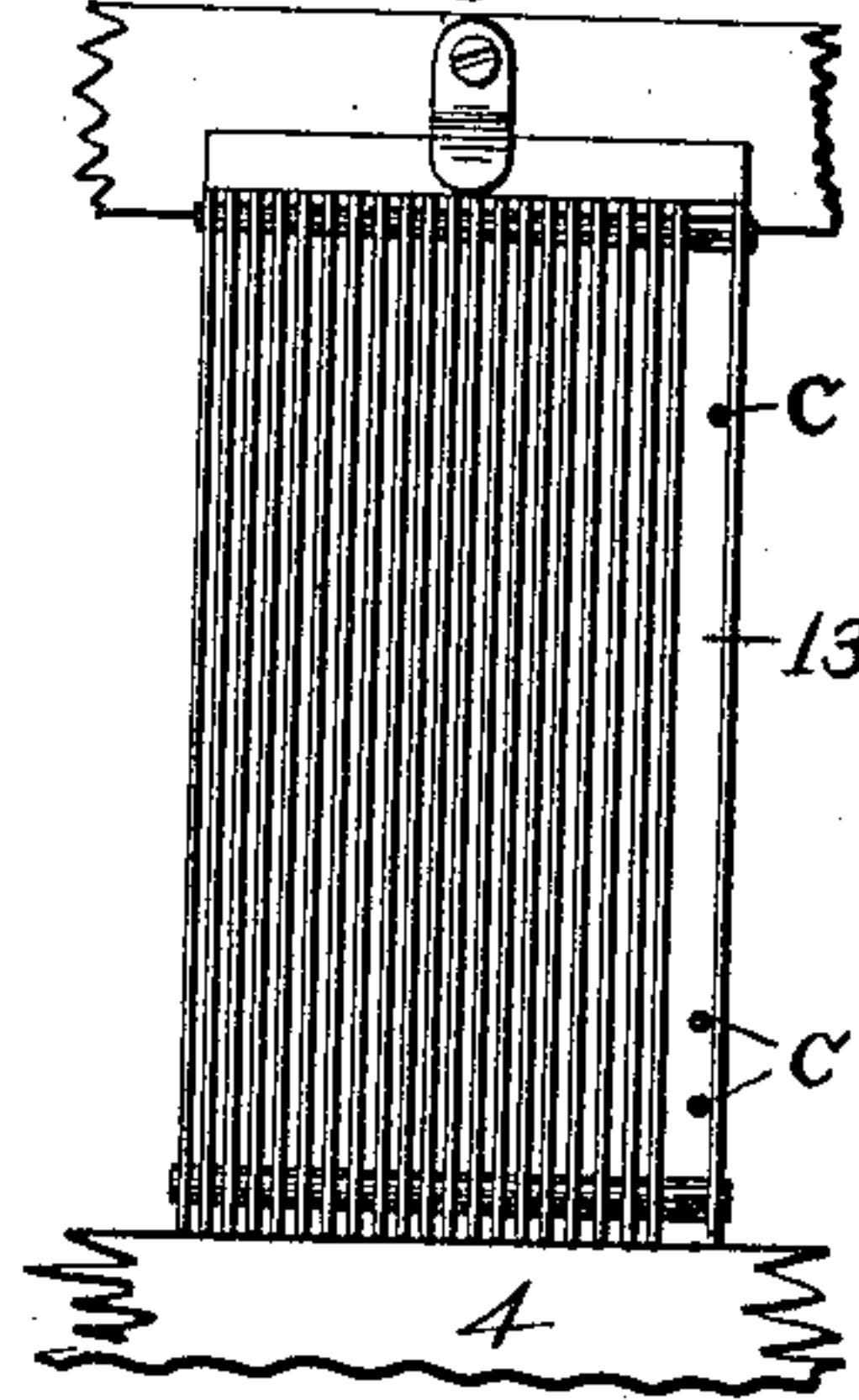
*Fig. 6.*



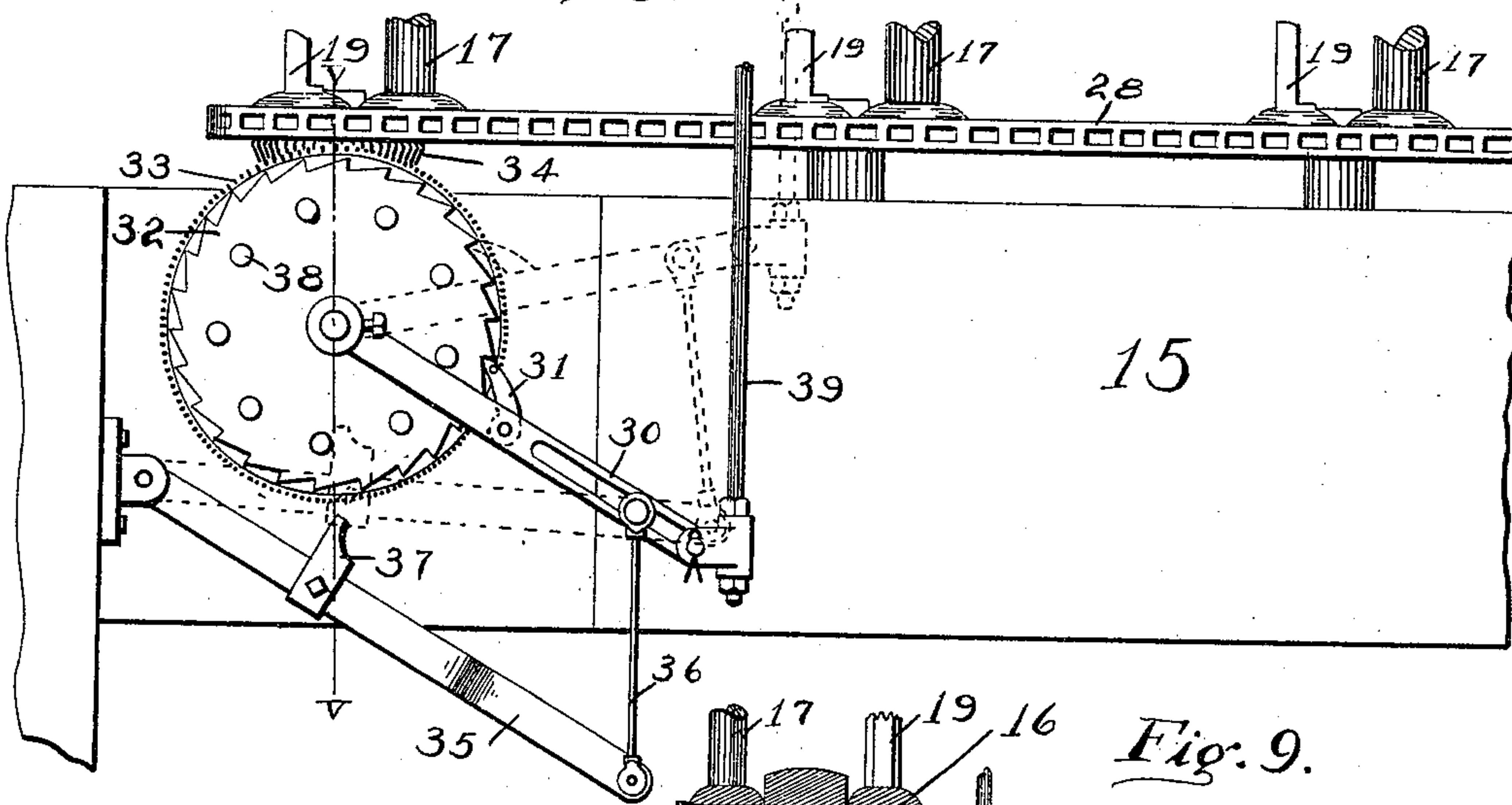
*Fig. 5.*



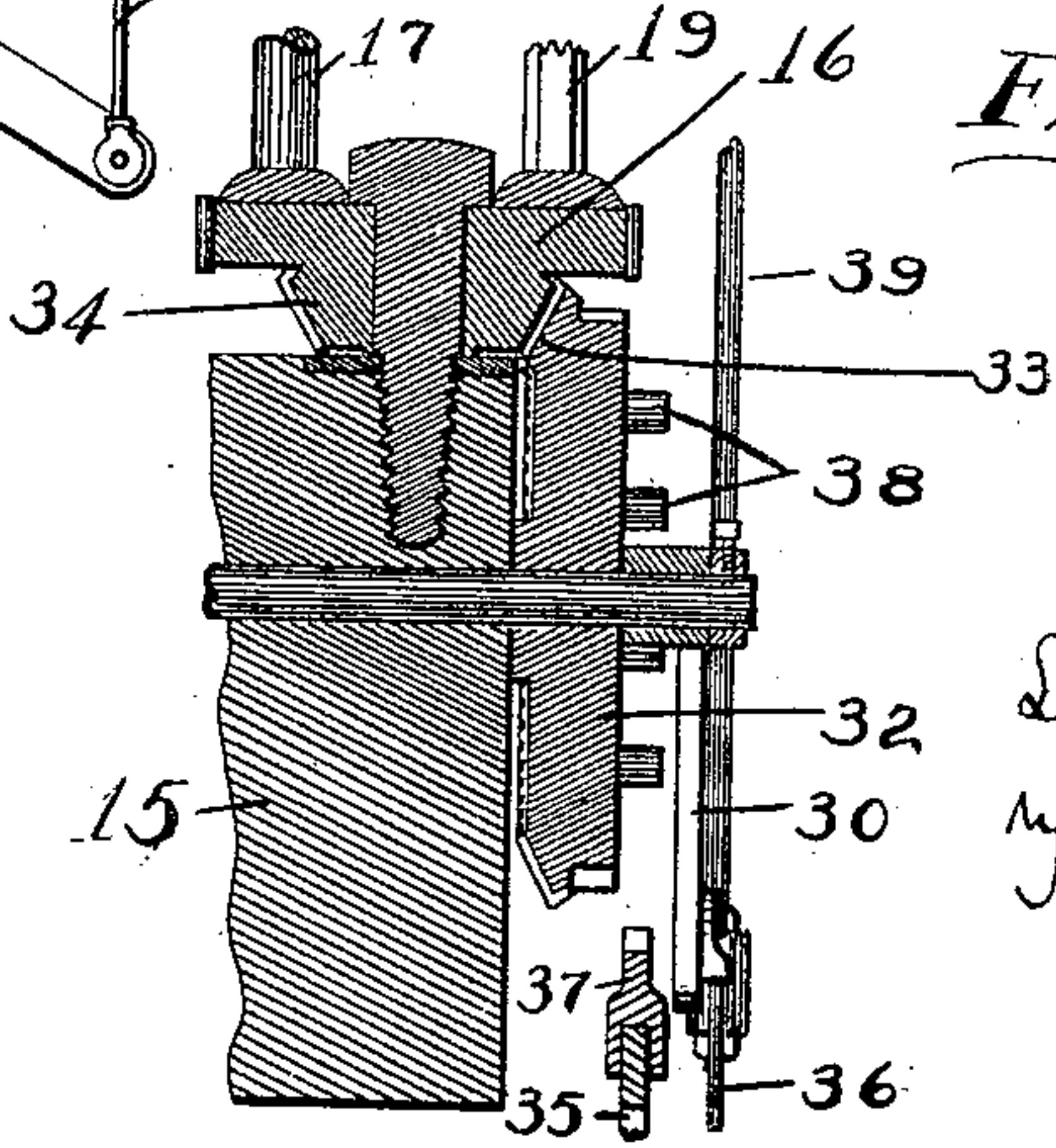
*Fig. 8.*



*Fig. 7.*



*Fig. 9.*



Witnesses.

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# UNITED STATES PATENT OFFICE.

LOUIS P. WARNER, OF ROCHESTER, NEW YORK, ASSIGNOR TO SCHAEFER & SCHLEGEL, OF SAME PLACE.

## FABRIC AND APPARATUS FOR MAKING SAME.

SPECIFICATION forming part of Letters Patent No. 587,349, dated August 3, 1897.

Application filed December 21, 1896. Serial No. 616,504. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS P. WARNER, of Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Fabric and Apparatus for Making the Same; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the reference letters and numerals marked thereon.

My present invention has for its object to provide an improved fabric adapted particularly for use as an edging or trimming for garments or other articles, which shall be capable of ready attachment and present an edge composed of a plurality of strands twisted into a cord, which forms not only an ornamental part of the fabric, but a wearing portion as well; and the invention has further for its object to provide an apparatus for making said fabric cheaply and rapidly.

To these and other ends the invention consists in the improved fabric and mechanism for making it, hereinafter fully described, the novel features being pointed out in the claims at the end of this specification.

In the accompanying drawings, Figure 1 is an enlarged plan view of a fabric constructed in accordance with my invention; Fig. 2, a cross-sectional view of the same; Fig. 3, a plan view of a portion of a loom and attachments for making the fabric; Fig. 4, a longitudinal sectional view on the line *xx* of Fig. 3; Fig. 5, a cross-sectional view on the line *yy* of Fig. 4, looking toward the rear; Fig. 6, a sectional view on the line *zz* of Fig. 3; Fig. 7, a rear view of the devices for actuating the cord-twisting heads; Fig. 8, a front view of the reed; Fig. 9, a sectional view on the line *vv* of Fig. 7.

Similar reference letters and numerals in the several figures indicate similar parts.

The fabric forming the subject-matter of my present invention embodies generally a body portion composed of the warp-threads *a a*, which may be single or compound, and a weft or filling *b*, which may also be composed of single or compound threads interwoven with the warp to produce a textile fabric or material of any desired pattern, and at

the side of this fabric is a twisted cord composed of a plurality of compound strands *C*, the "elements" *c* of the compound strands *C* being twisted together, and the compound strands of the cord are secured to the body of the fabric by the weft or filling *b*, which is passed around them during the formation of the fabric.

In making cord it is necessary that the strands composing it shall be given an initial twist in a direction opposite to that of the completed cord formed of the strands in order that as the strands tend to untwist when left alone they will twine themselves about each other to form the cord, and in the present invention the strands *C* are formed of elements or smaller strands *c*, twisted tightly together, the direction in which the elements *c* tend to untwist being indicated by the arrows in Fig. 1.

Inasmuch as the strands *C* are bound to the edge of the fabric by the weft thereof, which passes around them, and, as hereinafter described, the fabric is adapted to be made on an ordinary loom having a shuttle which carries the weft, I find it necessary to pass the weft around the strands composing the main cord in a direction opposite to that in which the elements *c* are initially twisted, as by this means the elements *c* of the strands in untwisting will tend to draw the weft *b* from the completed fabric instead of from the shuttle which is laying the weft around the strands, whereas if the elements *c* should be twisted in the opposite direction from that shown they will tend by their untwisting to draw the weft backward from the shuttle, which would render the loops of the weft that secured the cord to the fabric loose, and the connection would be an unsatisfactory one, the main cord in that event not being bound tightly to the fabric, but permitting the exposure of the weft-threads on one or the other side of the main cord, so that they might become worn and the connection between the cord and fabric impaired.

The body of the fabric may be formed of any material and may have any desired pattern woven therein by the use of warps of different materials or colors or by special manipulation of the threads to produce figures in the body thereof.



It is not essential that the cord be composed of any particular number of strands or that the strands be composed of three or any particular number of elements, though I prefer three, as shown; nor is it essential that all the elements of the strands be given the same amount of twist, as in some kinds of cord suitable for strands C of the cord attached to the fabric the central part or core is composed of elements or strands of cotton, for instance, which are twisted very little, while the outside or covering strands or elements of silk, for instance, are wound or whipped around the cotton strands so as to cover them, and as this whipped covering must be tight the cord thus formed has a decided twist, so that its tendency to twist around a corresponding strand and form a compound cord is precisely the same as the strands C, (shown in the drawings,) the only difference being that the elements of the strands are not twisted the same amount.

It will be noted from an inspection of Figs. 1 and 2 that it is necessary to form the cord constituting the edge of the fabric at the same time that the body of the fabric is woven, and while the strands of the cord are shown in the drawings as bound to the fabric by alternate passages of the weft around the strands this is not absolutely essential, although I prefer it, for the reason that the weft binds the edge of the warp at *d* when it does not engage a cord-strand, thereby forming a secure edge for the body of the fabric and making a longer twist in the cord, so that the tendency of the cord as a whole to untwist will not twist up the fabric. This form of edging, aside from the cheapness of its production, which will be referred to later on, is admirably adapted for use on the bottoms of ladies' skirts, and when the body is made of fine thread and the cord of fine silk it may be used for binding men's garments, the body of the fabric being secured to the garment between the edges of the lapel of a dress-coat, for instance, leaving only the cord exposed, the cheaper fabric itself and the connection between it and the cord being concealed by the material of the garment and affording a firm holding-ground for the securing-stitches, and thus the fabric will take the place of the expensive silk braids now used for this purpose and obviates the laborious operation of sewing silk cord sometimes used for edging a garment.

While a fabric such as described could be made by hand, I prefer to make it by machinery, as it will be more uniform in structure and the cost be materially reduced.

In the drawings I have shown the apparatus which I prefer to employ, and which consists generally of a weaving-loom and a cord-forming device of special construction and application. The loom is of the ordinary kind used for making narrow fabrics, sheds only being shown, and contains the breast rod or bar 1 on a suitable support 2 and over

which the completed fabric extends to the fabric-winding devices, the rear warp bars or rods 3 and the movable lay 4, having a reed 5 and ways 6 for the shuttles 7, which are actuated, as usual, in narrow-ware looms, or in any preferred manner. The warp-threads *a* pass through suitable heddles 8, contained in heddle-frames 9, actuated from the Jacquard or in any suitable manner to produce the desired pattern. The shuttles may be of any suitable construction and carry the spools 10, operated upon by brakes 11 and take-up devices 12, which may also be of any suitable construction. The loom thus far described does not differ materially from ordinary looms excepting in the provision of an enlarged recess 13 at one side of the reed, as shown particularly in Fig. 8.

The lay 4 is capable of swinging forward, as usual, to beat up the weft laid by the shuttles, and as the construction of looms generally is well known I have not deemed it necessary to specifically show herein the means for operating said lay.

The cord-twisting devices embody generally cord-twisting heads carrying bobbins or spools on which the strands of the cord are contained, and also tension take-up devices for each strand, so that the strands are always kept under even tension while they are being twisted to form the cord, and any slack due to the rotation of the twisting-heads or the manipulation of the strands is taken up, and it is also preferable that the twisting-heads should rotate on vertical axes, so that not only may space be economized and a relatively small twisting-head be employed, but also that the tension take-ups should be operated by gravity, as this permits an even tension to be maintained on the strands at all times. These twisting-heads are supported upon a beam or suitable support 15, secured to the loom-frame and extending across the same, preferably beneath the warp, and the twisting-heads are each composed of a base 16 in the form of a sprocket-wheel, mounted upon a vertical axis and having extending upwardly from it three spindles 17, upon the upper reduced ends of which are arranged bobbins 18, carrying the strands C, of which the cord is composed. Arranged at one side of each of the spindles is a vertical support 19, preferably angular in cross-section, and having at its upper end a guide-eye 20.

21 indicates gravity-pawls arranged to slide upon the uprights 19 and to engage the ratchet-teeth 22, formed on the upper ends of the bobbins or spools 18, said pawls normally engaging the spools and preventing their rotation.

23 indicates weights sliding upon the standards 19 and serving as take-up devices, being supported upon the strands C, which pass through the guide-eye 24 and beneath the weight and thence up through the guide-eye 20 at the upper end, as shown in Fig. 6.



The strands extend from the completed fabric downward or away from the shed through the recess 13 in the reed to the eyes 20 on the twisting-head at such an angle that the shuttle will ordinarily clear them, but on one side of each shed is arranged a bar 25, in the present embodiment vertically movable, and provided with a shedding hook or notch 26, and adapted when raised to shed or carry the strand of cord next the warp upward in such position that the shuttle may pass beneath it, the weft binding it to the fabric, and then when the rod is moved down again the strand will be out of the way and the shuttle may make the pick necessary to bind the warp-threads, as at *d*, Fig. 1.

The movements of the shedding-hook 26 may be accomplished by any suitable mechanism, but I prefer to attach the rod 25 to a heddle-frame 27, which is operated from the jacquard, or otherwise, so as to raise the strand laid in the hook by the rotation of the twisting-head at the proper time to bind the strand to the fabric. The rotation of the twisting-heads may be accomplished by any suitable mechanism, but I prefer to employ a sprocket-chain 28, passing around the sprocket 16, being held in contact by guide-rollers 29, as in Fig. 3, which chain may be intermittently moved by suitable mechanism actuated from the jacquard or a cam, but preferably from the jacquard by means of a lever 30, carrying a pawl 31, engaging a ratchet-wheel 32 on a bevel-gear 33, meshing with a beveled pinion 34 on one of the supports or sprockets 16.

In order to prevent racing of the ratchet-wheel 32, I provide a pivoted lever 35, connected to the lever 30 by a link 36 and carrying an arm or pin 37, adapted, when the lever 30 is raised, to project between two of the pins or studs 38 and insure the arrest of the twisting-heads in proper position. The connection between the lever 30 and the jacquard or other actuating device may be a rod 39, attached to the lever and drawn upward periodically to rotate the gears, said lever 30 being returned to normal position by gravity or otherwise.

The amount of movement permitted the twisting-heads, which rotate in the direction shown by the arrow in Fig. 3, is sufficient to bring one of the strands against the side of the rod 25, on which the shedding-hook is mounted, as in Fig. 3, and lay the strand in the hook, the bobbin carrying the strand last removed from the hook passing to the rear of the loom as the head is rotated. The rotation of the twisting-heads, the movement of the shedding-hook, and the movement of the shuttle are so timed, relatively, that the shuttle is passed out over the cord-strand, then the cord-strand is moved up by the shedding-hook, and then the shuttle passes beneath the cord-strand, as in Fig. 3, carrying the weft over the strand in a direction opposite to that in which the elements of the strand are ini-

tially twisted. The lay then beats up the weft, the shedding-hook returns beneath the shed, carrying the cord with it, the shuttle passes out of the shed on the cord side, then some or all of the warp-threads change, thence the shuttle passes back through the shed forming the securing-loop *d*, and in the meantime the cord-twisting head has been rotated one step, sufficient to bring the next strand of cord into the shedding-hook, the shuttle passes out at the cord side, then the shedding-hook is raised, and the shuttle passes back beneath the strand, thus returning to the position of parts shown in Fig. 3.

It will be understood that at each pick the weft is beaten up by the movement of the lay, as usual.

As before stated, it is important that the initial twist in the cord-strands and the direction of passage of the weft around them be opposite, so that the tendency of the strands to untwist will draw upon the weft from the completed fabric rather than the portion extending to the shuttle, and thereby an even tension will be given to the parts, preventing any slack during the beating up of the weft or during the inward movement of the shuttle.

The sliding weights 23 on the twisting-heads in connection with the pawl 21 constitute tension take-up devices, the weights serving to keep an even tension on the strands while falling and the pawls preventing the rotation of the spools until the weights are raised high enough to trip the pawls, when the strand will be unwound from the spool or bobbin and allow the weight to fall again, it being supported, however, by the strand until the pawl is released again. This device or its equivalent, a spring-operated tension take-up, I find is essential to the practical operation, because it is necessary to keep an even tension on the strands at all times to form a perfect cord, and as the spools move in succession nearer to the completed fabric and then away again as the heads rotate and as the shedding-hook draws and slackens the strands in succession the slack in the strand must be positively taken up, this being shown clearly in Fig. 3.

While it is desirable that a single strand of the cord should be bound to the fabric at every other inward movement of the shuttle from the cord side, this could be readily changed, depending upon the fabric to be made, and the cord could be twisted and bound at every pick of the shuttle, if desired, but, for the reasons before stated, I prefer the form shown.

While the shedding of the cord-strand could be accomplished by any suitable mechanism, it is desirable that it be done by a jacquard, because greater variety can be given the trimming, the shedding-hook shown permitting the strands to be drawn out of the hook if the latter is not operated.



The cord-forming devices described could be readily attached to narrow-ware looms now in use at comparatively slight expense.

I claim as my invention—

- 5 1. As a new article of manufacture, a woven fabric embodying a warp and a weft or filling and having at one edge a twisted cord composed of a plurality of compound twisted strands, the elements of the strands having a  
10 set or twist in themselves, and said strands being bound to the edge of the fabric by the weft of the latter, which is passed around the strands in a direction opposite to that of their initial twist, as set forth.
- 15 2. The combination with a weaving-loom, of a rotatable cord-twisting head arranged in rear of the lay and at one side of the warp and out of the plane of movement of the shuttle, a series of bobbins on said head, each  
20 carrying a cord-strand, a tension take-up device for each strand, and a vertically-movable shedding-hook into which the cord-strands are laid by the rotation of the twisting-head, substantially as described.
- 25 3. The combination with a weaving-loom, of a cord-twisting head located at one side of the shed and in a different plane from that in which the warp extends, said twisting-head having a series of bobbins carrying cord-  
30 strands, and a tension take-up for each strand, an intermittingly-operated shedding-hook for shedding the cord-strand next the warp, and mechanism for rotating the twisting-head intermittingly, substantially as described.
- 35 4. The combination with a weaving-loom, of a cord-twisting head rotatable on a vertical axis arranged in rear of the lay and at one

side of the warp and out of the plane of movement of the shuttle, a series of bobbins on the head, each carrying a cord-strand, a  
40 tension take-up device for each strand, and a shedding-hook into which the cord-strands are laid by the rotation of the twisting-head, substantially as described.

5. The combination with a weaving-loom, 45 of a cord-twisting head arranged in rear of the lay, at one side of the warp and out of the plane of movement of the shuttle, said head embodying a rotatable support, a series of spindles and bobbins thereon, a series of  
50 standards having guide-eyes at their ends, weights sliding on the standards and supported by the cord-strands, and stop devices, as pawls, retaining the bobbins adapted to be released by the weights, and a vertically-  
55 movable shedding-hook for shedding the cord-strands next to the warp, substantially as described.

6. The combination with a weaving-loom, of a rotary cord-twisting head located at one 60 side of the shed, carrying a series of cord-strands and a tension take-up device for each strand, of a ratchet-wheel connected to said twisting-head, and having a series of studs thereon, a lever, a pawl thereon engaging the  
65 ratchet-wheel, and an arm operated by the lever and adapted to engage the studs on the wheel to limit its motion when actuated by the movement of the lever, substantially as described.

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Witnesses:

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