

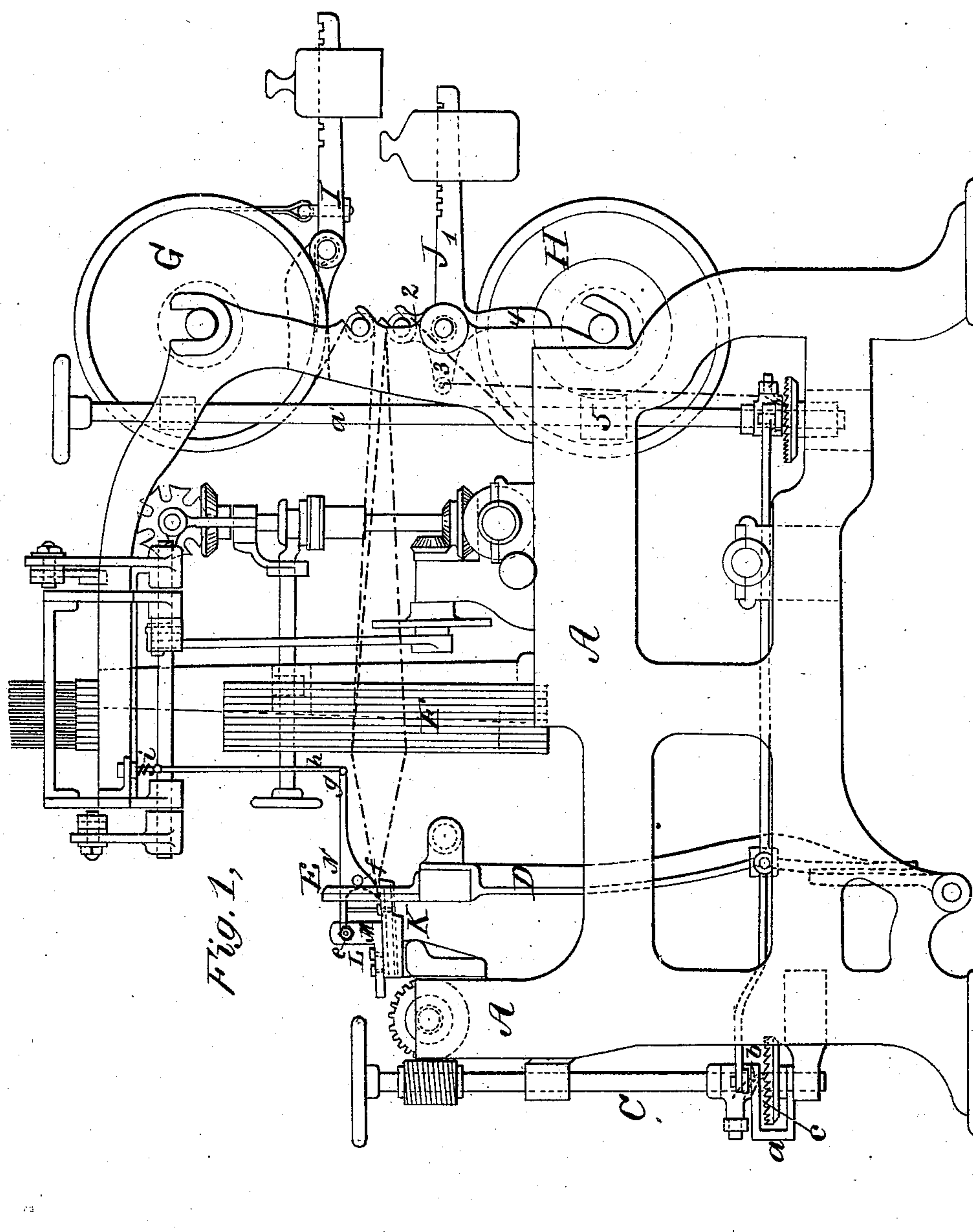
(No Model.)

5 Sheets—Sheet 1.

A. MILLS.

Loom for Weaving Cartridge Belt Fabric.  
No. 236,058.

Patented Dec. 28, 1880.



Witnesses:

*Estwick*  
*Georgie*

Inventor:

*Anson Mills,*  
*by W. Bailey*  
*his Atty.*

(No Model.)

5 Sheets—Sheet 2.

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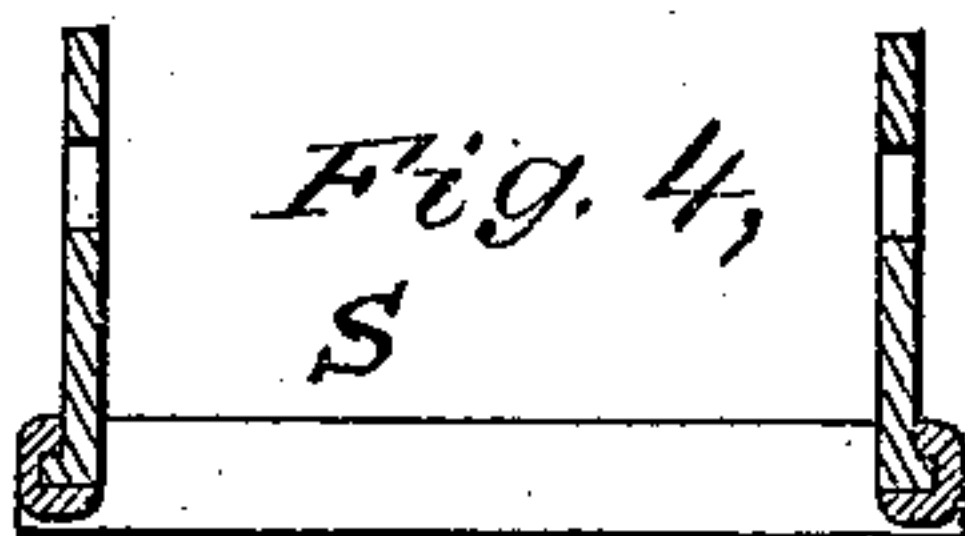
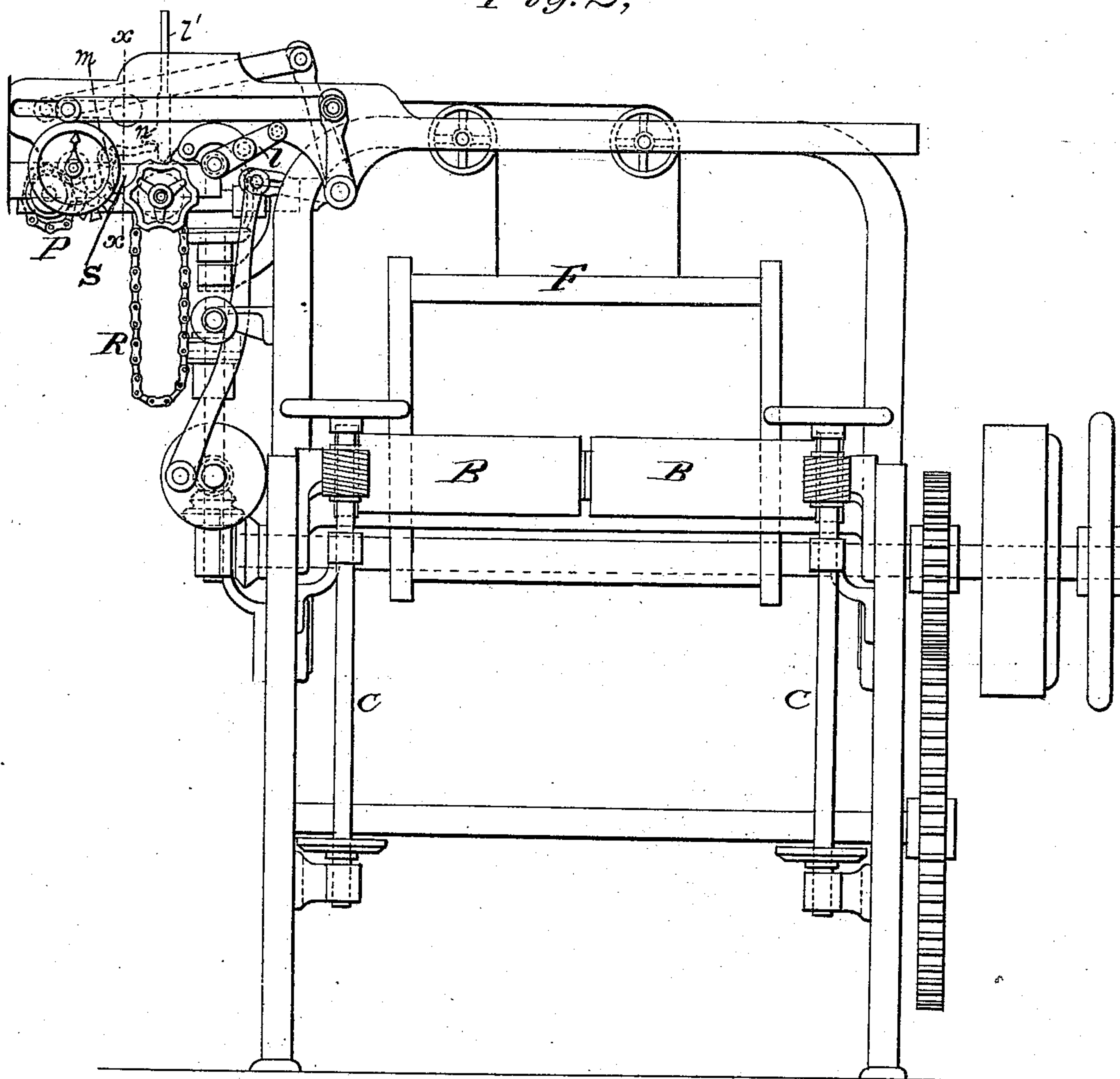


Fig. 2,



Witnesses:

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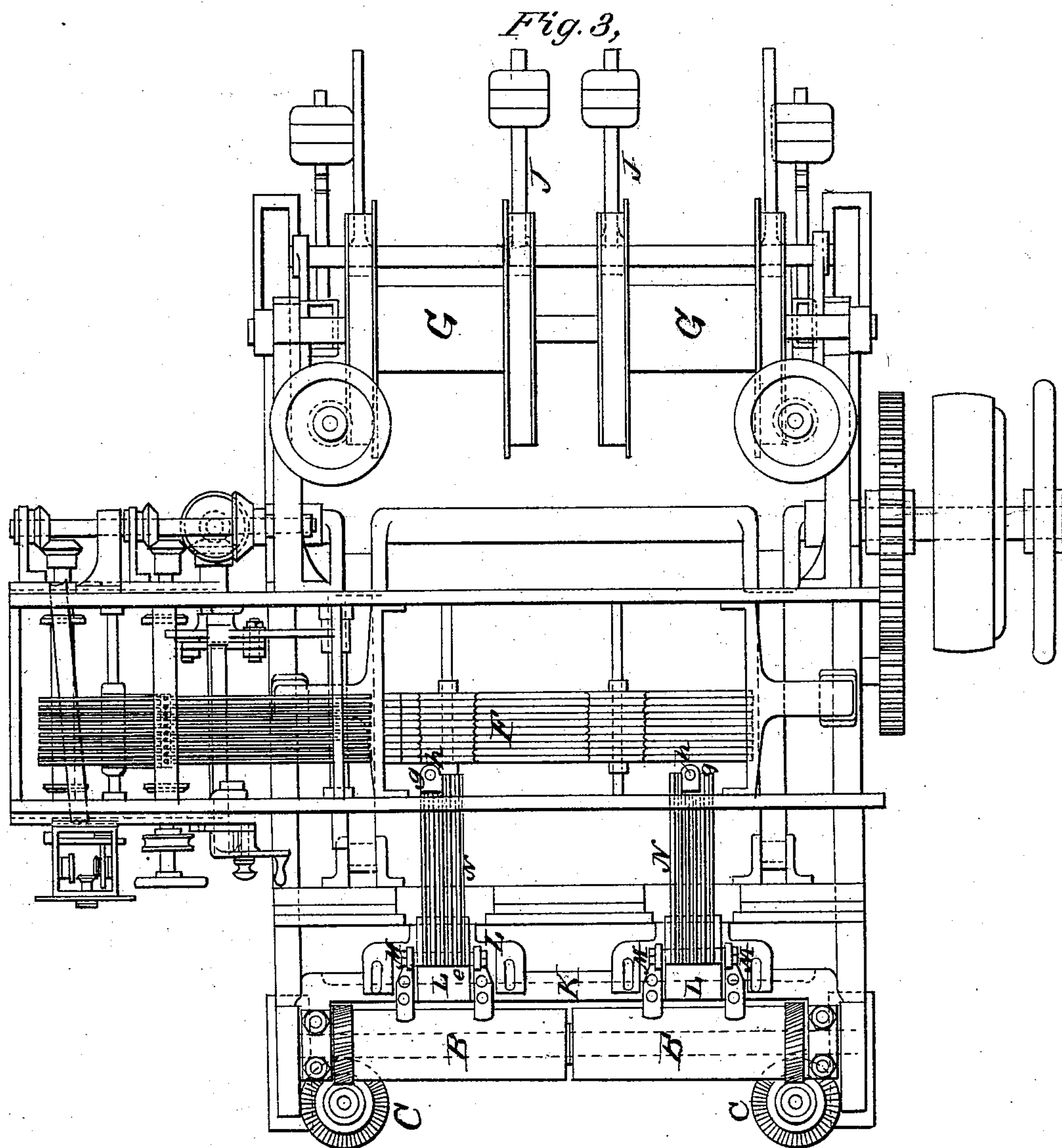
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(No Model.)

5 Sheets—Sheet 3.

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Loom for Weaving Cartridge Belt Fabric.  
No. 236,058. Patented Dec. 28, 1880.



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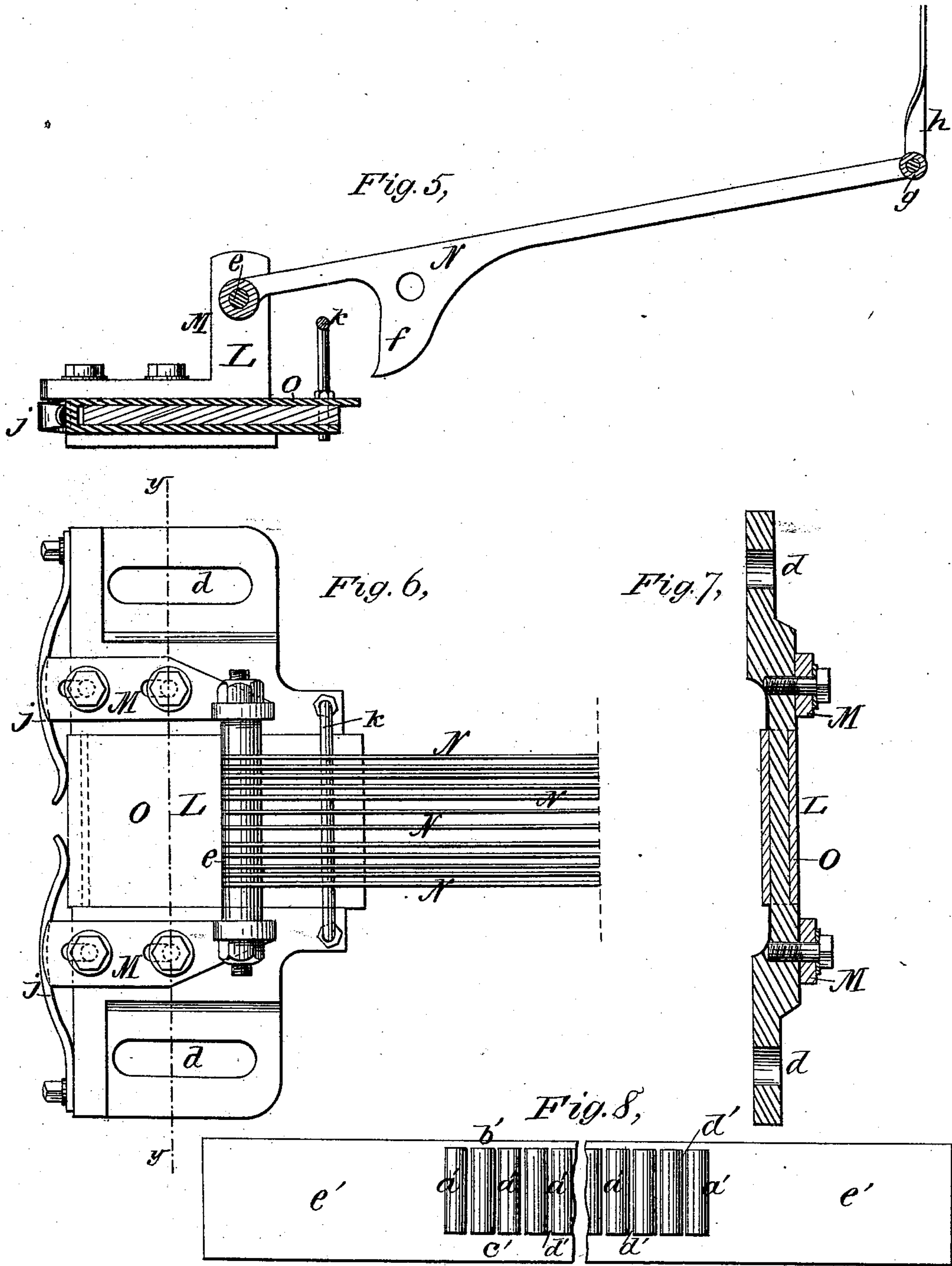


(No Model.)

5 Sheets—Sheet 4.

A. MILLS.

Loom for Weaving Cartridge Belt Fabric.  
No. 236,058. Patented Dec. 28, 1880.



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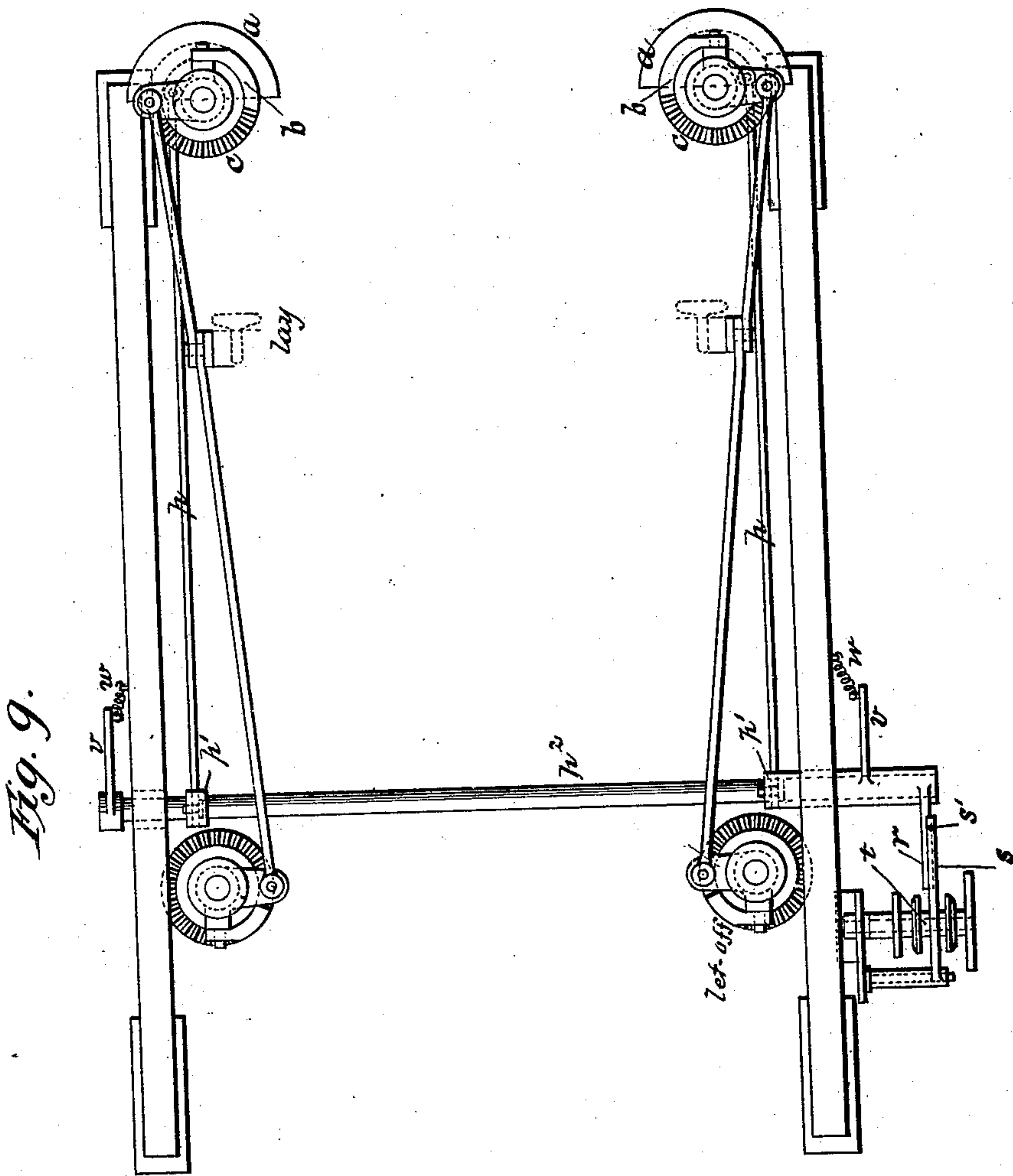
(No Model.)

5 Sheets—Sheet 5.

A. MILLS.

Loom for Weaving Cartridge Belt Fabric.  
No. 236,058. Patented Dec. 28, 1880.

Patented Dec. 28, 1880.



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# UNITED STATES PATENT OFFICE.

ANSON MILLS, OF THE UNITED STATES ARMY.

## LOOM FOR WEAVING CARTRIDGE-BELT FABRIC.

SPECIFICATION forming part of Letters Patent No. 236,058, dated December 28, 1880.

Application filed July 12, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, ANSON MILLS, of the United States Army, have invented certain new and useful Improvements in Looms for Weaving Cartridge-Belt Fabric, of which the following is a specification.

My invention is directed to looms for weaving a looped fabric intended especially to be used for cartridge-belts. The fabric is a heavy double one, laced together by using a portion of the warp as binding, and similar to a fabric known as "back-banding." It is formed on one side with loops or thimbles woven in one with the body of the fabric from the warps which form one thickness of the double fabric, the thimbles not extending the full width of the fabric, but leaving a selvage on both edges.

In Figure 8 of the accompanying drawings is a plan of such a belt, *a'* being the loops, *b' c'* the two selvages, *d'* the spaces between the loops, and *e'* the plain ends. The fabric herein described is not here claimed, however, having been made by me the subject of Letters Patent of even date herewith.

My invention resides particularly in the means employed for weaving the loops, and in the combination therewith of the instrumentalities which form the main fabric.

I employ two separate take-ups, one for the main fabric, the other for the loops or thimbles. The loop or thimble take-up consists of what I term "needles," which are so placed that when the loom is weaving the main fabric they are not in contact with the warp, although in close proximity thereto. As soon as it is time to weave a loop the main fabric ceases to move, being held immovably between the cloth-beam on the one hand and the main-warp beam on the other. The reed beats up the weft in the shed of the warp used to form the thimbles, and in so doing forces the weft past the points of the needles, by which it is held, the loop fabric naturally rising a little and gathering behind the needles as the weaving of the loop progresses. As soon as enough fabric has been woven to form the loop the weaving of the main fabric progresses, the last shoot of the loop being united with the main body of the fabric at the point where the weaving of the latter terminates and that

of the loop begins, the harness being properly operated by suitable pattern-chain to form sheds, which will cover the overshoot, which otherwise would be exposed at the points where the loop is commenced and finished. I employ, in conjunction with the parts named, two warp-beams, one for the loop-warp and one for the remainder of the warp. The former is governed by a friction let-off, the latter by a positive let-off, so that the main warp may be held taut and without slack or give while the loops are being woven.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of a loom embodying my improvements. Fig. 2 is a front elevation of the same with some of the parts removed. Fig. 3 is a plan of the same, the reeds being removed from the lay in order to more fully disclose the parts in which my invention principally resides. Fig. 4 is a section on line *x x*, Fig. 2, designed to show the arrangement of the sliding double-cylinder repeating chain carriage or frame. Fig. 5 is a sectional side elevation of the needles and their frame on an enlarged scale. Fig. 6 is a plan of the same. Fig. 7 is a section on line *y y*, Fig. 6. Fig. 8 is a plan representing the mechanism for producing automatically the requisite intermittent action of the cloth-beam take-up.

The loom, except in the respects hereinafter particularly noted, is of any ordinary and suitable construction well known to those skilled in the art, and therefore requiring no description here.

The loom shown in the drawings is a double loom, or one intended to weave two belts or strips of looped fabric simultaneously.

A is the frame in which the several working parts are supported. There are two cloth-beams, B, each of which has its own take-up C, said take-up being an intermittent take-up of any ordinary or suitable construction, and the intermittent action, in this instance, being obtained by means of the movable guard *a*, which, at proper intervals, is interposed between the pawl *b* and the ratchet *c*, so as to render the pawl inoperative. The mechanism for operating the guard *a* is represented in



Fig. 9. To each guard is pivoted a connecting-rod,  $p$ , which, at the other end, is jointed or pivoted to a boss or radial projection,  $p'$ , fast on a rock-shaft,  $p^2$ , supported in proper bearings in the lower part of the loom-frame. The shaft receives movement as follows: At one end it has a radial arm,  $r$ , fixed to it, which, by a cord, the upper end of which is indicated at  $s'$ , is connected with the upper pivoted or oscillatory lever  $s$ , hung on a suitable stud projecting from the loom-frame. Said lever  $s$  extends above and rests upon a chain (not shown) carried by the rotating chain-shaft  $t$ , which is connected with and receives a uniform and continuous movement of rotation from some appropriate moving part of the loom, and is, of course, so arranged that it may, by means of suitable clutch, be disconnected from the source of power during the weaving of the plain fabric at the ends of the belt, as will be understood without further explanation.

Suppose there be thirty-two picks in each thimble of the belt and eight picks in the main fabric intervening between the loops, then the chain for operating the arm  $s$  will have thirty-two bolts and eight spaces. The bolts, at the time the thimble is to be woven, come beneath and raise the lever  $f$ , and maintain it elevated during thirty-two picks. When the lever  $s$  is thus elevated it lifts the radial arm  $r$ , and consequently causes shaft  $p^2$  to partially rotate in a direction to draw each guard  $a$  under the take-up pawl. As soon as the chain revolves far enough to bring the spaces in it under the lever  $s$  the latter will drop, and then, by the action of another arm,  $v$ , on rock-shaft  $p^2$ , attached to a spring,  $w$ , (which, at the other end, is attached to the loom-frame, and is put under tension when the lever  $s$  is elevated,) the said rock-shaft is returned to its first position, thus causing the guard to be removed from between the take-up pawl and its ratchet. I thus obtain a cloth-beam take-up which is automatically thrown into and out of action at stated times, according to the requirements of the work.

D is the lay, which carries two reeds, E, one for each cloth-beam.

F are the harnesses or heddles, operated in the usual way by jacks, actuated from a suitable pattern-chain, which may, as shown in Figs. 2 and 3, be composed of two independent chains, the one for weaving the plain fabric needed at the ends of the belt, the other for weaving the looped fabric.

For each cloth-beam there is a loop-warp beam, G, which contains the warp that enters into the loops or thimbles, and a main-warp beam, H, which carries all the remaining warp used in the fabric. Each beam G is controlled by an ordinary friction let-off, I, and each main-warp beam is controlled by a positive let-off consisting of the four-armed lever J, one arm, 1, carrying the adjustable weight, the other arm, 2, carrying the roller over which the warp is led from the beam, the third arm, 3, connected by a rod with the pawl of the let-

off mechanism, and the fourth arm, 4, constituting a stop to limit the downward movement of the arm that carries the weight. A let-off of this kind is not novel and requires no extended description. The arm 3 ordinarily holds up the pawl out of engagement with the let-off ratchet. When, however, the tension of the warp becomes great enough to overcome the weight it draws forward arm 2, and consequently arm 3 descends and allows the vibratory pawl (actuated from the lay in the usual manner) to fall into engagement with the ratchet, thus causing partial rotation of the let-off shaft, whose worm 5, engaging a worm-gear on the warp-beam, rotates the said beam sufficiently to relieve the tension. The warp-beams are set as closely as possible to the cloth-beam, the distance between the two being noticeably less than in ordinary looms.

All the parts thus far described are of a construction known to those skilled in the art to which this invention pertains, and their arrangement will be understood by reference to the drawings without further explanation.

Upon the breast-beam K, back of each cloth-beam, is a metal frame, L, (shown on an enlarged scale in Figs. 5, 6, and 7,) which is secured to the beam by bolts passing through slots  $d$  in the frame, which permit said frame to be adjusted forward or back on the breast-beam. Secured in a like adjustable manner to the frame are brackets or standards M, carrying a cross-rod,  $e$ , which constitutes the axis on which are hung a series of devices, N, termed by me "needles," whose shape is shown clearly in Fig. 5. Each consists of a thin strip of steel or other metal suitable for the purpose, with a hook-like depending projection,  $f$ , which constitutes the needle proper. These needles are hung at one end on the cross-rod  $e$ , and at the other end on a rod,  $g$ , supported by a vertical rod,  $h$ , passing up loosely through the overhanging part of the loom-frame. The rod  $h$  terminates above the loom-frame in a head, which prevents it from dropping there-through, and below the frame is encircled by a spiral spring,  $i$ , held between the frame above and a boss or pin on the rod  $h$  below. This arrangement permits the needles to rise slightly when occasion demands. The points of the needles proper,  $f$ , are normally just above the warp when the main fabric is being woven; but when the weaving of the main fabric ceases and that of the loop commences, the fabric which forms the loop rises a little, and so gathers in front of the needles, the weft beaten up by the reed passing under and beyond the needles  $f$ , which rise slightly to permit the weft to pass, and then fall so as to retain the weft. The needles thus act as a take-up for the loop, (the main fabric being at rest during the time,) and serve to hold the loop-fabric in place and to bring the two points, where the weaving of the loop begins and ends, together, so that when the weaving of the main fabric again commences the loop will be perfectly formed and united with said main



fabric. It is in this instrumentality which I have termed the "needles" that my invention principally resides, an instrumentality which, when the main fabric is at rest, acts as a take-up for the loop during its weaving, and which ceases to be operative as soon as the weaving of the main fabric commences.

The needles pass through the dents of the reed, and there may be as many needles as may be found requisite in order to act as a take-up for the thimble part of the fabric. The reed beats up against the needle-supporting frame, and in order that it may beat up far enough I make the table O, over which the work is drawn, longitudinally movable, it being mounted in proper guides in the frame, as shown, with its inner edge projecting beyond the inner edge of said frame, and held in that position with a yielding pressure by springs *j*. A rest, *k*, is provided, which will prevent the needles from dropping too far.

In the loom shown there are ten harnesses. Two carry the two sheds of the lower half of the double cloth; two carry the warps which form the narrow selvage on one side or edge of the belt; two carry the warps which form the broad selvage on the other side or edge of the belt, and are used to cover the overshot of the shoot in passing from the main fabric to the loop and back again, and if it is desired to cover this overshot more perfectly two extra harnesses will be required to raise as much of the binders as will place the shoot exactly in the middle of the cloth; two carry the binders, which have each one thread in each dent of the reed, except three dents on each selvage, the binders being there dispensed with in order to get a comparatively soft rounded selvage; and two carry the warp for the thimbles.

By omitting the binders for a number of dents on each selvage, as above provided for, I obtain on each edge of the fabric a tubular rounded selvage. If it be desired to cord this selvage, a number of warp-threads in separate harness, worked so as not to engage with the woof-threads, but simply to fill up the tubular selvage, may be used.

The pattern mechanism which I employ is represented plainly in Figs. 2 and 4, and requires but brief description. The two pattern-chains—P, which forms the plain double fabric at the ends of the belt, and R, which forms the thimbles and parts of the plain double fabric intermediate between them—are mounted in the carriage or frame S (shown in cross-section in Fig. 4 and in side elevation in Fig. 2) in such manner that they may move to and fro horizontally and lengthwise of the carriage, being so connected as to thus move simultaneously and together. The sliding support in which they are mounted is moved by means of the crank-handle *l*. The chain P acts on the jack-operating fingers *l'* through the intermediary of bell-crank levers *m*, of which one end adjoins the chain P and the other end comes immediately below shoulders *n* on the sides of the fingers. The chain R when

in operative position comes directly under and operates directly upon the lower ends of the fingers *l'*, and it is shown in this position in Fig. 4, the chain P being out of operative connection with the bell-crank levers *m*.

The operation of the loom when in motion is as follows: The handle *l* of the double-cylinder repeating-chain carriage is turned to bring the chain P (which forms the plain double fabric) in position to operate the jacks. This will cause a plain double fabric to be woven of a length desired for one end of the belt. The handle is then turned to shift the sliding chain-carrying frame to a position to throw chain P out of action and to bring into play the chain R, which causes the weaving of the loops or thimbles and the parts of the fabric intervening between them. As soon as it becomes time to weave a thimble or loop the cloth-beam take-up ceases to act, and the proper set of heddles or harnesses for weaving the loops alone act, in conjunction, of course, with those which act at the beginning and end of the formation of the loop to cover the overshot of the shoot. The reed beats up the shoot or weft, so that it shall pass the needles by which it is retained. As soon as sufficient fabric has been woven for the loop the remaining harnesses again act, and the weaving of the spaces of main fabric between successive loops again commences, the weaving of spaces and loops alternating, until a sufficient number of thimbles have been formed, after which the chain R is thrown out of action and the chain P brought into action to weave the plain double fabric required for the other end of the belt, thus completing it, and so on. The fabric can be woven in strips of indefinite length and then cut up into belts.

I am aware that it has before been proposed, in the weaving of a light-looped fabric, to employ a laterally vibrating and sliding hook to draw back the loop as it is woven, this hook take-up being independent of the main take-up. In this case, however, the hook take-up does not act the instant the main take-up ceases, but is necessarily inactive after the weaving of the main fabric ceases until a sufficient length of loop has been woven to permit the hook to pass laterally beneath the loop fabric. In weaving my fabric, which is a very heavy double one with a powerful tension, it would be entirely impracticable to use such a take-up. The hook, in order to have sufficient strength to sustain the tension, would necessarily be of such size as to necessitate the weaving of from twelve to twenty picks before it could be introduced and allow the reed to come up to its proper position in the main cloth; and while weaving these twelve or twenty picks the warp of the loop would become slack and tangled and engage the shuttle in its passage. Besides, in my take-up the needles extend to the selvage of the loop-cloth, and act as a temple to prevent its selvage from yielding to the powerful tension on the filling in the shuttle required to



make a good selvage in the main cloth. Furthermore, my take-up is placed above the warp, with its needles or retaining-points extending down into the same, permitting the  
5 passage behind them of the loop-cloth as it is woven, and having no rearwardly-sliding take-up movement, and permitting the work to be always in full view of the weaver.

It is manifest that the form and arrangement  
10 of the needles can be widely varied, the essential feature being a take-up which has needles or retaining-points extending down from above into the warp, and which, while inactive during the weaving of the plain fabric, shall be in  
15 position to act as a take-up for the thimble the instant the cloth-beam take-up is inactive. I do not, therefore, restrict myself to the particular details hereinbefore shown and described in illustration of my invention; but

20 What I claim as my invention in looms for weaving cartridge-belt fabric is—

1. The combination, with the cloth and warp beams and the automatic intermittently-operating cloth-beam take-up, of a loop or thimble  
25 take-up provided with needles or retaining-points extending down from above into the warp and operating at the times the said cloth-beam take-up is inactive to take up the loop or thimble fabric, substantially as hereinbefore  
30 set forth.

2. The vibratory or rising-and-falling thimble take-up arranged above the warp, with needles or retaining-points extending down into the same, in combination with the cloth

and warp beams and the automatic intermittently-operating cloth-beam take-up, substantially as hereinbefore set forth. 35

3. The combination, substantially as hereinbefore set forth, of the cloth-beam and its intermittent take-up, the loop or thimble take-up, the thimble warp-beam and its let-off, and the main-fabric warp-beam and its positive let-off, these elements being combined for joint operation, substantially as described. 40

4. In combination with the reed, the take-up needles, extending through the dents of the reed and suspended at their free ends by a spring-controlled rod, which will permit the needles to slightly rise, substantially as and for the purposes hereinbefore set forth. 45

5. The combination, substantially as hereinbefore set forth, of the reed, the longitudinally-adjustable needle-supporting frame, the needles hung in said frame and extending through the dents of the reed, and the spring-controlled  
55 rod which sustains the free ends of the needles.

6. In combination with the needles, needle-supporting devices, breast-beam, and reed, the longitudinally yielding or movable spring-controlled table or plate over which the fabric  
60 passes, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 17th day of June, A. D. 1880.

ANSON MILLS.

Witnesses:

E. A. DICK,  
M. BAILEY.