

H. W. BLOEMKER.
 TRAVERSE WARP MACHINE.
 APPLICATION FILED SEPT. 9, 1909.

967,314.

Patented Aug. 16, 1910.

2 SHEETS—SHEET 1.

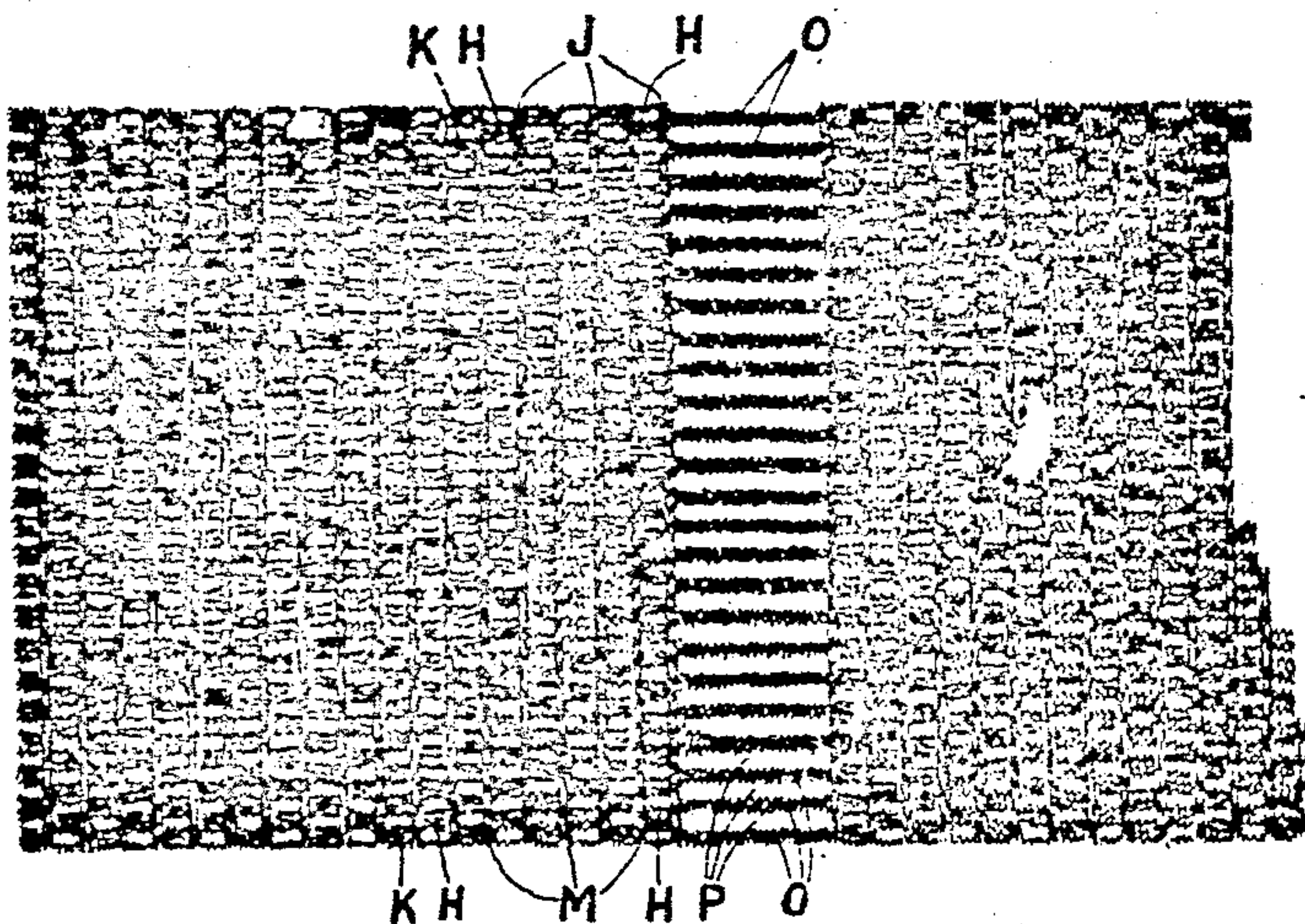


FIG. 1.

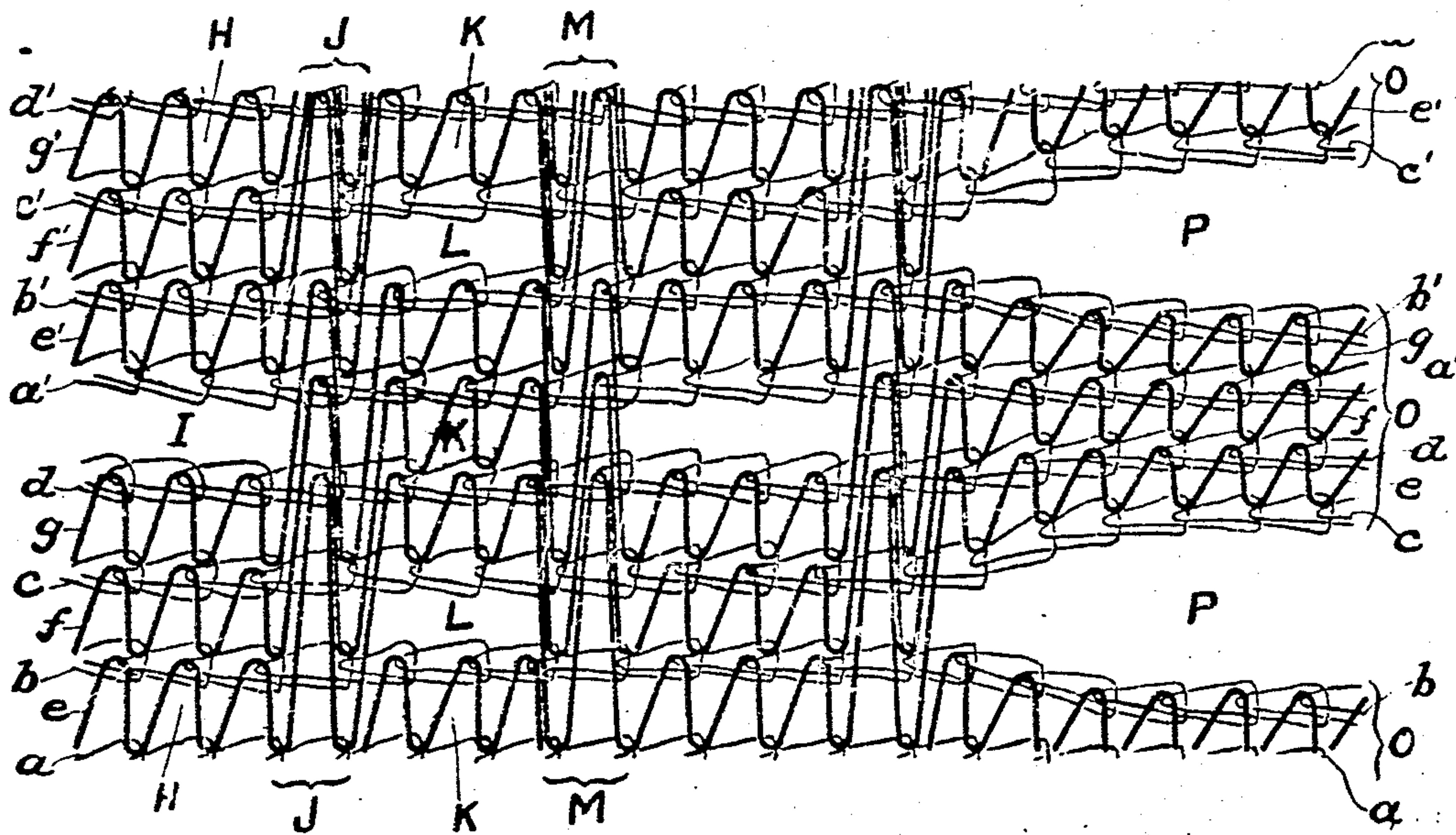


FIG. 2.

WITNESSES.

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3 SHEETS—SHEET 2.

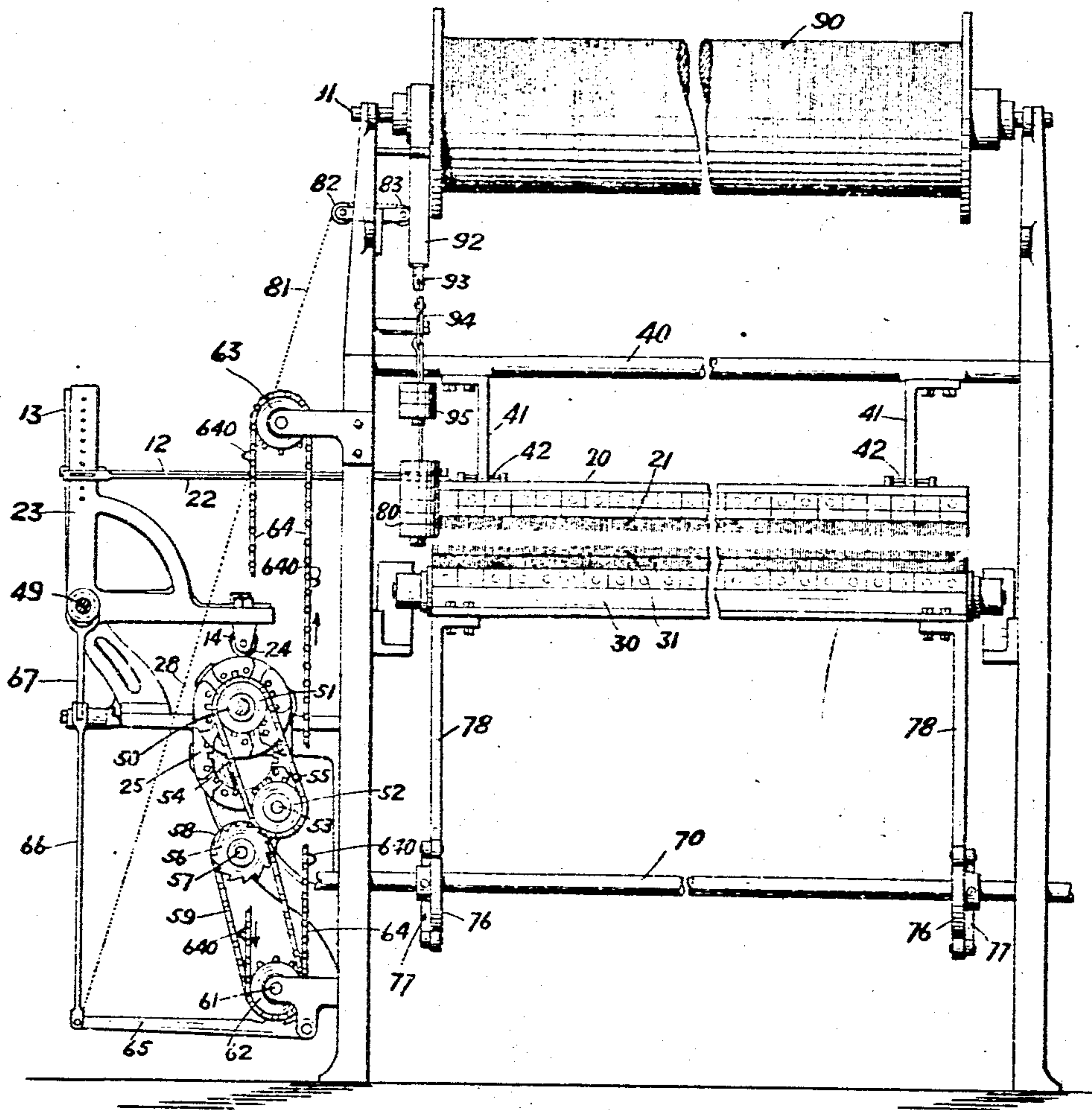


FIG. 3.

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3 SHEETS—SHEET 3.

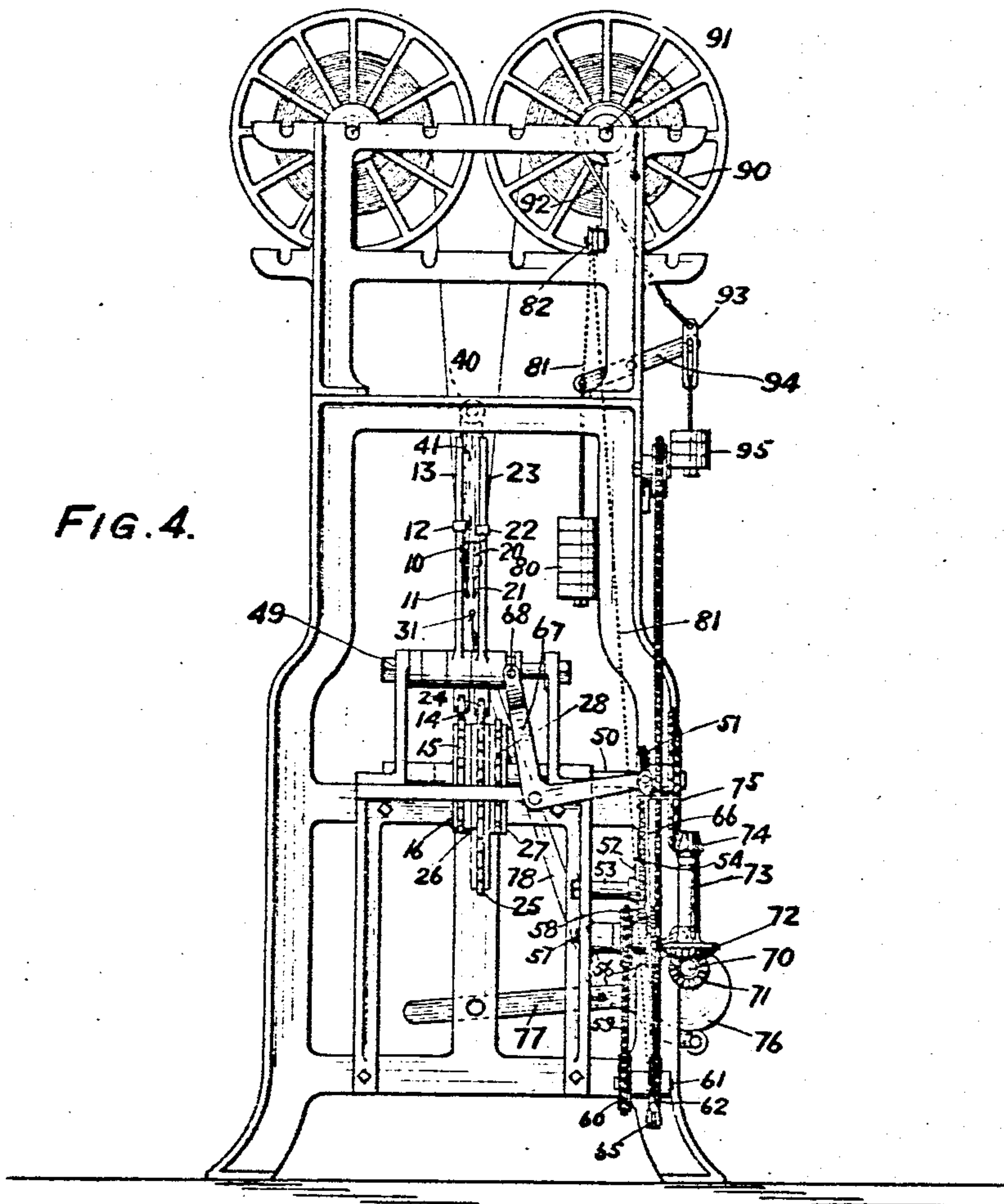


FIG. 4.

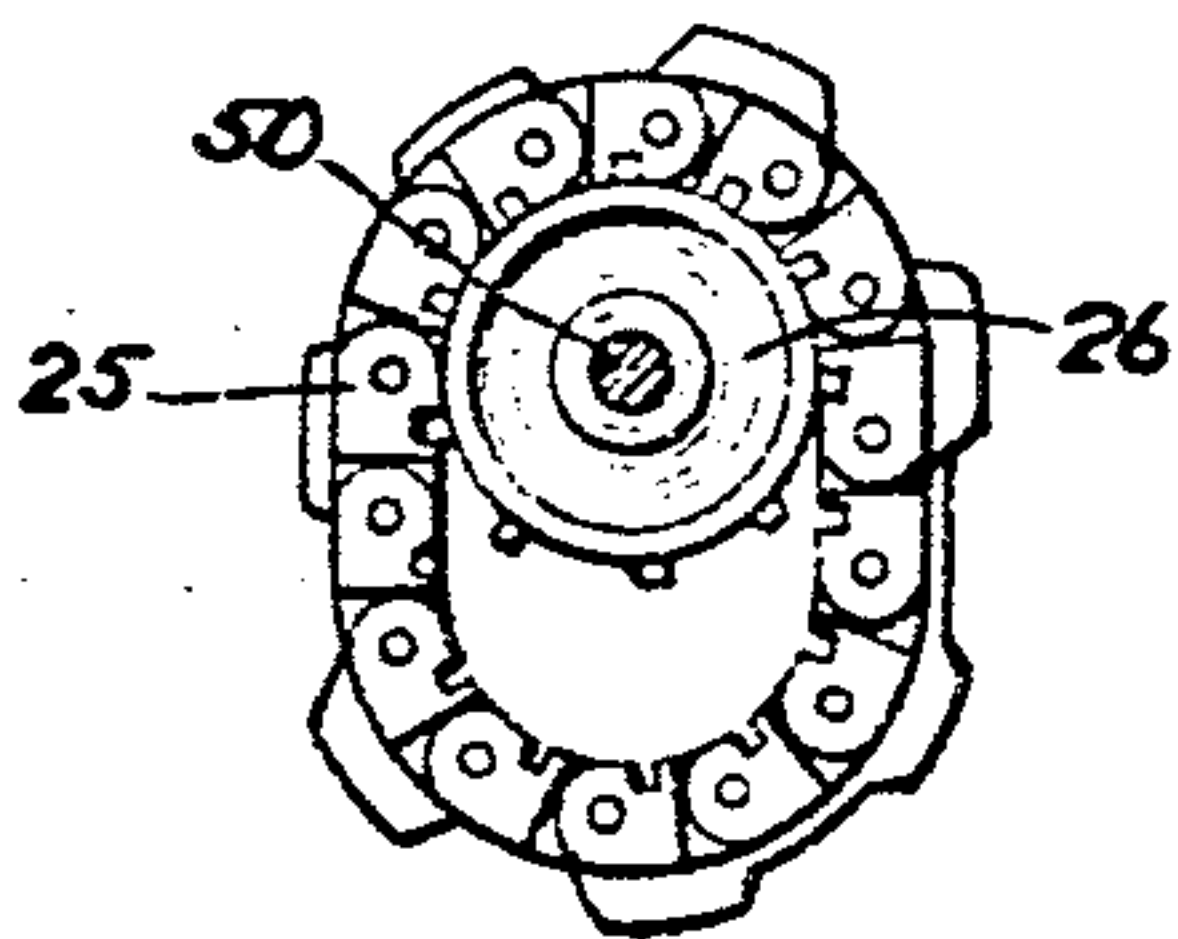


FIG. 5.

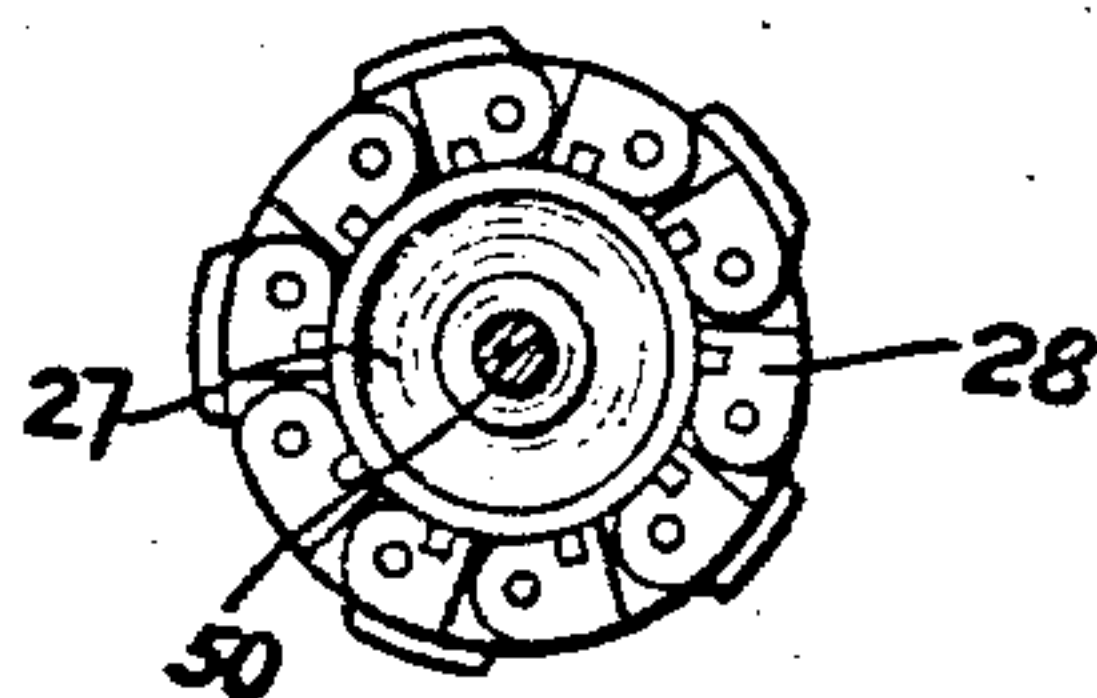


FIG. 6.

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TRAVERSE WARP-MACHINE.

967,314.

Specification of Letters Patent. Patented Aug. 16, 1910.

Application filed September 9, 1909. Serial No. 516,821.

To all whom it may concern:

Be it known that I, HENRY W. BLOEMKER, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Traverse Warp-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of the invention is to provide means for automatically and continuously knitting a fringed towel fabric of the class represented by the towel patented in the Clewley Patent No. 752,033, issued February 16, 1904. Fabric of this character is manufactured on the ordinary traverse warp machine for making crochet lace trimming.

The machine comprises a needle bar, guide bars for the chain warp and filling warp respectively, pattern chains and mechanism actuated by the pattern chains and actuating the guide bars, whereby the latter are shifted longitudinally of their length and transversely of the fabric in a predetermined manner to dictate the stitch formation of the body of the fabric. In the formation of the fringe, it is necessary to actuate the guide bars in a different manner for the purpose of changing the pattern and also to increase the tension upon the filling warp beam for the purpose of closely associating the wales of each section of fringe. Heretofore it has been necessary, after the desired length of towel body has been knitted, to stop the machine, shift the mechanism for actuating the filling warp guide bar into engagement with a different pattern chain and adjust the tension on the filling warp beam, before proceeding with the knitting of the fringe, and then, after the short length of fringe has been knitted, to again stop the machine and perform reverse operations before proceeding with the knitting of the body.

The invention consists of mechanism for effecting these operations automatically and without the necessity of stopping the machine, so that the fabric may be knitted continuously, thereby increasing the production of the machine and much reducing the cost of labor.

As the main features of the machine to which the invention is applied are old and well known in the art, the machine will not

be described in its entirety; nor will the fabric and the action of the needles and guide bars to form the same, which also are known in the art, be described with more particularity than is necessary to a full comprehension of the invention.

In the drawings: Figure 1 is a face view of a part of the fabric adapted to be made on a machine embodying my invention. Fig. 2 is a magnified view of a portion of the same. Fig. 3 is a front view of a portion of a machine embodying my invention. Fig. 4 is an end view of the same. Figs. 5 and 6 are detail views of the pattern chains.

It may be well at the outset to briefly describe a typical fabric that a machine embodying the invention is adapted to produce automatically and continuously, and for this purpose the towel of the Clewley Patent No. 752,033 above mentioned is selected. This fabric comprises a series of longitudinally extending chain warp threads and a series of longitudinally extending filling warp threads which also extend transversely to knit together adjacent chain warp threads. The chain warp threads may be considered as composed of sets of four threads each, the threads of the several sets being lettered *a, b, c, d*, and *a', b', c', d'*, etc. The filling warp threads may be considered as composed of sets of three threads each, the threads of the several sets being lettered *e, f, g*, and *e', f', g'*, etc. Starting on the left hand side of Fig. 2: In the reciprocation of the needles, the thread *e* is carried back and forth between and knitted to threads *a* and *b*, the thread *f* is carried back and forth between and knitted to threads *b* and *c*, and the thread *g* is carried back and forth between and knitted to threads *c* and *d*. In the same manner threads *e', f'* and *g'* are carried back and forth and knitted to threads *a', b', c'*, and *d'*. There are thus formed a series of closed blocks *H, H*, etc., separated by spaces *I, I*, etc.

After a definite length of the fabric is so knit, the thread *e* is carried from thread *a*, through loops formed by threads *b* and *c*, to thread *d*, to which it is knitted, the thread *e* being then returned to thread *a* in a similar manner and then back to thread *d*. The thread *f* is carried in a similar manner back and forth between threads *b* and *a'*, the thread *g* between threads *c* and

and b' , and the thread e' between threads a' and d' . There is thus formed a strip of closed fabric J. The thread e is then carried back and forth between threads d and c , the thread f back and forth between a' and d , the thread g back and forth between b' and a' , the thread e' back and forth between d' and c' , etc. Thus there are formed a series of closed blocks K, K, etc., separated by spaces L, L, etc. The thread e is then carried back and forth between threads d and a , thread f between threads a' and b , thread g between threads b' and c , thread e' between threads d' and a' , etc. There is thus formed a closed strip M similar to strip J. This completes a description of one repeat of the body of the fabric.

In knitting the fringe, the filling warp threads are passes back and forth in the same manner as during the formation of closed blocks H or K, but for a substantially greater number of reciprocations of the needles than in the formation of said blocks, each section O of fringe so formed being several times the length of one of the blocks H. In knitting the fringe, the tension on the filling warp beam, is increased, so as to draw the threads a , b , c and d , or (as shown) c , d , a' and b' , of a set relatively close together, whereby the fringe is more closely knitted than the blocks H or K, while the spaces P between fringe sections are substantially wider than spaces I or L.

It will be noticed from the foregoing description that at any given point in the length of the fabric the filling warp guide bar is shifted to carry each filling warp thread either from one chain warp to the next adjacent chain warp or from one chain warp to the third adjacent chain warp, and it will be understood that, to knit the body of the fabric, the proper sequence of movements can readily be imparted to the filling warp guide bars from a single pattern wheel or chain of reasonable length. When, however, the fringe is being knit, the filling threads must be carried back and forth between adjacent chain warps for a comparatively large number of successive needle reciprocations, this involving the actuation of the filling warp guide bar by different pattern mechanism or differently actuated pattern mechanism. In the embodiment of my invention herein described this is effected by automatically shifting the guide-bar-operating bell-cranks carrying the rollers engaging the pattern mechanism from one pattern chain to another, said shift being controlled by other pattern mechanism, which also controls the operation of means for varying the tension imposed upon the filling warp beam.

The machine embodying the invention will now be described.

10 is the chain-warp guide-bar carrying

the guides 11 for the threads a , b , c , d , a' , b' , c' , d' , etc.

20 is the filling-warp guide-bar carrying the guides 21 for the threads e , f , g , e' , f' , g' , etc.

30 is the needle bar carrying the needles 31. 70

40 is a shaft having bearings in the machine frame 9. From the shaft 40 are suspended holders 41 through which loosely extend respectively rods 42 secured to the respective guide bars 10 and 20. This permits each guide-bar to be moved, in the direction of its length, relatively to its corresponding holder. 75

Connected with the guide bars respectively are links 12 and 22 respectively secured to bell-crank levers 13 and 23 pivoted on a shaft 49. The bell-crank levers 13 and 23 carry rollers 14 and 24 respectively engaging respectively pattern chains 15 and 25 carried respectively by wheels 16 and 26 on the pattern shaft 50. The shaft 50 also carries a third wheel 27 carrying a third pattern chain 28. 80

On the shaft 50 is a sprocket wheel 51. Connecting sprocket wheel 51 and a sprocket wheel 52 on a stud 53 is a sprocket chain 54 carrying a pin or pins 55 adapted to intermittently engage a star wheel 56 on a shaft 57. Secured to the shaft 57 is a sprocket wheel 58 which is connected by a sprocket chain 59 with a sprocket wheel 60 on a shaft 61. On the shaft 61 is a sprocket wheel 62 which is connected with a sprocket wheel 63 by a sprocket chain 64 carrying lugs 640. Pivoted to the machine frame is a lever 65 in line of travel of the lugs 640. 90

66 is a link connecting the lever 65 and one arm of a bell-crank lever 67, which is pivoted on the machine frame. The other arm of bell-crank 67 carries pins 68 engaging a groove in the extended hub of the bell-crank lever 23. 105

70 is the shaft for operating the needle-bar 30. On the shaft 70 are the cam 76 actuating levers 77 pivoted on the machine frame. Connected with levers 77 are rods 78 depending from the needle bar 30. By this mechanism the needle bar is reciprocated vertically. On the shaft 70 is a bevel pinion 71 engaging a bevel pinion 72 on a counter shaft 73. The shaft 73 carries a bevel pinion 74, which engages and actuates a bevel wheel 75 on the shaft 50. 110

The operation of the mechanism just described is as follows: The shaft 70 drives the shaft 50, and the pattern chains 15 and 25 actuated thereby engage respectively the rollers 14 and 24 on the bell-cranks 13 and 23, thereby actuating the guide-bars 10 and 20 in such a way as to dictate the formation of the body of the fabric as hereinbefore described. To particularize: The pattern chain 25 is of such length and provided with pro- 120 125 130

jections of such height that the bell-crank 23 will be actuated to so shift the guide-bar 20 as to dictate the formation of one repeat of the body of the fabric. The number of repeats that will be formed before the knitting of the fringe will be dictated depends upon the length of chain 54, the number of pins 55 on chain 54, and the distance between the pins 640 on chain 64. These factors can be varied to dictate the knitting of any desired length of fabric. After such length of fabric has been knitted, one of the pins 640 engages and depresses the lever 65, which, through the link 66 and bell-crank 67 shifts the bell-crank 23 out of engagement with pattern chain 25 into engagement with pattern chain 28. The pattern chain 28 is of such length and is provided with projections of such height that the bell-crank 23 will be actuated thereby to so shift the guide-bar 20 as to dictate the formation of the fringe of the fabric. After the fringe is knitted to the desired length, the pattern mechanism is so timed that the pin 640 passes beyond the lever 65, whereupon the bell-crank 23 is returned into position to reengage the pattern chain 25, whereupon the knitting of the body of the fabric is resumed. The bell-crank 23 is so returned by means of a weight or weights 80 connected, by means of a cord 81 extending over rollers 82 and 83, with the lever 65.

90 is the filling warp-beam and 91 its axle. Secured at one end to the machine frame and extending around the hub of the warp-beam 90 is a strap 92, which is connected at its other end to a slotted link 93, whose slot engages a pin on one end of a lever 94, pivoted between its ends on the machine frame. From the slotted link 93 is suspended a weight or weights 95. The other end of the lever 94 is secured to the cord 81.

It will be understood that during the knitting of the body of the fabric the weight 80, which is substantially heavier than the weight 95, not only holds the bell-crank lever 23 into engagement with the pattern-chain 25, but also lifts the weight 95 so as to relieve the tension on the warp-beam. When, however, the lever 65 is depressed to cause the bell-crank lever 23 to be shifted into engagement with the pattern chain 28 to dictate the knitting of the fringe, the weight 80 is lifted and the lever 94 is rocked, allowing the weight 95 to impose a tension upon the brake-strap 92. The tension of brake-strap 92 may be regulated by varying the weight 95 to a maximum less than weight 80. The greater the tension imposed upon the filling warp-beam 90, the closer together the chain warp threads *a, b, c, d*, etc., will be drawn by the increased tension applied to the filling warp threads *e, f, g*, etc.

It will be understood that, by means of independent weights (not shown), a tension

may be applied to the filling warp-beam appropriate to the formation of the body of the fabric, the device herein described being effective to increase the tension during the knitting of the fringe only.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a traverse warp machine, in combination, a guide bar for a series of warp threads, two pattern chains, mechanism adapted to reciprocate the guide bars longitudinally and adapted to be actuated by either pattern chain, means to bring said mechanism into and out of operative relation with the pattern chain, a warp beam, means to regulate the tension upon said warp beam, and devices actuated thereby controlling the operation of the warp tension-regulating means and the means for bringing said mechanism into and out of operative relation with said pattern chains.

2. In a traverse warp machine, in combination, a guide bar for a series of warp threads, two pattern chains, mechanism adapted to reciprocate the guide bars longitudinally and adapted to be actuated by either pattern chain, a warp beam, a device adapted to impose a tension upon said warp beam, and means to simultaneously bring said mechanism into operative relation with one pattern chain and out of operative relation with the other and relieve the braking action of the tension device.

3. In a traverse warp machine, in combination, a guide bar for a series of warp threads, two pattern chains, mechanism adapted to reciprocate the guide bars longitudinally and adapted to be actuated by either pattern chain, a warp beam, a device adapted to impose a tension upon said warp beam, and means to simultaneously bring said mechanism into operative relation with one pattern chain and out of operative relation with the other and render said tension device operative.

4. In a traverse warp machine, in combination, a guide bar, two pattern chains, a bell-crank lever connected with said guide bar and adapted to be actuated by either pattern chain, a warp beam, a tension device therefor, a lever, connections between the lever and the bell-crank adapted when operated by said lever to bring said bell-crank into operative relation with one pattern chain and out of operative relation with the other pattern chain, connections between the lever and the tension device adapted, when operated by said lever simultaneously with the connections to the bell-crank, to render said tension device operative, and pattern mechanism controlling the operation of said lever.

5. In a traverse warp machine, in combination, a warp beam, a tension device therefor comprising a brake and a weight nor-

malis rendering said brake inoperative, a guide bar, mechanism adapted to reciprocate the guide bars longitudinally, two pattern chains adapted to actuate said mechanism alternately, and means to simultaneously bring said mechanism into operative relation with one pattern chain and out of operative relation with the other and lift said weight out of operative position.

6. In a traverse warp machine, in combination, a guide bar for a series of warp threads, two pattern chains, mechanism adapted to reciprocate the guide bars longitudinally and adapted to be actuated by either pattern chain, means to shift said mechanism into operative relation with either pattern chain, a warp beam, a brake therefor, a weight, and connections between said weight and brake and between said weight and guide-bar-shifting-mechanism adapted to be simultaneously operated by said weight to respectively release said brake and actuate said guide-bar-shifting-mechanism.

7. In a traverse warp machine, in combination, a guide bar for a series of warp threads, two pattern chains, mechanism adapted to reciprocate the guide bars longitudinally and adapted to be actuated by either pattern chain, means to shift said mechanism into operative relation with either pattern chain, a warp beam, a brake therefor, a weight, connections between said weight and brake and between said weight and guide-bar-shifting-mechanism adapted to be simultaneously operated by said weight to respectively release said brake and move said guide-bar-shifting-mechanism into engagement with one pattern chain, pattern mechanism and means, interposed in the connections between the weight and guide-bar-shifting-mechanism, adapted to be operated by said pattern mechanism to simultaneously lift said weight and move said guide-bar-shifting-mechanism into engagement with the other pattern chain.

8. In a traverse warp machine, in combination, a warp beam, a tension device therefor including an unequally weighted lever and a brake engaging the warp beam and connecting with the lighter end of the lever whereby said tension device is normally inoperative, pattern mechanism, and means operated by said mechanism to lift

the heavier end of said lever and render the lighter end effective to apply the brake.

9. In a traverse warp machine, in combination, a warp beam, a tension device therefor including an unequally weighted lever and a brake engaging the warp beam and connecting with the lighter end of the lever, whereby said tension device is normally inoperative, a guide bar, two pattern chains, mechanism adapted to shift the guide bars longitudinally and adapted to be actuated by either pattern chain, connections between the heavier end of said lever and said mechanism adapted to normally hold said mechanism in engagement with one pattern chain, pattern mechanism, and means controlled thereby to simultaneously shift said guide-bar-shifting-mechanism into engagement with the other pattern chain and lift said weight, thereby permitting the lighter end of the lever to be effective to apply the brake.

10. In a traverse warp machine, in combination, a guide bar for a series of chain warp threads, a guide bar for a series of filling warp threads, three pattern chains, mechanism connected with and adapted to reciprocate the chain warp guide bar and adapted to be actuated by one pattern chain, mechanism connected with and adapted to reciprocate the filling warp guide bar and adapted to be actuated by either of the other two pattern chains, means to bring the last named mechanism and either pattern chain into operative relation, a filling warp beam, a device adapted to impose a tension upon said warp beam, means to simultaneously bring the last named mechanism into operative relation with one of the last two pattern chains and out of operative relation with the other and simultaneously render said tension device operative or inoperative, pattern mechanism controlling the operation of said means, and driving means adapted to operate the pattern chains and pattern mechanism.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, on this 20th day of August, 1909.

HENRY W. BLOEMKER.

Witnesses:

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E. E. WALL.