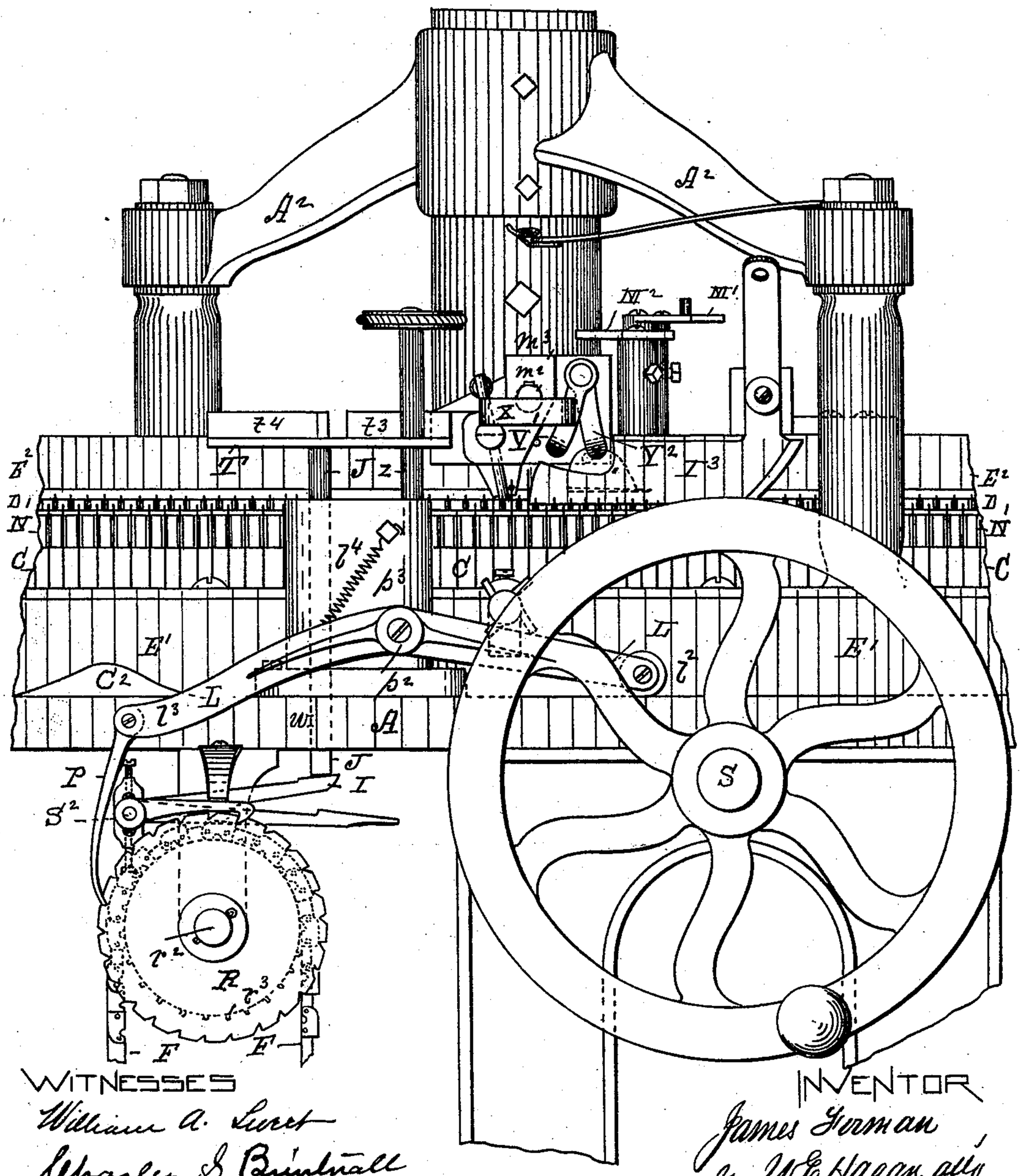
(No Model.) 6 Sheets—Sheet 1

J. FORMAN.

STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

No. 541,084. Patented June 18, 1895

Fig 1



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(No Model.) 6 Sheets—Sheet 2.

J. FORMAN.

STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

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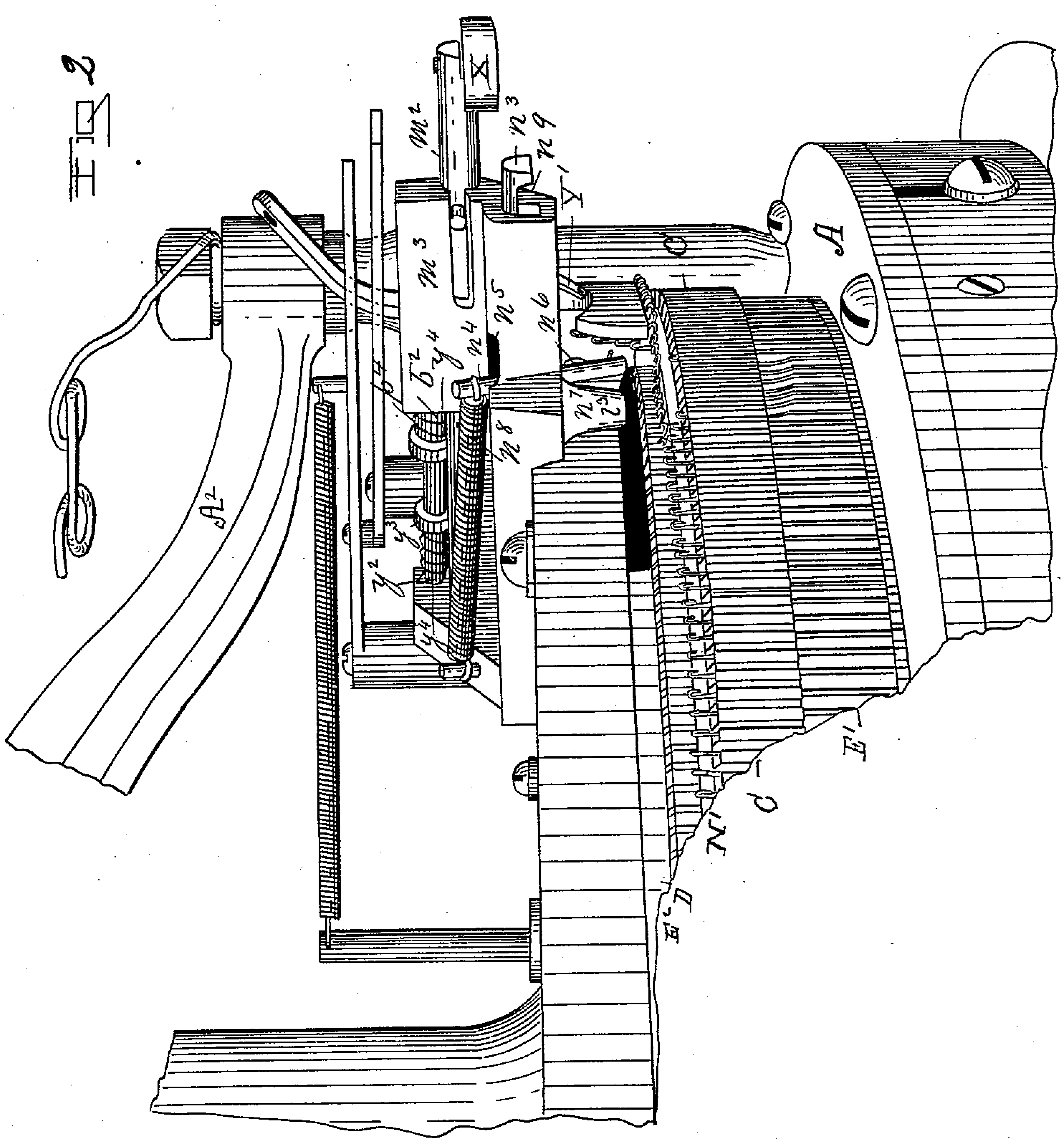
Fig 2.



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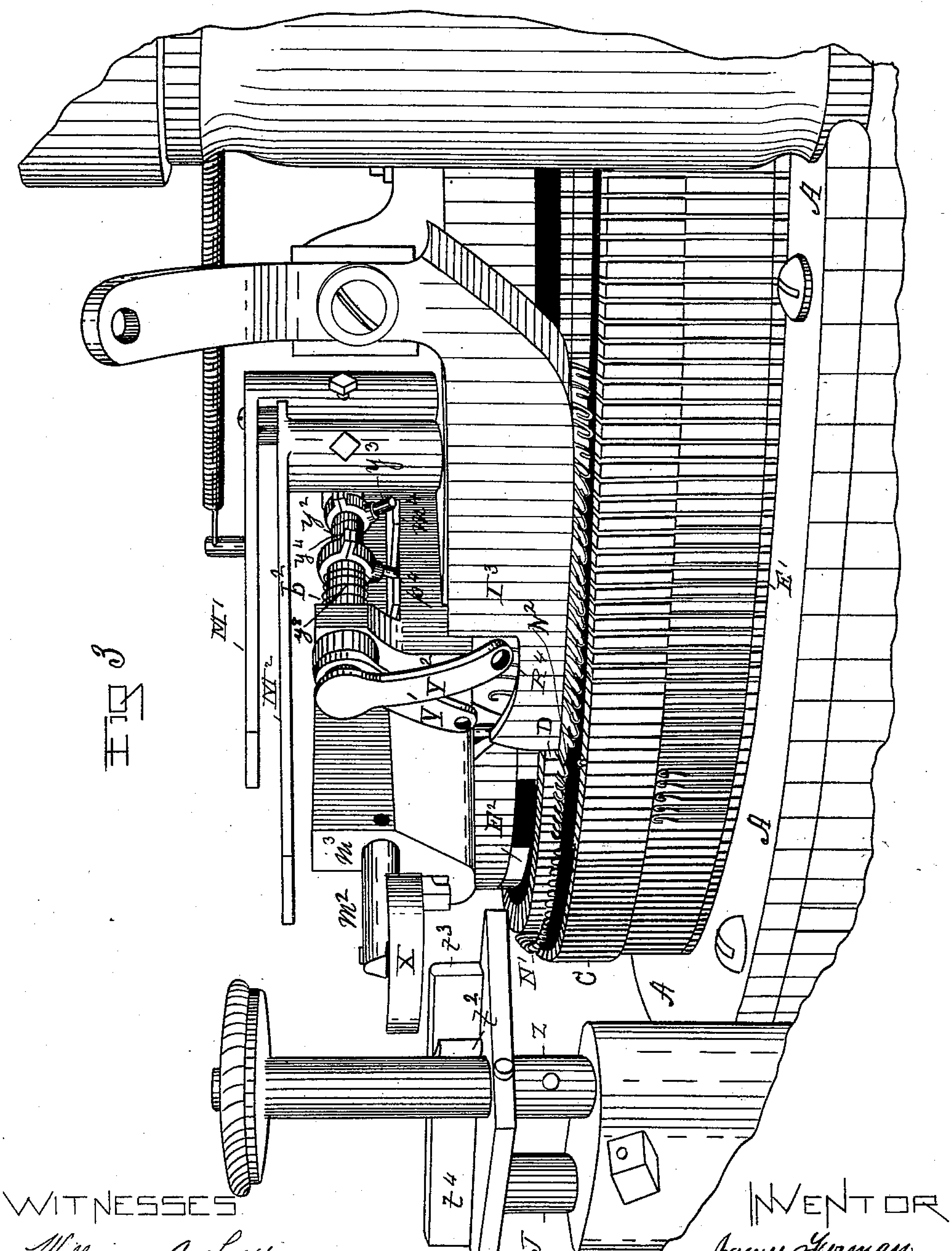
(No Model.) 6 Sheets—Sheet 3.

J. FORMAN.

STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

No. 541,084. Patented June 18, 1895.



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J. FORMAN.

STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

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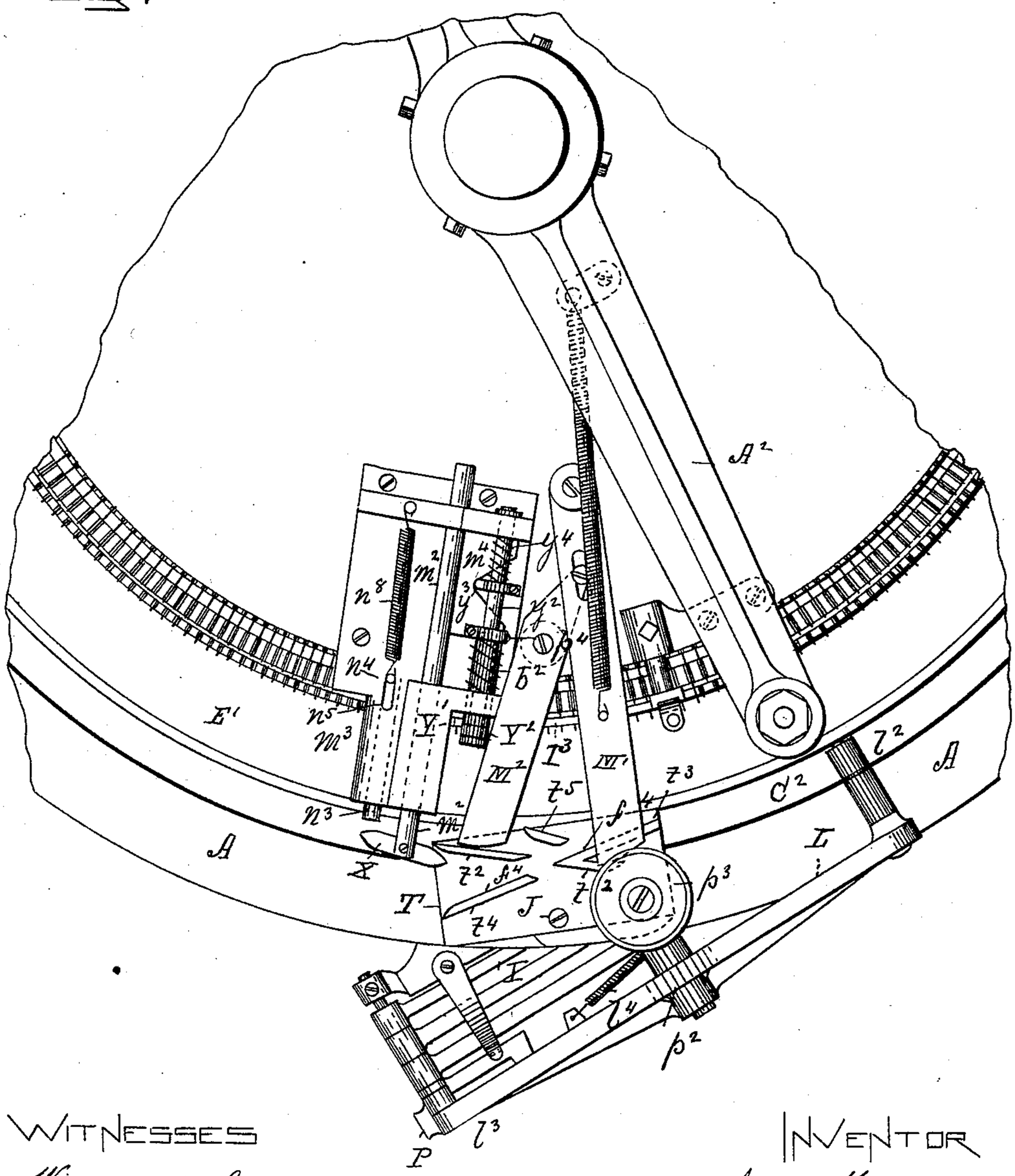
Fig 4



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(No Model.) 6 Sheets—Sheet 5.

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STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

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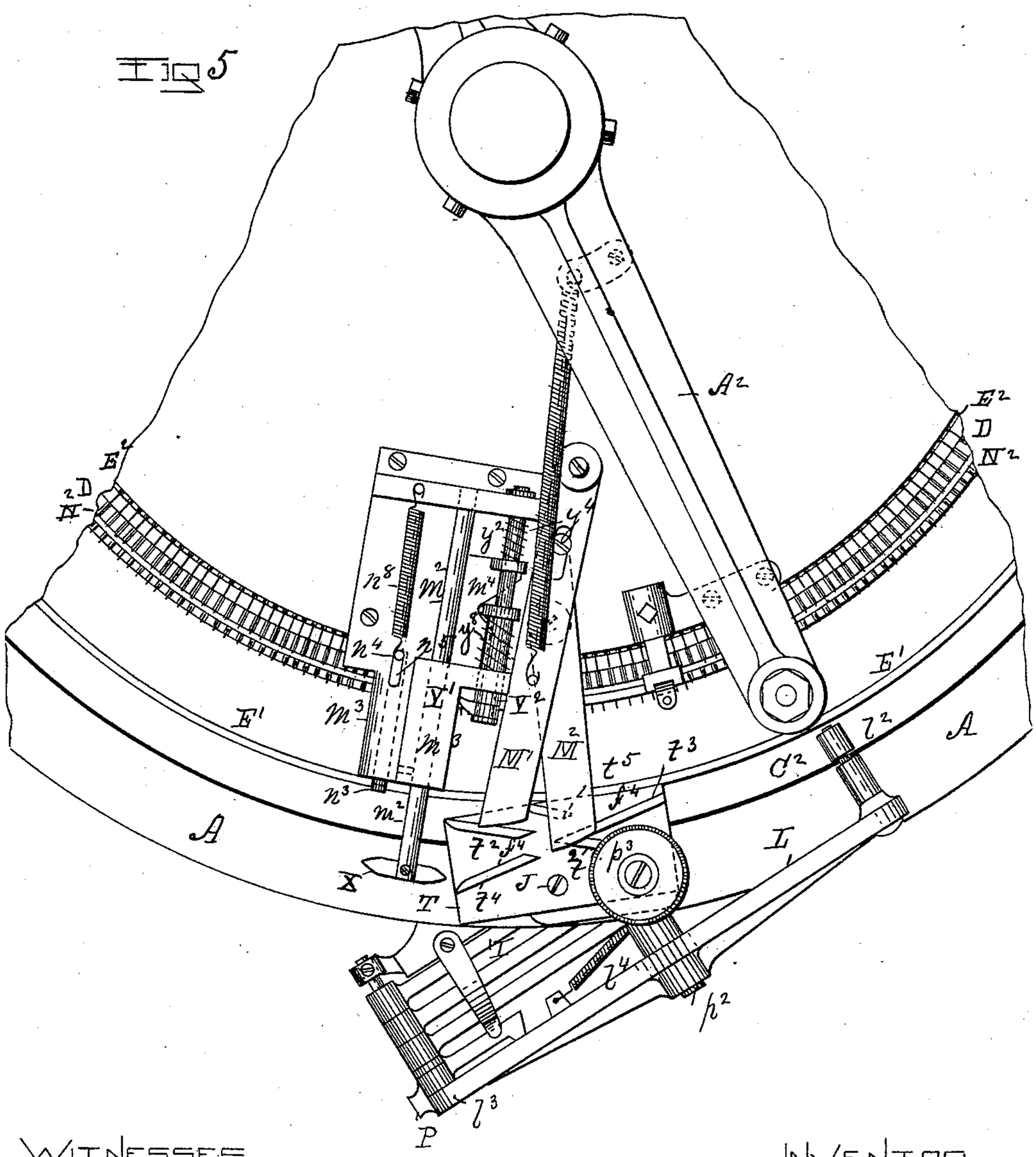
Fig 5



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(No Model.) 6 Sheets—Sheet 6.

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STRIPING ATTACHMENT FOR LATCH NEEDLE ROTARY KNITTING MACHINES.

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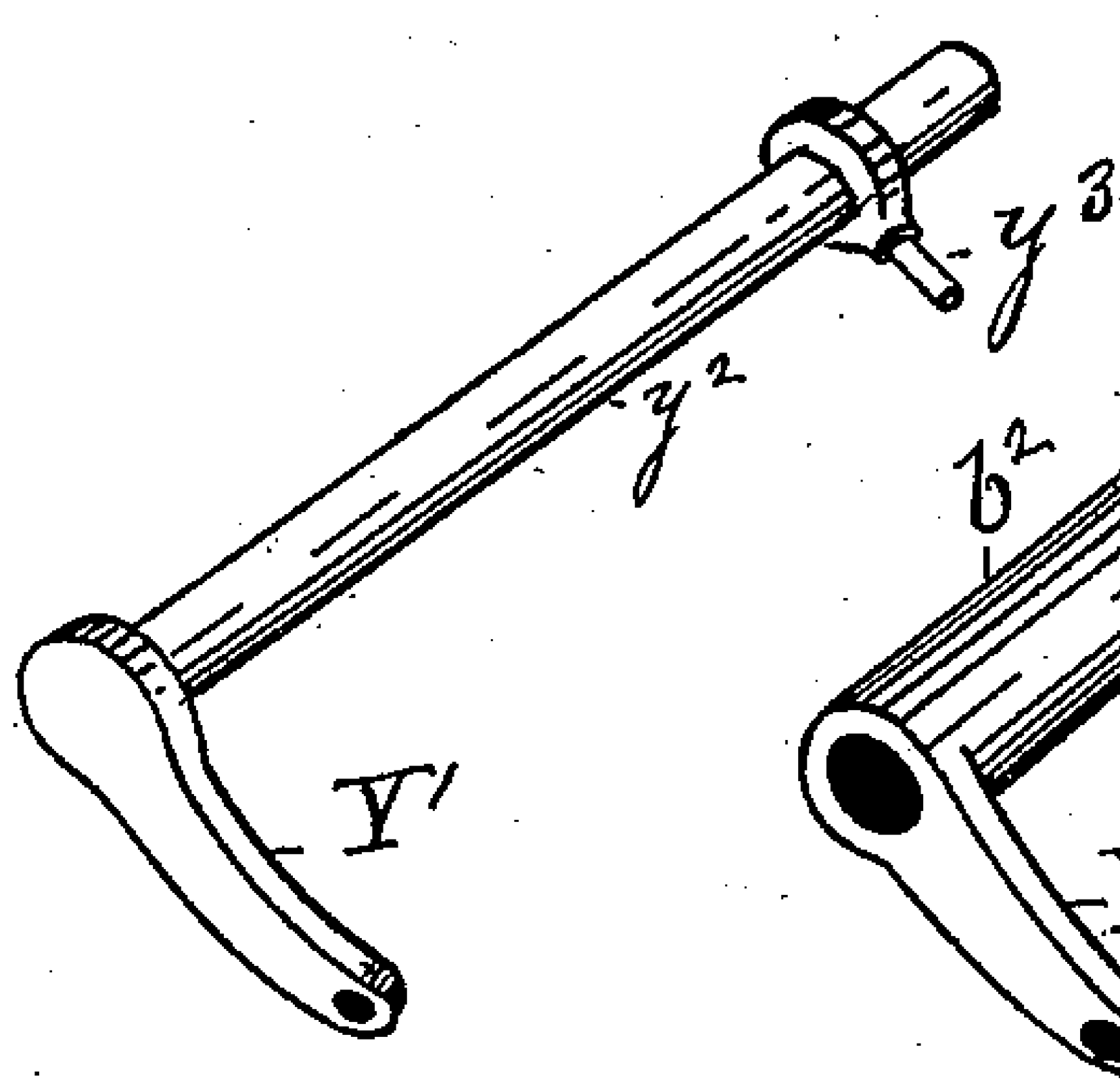
Fig 8



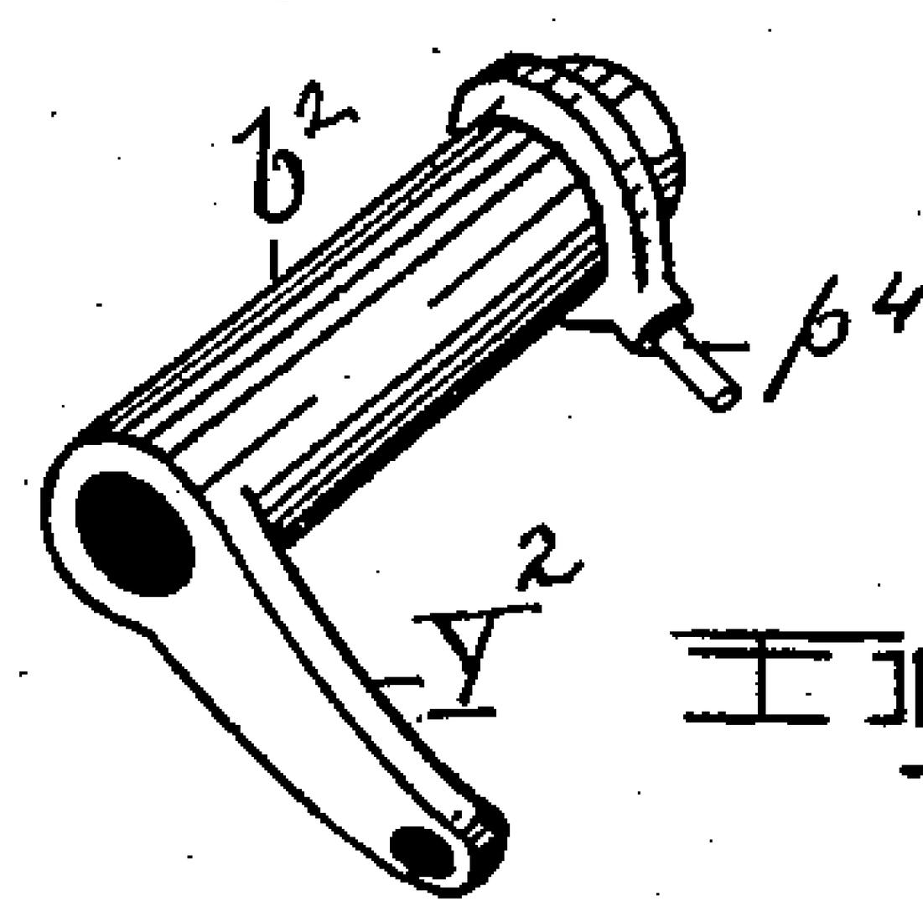


Fig 7

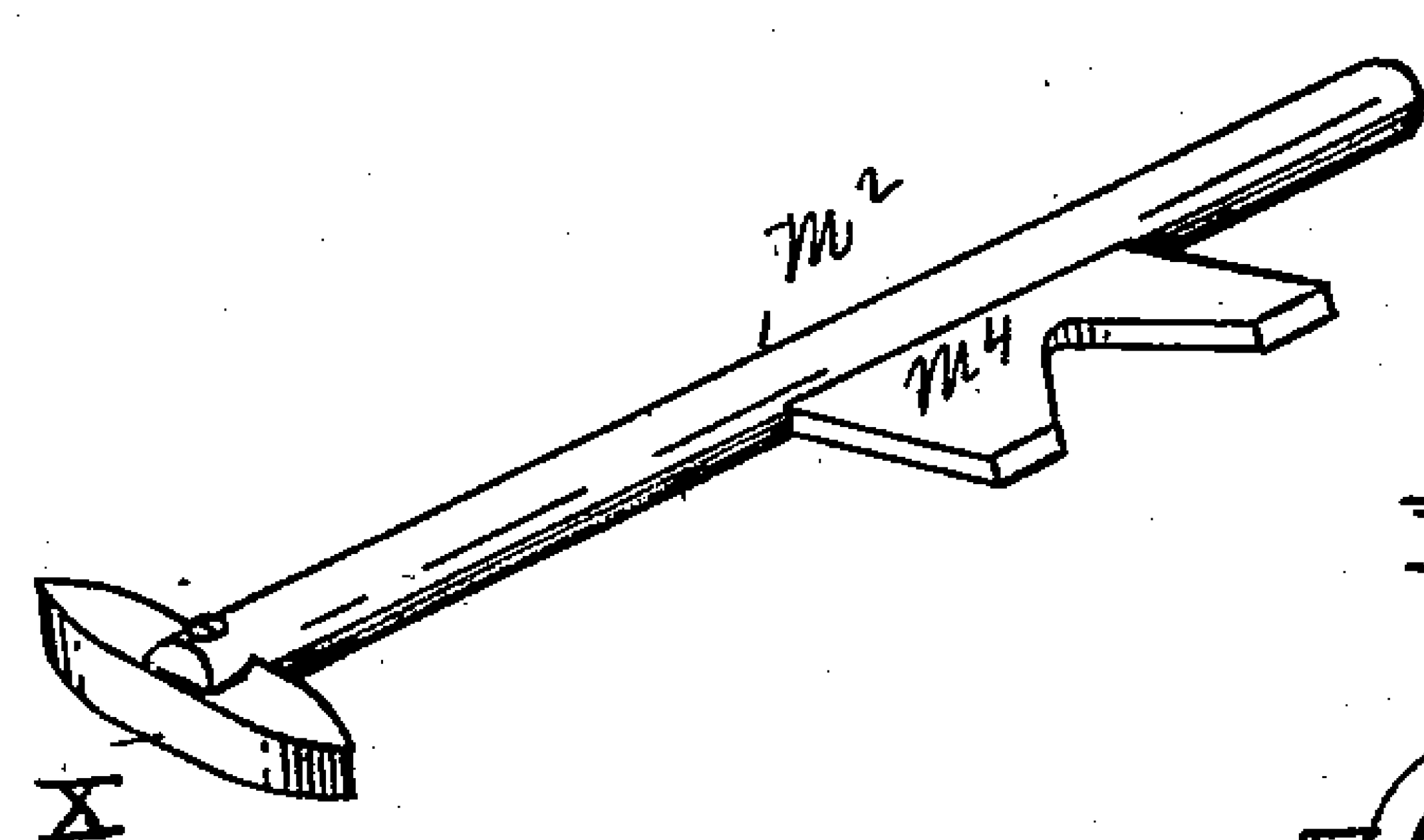


Fig 6

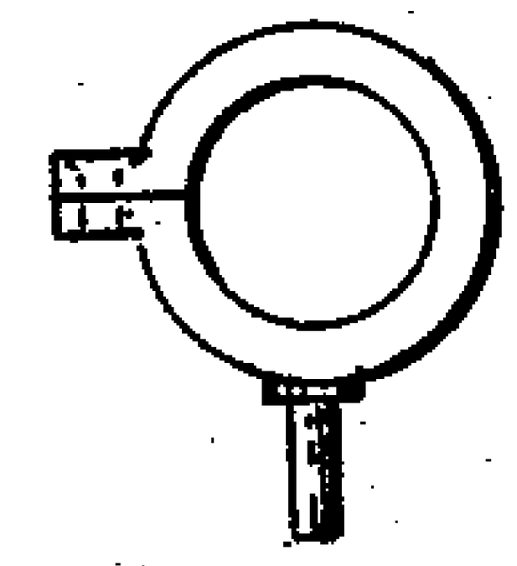


Fig 9

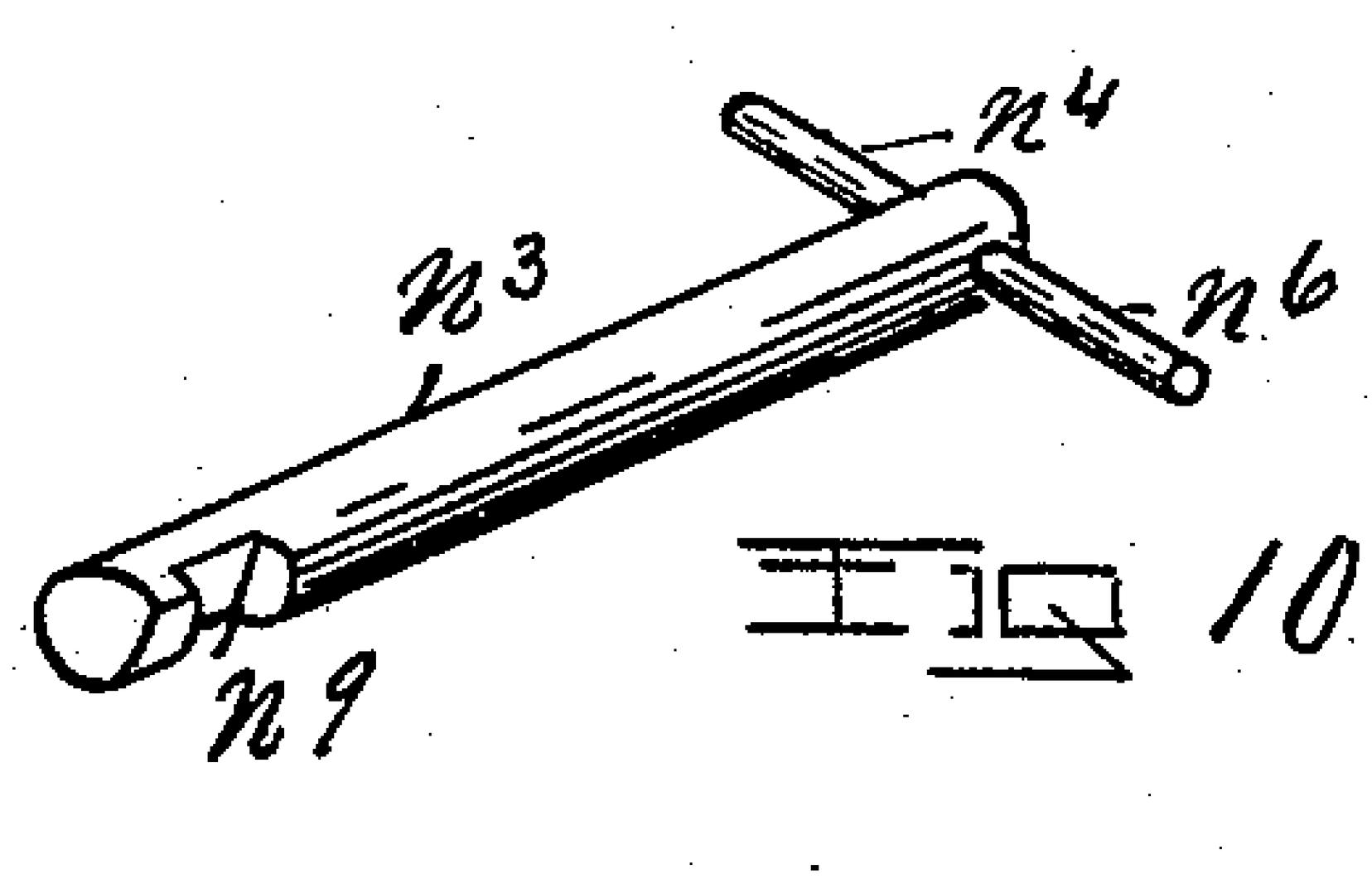


Fig 10

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UNITED STATES PATENT OFFICE.

JAMES FORMAN, OF COHOES, NEW YORK.

STRIPING ATTACHMENT FOR LATCH-NEEDLE ROTARY KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 541,084, dated June 18, 1895.

Application filed November 12, 1894. Serial No. 528,465. (No model.)

To all whom it may concern:

Be it known that I, JAMES FORMAN, of the city of Cohoes, county of Albany, State of New York, have invented new and useful Improvements in Striping Attachments for Latch-Needle Rotary Knitting-Machines, of which the following is a specification.

My invention relates to an attachment to latch-needle rotary knitting machines, and more particularly to that class of them which are used to produce ribs or welts upon the ankle-parts of drawers, and the sleeve-parts of shirts by means of loosely knit courses, and the object and purpose of my invention is to adapt this class of machines to knit alternating courses of different colored yarns, so as to produce striped work.

My invention is shown as applied to what is known as the Heginbothom machine, it being a modification of that shown and described in Letters Patent No. 286,003, although it may be attached to any rotary latch-needle machine in which vertical needles are used and upon which my switch-table and yarn-changing and guiding apparatus may be applied to operate in substantially the same manner.

Accompanying this specification to form a part of it there are six plates of drawings containing ten figures illustrating my invention with the same designation of parts by letter reference used in all of them.

Of the illustrations, Figure 1 is a side view of part of a latch-needle rotary knitting-machine with my invention shown as applied thereto. Fig. 2 is a side elevation of a part of the same machine with my switch-table and the mechanism operating it omitted. Fig. 3 is another side elevation of parts of the machine shown at Figs. 1 and 2. Figs. 4 and 5 are top views of the machine and attached mechanism and Figs. 6, 7, 8, 9, and 10 are perspectives of detached parts of my attachment.

The several parts of the apparatus thus illustrated are designated by letter reference and the function of the parts is described as follows.

The letter A, designates the bed on which the apparatus rests.

The letter C, designates the fixed cylinder in which the vertical needles N′, are placed, and the letter D, designates the ring-form plate in which the horizontal or dial needles N^2 are placed and arranged.

The letter E′, designates the rotating cam-cylinder which operates the vertical needles, and E^2, the rotating cam-plate which operates the dial needles; the rotating cam cylinder E′, being driven by a beveled gear connection made with the driving shaft S, and the cam-plate E^2, which operates the dial needles being suspended from and moving with the arched frame A^2 said cam cylinder E′, being of the ordinary form and construction. The geared connection with the shaft S, and the cams connected with the cam-plate E^2, are not shown, they being of the usual construction occurring in machines of this class and which apart from their connection with the machine to which my invention is shown to be applied form no part of my invention.

The letter C^2, designates a cam formed on the side of the cylinder E′, as shown at Fig. 1, and the letter L, designates a pivoted lever which at one of its ends is provided with a cam-roller l^2, and at its other end l^3 with a pawl P, said lever being centrally pivoted at p^2, to standard p^3, as shown at Fig. 1, and the letter l^4, designates a spring which at one of its ends connects with the said lever L, between its pivot and its pawl and at its other end this spring connects with the standard p^3.

The letter R, designates a ratchet-wheel mounted upon a shaft r^2; and r^3, a sprocket-wheel mounted upon the same shaft as the ratchet-wheel; said sprocket-wheel having upon its perimeter, ribs as shown at Fig. 1. This sprocket-wheel is made to turn with the shaft r^2, when the latter is operated by the ratchet-wheel and pawl as actuated by the lever L.

The letter F, designates a pattern-chain which is made of links that on their under side will engage with the sprocket-ribs on the wheel r^3, and each of these links, or every other one of them as the case may be is made to project beyond the intermediate ones on its exterior face.

The letter I, designates a lever which at one of its ends is journaled on to the shaft S^2, and arranged to rest on the top of the pattern-chain, and adapted to be raised thereby as its projecting links when the chain is mov-

ing on the sprocket wheel come in contact with the under side of said lever I.

The letter J, designates a bar that is vertically arranged in a slide-way *w*, formed in the standard p^3, the lower end of this bar being placed in contact with and to rest upon the inner end of the lever I, so that as the latter is raised on its inner end by the pattern chain the lever I, will act upon the bar J, to raise the latter in its slide-way.

The letter T, designates a switch-cam table which is arranged on and secured to so as to move with the bar J, upon the upper end of the latter and to slide up and down on the bar *z*. This table is made with the tracking-cams t^2, t^3, t^4, and t^5, each of which consists of a rib or bar upwardly projected from the top of the table.

The letter m^2, designates a yarn-guide operating bar which is arranged to move horizontally in slides made in the stock m^3 which latter is attached to, so as to move with the cam cylinder E′.

The letter m^4, designates a cam formed on the side of the bar m^2. This cam is of a V-form and its function when actuated and moving with the bar m^2, is to reverse the position of the yarn-guides relatively to the vertical needles.

The letters Y′, and Y^2, designate yarn-guides, that one designated at Y′, being journaled by means of an attached bar y^2, in the stock m^3, and it is provided with a cam-pin y^3, and in a position to be operated to partly turn on its journals in one direction when the bar m^2, is moved inwardly, and in an opposite direction, when said bar is drawn outwardly.

The letter y^4, designates a spring, one end of which is attached to said bar y^2, and its other end to the stock m^3.

The letter Y^2, designates another yarn-guide which has projected inwardly from its side a sleeve b^2, by which it is passed on over the journal-bar y^2, of the yarn-guide Y′, in front of its guide-pin so that it will journal thereon and the two-yarn-guides will thus when turning have the same axial center.

The letter p^4, designates a cam-pin which is projected from the side of the sleeve b^2, and by the engagement of which cam-pin with the cam m^4, on the bar m^2, this yarn-guide sleeve and connected yarn-guide Y^2, will be operated to partly turn on its journaled connection in one direction when said bar is moved inwardly and in another direction when said bar is drawn outwardly, with each movement of the yarn-guide opposite to that made by the yarn-guide Y′, and as thus constructed the position of these yarn guides relatively to the needles will be reversed when the bar m^2, is moved inwardly or drawn outwardly.

The letter y^8 designates a spiral spring arranged to encircle the journal sleeve b^2, between the cam-pin p^4 and the abutting end of the stock m^3; and the function of the springs y^4 and y^8, is to act torsionally upon the yarn-guides Y′ and Y^2, after having been moved by the cam m^3, on the bar m^2. Both of these yarn-guides Y′ and Y^2 have their guides proper projected downwardly from the outer ends of their journal parts, and at, or nearly at, right angles to the latter, with their eyes or yarn passages which are bent inwardly so as to present the said eyes obliquely downward made in their lower ends, toward the needles.

The letter X designates a switch-bar which is pivoted to the outer end of the bar m^2.

The letter n^3 designates a nipper-bar made with a slide-way in the stock m^3, and this nipper-bar is provided with a guide-pin n^4, which is projected from its upper surface and adapted to run in a slot n^5, made in the top of the stock m^3.

The letter n^6 designates a nipper-pin which is projected downwardly from the bar n^3, and the letter n^7 designates a recess formed in the lug l^3, which is downwardly projected from the stock m^3.

The letter n^8 designates a spring connecting at one end with the nipper-bar and at its other end with the stock against the force of which spring this nipper-bar is drawn outwardly and which acts when the bar is not drawn out to hold the nipper-pin in a grasping contact with the recess n^7.

The letter n^9 designates a cross-slot that is made obliquely in the outer end of the nipper-bar n^3, upon its under side.

When the table T is raised and the stock m^3, as carried around by the cam cylinder, brings the slot in the end of the nipper-bar in engagement with the tracking cam t^5, the slot straddles this cam to pull out the nipper-bar against the force of its spring until its nipper-pin is outside of the yarn coming from the yarn-guide which has been moved away from a feeding position, and after passing from off the tracking cam t^5, the nipper-pin draws the yarn into the recess n^7, to hold its end when broken off with the yarn moved out of a feeding position and held by the nipper-pin and yarn-guide moved away from the needles, and when the number of courses of yarn supplied by the yarn-guide in position to feed the yarn to the needles has been knit, the nipper-pin is drawn out as before to release the yarn which it held coming from the yarn-guide brought into feeding position, to grasp and hold that one coming from the yarn-guide moved from out a feeding position.

When the table T is raised and the switch-bar X comes in contact with the inside surfaces of the track t^2, it draws out the bar m^2, and positions the yarn of one of the yarn-guides for a feeding position until the requisite number of courses have been knit, when the pattern chain again operates the table to rise, (the bar m^2 having been drawn outwardly as the stock comes around) the switch bar X, in this position outwardly extended as shown at Fig. 5, engages with the side sur-

faces f^4, of the track t^3 and t^4, by which it is deflected so as to move inwardly the bar m^2, and to again change the position of the yarn-guides so that another color is knit as before.

The combined action of the parts thus described is as follows: There being different colors of yarn supplied by the two yarn-guides Y′ and Y^2, with the latter one of the two in a position to supply its color of yarn until the number of courses provided to be knit by it at each interval by the pattern chain has been knit, with the parts in the position as shown at Fig. 4, and the table T is again raised by the pattern chain so that the switch-bar X will come in contact with the surface f^4, of the tracks t^4 and t^3, as shown at Fig. 5, the previously outwardly moved bar m^2 is moved inwardly and the yarn-guide Y^2 is moved away from a feeding position and the yarn-guide Y′ brought into a feeding position, while the nipper-pin as drawn out releases its hold upon the yarn running to the latter yarn-guide and seizes as it draws back that running to the yarn-guide Y^2, moved out of position, the operation of the nipper-pin being timed to first release the yarn of the yarn-guide coming into a feeding position, and then as drawn back, to grasp that of the yarn-guide moved out of position.

The letter I^3 designates a yarn-guide-plate such as is usually employed upon machines of this kind, and the letter R^4 designates a recess made therein for the passage of the yarn to the guides Y′ and Y^2.

The vertical needles are the only ones employed on the machine when my attachment is applied to the latter. The pawl operated by the cam lever L, the ratchet-wheel R, the pattern-chain F, and lever I, when my attachment is not used, are employed to operate the levers M′ and M^2, which actuate the cams operating the dial needles. While I have shown my invention as operated by these same factors to operate the switch table by means of the pattern chain F, any other well known mechanism which will operate a pattern chain in the same manner may be used as the function and operation of the parts composing my attachment would be the same whether the table T was raised by the mechanism shown or some other mechanism that would operate it substantially in the same manner.

While I have shown one set of mechanism operating two colors of yarn as applied to one cylinder there may be two sets of apparatus and each operated to alternatingly bring the same color into the needles and thus four feeds may be employed upon one cylinder, and each two of them operated to supply the same color.

As thus made and actuated my apparatus is adapted to automatically knit alternating courses of colored yarns and to give to the web a striped appearance.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a latch needle rotary knitting machine having vertical needles operated by a revolving cylinder, the combination with the latter of a stock mounted thereon; a yarn-guide operating bar, arranged to move in slides in said stock, and provided with a pivoted switch-bar at its outer end, and a cam upon one of its sides; two yarn guides journaled within said stock and each provided with a cam-pin; and a switch-cam-table, mounted upon a vertical slide-bar which moves in a slide way in the machine bed and means whereby it can be operated to rise and descend, substantially in the manner as and for the purposes set forth.

2. In a latch-needle rotary knitting machine having vertical needles operated by a revolving cylinder, the combination with the latter of a stock connected to said cylinder and provided with a slide-way; two yarn-guides journaled in said stock; a yarn-guide operating-bar, arranged in said stock slide-way, and provided with a cam upon its side, adapted to partially rotate oppositely said yarn-guides, so that alternatingly one of them will be in a position to feed yarn to said needles and the other will not; a pivoted switch-bar on the outer end of said yarn-guide-operating-bar; a switch-cam-table mounted in a vertical slide-way in the machine bed; and a pattern chain constructed and operated to actuate said switch cam-table, substantially as and for the purposes set forth.

3. In a latch-needle rotary knitting machine having vertical needles operated by a revolving cylinder, the combination with the latter of a stock connected to said cylinder, and provided with slide-ways; the yarn-guides Y′ and Y^2, each journaled in said stock and each provided with a cam-pin; the yarn-guide operating-bar m^2, arranged in one of the slide-ways of said stock, provided with the side-cam m^4, and having the pivoted switch-bar X, at its outer end; the switch cam-table T, the slide-bar J carrying the said switch cam-table, and having the tracking cams t^2, t^3, t^4 and t^5, on its upper face; the nipper-bar n^3, arranged in a slide-way on said stock and having the notched recess n^7, in its outer end, and at its inner end provided with the spring n^8; the pattern chain F, constructed and arranged to operate the said switch cam-table, and means for driving the said pattern chain substantially as and for the purposes set forth.

4. In a latch needle rotary knitting machine having vertical needles operated by a revolving cylinder, the combination therewith of a stock connected to said cylinder, said stock having a slide-way formed therein; two yarn-guides, one of which is journaled in said stock, and the other journaled upon the before named yarn-guide by a sleeved connection therewith, and each provided with a cam-pin upon its side and an encircling spring, against the force of which they are partially rotated; a yarn-guide-operating-bar arranged in said stock-slide, and having a cam upon one of its

sides, adapted to engage with the cam pins on each of said yarn-guides, and having a pivoted switch-bar on its outer end; a switch cam table and mechanism whereby it is moved upwardly to operate said yarn-guide operating-bar, and to descend therefrom, substantially as and for the purposes set forth.

5. In a striping attachment to a latch-needle rotary knitting machine the combination with the revolving cylinder thereof, of a stock mounted thereon; two yarn-guides mounted to journal on the same axis, in said stock, and each provided with a cam-pin; of a yarn-guide operating-bar arranged in a slide-way in said stock, and provided with a cam constructed to engage with each of said cam-pins and having a pivoted switch-bar on its outer end; and a switch-table provided with tracking cams on its upper face and mechanism whereby the said switch table is raised and depressed, and when raised to have its tracking cams engage with and actuate the switch-bar on the yarn-guide operating-bar to move the latter, substantially in the manner as and for the purposes set forth.

6. The combination with the revolving cylinder E′, of the stock m^3; the yarn-guides Y′ Y², journaled in said stock, and each provided with a cam-pin; the yarn-guide operating-bar m^2, having the side cam m^4, and at its outer end provided with the pivoted switch-bar X, and mounted in a slide-way formed in said stock; the switch-cam-table T, the slide-bar J on which the said switch-cam-table is mounted, the said slide-bar being provided on its upper face with the cams t^2, t^3, t^4 and t^5; and the nipper-bar n^3 arranged in a slide-way in said stock and constructed with the cross-slot n^9, in its outer end, and provided with the spring n^8, on its inner end, substantially in the manner as and for the purposes set forth.

7. In a latch needle rotary knitting machine having vertical needles operated by a revolving cylinder; the combination with the latter of a stock connected therewith; a switch-cam-table having cams on its upper surface, and mounted on a vertical slide-bar moving in a slide-way in the machine bed; a pattern chain, arranged to raise the said table at intervals; mechanism for causing the said chain to give such motion to the said table; a bar moving in a slide-way in said stock and having a cam upon one of its sides, and a pivoted switch-bar at its outer end; and two yarn-guides journaled in said stock and each provided with an encircling spring, and a cam-pin projected from its side, arranged to be operated substantially in the manner as and for the purposes set forth.

8. The combination with the revolving cylinder E′ of the switch-cam-table T, the tracking cams t^2, t^3 and t^4, therein; the pattern chain P, constructed to operate said table substantially as described; the stock m^3, connected to said cylinder; the bar m^2, moving in a slide-way in said stock and having the cam m^4, at one of its sides, and the switch-bar X, at its outer end; and the yarn-guides Y′, and Y², each provided with an encircling spring, and cam-pin, and journaled in said stock, constructed and arranged to operate substantially in the manner as and for the purposes set forth.

9. The combination with the revolving cylinder E′, provided with the connected stock m^3, of the table T, having the tracking-cams t^2, t^3, t^4, and t^5; the pattern-chain F, operated to cause said table to rise into position and to descend by gravity at intervals; the bar m^2, arranged in a slide-way in said stock and provided with the cam m^4, and the pivoted switch-bar X, on its outer end; the yarn-guides Y′, and Y², journaled in said stock, and each provided with a cam-pin and an encircling spring; and the nipper-bar n^3, provided with the spring n^8, nipper-pin n^6, and cross-slot n^7, constructed and arranged to operate substantially in the manner as and for the purposes set forth.

10. A striping attachment to latch-needle rotary knitting machines in combination consisting of a revolving cylinder provided with a stock; two yarn-guides journaled in the latter and having downwardly projected outer ends provided with yarn-passages, means for partially rotating the said guides in opposite directions, to alternatingly feed yarn to the needles; a guide-plate upwardly projected from the machine bed and provided with the recess R⁴; and a nipper-bar arranged to slide in said stock, and having a spring on its inner end, and at its outer end provided with a cross-slot, said nipper-bar engaging with and holding the yarn leading from the guide when the latter is moved away from a feeding position, and restoring it to a feeding position when said yarn-guide comes again into a feeding position and means for moving the said bar into and out of feeding position all constructed and arranged to be operated substantially in the manner and for the purposes herein set forth.

Signed at Troy, New York, this 7th day of April, 1894, and in the presence of the two witnesses whose names are hereto written.

JAMES FORMAN.

Witnesses:
N. E. HAGEN,
CHARLES S. BRINTNALL.