No. 847,243. PATENTED MAR. 12, 1907.

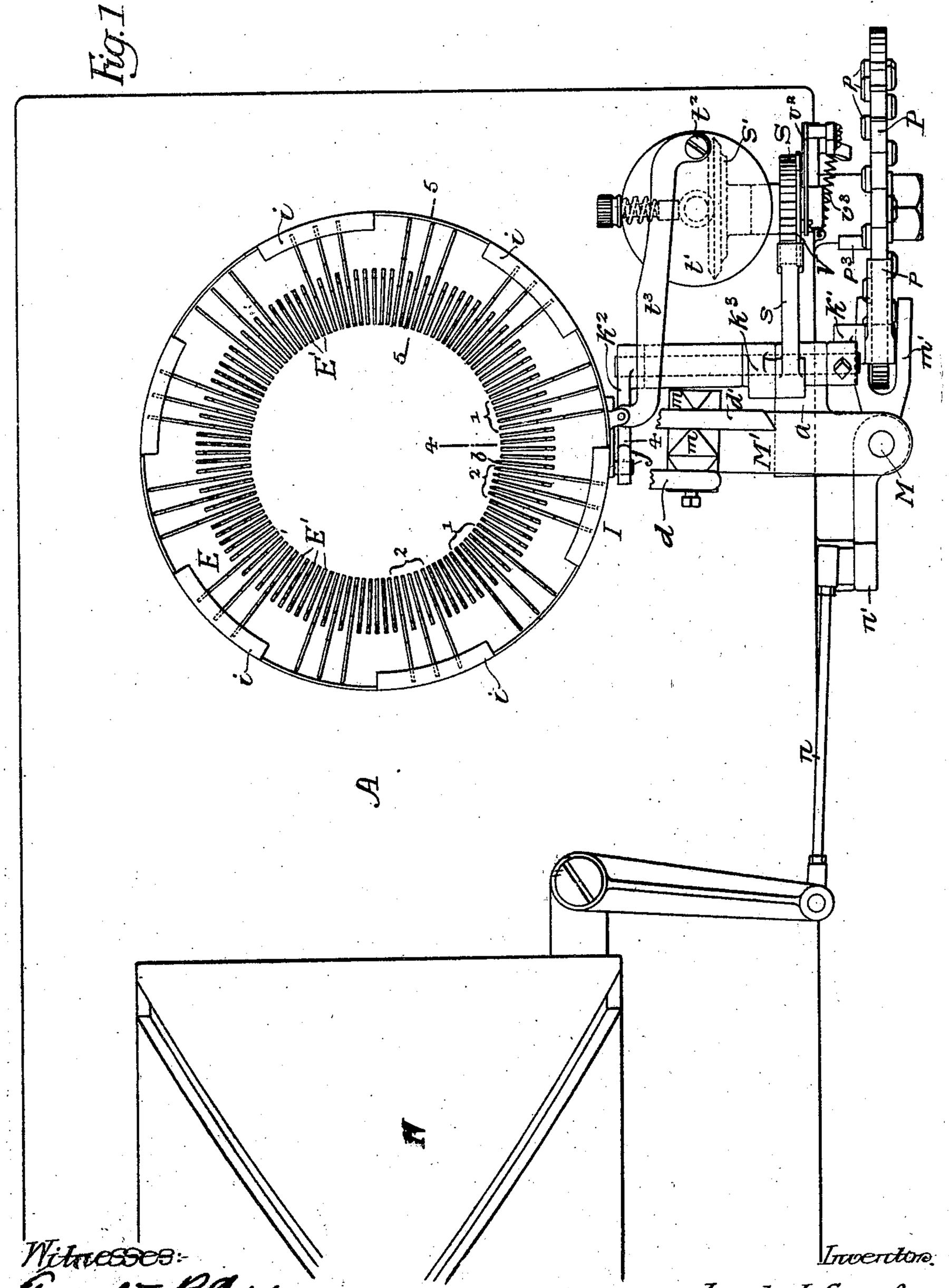
J. J. CURRY.

KNITTING MACHINE.

APPLICATION FILED MAY 22, 1906.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
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5 SHEETS—SHEET 2.

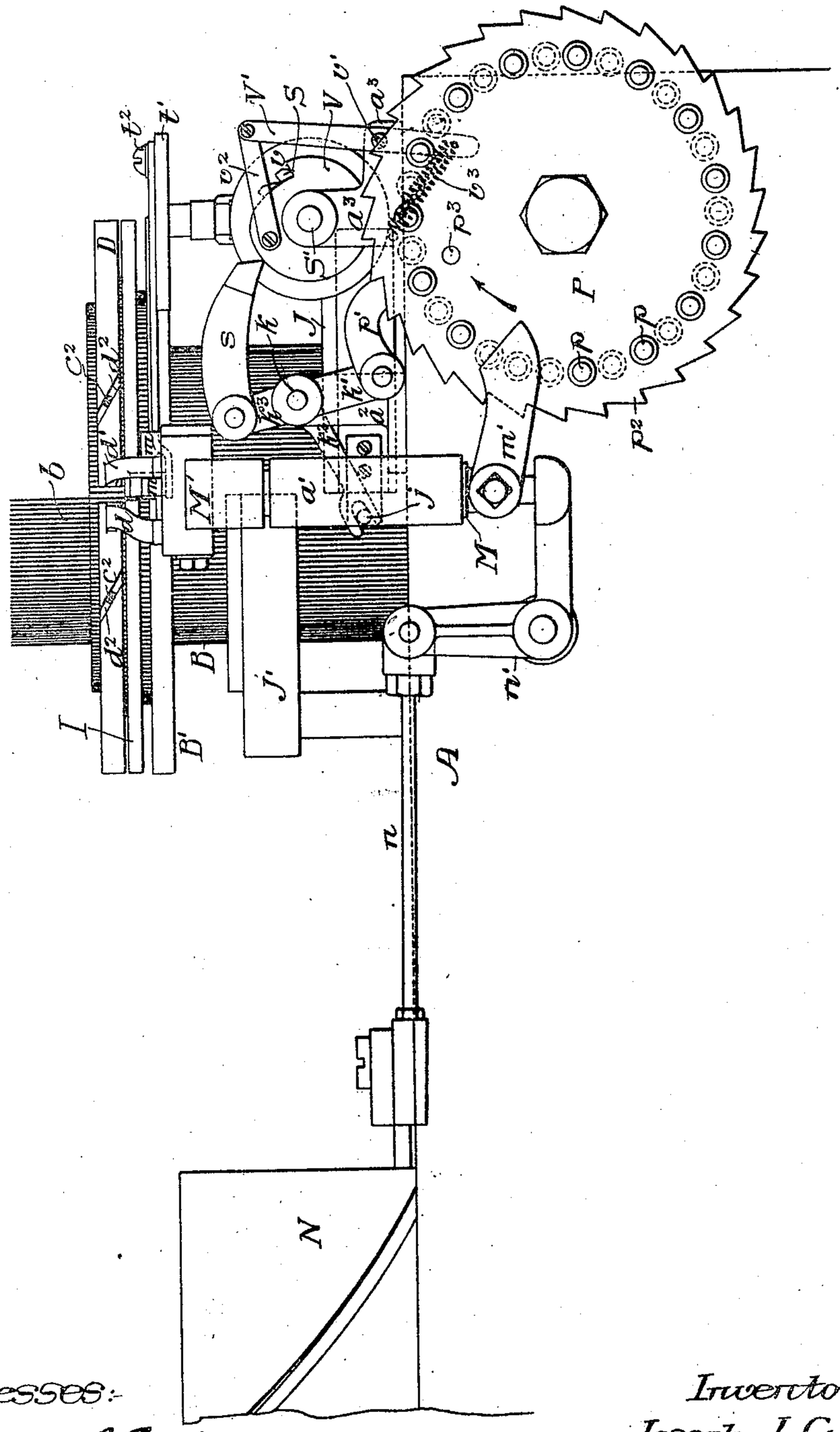

Fig. 2.

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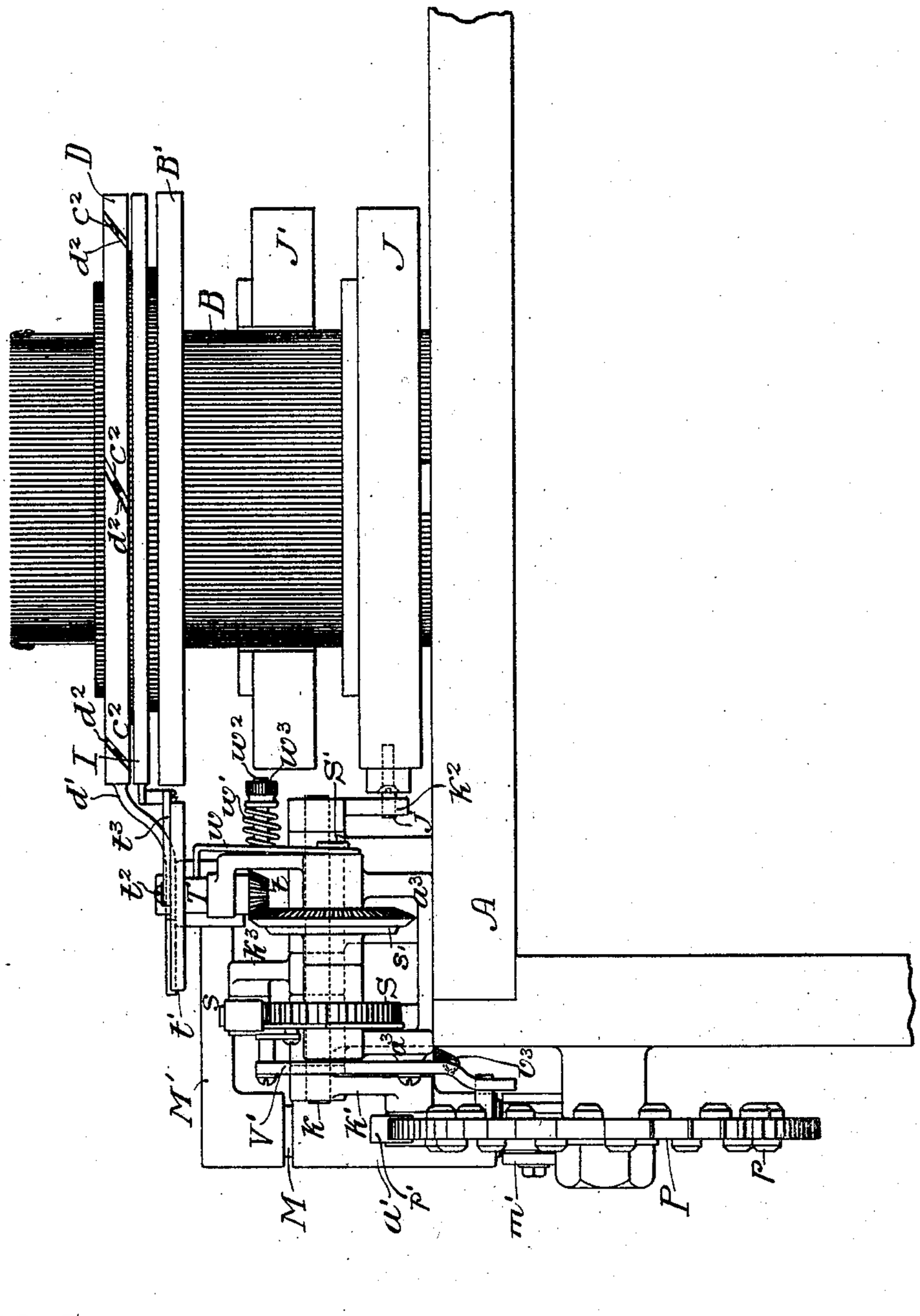
5 SHEETS—SHEET 3.

Fig. 5.



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5 SHEETS—SHEET 4.

Fig. 6.

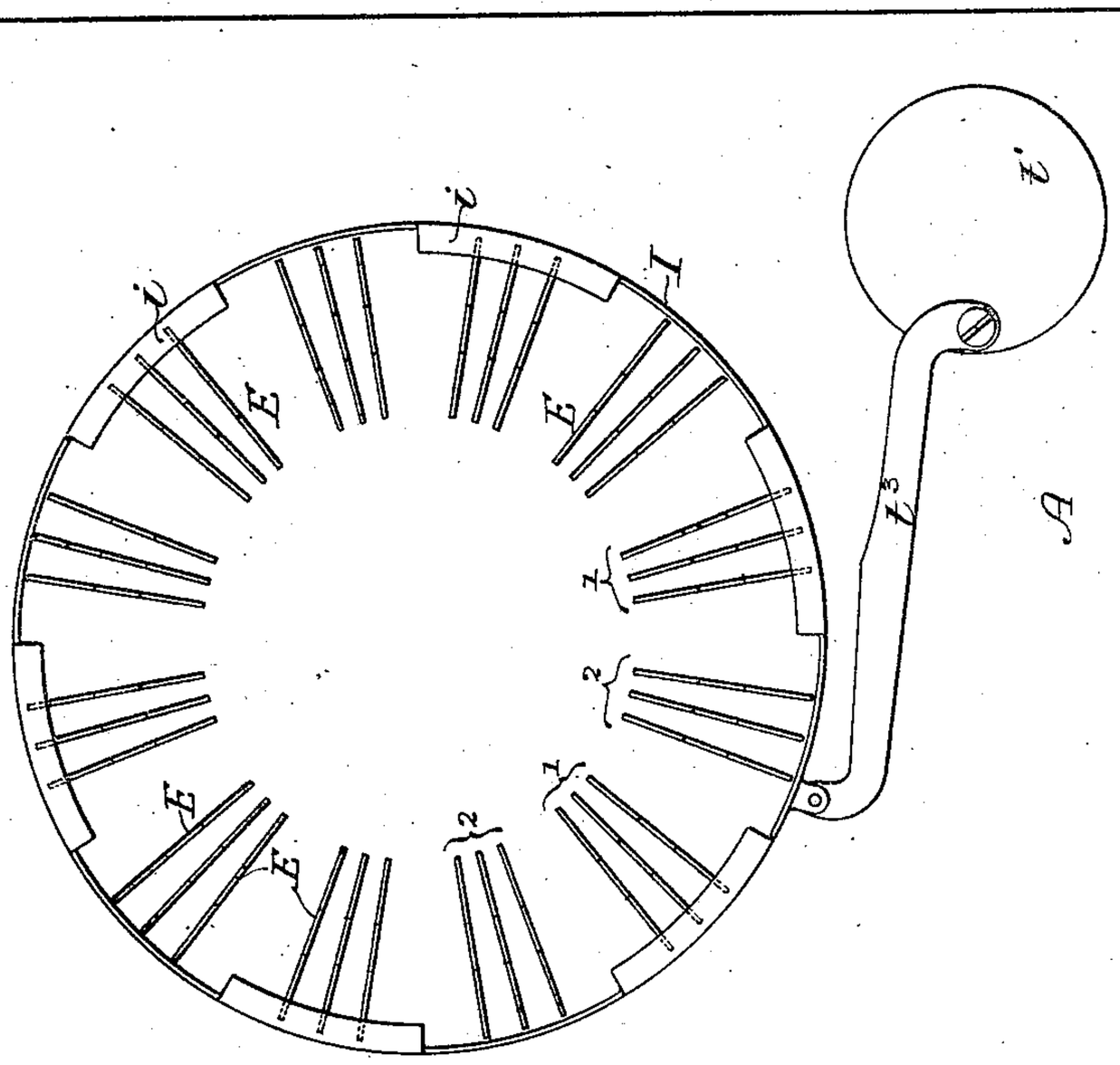


Fig. 4.

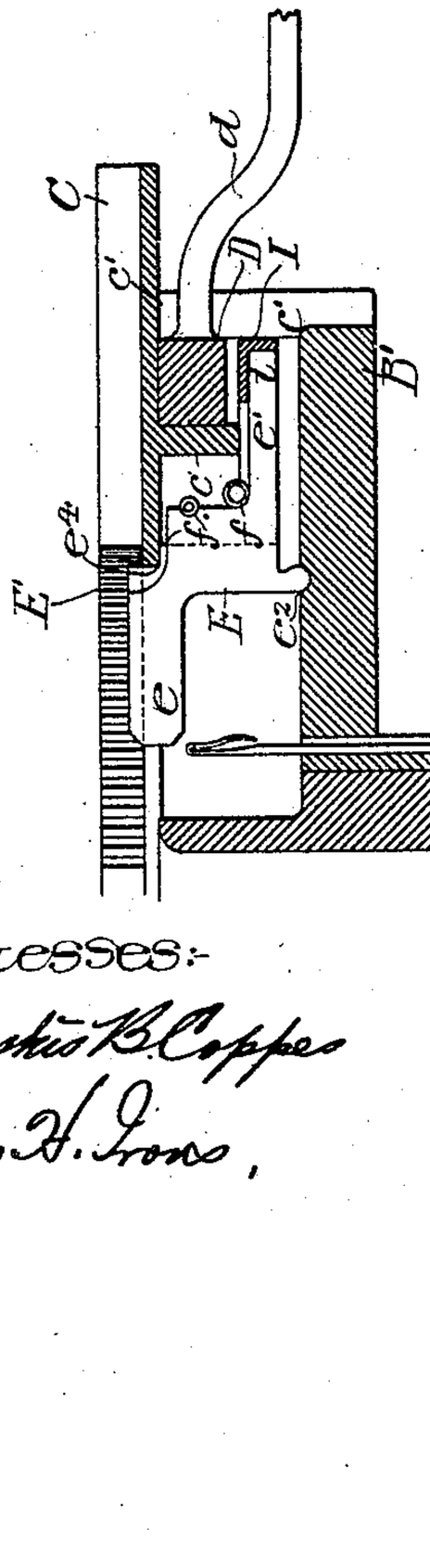
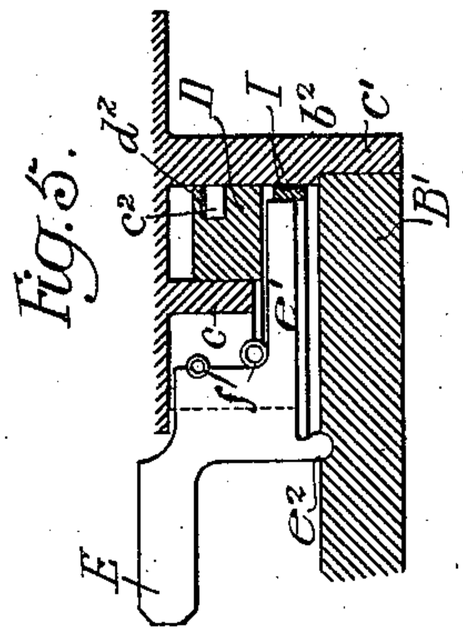


Fig. 5.



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5 SHEETS—SHEET 5.

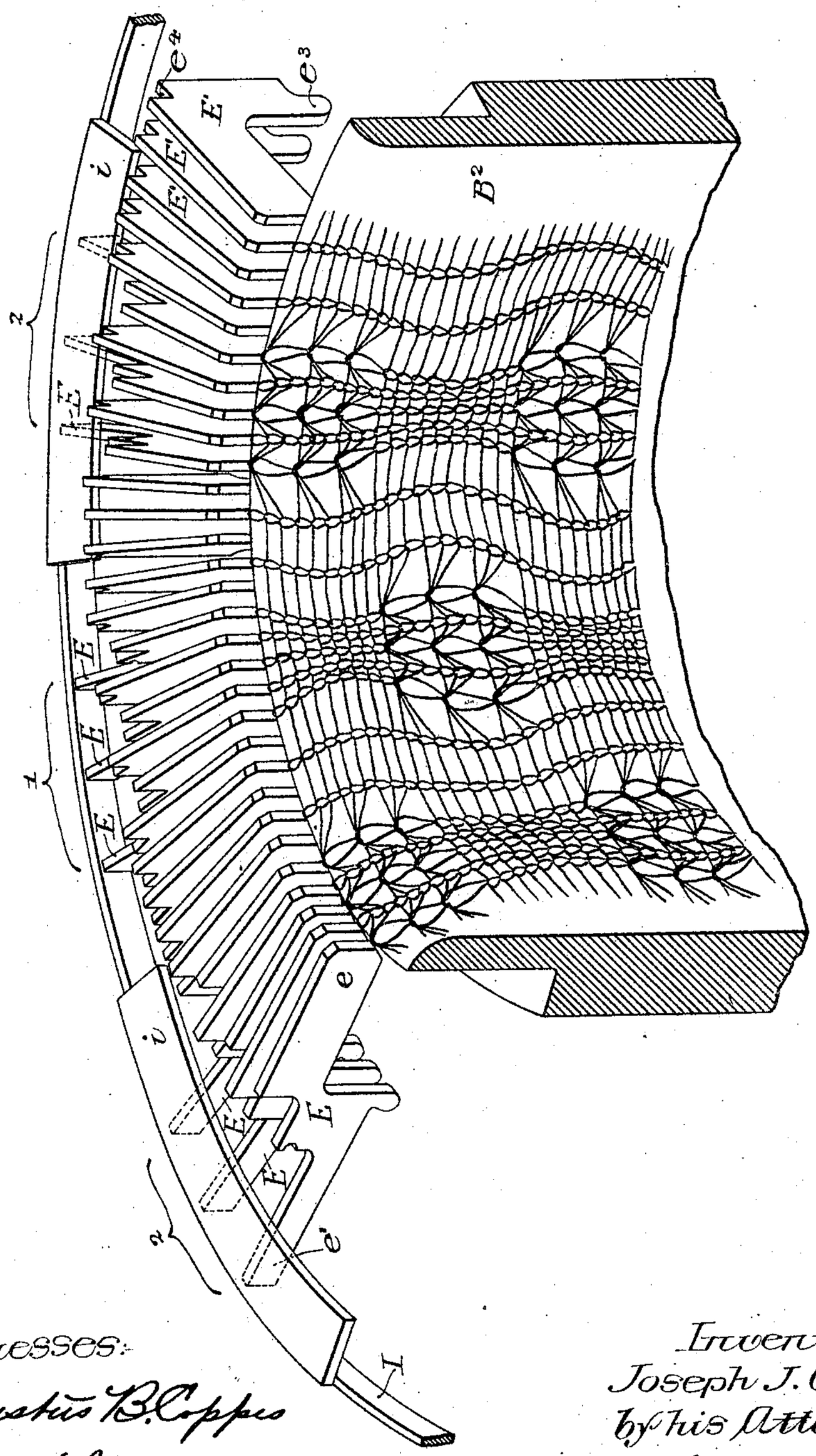

Fig. 7.

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UNITED STATES PATENT OFFICE.

JOSEPH J. CURRY, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

No. 847,243. Specification of Letters Patent. Patented March 12, 1907.

Application filed May 22, 1906. Serial No. 318,218.

To all whom it may concern:

Be it known that I, JOSEPH J. CURRY, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain Improvements in Knitting-Machines, of which the following is a specification.

My invention relates to certain improvements in automatic circular-knitting machines of the type employing two series of simultaneously-reciprocated bearded needles capable of producing either plain work or lacework, or a combination of the two. Heretofore in this class of machines the combinations were limited, which limited the designs.

The object of my invention is to widen the scope of a machine of the above type so that various designs can be made which were not obtainable in machines of this type. This object I attain by so designing the machine that alternate tucking-needles or sets of tucking-needles can be so arranged as to knit plain work, while intermediate tucking-needles or sets of tucking-needles are so acted upon as to produce tuck-stitches.

In the accompanying drawings, Figure 1 is a plan view of sufficient of a circular automatic knitting machine using bearded needles to illustrate my invention. Fig. 2 is a rear view of the machine illustrated in Fig. 1. Fig. 3 is an end view. Fig. 4 is a sectional view of a portion of the machine on the line 4 4 Fig. 1. Fig. 5 is a sectional view on the line 5 5, Fig. 1. Fig. 6 is a diagram plan view of a portion of Fig. 1. Fig. 7 is a sectional perspective view of a portion of the head of the machine, showing the jacks and the plate-ring and illustrating one design of fabric capable of being produced on this machine.

A is the frame of the machine.

B is the needle-cylinder.

B′ is the head of the cylinder.

B^2 is the web-cylinder mounted within the needle-cylinder.

b b are the needles arranged in the grooves of the needle-cylinder, and these needles are of the bearded type, some being flanged when arranged for heel and toe work; but it will be understood the machine may be provided with an entire set of plain needles for tubular work.

C is the sinker-head, constructed in the usual manner and in which the sinkers are mounted. This sinker-head has two projecting flanges *c c′*, between which is mounted the shogging-ring D. The ring in the present instance is made in halves, one half having an arm *d* and the other half having an arm *d′*, so that one may be thrown out of gear while the other is operating, this being done when knitting hosiery during the making of the heel and toe.

In the periphery of each ring are cam-grooves d^2, (clearly shown in Fig. 2,) and projecting into these grooves from the flange *c′* are pins c^2, and as these pins are stationary any shogging movement of either half of the ring will cause said half to be lowered or raised.

E are the tucking-jacks, and E′ the blind jacks. These two forms of jacks are clearly shown in the perspective view, Fig. 7. Each tucking-jack has the usual head *e* and the rear extension *e′*, and projecting from the under side of the jack is a rounded portion which rests in the groove in the cylinder-head and forms the pivot for the tucking-jack. The blind jacks have a projecting portion e^2, which also rests in the grooves in the cylinder-head, but are not pivoted, being held rigid by the overlapping flange of the sinker-head, which rests in the notch e^4 at the upper corner of the said jack.

f f are the usual spiral springs in the form of rings, which bear upon the tucking-jacks, tending to keep them in the normal position, as clearly shown in Fig. 4. The jacks when in their normal position act to close the beard of the needles. Heretofore the shogging-rings when depressed acted to throw all of the tucking-jacks out of normal position and free of the needles, so that the beards of the needles would not close, therefore causing all the needles which were in line with the tucking-jacks to retain the old stitch, producing a tuck-stitch, which, in fact, is an element of lacework.

By my invention, which I will now proceed to describe, the mechanism can be so controlled that either alternate tucking-jacks or sets of tucking-jacks can be moved out of their normal position while other tucking-jacks or sets of tucking-jacks can be allowed to remain in their normal position. Thus in the same course certain needles capable of tucking are knitting plain work while others of these needles are knitting tucked or lace work, and by providing means for shifting this mechanism the tucking-needles which were producing plain work will pro-

duce tucked work, and the tucking-needles which were producing tucked work will produce plain work.

It will be understood that my improved mechanism does not affect the needles which are closed by the blind jacks for producing plain knitting.

Mounted directly under the shogging-ring D in the present instance is a ring I, having a series of segmental flanges *i*, which extend over the rear extensions of t' › tucking-jacks E. This ring I will term hereafter a "plate-ring," as these segmental flanges *i* form plates which intervene between some of the tucking-jacks and the shogging-ring, and the flanges are of sufficient depth that when the shogging-ring is depressed it will bear upon the ring I and the segmental flanges *i* will act upon the rear extensions of the tucking-jacks E, thus throwing the tucking-jacks out of the path of the needles, so that the beard of the needles will not be acted upon by said jacks. The plate-ring I is made in halves in the present instance to correspond with the two-part shogging-ring D, as illustrated in Figs. 1 and 6. The tucking-jacks which are not under the segmental flanges are free and remain in their normal position, as the shogging-ring is not depressed to such an extent as to act upon these jacks. This is clearly shown in Fig. 5, where the shogging-ring D is depressed and in its lowest position, but clear of the jack. It will be readily seen that if the plate-ring I is shifted the flange will be moved over the rear extensions of their jacks, while jacks previously under the control of the ring will be free and undisturbed. In Fig. 7 I have shown the tucking-jacks in groups of three, and the segmental flanges *i* of the ring I are so spaced that each alternate group 2 will be acted upon and thrown out of the path of the needles, while the other intervening groups 1 will remain in position, so that while the groups 2 are causing the needles to tuck the groups 1 are causing the needles to knit plain work, as clearly shown in Fig. 7 of the drawings. In order to operate this plate-ring, I provide mechanism which I will now proceed to describe.

In the first place the shogging-ring is raised and lowered by mechanism which turns the rings to a given extent, so that the cam-grooves will raise or lower the ring, as described above. The ring is made in two parts, so that one can be operated independently of the other.

a is a bracket secured to the base A, having a bearing *a'* for a vertical spindle M, carrying at its upper end an arm M', provided with bearing-lugs *m m*, which engage and actuate the arms *d d'* of the shogging-ring in the ordinary manner. This spindle M can be raised and lowered by a cam-drum N through the medium of the rod *n* and the lever *n'*. The spindle is turned in its bearing by a pattern-wheel P, having lugs *p* on both sides, and on the spindle M is a forked arm *m'*, which is actuated by the lugs *p*, so that the arm and its spindle will be reciprocated as the lugs pass the arm. All the above-described mechanism is common to this type of machine.

J J' are the needle-carriers of the ordinary type, and mounted on the base A is a bracket a^2, on which is mounted a rock-shaft *k*, having arms k' k^2 k^3. The arm k^2 is forked at its outer end and engages a pin *j* on the plate, secured to the needle-carrier J, so that as the needle-carrier is raised and lowered motion will be imparted to the rock-shaft *k*. Pivoted to the end of the arm k' is a pawl p', which engages the teeth p^2 of the pattern-wheel P, and pivoted to the end of the arm k^3 is a pawl *s*, which is arranged to actuate the ratchet-wheel S, secured to the shaft S', which is mounted in bearings a^3, secured to the base A. On the shaft is a bevel-wheel *s'*, meshing with a pinion *t* on a short vertical shaft T, and on the upper end of this shaft is a disk *t'*, having a crank-pin t^2, which is connected to the plate-ring I by a connecting-rod t^3 and in the present instance shaped, as clearly shown in Fig. 1, so that any motion imparted to the shaft T will be transmitted to the plate-ring.

It will be noted in the present drawings that the segmental flanges *i* of the plate-ring are arranged an equal distance apart, and the ring must be shifted into either of two positions, and the crank-pin t^2 is of such a distance from the center of the shaft T that in order to shift the ring into either of its proper positions the disk *t'* must be given a one-half turn. To accomplish this, I so proportion the parts that when the pawl *s* acts upon the ratchet-wheel S it will turn the disk a one-half revolution; but there is a certain amount of dwell required so as to produce the design, as the needles must knit a certain number of courses before a change takes place. This change is governed by a disk V, which has a notch *v*. The disk is mounted at one side of the ratchet-wheel S and is so shaped as to hold the pawl *s* out of engagement with the ratchet-wheel S except when the notch *v* is in line with the pawl. During this time the pawl actuates the ratchet-wheel S and turns the disk *t'* one-half revolution, and consequently shifts the plate-ring to the desired position. To accomplish the movement of this notch-disk *v* in the present instance, I pivot a lever V' at *v'* to the bearing a^3. One arm of this lever is connected by a link v^2 to the disk V, and the other arm extends in the path of a pin p^3, projecting from one side of the pattern-wheel P. A spring v^3 is connected to this arm and to any fixed point on the machine, so as to return the lever V' to its normal position as soon as it is released from the pin p^3.

The operation of this mechanism is as follows: As the pattern-wheel is intermittently rotated and the pin p^3 is traveling toward one arm of the lever V′ the pawl s is being reciprocated, but slides upon the notched disk V clear of the teeth of the ratchet-wheel S, so that it imparts no motion to the plate-ring; but as soon as the pin p^3 on the pattern-wheel P strikes the arm of the lever V′ it shifts the said notched disk so as to bring the notch v in the path of the pawl s. The pawl will immediately engage the teeth of the ratchet-wheel S, moving the ratchet-wheel a given distance, causing the crank-pin t^2 to move one-half a revolution, which in turn causes the plate-ring to shift from one of its positions to the other, and as soon as the pin p^3 passes the lever V′ the spring v^3 returns the said lever to its normal position, and with it the notched disk V, throwing the pawl s out of engagement with the ratchet-teeth.

There may be as many pins p^3 as desired on the pattern-wheel P, so as to shift the plate-ring more frequently than once in each revolution of the pattern-wheel, as shown in Fig. 2. The pin controls the number of courses in a certain design—*i. e.*, when any pin p^3 operates lever V′ the ring I will be shifted, causing a change of the tuck-stitch to another wale or set of wales, which before had been knitting plain work. Any suitable mechanism may be devised for preventing the shifting of the shaft T and its disk t' when it is free of control of the ratchet mechanism. One device is clearly shown in Fig. 3 and consists of a spring-plate w, secured to the bearing a^3 and bent so as to bear upon the shaft T, and in order to increase or diminish the friction I mount a coiled spring w' on the stud w^2, projecting from the bearing a^3. The stud is screw-threaded, and mounted on the screw-threaded portion is a nut w^3, so that on turning the nut more or less pressure can be applied to the spring-plate w.

While I have shown and wish to claim the mechanism for imparting motion to the plate-ring I, it will be understood that the mechanism may be modified without departing from the main feature of my invention.

I claim—

1. The combination in a circular-knitting machine, of a series of needles, tucking-jacks and plain jacks operating upon the needles, a shogging-ring, a segmental plate intervening between the shogging-ring and the tucking-jacks, means for shifting said plate circumferentially, and means for vertically moving the shogging-ring to depress the plate, whereby certain tucking-jacks will be actuated by the shogging-ring through the intervention of the plate leaving other jacks free, substantially as described.

2. The combination in a circular-knitting machine, of needles, tucking-jacks, a plate-ring having segmental flanges extending over a portion of the jacks, a shogging-ring above the plate-ring, means for moving the shogging-ring vertically, and means for shifting the plate-ring so that a portion of the jacks will be actuated by the shogging-ring through the plate-ring while other portions will remain in their normal position, substantially as described.

3. The combination in a circular-knitting machine, of needles, a series of tucking-jacks arranged in groups, a plate-ring having a series of segmental flanges arranged to cover the alternate groups of tucking-jacks, means for shifting the said plate-ring from one group of jacks to the other, a shogging-ring, and means for raising and lowering the said shogging-ring to actuate the jacks covered by the segmental flanges of the plate-ring, substantially as described.

4. The combination in a circular-knitting machine, of a series of tucking-jacks and blind-jacks, the tucking-jacks being arranged in groups, a plate-ring having a series of segmental flanges extending over the rear portions of the tucking-jacks, means for shifting said ring to cover a certain group of jacks at one time and another group of jacks at another time, a shogging-ring mounted above the plate-ring, and means for imparting a reciprocating motion to the shogging-ring, and cams for converting the reciprocating motion into a vertical motion so as to actuate the tucking-jacks through the medium of the flanges of the plate-ring, substantially as described.

5. The combination in a circular-knitting machine, of the needles, tucking-jacks having rear extensions, a plate-ring having segmental flanges extending over the rear extensions of the tucking-jacks, the said segmental flanges being spaced a given distance apart, a shogging-ring mounted above the plate-ring, means for imparting a vertical movement to the shogging-ring, a pattern-wheel, a needle-carrier, means actuated by the needle-carrier for shifting the plate-ring, and means controlled by the pattern-wheel for throwing the operating means into and out of gear, substantially as described.

6. The combination in a circular-knitting machine, of the needles, tucking-jacks having rear extensions, a plate-ring having segmental flanges extending over the rear extensions of the tucking-jacks, said plate-ring made in halves, a shogging-ring mounted above the plate-ring and also made in halves, the halves of the shogging-ring alining with the halves of the plate-ring when in central position, means for actuating the shogging-ring, and means for turning the plate-ring, substantially as described.

7. The combination in a circular-knitting machine, of the tucking-jacks, a plate-ring having flanges extending over the jacks, a shogging-ring mounted above the plate-ring,

means for imparting vertical motion to the shogging-ring, a needle-carrier, a pivoted lever having an arm engaged by the needle-carrier, a pattern-wheel, a pawl on one of the arms of the lever engaging teeth on the pattern-wheel, a pawl on one of the other arms of the lever, a ratchet-wheel with which said pawl is arranged to engage, means connecting said ratchet-wheel with the plate-ring, and means for keeping the pawl out of engagement with the ratchet-wheel during certain portions of the movement of the machine, said means being controlled by the pattern-wheel, substantially as described.

8. The combination in a circular-knitting machine, of tucking-jacks, a plate-ring having segmental flanges extending over the tucking-jacks, a shogging-ring mounted above the plate-ring, means for imparting motion to the shogging-ring to actuate those jacks directly under the flanges of the plate-ring, a needle-carrier, a pattern-wheel, a rock-shaft, three arms on said rock-shaft, one arm engaging the needle-carrier so as to impart a rocking motion to said shaft, a pawl pivoted to another arm and engaging the teeth of the pattern-wheel, another pawl pivoted to another arm, a ratchet-wheel with which said pawl engages, a shaft on which said ratchet-wheel is mounted, a vertical shaft, gearing between said ratchet-wheel shaft and the vertical shaft, a disk on the vertical shaft, a crank-pin on the disk, a rod connecting the crank-pin with the plate-ring, a notched disk situated at the side of the ratchet-wheel so as to keep the pawl out of engagement with the ratchet during a certain portion of the operation of the machine, a lever connected to the said ratchet-disk, and a pin on the pattern-wheel arranged to actuate the lever and shift the notched disk so that the pawl will turn the ratchet-wheel and impart motion to the plate-ring, substantially as described.

9. The combination in an automatic circular-knitting machine, of the needle-cylinder, bearded needles mounted therein, a cylinder-head, tucking-jacks pivoted on said head arranged to act upon the beards of the needles and having rear extensions, a sinker-head, a shogging-ring mounted in the sinker-head, means for imparting combined reciprocating and vertical movement to the shogging-ring, a plate-ring mounted under the shogging-ring, said plate-ring having segmental flanges projecting into the space between the rear extensions of the tucking-jacks and the shogging-ring, means for turning the said plate-ring so that the plates can be shifted from one tucking-jack or sets of tucking-jacks to another tucking-jack or sets of tucking-jacks, substantially as described.

10. The combination in an automatic circular-knitting machine, of the needle-cylinder, bearded needles therein, a cylinder-head, tucking-jacks pivoted to the said head and arranged to act upon the beards of the needles, said tucking-jacks having rear extensions, a plate-ring having segmental flanges extending over the rear extensions of the tucking-jacks, a shogging-ring mounted above the plate-ring, means for imparting a vertical movement to the shogging-ring, needle-carriers, a pattern-wheel, connections between the pattern-wheel and the shogging-ring whereby the shogging-ring is actuated, a rock-shaft, an arm on the rock-shaft engaging a pin on one of the needle-carriers, another arm on the rock-shaft, a pawl pivoted to said arm and engaging the teeth of the pattern-wheel and through which motion is imparted to the pattern-wheel, a third arm on the rock-shaft, a pawl on said arm, a ratchet-wheel with which said pawl engages, a shaft carrying said ratchet-wheel, a vertical shaft, a disk on said shaft, gearing between the disk-shaft and the ratchet-wheel shaft, a crank-pin on the disk-shaft, a connecting-rod coupling the crank-pin to the plate-ring, a notched disk at one side of the ratchet so shaped that it will hold the plate out of engagement with the teeth of the ratchet-wheel when in one position and will allow the pawl to engage the teeth when in another position, a pivoted lever connected to the said disk, a spring connected to the lever for returning the lever and its disk to normal position, and a pin on the pattern-wheel for operating the lever to shift the disk, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOSEPH J. CURRY.

Witnesses:
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JOS. H. KLEIN.