No. 714,825. Patented Dec. 2, 1902.

F. G. SHELAIN.

MECHANISM FOR TRANSVERSELY SEVERING WEBS OF KNIT FABRICS.

(Application filed Aug. 20, 1902.)

(No Model.) 5 Sheets—Sheet 1.

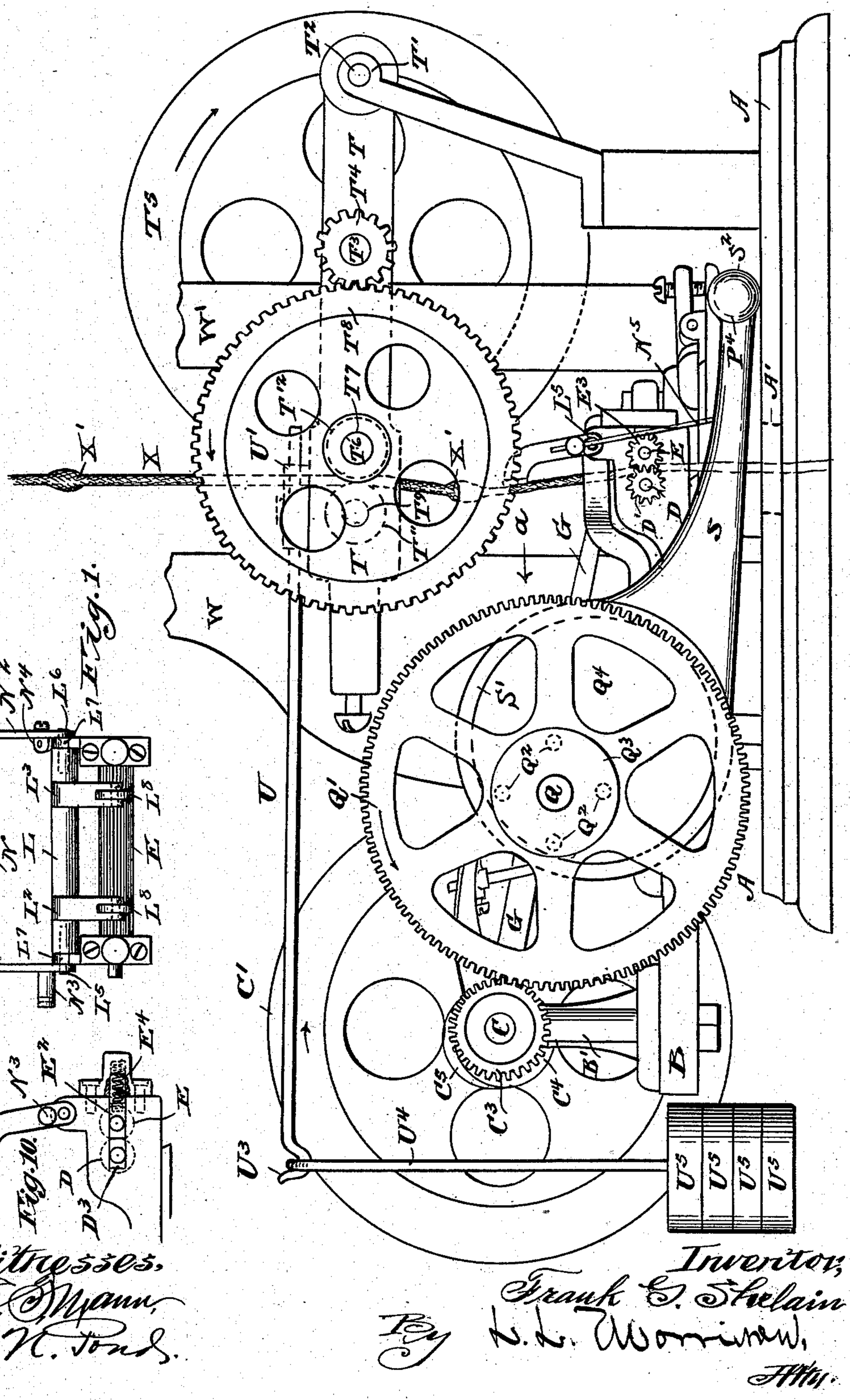

Fig. 1.

Fig. 9.

Fig. 10.

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(Application filed Aug. 20, 1902.)

(No Model.) 5 Sheets—Sheet 2.

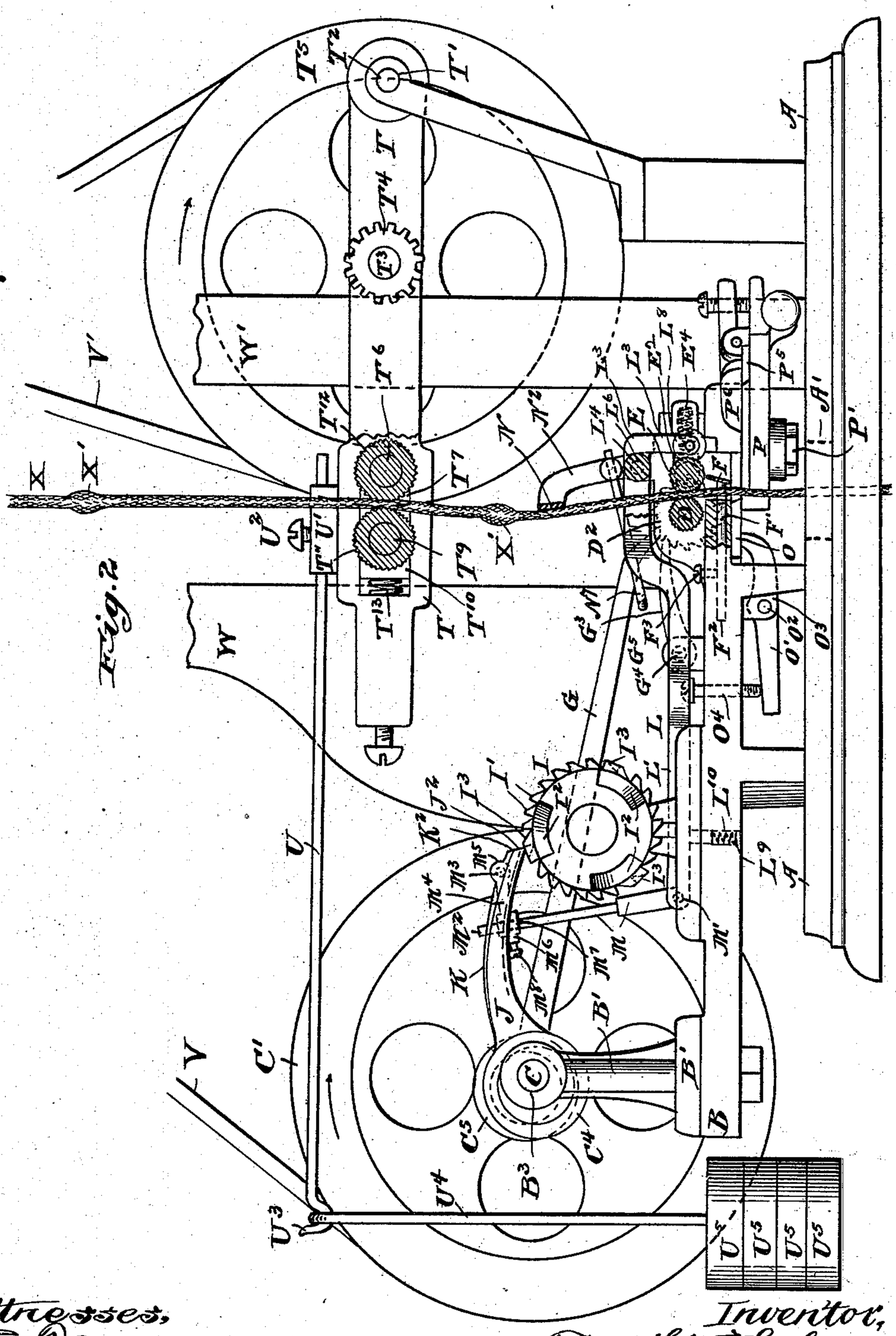

Fig. 2.

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(No Model.) 5 Sheets—Sheet 3.

Fig. 8.

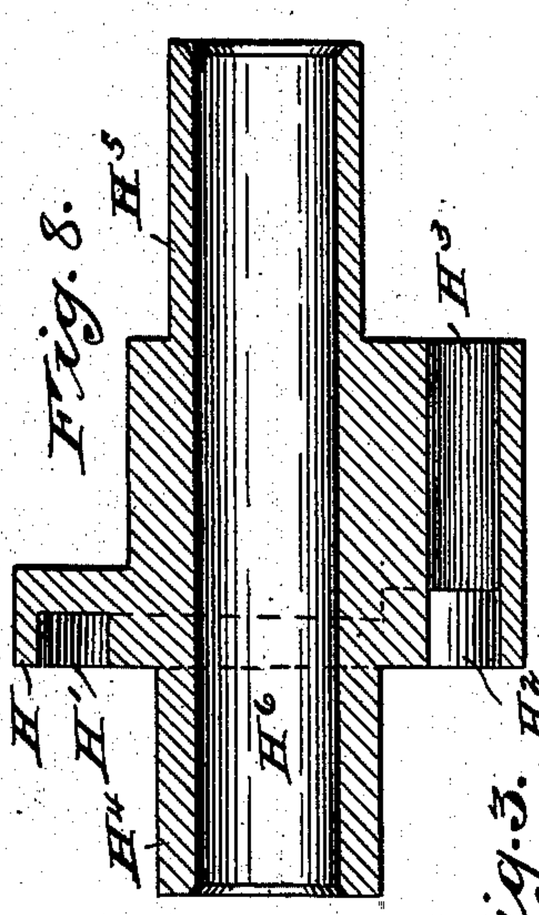

Fig. 3.

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(No Model.) 5 Sheets—Sheet 4.

Fig. 4.

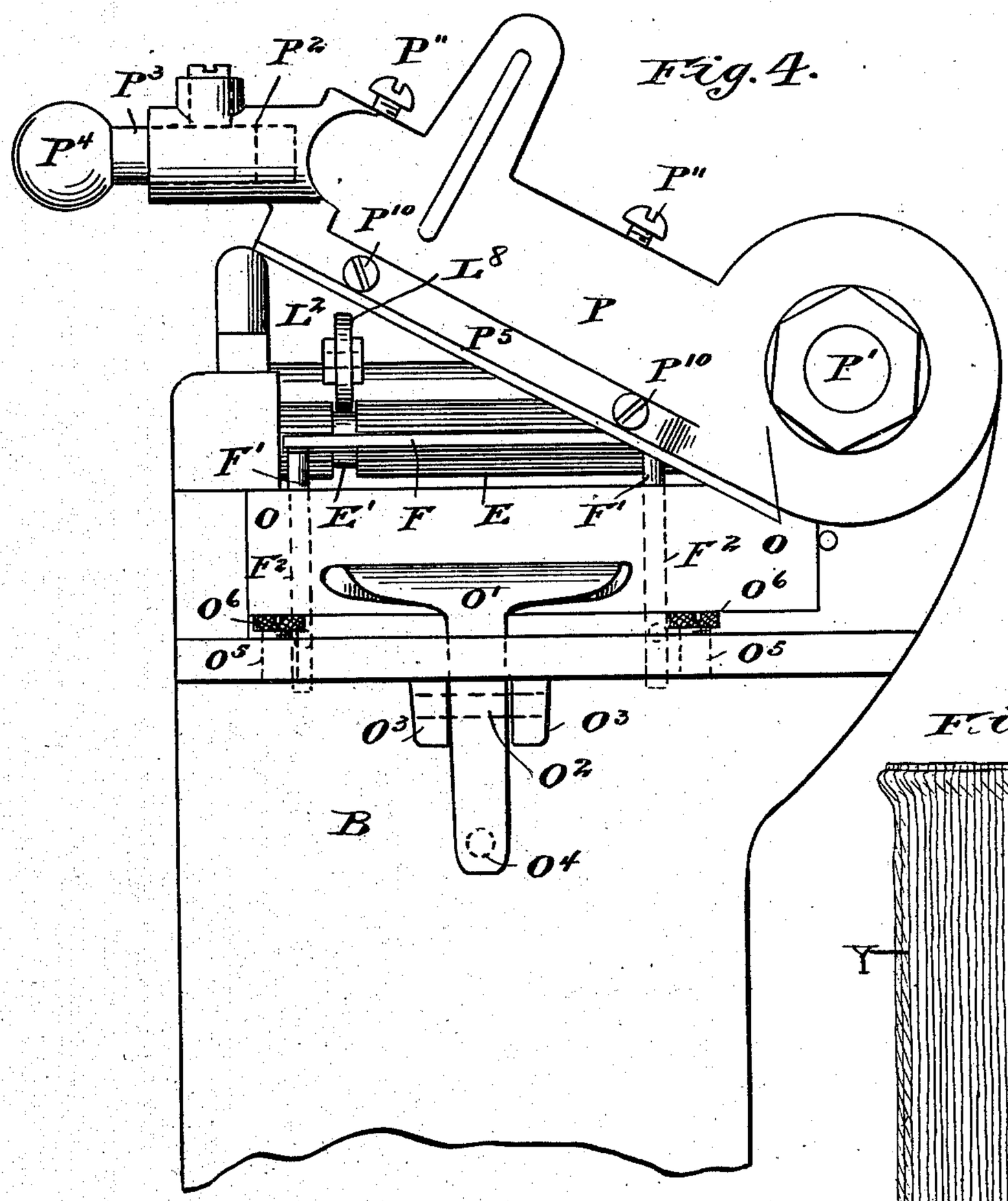
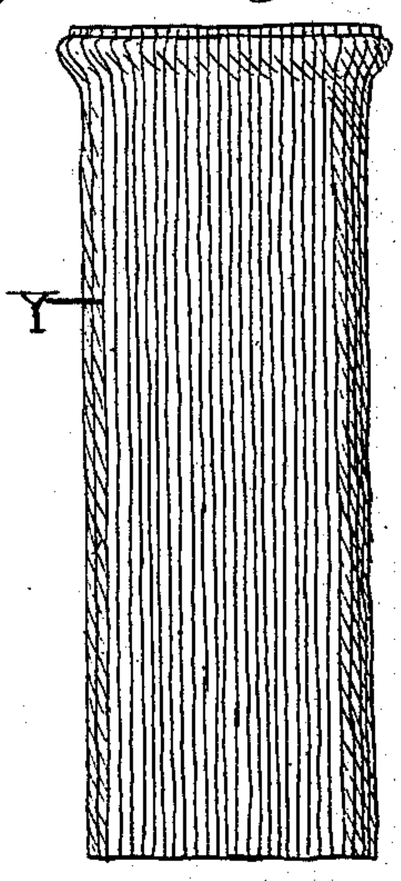


Fig. 11.



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MECHANISM FOR TRANSVERSELY SEVERING WEBS OF KNIT FABRICS.

(Application filed Aug. 20, 1902.)

(No Model.) 5 Sheets—Sheet 5.

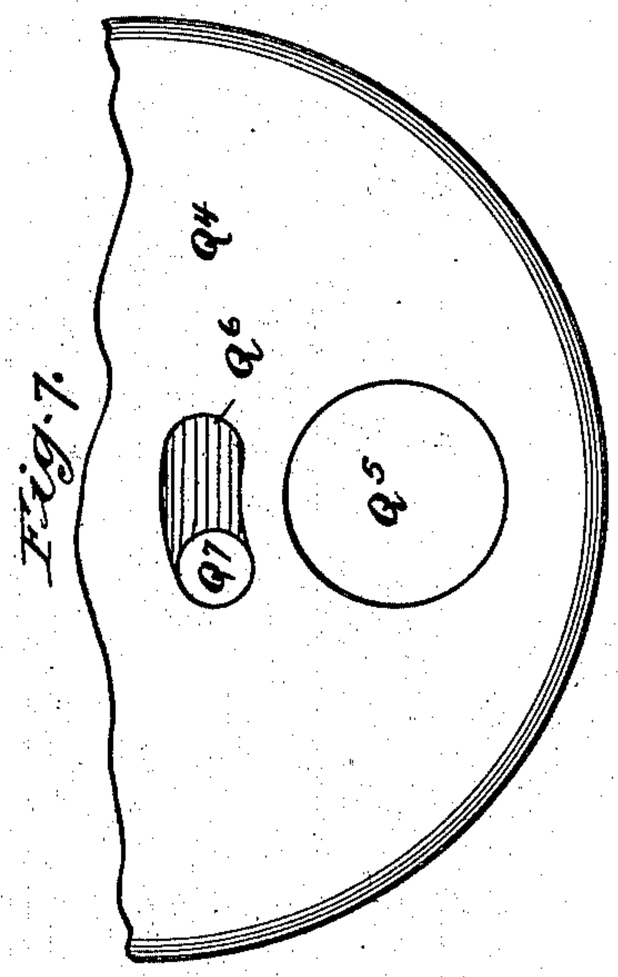

Fig. 7.

Fig. 5.

Fig. 6.

Witnesses,
F. D. Mann,
D. N. Ford.

Inventor,
Frank G. Shelain
By L. L. Morrison,
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UNITED STATES PATENT OFFICE.

FRANK G. SHELAIN, OF ROCKFORD, ILLINOIS, ASSIGNOR TO HIMSELF AND FRANK R. BROWN, OF ROCKFORD, ILLINOIS.

MECHANISM FOR TRANSVERSELY SEVERING WEBS OF KNIT FABRICS.

SPECIFICATION forming part of Letters Patent No. 714,825, dated December 2, 1902.

Application filed August 20, 1902. Serial No. 120,305. (No model.)

To all whom it may concern:

Be it known that I, FRANK G. SHELAIN, a citizen of the United States of America, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Mechanism for Transversely Severing Webs of Knit Fabrics, of which the following is a specification.

This invention relates to a machine for transversely severing tops for hosiery and ankle and wrist bands for knit underwear of predetermined lengths from continuous tubular webs especially knit therefor as the webs come from machines knitting the same. Such webs have formed on the outside thereof transverse annular welts. The distances apart of these welts determine the length of the segments tops or bands to be cut therefrom, and the severing mechanism is controlled by the welts on the web passing therethrough, the web being severed shortly after the passage of each welt between a pair of rollers therein. The welts serve as a finish for the outer ends of the tops or bands and will not ravel; and this invention consists of certain new and useful features of construction and combinations of parts, all as hereinafter fully described, and specifically pointed out in the claims.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a right side elevation of a machine embodying my invention. Fig. 2 is a like view of the same with parts omitted and other parts broken away. Fig. 3 is a top plan view of the lower portions of the machine, the upper portions thereof as seen in Figs. 1 and 2 being removed. Fig. 4 is a full-sized bottom plan view of the cutting mechanism of the machine, shown most clearly in Fig. 3. Fig. 5 is a view of the mechanism for operating the vibrating blade of the machine as seen when looking in the direction indicated by the arrow *a* in Fig. 1, with parts broken away to show the construction, arrangement, and operation of the interior portions thereof. Figs. 6 and 7 are face views of parts shown in Fig. 5. Fig. 8 is a section at the line 8 8 in Fig. 6 of the part there shown. Figs. 9 and 10 are detailed views showing parts of the mechanism. Fig. 11 is a segment severed from the web X by the knives of the mechanism.

Like letters of reference indicate corresponding parts throughout the several views.

A is the base of the machine, which has a vertical opening therethrough at A′ and is provided with legs. (Not shown.)

B is the frame, that supports the cutting mechanism of the machine and is rigidly secured to the base A.

B′ B^2 are vertical standards fast to the frame B and having bearings B^3 B^4 therein.

C is a shaft mounted in the bearings B^3 B^4.

C′ is a driving-pulley mounted fast on the shaft C and having a belt-groove C^2 in the periphery thereof.

C^3 is a pinion fast to the shaft C.

C^4 C^5 are eccentrics fast to the shaft C.

D is a fluted roller provided at one end with a fast pinion D′ and at the other end with a fast ratchet-wheel D^2 and mounted in stationary bearings D^3 on the frame B.

E is a fluted roller having transverse annular grooves E′, Figs. 3 and 4, sunk into the periphery thereof and mounted in laterally-slidable bearings E^2 in the frame B.

E^3 is a pinion fast to the roller E and meshing with the pinion D′ of the roller D.

E^4 represents springs which normally impel the laterally-slidable bearings E^2, Fig. 10, and the roller E, supported thereby, toward its companion roller D.

F is a guide for insuring constant downward travel of the web to be cut and is rendered adjustable by means of the shanks F′, extending transversely therefrom into sockets F^2 in the frame B, whereinto they are secured by means of set-screws F^3.

G is a pawl connected, by means of the eccentric-hoop G′, with the eccentric C^5 and engaging with its free end G^2 the ratchet-wheel D^2, which it drives, and therethrough communicates motion to the roller D and thence, through the pinions D′ E^3, to the roller E.

G^3 is a detent, Fig. 3, pivoted at G^4 to the lugs G^5 on the frame B and engaging the ratchet-wheel D^2, which it prevents from being rotated backward.

H is a head having an annular recess H′

sunk transversely thereinto, a recess H^2 countersunk into the bottom of the recess H′, and an opening H^3 extending from the bottom of the countersunk recess H^2 transversely outward through such head.

H^4 H^5 are axes projecting transversely in opposite directions from the head H and having a bearing H^6 extending through and concentric with their longitudinal centers.

The head H is supported by the standard and base H^7 H^8, which are preferably integral therewith.

I is a combined ratchet-and-cam wheel, the teeth I′ of the ratchet being formed on the periphery of and the cams I^2 being sunk into and sloping outward to one end of such wheel, which is mounted in the axis H^5. The wheel I is provided with several—in this case with three—teeth I^3, which are, say, twice as thick and about half as wide as the remaining teeth I′ thereon, Fig. 5. The office of the teeth I^3 will be fully explained hereinafter.

J, Fig. 3, is a pawl connected, by means of the eccentric-hoop J′, with the eccentric C^4 and either engaging with its free end J^2 the teeth I′ or idly reciprocating upon the flat ends of the teeth I^3 of the ratchet-and-cam wheel I.

K, Fig. 3, is a pawl connected, by means of the eccentric-hoop K′, with the eccentric C^4 and intermittently engaging with its free end K^2 and at predetermined intervals the teeth I′ only of the ratchet-and-cam wheel I.

L, Figs. 2 and 3, is a bell-crank composed of a long horizontal arm L′ and preferably two short parallel vertical arms L^2 L^3, all united by means of a rock-shaft L^4, which is integral therewith and is mounted by its ends, by means of pivots L^5 L^6, in bearings L^7. In the ends of the vertical arms L^2 L^3 are mounted rolls L^8, the peripheries whereof constantly contact the bottoms of the transverse annular grooves E′ in the fluted roller E.

L^9, Fig. 2, is a spring seated in a socket L^{10} in the base B of the machine and normally impelling the free end L′ of the bell-crank L upward.

M, Fig. 2, is an arm connected at its lower end by means of a pivot M′ with the free end of the horizontal arm L′ of the bell-crank L, and its upper end M^2 extends upward past the pawl K.

M^3 is a stud rigidly connected with and projecting horizontally from the pawl K.

M^4 is an arm pivot-jointed by one end M^5 to the stud M^3 on the pawl K and rigidly and also adjustably connected by its other end M^6 by means of the open socket M^7 therein and the set-screw M^8, passing transversely through such socket M^7.

N, Figs. 3 and 9, is a stop-motion bar having its ends N′ N^2 bent at right angles thereto and mounted thereby on the pivots L^5 L^6, so as to freely oscillate thereon, and provided with transversely-socketed studs N^3 N^4, into the former of which a straight arm N^5 is secured by means of a set-screw N^6 and into the latter whereof a bent arm N^7, projecting under the pawl G, is secured by means of a set-screw N^8.

O, Fig. 4, is a knife rigidly secured to the under side of the base B by means of a clamp O′, pivoted at O^2 in the lugs O^3, and a set-screw O^4 for locking such clamp against the knife.

O^5 represents set-screws the heads O^6 whereof serve as adjustable stops for the back of the knife O.

P is a jaw hinge-jointed, by means of the pivot P′, to the base B and having a socket P^2 in the free end thereof to admit a shank P^3, terminating at its outer end in a ball P^4, one member of a ball-and-socket joint to be described hereinafter.

P^5 is a knife rigidly secured to the upper side of the jaw P by means of a clamp P^6, pivoted at P^7 in the lugs P^8, and a set-screw P^9 for locking such clamp against the knife.

P^{10} P^{11} are screws for adjusting the knife P^5 on its jaw P.

Q is a shaft mounted in the bearing H^6, extending through the longitudinal centers of the axes H^4 H^5.

Q′ is a gear fast to the shaft Q and having circular chambers Q^2, Figs. 1 and 5, sunk therethrough and into the hub Q^3 thereof and parallel with such shaft Q.

Q^4 is an eccentric mounted, by means of a transverse hole Q^5 therein, loose on the axis H^4 and having a recess Q^6 sunk transversely thereinto, and an opening Q^7 extending from the bottom of the recess Q^6 transversely outward through such eccentric.

Q^8 is a spiral spring, one end of which is seated in each of the chambers Q^2 in the hub Q^3 and gear Q′.

Q^9 is a collar fixed upon the axis H^5 by means of a set-screw Q^{10} to retain the ratchet-and-cam wheel I thereon.

Q^{11} is a collar fixed upon the shaft Q by means of a set-screw Q^{12} and coöperating with the gear Q′ to retain the shaft Q in its bearing H^6.

R is a pin inserted into and freely slidable in each of the chambers Q^2 in the gear and hub Q′ Q^3.

R′ is a footed pin inserted through and freely slidable in the opening Q^7 in the eccentric Q^4, the foot portion R^2 thereof being housed and slidable in the recess Q^6 in such eccentric Q^4.

R^3 is a cam-footed pin inserted through and freely slidable in the opening H^3 in the head H, the cam-foot portion R^4 thereof being housed and slidable in the recess H^2 in the head H.

S is a pitman connected, by means of the eccentric-hoop S′, with the eccentric Q^4 and by means of the socket S^2 with the ball P^4 and forming therewith a ball-and-socket joint.

S^3 is a babbitt ring for reducing friction between the inner surface of the eccentric-hoop S′ and its eccentric Q^4.

T, Figs. 1 and 2, is an oscillating frame hinge-jointed to bearings T′ by means of a pivot T^2.

T^3 is a shaft journaled in the oscillating frame T and having mounted fast thereon a pinion T^4 and a driving-pulley T^5, having a belt-groove in the periphery thereof like that in the pulley C′.

T^6 is a shaft journaled in stationary bearings T^7 in the oscillating frame T and having a gear T^8 mounted fast thereon and meshing with the pinion T^4 on the shaft T^3.

T^9, Fig. 2, is a shaft journaled in sliding bearings T^{10} in the oscillating frame T.

T^{11} and T^{12} are fluted rollers mounted fast on the shafts T^6 T^9, the latter roller being normally forced through its bearings T^{10} and by means of springs T^{13} toward its companion roller T^{12}.

U is an arm rigidly connected at one end with the free end of the oscillating frame T by means of a horizontal open socket U′, fast thereto, and a set-screw U^2. At the free end of the arm U is a hook U^3, from which depends a hooked rod U^4, to the lower end whereof weights U^5 are attached.

V and V′ are belts which connect the driving-pulleys C′ T^5 with a common main driving-shaft. (Not shown.)

Supported by the uprights W W′, extended upward, is any knitting-machine (not shown) adapted to knit the tubular web X and form thereon the transverse welts X′ at predetermined intervals. The knitting-machine just referred to is driven by the same shaft that propels the driving-pulleys C′ T^5. As the web X passes downward from the knitting-machine and between the rollers T^{11} T^{12}, the revolution of the latter against such web will draw the free end of the frame T upward until the belt V′ slackens sufficiently not to turn the pulley T^5, the gear T^8, and rollers T^{11} T^{12}. The knitting-machine, however, will continue to knit, and the portion of the web X between the latter and the rollers T^{11} T^{12} will continue to lengthen, while the weights U^5 cause the free end of the oscillating frame T to descend until the driving-belt V′ again engages and drives the pulley T^5 and the rollers T^{11} T^{12}. The slow upward and downward oscillations of the frame T just described continue during the operation of the machine and serve to thoroughly stretch the web X before it passes to the lower rollers D E. The rollers D E constantly rotate, except when for any reason the knitting-machine fails to furnish web X thereto fast enough or while the knives O P^5 are severing a segment Y from such web. Upon the happening of the first of these contingencies—failure of the knitting-machine to furnish web to the severing mechanism fast enough—that portion of the web between the upper and lower pair of fluted rollers will be drawn taut by the passage of the web between the rollers D E more rapidly than between the rollers T^{11} T^{12}, and such tightening of the web will cause it to impinge against the stop-motion bar N and swing it over toward the upright W′, and thus lift the free end of the arm N^7, which will in turn lift the pawl G out of engagement with the ratchet-wheel D^2, and thereby stop the rollers D E until sufficient web has passed between the rollers T^{11} T^{12} to release the stop-motion bar N, and thus permit the pawl G to descend into engagement with and again drive the rollers D E. The mechanism's mode of operation during the severing of the segment Y from the web X will be fully described hereinafter.

The free end J^2 of the pawl J is idly slid back and forth by its eccentric J′ on the broad upper end of one of the thick teeth I^3 of the ratchet-and-cam wheel I until the lower welt X′ of the web X reaches and passes between the rollers D E. The increased thickness of the web X and welt X′ taken together will force the roller E in its slidable bearings E^2 and against the action of the springs E^4 over against the rolls L^8, thereby forcing the free ends of the arms L^2 L^3 of the bell-crank L outward and the free end of its horizontal arm L′ and the arms M M^4 downward against the action of the spring L^9 until the free end K^2 of the pawl K, pivotally connected with such arm M^4, is thereby drawn downward until it engages one of the teeth I′ on the ratchet-and-cam wheel I. One or two strokes of the pawl K will turn the wheel I forward far enough to cause the free end J^2 of the pawl J to leave the thick tooth I^3 and engage one of the adjacent teeth I′ thereof. As soon as the welt X′ leaves the rollers D E the springs E^4 will restore the slidable roller E to its normal position and the spring L^9, acting against the under side of the long arm L′ of the bell-crank L, will raise such arm L′ and the arms M M^4 and the free end K^2 of the pawl K sufficiently to disengage such pawl K from the teeth of the wheel I; but the pawl J will continue to rotate such wheel I a distance measured by, say, five teeth I′, during which operation one of the sunken cams I^2 in the end of the wheel I will reach and register with the opening H^3 in the head H. The first of the pins R in the constantly-rotating gear Q′ that reaches and registers with the footed pin R′ will be forced by the spring Q^8 over into engagement with the eccentric Q^4, and the footed pin R′ and cam-footed pin R^3 will also be forced by the action of such spring Q^8 into the positions shown in Fig. 5, the free end of the pin portion of the cam-footed pin R^3 being then in engagement with the innermost recess of the cam I^2 in the wheel I. Obviously as soon as the constantly-rotating gear Q′ is connected with the eccentric Q^4 by the pin R such eccentric Q^4 will be rotated and, acting through its pitman S, will close the swinging jaw P, and thereby cause the knives O P^5 to sever a segment Y from the web. The eccentric Q^4 makes a single rotation at each operation of severing a segment Y from the web X, during which rotation of the eccentric the pawl J will continue to rotate the wheel I a dis-

tance measured by, say, three teeth of such wheel I. The cam I^2 will by this time have forced the cam-footed pin R^3 into the head H, the cam-foot R^4 will have forced the footed pin R′ into the eccentric Q^4, and the pin R into the gear Q′ against the action of the spring Q^8, thereby leaving the parts I, H, Q^4, and Q′ entirely disconnected from each other. As the jaw P closed it engaged the arm N^5 on the stop-motion bar N and therethrough and through the arm N^7 thereon lifted the pawl G out of engagement with the ratchet-wheel D^2 of the roller D, thereby causing the rollers D E to remain motionless during the operation of severing each segment Y from the web X.

The sole function of the foot R^2 is to increase the engaging area of the end of the pin portion R′ thereof adjacent to the pin R.

While the eccentric Q^4 is making a rotation the footed pin R′ will occupy the position shown in Fig. 5, the free end of the pin portion thereof projecting over against the bottom of the annular recess H′ in the head H. Immediately after the cam I^2 in the wheel I has driven the cam-footed pin R^3 into the head H the rotation of the eccentric Q^4 will carry the free end of the pin portion of such pin R′ along the face of the cam R^4, which will force the footed pin R′ into the eccentric Q^4 and the pin R into the recess Q^2 in the gear Q′, as already stated.

What I claim as new, and desire to secure by Letters Patent, is—

1. In mechanism for transversely severing knit fabrics, in combination, a pair of fluted rollers mounted parallel to each other, one in stationary and the other in laterally-slidable bearings, springs normally impelling the slidable bearings and their roller toward its counterpart roller, means for driving such rollers, a mounted ratchet-wheel, a mounted bell-crank, having short arms and a long arm, rolls, mounted in the free ends of the short arms of the bell-crank and contacting peripherally the slidable roller, a pawl adapted to be engaged with and disengaged from the ratchet-wheel, and pivoted connections between such pawl and the free end of the long arm of the bell-crank, substantially as and for the purpose specified.

2. In mechanism for transversely severing knit fabrics, in combination, a pair of fluted rollers mounted parallel to each other, one in stationary and the other in laterally-slidable bearings, and the latter roller having transverse annular grooves sunk into the periphery thereof, springs normally impelling the slidable bearings and their roller toward its counterpart roller, means for driving such rollers, a mounted ratchet-wheel, a bell-crank, having short arms and a long arm, rolls, mounted in the free ends of the short arms of the bell-crank and contacting peripherally the bottom of the annular grooves in the slidable roller, a pawl adapted to be engaged with and disengaged from the ratchet-wheel, pivoted connections between such pawl and the free end of the long arm of the bell-crank, the slidable roller being operative, slidably, by transverse welts on a web of knit fabric passing between such fluted rollers, substantially as and for the purpose specified.

3. The combination, with a base, of a head having an annular recess H′ sunk transversely thereinto, a recess H^2 countersunk into the bottom of the annular recess, and an opening H^3 extending from the bottom of the countersunk recess transversely outward through such head, and provided with axes H^4 H^5 projecting transversely, in opposite directions, from said head and having a bearing H^6, extending through and concentric with the longitudinal centers of such axes, a combined ratchet-and-cam wheel I—the teeth of the ratchet being formed on the periphery of, and the cams being sunk into and sloping outward to one end of, such wheel—mounted on the axis H^5, a cam-footed pin R^3 inserted through and freely slidable in the opening H^3 in the head, the cam-foot portion R^4 thereof being housed and slidable in the countersunk recess H^2 therein, an eccentric Q^4 rotatably mounted on the axis H^4, of the head and having a recess Q^6 sunk transversely thereinto and an opening Q^7 extending from the bottom of the recess Q^6 transversely outward through the eccentric, a footed pin R′ inserted through and freely slidable in the opening Q^7 in the eccentric, the foot portion R^2 thereof being housed and slidable in the recess Q^6 therein, a shaft mounted in the bearing H^6 in the head, a gear, fast to the shaft and having chambers Q^2 therein, springs seated in the chambers Q^2 in the gear, pins R inserted into and freely slidable in the chambers Q^2 in the gear, and means for operating the combined ratchet-and-cam wheel and the gear, substantially as and for the purpose specified.

4. The combination, with a base, of a head having an annular recess H′ sunk transversely thereinto, a recess H^2 countersunk into the bottom of the annular recess, and an opening H^3 extending from the bottom of the countersunk recess transversely outward through such head, and provided with axes H^4 H^5 projecting transversely, in opposite directions, from said head and having a bearing H^6 extending through and concentric with the longitudinal centers of such axes, a combined ratchet-and-cam wheel I—the teeth of the ratchet being formed on the periphery of, and the cams being sunk into and sloping outward to one end of, such wheel—mounted on the axis H^5, a cam-footed pin R^3 inserted through and freely slidable in the opening H^3 in the head, the cam-foot portion R^4 thereof being housed and slidable in the countersunk recess H^2 therein, an eccentric Q^4 rotatably mounted on the axis H^4, of the head, and having a recess Q^6 sunk transversely thereinto and an opening Q^7 extending from the bottom

of the recess Q^6 transversely outward through the eccentric, a footed pin R′ inserted through and freely slidable in the opening Q^7 in the eccentric, the foot portion R^2 thereof being housed and slidable in the recess Q^6 therein, a shaft mounted in the bearing H^6 in the head, a gear, fast to the shaft and having chambers Q^2 therein, springs seated in the chambers Q^2 in the gear, pins R inserted into and freely slidable in the chambers Q^2 in the gear, a knife secured to the base, a jaw pivot-jointed to the base and provided with a knife adapted to coöperate with the knife on the base, and a pitman connecting the eccentric Q^4 with the outer end of the jaw, substantially as and for the purpose specified.

5. In mechanism for transversely severing knit fabrics, in combination, a base, a pair of fluted rollers mounted parallel to each other thereon, one in stationary bearings and the other in laterally-slidable bearings, a ratchet-wheel fast to one end of the roller mounted in stationary bearings, a mounted shaft, a pawl, as G, driven by such shaft and normally engaging the ratchet-wheel, a stop-motion bar mounted on bearings on the base so as to freely oscillate thereon, and provided with an arm projecting under and adapted to lift the pawl, and an arm projecting into the path of the jaw P of the mechanism, pivot-jointed to the base, substantially as and for the purpose specified.

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

FRANK G. SHELAIN.

Witnesses:
L. L. MORRISON,
NELLIE BUNKER.