No. 753,812. PATENTED MAR. 1, 1904.

F. G. SHELAIN.

# MECHANISM FOR TRANSVERSELY SEVERING WEBS OF KNIT FABRICS.

APPLICATION FILED AUG. 26, 1903.

NO MODEL. 5 SHEETS—SHEET 1.

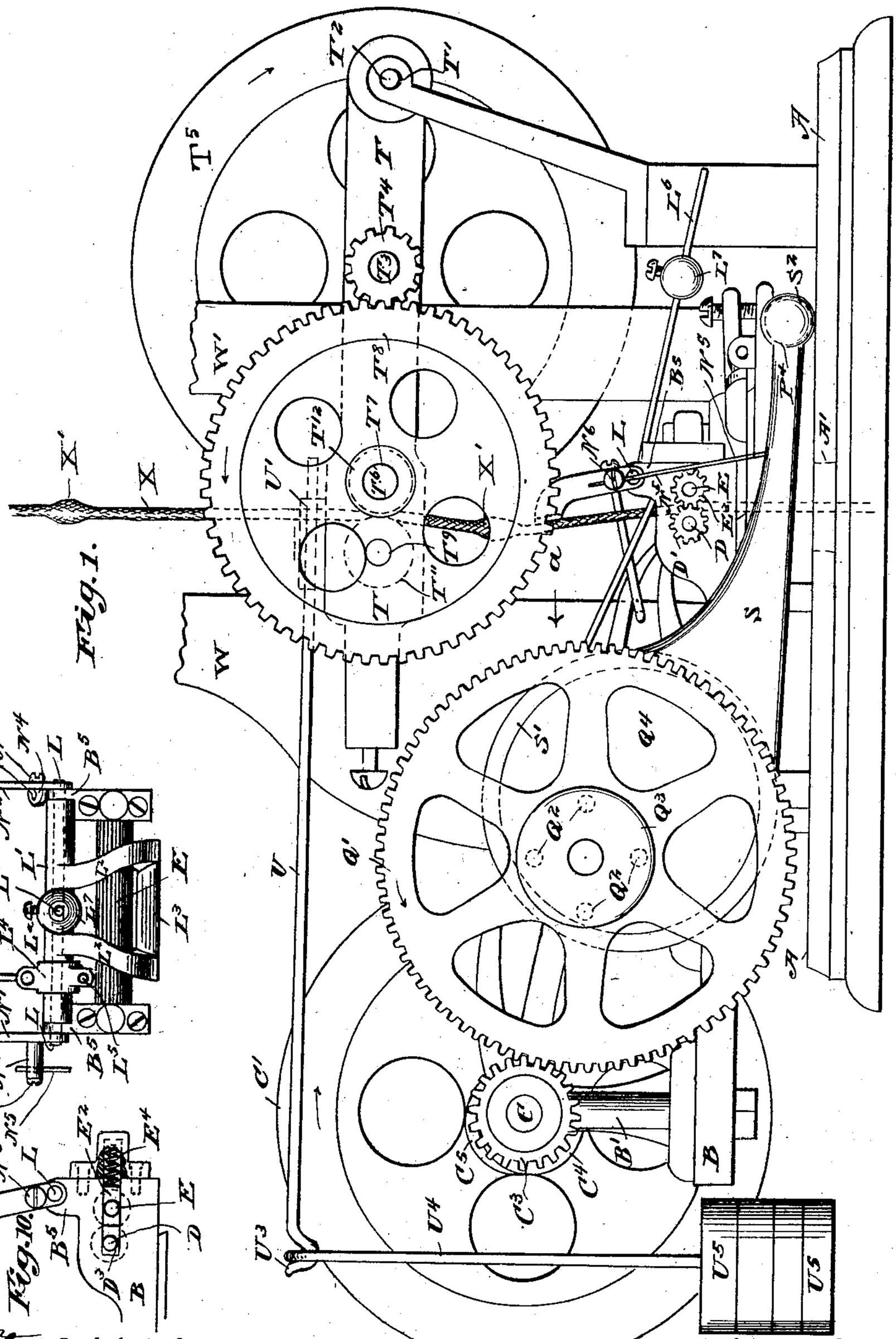

Fig. 1.



Fig. 9.



Fig. 10.

Witnesses.
F. G. Mann,
H. Litzenberg.

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By L. L. Morrison,
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NO MODEL. 5 SHEETS—SHEET 2.

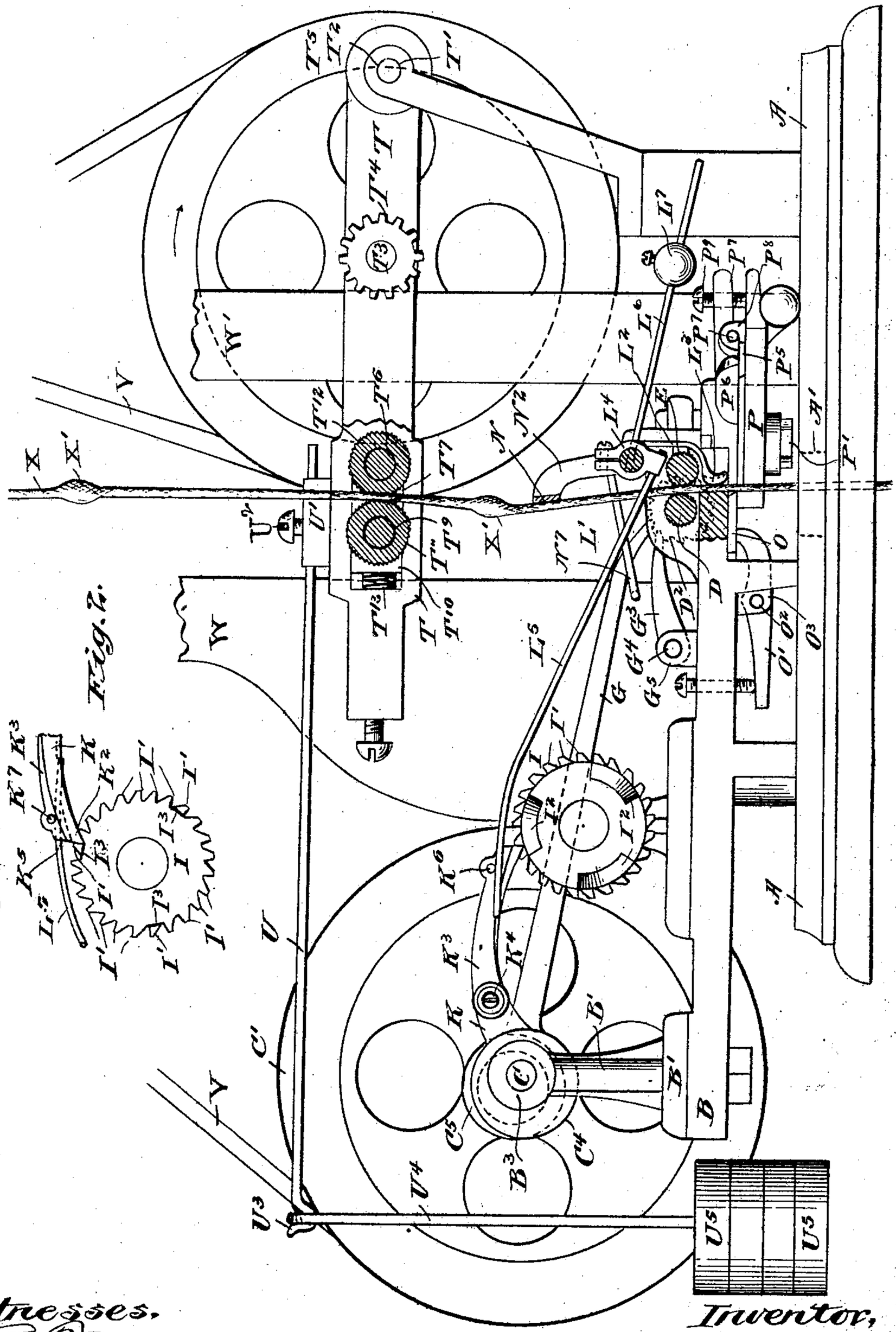


Fig. 1.

Fig. 5a.




Witnesses.
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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 8.

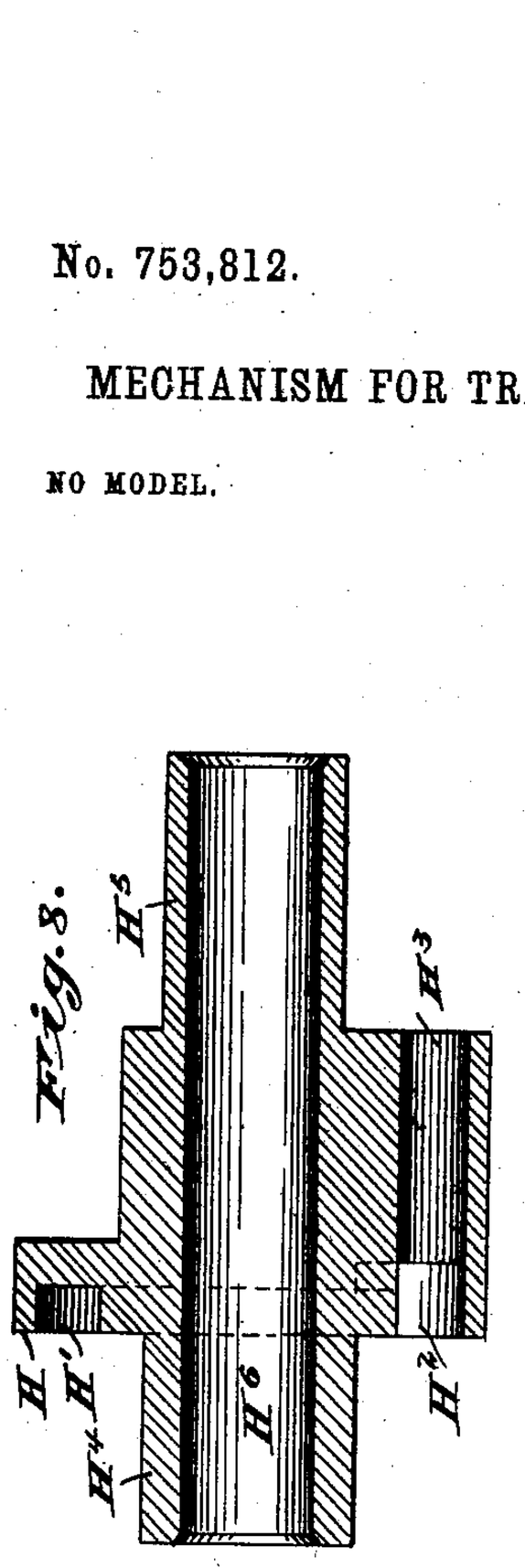


Fig. 5.




Witnesses,
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NO MODEL. 5 SHEETS—SHEET 4.

Fig. 4.

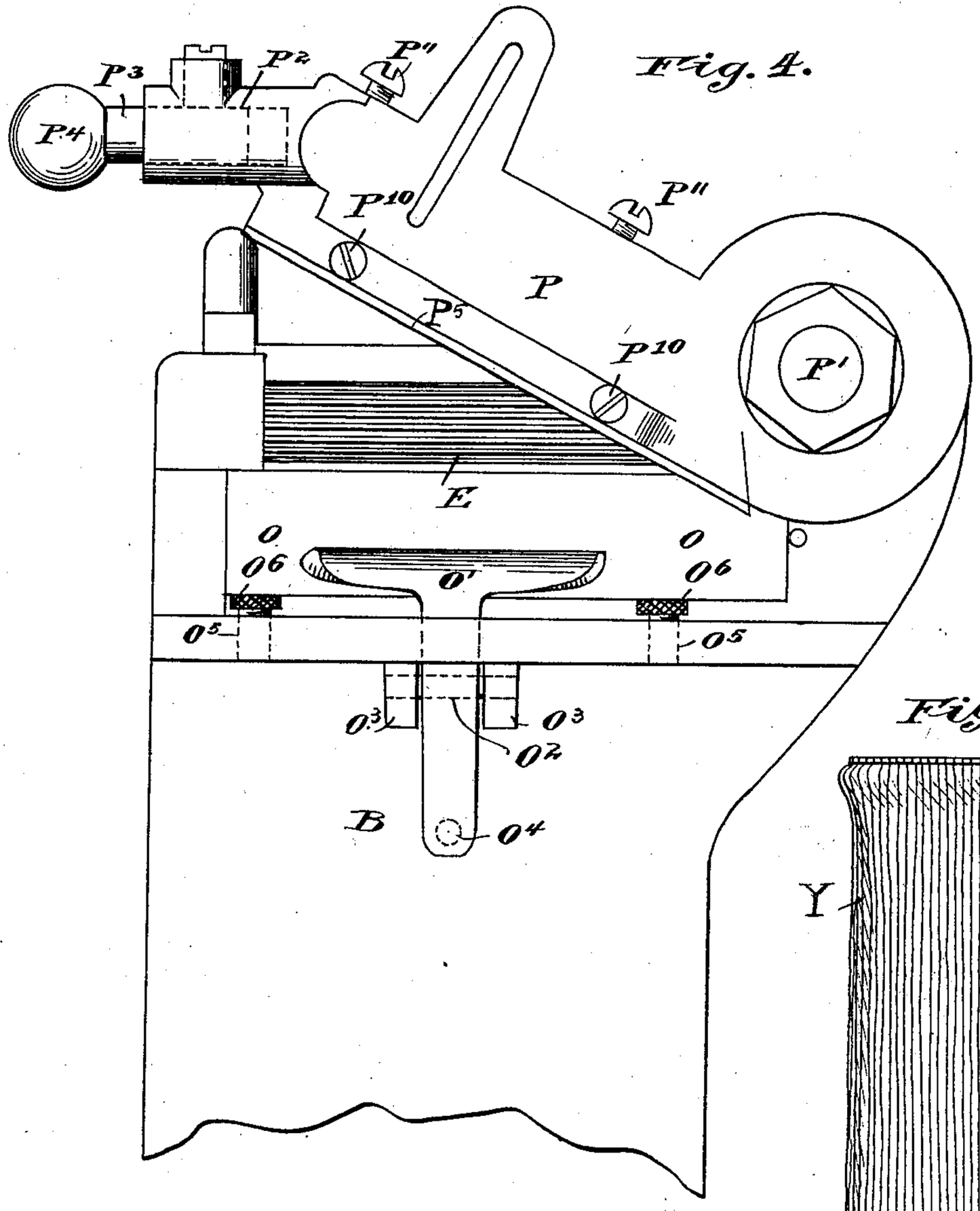


Fig. 11.




Witnesses,
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NO MODEL 5 SHEETS—SHEET 5.

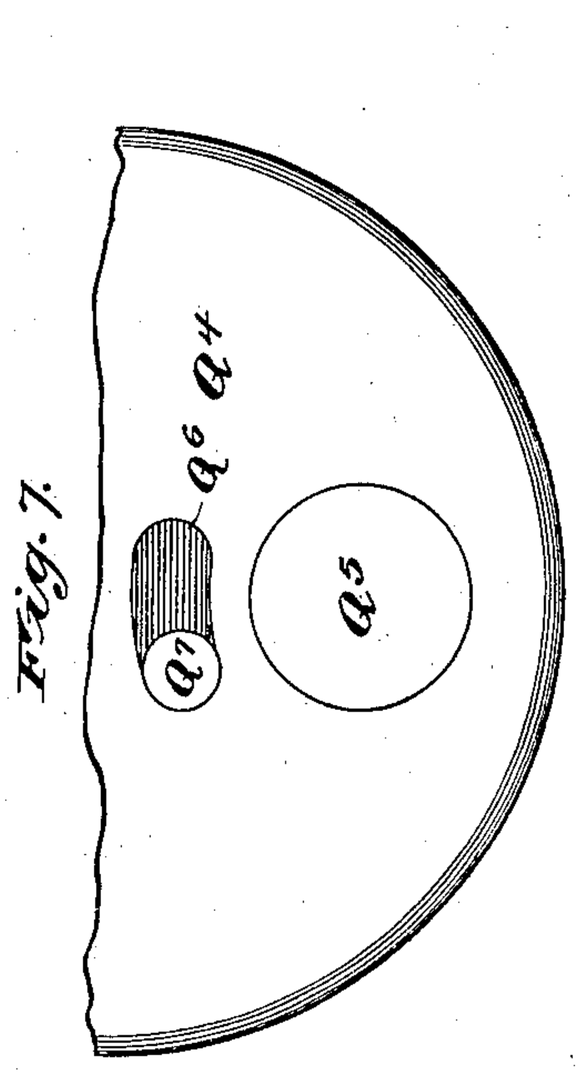





Fig. 5.




Fig. 6.

Witnesses,
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A. R. Litzenberg

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No. 753,812. Patented March 1, 1904.

# UNITED STATES PATENT OFFICE.

FRANK G. SHELAIN, OF ROCKFORD, ILLINOIS, ASSIGNOR OF ONE-HALF TO FRANK R. BROWN, OF ROCKFORD, ILLINOIS.

## MECHANISM FOR TRANSVERSELY SEVERING WEBS OF KNIT FABRICS.

SPECIFICATION forming part of Letters Patent No. 753,812, dated March 1, 1904.

Application filed August 26, 1903. Serial No. 170,884. (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 lengths 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 an impingement of each welt against the free end portions of rock-shaft-actuating arms therein. The welts serve as a finish for the outer ends of the tops or bands and will not ravel.

The object of this invention is to improve the mechanism shown and described in Letters Patent of the United States, No. 714,825, issued to myself and Frank R. Brown, of Rockford, Illinois, December 2, 1902, for mechanism for transversely severing webs of knit fabrics; and it consists of certain new and useful features of construction and combinations of parts especially devised to that end, 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 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. Fig. 5$^a$ is an end view of a combined ratchet and cam wheel shown in side elevation in Fig. 5. 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 parts 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.

B$^5$ represents lugs integral with and projecting vertically from the top of the frame B.

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 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. The resulting adjustability of the roller E insures both that the web X will always be fed downward thereby and that the welts X′ thereon will pass between them without injury to themselves or to the machine.

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 $H^5$. About one-half, in width, of several—in this case three—teeth I′, Figs. 5 and $5^a$, of the wheel I are cut away to form slideways $I^3$ therein for the free end of a pawl, to be described hereinafter, to reciprocate upon idly at predetermined times.

K, Fig. 3, is a pawl connected by means of the eccentric hoop K′ with the eccentric $C^4$ and having its free end $K^2$ projecting into engagement with one of the slideways $I^3$ in the periphery of the wheel I and at predetermined times engaging with the teeth I′ thereon and therethrough operating the same in conjunction with another pawl to be next hereinafter described.

$K^3$, Figs. 2 and 3, is a pawl jointed by means of a transverse fixed pivot $K^4$ to the pawl K between the ends thereof and parallel thereto and having its free end $K^5$ adapted to engage with and projectable into the path of all of the teeth (including the three narrow ones opposite to the slideways $I^3$) I′ of the wheel I.

$K^6$ is a pintle extending transversely through and seated in the pawl $K^3$, one end $K^7$ thereof extending across and being adapted to rest upon the pawl K, thereby rendering such pawl $K^3$ available as a weight to maintain the free end $K^2$ of the pawl K in engagement with the wheel I while such pawl K is being operatively reciprocated.

L, Figs. 1, 9, and 10, is a pintle mounted loose in and projecting outward through transverse circular bearings in the lugs $B^5$ on the frame B.

L′, Figs. 3 and 9, is a rock-shaft mounted fast on the pintle L.

$L^2$, Figs. 2 and 9, represents rock-shaft-actuating arms integral or rigidly connected by their upper ends with the rock-shaft L′ and connected by their lower end portions by means of a transverse bar $L^3$. The form of the arms $L^2$ may be varied and the bar $L^3$ may be omitted therefrom, if desired, or a single wider arm may be employed instead of the two described above. In other words, the form or number of elements composing such device are entirely immaterial, so long as it will perform its function.

$L^4$ is a collar fast to the rock-shaft L′.

$L^5$ is a pawl-regulating arm seated in the collar $L^4$ on the rock-shaft L′ and projecting transversely therefrom under and into engagement with the pintle $K^6$ of the pawl $K^3$.

$L^6$ is a weight-arm seated in the rock-shaft L′ and projecting transversely therefrom in the opposite direction from that in which the pawl-regulating arm $L^5$ projects.

$L^7$ is a weight slidably mounted for adjustment on the arm $L^6$.

Obviously a weight might be attached directly to the rock-shaft L′ or to the arms $L^2$ or to their connecting-bar $L^2$; but in either event a heavier weight than is here shown would be required and a clumsier construction would consequently result. A weight acting through the rock-shaft L′ and pawl-regulating-arm $L^5$ sufficient to normally lift and hold the point $K^5$ of the pawl $K^3$ out of engagement with the teeth I′ of the wheel I is what and all that is required.

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 pintle L, mounted in the bearings $B^5$, 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 $H^6$, ex-

tending 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.

$Q^8$ represents spiral springs seated in 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 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 $K^2$ of the pawl K is idly slid back and forth by its eccentric $C^4$ in one of the slideways $I^3$ in the periphery of the ratchet and cam wheel I until the lower welt X′ of the web X impinges against the free ends of the rock-shaft-actuating arms $L^2$ and swings them away from the roller E, and thereby rocks the shaft L′ in the direction indicated by the arrow

$a'$ in Fig. 3 until the free end of the pawl-regulating arm $L^5$ descends out of intermediate engagement with the pawl $K^3$, whereupon the latter will drop downward into engagement with one of the teeth I′ on the ratchet and cam wheel I. One or two strokes of the pawl $K^3$ will turn the wheel I forward far enough to cause the free end $K^2$ of the pawl K to be left by its slideway $I^3$ and engage one of the adjacent teeth I′ thereof. As soon as the welt X′ of the web X descends below and out of engagement with the arms $L^2$ the weighted arm $L^6$, acting through the rock-shaft L′, pawl-regulating arm $L^5$, and pintle $K^6$, will lift the free end $K^5$ of the pawl $K^3$ out of engagement with the teeth of the wheel I; but the pawl K will continue to rotate such wheel I a distance measured by, say, five teeth I′, during which rotation 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 a 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 K will continue to rotate the wheel I a distance 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.

The parts L′ to $L^7$, inclusive, taken together constitute a bell-crank (lettered $L^a$ in Figs. 3 and 9) and considered collectively are so denominated for brevity and convenience in the claims hereof.

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 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 driving-pawl adapted to engage with and be disengaged from the ratchet-wheel, a pivotally-mounted bell-crank, having a long arm projecting into engagement with the pawl and short arms projecting transversely around and under one of the rollers and so weighted as to normally hold the pawl out of engagement with the ratchet-wheel and to maintain the free ends of its short arms in the path of the transverse welts on a web of knit fabric passing between the rollers, 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, springs normally impelling the slidable bearings and their roller toward its counterpart roller, means for driving such rollers, a mounted ratchet-wheel, a driving-pawl adapted to engage with and be disengaged from the ratchet-wheel, a pivotally-mounted bell-crank, having a long arm projecting into engagement with the pawl and short arms projecting transversely around and under the slidable roller and so weighted as to normally hold the pawl out of engagement with the ratchet-wheel and to maintain the free ends of its short arms in the path of the transverse welts on a web of knit fabric passing between the fluted rollers, the free end of the long arm of such bell-crank being depressible—by impingement of the transverse welts of the knit fabric against the free end portions of the short arms thereof—to such an extent as to permit the pawl to engage the ratchet-wheel, 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, a pair of rollers D E mounted parallel to each other, one in stationary and the other in laterally-slidable bearings, springs normally impelling the slidable bearings and their roller E toward its counterpart roller D, a driving-pawl K constantly engaging the ratchet and cam wheel I and projecting into the path of the slideways $I^3$ therein, a driving-pawl $K^3$—mounted on the pawl K between its ends—adapted to engage with and be disengaged from the ratchet and cam wheel I, a pivotally-mounted bell-crank $L^a$, having an arm $L^5$ projecting into engagement with the pawl $K^3$ and arms $L^2$ projecting around and under the roller E and so weighted as to normally hold the pawl $K^3$ out of engagament with the ratchet and cam wheel I and to maintain the free ends of its arms $L^2$ in the path of the transverse welts X′, on the web of knit fabric passing between the rollers D E, 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,
RICHARD F. LOCKE.