(No Model.) 2 Sheets—Sheet 1.

# E. C. COVELL, E. S. CRAM & W. E. SHEEHAN.

## TRIMMING DEVICE FOR KNITTING MACHINES.

No. 388,183. Patented Aug. 21, 1888.

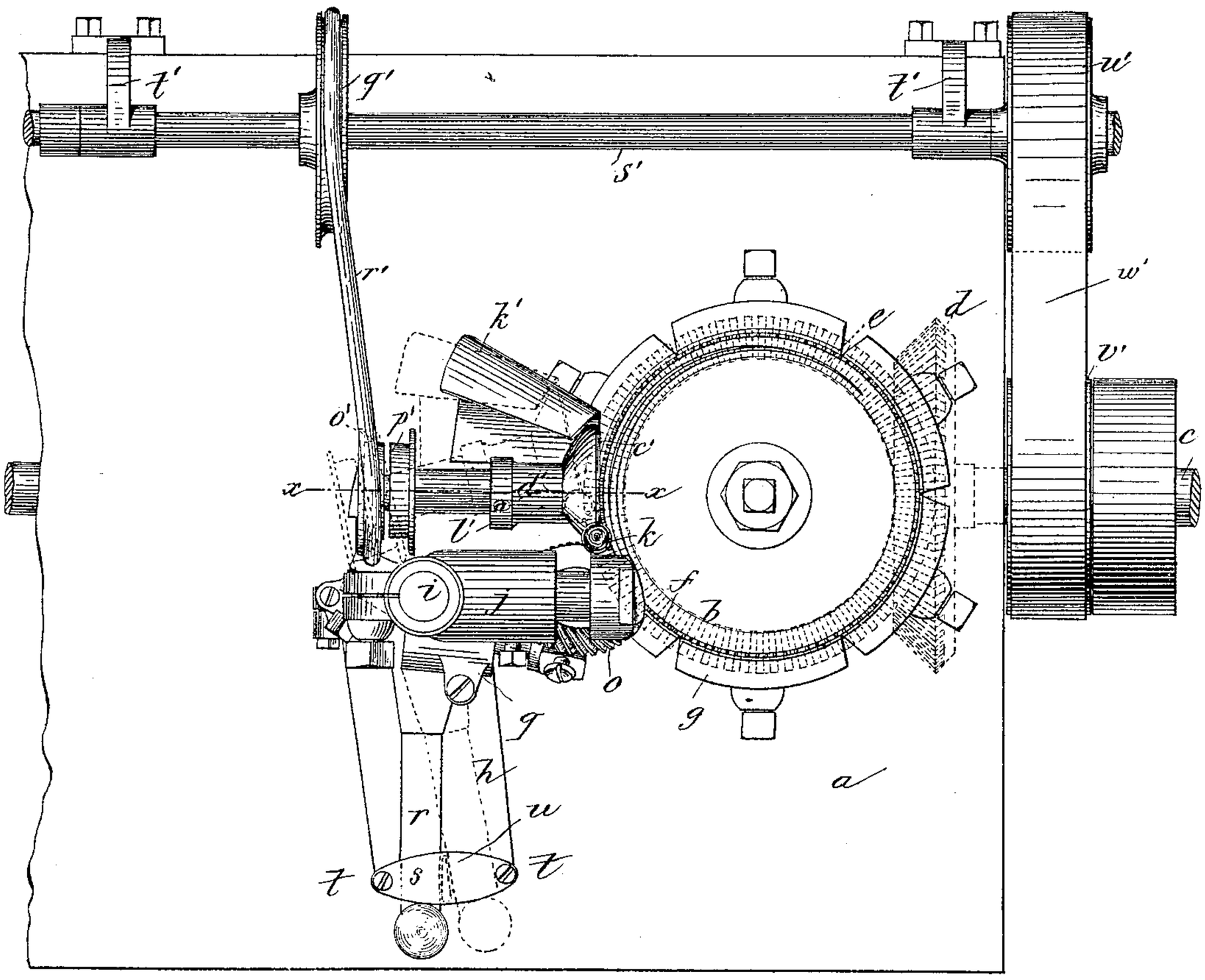


Fig: 1.

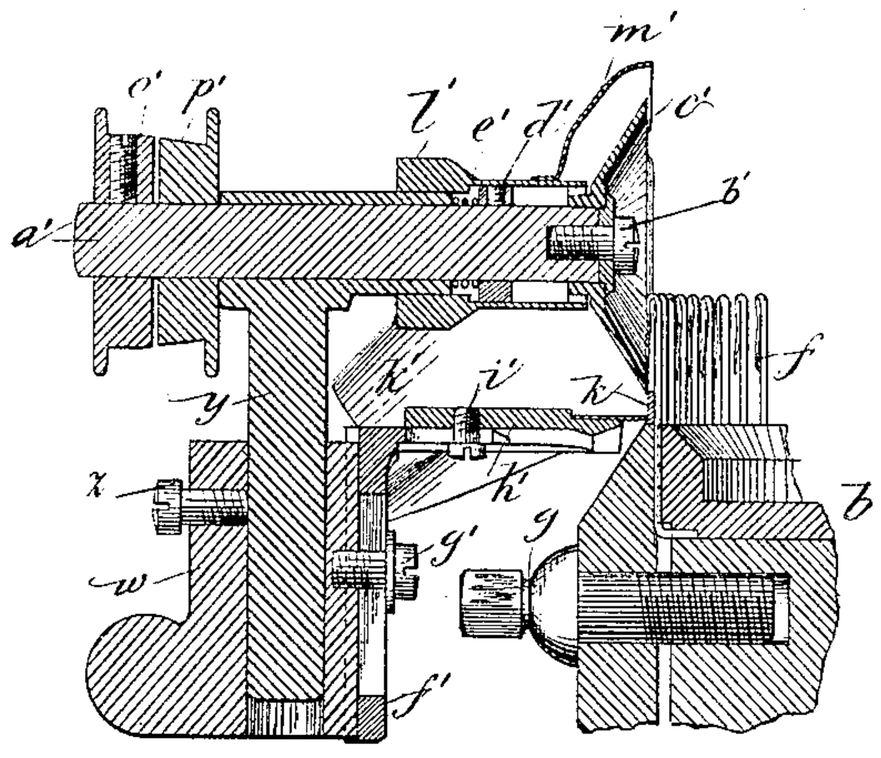


Fig: 2.

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(No Model.) 2 Sheets—Sheet 2.

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Fig: 3.

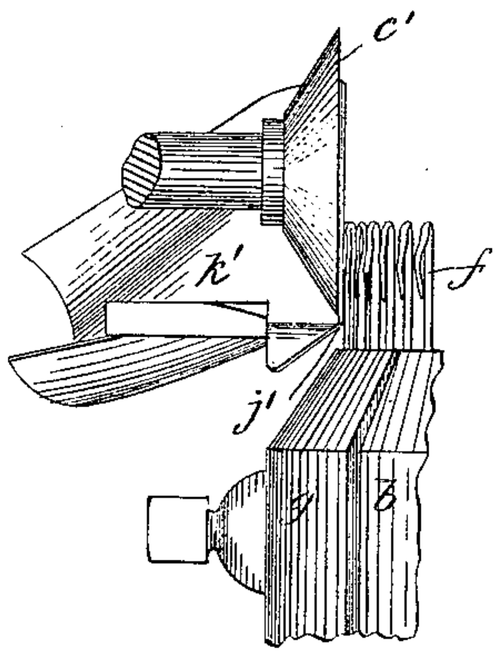



Fig: 4.

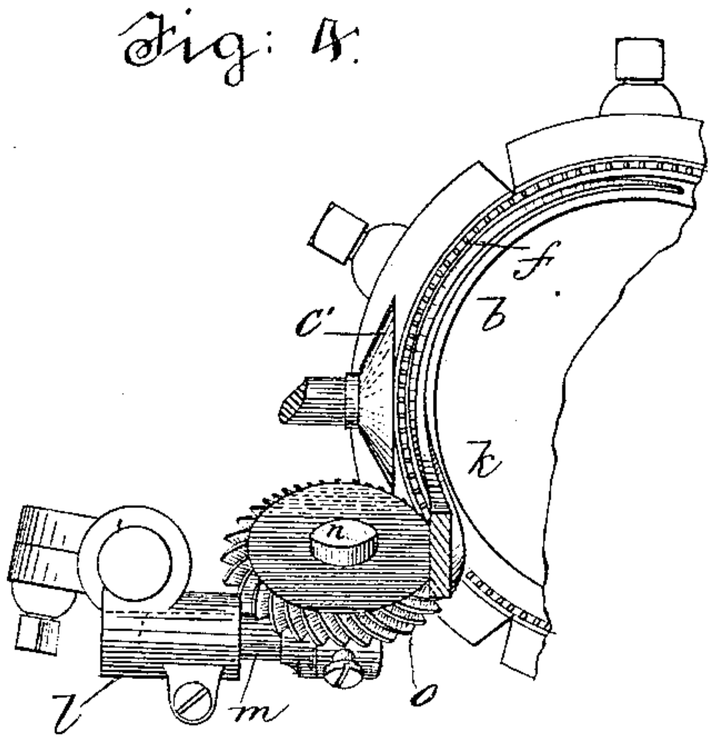



Fig: 5.

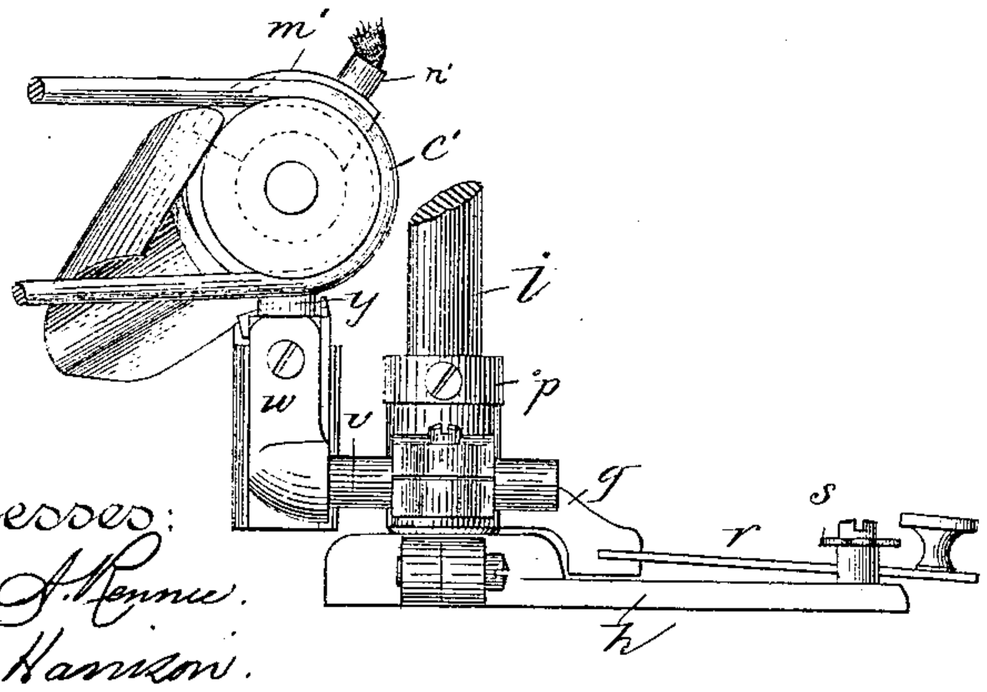
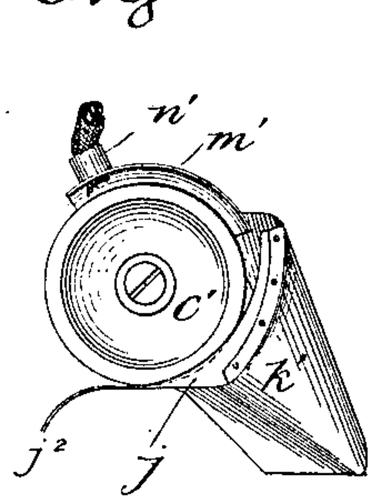



Fig: 6.

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# UNITED STATES PATENT OFFICE.

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## TRIMMING DEVICE FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 388,183, dated August 21, 1888.

Application filed June 7, 1886. Serial No. 204,329. (No model.)

*To all whom it may concern:*

Be it known that we, EDGAR C. COVELL, ELISHA S. CRAM, and WILLIAM E. SHEEHAN, of Laconia, in the county of Belknap and State of New Hampshire, have invented certain new and useful Improvements in Trimming Devices for Knitting-Machines, of which the following is a specification.

Our invention relates to knitting-machines, and particularly to contrivances whereby the edge of a previously-knit fabric picked upon the needles in the process of knitting and projecting from the course or line of stitches by which it is joined to the main web is trimmed off in the process of finishing the completed fabric.

It is the object of the invention to provide a mode whereby the trimming aforesaid may be accomplished expeditiously, resulting in a material saving of time, and also to effect the trimming so as to leave a course or fraction of a course of loops of the trimmed-off edge in the row of loops by which the previously-knit web is joined to the main web, which last-mentioned row or course of loops is usually open, or what is better known as a "slack course," so that in finishing the fabric the projecting row or fractional part of a row of loops aforesaid may be filled in said slack course to fill up the otherwise open loops or meshes.

It is also the object of the invention to provide a trimming device which may be operated in connection or combination with the needles or knitting or fabric-forming means, whereby the trimming may be effected automatically and while the knitting or fabric-forming means are in operation, whereby the foregoing method may be practiced.

It is also the object of the invention to provide a trimming-knife of such construction as will permit of trimming close to the needles and avoid contact with and injury to the barbs or hooks of the same.

It is also the object of the invention to provide the trimming device with a guiding contrivance adapted to operate in connection with the needles and needle head or cylinder in such manner that the projecting edge of the fabric to be trimmed off may be properly guided to the trimming device to be trimmed at precisely the desired point.

It is also the object of the invention to provide means whereby the trimming device may be readily adjusted in and thrown out of operative position with respect to the knitting mechanism irrespective of the operative or quiescent state of the latter.

It is also the object of the invention to so construct the pulley or pulleys by which the shaft carrying the rotary cutter is operated that the belt may be readily shifted thereon from the fast to the loose portion of the pulley.

It is also the object of the invention to provide means for adjusting the trimming device nearer to or farther from the needles, for the purpose of varying the amount of fabric or the fractional part of a course of loops left in the course by which the previously-knit fabric was picked upon the needles.

It is also the object of the invention to provide means whereby one of the knives of the trimming device may be held against the other with a yielding pressure, in order to secure certainty in the operation of the knives.

It is also the object of the invention to provide a guide for carrying the trimmed-off edge away from the needles and other operative parts of the machine, to avoid damage to the fabric and machine in the operations of the latter.

It is also the object of the invention to provide means for lubricating the rotating cutting-knife to avoid friction and wear of the parts.

It is also the object of the invention to incidentally improve the machine in carrying out the hereinbefore-mentioned objects.

To the foregoing ends our invention consists in the devices and combinations of devices hereinafter described in such manner that those skilled in the art may make and use the invention, the latter being particularly set forth in the claims hereto appended.

Of the drawings hereto annexed and forming a part of this specification, Figure 1 represents a plan view of a knitting-head having our improvements applied thereto. Fig. 2 represents a vertical section thereof on the line *x x*, Fig. 1. Figs. 3, 4, 5, and 6 represent detail views hereinafter referred to.

Similar letters of reference indicate similar parts in all of the views.

In the drawings, *a* represents the bed or table in which the needle cylinder or head *b* is adapted to rotate. *c* is the driving-shaft, having secured thereto the bevel-wheel *d*, meshing with a like wheel, *e*, formed upon or secured to the lower end of the cylinder *b*, the wheels *d e* being shown in dotted lines only in Fig. 1. The needles *f* are of the barbed or spring-beard class, and are secured to the cylinder by the clamping-sections *g*, in the usual well-known manner. Indeed all of the parts thus far described are of common construction, and a machine thus constructed is adapted to be equipped with a yarn-guide, a loop or stitch wheel, a sinker or dividing wheel, a presser-wheel, and landing and knocking-over wheels, all constructed and arranged to assist in performing the functions of knitting a plain web, in a manner well understood by knitting artisans, and fully illustrated and described on page 221, Vol. II, of Appleton's Cyclopedia of Applied Mechanics. (New York, D. Appleton & Co., 1885.) These last-mentioned devices form no part of our invention, and for the sake of clearness of illustration are omitted from the drawings.

*h* represents a plate or base attached to the bed *a*, in which is secured in any suitable manner an upright standard or shaft, *i*, to the upper end of which is clamped or otherwise secured a bracket, *j*, supporting at its forward end the usual push-back or cloth-presser, *k*, as is clearly represented in Fig. 1. Below the bracket *j*, and secured on the same standard therewith, is another bracket, *l*, in which is clamped a rod, *m*, having a pin, *n*, on which the clearing-wheel *o* is journaled.

On standard *i*, below bracket *l* and between a fixed collar, *p*, and the plate *h*, is a frame, *q*, adapted to be oscillated on said standard by means of an arm, *r*, extending forward from the frame *q* between the plate *s* and base-plate *h*, the studs or screws *t t*, by means of which said first-mentioned plate is secured to the base, limiting the extent of the lateral movement of arm *r*. A stud or projection, *u*, (shown in dotted lines in Fig. 1,) serves to maintain the arm in either extreme limit of its movement, it being understood that said arm is constructed in the character of a spring, so that at its forward or free end it will bear down upon base-plate *h*.

Extending rearwardly from frame *q* is a rod, *v*, which supports at its rearward extremity a bracket, *w*, in a hole bored in which is vertically secured a rod or post, *y*, adjustable by means of the set-screw *z*, as is clearly represented in Fig. 2.

A short shaft, *a'*, is supported in a bearing formed in the upper end of rod *y*, and to the end of said shaft, extending toward the needles of the head *b*, is secured by means of a screw, *b'*, a circular knife, *c'*, having a concave form on the side facing the needles, said concave form of face extending from substantially the cutting-edge inward toward the center of the wheel, and being convex on the opposite side, as is clearly shown in Fig. 2; or said circular knife may be formed integral with said shaft *a'*. An adjusting-collar, *d'*, is secured to shaft *a'* near the forward end thereof, and between said adjusting-collar and the forward end of the bearing in which said shaft *a'* rests is placed a spiral spring, *e'*, which surrounds the shaft and operates with a tendency of pressing the knife *c'* toward the needles, for a purpose to be presently explained.

Secured to bracket *w* on the side facing the needles is another bracket, *f'*. The means by which the latter is attached to the former is here represented as a screw, *g'*, passing through a slot in the shank of the latter bracket, whereby it is rendered adjustable vertically on the former. To the horizontal arm of the bracket *f'* is attached a plate, *h'*, horizontally adjustable toward and from the needles *f* by means of a screw, *i'*, passing through a slot in said horizontal arm and into said plate. On the forward end of plate *h'* is secured the stationary knife *j'*, having a finger, $j^2$, extending down from its forward end close to the beveled edge of the upper ends of the clamping-sections *g*.

As shown, the circular knife *c'* bears at its side near its rim against stationary knife *j'* on that side thereof opposite the needles, spiral spring *e'* operating to press the circular knife against the stationary knife with a yielding pressure.

Secured to the rear edge of stationary knife *j'* and plate *h'*, or any other part of the machine adapted to support the same, is a hood or guide, *k'*, extending from said knives rearwardly to any convenient distance or point.

To a collar, *l'*, surrounding the bearing in which shaft *a'* is supported, is attached or integrally connected a shield, *m'*, extending up over circular knife *c'*, and on the upper edge of said shield is formed a small cup, *n'*, adapted to contain a packing saturated with a lubricant. Said packing passes through a small hole in the bottom of cup *n'* and into contact with the edge of circular knife *c'*, which arrangement serves to prevent anything from accidentally falling upon or being brought into contact with the cutting-edge of the knife, and at the same time lubricate the latter, so as to avoid friction and wear.

To the end of shaft *a'* opposite the needles is secured a pulley, *o'*, having a substantially convex face, the crown of which is at or near the center, and loosely mounted on said shaft between the end of its bearing or support and fixed pulley *o'* is a pulley, *p'*, having an inclined face, the side adjacent to pulley *o'* coinciding therewith, so that if said pulleys were secured together as one their face would incline from the center or near the center of pulley *o'* to the rim of pulley *p'*, and from said point on pulley *o'* in the opposite direction to the rim of the latter.

Extending around pulleys *o' p'* to and around

a pulley, $q'$, is a belt, $r'$. Said pulley $q'$ is secured to a shaft, $s'$, supported in brackets $t'$, secured to and extending upward from the rear of the table $a$. At an appropriate point on shaft $s'$ is a pulley, $u'$, around which pulley and another pulley, $v'$, on driving-shaft $c$ passes a belt, $w'$, by which shaft $s'$ is rotated, by which latter shaft, through the medium of instrumentalities fully portrayed in Fig. 1, rotary cutter $c'$ is operated.

The operation of our invention will now be fully understood by those skilled in the art with the merest outline of explanation: A stocking or other article of apparel having been completed, and it being desired to begin the knitting of another, the rotation of the head $b$ from the driving-shaft is stopped in any of the ways that may be provided therefor, and by means of arm $r$ the trimming-knives, their supports, and adjuncts are moved into operative position, which is the full-line position in which they are represented in Fig. 1, which movements of said parts will cause belt $r'$ to pass from loose pulley $p'$ to fast pulley $o'$, the peculiar form of the face of said pulleys facilitating this operation. This will cause shaft $a'$, and with it circular knife $c'$, to be rapidly revolved. The operator now proceeds to "pick or run" on the ribbed top or cuff or other previously-formed web, turning the needle cylinder or head by hand as fast as the latter operation is effected, when the edge or portion of the fabric projecting from the needles, coming in contact with the knives $c'$ $j'$, will be trimmed off on a line as close to the course of stitches on the needles as the position to which the knives are adjusted relative thereto will permit, the concave form of the face of circular knife $c'$ permitting of a close adjustment to the shanks or stems of the needles without interference with or injury to the barbs or hooks of the needles. The trimmed-off edge will be carried away from the operative parts of the machine by the hood or guide $k'$, and should the projecting edge be curled into a roll or other form the projecting finger $j^2$ on knife $j'$ will guide or direct it into proper position relative to the knives to be trimmed off, and by locating the trimming device immediately in the rear of the clearing-wheel and just beyond the point where the fabric is first depressed by the push-back, the trimming takes place as soon as the projecting edge is depressed into proper position relative to the stems of the needles and before from any cause its position can be further disturbed. It is to be understood that while the top or previously-formed fabric is being picked or run upon the needles the usual knitting operations are in progress and will take place as fast as the needle-cylinder is turned by hand, the same as if the cylinder were turned by power, so that the trimming and knitting are performed simultaneously, securing a great saving of time. The projecting edge is by the mode and means explained very evenly trimmed off and the course or fraction of a course left in the line of loops by which the top was picked upon the needles is fulled in the open or slack course in finishing the article of apparel knit, thus effectually closing the otherwise open loops of said "picking-on" course. After the fabric has been picked on and the needle-cylinder turned substantially once around, the projecting edge will have been trimmed off, as hereinbefore described, and a full course will have been knit onto the picked-on web. The trimming device is now adjusted to the dotted-line position of Fig. 1, by which it is thrown out of operative position and the belt $r'$ shifted from the fast pulley $o'$ to loose pulley $p'$, as before, when the knitting operations are proceeded with as before uninterrupted and uninterfered with by the trimming device.

We have here shown the trimming device applied to a spring-beard knitting-machine, in which the needles do not reciprocate; but it is obvious that it may be applied to a latch-needle machine, in which the needles do reciprocate, and to other forms of machines, mechanical ingenuity alone being all that is necessary to adapt it to different styles or types of machines, and the concave form of the circular knife extending from substantially the cutting-edge inward toward the center of the knife permitting the unobstructed operation of the beards or hooks and latches of the needles, which would not be the case if the face of the knife adjacent to the needles were flat for any substantial distance inward from its cutting-edge.

Other changes may be made in the form and arrangement of the parts without departing from the spirit of the invention.

We are aware that it is not new during the operation of uniting two or more pieces of knit or other fabric to mechanically trim off the surplus material outside of the seam; hence we do not claim the mode of trimming a fabric and the performance of any other act simultaneously therewith, but confine ourselves to the mode particularly set forth in the claims, whereby simultaneously with the process of forming or knitting the fabric it is trimmed and to this extent finished, as has hereinbefore been described and shown.

While we have set forth our invention as adapted to trim off the projecting edges of ribbed tops—that is, tops of stockings and the like knit in rib-stitch—it is not of course confined in its use to that particular class of goods.

What we claim is—

1. The improvement in the art of manufacturing and finishing a knit fabric, which consists in picking or running a single course of stitches of a previously-knit fabric on the needles of a knitting-machine, leaving an edge or portion of such fabric projecting from the needles, and then proceeding with the knitting in such single picked-on course, and simultaneously therewith trimming off such single projecting edge, substantially as hereinbefore set forth.

2. The improvement in the art of manufacturing and finishing a knit fabric, which consists in picking or running on the needles a previously-knit fabric, then proceeding with the knitting of the same, and simultaneously trimming off such projecting edge, leaving a course or fractional part of a course of loops of such trimmed-off edge in the line of loops or stitches by which the previously-knit fabric was picked on the needles, and fulling such first-mentioned course or fractional part of a course into said last-mentioned course or line of loops, as set forth.

3. The combination, with a needle-head and its needles, of trimming-knives, substantially as described, located in close proximity to the needles, whereby an edge projecting from the needles may be trimmed off close to the main fabric as the knitting progresses, substantially as hereinbefore set forth.

4. A rotary trimming-knife, *c'*, having a concaved face, said concave form of face extending from its periphery or cutting-edge inward toward its center, substantially as and for the purpose hereinbefore set forth.

5. The combination, with the needle-head and its needles, of a stationary knife and a rotary knife, *c'*, adapted to co operate therewith, said rotary knife having a concaved face, and said concave form of face extending from the periphery or cutting-edge of the knife inward toward its center, whereby provision is made for the operation of the knife close to the needles without interference with the beards or latches of the latter, substantially as and for the purposes hereinbefore set forth.

6. The combination, with the needle-head and needles of a knitting machine, of a rotary and a stationary trimming-knife adapted to trim an edge projecting from the needles, said rotary knife having a concaved face, and said stationary knife being provided with the guiding-finger $j^2$, for bringing the projecting edge into proper position to be trimmed off, substantially as set forth.

7. The combination, with the needle-head and needles of a knitting-machine, the needle-head being provided with clamping-sections beveled on their upper outer edges, of a rotary and a stationary trimming-knife adapted to trim an edge projecting from the needles, said stationary knife being provided with a guiding-finger, $j^2$, arranged close to the beveled edge of the clamping-sections, for bringing the projecting edge into proper position to be trimmed off, substantially as set forth.

8. The combination, with the needle-head and needles of a knitting-machine, of a trimming mechanism, substantially as set forth, for trimming off a projecting edge of a fabric picked on the needles, a movable support for said trimming mechanism, means for operating the trimming mechanism and needle-head, and devices, substantially as explained, for moving said support to bring the trimming mechanism into operative or inoperative position, substantially as set forth.

9. The combination, with the needle-head and needles of a knitting-machine, of a trimming mechanism adapted to trim off an edge of a picked-on web projecting from the needle, the guiding-finger $j^2$, and guide or hood $k'$, substantially as and for the purposes set forth.

10. The combination, with the needle-head and needles of a knitting-machine, of a trimming mechanism comprising a rotary knife having a concaved face and a stationary knife adapted to co-operate with said rotary knife for trimming off an edge of a fabric projecting from the needles, and means for adjusting said trimming-knives nearer to or farther from the needles, substantially as set forth.

11. The combination, with the rotary cutter and its shaft, of the fast and loose pulleys, having their faces formed substantially as herein shown and described, and means for adjusting the position of said shaft and pulleys for shipping the belt, as set forth.

12. The combination, with the rotary and stationary cutter, of the oil-cup *n'*, provided with a "packing" in contact with the rotary knife, for applying a lubricant to the cutters, as set forth.

13. The combination, with the rotating head, of the push-back, clearing-wheel, and trimming device, located in the rear of the clearing-wheel and front of the push-back, as set forth.

In testimony whereof we have signed our names to this specification, in the presence of two subscribing witnesses, this 19th day of May, 1886.

EDGAR C. COVELL.
ELISHA S. CRAM.
WILLIAM E. SHEEHAN.

Witnesses for Covell and Cram:
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Witnesses for Sheehan:
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