(No Model.) 2 Sheets—Sheet 1.

H. C. RIGHTMIRE.

KNITTING MACHINE.

No. 457,868. Patented Aug. 18, 1891.

Fig. 3.

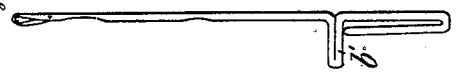


Fig. 2.

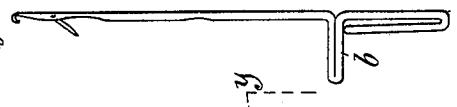


Fig. 1.

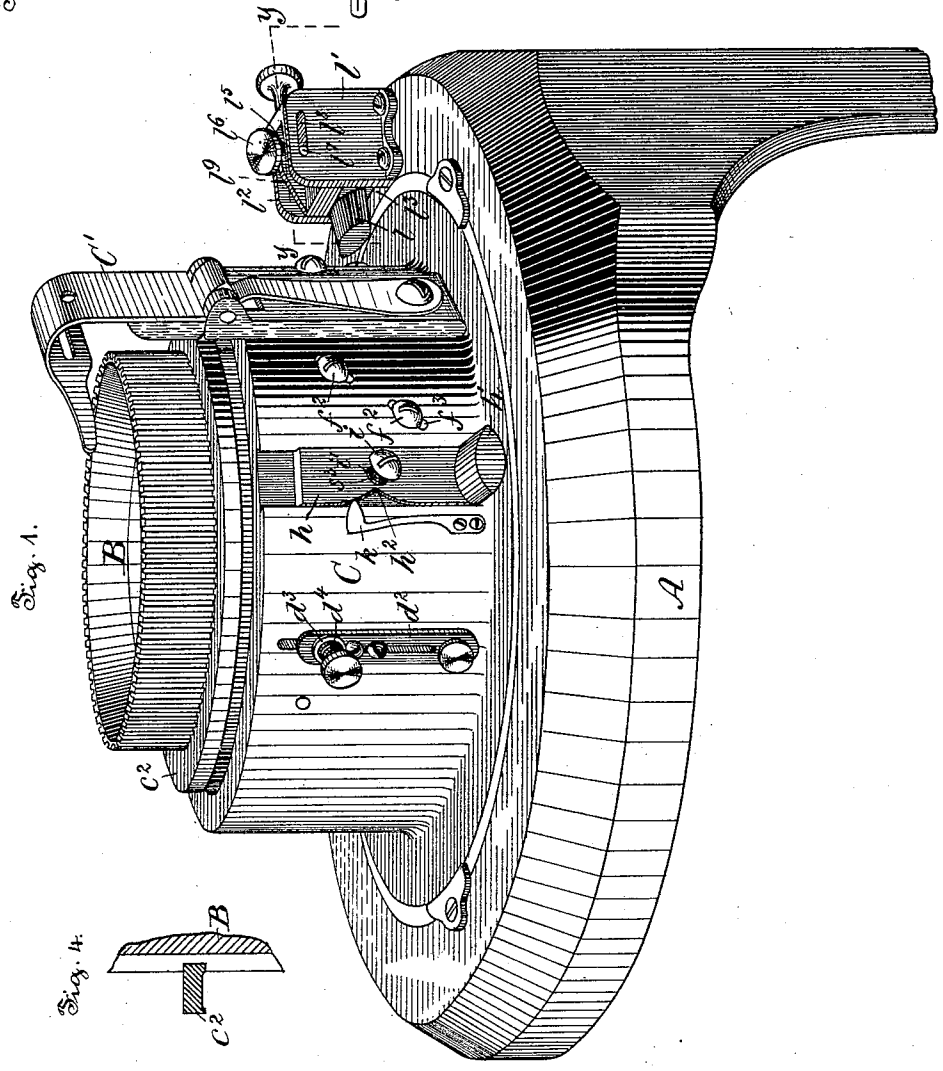


Fig. 4.

WITNESSES:

Hermann Bornmann.

Thomas M. Smith.

INVENTOR

Harry C. Rightmire,

by J. Walter Douglass,

Atty.

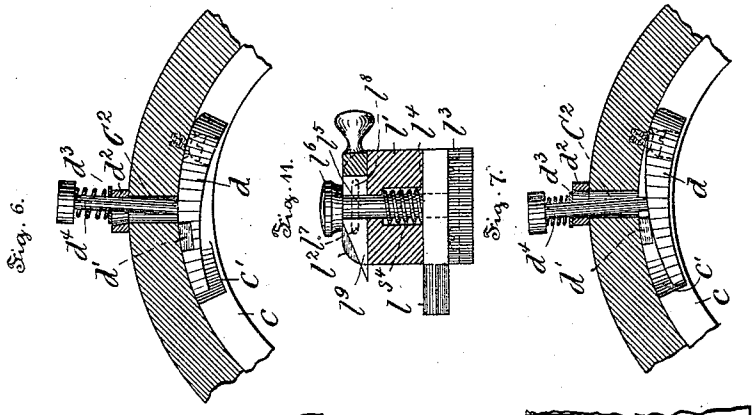
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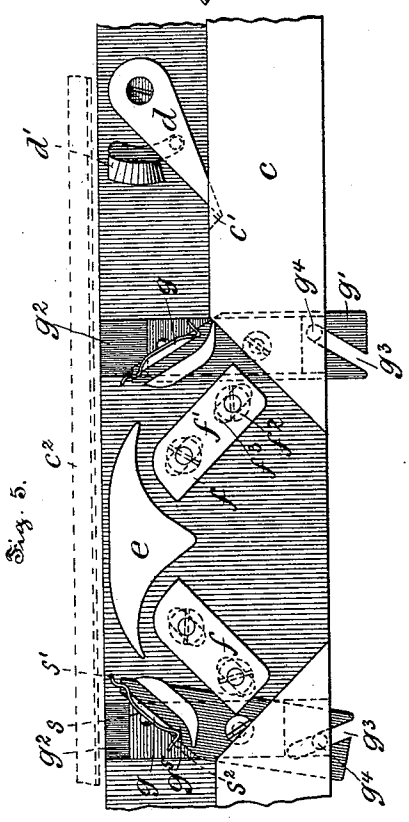
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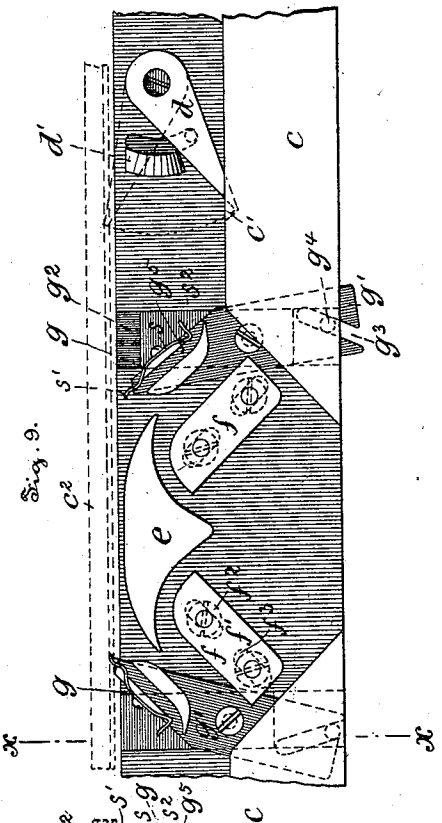
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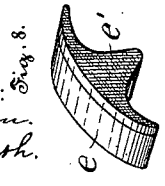
KNITTING MACHINE.

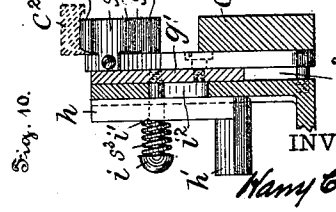
No. 457,868. Patented Aug. 18, 1891.











WITNESSES:
Hermann Bormann.
Thomas M. Smith.

INVENTOR
Harry C. Rightmire
by J. Walter Douglass, Atty

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HARRY C. RIGHTMIRE, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,868, dated August 18, 1891.

Application filed January 8, 1891. Serial No. 377,092. (No model.)

To all whom it may concern:

Be it known that I, HARRY C. RIGHTMIRE, a citizen of the United States, residing at the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a specification.

It is well understood that in knitting certain articles—for example, the breast-pockets of ladies' undervests and the heels or toes of socks or stockings—it is necessary or desirable in order to attain the required shape or form to widen and narrow portions of the articles during the process of their manufacture. This result is usually accomplished in practice by dividing all the needles of the machine into two sets or divisions and throwing one of these sets or divisions out of or into action, and then throwing certain of the needles constituting the other set out of or into action, thus narrowing or widening the article.

The present invention has relation to knitting-machines, and more particularly in such machines to simple, durable, and efficient means for controlling the operation of the needles, as well as to certain improvements in the construction and arrangement of the operating-cams connected therewith.

The principal objects of the invention are, first, to provide simple, durable, and efficient mechanism for throwing all or a portion of the needles out of or into action, so as to permit of the needle-cylinder being removed from or returned to position upon the machine or for throwing only a portion of the needles out of or into action in order to permit of the accomplishment of the operation of narrowing and widening the fabric therein; second, to provide means for automatically and successively throwing certain of the needles into or out of action, so as to accomplish the operation of widening and narrowing the article being knit, and, third, to prevent dropping of stitches and consequent formation of loops at the point where the operation of widening or narrowing is commenced.

My invention consists of a knitting-machine provided with a wedge or other suitable shaped bridge-piece or finger adapted to engage the bits or hubs of either all or a portion of the needles, so as to throw the same into or out of action.

My invention further consists of convenient means for actuating said bridge-piece or finger so at to cause the same to engage the bits or hubs of all or of a portion of the needles of the machine and for turning the bridge-piece or finger out of range of all the needles, as may be required.

My invention further consists of a knitting-machine provided with a channeled trap preferably having spring-jaws attached thereto and arranged so as to engage the bits or hubs of certain of the needles successively and be operated thereby in such manner that the trap is moved with a positive motion out of range of the succeeding needles, whereupon the single needle previously engaged by the trap is delivered through the channel thereof into or out of action of the operating-cams; and my invention further consists of the improvements in knitting-machines hereinafter described, and particularly pointed out in the claims.

My improvements are applicable in whole or in part to so-called "straight" or "flat" as well as to "circular" knitting machines. However, in the accompanying drawings the invention is illustrated in application to a well-known type of circular-knitting machine provided with two sets of needles, whereof one set has short bits or hubs and the other set long bits or hubs.

In the drawings, Figure 1 is a perspective view of a well-known type of circular-knitting machine having my improvements applied thereto and showing the handles and stop and dog for actuating the needle-controlling mechanism. Fig. 2 is a side elevation of one of the series of latch-needles having long bits or hubs. Fig. 3 is a similar view of one of the series of latch-needles having short bits or hubs. Fig. 4 is a transverse section of a portion of the needle-cylinder, showing a flanged ring fitted thereto and adapted to retain the respective sets of needles to place. Fig. 5 is a development of a portion of the interior of the cam-cylinder, showing the bridge-piece for engaging the long or the short needle-bits, or both, and also showing channeled traps provided with

spring-jaws and adapted to throw certain of the needles successively into or out of action. Fig. 6 is a top or plan view, partly in section, of a portion of the cam-cylinder, showing a bridge-piece or finger pivotally attached thereto and in position to engage the long needle bits or hubs. Fig. 7 is a like view of the same, showing the bridge-piece shifted toward the center of the cam-cylinder and in position to engage both the long and short needle bits or hubs. Fig. 8 is a perspective view of a curved or heart-shaped cam, showing the same provided with a hard-metal face adapted to contact with the bits or hubs of the needles. Fig. 9 is a development of a portion of the interior of the cam-cylinder, showing the traps, bridge-piece or finger, and heart-shaped cam, and also showing the side or stitch cams attached to the cam-cylinder by means of screws fitted into suitable slots formed therein. Fig. 10 is a transverse section on the line x x of Fig. 9, showing a trap adapted to engage the short needle bits or hubs; and Fig. 11 is a transverse section on the line y y of Fig. 1, showing the detail construction of the parts of a bracket for supporting an adjustable stop.

In order that my invention may be fully understood, a brief description will be given of so much of an ordinary knitting-machine as is necessary to a full explanation thereof.

In the drawings, A is the main frame of the machine.

B is a needle-cylinder provided with two sets of needles, whereof one has long bits or hubs b, Fig. 2, and the other short bits or hubs b', Fig. 3.

C is a cam-cylinder provided with a thread-guide C′ and susceptible of being rotated around the needle-cylinder in either direction by the intervention of suitable gearing actuated by means of a hand-crank or in any other suitable manner. (Not shown.)

Having thus pointed out certain well-known features of a circular-knitting machine, a description will now be given of my improvements as applied thereto; but it must be borne in mind that the said improvements are applicable in whole or in part to other types of knitting-machines—for example, to knitting-machines in which the cam-cylinder is fixed and in which the needle-cylinder is movable.

Referring now to the drawings, c is the straight portion of a cam adapted to engage both the long and short bits or hubs of the needles and provided with a notch or recess c', adapted for the reception of the bridge-piece or finger d. This recess c' preferably extends only partially across the face of the cam c, so as to permit the bits of the needles to pass freely over the same. The bridge-piece or finger d is pivotally and loosely attached to the interior of the cam-cylinder C, Figs. 5 and 9, and is adapted to normally engage with the long bits or hubs of the needles, Fig. 6, but is, nevertheless, susceptible of being shifted toward the center of the cam-cylinder C, Fig. 7, so as to engage the short as well as the long bits or hubs, so that this bridge-piece or finger d may be employed for lifting the series of needles having long bits or hubs out of engagement with the operating-cams by turning the former into engagement with the recess c', Fig. 5, and rotating the cam-cylinder C, or for lifting both series of needles by turning the bridge-piece or finger d into contact with the cam c and shifting said bridge-piece or finger toward the center of the cam-cylinder, as shown in Fig. 7. Moreover, this bridge-piece or finger d may be employed for lowering all of the needles into the range of the operating-cams c by turning it upward past the inclined cam d' into contact with the flanged ring c^2, as illustrated in dotted lines in Fig. 9, and then operating the cam-cylinder C. It may be remarked that the inclined cam d' serves to shift the bridge-piece d toward the center of the cam-cylinder C when the former is turned upward, and thus insures the engagement of the long and short bits or hubs, and consequently causes all the needles to be brought into range of the operating-cams, as has been above explained. The vertical adjustment of the bridge-piece d is accomplished by means of a plate d^2, attached to the exterior of the cam-cylinder C by means of a slotted connection d^3, and connected with the bridge-piece d by means of a spring-actuated spindle d^4, attached at one end thereof to the tongue or point of the bridge-piece d and engaging at or near the other end in an aperture in the plate d^2, and having the shank thereof adapted to work in and through a vertical elongated slot C^2, formed in the wall of the cam-cylinder C. The adjustment of the bridge-piece d toward the center of the cam-cylinder C is accomplished by pressing the spring-actuated spindle d^4 inward, and the adjustment of the bridge-piece d away from the center of the cam-cylinder C is automatically accomplished through the release of the spindle d^4 by means of a compressed spiral spring interposed between the head of the spindle and the plate d^2.

e is a central or heart-shaped cam attached to the interior wall of the cam-cylinder C and provided with a hard face or plate e' for the bits or hubs of the needles to travel on or over.

f are side or stitch cams provided, respectively, with hard-metal faces or plates f' and attached to the interior of the cam-cylinder C by means of screws f^2 passing through slots f^3, formed in the wall of the cam-cylinder C, so that the side or stitch cams f may be adjusted with reference to the heart-shaped cam e, whenever it becomes necessary or desirable to do so, in order to insure proper operation of the needle-controlling mechanism, or for any other purpose—for example, when the cams f are unevenly ground or are imperfectly shaped.

g are traps located on opposite sides of the

cam *e* and provided, respectively, with channels or passages g^5, cut or otherwise formed therein. Each of these traps *g* is preferably provided with a curved spring *s*, having the respective extremities *s'* and s^2 thereof bent, as shown in the drawings, in order to form spring-jaws for gripping and releasing the bits or hubs of certain of the needles, as is hereinafter more fully described. However, the spring *s* may be omitted. Each of the traps *g* is attached to a carrier *g'*, susceptible of being slid and slightly oscillated in suitable ways g^2, formed in the interior wall of the cam-cylinder C. Each of these carriers *g'* is provided, preferably at or near the bottom thereof, with an oblique slot g^3, adapted to engage a fixed pin g^4, so as to oscillate the carrier slightly, in order to attain the proper adjustment of the jaws *s'* and s^2 or of the extremities of the channel g^5 with relation to the flanged ring c^2 or to the upper portion of the straight cam *c*, so as to insure the positive engagement of the bits or hubs of the needles in the spring-jaws *s'* or s^2 or in the channel g^5.

h are sliding plates located upon the exterior of the cam-cylinder C and provided, respectively, with dogs *h'* and with V-shaped recesses h^2.

i are screws attached, respectively, to the carriers *g'* and extending through apertures *i'*, formed in the plates *h*, and through slots i^2, formed in the cam-cylinder C.

s^3 are spiral springs interposed, respectively, between the plates *h* and the heads of the screws *i*, so as to clamp the carriers *g'* and sliding plates *h* to place upon the opposite faces of the cam-cylinder C, and so as to permit the shank of the screw *i* to work freely in the slot i^2.

k are spring-detents, of which only one is shown, Fig. 1, attached to the exterior of the cam-cylinder C and adapted, respectively, to engage the V-shaped recesses h^2 of the sliding plates *h*, in order to lock the latter, when the detents *k* are in engagement with the deepest portion of the V-shaped recesses, in such position that the traps *g* are located midway between the cam *c* and flanged ring c^2, as shown at the left-hand side of Fig. 5 and at the right-hand side of Fig. 9, and consequently are out of range of the bits or hubs of the needles. These spring-detents *k* also serve to assist in the operation of shifting the traps *g* in both directions by reason of the pressure which they exert upon the sloping portions of the respective V-shaped recesses h^2. *l* is a stop supported in a bracket *l'*, attached to the main frame A and adapted to occupy normally a depressed position out of range of the dogs *h'*, yet, nevertheless, susceptible of being elevated into two operative positions, in order to contact with the upper or lower portions of the dogs *h'*, so as to force the sliding plates *h* downward or upward when the machine is in operation, thus throwing the traps *g* into action.

The vertical adjustment of the stop *l* into the above-mentioned three positions in the bracket *l'* may be accomplished in the following manner: Referring to Fig. 11, the bracket *l'* is provided at the upper portion thereof with ways l^2 and at the lower portion thereof with a channeled recess l^3, adapted for the reception of the shank of the stop *l*. l^4 is an aperture formed in the web of the bracket *l'* and extending from the recess l^3 to the ways l^2. l^5 is a pin provided with an enlarged head l^6 and attached to the shank of the stop *l*. This pin l^5 is adapted to work freely in the aperture l^4, but is normally depressed by means of spiral springs s^4, interposed between the shank of the stop *l* and the web of the bracket, so that the stop *l* normally occupies a position out of range of the dogs *h'* when the machine is in operation. The stop *l* may be raised into operative position—that is, into position for contacting with the lower or upper portion of the dogs h^2—by forcing a slotted wedge l^9 either partially or wholly through the ways l^2 into engagement with the head l^6 of the pin l^5, as will be readily understood by reference to the drawings. This slotted wedge l^9 is permitted a freedom of motion and is retained to place in the ways l^2 by means of pins l^7, working in slots l^8, formed in the ways l^2 of the bracket *l'*, Fig. 1.

The mode of operation of the hereinabove-described improvements is as follows: All the needles may be thrown out of range of the operating-cams *c*, *f*, and *e*, and consequently out of action, by turning the bridge-piece or finger *d*, by means of the spindle d^4, downward, as shown in Figs. 5 and 9, and inward, as shown in Fig. 7, into contact with the straight cam *c*, so that when the cam-cylinder C is revolved toward the left in Figs. 5 and 9 the bits or hubs of all the needles engage with and travel up the bridge-piece *d* and are delivered at a position above the shoe *e'* of the heart-shaped cam *e* and beneath the flanged ring c^2, whereupon the needle-cylinder B may be lifted from and returned to place upon the machine. All the needles may be returned to operative position in engagement with the cams *c*, *f*, and *e* by the simple operation of turning the bridge-piece or finger *d* upward by means of the spindle d^4 upon the inclined cam *d'* and into engagement with the flanged ring c^2, as shown in Figs. 7 and 9, whereupon the bits or hubs of all the needles are engaged and are drawn downward by the bridge-piece or finger *d* and are delivered above the straight cam *c* when the cam-cylinder C is rotated toward the left, as illustrated in Fig. 9. One set, comprising any preferred number of needles having long bits or hubs, may be thrown out of action, instead of all the needles, for example, in order to permit of the operation of widening or narrowing, in the following manner: The bridge-piece *d* is turned downward, but not inward, by means of the spindle d^4, into engagement with the recess *c'*, so that it

occupies a position out of range of the short bits or hubs and engages only the long bits or hubs, Fig. 6. These latter are engaged by the bridge-piece d and lifted above the operating-cams c, f, and e, and occupy positions beneath the flanged ring c^2, while the needles having short bits or hubs remain in action and are operated in the usual manner. After the set of needles having long bits or hubs are thrown out of action in the manner above described or in any other convenient manner, certain of the needles having short bits or hubs are successively thrown out of or into action alternately on opposite sides of the operating-needles, in order to effect the operation of widening or narrowing a fabric being knit, as follows: The stop l is adjusted in the bracket l' by means of the slotted wedge l^9, so as to contact with the dogs h' when the cam-cylinder C is rotated back and forth, first in one direction and then in the other, thus shifting the sliding plates h in such manner that the detents k are forced out of their normal positions in the deepest portion of the V-shaped recesses h^2 onto the sloping sides thereof, while at the same time the traps g are thrown alternately into operative position during the subsequent operation of the machine. For the sake of a further description it will be assumed that a certain number of needles having short bits or hubs are to be successively and singly thrown out of action, first on one side and then on the other of the operating-needles, and that these needles are to be then thrown into action in a similar manner. In such case the stop l is raised so as to contact with the upper portions of the dogs h' and depress the same alternately at each operation of the cam-cylinder C. This motion of the dogs h' is transmitted to each of the two carriers g', so that the latter are alternately depressed and slightly oscillated, as shown at the right-hand side of Fig. 5, thus bringing one of the jaws s' of the respective traps g opposite to one of the extremities of the cam c and in position to engage a bit or hub of a single needle. When the cam-cylinder C is rotated in one direction, a bit or hub of a needle on one side of the operating needles enters the jaw s^2 of one of the traps g, and when the cam-cylinder C is rotated in the other direction a needle on the other side of the operating-needles enters one of the jaws s^2 of the other trap g, and so on at each reciprocation of the cam-cylinder. As soon as a needle enters one of the spring-jaws it is gripped thereby, so that the former ascends and lifts the carrier g' and trap g upward, and the upward motion of the carrier g' is assisted by the resiliency of the spring-detent k until the point thereof enters the deep portion of the V-shaped recess k^2, whereupon the carrier g' is locked to place and the bit or hub, overcoming the resistance of the spring-jaw s^2, traverses the channel g^5 and is delivered above the heart-shaped cam e and beneath the flanged ring c^2. At the next operation of the cam-cylinder C the stop l contacts with the dogs h', and thus brings the traps g into operative position for throwing another needle on each side of the operative needles out of action, and so on, first throwing out a needle on one side and then on the other until the required number of needles have been thrown out of action. These needles which have been previously thrown out of action are successively returned to operative position by shifting the stop l downward, so as to contact with and elevate the dogs h' successively, whereby the traps g are shifted alternately upward into the position illustrated at the left-hand side of Fig. 9, so that the spring-jaws s' are alternately and successively brought into contact with the flange c^2 and are adapted to engage a needle bit or hub first on one side and then on the other of the operating-needles. During the subsequent reciprocation of the cam-cylinder C the bit or hub of a single needle on one side of the operating-needles is gripped by the spring-jaw s', so that the needle draws the trap g and carrier g' downward. This downward motion of the trap g is facilitated by the pressure exerted by the spring-detent k^2 until the point of the latter enters the deepest portion of the V-shaped recess h^2, whereupon the trap g is locked to place and the bit or hub of the needle traverses the channel g^5 and is delivered upon the upper surface of the straight cam c. At the next operation of the cam-cylinder a needle on the other side of the operating needles is thrown into action, and so on, throwing needles singly and successively into action first on one side and then on the other of the operating-needles until all the needles having short bits or hubs are brought into action. The stop l may then be shifted out of range of the dogs h' by shifting the slotted wedge l^9 by hand, thus locking the traps g, which are permitted to occupy inoperative positions out of engagement with the bits or hubs of the needles, and after the set of needles having long bits or hubs are thrown into action the machine may be operated for knitting a plain or ribbed tube in the usual and well-understood manner.

It may be remarked that during the operation of narrowing and widening the first short-bit needle thrown out of action is preferably brought into action with the set of needles having long bits and by means of the bridge-piece or finger d, so that dropping of stitches and consequent formation of loops or open spaces in the finished article is obviated. Moreover the operation of narrowing and widening is conducted at the back of the machine and opposite to the set of needles having long bits or hubs, whereby the proper operation of the needle-controlling mechanism is insured.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made in the details thereof without departing from the true spirit of the

invention. For example, the traps *g* may be operated by means of one dog and suitable connections, and the springs *s* may be dispensed with. Hence I do not limit myself to the exact construction and arrangement of the parts as hereinbefore described; but

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

1. In a knitting-machine provided with a cam-cylinder and with two sets of needles, whereof one has long and the other short bits or hubs, an operating-cam having a recess extending partially across the face, a bridge-piece or finger pivotally attached at one extremity to the inner face of said cam and having the point thereof adapted to be shifted into and transversely of said recess to engage said short and long bits or hubs and out of contact with said cam, and means for actuating said finger or bridge-piece, substantially as and for the purposes set forth.

2. In a knitting-machine provided with a cam-cylinder and with two sets of needles, whereof one has long and the other short bits or hubs, a bridge-piece or finger pivotally attached to said cam-cylinder and adapted to be shifted into and out of contact with said cam and transversely of the face thereof, and a spindle connected with the free end or point of said finger and working in a slot in said cylinder, substantially as and for the purposes set forth.

3. In a knitting-machine provided with a cam-cylinder and with two sets of needles, whereof one has long and the other short bits or hubs, a bridge-piece or finger pivotally attached to said cam-cylinder and adapted to be shifted into and out of contact therewith and transversely of the face thereof, a sliding plate attached to the exterior face of said cylinder by a slotted connection, a spindle working loosely in an aperture in said plate and in a slot in said cylinder and attached to the free end of said finger or bridge-piece, and a spring interposed between the head of said spindle and said sliding plate, substantially as and for the purposes set forth.

4. In a knitting-machine provided with an operating-cam and two sets of needles, whereof one has short and the other long bits or hubs, a bridge-piece or finger for engaging said short and long bits or hubs and adapted to be shifted into and out of contact with said cam and transversely of the face thereof, substantially as and for the purposes set forth.

5. A knitting-machine provided with two sets of needles, whereof one has long and the other short bits or hubs, a cylinder provided with an operating-cam, an inclined cam, and a flanged ring, a bridge-piece or finger adapted to be shifted into contact with said operating-cam or past said inclined cam into contact with said flanged ring or out of contact with both, and means for shifting said bridge-piece or finger, substantially as and for the purposes set forth.

6. In a knitting-machine, the combination of the needles, the cams *c*, *e*, and *f*, the channelled trap *g*, and the spring-jaws *s'* and s^2, substantially as and for the purposes set forth.

7. In a knitting-machine, the combination of the needles, the cams *c*, *e*, and *f*, the flanged ring c^2, the channeled trap *g*, and the spring-jaws *s'* and s^2, substantially as and for the purposes set forth.

8. In a knitting-machine, the combination of the needles having bits or hubs *b* and *b'* a central cam *e*, the channeled trap *g*, and the spring-jaws *s'* and s^2 for engaging the bits or hubs of said needles and transferring them out of range of said cam, substantially as and for the purposes set forth.

9. A knitting-machine provided with needles having bits or hubs, an operating-cam, a sliding plate having a V-shaped slot, a trap pivotally connected with said plate and provided with a channel for engaging certain of said bits or hubs and for permitting the same to be forced or drawn therethrough, whereby the traps are shifted, and a spring-detent for engaging in said V-shaped slot to accelerate and then to retard the motion of said plate and trap with reference to the needles, substantially as and for the purposes set forth.

10. In a knitting-machine provided with an operating-cam and needles, a channeled trap provided with spring-jaws for engaging bits or hubs of certain of the needles, substantially as and for the purposes set forth.

11. A knitting-machine provided with needles having bits or hubs, an operating-cam, a sliding plate having a V-shaped slot, a spring-detent, and a trap having spring-jaws and connected with said sliding plate, substantially as and for the purposes set forth.

12. A knitting-machine provided with two sets of needles having bits or hubs, a sliding plate having a slot formed therein, a channeled trap connected with said plate, a detent for engaging in said slot, and spring-jaws connected with said trap for engaging the bits or hubs of said needles, substantially as and for the purposes set forth.

13. A knitting-machine provided with needles having bits or hubs, an operating-cam, a sliding plate having a V-shaped slot, a spring-detent adapted to engage said V-shaped slot, a carrier pivotally attached to said plate and provided with an oblique slot, a fixed pin working in said oblique slot, and a trap attached to said carrier, substantially as and for the purposes set forth.

14. A knitting-machine provided with needles having bits or hubs, a cylinder having operating-cams and provided with ways, a sliding plate having a V-shaped slot, a spring-detent, a carrier adapted to work in said ways and provided with an oblique slot, a fixed pin engaging said oblique slot, a screw working in a slot cut through said cylinder and attached to said plate and carrier, and a trap attached to said carrier, substantially as and for the purposes set forth.

15. A knitting-machine provided with nee-

dles having bits or hubs, a rotatable cylinder provided with operating-cams, a sliding plate provided with a dog and with a V-shaped slot, a spring-detent, a trap connected with said plate and provided with jaws, and a stop adapted to contact with said dog and shift said plate and trap by the rotation of said cylinder, substantially as and for the purposes set forth.

16. A knitting-machine provided with needles having bits or hubs, a cylinder provided with operating-cams, a sliding plate provided with a dog and with a V-shaped slot, a spring-detent, a carrier provided with an oblique slot, a fixed pin engaging said oblique slot, a spindle working in a slot formed in said cam-cylinder and attached to said plate and carrier, a channeled trap provided with spring-jaws and attached to said carrier, and a stop adapted to contact with said dog by the actuation of said cam-cylinder, substantially as and for the purposes set forth.

17. A knitting-machine provided with a bracket having a recess and ways, a stop for operating the needle-controlling mechanism fitted into said recess, a pin having an enlarged head and attached to said stop, and a wedge engaging said enlarged head and adapted to be shifted through said ways, substantially as and for the purposes set forth.

18. A knitting-machine provided with a bracket having a recess and ways, a stop fitted into said recess and adapted to operate the needle-controlling mechanism, a pin having an enlarged head and attached to said stop, a spring interposed between said stop and bracket, and a wedge engaging said enlarged head and adapted to be shifted through said ways, substantially as and for the purposes set forth.

19. A knitting-machine provided with a cam-cylinder and needles, a sliding plate disposed on the exterior face of said cam-cylinder, a carrier provided with a trap and disposed on the interior face of said cam-cylinder, a spindle working in an aperture in said sliding plate and in a slot in said cylinder and pivotally connected with said carrier, and a spring interposed between the head of said spindle and said sliding plate, substantially as and for the purposes set forth.

20. In a knitting-machine provided with needles, an operating-cam, a channeled trap, and spring-jaws, as described, connected with said trap for engaging parts of said needles, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my signature in the presence of two subscribing witnesses.

HARRY C. RIGHTMIRE.

Witnesses:
THOMAS M. SMITH,
RICHARD C. MAXWELL.