H. SCHWARTZ & A. A. GRUNDY.

CAM FOR FLAT KNITTING MACHINES.

APPLICATION FILED AUG. 11, 1915.

1,210,107. Patented Dec. 26, 1916.

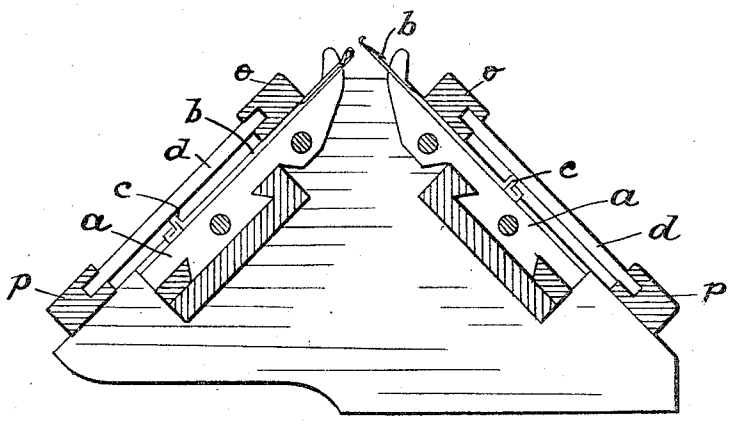


FIG. 1.

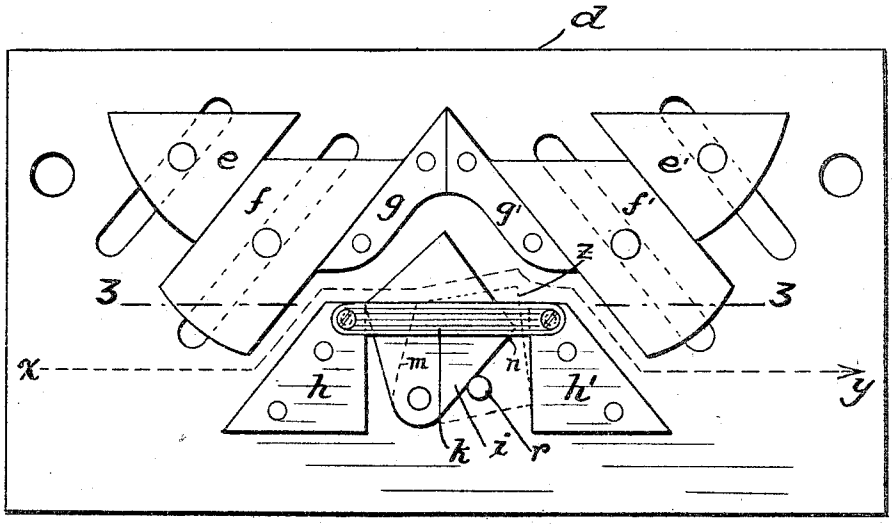


FIG. 2.

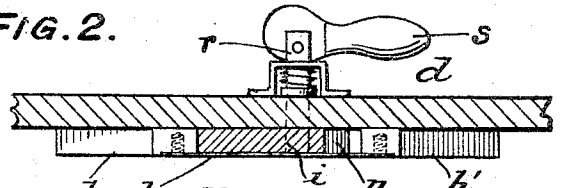


FIG. 3.

WITNESS:

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CAM FOR FLAT-KNITTING MACHINES.

1,210,107. Specification of Letters Patent. Patented Dec. 26, 1916.

Application filed August 11, 1915. Serial No. 44,872.

To all whom it may concern:

Be it known that we, HERMAN SCHWARTZ and ALFRED A. GRUNDY, citizens of the United States, and residing, respectively, in Philadelphia, county of Philadelphia, State of Pennsylvania, and Brooklyn, county of Kings, State of New York, have invented a new and useful Improvement in Cams for Flat-Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

The object of our invention is to construct, connect and arrange the cams of a knitting machine so as to obviate the danger of breakage or damage of needles and cams by reason of conditions, due to improper operation or otherwise, that are productive of such damage and breakage in the ordinary operation of the machine.

Another object of the invention is to prolong the life of the cams by rendering them interchangeable or reversible.

A preferred embodiment of our invention is shown in the accompanying drawings, in which—

Figure 1 is a cross section through the needle bed of a flat or straight knitting machine in connection with which our improved cams may be used. Fig. 2 is an enlarged face view of the cam plate and cams. Fig. 3 is a partial section on line 3—3 of Fig. 2.

Upon the needle bed *a* on each side of the machine are slidable the needles *b* by means of their butts *c*. As is well understood in the art, these butts are actuated to move the needles of opposite banks toward and from each other in the operation of forming the knitted fabric, by means of cams mounted upon cam plates *d*, which are moved transversely across the banks of needles.

As shown in Fig. 1 rails *o*, *p*, are provided with ways in which slide the cam plates *d*.

As shown in Fig. 2, cams *e*, *e'*, *f*, *f'*, *g*, *g'*, *h*, *h'* and *i* are mounted in the usual manner. *x*, *y* shows the path of the needle butts through the cams in direction of the arrow *y*. It is seen that the butts move cam *i* to its lower position shown in dotted lines. Moving in the reverse direction the butts strike corner *z* of cam *i* and raise the cams again to the full line position. In this movement the pivot of cam *i* is so placed in relation to the corner *z* struck by the needle butts that the action of tilting the cam up is accomplished very easily and does not tend, as heretofore, to stop and break the butts in the rapid passage of the cam plate over the needle bed.

In order to be able when desired to work with cam *i* held immovable in its upper position a stop pin *r* is provided which is spring pressed into its active position as shown in Fig. 3, and is retractable by means of the cam lever *s*.

It is seen that when cam *i* is in its upper position there is a space between corner *n* and the contiguous side of cam *h'* into which needle butts may drop if for any reason the cam plate stops or hesitates in its passage through the machine, causing jamming and breakage of the needles. Similarly when cam *i* is in dotted line position there is an open space between side *m* and the contiguous side of cam *h*. To obviate this contingency, we have provided a thin plate *k* bridging the entire space between cams *h* and *h'*. This bridge piece is preferably made of very thin steel, and is attached to cams *h*, *h'* so as to present a flush outer surface. Also cam *i* is made slightly thinner than cam *h*, *h'* so as to move freely between the bridge piece and the cam plate. By this means, no matter what the position of cam *i* may be, the butts of the needles are prevented from dropping into any part of the space between cams *h* and *h'* and yet remain guided by the cams just as positively as before.

By shaping the cams and arranging them relatively to each other, as shown, we are enabled to make them reversible, thereby doubling their length of life. Thus when cams *g* *g'* are worn and need to be replaced, they are so similarly shaped that they may be removed from the plate, and substituted the one for the other, placing the worn faces against the plate and presenting fresh new surfaces to the work. In like manner *h* and *h'* may be reversed and substituted for each other. Cam *i* is made of symmetrical shape and may be reversed to bring its fresh new surface out against the work.

It will be understood that while the bridge-piece *k* is not limited in its applica-

tion to cams constructed and arranged specifically as shown and described, still it is especially adapted for use in connection with cams of the specific construction of cams *h* and *h'* and more especially cam *i*. That is, while cams so constructed obviate the danger of jamming and breaking from one cause, they create wide spaces on one side or the other of cam *i*, into which the needles would drop were it not for the bridge-piece.

While in the claims we refer to certain of the cams as fixed, we do not thereby intend to exclude adjustability, but intend merely to exclude movability in the ordinary operation of the machine.

Having now fully described our invention, what we claim and desire to protect by Letters Patent is:

1. In knitting machine cams, the combination of the cam plate, the two lower cams spaced apart, the upper cams coöperating with the lower cams to guide the needle butts, a bridge-piece connecting the said two lower cams, and a third pivoted lower cam located between the said two lower cams and extending between the cam plate and the bridge-piece.

2. In knitting machine cams, the combination of the cam plate, the two lower cams spaced apart, the upper cams coöperating with the lower cams to guide the needle butts, a bridge piece connecting the said two lower cams, and a third lower cam located between the first named two lower cams and extending between the cam plate and the bridge piece, the third cam being pivoted to the cam plate on a level with the lower parts of the two first-mentioned lower cams and nearer to one cam than to the other.

3. In knitting machine cams, the combination of the cam plate, the two lower cams spaced apart, the upper cams coöperating with the lower cams to guide the needle butts, a bridge piece connecting the said two lower cams, and whose upper face is flush with the adjacent horizontal edges thereof, and a third pivoted cam located between said two lower cams and extending between the cam plate and the bridge-piece.

4. In knitting machine cams, the combination of the cam plate, the two lower fixed cams spaced apart, the upper cams coöperating with the lower cams to guide the needle butts, a movable cam located between the two fixed lower cams, said movable cam being pivoted to the cam plate relatively close to the lower part of the inner straight edge of one of the two fixed lower cams and adapted, when swung against either of the lower fixed cams, to leave a substantial space between itself and the other lower fixed cam, and a bridge piece spanning the space between the two lower fixed cams and overlying the movable pivoted cam.

5. In knitting machine cams, the combination with the cam plate, of two interchangeable lower cams spaced apart, two central abutting and interchangeable upper cams, two interchangeable upper cams adjacent to the respective central cams, and a pivoted lower cam arranged between the first-named two lower cams.

6. In knitting machine cams, the combination with the cam plate, of the upper cams, the two fixed lower cams spaced apart, and a pivoted lower cam arranged between the two fixed lower cams, said pivoted cam being symmetrical to permit reversal.

7. In knitting machine cams, the combination with the cam plate, of two interchangeable fixed lower cams spaced apart, of a pair of abutting and interchangeable upper cams, and a pivoted lower cam arranged between the two fixed lower cams, said pivoted cam being symmetrical to permit reversal.

In testimony of which invention, we have hereunto set our hands, at Philadelphia, on this 9th day of August, 1915.

HERMAN SCHWARTZ.
ALFRED A. GRUNDY.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."