Feb. 20, 1973 NORISHIGE SUMITOMO 3,717,013

CAMS FOR KNITTING MACHINES

Filed Feb. 9, 1971

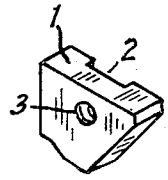



Fig. 1.
(Prior Art)

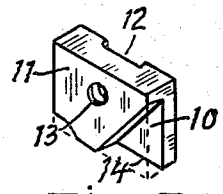



Fig. 5.

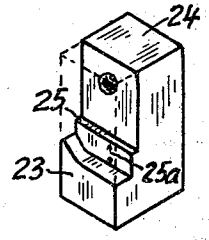



Fig. 9.

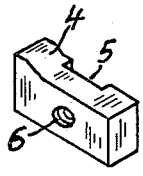



Fig. 2.
(Prior Art)

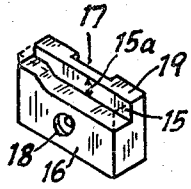



Fig. 6.

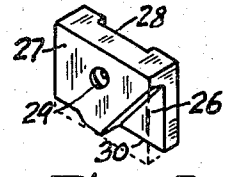



Fig. 10.

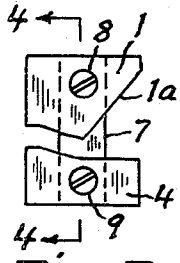



Fig. 3.
(Prior Art)

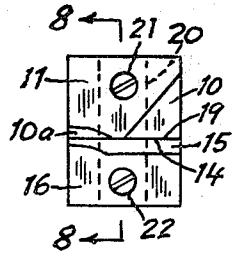



Fig. 7.

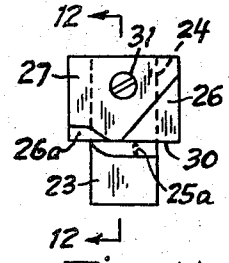



Fig. 11.

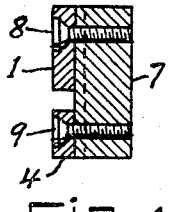



Fig. 4.
(Prior Art)

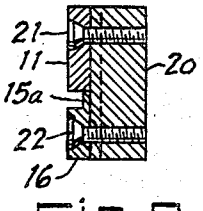



Fig. 8.

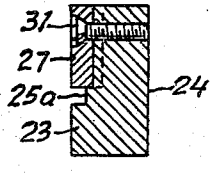



Fig. 12.

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3,717,013

# CAMS FOR KNITTING MACHINES

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Claims priority, application Japan, Mar. 2, 1970, 45/17,832
Int. Cl. D04b *15/32*
U.S. Cl. 66—57 1 Claim

## ABSTRACT OF THE DISCLOSURE

Post mounted cam formed of a rectangular block wherein the profile of the cam is formed by removing portions of one side of the block to a depth less than the depth of the block whereby the cam profile extends upwardly from the surface surrounding the cam profile, wherein a vertically extending keyway is formed in the other side of the block for the full height thereof, and wherein the cam block is mounted upon and is secured to the post by a flat head screw extending through a countersunk hole in the cam block and into threaded engagement with the post. A stitch cam and a guard cam formed of a pair of blocks are mounted upon and are secured to a common post by flat heat screws with the cam profiles spaced from each other to provide a needle butt pathway therebetween and with the near sides of the cam blocks pressed together and extending perpendicular to the post.

The present invention relates generally to the art of knitting and particularly to the construction of post mounted cams used for the movement of needles in knitting machines.

It is the general practise to mount vertically spaced stitch and guard cams of knitting machines upon a common vertically adjustable post which fits into keyways formed in the rear sides of each of the cams and to secure each of the cams to the post by a single screw extending through each cam and into threaded engagement with the post. It is desirable that such stitch and guard cams be fully horizontally disposed, however, in this construction as the result of lateral clearance between the cam keyways and the post, because of the clearance between the screws and the cams, and because the keyways are not effective for the full height of the cams, it often happens that the cams are undesirably inclined to the horizontal when secured to the post.

It is the principal object of the present invention to provide a construction for post mounted cams used for the movement of needles in knitting machines wherein the cams are positively maintained in full horizontal disposition.

It is a further object of the present invention to form each of the cams so as to extend from one side of a rectangular block with the keyway extending for the full height of the block in the other side thereof and wherein the cam profiles of a pair of post mounted cams are spaced while the near sides of the pair of cam blocks are in pressure contact thereby to positively maintain said cams in full horizontal disposition.

With the above and other objects in view as will be apparent from the following detailed description of preferred forms of the invention to be read in connection with the accompanying drawings, the invention resides in the construction of the post mounted cams illustrated in the drawings, and as defined in the appended claims.

In the drawings:



FIG. 1 is a perspective view of a stitch cam of the prior art,

FIG. 2 is a perspective view of a guard cam of the prior art,

FIG. 3 is a front elevational view of the stitch cam of FIG. 1 and of the guard cam of FIG. 2 mounted upon and secured to a common post,

FIG. 4 is a sectional view taken along line **4—4** of FIG. 3,

FIG. 5 is a perspective view of a stitch cam of the present invention as formed with a rectangular block,

FIG. 6 is a perspective view of a guard cam of the present invention as formed with a rectangular block,

FIG. 7 is a front elevational view of the stitch cam of FIG. 5 and of the guard cam of FIG. 6 mounted upon and secured to a common post,

FIG. 8 is a sectional view taken along line **8—8** of FIG. 7,

FIG. 9 is a perspective view of a combined guard cam and post of the present invention as formed with a rectangular block,

FIG. 10 is a perspective view of a stitch cam of the present invention as formed with a rectangular block,

FIG. 11 is a front elevational view of the guard cam of FIG. 9 and of the stitch cam of FIG. 10 with the stitch cam mounted upon and secured to the post formed in combination with the guard cam, and

FIG. 12 is a sectional view along line **12—12** of FIG. 11.

A conventionally shaped stitch cam **1** of the prior art, FIG. 1, has a vertically extending square bottomed keyway **2** formed in its rear side and has a countersunk screw receiving hole **3** extending through the cam and into the keyway. A conventionally shaped guard cam **4** of the prior art, FIG. 2, has a vertically extending square bottomed keyway **5** formed in its rear side and has a countersunk screw receiving hole **6** extending through the cam and into the keyway. It will be noted, in each of the cams **1** and **4**, that their profiles extend the full depth or thickness of the stock of which the cams are made. The cams **1** and **4** are conventionally mounted, FIGS. 3 and 4, in spaced relation upon a common vertically extending square sided post **7** which fits into keyways **2** and **5**. Cam **1** is secured to post **7** by a flat head screw **8** extending through hole **3** and into threaded engagement with post **7**, and cam **4** is secured to post **7** by a flat head screw **9** extending through hole **6** and into threaded engagement with post **7**. The near faces of spaced cams **1** and **4**, FIGS. 3 and 4, provide a channel therebetween for the passage therethrough of the butts of the needles once the latter have been lowered by the action of face **1***a* of cam **1** upon the needle butts.

There is normally some lateral clearance between post **7** and the sidewalls of keyways **2** and **5**, and between screws **8** and **9** and holes **3** and **6**, of cams **1** and **4**, respectively. One side of keyway **2** terminates at approximately the midpoint of cam face **1***a* of cam **1**, FIG. 3, thus one sidewall of keyway **2** is considerably shorter than the other thereof. Accordingly, when screws **8** and **9** are tightened, it often happens that one or the other or both of cams **1** and **4**, which are not in direct contact with each other, instead of being horizontal with their keyways vertical, have been angularly located and are inclined relative to the post **7** in the direction in which the screws have been turned and thus the cams may be above or below the desired horizontal positions thereof. The cams may also be twisted by contact of the needle butts therewith. Such undesired positioning of the cams results in irregularity in the width of the butt pathway

therebetween so that the needles move irregularly and often form non uniform stitches. The distance between cams **1** and **4** is greater than it need be for properly positioned cams and is such as to allow for irregular positioning of the cams while still providing a pathway of sufficient width for the needle butts. It may be noted that with the substantial increase in the number of feeds in multi-feed circular knitting machines, the cams are smaller and the area of contact between the keyways and the post is accordingly reduced, thus accentuating the problem of properly positioning the cams.

A stitch cam formed as part of a rectangular block according to the present invention is shown at **11**, FIG. 5, wherein the outline of the cam profile itself (similar to the profile of cam **1**) is formed in approximately half the depth or thickness of the block and the remaining half thickness of the block retains its rectangular outline. Thus the half thickness triangular portion **10** of the block, which would not be present or which would be cut away in forming cam **1** of FIG. 1, is retained, as is the portion **10***a*. Cam **11** has a vertically extending square bottomed keyway **12** formed in its rear side for the full height of the cam block and has a countersunk screw receiving hole **13** extending through the cam and into the keyway. Cam **11** has a bottom face **14** extending fully across the width of the cam perpendicular to keyway **12** and spaced from hole **13**.

A guard cam similarly formed as part of a rectangular block, according to the present invention, is shown at **16**, FIG. 6, wherein the cam profile (similar to the profile of cam **4**) is formed in approximately half the depth or thickness of the block and the remaining half thickness of the block retains its rectangular outline. Thus the full width upright extension **15** of height **15***a*, which would not be present or which would be cut away in forming cam **4** of FIG. 2, is retained. Cam **16** has a vertically extending square bottomed keyway **17** formed in its rear side for the full height of the cam block and has a countersunk screw receiving hole **18** extending through the cam and into the keyway. Cam **16** has a top face **19** extending fully across the width of the cam perpendicular to keyway **17** and spaced from hole **18**.

Cams **11** and **16** are mounted upon a common vertically square sided post **20**, FIGS. 7 and 8, which fits into keyways **12** and **17** of the cams. Cam **12** is secured to post **20** by a flat head screw **21** extending through its hole **13** and into threaded engagement with the post, and cam **16** is secured to post **20** by a flat head screw **22** extending through its hole **18** and into threaded engagement with the post. The holes **13** and **18** of the cams and the threaded apertures in post **20** are so disposed that when screws **21** and **22** are tightened, the surfaces **14** and **19** of the cams are tightly pressed together so that the cams **11** and **16** are in fixed squared relationship with each other with their surfaces **14** and **19** fully perpendicular to post **20**. In this construction there is no possibility that the cams may be twisted when the screws are tightened. This will be so even though there is lateral clearance between keyways **12** and **17** and post **20**, and between holes **13** and **18** and screws **21** and **22**, of the cams **11** and **16**, respectively, for the reason that the camming action of the conical heads of screws **21** and **22** acting upon the conical surfaces of the countersunk portions of holes **13** and **18** will force the cams **11** and **16** together and in so doing will automatically cause the contacting surfaces **14** and **19** and the cams themselves to be fully perpendicular to post **20**. The keyways **12** and **17** are adjoining and are in contact with the full length of post **20**. The width of the needle butt path between the cams is determined by the height **15***a* of upright **15**. It should be noted that the width of the needle butt pathway between cams **11** and **16** is somewhat less than the corresponding width between cams **1** and **4** of the prior art, as may be seen by comparing FIGS. 4 and 8. This is for the reason that no allowance need be made for any twisting of the cams and accordingly, with a narrower and more restricted butt pathway, the needle hooks move in a correspondingly more uniform pathway and knit more uniform stitches.

A modified form of the invention is shown in FIG. 9 wherein a single rectangular block is cut away to provide a guard cam **23** at the bottom portion of one side of the block and to provide a square sided post **24** extending upwardly therefrom, the block being provided with a relatively narrow shelf or ledge **25** above cam **23**, the height **25***a* of the ledge being similar to that of upright **15** of cam **16**, FIG. 6. It will be noted that the length of guard cam **23** is somewhat less than that of guard cams **4** and **16**, however, cam **23** is of sufficient length to function as a guard cam for the needle butts lowered by its associated stitch cam.

Another stitch cam formed as part of a rectangular block according to the present invention is shown at **27**, FIG. 10, this cam being generally similar to cam **11**, FIG. 5, except that it has a keyway **28** which is wider than keyway **12** of cam **11** in order to fit the wider post **24**. The parts **26**, **29** and **30**, of cam **27**, are similar to the parts **10**, **13** and **14**, of cam **11**, respectively.

The cam **27** is mounted upon post **24** which fits into its keyway **28** and the cam is secured to the post by a flat head screw **31** extending through hole **29** and into threaded engagement with the post. In this construction, the surface **30** of cam **27** and the top of ledge **25** are forced together by the tightening action of screw **31** (as explained in reference to the action of screws **21**, **22**) so that cam **27** is in fixed squared relation to cam **23** with surface **30** of the cam fully perpendicular to the post. The width of the needle butt path between cams **23** and **27** is determined by the height **25***a* of ledge **25** and is similar to the width of the needle butt path between cams **11** and **16**. There is likewise no possibility of cam **27** being twisted relative to post **24** when screw **31** is tightened.

It will be understood that the cam profiles and their associated rectangular portions may be formed from single rectangular blocks, may be formed separately and joined together, or may be molded as a single unit. The faces of the cams, as may be required, are curved for operative relation to the curvature of the needle cylinder of the machine. The dotted lines in FIGS. 5, 6, 9 and 10 indicate the outline of the rectangularly shaped blocks before portions thereof are cut away to form the several cam profiles.

I claim:

**1**. A pair of juxtaposed knitting cams for use with knitting needles on a knitting machine, each of said needles having a shank and a butt extending therefrom, each of said cams being of one piece construction, said cams being mounted upon and secured to a lengthwise extending common post in fixed juxtaposed relation to each other and to said post, said cams having adjacently disposed sides of which edge portions thereof are in fixed pressed together abutting relation and which extend in perpendicular relation to said post, a continuous keyway formed in one face of said juxtaposed cams for the full height of each thereof, said keyway extending across and being perpendicular to said edge portions of said cams, said post being disposed in said keyway, a single screw extending through each of said cams and into threaded engagement with said post, said cams being fixedly secured to said post exclusively by said screws, said screws at the same time acting upon said cams to force their said edge portions together in pressed together abutting relation whereby said edge portions are effectively maintained in perpendicular relation to said post and whereby said cams are effectively maintained in fixed relationship with each other in their said juxtaposed relation, other portions of both of said adjacently disposed sides of said cams providing a fixed raceway therebetween in the opposite faces of said cams for the travel

of said needle butts therethrough, said raceway being of minimum width for the passage of said needle butts thereby to effectively prevent undesirable movement of said needles transversely of said raceway, and the depth of said raceway being less than the thickness of said cams, said minimum width of said raceway being made possible by reason of said construction of said cams whereby angular movement of each of said cams about its associated screw is effectively prevented.



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