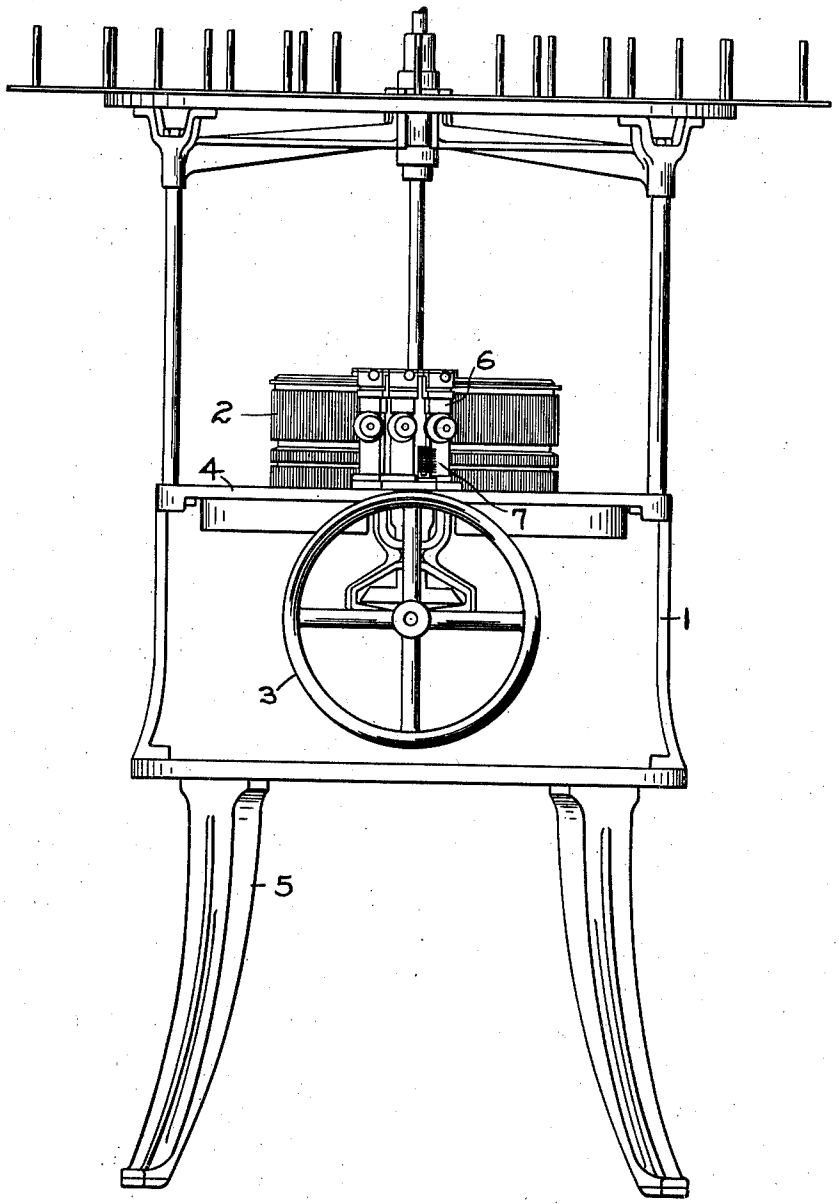
Aug. 9, 1938. R. H. LAWSON ET AL 2,126,646

CAM FOR KNITTING MACHINES

Original Filed Jan. 10, 1934 3 Sheets-Sheet 1

FIG. 1.



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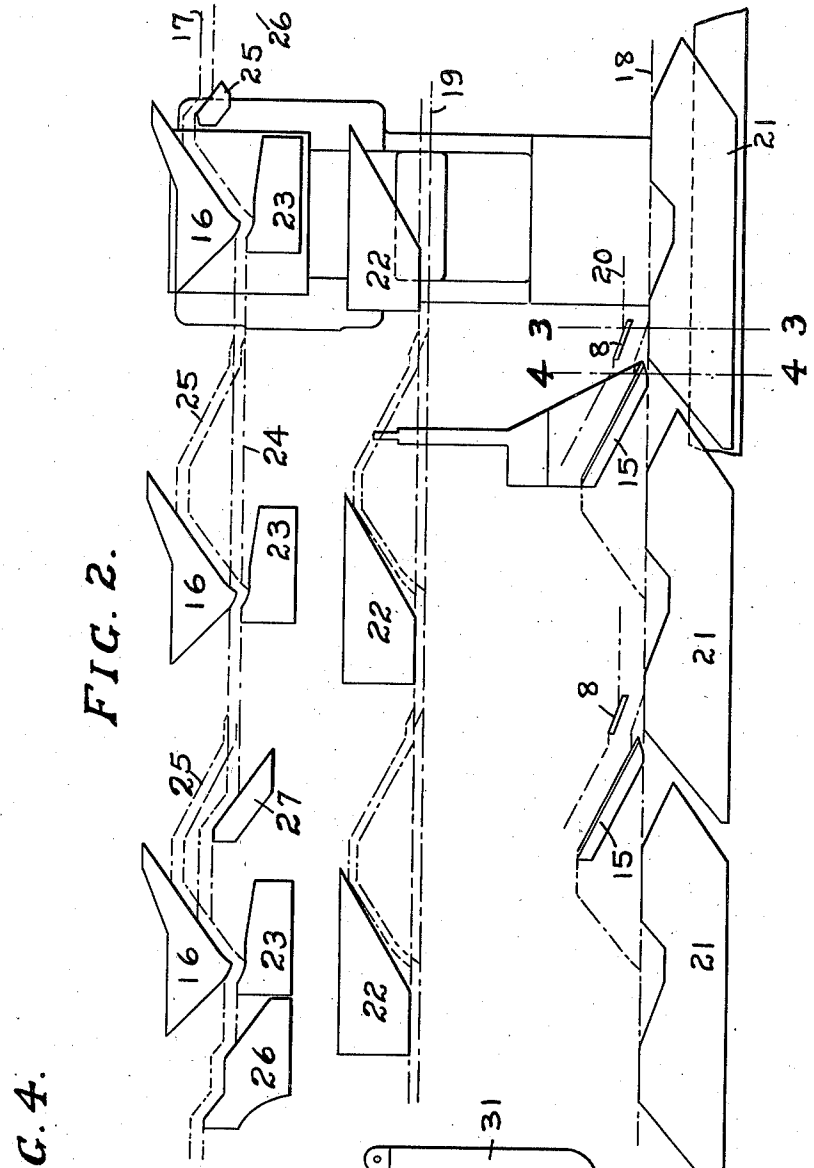


FIG. 2.

FIG. 4.

FIG. 3.

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FIG. 5.

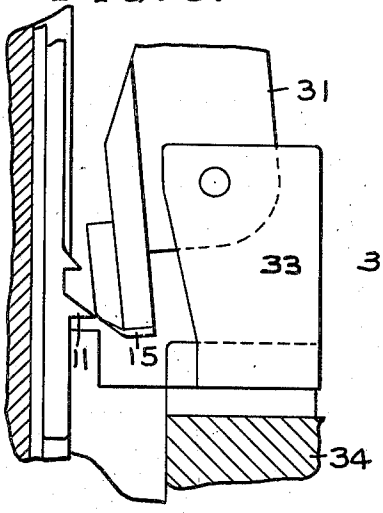


FIG. 8.

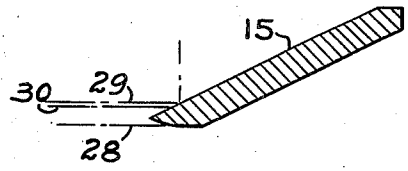


FIG. 10.

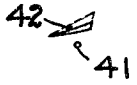


FIG. 9.

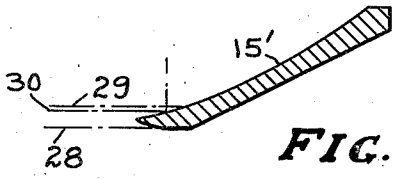


FIG. 6.

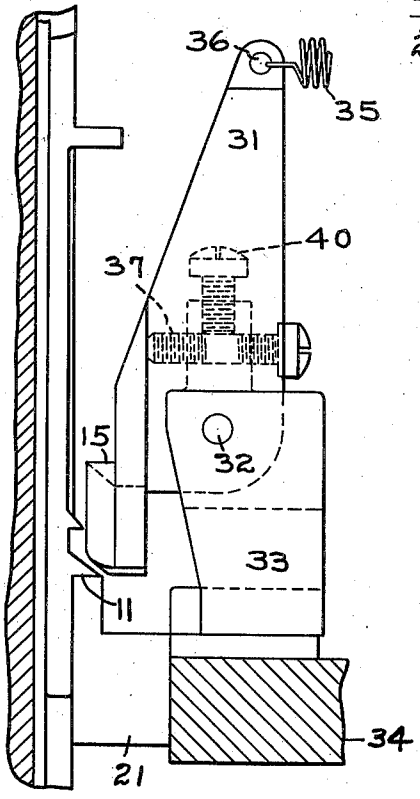
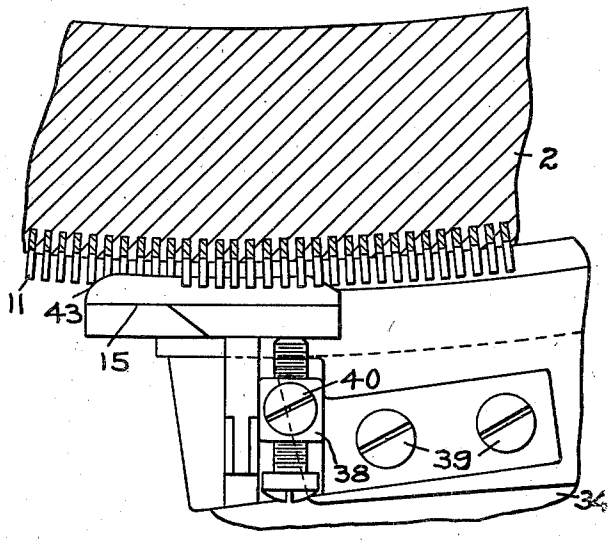


FIG. 7.



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2,126,646

CAM FOR KNITTING MACHINES

Robert H. Lawson and William L. Smith, Jr., Pawtucket, R. I., assignors to Hemphill Company, Central Falls, R. I., a corporation of Massachusetts

Original application January 10, 1934, Serial No. 706,082. Divided and this application November 11, 1936, Serial No. 110,353

6 Claims. (Cl. 66—57)

This invention relates to improvements in knitting machines and more especially, although not necessarily, to knitting machines having a plurality of feeding stations at each of which is a set of knitting cams. The case is a division of co-pending application Ser. No. 706,082, filed January 10, 1934, now Patent No. 2,067,877.

In the drawings:

Fig. 1 is a view in elevation showing a knitting machine to which the improvements are applied;

Fig. 2 is a diagrammatic representation showing needles and jacks moving throughout their respective pathways and being influenced by the several cams;

Fig. 3 is a sectional view showing a needle and associated jack at a certain phase of the knitting cycle, said phase of the knitting cycle being indicated by line 3—3, Fig. 2;

Fig. 4 is a view in section showing the needle and jack at a later phase in the knitting cycle as indicated by the line 4—4, Fig. 2;

Fig. 5 is a relatively enlarged fragmentary view, partly in section, similar to Fig. 4 but showing the jack raising cam in tilted position;

Fig. 6 is a relatively enlarged fragmentary view, partly in section, and similar to Fig. 4;

Fig. 7 is a fragmentary plan view, partly in section of the parts shown in Fig. 6;

Fig. 8 is a view in section of the jack raising cam, the dotted lines representing different paths of the jack butts;

Fig. 9 is a view similar to Fig. 8 but showing a slightly modified construction of the cam; and

Fig. 10 is a fragmentary view showing the advantages of the cam shown in Fig. 9 as compared with the cam shown in Fig. 8.

Referring to Fig. 1, the frame 1 of the machine has mounted therein for rotary movements a needle cylinder 2 which may be rotated in any suitable manner by driving mechanism (not shown), and, at times, by a hand wheel 3. Surrounding and supporting the needle cylinder 2 for rotary movements therein is a circular plate or base 4 which is connected to the frame of the machine supported on legs 5. About the needle cylinder 2 there have been spaced a plurality of cam supporting structures or units 6, these units comprising the necessary cams for actuating needles and sinkers. Such cam supporting units are not necessarily of a type illustrated in this or the parent case, but may be of any suitable type such as employed in machines of this sort. Adjacent and preferably between each of the cam units has been secured a selecting device individual to each separate feeding station, such selecting mechanism having a series of plunger-like instruments for functioning on one or more of a series of removable butts and a cam for engagement with a so-called master butt on instrumentalities which are to be selected or caused to function in some desired way incidental to the knitting of patterned fabric. This selecting mechanism is generally indicated at 7.

A detailed description of this selecting mechanism is available in the parent case and will not be repeated here. The selecting instruments which may be in the form of plunger-like elements manually movable to and from position to engage butts were claimed in that parent case and the cam for engaging the so-called master butt to cause selected instrumentalities to be moved in some predetermined pathway will form the subject matter of this case.

Now referring to Figs. 2, 3 and 4, one of these selecting plungers or elements is shown at 8 engaging a butt 9 on a jack 10. These butts 9 may be frangible or movable in any desired manner, and jacks may have any convenient number of such butts. Said jacks 10 are further provided with a master butt 11 and another butt 12, this latter being for the purpose of returning jacks to non-selected position. Jacks are herein shown as working beneath and upon needles 13 having the usual needle butts 14. Cam 15, one of which is to be provided as an essential adjunct to each selecting unit works upon the master butt 11 in the event one of the jacks provided with such a butt is selected.

Needles pass through the cams of the machine being drawn down for knitting by one of cams 16, the pathway in which needle butts travel being indicated at 17, this pathway varying as shown depending upon whether or not a needle is raised by one of the selecting jacks 10. These jacks move about the machine in a pathway indicated at 18 for the master butts 11 and at 19 for the butts 12 which, as before stated, return selected jacks to non-selected position. As shown, any one of butts 9 passing along in pathway 20 and encountering a plunger 8 which is in butt engaging position, will be elevated sufficiently for its master butt to engage and ride up cam 15 whereas if not selected, that master butt would have passed along below said cam. Cams 21 maintain jacks at a predetermined low level and in alignment so that their butts 9 will properly engage any selecting plungers 8 which are in position while cams 22 return jacks to their initial position after being raised by any one of cams 15. Needles the corresponding jacks of

which are not selected will be influenced by cams 23 only and will not be raised to a latch clearing position nor will they take yarn at that particular feed. The pathway of such needles is indicated by numeral 24. Pathway 25 indicates the manner in which needles will be raised by selected jacks for clearing latches, taking yarn and knitting. Cams 25 may be positioned at any desired feed for acting in conjunction with cam 26 to knit continuously at that feed thus forming no pattern or ornamental work thereat. Another cam such as 27 may be provided at any desired feed for raising needles to a tuck position. The above is a brief description of the operation of the machine in the selection and control of needles for knitting pattern work and is not detailed in nature since a complete and full disclosure is available in application Serial No. 706,082.

It sometimes happens when changing patterns, i. e., re-selecting the plungers 8 at the several feeding stations, that the selected jacks, the selective butts 9 of which have been partially elevated by plungers 8, have elevated the lower butts 11 to a level intermediate their upper and lower positions. The effect of such a relative positioning of the lower butts 11 with respect to a cam 15 is illustrated in Figs. 5–10 inclusive. The lower butts 11 of the non-selected jacks pass below the cam 15 when the needle cylinder 2 is again rotated after a pattern has been changed, the position of the said butts being shown in Fig. 6 and the path of the said butts being also illustrated at 28, Figs. 8 and 9. Furthermore, the jacks that have been fully raised by the plungers 8, upon resumption of knitting move along a path 29, Figs. 8 and 9. Accordingly the jacks whose butts upon resumption of knitting move along paths 28 and 29 cause no trouble; however, the butts 11 that have, as just described, been partially elevated only by the withdrawn jacks which were active in accordance with the previous pattern, upon resumption of knitting will move along an intermediate path such as 30, Figs. 8 and 9. As knitting is resumed and the needle cylinder recommences to rotate, such butts 11 move along the dotted line paths 30, Figs. 8 and 9, towards the respective cams 15 or 15' and if the cam 15 or the cam 15' were held in a rigid position adjacent to the needle cylinder the butts 11 advancing along the paths 30 would strike the cam 15 or 15', as the case may be, at its leading edge but below the proper level 29 to engage the upper face of the cam and be elevated thereby; in other words, the butts 11 of such jacks would be broken. To avoid any such occurrence the cam 15 is pivotally mounted so that it may be swung away from the needle cylinder by a butt 11 advancing along an intermediate path 30 as indicated in Fig. 5.

The cam 15 is mounted upon cam plate 31 which is pivotally connected at 32 to an upstanding bracket 33 which is mounted upon and attached to the circular plate 4 through plate 34. A coil spring 35 is connected to the upper end of the cam plate 31 at 36 and at its other end is connected to a block (not shown) or to any suitable part of the machine, the said spring serving to maintain the cam yieldably in the position shown in Fig. 6. The movement of the cam 15 toward the needle cylinder is limited by means of stop screw or pin 37 which passes through an upwardly extending arm 38 of a bracket which is fastened to the circular base 4 of the machine as by screws 39. The pin or screw 37 is locked in adjusted position as by means of a second screw 40 which passes downwardly through the arm 38 and into contact with the screw 37.

Although the cam 15 shown in Fig. 8 is pivotally mounted as just described to swing away from the needle cylinder thus avoiding the breaking of butts 11, it is desirable that a butt the jack of which is to select its needle for the new pattern, which but is adjacent to a butt travelling along an intermediate path 30, be permitted upon resumption of knitting, to engage and be elevated by the upper face of the cam 15. This desirable object is not always attained when using the cam 15 having a straight, inclined surface such as shown in Fig. 8 and it is with the purpose of overcoming the possibility of certain of the butts 11 not being elevated upon the resumption of knitting, that the cam 15' is used. The advantages inherent in the cam 15' as compared with the cam 15, will be obvious by inspection of Fig. 10. In this figure the dotted line represents the upper surface of the cam 15, Fig. 8, and the curved line immediately adjacent thereto represents the upper surface of the cam 15'. In the said Fig. 10 an intermediately positioned butt 11 is shown at 41 and an immediately adjacent butt 11, the jack of which has been selected according to the new pattern, is indicated at 42. It will be evident that if the straight cam 15 be used and assuming the cam 15 to be in the position shown in Fig. 5, that the butt indicated at 42 would pass back of the cam 15 before the said cam would be released to swing to a position adjacent to the needle cylinder such as shown in Fig. 6, and as a consequence thereof the said butt indicated at 42 would pass back of the cam and would hold the said cam in an outer position which would also prevent adjacent and following butts 11 being elevated by the cam 15. Now considering the cam 15' as indicated in Fig. 10 by a full line: the curving or cutting away of the upper face of cam 15' adjacent to its leading end permits the immediately following butt 11 indicated at 42, to be engaged and elevated by the upper surface of the said cam 15'. In other words, the cutting away of the portion of the cam 15' as compared with the cam 15 delays the interval of time which must elapse before a butt such as that indicated at 42 will be engaged and elevated.

It will be noted that the leading edges of the cams 15, 15' are curved as at 43 thereby to permit the intermediately positioned butts 11 to swing the cam to the position shown in Fig. 5; otherwise the said butts would be broken by the said leading edge of the cam.

This cam has been described in connection with a selecting mechanism particularly adapted to multi-feed knitting machines and further, selecting mechanism involving manually controlled elements, however, in its broadest aspect the principles of the invention are to be applied to any knitting machine wherein butts of the jacks or other knitting instrumentalities are likely to strike the cam in a manner to cause damage. The invention is defined in the appended claims.

We claim:

1. In a knitting machine a cam adapted to be engaged by butts of knitting instrumentalities thereby to actuate them, said cam being pivotally supported to swing about a horizontal axis and yieldably held in position adjacent to the needle cylinder, but being adapted to recede therefrom upon being engaged by a butt on one of the

knitting instrumentalities, a stop to limit movement of the cam in the direction of the needle cylinder.

2. Selecting means for knitting machines including in combination knitting instrumentalities having a plurality of removable selecting butts and a master butt, a cam for engagement with said master butt and a series of selecting elements for engagement with the selecting butts, the construction being such that said selecting elements if in position to engage a selecting butt on an instrumentality will move it to a position for engagement of its master butt with said cam, means whereby said cam may recede from active position so that upon withdrawal of any selecting element, master butts left in a position to engage said cam improperly may pass without interference.

3. Selecting means for knitting machines including combination knitting instrumentalities having a plurality of removable selecting butts and a master butt, a cam positioned for engaging master butts on selected instrumentalities but not to engage butts on those instrumentalities which are not selected, a series of selecting elements movable to and from a position to engage the selecting butts, the construction being such that an element in active position for engaging selecting butts will move instrumentalities progressively to a position wherein their master butts will engage said cam, said cam having means thereon whereby it will be maintained in position during normal operation of the machine, but allowing it to recede from that position in the event a master butt on an instrumentality which has been left in an intermediate position upon withdrawal of any selecting element strikes the cam.

4. Selecting means for knitting mechines including in combination jacks having a plurality of removable selecting butts and a master butt, a cam for engagement with master butts on jacks which have been selected, a plurality of selecting plungers for engagement with said selecting butts, said plungers moving jacks having butts thereon in a position to be contacted by one of said plungers in active position to a position wherein its master butt will engage and be controlled by the said cam, means for resiliently maintaining said cam in active position but allowing it to recede from that position upon contact of any master butt on a jack which has been left in an intermediate position upon withdrawal of a plunger.

5. In a knitting machine a cam adapted to be engaged by butts of knitting instrumentalities thereby to actuate them, said cam being pivotally supported to swing in a vertical plane, means for holding said cam in position to engage butts but allowing them to swing to a position wherein butts may pass freely, and a stop for limiting movement of the cam in a direction to engage butts.

6. In a knitting machine a cam for engaging butts on knitting instrumentalities, a vertically extending arm for supporting said cam, a horizontal pivot about which said arm and cam may swing and spring means for swinging said arm and cam to an active or butt engaging position, said spring means allowing the cam to be swung to a position wherein butts may pass freely in the event of a butt striking said cam improperly, and an adjustable stop for limiting the movement of the cam and arm in a direction to engage butts on the instrumentalities.

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