

May 7, 1940.

R. H. LAWSON

2,199,636

KNITTING MACHINE

Filed Dec. 31, 1935

3 Sheets-Sheet 1

FIG. 1.

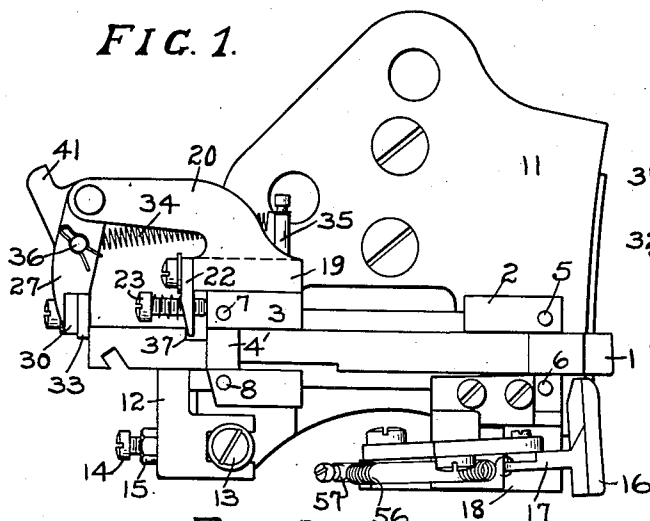


FIG. 2.

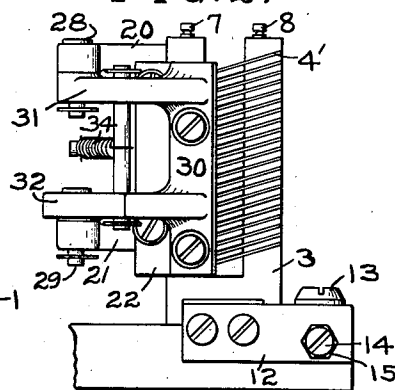


FIG. 3.

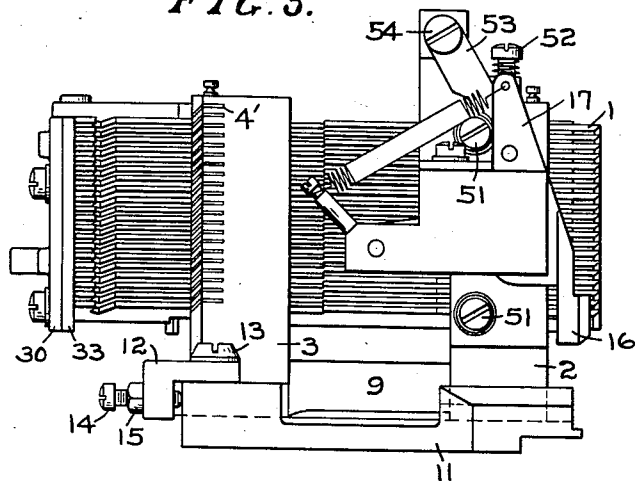


FIG. 4.

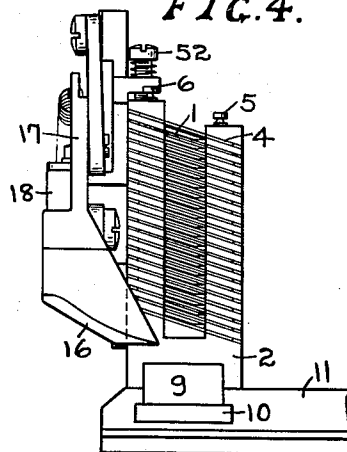


FIG. 6.

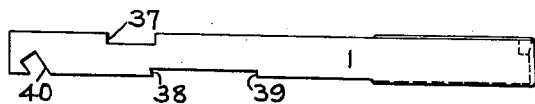
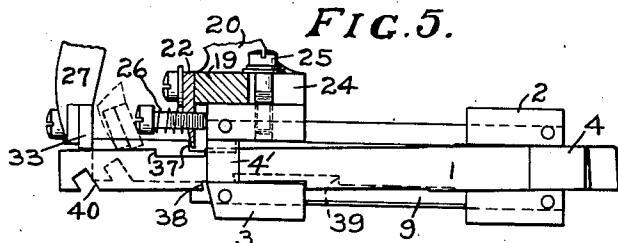


FIG. 5.



INVENTOR:
ROBERT H. LAWSON,
By Roy F. Lovell,
ATTY.

May 7, 1940.

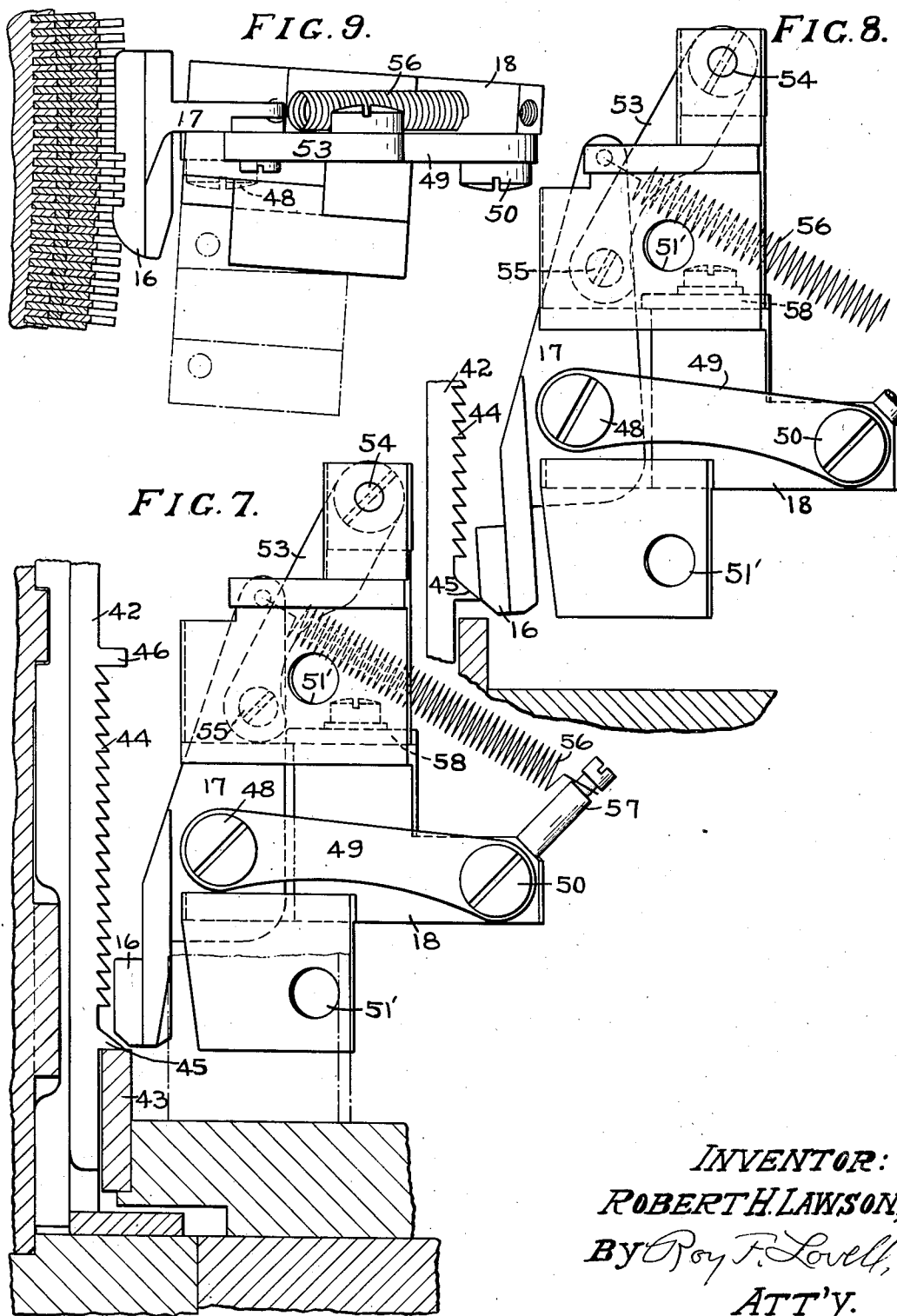
R. H. LAWSON

2,199,636

KNITTING MACHINE

Filed Dec. 31, 1935

3 Sheets-Sheet 2



INVENTOR:
ROBERT H. LAWSON,
By Roy F. Lovell,
ATT'Y.

May 7, 1940.

R. H. LAWSON

2,199,636

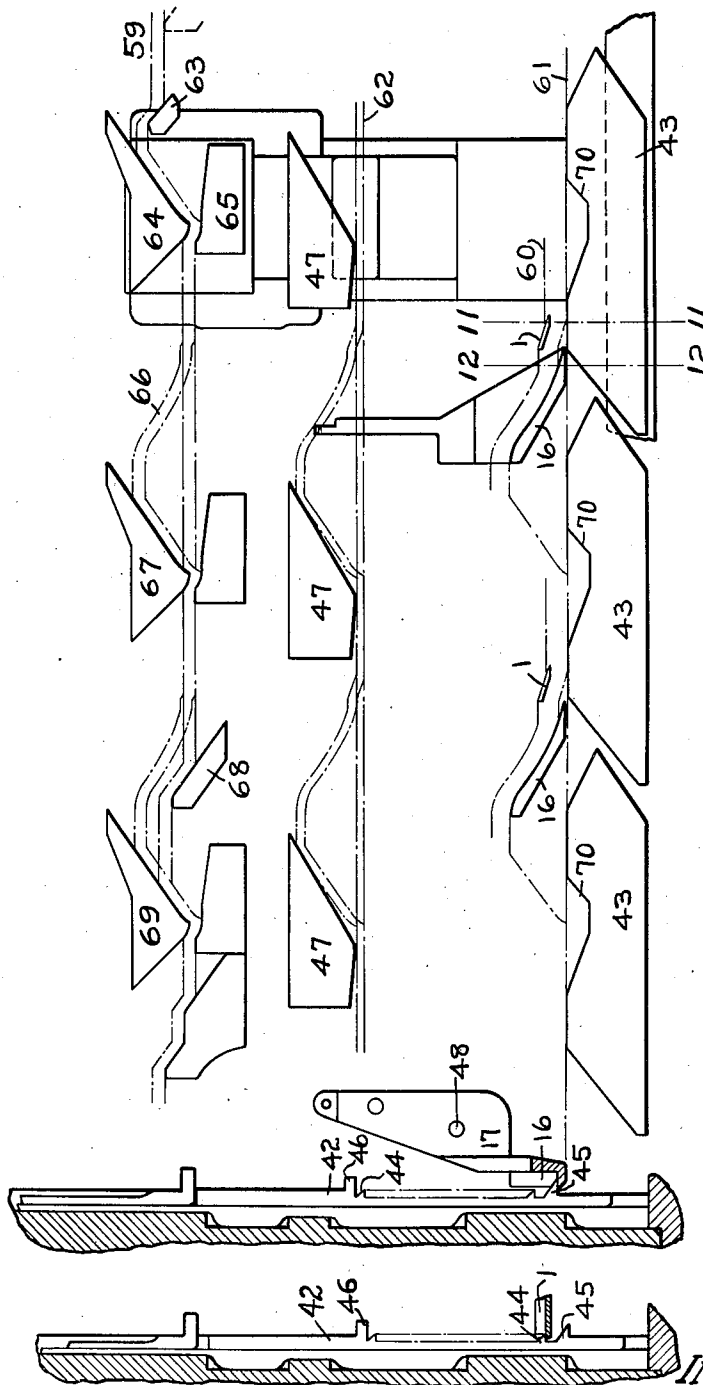
KNITTING MACHINE

Filed Dec. 31, 1935

3 Sheets-Sheet 3

FIG. 10.

FIG. 11. FIG. 12.



INVENTOR:
ROBERT H. LAWSON
BY Ray F. Lovell
ATT'Y.

UNITED STATES PATENT OFFICE

2,199,636

KNITTING MACHINE

Robert H. Lawson, Pawtucket, R. I., assignor to
Hemphill Company, Central Falls, R. I., a cor-
poration of Massachusetts

Application December 31, 1935, Serial No. 56,991

4 Claims. (Cl. 66—50)

This case deals with certain improvements in a selecting device for use in knitting machines, especially multi-feed knitting machines. The case is a continuation as to all common subject matter of the applicant's co-pending United States application, Serial No. 706,082, filed January 10, 1934, now Patent No. 2,067,877.

In the drawings:

Fig. 1 is a plan view of one selector device according to the present invention;

Fig. 2 is an end elevation corresponding to Fig. 1, showing the device as seen from the outside of the machine;

Fig. 3 is an elevation showing one side of the jack selecting mechanism;

Fig. 4 corresponds to Fig. 2 but shows the selector as seen from the opposite end;

Fig. 5 shows in detail the manner in which one selecting plunger may be held in operative position and another in inoperative position;

Fig. 6 shows one of the plungers in detail;

Fig. 7 is a sectional view greatly enlarged, showing the manner in which jacks pass by the jack raising cam, also how that cam is attached to the selector block;

Fig. 8 is a view corresponding to Fig. 7 but showing how the raising cam may be swung out of the way when improperly engaged by a jack butt;

Fig. 9 shows the mechanism of Fig. 7 as seen from above;

Fig. 10 is a diagrammatic view showing the manner in which the selector device functions to cause needles to knit, to float or to tuck;

Fig. 11 is a section taken on line 11—11 of Fig. 10 showing a small portion of the needle cylinder, a jack and part of the cooperating needle, and the manner in which a plunger engages the selector butts on the jack; and

Fig. 12 is a section taken on line 12—12 of Fig. 10 showing the same instrumentalities illustrated in Fig. 11 after the jack has been selected for operation by the raising cam.

The mechanism with which I am concerned in this case has for its general purpose the selection according to a predetermined pattern requirement, of certain jacks, needles, sinkers, pressers or other knitting instrumentalities by means of which variations of pattern or ornamentation may be effected in knitted fabrics. While I do not intend to be limited to any particular use of the selector mechanism herein described, its greatest advantages may be apparent when used to select instrumentalities such as have been indicated in multi-feed knitting ma-

chines. Due to compactness of design and the extreme simplicity of the device as well as the ease and speed with which patterns may be changed, I have found that for knitting machines having a great number of separate yarn feeding stations a selector device of this type is the only practical one which may be employed. The range of patterns is exceedingly great and may be in the form of tuck stitches, draw stitches or floating in combination with plain work, or any combinations of these well-known stitches such as usually form the basis of ornamentation in circularly knit fabric.

Referring to Figs. 1-6, it will be seen that the device consists of a plurality of selector plungers 1 individually movable within a pair of uprights 2 and 3 which have been slotted centrally and vertically for the reception of said plungers. The plungers are arranged at an angle as indicated in Figs. 2 and 4, and they are maintained in separated relationship and at the proper elevation by means of a plurality of spacers or guides 4 and 4'. These guides are inserted in the uprights in slots cut at the proper angle and are held therein by means of pins 5 and 6 through the upright 2 and another corresponding pair of pins 7 and 8 in upright 3. The guides 4 extend forwardly between the plungers, maintain the ends rigid and prevent flexing. The uprights are attached at their base to a longitudinally disposed base member 9 which member has attached at the forward portion a plate 10 which serves to engage within a cooperating slot in a connecting piece 11 which is to be attached by suitable bolts or screws to the knitting machine itself. Of course, it is within the scope of the invention to attach the selecting assembly directly to the knitting machine without the intervening element 11. At the outer end of the assembly an angular bracket 12 has been attached to the base element 9, this angular bracket being slotted for the reception of a screw 13 by means of which the assembly is held in rigid and properly adjusted position on the machine. An adjusting screw 14 serves to adjust the whole device radially of the machine until it has been properly located in correct proximity to jacks or other instrumentalities with which it cooperates, this adjustment being made before the screw 13 is tightened down whereupon the entire assembly is locked in position. Adjusting screw 14 is maintained in its properly adjusted relationship by means of a lock-nut 15. In the event that any selector assembly is to be removed from the machine temporarily, it may be reinstalled so that adjusting screw 14 abuts

against plate 11 in which event the assembly will be locked in properly adjusted position as it was before it was removed.

The general scheme by which the jacks or other instrumentalities are to be controlled consists of first engaging a butt upon one of the jacks or other instrumentalities with one of the inclined selector plungers whereupon that butt will ride up the inclined front edge of said plungers so that the said instrumentalities will then be in a position where they may be engaged by another cam or cams and thereby controlled for knitting or tucking, or some other function incident to the production of fabric having therein varied stitches. In the embodiment herein disclosed the jacks are raised a slight amount as before described, and then another butt upon said jack is engaged by a second cam which may or may not be integral or attached to the selector device. As herein shown, and according to the preferred form of my invention, this cam which operates upon the instrumentalities after they have been selected is attached to and functions as a portion of the assembly shown. The cam 16 is constructed to depend from an arm 17 mounted for operation in a bracket 18. The details of said cam and bracket and the manner in which it is arranged to swing from operative position in the event of a jack passing through at a proper level will be described later.

A bracket 19 having two extending arms 20 and 21 projecting therefrom is adjustably attached on one side of the rear upright 3. A plate 22 is secured to this bracket 19 by means of suitable connection, this plate having a pair of adjusting screws 23 extending therethrough and abutting against the upright. The bracket is slotted for attachment by means of bolts or screws to the side of said upright 3 and when it has been adjusted to the proper radial position by means of screws 23, is to be secured to said upright by tightening the screws passing through the slots in the bracket, these slots and screws being illustrated at 24 and 25, Fig. 5. A spring 26 is placed under the head of each screw 23 for the purpose of keeping it from vibrating loose. A locking element 27 is hinged to swing about pivots 28 and 29 in the ends of arms 20 and 21, this locking element being employed for holding plungers in their operative positions and also for maintaining the inoperative plungers locked in that position. This locking element is composed of a vertically extending portion 30 from which a pair of elements 31 and 32 extend to pass between arms 20 and 21 being hinged thereto at pivots 28 and 29. The vertical portion 30 has a hardened contact piece 33 attached to the inner side thereof for engaging with the plungers. This locking element is normally held in a position to press plungers inwardly against the needle cylinder or the jacks therein by means of a spring 34 which is attached at one end to a pin 35 and at the other end to another pin 36 which passes through elements 31, 32 of the locking member. This spring will hold plungers in as shown in Figs. 1 and 5, the distance inward to which said plunger will be pushed is limited by a shoulder 37 which butts up against adjustable plate 22. The adjustment as accomplished by means of screw 14 was for the purpose of properly positioning the entire assembly so that cam 16 would lie at just the proper distance from the cylinder to properly engage the butt on the jack or other instrumentality which is to ride up said cam. After this general positioning of the whole as-

sembly has been obtained, screws 23 may be employed to adjust the inward position of plungers so that they will engage the selecting butts of the jacks or other instrumentalities in the most efficient manner.

The plungers which are not to be projected inwardly for engaging selector butts are pulled outwardly as shown in Fig. 5 until they extend to the side of locking element 27, more specifically the hardened portion 33 thereof, and in this position can not return to an operative position due to a shoulder 38 being in engagement with the upright 3. The plunger is grooved or recessed on one side to form shoulder 37 the purpose of which has been previously mentioned, and on the other side, to provide a shoulder 38 and another opposed shoulder 39; this latter shoulder 39 prohibits any plungers from being pulled outwardly beyond certain definite limits. Each of the plungers is provided with a notch 40 which is for the purpose of being engaged by a hooked instrument as the knitter pulls said plunger or plungers outwardly in setting up his pattern. In case all of the plungers were to be pulled out, thus eliminating all possibilities of selection for a particular knitting station, the lock 27 will swing into the dotted line position shown in Fig. 5 wherein all of the said plungers will be locked in the inactive position.

Each of the plungers has its forward end beveled as shown in Figs. 3 and 6 so that the saw-tooth butts may pass between plungers without interference. In this manner it is possible to use more plungers in a given space than it would be if said plungers were spaced apart far enough to allow the butts to pass between. Figs. 10 and 11 indicate the manner in which a jack is raised throughout a slight extent by one of the plungers just prior to the time when it would contact one of the raising cams. It is not possible to return a plunger which has been moved from an inner position to an outer position where it is locked by means of element 27, without swinging that latter element away from the end of the plungers so that the shoulder 38 may be disengaged from the upright 3. This locking element 27 may be swung about its pivot until a stop 41 engages with a portion of the arm 21, in which event the spring 34 will hold that locking element in an inactive position.

Referring to Figs. 7, 8 and 9, the jack raising cam and its attached parts have been shown in the position which they occupy relative to the needle cylinder, jacks, etc. The cam 16 projects from the lower end of an arm designated at 17 and is normally maintained in an active position as shown in Figs. 7 and 9. A jack 42 has been indicated in Fig. 7 as passing along a cam 43, a series of which extend about the base of the knitting machine as shown in Fig. 10, and at this height would not be engaged by the said cam and thus would not affect the needles in any way. The jack has a series of saw-tooth butts 44 and below these butts which are used for selection purposes, one larger butt 45. Each of the jacks always has the butt 45 in the position shown but may have one or more of the butts 44 broken away. Above the saw-tooth selector butts there is one rectangular shaped butt 46 which is for the purpose of engaging a cam 47, one of which is included at each separate feeding station, and whereby the jack will be controlled to return to its lowermost position even if the cooperating needle should fail to do so.

In case there should be some misalignment

between parts or for any reason one of the jack butts 45 should pass through at such a level that it ran into the point of cam 16, that cam has been provided with means to allow it to swing outwardly so that no damage may result. In the case previously referred to this cam 16 swung about a single pivot point which forced the cam to change its relative elevation in reference to the jack butts passing by it. To overcome the evils which resulted from a tendency of the cam to change its proper height and to allow it to move more nearly in a straight line, it has been pivoted at point 48 to an arm 49 which is also pivoted at 50 to a fixed portion of the bracket 18 previously mentioned. This bracket has been attached to the upright at the forward end of the assembly by means of two screws 51, Fig. 3, which pass through enlarged holes 51', Fig. 7, in the bracket to provide for a slight adjustment. The adjustment is brought about by means of a pair of adjusting screws 52 which abut against the upper end of upright 2. This adjustment takes care of positioning the cam at the proper height and it may be moved into the proper radial position by means which have been described above. A second arm 53 is also pivoted at a fixed point 54 on an upwardly extending portion of said bracket 18 and is connected to the arm 17 by means of a shouldered screw 55. A spring 56 has been attached at the upper end of said arm and also to a pin 57 which is fixed to some suitable part of the assembly.

When in the position shown in Fig. 7, the arm 49 bears upon a horizontal portion of said bracket 18 and for all intents and purposes the cam is stationary. However, when contacted by a butt which is not passing at the proper height as in Fig. 8, the tension in spring 56 is easily overcome so that said cam will swing upon the levers or arms 49 and 53 into a position approximately that shown in said figure. The cam itself will remain at about the same elevation so that it will not swing into the path of any other jack butt as might have been possible in the previous construction. A plate 58 has been attached to the bracket 18 just behind a slot in which the arm 17 moves so that the swing of the arm will be limited to about the position shown in Fig. 7 where it will remain vertical when in active position. This plate is provided with a slot for adjustment.

The operation of the device is shown in Figs. 10, 11 and 12 wherein three different possibilities are shown. In Fig. 10 the pathway of needle butts is shown at 59 and the path of selector butts at 60. The lowermost path 61 indicates that which is traveled by the jack butts 45, while the butts 46 would travel in the path indicated at 62. At the first knitting point shown at the right-hand side of the figure, the jacks have not been acted upon to affect the action of needles in any way. Said jacks have merely passed along over the cam 43 which maintains them at an elevation such as shown in Fig. 7 where they will not be engaged by the following raise cam unless they are selected by one of the plungers. The needles pass through this knitting station to knit and it is not possible with the set-up shown to form any kind of ornamental stitch. A cam 63 raised the needles to the position in which the latches are cleared whereupon they take yarn and knit as they pass down under cam 64. A cam 65 acts to relieve the stitch and to return all the needle butts to a common level. A selector device such as has been indicated

in the previous figures would be interposed between this knitting station and the one next following in which case it is likely that some needles would knit while others might merely be caused to miss the yarn in which case floats would appear in the fabric. All of the needles which are to knit must have at least one selector butt engaged by a plunger so that the butt 45 will ride up cam 16 whereupon the jacks will elevate their corresponding needles to a latch clearing position which is shown by the upper pathway 66. These needles will draw stitches as they pass under a stitch cam 67, while the remaining needles will merely pass along at the lower level not drawing any yarn at this feed.

In the next stage the needle butts which are not selected will be engaged by a cam 68 which will not raise said needles to a latch clearing height, however, it will raise them high enough to take the yarn in their hooks so that tuck stitches will be formed at the next casting off point. The remaining needles which were selected would take yarn and knit under cam 69 precisely in the same manner in which they did in the previous stage. Each of cams 43 is provided with a recess portion 70 which will allow the butts 45 on the jacks to descend below the upper edge of said cams in case there is any misalignment, or stitch length is adjusted to such an extent that there would be a lack of clearance.

The device has been described relative to a particular and somewhat specific embodiment of the same but I do not intend to be limited to such a single embodiment since the device may take many forms and there may be several changes in the details without departing from the spirit of the invention. The examples which have been used to indicate the manner in which needles or jacks may be controlled are given merely for purposes of illustration and many other uses such as the control of pressers with spring beard needles are well within the scope of the invention. I do not intend to be limited except by the scope of the appended claims.

I claim:

1. A selecting device for knitting machines including a support, a plurality of selecting instrumentalities movable within said support to and from positions wherein they engage or fail to engage elements to be selected, means on each element for limiting its movement in either direction and a swinging element common to all of the selecting elements for resiliently retaining some of them in an active position and at the same time, locking those which are to be inactive in an inoperative position.

2. A selecting device for knitting machines including a support, a plurality of slidable plungers in said support individually movable to and from an active position, means for limiting movement of each plunger in either direction and a swinging element resiliently retained in contact with the outer ends of active plungers for holding them in that position, but so constructed that it locks other plungers which have been moved to inoperative position in that position.

3. Pattern mechanism for knitting machines of the type described including a support, a series of superposed selecting plungers individually slidable in said support, said plungers being movable to and from operative and inoperative positions and means including a single member bodily movable to and from a position to engage a plural number of said plungers to permit re-

selection thereof and forming a component part of said mechanism for holding some plungers in active position, and at the same time, retaining other plungers in inactive position.

- 5 4. Pattern mechanism for knitting machines of the type described including a support, a series of superposed selecting plungers individually slidable in said support, said plungers being movable to and from operative and inoperative

positions and means including a single pivoted member bodily movable to and from a position to engage a plural number of said plungers to permit reselection thereof and forming a component part of said mechanism for holding some plungers in active position, and at the same time, retaining other plungers in inactive position.

ROBERT H. LAWSON.