Aug. 20, 1935. J. MEYER 2,012,246

KNITTING MACHINE

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Fig. 1.

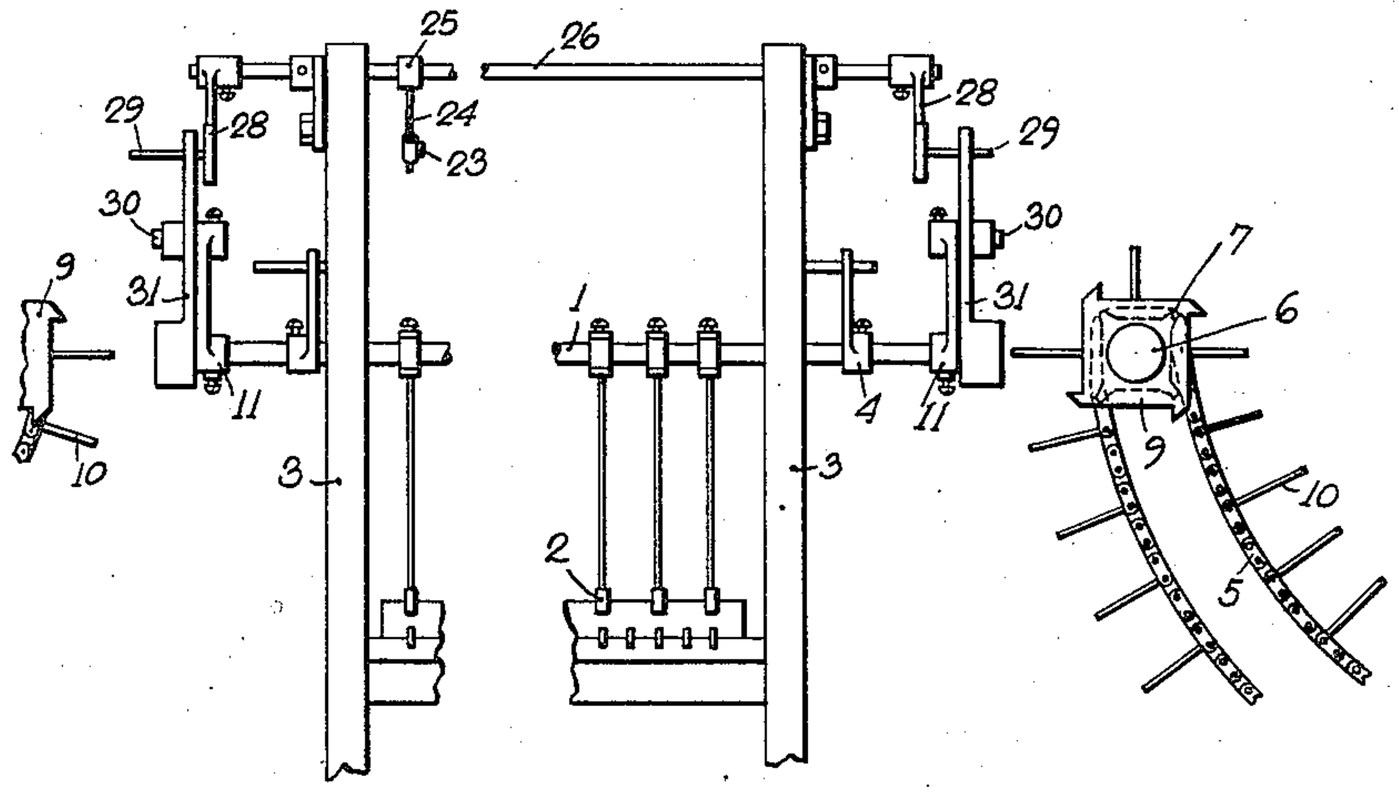


Fig. 5.

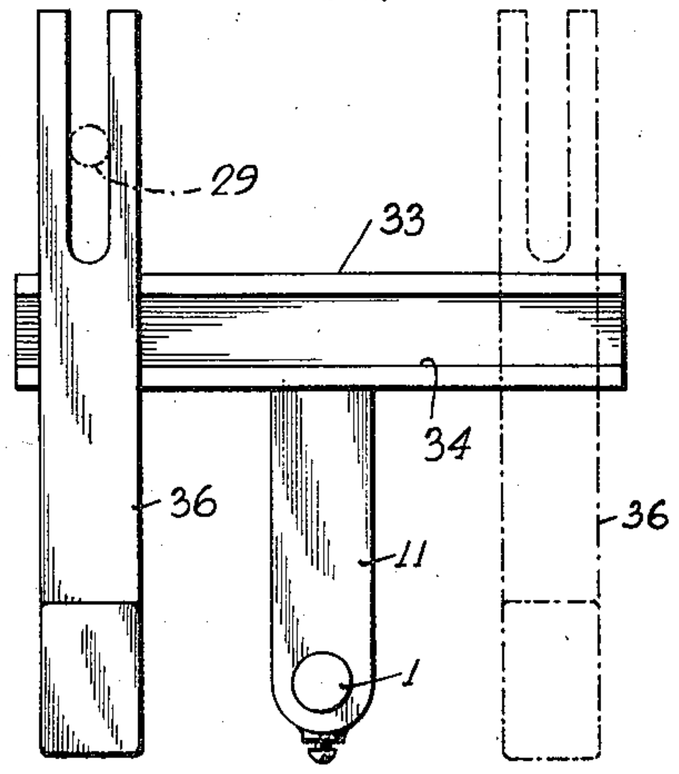


Fig. 6.

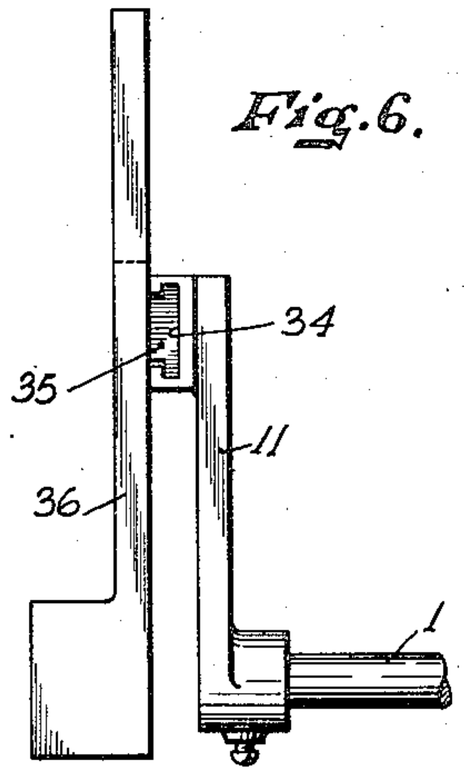


Fig. 7.

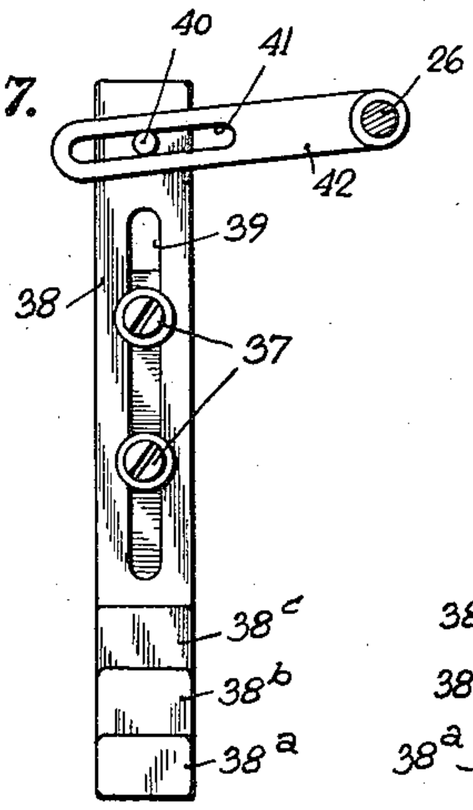
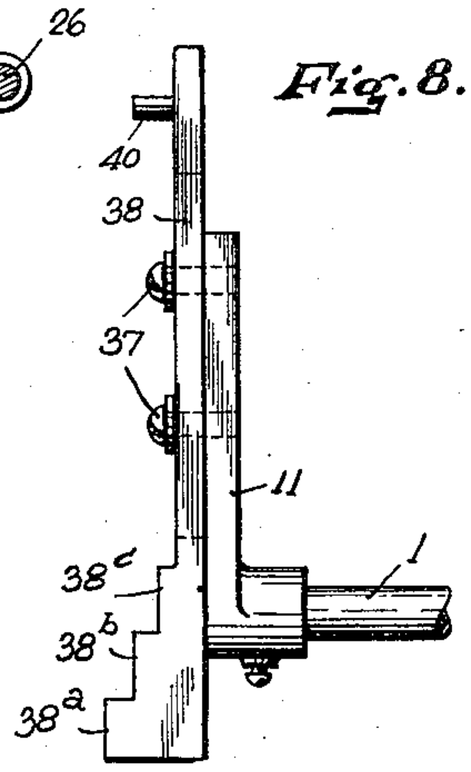


Fig. 8.



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KNITTING MACHINE

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Fig. 2.

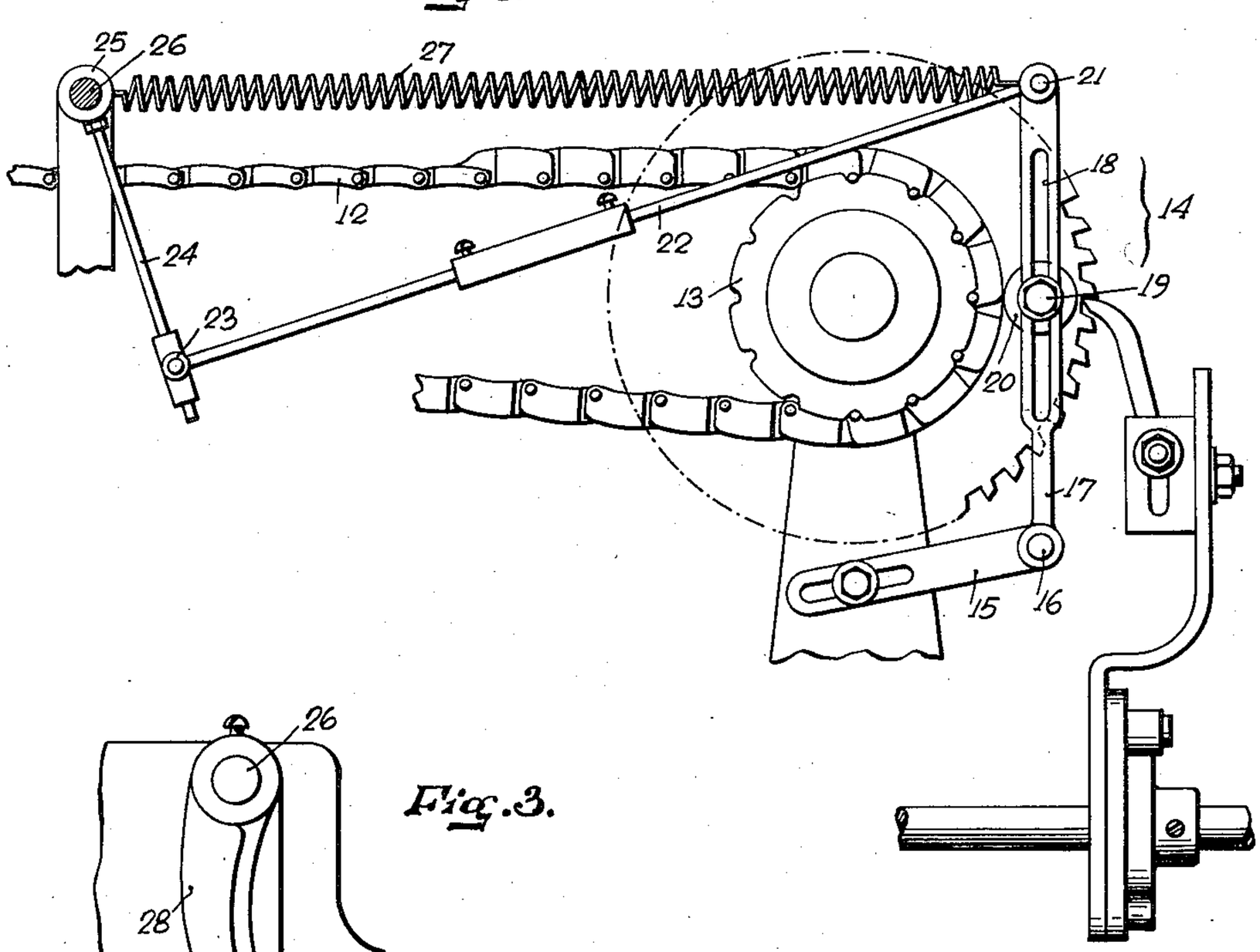
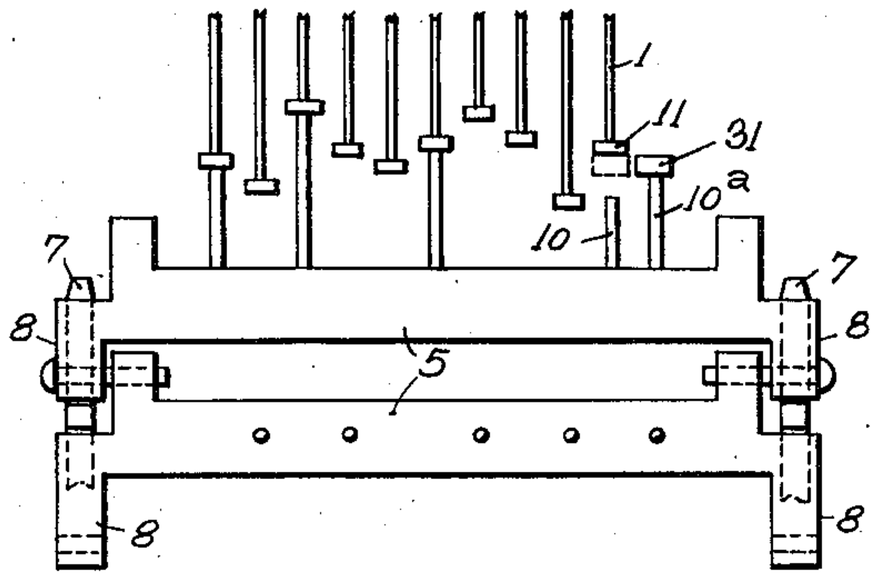


Fig. 3.

Fig. 4.



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Patented Aug. 20, 1935 2,012,246

UNITED STATES PATENT OFFICE

2,012,246

KNITTING MACHINE

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Application October 31, 1934, Serial No. 750,776

4 Claims. (Cl. 66—126)

This invention relates to knitting machines.

Special objects of the invention are to provide a machine capable of producing a greater variety of patterns than was formerly possible, which will automatically change patterns and which, in form, is relatively simple and compact.

Other desirable objects and the novel features of construction, combinations and relations of parts by which the same are attained will appear from the following specification, read in connection with the accompanying drawings in which:

Fig. 1 is a fragmentary elevational view of a knitting machine, showing certain elements of the invention.

Fig. 2 is a side view of the elements of the invention which actuate those shown in Fig. 1.

Fig. 3 is a right end view of the rod, or bar arrangement, showing the movable headpiece and the arm that actuates it.

Fig. 4 is a fragmentary plan view, diagrammatic in part, of the bar, pin and link arrangement.

Figs. 5 and 6 represent elevational and side views respectively of another embodiment of the invention.

Figs. 7 and 8 represent elevational and side views, respectively, of a further modification of the invention.

Referring to the drawings, 1 are the rods or bars carrying the thread tubes 2. These bars are slidably mounted with respect to frame 3 and guides 4 and slide axially to change laterally the position of the thread tubes 2. Pattern links 5 form an endless chain which is caused to revolve about axle 6 by teeth 7, positioned on the axle and rotating therewith. The teeth 7 coact with end pieces 8 of the pattern links, whereby the links are advanced. Axle 6 is suitably driven, as by the cooperation of a grab-hook (not shown) with the wheel 9. Mounted on the pattern links 5 are pins 10, their arrangement and protruding lengths being varied for different pattern designs.

As is well known in the art, the axle 6 is caused to oscillate by suitable means substantially horizontally through a fixed displacement toward and away from the frame 3 at the same elevation as that of the bars 1. Pins 10, lying in a horizontal plane between the axle 6 and the operating heads 11 of the bars 1, will coact with the operating heads 11 to slide the bars 1 to a position determined by the amplitude of the horizontal oscillation and the length of the pin. When, of course, the pin is too short to reach the head 11 of any particular bar 1, or when there is no pin in the link in position to coact with that bar, that bar will remain stationary until acted upon by a pin of sufficient length in another pattern link.

It is this coaction between pin and bar, resulting in motion of the bar, which, in knitting machines, controls the design. Changes in design are effected by changing the lengths of the pins 10 and/or their positions in the links 5. Obviously, however, it would be impractical to stop the machine and reset the pins to effect a change of pattern in the course of knitting a length of product embracing different designs. Therefore, it is desirable to have automatic means for the changing of patterns, which means will utilize as fully as possible the available pin settings on any machine to produce a variety of design. Applicant's invention is designed to provide such means, and makes possible a greater variety of patterns than has heretofore been available, the changes in design being effected quickly, easily and automatically. Applicant accomplishes this result by varying, in effect, the effective length of the bars.

Knuckles 12, of varying height, form an endless chain revolved by sprocket 13 which, through reducing mechanism designated generally as 14, is actuated by the drive shaft of the machine. Thus, for a predetermined number of revolutions of the drive shaft, there is a single complete passage of any point on the knuckle chain through its orbit. Suitably mounted to a stationary part of the frame is bar 15, which may be adjustably positioned, but which thereafter remains stationary. Bar 15 is connected through pivot 16 to bar 17, slotted through a portion of its length. Through the slot 18 extends the pin 19 which is fixed to the bar 17 at a point substantially opposite the axis of sprocket 13. Roller 20 is carried by pin 19 and is free to rotate about it. The end of bar 17 opposite the pivot 16 is connected through pivot 21 to a rod 22 of adjustable length which, in turn, is connected through adjustable collar and stud 23 to rod 24. The end of rod 24 opposite the collar and stud 23 is suitably connected to a collar 25 which is keyed or otherwise suitably fastened to shaft 26, so that motion of the collar 25 about its axis will cause corresponding angular rotation of the shaft 26. One end of the spring 27 is connected to the rod structure at pivot 21, and the other end to a convenient point on the frame 3 near the shaft 26, or to the shaft 26 itself in such a way as to not prevent its rotation, as by means of a loose collar. Spring 27 is substantially perpendicular to shaft 26 and tends to draw the pivot 21 toward the shaft 26. Spring 27 holds the roller 20 in contact with knuckles 12 at all times. Therefore, as the height of knuckles 12 is increased, the roller 20 is forced further away from the axis of the sprocket 13, and so causes rotation of the bar 17 about the pivot 16. This change in position of bar 17 is transmitted through bars 22 and 24 and collar 25 and causes counterclockwise rotation of shaft 26, as seen in Fig. 2.

When the height of knuckles 12 is reduced to their former value, spring 27 operates to restore bar 17 to its former position and to so return shaft 26 to its former position, rotation now being in the opposite direction, or clockwise. It will be seen, therefore, that by appropriate design, it is possible to completely control the direction and extent of rotation of shaft 26, and the times at which rotation occurs.

At the end of shaft 26 is mounted operating arm 28, suitably fastened so that rotation of the shaft 26 will cause corresponding co-axial rotation of the arm 28. Extending perpendicularly from the free end of the operating arm 28, and parallel to the shaft 26, is the operating pin 29. Extending from the upper part of the head 11 is a pin 30, which supports the headpiece 31, free to rotate about the pin 30. The headpiece 31 is slotted above its point of support and through this slot 32 is positioned the operating pin 29. As the shaft 26 turns, there is a corresponding rotation of the arm 28, and the pin 29. The lateral motion of the pin 29 will cause a rotation of the headpiece 31 about the pin 30, as indicated in Fig. 3, and will so cause the lower end of headpiece 31 to be either in or out of a position between the pin 10 and the point or head 11 where pin 10 would meet it. When headpiece 31 is in that position, of course, an impulse given it by pin 10 is transmitted directly to head 11 and bar 1. The pin 10 takes the same position whether or not headpiece 31 is immediately in front of it, but when headpiece 31 is immediately between pin 10 and head 11, bar 1 is pushed further over than when headpiece 31 is not in that position. The function of headpiece 31, therefore, is to increase the effective length of the pin 10.

In operation, the pin 10 and head 11 may for a time contact directly. At a predetermined time, regulated by the reducing mechanism and the knuckle sizes, the headpiece 31 falls into position between head 11 and pin 10 and has the effect of causing a greater lateral motion of bar 1 for the same setting of pin 10. Conversely, if normal operation calls for the presence of headpiece 31 in position between pin 10 and head 11, then, at a predetermined time, it may be thrown out of position. This would reduce the lateral motion of bar 1 for a given length of pin 10, and might even cause the pin 10 and head 11 to be entirely out of contact, as indicated in Fig. 4.

Thus far, this description has been concerned with a single bar 1, its head 11, and pins 10, but as appears from Fig. 4, it is possible to effect coaction between the head 11 and any other row or rows of pins 10*a* by motion of the headpiece 31. The headpiece 31 being hung on the pin 30 of head 11, motion of the headpiece 31 in a direction parallel to the axis of bar 1 will be transmitted to head 11 regardless of the rotation of headpiece 31 about pin 30. Thus in Fig. 4 as shown, by swinging headpiece 31 into a position in the line of travel of pin 10*a*, the motion of bar 1 is controlled by pin 10*a* rather than by pin 10. When pins 10 and 10*a* are of different lengths, the change of control from one to the other thus effects a change of travel of bar 1, and thus, of design, conveniently and automatically, without changing the pin settings. Of course, pin 10*a* can be no shorter than pin 10 than by the thickness of headpiece 31, or pin 10 would still control. It will thus be seen that the invention provides for not only different motions of a bar for given settings of a row of pins but also for control of the motion of any single bar by any of a plurality of rows of pins. Manifestly, each bar of the machine may be similarly controlled.

Figs. 5 and 6 show a modification of the invention in which the headpiece is slidably mounted. At the upper end of head 11, and extending therefrom at right angles to the line of motion of bar 1, is the cross piece 33. Channel 34 running lengthwise in the cross-piece 33 receives the key 35 attached to the headpiece 36. As the operating arm 28 revolves, the operating pin 29 in slot 36 of the headpiece 36, causes the headpiece 36 to assume different positions along the channel. Thus, headpiece 36 may be between pin 10 and head 11; it may be in position to be acted upon by pin 10*a*; or it may be so located that it is touched by none of the pins, as by being halfway between the two former positions.

Figs. 7 and 8 show a further modification of the invention, in which the headpiece is designed to make available different effective thicknesses of headpiece. As illustrated, two pins 37, one above the other, extend from the head 11. The lower portion of headpiece 38 consists of a series of sections 38*a*, 38*b* and 38*c*, of different thicknesses. The upper portion of the headpiece 38 contains the slot 39. The pin 40, formed at the top of headpiece 38 is fitted through the slot 41 of the operating arm 42. As the arm 42 is revolved, headpiece 38 is raised or lowered vertically, guided by pins 37, thus positioning one of the sections 38*a*, 38*b*, or 38*c* between the pin 10 and the head 11. The different thicknesses of headpiece cause different positioning of the bar 1, and so result in different pattern effects.

While only particular forms of the invention have been described in detail in this specification, it will be apparent to those skilled in the art that the invention is not so limited, but that various other forms of the invention may be embraced within the spirit thereof and within the scope of the appended claims.

I claim:

1. In a knitting machine, a bar, a pin, a headpiece, means for positioning said headpiece between said pin and said bar at predetermined intervals and means for pushing said pin against said headpiece at said intervals and against said bar during other intervals.

2. In a knitting machine, a bar, a pin, a headpiece, automatic means for positioning said headpiece at the end of said bar at predetermined times, means for moving said pin through a fixed distance against said headpiece at said predetermined times and against the end of said bar at other times.

3. In a knitting machine, a bar, a pin, a headpiece comprising a plurality of sections of different thickness, means for positioning different of said headpiece sections at the end of said bar at predetermined times, and means for pushing said pin against the headpiece section at the end of said bar.

4. In a knitting machine, a bar, an adjustable headpiece, a plurality of rows of pins, means for moving said pins, and means for placing said headpiece in position to be impelled by pins of different rows at predetermined times.

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