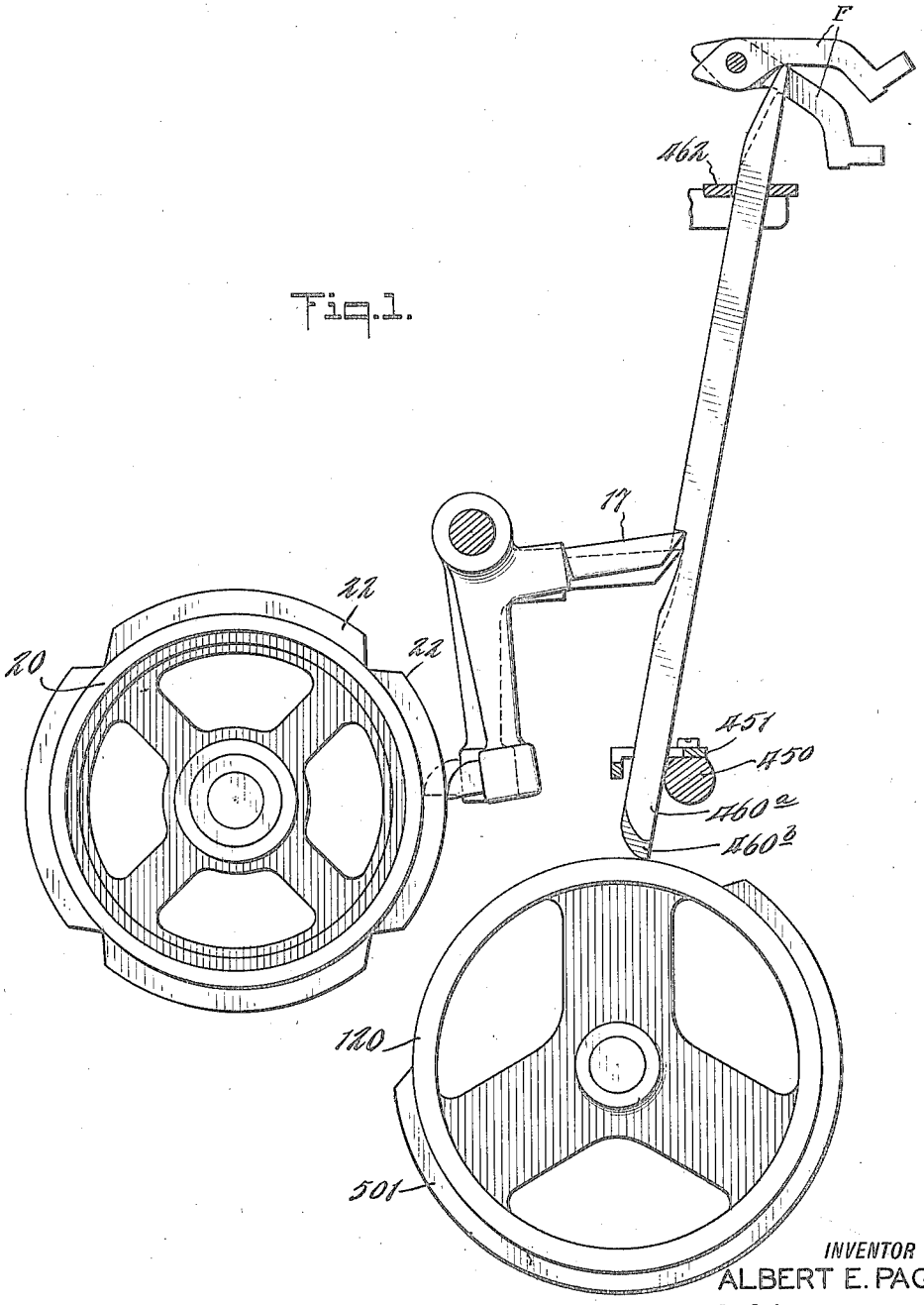
Oct. 2, 1928. 1,685,860

A. E. PAGE

CIRCULAR KNITTING MACHINE

Filed Feb. 17, 1927 3 Sheets-Sheet 1

Fig. 1.




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Filed Feb. 17, 1927 3 Sheets-Sheet 2

Fig. 2.

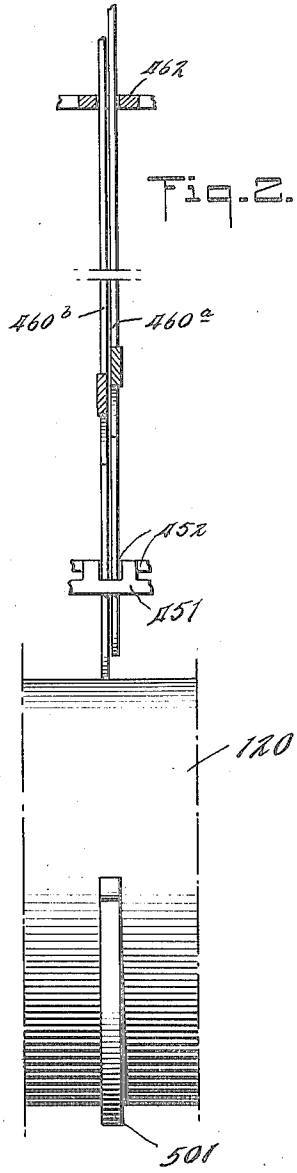
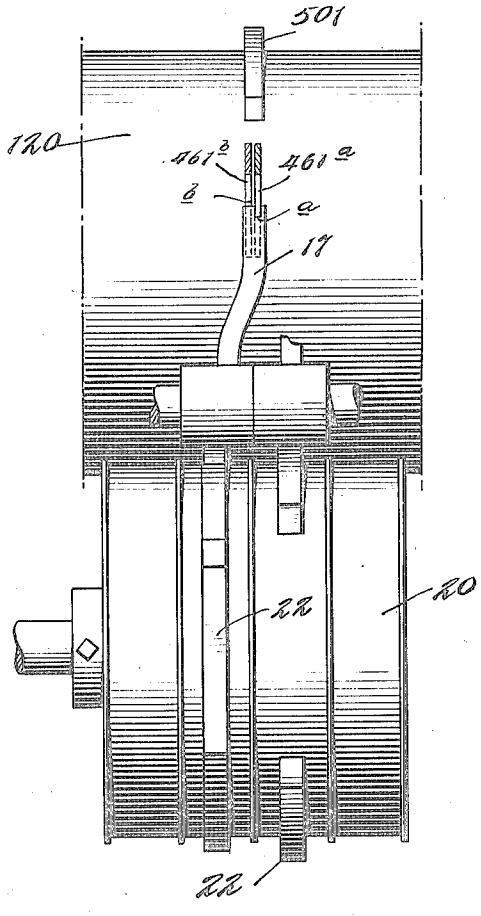



Fig. 3.




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Fig. 5.

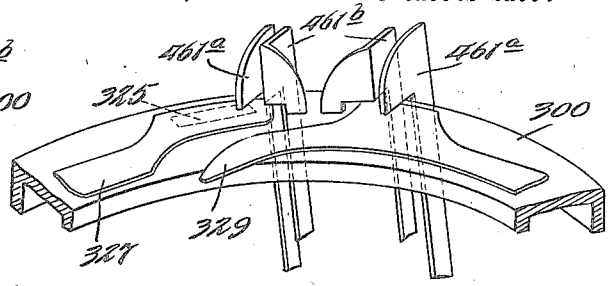



Fig. 6.

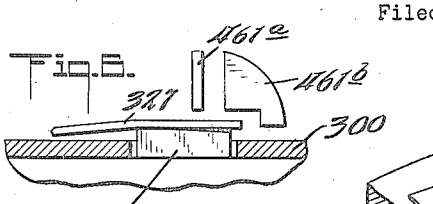



Fig. 7.

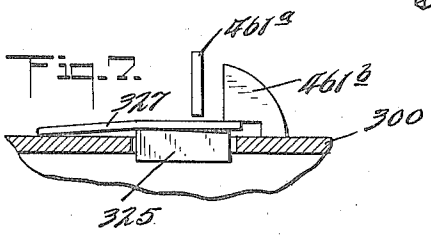



Fig. 8.

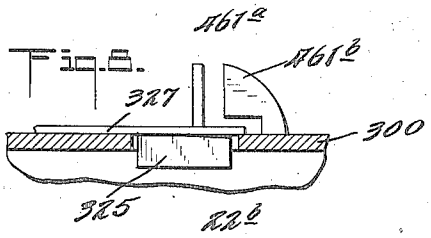
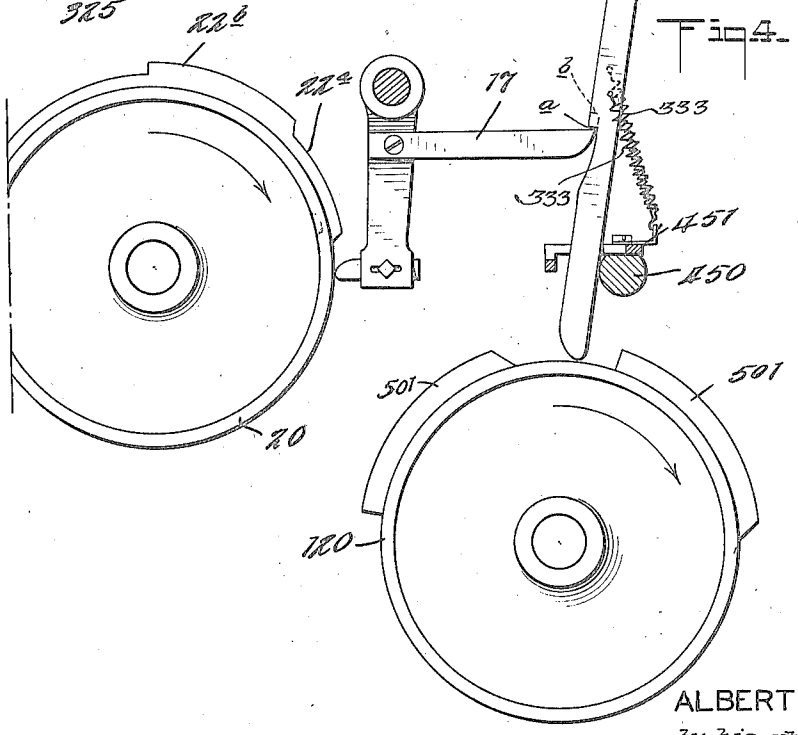



Fig. 4.




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Patented Oct. 2, 1928. 1,685,860

# UNITED STATES PATENT OFFICE.

ALBERT E. PAGE, OF BROOKLYN, NEW YORK, ASSIGNOR TO SCOTT & WILLIAMS, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF MASSACHUSETTS.

## CIRCULAR-KNITTING MACHINE.

Application filed February 17, 1927. Serial No. 168,979.

This invention relates to circular knitting machines and more particularly to the means for controlling pattern movements in the knitting head. One object of the invention is to increase the number of selections which can be made without disturbing the parts of the machine already found in the knitting head. Another object of the invention is to obtain a greater number of selections from the same number of cam races or positions on the pattern drums or other revolving pattern means.

In the modern seamless hosiery machine there are a large number of parts and attachments on the knitting head, and the space available in the knitting head for the yarn fingers and for the thrust rods which operate those yarn fingers and other attachments is very limited, and the dimensions are well standardized. According to the present invention the number of thrust rods available to cause the movements of the yarn fingers and the operation of the other attachments is increased without in any way changing the amount of space occupied by the yarn fingers or the guide plates or other elements associated with the thrust rods. In addition the same number of cam positions heretofore used is made to operate the increased number of thrust rods and to give them varied movements.

The invention will be shown and described embodied in the well known Scott & Williams type of seamless hosiery machine (such, for instance as that shown and described in the patent to Robert W. Scott, No. 1,236,770, dated Aug. 14th, 1917) with revolving needle cylinder, but it should be understood that the invention is not limited to that type. Certain features of construction of the sinker control disclosed in this application and not herein claimed form the subject matter of an application by Albert E. Page and Frank R. Page filed September 17, 1926, Ser. No. 136,131.

In the drawings:

Figure 1 is a side elevation of mechanism operating the yarn fingers according to the present invention;

Fig. 2 is a rear elevation of a portion of the main pattern drum and two thrust rods;

Fig. 3 is a plan view illustrating the mechanism adapted to operate two thrust rods at different times from one cam position on the auxiliary pattern drum;

Fig. 4 is a side elevation corresponding to Fig. 3 and showing two thrust rods shaped to control one sinker cam;

Fig. 5 is a perspective of a portion of a sinker cap, showing two pairs of thrust rods operating two movable sinker cams;

Fig. 6 is a fragmentary sectional view of the sinker cap showing a throw-in cam lifted out of action;

Fig. 7 is a view similar to Fig. 6 showing the throw-in cam pushed half way in by one of the thrust rods; and

Fig. 8 is a fragmentary sectional view of the sinker cap showing the throw-in cam held all the way in; by the other thrust rod.

In the machine shown in the drawings there is the usual intermittently racked main pattern drum 120 and an auxiliary or striping drum 20. The main pattern drum constitutes pattern means revolving once for every stocking knit and carries cams 501 for operating thrust rods in the ordinary manner. There are a plurality of yarn fingers F each separately controlled by a thrust rod $460^a$ or $460^b$. Alongside these thrust rods there are other thrust rods $461^a$ and $461^b$ adapted to control other pattern movements in the knitting head, such for instance as the manipulating of cams in the sinker cap 300 (Fig. 5). The whole series of thrust rods is guided vertically by a lower comb or sley 451 mounted on a stationary stud 450, and by an upper comb 462.

Heretofore each thrust rod has passed through and filled a separate slot in the upper comb and a separate slot 452 in the lower comb 451. The lower end of each thrust rod rested on a separate cam 501 on the main pattern drum 120. With such a construction the maximum number of thrust rods was very limited, because of the necessarily restricted space available in the knitting head for their accommodation. In the machine shown in the drawings the thrust rods are half as thick as heretofore and the number of thrust rods operable within the available space is therefore increased. Two thrust rods are passed through one slot in the combs and thus it is possible to employ a greater number of yarn fingers in the standard sized throat (not shown). By using thinner thrust rods and

placing two of them in the space formerly occupied by one, it is possible to double the number of thrust rods and hence the number of movements transmitted to the yarn fingers manipulating them. The two thrust rods passing through a single opening in the comb are both lifted and lowered by the same drum cam 501 thus economizing space on the main pattern drum.

When the machine is making striped fabric the thrust rods are manipulated from the auxiliary drum 20 by means adapted to move each individual thrust rod separately. There results a corresponding increase in the total number of thrust rod movements available. One embodiment of these means is shown in Figs. 1 and 2 where the thrust rods $460^a$ and $460^b$ have notches in their edges on the side nearest to the auxiliary pattern drum 20. These thrust rods are operated from the auxiliary pattern drum 20 through the action of cams 22 in two cam races or positions thereon, which actuate bell crank levers 17, whose upper arms engage the notches in the thrust rods. Each of the thrust rods $460^a$ and $460^b$ is thus operated by an individual bell crank lever.

It has been discovered, however, that a pair of thrust rods can be operated separately or both together and one separately from a single cam race on the auxiliary drum 20. This is accomplished by cutting the notch *b* of the thrust rod $461^b$ higher than the notch *a* of the thrust rods $461^a$ and using a low cam $22^a$ to lift the thrust rod $461^a$ and a high cam $22^b$ on the same cam race to operate thrust rods $461^b$ (Figs. 3 and 4). By this means the two thrust rods will be lifted and lowered successively as the lower arm of the single bell crank lever rides up or down the successive elevations of the drum cams $22^a$ and $22^b$. When the bell crank lever rides up onto the cam $22^a$ the thrust rod $461^a$ alone will be lifted. As the bell crank lever rides up on the cam $22^b$ its upper arm engages the notch *b* in the thrust rod $461^b$, and elevates both thrust rods from that point together. As many movements desired in knitting machinery are successive movements, the fact that the thrust rod $461^a$ is raised higher by cam $22^b$ is no disadvantage. One of the uses of the increased capacity of the machine is illustrated in Figs. 5, 6, 7 and 8, in which the cams 325 and 329 on a sinker cam cap 300 are each manipulated by a pair of thrust rods consisting of a thrust rod $461^a$ and a thrust rod $461^b$. The sinker cam 325 is attached to the under side of a flat spring 327 and this spring 327 and the secondary sinker cam 329—which itself is a flat spring—are each attached at their non-operating end to the top of the cam cap 300. The upper end of each thrust rod $461^a$ has a shoulder overlying the free end of the spring 325 or the cam 329 as the case may be and the upper end of each thrust rod $461^b$ forming the other member of a pair not only has a shoulder overlying the spring 325 or the cam 329 in a similar manner, but also has a downwardly directed foot overlying the cam cap 300 but not the spring 325. The notches *a* and *b* in the sides of the two thrust rods are so located that when both thrust rods are resting on the surface of the main pattern drum and the bell crank lever is on the surface of the auxiliary drum, the sinker cam is held in its lowermost position by the thrust rod $461^a$. The thrust rods $461^a$ and $461^b$ may be held down by any known or convenient means. For instance, I may employ springs 333 such as those illustrated in Patent No. 1,282,958 granted to Robert W. Scott on October 29th, 1918. Each of these springs may have one end connected with a thrust rod and the other end attached to the plate 451. Such an arrangement is illustrated by way of example in Fig. 4. When the bell crank lever meets the drum cam $22^a$ it lifts the thrust rod $461^a$ and the sinker cam rises until held by the thrust rod $461^b$, whose foot is resting on the cam cap 300. These sinker cams 325 and 329 act on the operating butts of the sinkers as shown and described in the co-pending application of Albert E. Page and Frank R. Page, Serial No. 136,141, filed September 17th, 1926. In the illustration given, the thrust rod $461^a$ is first elevated, allowing the flat spring 327 to rise up under the shoulder of the thrust rod $461^b$, thus raising the cam 325 from the position shown in Fig. 8 to its intermediate position illustrated in Fig. 7. A further movement of the auxiliary pattern drum 20 causes the bell crank lever to ride up on cam $22^b$ and to engage and lift the thrust rod $461^b$. This permits the spring 327 to lift the cam 325 to its uppermost position as illustrated in Fig. 6. Further turning of the auxiliary pattern drum 20 will cause the end of the bell crank lever 17 to ride down off of the cam $22^b$, thus dropping both thrust rods to an intermediate position where the thrust rod $461^b$ depresses the spring 327 to this intermediate position as regulated by the foot upon the thrust rod.

It will be obvious that this invention may be applied to many other uses than the operation of sinker cams.

With the understanding that the description and illustrations herein are employed merely by way of example,

I claim:

1. In a knitting machine a pattern drum and a slotted comb, in combination with a plurality of thrust rods operated simultaneously by said pattern drum and passing through a single slot in said comb and other means adapted to operate both thrust rods and one thrust rod separately.

2. In a knitting machine a pattern drum, a plurality of thrust rods, a single cam on

said pattern drum adapted to operate said plurality of thrust rods simultaneously, in combination with a slotted comb through one of whose slots said plurality of thrust rods pass and means adapted to operate both thrust rods and one thrust rod separately.

3. In a knitting machine revolving pattern means, an auxiliary pattern drum, a slotted comb, and a pair of thrust rods adapted to pass through one of the slots in said comb, in combination with one cam on said main pattern drum adapted to control said pair of thrust rods, and means controlled from said auxiliary pattern drum adapted to move said thrust rods separately.

4. In a knitting machine revolving pattern means, an auxiliary pattern drum, a slotted comb, a pair of thrust rods passing through one slot in said comb, and one cam on said revolving pattern means adapted to control said pair of thrust rods, said thrust rods having notches in the sides thereof the notch in one thrust rod being higher than that in the other, in combination with a bell crank lever adapted to be controlled from said auxiliary pattern drum engaging in said notches to raise first one and then both of said thrust rods.

5. In a knitting machine a pair of thrust rods each having a notch in the side thereof, revolving pattern means, and cams on said pattern means, in combination with a single bell crank lever operated from said revolving pattern means and adapted to raise first one and then both of said thrust rods by successive movements.

6. In a knitting machine a pair of thrust rods each having a notch in its side, said notches being at different elevations, revolving pattern means, cams of two heights on said revolving pattern means and a single bell crank lever actuated by said cams of two heights adapted to raise the thrust rods by successive movements.

7. In a circular knitting machine, a main pattern drum, an auxiliary pattern drum, a pair of thrust rods, one cam on said main pattern drum adapted to control said pair of thrust rods, a comb through one of whose slots said pair of thrust rods passes, means controlled from said auxiliary pattern drum adapted to raise one of said thrust rods by one movement and both of said thrust rods on a further movement, in combination with vertically movable cams for knitting elements, the limits of whose upward movements are controlled by said pair of thrust rods.

8. In a knitting machine a main pattern drum, an auxiliary pattern drum, a comb, a pair of thrust rods passing through one of the slots in said comb, said thrust rods having slots in their sides at different elevations, one cam on said main pattern drum adapted to control said pair of thrust rods, cams of two heights on one cam position of said auxiliary drum, means controlled by said auxiliary drum cams to raise one thrust rod when actuated by the low cam and the other thrust rod when actuated by the high cam, in combination with a stationary external sinker cam cap and a vertically movable cam in said cam cap, said vertically movable cam having a spring mounted on said cam ring tending to hold said vertically movable cam in its uppermost position, said pair of thrust rods controlling the position of said cam.

9. In a knitting machine, a pattern drum, a plurality of cams on said pattern drum, a comb having slots therein, and thrust rods each passing through and filling one slot and each operated by one of said cams, in combination with a pair of thrust rods passing through one of said slots and operated by one of said cams, and means adapted to actuate said pair of thrust rods and adapted to lift one of said pair separately.

In testimony whereof I have signed my name to this specification.

ALBERT E. PAGE.