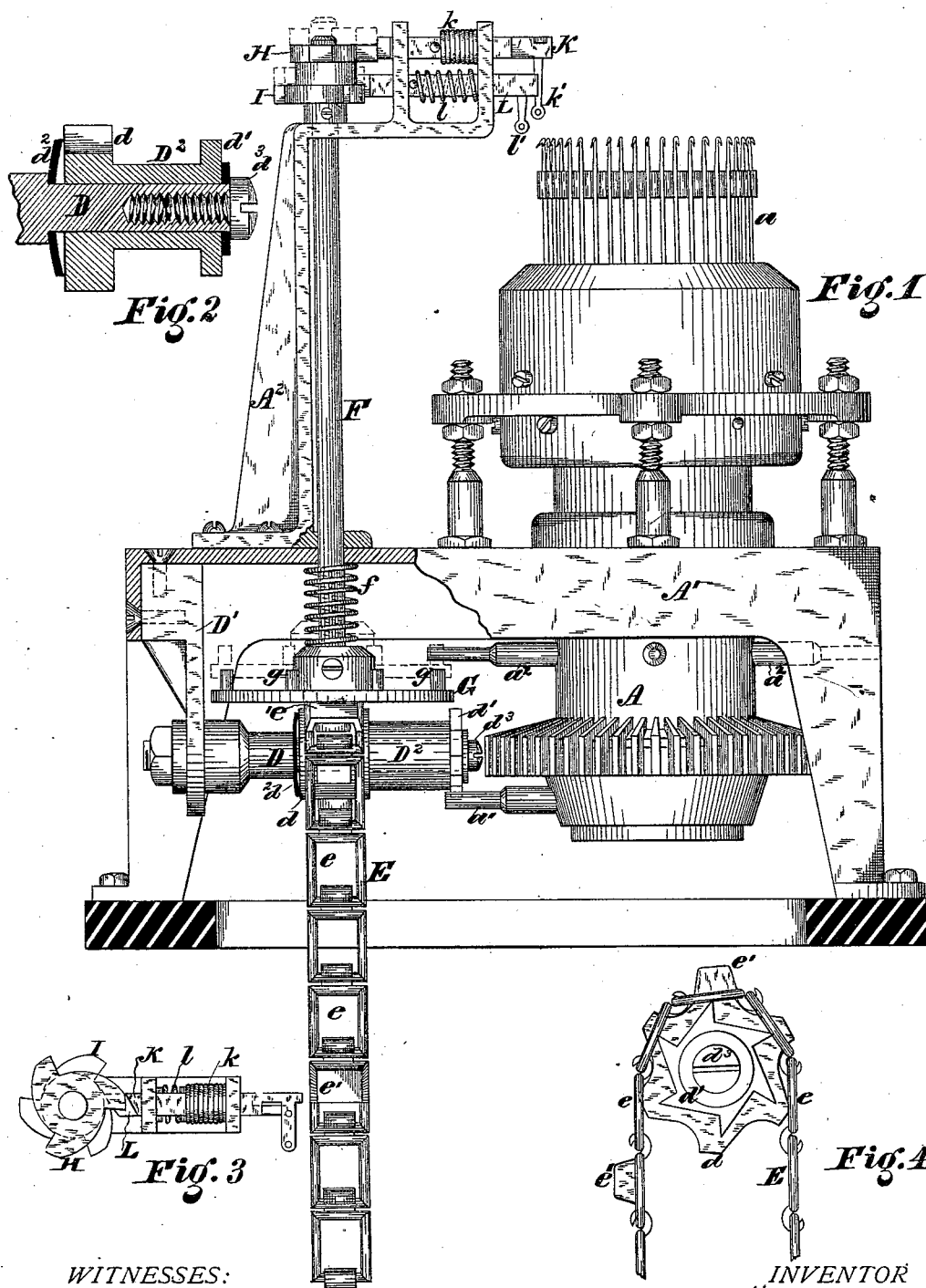


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Feeding Attachment for Circular Knitting-Machines.

No. 217,581.

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# UNITED STATES PATENT OFFICE.

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## IMPROVEMENT IN FEEDING ATTACHMENTS FOR CIRCULAR-KNITTING MACHINES.

Specification forming part of Letters Patent No. **217,581**, dated July 15, 1879; application filed May 5, 1879.

*To all whom it may concern:*

Be it known that we, FRANK A. BYRAM and JOHN FOX, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented a certain new and useful Feeding Attachment for Circular-Knitting Machines; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification, in which—

Figure 1 is a side elevation, partly in section, of our invention. Fig. 2 is a detail longitudinal section of sprocket and star wheels with a friction-brake device applied thereto. Fig. 3 is a plan of the feeding-slides and operating-cams, and Fig. 4 is an end view of sprocket and star wheels and pattern-chain.

Our invention has for its object to provide a feeding attachment for circular-knitting machines, whereby a change of colors may be automatically obtained while the machine is in motion, such change being governed by the prearrangement of a pattern-chain, thus producing in the knit fabric alternate stripes; also, if desired, stripes three-fourths way, half-way, one-quarter way, or less, around such fabric.

Our improvements consist in the peculiar construction and combination of parts hereinafter described, having reference principally, first, to a shaft carrying a sprocket-wheel and star-wheel, on which a pattern-chain is operated by means of fingers attached to the cylinder of the machine; second, to the provision of an upright shaft, having a pin-wheel at its lower end, operated by fingers on the cylinder and cams on its upper end, which move the feeding slides or guides; and, third, to the combination, with said sprocket and star wheels, operated as described, and said vertical shaft with pin-wheel and cams, of a pattern-chain provided with cam-links, so that at every revolution of the cylinder the chain will be moved a link, and at determined periods the shaft will be elevated so as to bring its pin-wheel in plane of contact with the operating-fingers on the cylinder, whereby the cams on said shaft will be moved and the feed-guides caused to slide to effect a change of feed, as hereinafter more fully set forth.

Referring to the accompanying drawings, A indicates the cylinder of a circular-knitting machine of the usual or any suitable construction, having needles *a a*, to which threads of different colors are fed through guides K L. D represents a horizontal shaft, having its support in a hanger, D', secured to the stand A<sup>1</sup> of the machine, and provided with a sprocket-wheel, *d*, and star-wheel *d'*. From the cylinder A projects a pin or finger, *a'*, which, once in every revolution of said cylinder, comes in contact with one of the points of the wheel *d'*, and thereby moves the shaft D, advancing accordingly a pattern-chain, E, which hangs on the sprocket-wheel *d*. Said pattern-chain is composed of links *e e*, some of which, according to any arbitrary arrangement, are cam-links, *e'*.

F is an upright shaft, located directly above the sprocket-wheel *d*, having its support or bearing in the stand A<sup>2</sup>, and being caused to press down on the chain E by a spring, *f*. G is a pin-wheel fast on the shaft F, having pins or studs *g g*, and *a'* are fingers projecting from the cylinder A. Said fingers are in such plane that when the shaft F is elevated by one of the cam-links *e'* they will come in contact with said studs *g*; but when such shaft is resting upon one of the plain links *e*, said studs *g* will be below the line of contact with said fingers *a'*. H and I are cams on the upper end of the shaft F and turning therewith, and K L are thread-guides, whose ends impinge against the peripheries of said cams, respectively. Said cams and guides are so arranged relatively that when one of the latter is pushed out the other will be withdrawn, the guides being furnished with springs *k l*, which push them back constantly against the adjacent surface of the cams. Through the eyes *k' l'* of said guides pass different-colored threads, which are fed to the needles *a a*.

The operation is as follows: The pattern-chain being previously arranged to produce any number of stripes by the more or less frequent introduction into said chain of cam-links *e'*, the cylinder A is revolved in the usual manner. At each revolution of said cylinder the finger *a'* meets a point of the star-wheel *d'*, and thereby advances the chain E one link. So long as plain links *e* pass over the sprocket-

wheel  $d$  the shaft F is not raised or revolved, and no change of feeding-threads is effected. When, however, a cam-link,  $e'$ , comes over the wheel  $d$  and directly under the shaft F, said shaft is raised, so that the pins  $g$  enter the plane of contact with fingers  $a^2$ . The next one of said fingers  $a^2$  which comes around will therefore strike one of said pins  $g$ , thereby producing a partial revolution of the shaft F and a corresponding movement of the cams H I, thereupon projecting one of the thread-guides K L and withdrawing the other, thus producing a change of feed. The next one of the fingers  $a^2$  meeting one of the pins  $g$  will produce a reverse change. If only two fingers  $a^2$  are employed, there will be but two changes effected at each revolution of the cylinder; but any greater number desired may be employed. At the next revolution of the cylinder the cam-link  $e'$  will be moved from beneath the shaft F, thus permitting said shaft to drop. Thereafter no change of feed will be produced until another cam-link comes directly beneath and raises the shaft F, when the changes will be made, as already described.

If desired, there may be two fingers  $a^1$  to operate the star-wheel  $d^1$ , thus advancing the pattern-chain two links at each revolution of the cylinder A. The fingers  $a^2$  may be in two different horizontal planes—two, for example, in one plane and two in another—and the cam-links  $e'$  of the chain E tapped and provided with screws, thus forming double cam-links. Two of the fingers  $a^2$  would thus operate on the single cam-links  $e'$ , and the other two on the double or screw cam-links.

The sprocket and star wheels  $d$   $d^1$  are on a

drum,  $D^2$ , which turns on the shaft D. To prevent the revolution of this drum except when positively impelled by the contact of a finger,  $a^1$ , with the star-wheel  $d^1$ , we provide a friction-brake consisting of a spring-disk,  $d^2$ , fitting on the shaft D, its tension being regulated by a screw,  $d^3$ , as plainly indicated in Fig. 2 of the drawings.

What we claim as our invention is—

1. The upright shaft F, having pin-wheel G and cams H I, substantially as shown and described.

2. The combination of pattern-chain E, having cam-links  $e'$ , with shaft F, having pin-wheel G, substantially as and for the purpose set forth.

3. The combination of cylinder A, having finger  $a^2$ , with pin-wheel G on shaft F, and pattern-chain E, having cam-links  $e'$ , whereby said fingers are brought into contact with said wheel when the shaft of the latter is raised by said pattern-chain.

4. The combination of cylinder A, having fingers  $a^1$   $a^2$ , shaft D, having wheels  $d$   $d^1$ , pattern-chain E, having plain links  $e$  and cam links  $e'$ , upright shaft F, having pin-wheel G and cams H I, and sliding guides K L, having springs  $k$   $l$ , substantially as shown and described.

In testimony that we claim the foregoing we have hereunto set our hands this 26th day of April, 1879.

FRANK A. BYRAM.  
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Witnesses:

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