

W. D. HUSE & C. F. CARR.
CIRCULAR KNITTING MACHINE.

No. 419,151.

Patented Jan. 7, 1890.

Fig: 1.

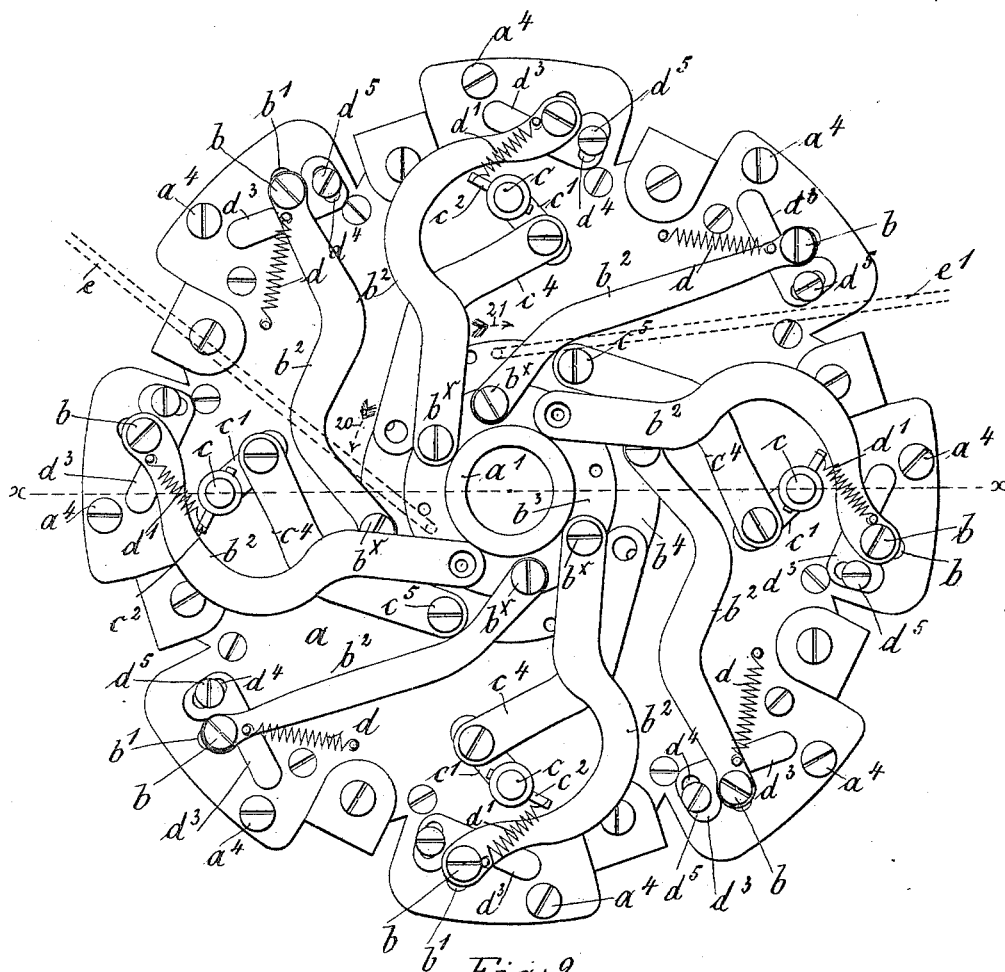
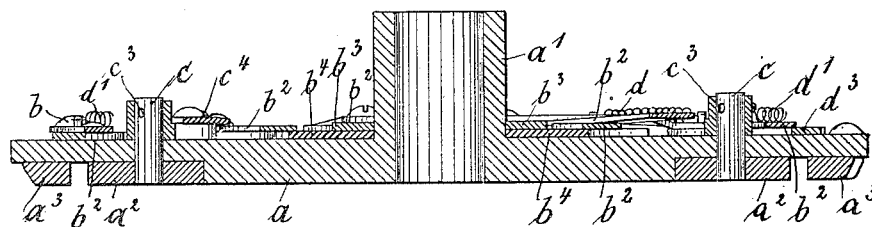


Fig: 2.



Witnesses.

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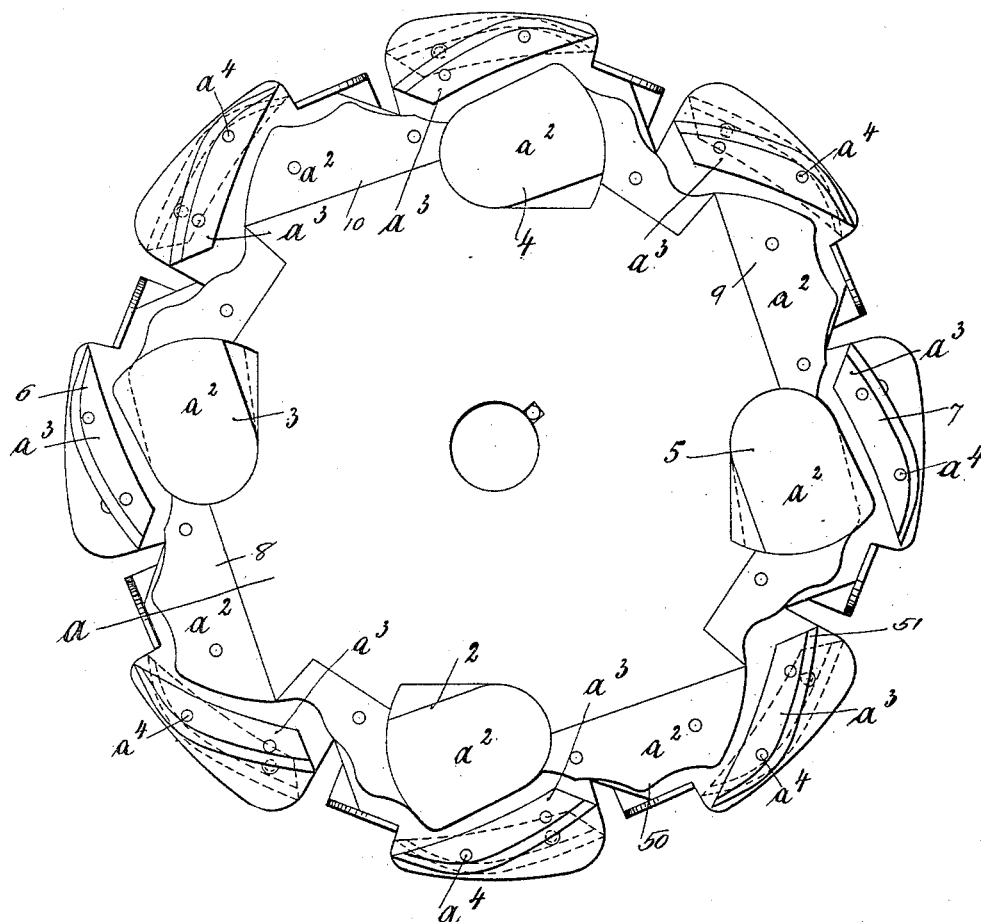
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Fig. 3.



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UNITED STATES PATENT OFFICE.

WARREN D. HUSE AND CHARLES F. CARR, OF LACONIA, NEW HAMPSHIRE;
SAID CARR ASSIGNOR TO SAID HUSE.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 419,151, dated January 7, 1890.

Application filed July 16, 1888. Serial No. 280,013. (No model.)

To all whom it may concern:

Be it known that we, WARREN D. HUSE and CHARLES F. CARR, of Laconia, county of Belknap, State of New Hampshire, have invented an Improvement in Circular-Knitting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like letters and figures on the drawings representing like parts.

10 This invention is an improvement in circular-knitting machines of that class in which two sets of needles are employed for the production of ribbed or tucked work in circular fabrics, one set working horizontally, called
15 "dial-needles," and the other vertically, called "cylinder-needles."

Our invention relates especially to the cap or cam plate carrying the cams which actuate the dial-needles, and has for its object to provide means, as will be described, by which the cams may be operated to produce different kinds or classes of work.

In accordance with our invention the cam-plate, which in practice will preferably carry 25 or support eight sets of cams, but which may carry any other desired number of sets, each set comprising a throwing-out and a drawing-in cam, supports, preferably, two rings, to which the drawing-in cams are connected by 30 rods capable of being readily detached from the said rings to render one or more of the said drawing-in cams inoperative, one or more of the throwing-out cams being preferably pivoted to the cam-plate, and also connected 35 to the said rings for a purpose which will be described.

Our invention in knitting-machines therefore consists, essentially, in a dial cam-plate and two or more sets of cams carried thereby 40 and movable with relation to each other, as described, combined with a movable ring on said dial cam-plate adapted to be connected to said cams, substantially as will be described.

45 Figure 1 is a top or plan view of a cam-plate embodying our invention; Fig. 2, a section of the cam-plate on line xx , Fig. 1; and Fig. 3, an under side or bottom view of the cam-plate shown in Fig. 1, the dotted and 50 full lines showing the cams in their extreme positions.

The cam-plate a , provided, as shown, with

a hub a' , has secured to its under side, as herein shown, eight sets of cams for operating the dial-needles of a knitting-machine. 55 (Not shown, but of usual construction—for instance, as in United States Patent No. 284,591.) Each set of cams (see Fig. 3) is composed of a throwing-out cam a^2 and a drawing-in cam a^3 , the said drawing-in cams being pivoted, as at a^4 . Each drawing-in cam a^3 is provided, 60 as shown, with a stud or projection b , (see Fig. 1,) which is extended up through a substantially-radial slot b' in the cam-plate, and the said stud has connected to it one end of a rod b^2 , having its opposite end detachably 65 connected, as by screw b^x , to one or the other of two rings b^3 b^4 , mounted on the hub a' of the cam-plate. As herein shown, four of the throwing-out cams (marked, respectively, 70 2 3 4 5 in Fig. 3) are made movable, they being pivoted to the cam-plate, as at c , (see Figs. 1 and 2,) the pivot of each movable throwing-out cam being extended up through the cam-plate and having connected to it, as here- 75 in shown, an arm c' , secured to the said pivot, as shown, by a pin c^2 , inserted through a hole in the said arm and through a hole c^3 in the pivot. Each arm c' , as shown, has connected to it a rod c^4 , which is detachably joined, as 80 by screw c^5 , to one of the rings b^3 b^4 , according to the kind of work to be produced. The rings b^3 b^4 in practice will have connected to them rods e e' , respectively, which may be reciprocated by any usual cam mechanism, or 85 they may be operated by hand. As the rods e e' are reciprocated, the rings b^3 b^4 will be oscillated, and the cams a^2 a^3 , connected to the said rings, will be operated.

In operation the rods b^2 , connecting the 90 the drawing-in cams with the rings b^3 b^4 , may all be connected to one ring, or some of the said rods may be connected to one ring, as b^3 , and some to the other ring, as b^4 . So, also, all of the movable throwing-out cams 95 may be connected by the rods c^4 to one ring, or some to one ring, as b^3 , and some to the other ring, as b^4 . As shown in the drawings, in Fig. 1, two of the movable throwing-out cams a^2 are connected to the ring b^4 by the rods 100 c^4 , secured to the said ring by screws c^5 , and the rods c^4 , connected to the remaining movable throwing-out cams, are disconnected from the ring b^4 , and these latter cams act as

stationary throwing-out cams, whereas four of the rods b^2 , connected to the drawing-in cams, are secured, as by screw b^x , to the ring b^3 , and two of the remaining rods b^2 are secured to the ring b^4 , while the remaining two rods b^2 are disconnected from both rings and act as stationary drawing-in cams in their innermost position. (Indicated by full lines.) When the rings $b^3 b^4$ are oscillated through the rods $e e'$, the drawing-in cams, on one movement of the said rings—that is, during one-half of the oscillation, as in the direction indicated by arrow 21—are moved outward from their full to their dotted line position, (shown in Fig. 3,) while the movable throwing-out cams are moved inward to their dotted-line position. On the return movement of the rings, as in the direction indicated by arrow 20, the drawing-in cams are restored to their normal position by the rods b^2 , assisted by the springs d and d' , the springs d' each having one end connected to one of the pins c^2 , so that they assist to restore the movable throwing-out cams to their normal or outermost position. The inward movement of each drawing-in cam is limited by an adjustable stop (herein shown as a bar d^3) extended across the slot b' , the said bar having a slot d^4 , through which the screw d^5 , securing the said bar to the cam-plate, is extended, the slot d^4 permitting the bar to be changed to adjust or vary the movement of the drawing-in cams, and thus vary the length of stitch. The movable throwing-out cam of each set of cams connected to either ring $b^3 b^4$ is moved in when the drawing-in cam of the said set is thrown out, as above described, for the purpose of leaving the needles in as far as possible—that is, toward the center of the cam-plate.

In the formation of tuck-work the stationary throwing-out cams and the movable throwing-out cams in their outermost position act on the needle and force the same outward far enough to slip the thread laid in the hook of the needle behind the latch of the said needle, while the drawing-in cams in their innermost position force the needle inward far enough to cast the thread behind the latch of the needle over the thread in the hook of the said needle. The movable throwing-out cam in its innermost position forces the needle out far enough to take a thread in its hook, but not far enough to slip the thread previously laid in the hook over the latch of the needle, and the movable drawing-in cam in its outermost position does not move the needle in far enough to cast off the threads behind the latch of the needle.

As shown in Fig. 3, two of the drawing-in cams a^3 (marked 6 7) are stationary by reason of their rods b^2 being disconnected from the ring b^3 , and two of the movable throwing-out cams a^2 (marked 2 4) are also stationary by reason of their rods c^4 being disconnected from the ring b^4 .

In order that the operation of the machine

may be more readily comprehended, let it be supposed that the remaining cams occupy the positions indicated by dotted lines. In this case let it be supposed that a needle is about to pass the stationary throwing-out cam marked 8. With the cams arranged as shown, the needle has two threads laid in its hook, as will be described. As the needle with the two threads in its hook passes by the throwing-out cam 8 it is moved out far enough to slip the two threads behind the latch, and it takes a third thread in its hook. As the needle passes by the drawing-in cam co-operating with the cam 8 in its dotted-line position the threads behind the latch are not cast off, and as the needle passes by the movable throwing-out cam 2 in its outermost position the thread in the hook is slipped behind the latch and a new thread is laid in the hook. The needle now has three threads behind the latch and one in the hook. As the needle passes by the drawing-in cam co-operating with the throwing-out cam 2 in its dotted-line position the threads are not cast off, and as the said needle passes by the stationary throwing-out cam marked 50 the thread in the hook is slipped behind the latch and a new thread laid in the hook. These are not cast off by the drawing-in cam marked 51 in its outermost position, so that four threads are now behind the latch and one in the hook. As the needle passes by the movable throwing-out cam 5 in its innermost position it is not moved in far enough to slip the thread in the hook behind the latch; but the said needle is moved out far enough to take a second thread in its hook. The needle now has two threads in its hook and four threads behind the latch, and when the needle passes by the stationary drawing-in cam marked 7 it is moved in far enough to cast off the threads or loops behind the latch—that is, the said threads or loops are cast over the two threads in the hook and a triple tuck is formed. The needle now has two threads in its hook, and these are slipped behind the latch by the stationary throwing-out cam marked 9 and another thread laid in the hook. The loops behind the latch are not cast off by the drawing-in cam co-operating with the cam 9 in its outermost position. The thread is slipped behind the latch by the movable throwing-out cam 4 in its outermost position and another thread laid in the hook. The needle now has three threads behind the latch and one thread in the hook; but the loops are not cast off by the next drawing-in cam in its outermost position. The thread in the hook is slipped behind the latch by the throwing-out cam 10 and another thread laid in the hook, and the loops are not cast off by the drawing-in cam in its outermost position. The needle now has four threads behind the latch and one in the hook, and as it passes by the movable throwing-out cam 3 in its innermost position a second thread is laid in the hook, and the four threads are then cast off by the sta-

tionary drawing-in cam 6, leaving two threads in the hook.

If it is desired to produce other forms of tuck-work, the rods $b^3 c^4$ may be connected to one or both rings in such manner as to produce this result. For instance, if it is desired to produce single-tuck work, every other drawing-in cam may be connected to one of the rings $b^3 b^4$. For example, suppose the drawing-in cam co-operating with the stationary throwing-out cam (marked 8) is connected to one of the rings $b^3 b^4$, and the next drawing-in cam co-operating with the throwing-out cam 2 is disconnected from the said rings. This latter cam will then occupy its innermost or full-line position, and the operation is as follows, viz: As the needle passes by the throwing-out cam 8 a thread is slipped behind the latch and a second thread laid in the hook, and as the needle passes by the drawing-in cam co-operating with the cam 8 the thread is not cast off, and as the needle passes by the throwing-out cam a^2 the thread in the hook is slipped behind the latch and another thread laid in the hook, and as the needle with two threads behind the latch passes by the drawing-in cam co-operating with the cam 2 in its innermost position the two threads behind the latch are cast off and a single tuck formed.

If it is desired to form a double tuck, the drawing-in cam co-operating with the cam 2 will be connected to one of the rings, and the drawing-in cam marked 51 will be disconnected, so as to occupy its innermost position. In this case the drawing-in cam 51 will cast off three threads and form a double tuck.

A triple tuck may be formed as above described—that is, with the movable throwing-out cam 5 in its innermost position—or it may be formed with the said cam in its outermost position, the drawing-in cam 51 being in its outermost position and the drawing-in cam 7 in its innermost position, so that as the needle passes by the drawing-in cam 51 in its outermost position the three loops behind the latch are not cast off, and as it passes by the throwing-out cam 5 the thread in the hook of the needle is slipped behind the latch and another thread laid in the hook, and the four loops behind the latch are then cast off by the cam 7 in its innermost position. Hence it will be seen that tuck-work may be formed with all the throwing-out cams made stationary and the drawing-in cams made movable, or it may be made with all the drawing-in cams made stationary and one or more of the throwing-out cams made movable. To illustrate, suppose the throwing-out cam 2 is in its innermost position.

In this case the needle having one thread in its hook is moved out far enough to take a second thread in its hook, and as the needle passes by the stationary drawing-in cam co-operating with the cam 2 the needle is moved in a sufficient distance to cast off any threads behind the latch, as above described; but in the present instance both threads are in the hook and consequently cannot be cast off. The needle then passes by the throwing-out cam 50 and both threads are slipped behind the latch and another thread laid in the hook, and the two threads behind the latch are cast off by the drawing-in cam 51 and a single tuck formed.

To form a double tuck, the throwing-out cam 50 would be made movable and be placed in its innermost position, so that three threads would be in the hook of the needle as the latter passed by the said cam 50, and the three threads would be slipped behind the latch by the cam 5 in its outermost position, and would then be cast off by the drawing-in cam. With the drawing-in cams and movable throwing-out cams arranged and connected as shown in Fig. 3 a triple tuck is formed in one instance by casting off four loops over two, and in another instance by casting off four loops over one. In both cases a triple tuck is formed; but the triple tuck formed by casting off four loops over two will be stronger than the other and the garment made from the fabric will be heavier and better.

We claim—

1. In a knitting-machine, a dial cam-plate and two or more sets of cams secured to the under side of said plate and movable with relation to each other, as described, and studs on the movable cams extended up through the dial cam-plate, combined with independent movable rings on the upper side of the said dial cam-plate and rods connected to the said studs and to the said rings, substantially as and for the purpose specified.

2. In a knitting-machine, a dial cam-plate and a movable drawing-in cam and a movable throwing-out cam, combined with a movable ring carried by said cam-plate and to which the said cams may be connected, substantially as described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

W. D. HUSE.
C. F. CARR.

Witnesses:

A. B. STANLEY,
GEO. R. LEAVITT.