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E. TIFFANY.

NEEDLE AND JACK STRUCTURE FOR KNITTING MACHINES.

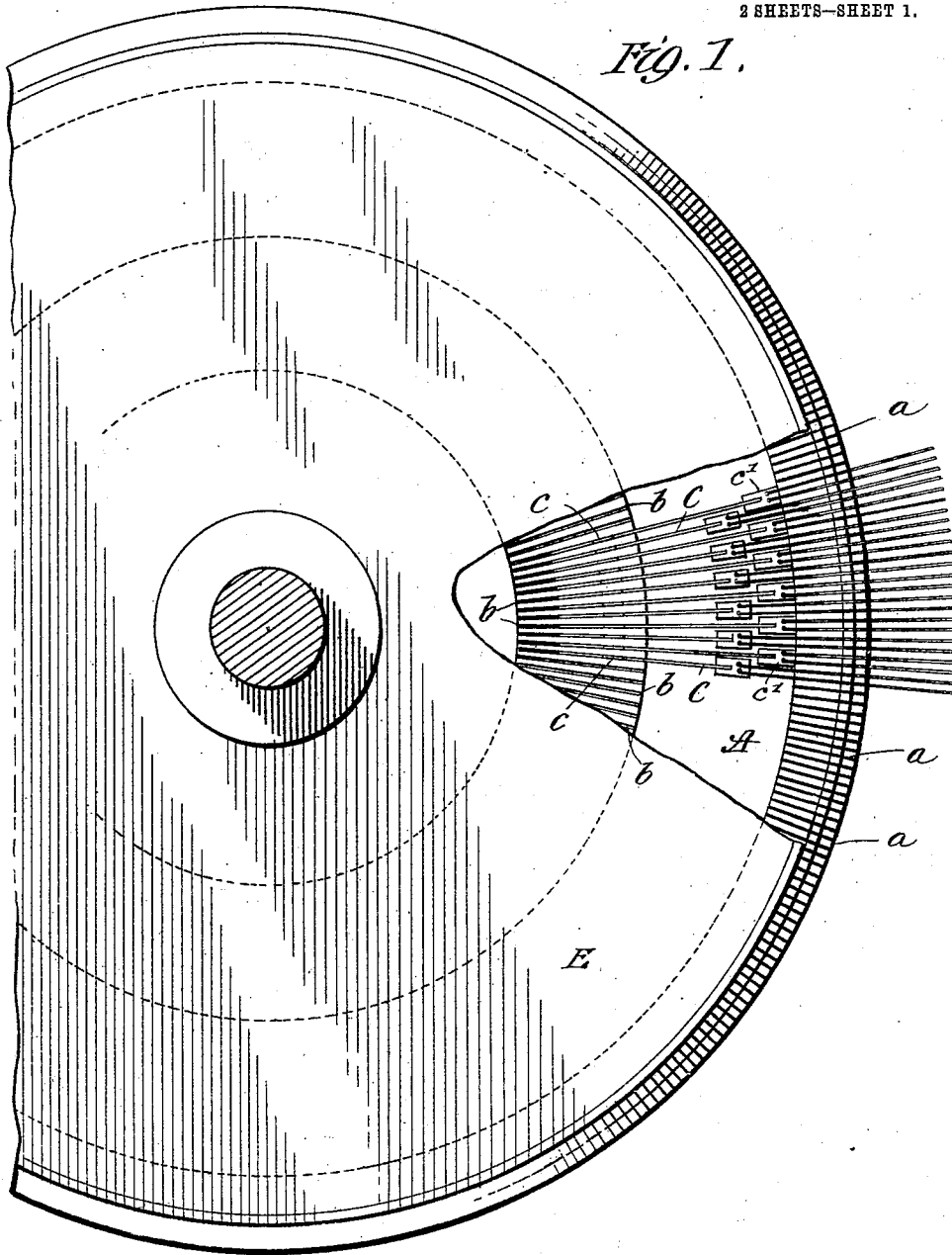
APPLICATION FILED FEB. 24, 1909.

969,222.

Patented Sept. 6, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
Francis Ober
James D. Antonio

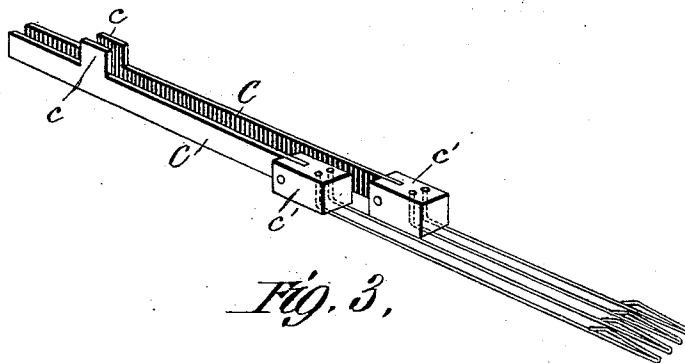
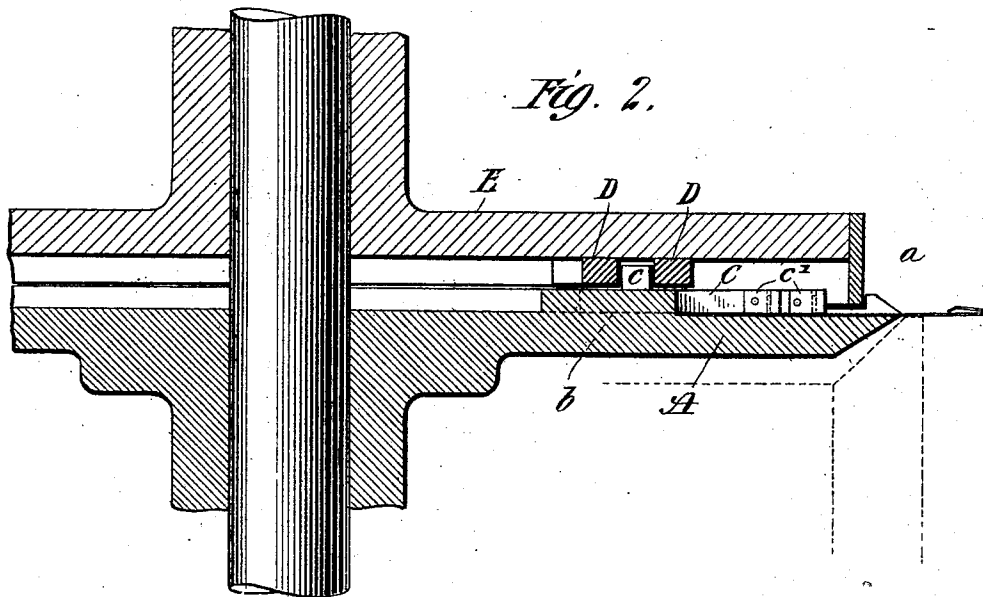
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By *his Attorneys*
Rogers Kennedy

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UNITED STATES PATENT OFFICE.

ELI TIFFANY, OF BENNINGTON, VERMONT, ASSIGNOR TO NYE AND FREDICK COMPANY,
A CORPORATION OF DELAWARE.

NEEDLE AND JACK STRUCTURE FOR KNITTING-MACHINES.

969,222.

Specification of Letters Patent.

Patented Sept. 6, 1910.

Application filed February 24, 1909. Serial No. 479,771.

To all whom it may concern:

Be it known that I, ELI TIFFANY, a citizen of the United States, residing at Bennington, in the county of Bennington and State of Vermont, have invented certain new and useful Improvements in Needle and Jack Structures for Knitting-Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to knitting machines, the object of the invention being to provide for the use of needles of fine gage, in needle beds in which the grooves for receiving the needles radiate outwardly, as for instance in the case of needle-dials and also in conical needle beds.

Needles of fine gage, sometimes as many as sixteen to the inch, cannot be made sufficiently strong to permit of their projection and retraction by the cams, and to meet this condition the practice has been to connect them to a stem or plate, known as a needle "jack" on which the cams are adapted to act to cause the proper movements of the needles, and in order that these jacks may themselves be of sufficient strength and size to admit of their operation by the cams, it has been proposed, as shown for instance in my Patent No. 558,237 to connect a plurality of the needles, in the patent two, to each jack, the outer ends of the latter being formed with an enlargement or head to permit this to be done. In the use of needles and jacks of this construction in needle beds in which the grooves are parallel, the proportion of jack-grooves to needle-grooves will be the same as the proportion of jacks to needles, and by arranging the jack-grooves opposite the spaces between the needle-grooves, the enlargements or heads on the jacks may be disposed side by side in the needle bed, as is the case in my patent above referred to, and the needles may be all of the same length. When, however, it is attempted to operate the needles and connected jacks in a needle bed in which the grooves radiate from a common center, such for instance as in a dial-plate or conical needle bed, it is found that the heads on the jacks have not sufficient room circumferentially to operate side by side, because of the closer relation to each other which the grooves occupy as the center of the bed is approached, the exigencies of

manufacture and use of the needles and jacks prohibiting the employment of a jack-head of such fineness as would admit of the heads, under such conditions, operating side by side.

To overcome this difficulty, is the aim of my invention, which consists primarily in providing a plurality of groups of needles and connected jacks, distinguished from each other in the respect that the needles of one group are shorter than the needles of the other group, and are so related to the jacks that when the outer ends of the needles are in line circumferentially and occupy operative relations to each other, the heads of the jacks carrying the respective groups of needles will be out of line and not disposed side by side, the heads of the jacks carrying the longer needles being nearer the center than the heads of the other jacks and the two series overlapping. By this means I am enabled to actuate in a dial or conical needle bed, or other form of bed where the grooves radiate from a common center, needles of sufficient fineness to produce the character of work required, without sacrificing the strength or size of the operating jacks.

In the accompanying drawings: Figure 1, is a plan view of a dial needle bed equipped with needles and jacks arranged in groups in accordance with my invention, the cam plate being removed to expose other parts to view. Fig. 2, is a vertical longitudinal section through the dial plate and cam plate. Fig. 3, is a perspective view showing a needle and its connected jack of each group.

Referring to the drawings: A, represents a needle-dial provided with a series of needle-grooves *a*, near its periphery, and with a series of jack-grooves *b*, arranged farther inward toward the center of the plate, in which needle grooves are mounted needles connected at their inner ends with needle jacks C, mounted in the jack grooves and formed with shanks *c*, adapted to be acted on by cams D on the under face of an overlying cam-dial or plate E, the rotation of one of these parts relative to the other causing the needles to be reciprocated in the bed as usual to form the stitches. The jacks, as shown more particularly in Fig. 3, each carries a plurality of needles, in the present instance two, the ends of the jacks being formed with an enlargement or head *c'* in

order to adapt the two needles to be attached thereto, which attachment may be by any appropriate means, but which in the present case is effected by forming two holes
 5 in the head, to receive the laterally bent ends of the needles as shown in my said patent above referred to, this mode of connection not only admitting of the renewal of the needles individually in case of breakage, but
 10 also permitting of a relative or pivotal motion of the needles with reference to the head in a lateral direction, which takes place as the needles are reciprocated in the bed.

As shown particularly in Fig. 1, the
 15 needles and jacks are arranged in two groups which are distinguished from each other in the respect that the needles of one group are shorter than the needles of the other group, and in their disposition in the
 20 needle bed, the individual needles of the two groups alternate with each other, their outer active ends terminating in a circumferential line, and the heads on the jacks, by reason of this arrangement being thrown out of
 25 line so that they are not disposed side by side, those to which the needles of the longer series are attached being beyond or closer to the center of the plate than the heads of the jacks to which the needles of the other
 30 series are attached, so that the jack-heads occupy much less space circumferentially than they would if they were arranged side by side. This reduction in space is essential to the operation of fine-gage needles and
 35 jacks of the construction described, in needle beds containing grooves radiating from a common center, by reason of the fact that the convergence of the grooves toward the center of the bed restricts the circumferential
 40 space available for the jack-heads to such extent that if the heads operated side by side they would be too small and frail to carry each a plurality of needles.

By reason of the fact that the jack-heads
 45 are arranged alternately at different distances from the center of the plate, the operating shanks *c*, of the two series will of course occupy different positions in the length of the body of the jacks, the shanks
 50 of the jacks carrying the shorter needles being a greater distance inward from the heads of their jacks than the distance between the shanks of the jacks carrying the long needles and the heads of these jacks,
 55 these relations of the parts being necessary

by reason of the fact that all the shanks are acted on by the same cams.

The invention is particularly applicable to machines equipped with fine-gage needles for the production of work of fine texture, 60 where, by reason of the comparatively great number of needles occupying a given space circumferentially, it is necessary in order to provide for the actuation of these needles by the cams to relieve the needles of the direct 65 contact of the cams and employ jacks to coöperate with the cams, which by reason of the fact that a plurality of needles is connected with each jack, enables the latter to be made sufficiently stout and strong to be acted on by 70 the cams without danger of breakage. By the improved construction described, it will be seen that these several conditions are met by arranging the enlargements on the jacks, which are necessary for the attachment of 75 the needles, alternately one in front of the other or overlapping, so that notwithstanding the restricted space in dial needle beds or other needle beds where the grooves radiate, such as conical beds, the actuation of fine 80 needles as before is provided for without lessening the strength or size of the jacks or their heads.

While I have shown and described my invention as embodied in a form which has 85 been found to answer to an admirable degree the objects to be attained, it will be understood that the invention is not limited to any specific form or arrangement of the parts except in so far as such limitations are speci- 90 fied in the claim.

Having thus described my invention what I claim and desire to secure by Letters Patent is;

In a knitting machine and in combination 95 with a needle bed provided with radiating grooves, needle jacks provided with enlargements or heads having a plurality of needles connected to each and mounted in said grooves and arranged therein in two groups, 100 the needles of one group being shorter than the needles of the other group, and the jack-heads carrying the needles of the shorter group being arranged in advance of the other jack heads. 105

ELI TIFFANY.

Witnesses:

H. E. TIFFANY,
 ROBERT B. PIKE.

Correction in Letters Patent No. 969,222.

It is hereby certified that the assignee in Letters Patent No. 969,222, granted September 6, 1910, upon the application of Eli Tiffany, of Bennington, Vermont, for an improvement in "Needle and Jack Structures for Knitting-Machines," should have been described and specified as *Nye and Fredick Company*, instead of "Nye and Fredick Company," as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 4th day of October, A. D., 1910.

[SEAL.]

E. B. MOORE,
Commissioner of Patents.