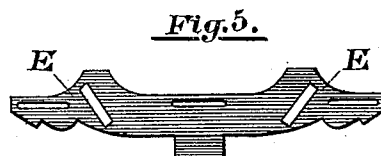
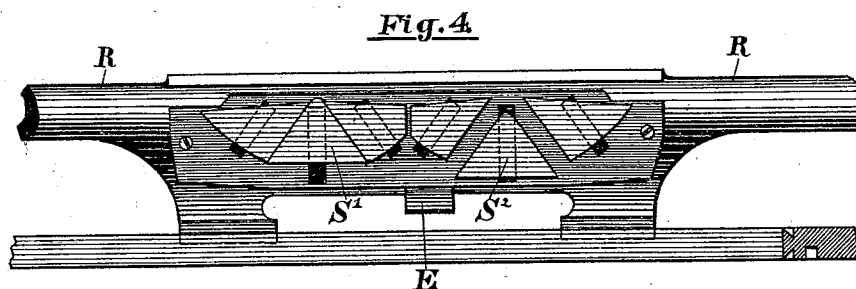
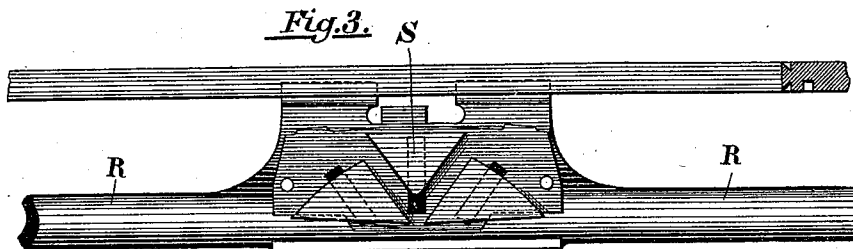
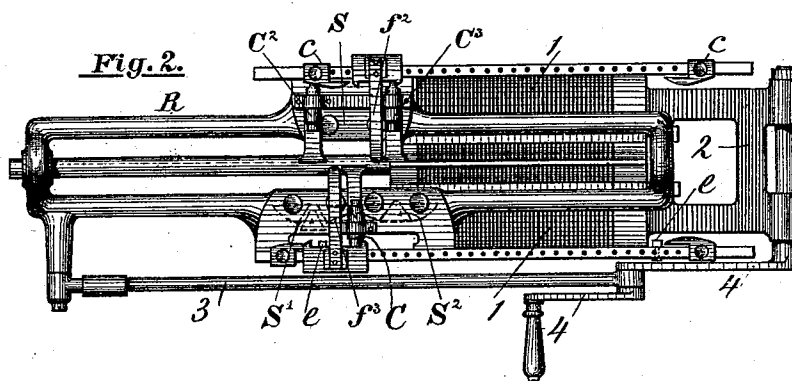
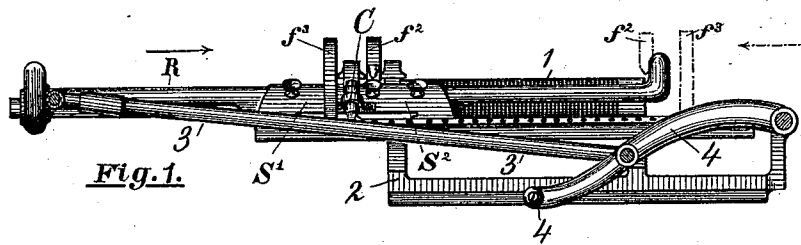


(No Model.)

A. AUWÄRTER.
KNITTING MACHINE.

No. 510,760.

Patented Dec. 12, 1893.



Witnesses
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UNITED STATES PATENT OFFICE.

AUGUST AUWARTER, OF SCHLIERBACH, GERMANY.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 510,760, dated December 12, 1893.

Application filed July 18, 1892. Serial No. 440,299. (No model.) Patented in Switzerland June 20, 1892, No. 5,580; in Germany June 21, 1892, No. 71,280; in England June 22, 1892, No. 11,678; in France June 23, 1892, No. 222,555; in Belgium June 23, 1892, No. 100,250, and in Austria-Hungary May 4, 1893, No. 32,941 and No. 88,284.

To all whom it may concern:

Be it known that I, AUGUST AUWARTER, a subject of the King of Württemberg, residing at Schlierbach, Württemberg, Germany, have invented a certain new and useful Improvement in Knitting-Machines, (for which I have received Letters Patent as follows: in Great Britain June 22, 1892, No. 11,678; in Switzerland June 20, 1892, No. 5,580; in Germany June 21, 1892, No. 71,280; in Austria-Hungary, No. 32,941 and No. 88,284, dated May 4, 1893; in France June 23, 1892, No. 222,555, and in Belgium June 23, 1892, No. 100,250;) and I 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 appertains to make and use the same.

My invention relates to knitting machines and it consists in certain features, and details of construction whereby a tubular fabric may be made on a straight machine, and, if desired, a reinforce yarn knit in on any article being made on the machine.

The invention will first be described in connection with the accompanying drawings, and then pointed out in the claims.

In the drawings,—Figure 1 is a side elevation of so much of a straight knitting machine as is necessary to illustrate my invention. Fig. 2 is a plan view of the same. Fig. 3 is a detail view of the single cam. Fig. 4 is a detail view of the double-cam. Fig. 5 is a detail view of the cam-operating device.

Referring to the drawings, 1, are the needle plates, 2, the bed, 3, the crank-rod, and 4, the crank of an ordinary straight knitting machine, the needles and such other devices as are unnecessary in the explanation of my invention being omitted.

R, is the working-frame carrying a single needle-operating cam, S, on one side and double needle-operating cams, S' and S², on the opposite side.

E, is a slide or cam-operating device, which engages with the double-cams, S' S², to open and close the needle race-ways alternately, it being apparent that as one race-way is opened the other will be closed, the slide or cam-op-

erating device being thrown at each end of the stroke by striking against the adjustable stops, e, as will be plain from Fig. 2. Each cam, S', S², has a pin engaging one of the inclined slots of the plate, E.

C is a bolt for operating the block on which the yarn-guide, f³, is mounted, whereby the yarn-guide will be moved along with the carriage, as will be fully understood from the description and drawing of a similar arrangement shown in Patent No. 471,696, dated May 29, 1892. C² and C³ are similar bolts for engagement with the block on which yarn-guide, f², is mounted, these two bolts being alternately engaged with and disengaged from the said block by riding up the inclined edges of the adjustable stops, c.

The yarn-guides are shown at f² and f³, the front one operating for the rear needle-row and the rear yarn-guide operating for the front needle-row; whereby, by each change of throw, the yarns are crossed, the rear yarn-guide, after each change of throw, again running ahead of the front one. Of the two yarn-guides f² and f³, one of them receives a simple knitting yarn, and the other a like yarn together with the reinforcing yarn.

In Fig. 1, the position of the two yarn-guides f² and f³ is shown by full lines at the beginning of the throw toward the right, and by dotted lines at the beginning of the throw toward the left. The yarn-guide, f³, located above the double-cam, S' S², which yarn-guide operates for the row of needles actuated by the single cam, S, will always run behind the guide, f², which operates for the front row of needles actuated by the double-cam, the forward of the two bolts C² or C³, after the change of throw, always bringing the yarn-guide, f², to its advance position with respect to the other yarn-guide. Moreover the single cam is so located opposite the double-cam that one cam of the latter always works in advance of the oppositely-disposed single cam while the other cam of the double-cam is at rest; so that the needles of the advanced portion of the double-cam have already returned to their position of rest before those of the ordinary cam begin to work.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a knitting machine, the combination,
5 with the double row of needles and means for supplying yarn to the needles, of a double cam-plate upon one side of the machine, the forward cam normally in engagement with the needles on its respective side, a single
10 cam-plate on the opposite side of the machine, and means for opening one and closing the other cam of the double cam-plate, substantially as described and for the purpose set forth.
- 15 2. In a knitting machine, the combination, with the double row of needles, of a double cam-plate upon one side of the machine, and

a single cam-plate on the opposite side of the machine, a cam-shifter arranged to open the forward cam and close the rear cam of the
20 double cam-plate at each change of throw, a pair of yarn-guides, each mounted over the row of needles opposite to that which it supplies with yarn, and provisions in virtue of which one yarn-guide is caused to lead the
25 other in both directions, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

AUGUST AUWARTER.

Witnesses:

AUGUST B. DRANTZ,
CARL DUSSMANN, Jr.