

No. 665,016.

Patented Jan. 1, 1901.

B. KERSHAW.
CIRCULAR KNITTING MACHINE.

(Application filed Jan. 17, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

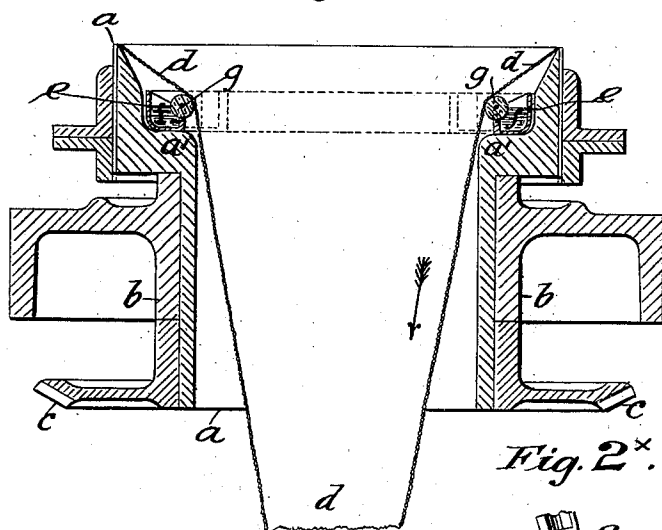
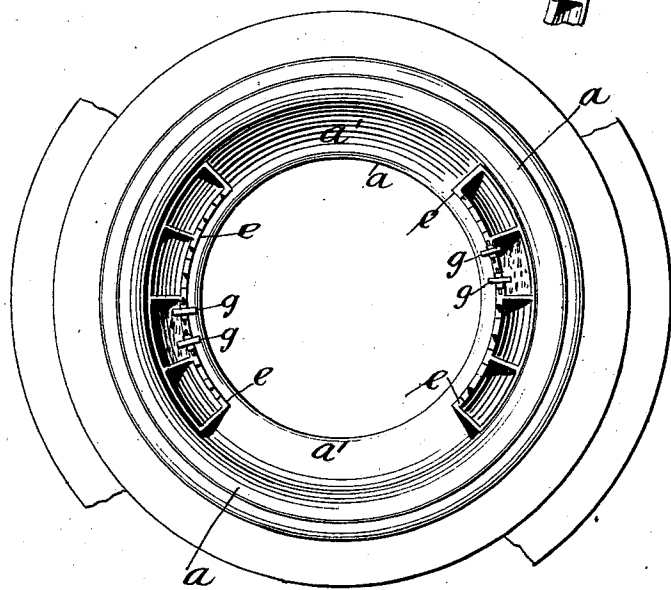


Fig. 2^x.



Fig. 2.



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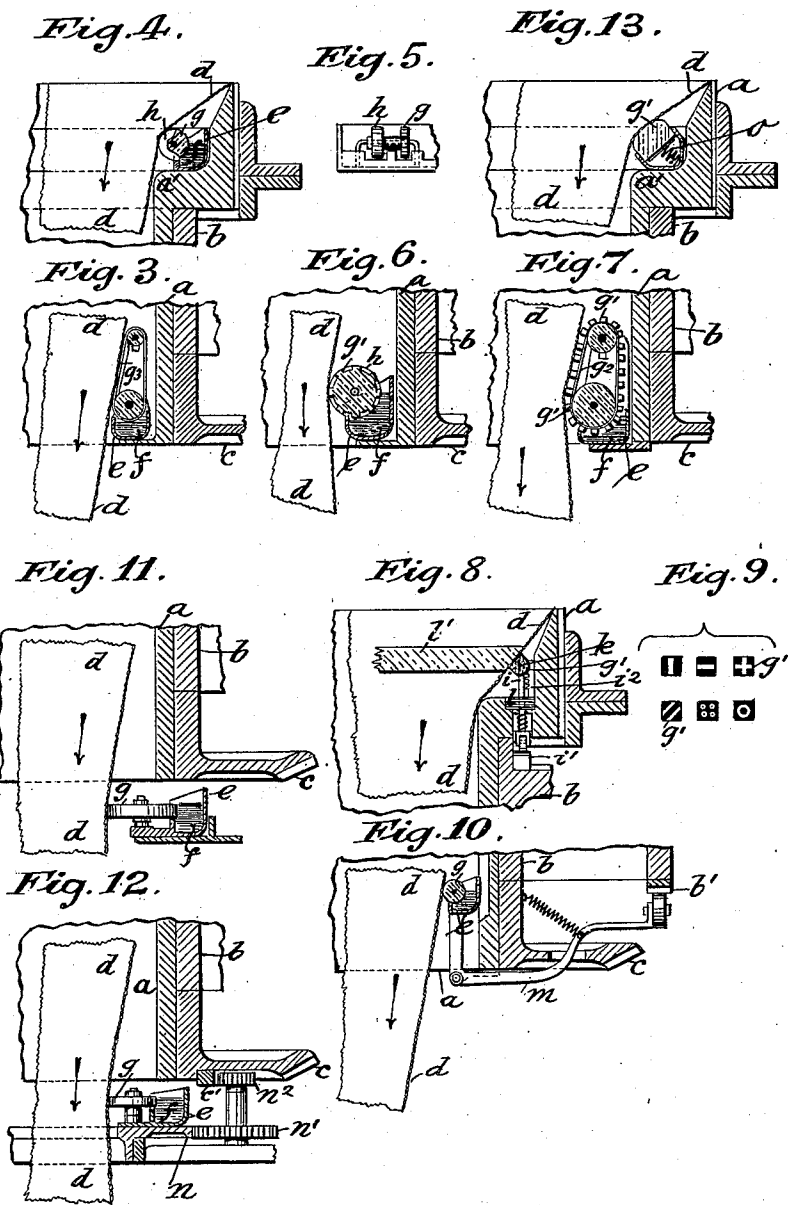
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

BINNS KERSHAW, OF MANCHESTER, ENGLAND.

CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 665,016, dated January 1, 1901.

Application filed January 17, 1899. Serial No. 702,436. (No model.)

To all whom it may concern:

Be it known that I, BINNS KERSHAW, a subject of the Queen of Great Britain, residing at Manchester, in the county of Lancaster, England, have invented new and useful Improvements in and Connected with Circular-Knitting Machines, (for which I have made application for English Letters Patent No. 19,126, dated September 8, 1898,) of which the following is a specification.

My invention relates to improvements in and connected with circular-knitting machines; and the object is to provide such machines with means whereby the fabric as it has been knitted is automatically ornamented externally by having designs in one or more colors applied, so as to render the fabric more serviceable, attractive, and pleasant to the eye than heretofore has been the case, such fabric being generally used as an envelop for meat shipped or stored, but is also applicable for other purposes.

To this end my invention consists in employing in circular-knitting machines, at a suitable point below where the fabric has been knitted, one or more printing rollers, wheels, or blocks, respectively adapted to run against or be brought into contact with the exterior of the fabric as it has been knitted and print thereon designs in one or more colors in a continuous or intermittent manner, as may be found most suitable. For instance, the said rollers, wheels, or blocks may be applied at the upper end of the needle-cylinder and the said rollers or wheels mounted in suitable troughs charged with color revolved by the fabric through frictional contact therewith or be driven by suitable gearing, so as to print onto the fabric longitudinally, or the said blocks, suitably supplied with color, may be reciprocated to and from the fabric by such as levers and cams and be adapted to print thereon longitudinally, crosswise, or diagonally. In some cases the troughs containing the said rollers or wheels may be adapted to run continuously or intermittently around the fabric, so as to produce a continuous or intermittent spiral design. To print intermittently, the said rollers or wheels may be formed sectional or they may be adapted to run only half-way around the fabric. I at-

tain these objects by the means illustrated in the accompanying drawings, in which—

Figure 1, Sheet I, is a vertical section, and Fig. 2 a plan, of the needle-cylinder of a circular-knitting machine and its adjacent parts; Fig. 2^x, a detached plan; Figs. 3, 4, 6, 7, 8, 10, 11, 12, and 13, Sheet II, detached vertical sections, and Figs. 5 and 9 partly side views of Figs. 4 and 8, respectively. Fig. 9 represents various designs of the printing-blocks shown in Fig. 8.

Similar letters refer to similar parts.

Referring to the figures generally, *a* is the needle-cylinder; *b*, the bearing in which it revolves; *c*, the wheel by which the needle-cylinder is revolved; *d*, the fabric knitted and to be furnished with designs; *e*, the color-troughs; *f*, the coloring-matter; *g g'*, the printing wheel or block, respectively.

In carrying out my invention, and referring to Figs. 1 and 2, I form one or more segmental troughs *e*, adapted to be placed upon the annular recess *a'* of the cylinder *a* or upon a ledge on the latter, situated at a suitable point below the said recess. This trough is divided into compartments containing each coloring-matter of a like or different color and one or more printing-wheels *g*, suitably mounted in frictional contact with and rotated by the downward travel of the fabric knitted. The periphery of the said wheel rotates in contact with the said coloring-matter, which latter may consist of wool or other fibers soaked with color, which is picked up by the said wheel as it rotates and deposited thereby upon the exterior of the fabric in stripe fashion. By forming one side of the said wheel in cam fashion, as shown in Fig. 2^x, and pressing same by a spring against a stationary corresponding cam-face a horizontal displacement of the wheel is effected during its rotation, which produces a zigzag design on the fabric.

In lieu of the wheel *g* an endless printing-band *g'* may be employed, as shown in Fig. 3, to deposit the color onto the fabric in stripe fashion or in checks.

The three arrangements of printing-wheels described produce a continuous longitudinal design; but by employing a wheel with a sectional printing-periphery and upon its shaft

a driver *h*, as shown in Figs. 3 and 4, rotated by frictional contact with the fabric, longitudinally intermittent designs may be applied to the fabric.

5 Another method of printing intermittently upon the fabric by a wheel is shown in Fig. 6, in which its periphery is formed with projections *g'* and also rotated by a driver *h* in frictional contact with the fabric.

10 Fig. 7 shows the use of an endless band *g*², furnished with printing-blocks *g'*, adapted to be actuated through frictional contact with the fabric. This arrangement, as well as that shown in the previous figure, may be used
15 for printing longitudinally intermittently in stripe fashion upon the fabric, or, if the said projections or blocks are formed with letters or figures, letters, words, or numbers may be printed thereon.

20 Another form of continuous or intermittent block-printing is shown in Fig. 8, wherein the printing-block *g'* is mounted upon the upper end of a rod *i*, raised by stationary cam-faces *i'* and withdrawn by a spring, the
25 block *g'* being furnished with a pinion *k*, which when the rod *i* is withdrawn comes into gear with a stationary rack *i*², and thereby causes the block to turn and take up color from the pad *l* and on its rise to reverse again
30 into position for printing. A support *l'* may be employed inside of the fabric to receive the pressure of the block.

Fig. 9 shows some of the designs that may be applied to the printing-face of the block.

35 Fig. 10 shows a printing-wheel *g* mounted upon the upper end of an angular lever *m*, carried by the needle-cylinder *a* and kept in contact with the fabric by means of a spring and when desired to print intermittently
40 brought out of contact by passing over and being depressed by a stationary projection *b'*.

Circular or spiral designs may be printed onto the fabric (see Fig. 11) by arranging the color-trough *e* stationary in relation to the
45 needle-cylinder and the printing-wheel *g* to revolve in a horizontal or inclined plane, or the color-trough and printing-wheel may be arranged to rotate around the fabric at a speed which is in excess of that of the fabric,
50 as shown in Fig. 12, by mounting both onto a toothed ring *n*, rotated by spur-wheels *n'* and

*n*², and a toothed ring *c'*, secured upon the bevel-wheel of the needle-cylinder *a*. In each of these last two cases the printing may be effected intermittently by employing sectional printing-wheels, as shown in Figs. 4 and 5.

In lieu of employing the coloring-matter in a liquid form it may be used in a solid form, as shown in Fig. 13, by being made in the form of a block *g'* in width to correspond with the width of stripe to be produced, the said block being suitably guided and kept in contact with the fabric by a spring *o*, (or weight.)

If necessary, the printing-wheels or their driver *h* described may be formed on their peripheries with pins to insure being rotated by the fabric.

It is obvious that some of the printing appliances described may be applied inside of the needle-cylinder *a*, and thus the fabric printed upon the inside instead of the outside. The former way is, however, preferable, as it is more difficult to arrange the printing-appliance inside the needle-cylinder, and the fabric would require reversing when out of the machine.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a circular-knitting machine, the combination with the needle-cylinder, of a printing device located within the line of said cylinder, substantially as described.

2. In a circular-knitting machine, the combination with the needle-cylinder, of a plurality of printing-wheels located within the line of said cylinder, substantially as described.

3. In a circular-knitting machine, the combination with the needle-cylinder having an interior annular shoulder, color-troughs supported by said shoulder, and printing devices carried at the edges of said troughs and projecting into the path of the knitted fabric, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

BINNS KERSHAW.

Witnesses:

ALFRED BOSSHARDT,
STANLEY E. BRAMALL.