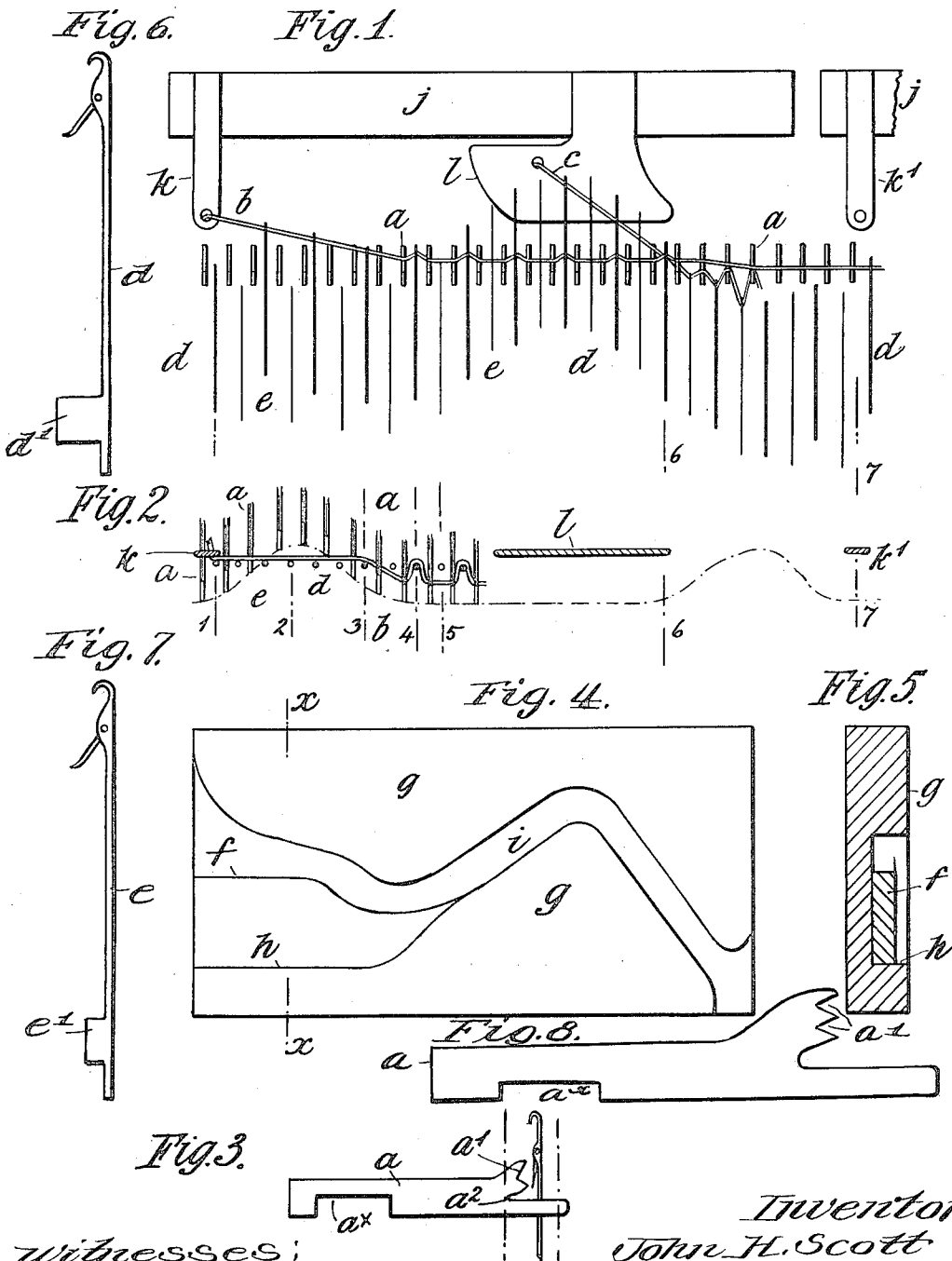


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 CIRCULAR KNITTING MACHINE FOR LOOPED FABRICS.
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981,483.

Patented Jan. 10, 1911.



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CIRCULAR-KNITTING MACHINE FOR LOOPED FABRICS.

981,483.

Specification of Letters Patent. Patented Jan. 10, 1911.

Application filed February 28, 1908. Serial No. 418,314.

To all whom it may concern:

Be it known that I, JOHN HENRY SCOTT, a subject of the King of Great Britain, residing at the Standard Machine Works, Dame Agnes street, Nottingham, in the county of Nottingham, England, engineer, have invented certain new and useful Improvements in Circular-Knitting Machines for Looped Fabrics, of which the following is a specification.

This invention relates to circular knitting machines for looped fabrics, such fabrics being of the kind which comprise a knit portion which carries extra or surface yarns or pile threads arranged as hereinafter indicated.

An important feature of the invention is that it enables a fabric of this kind to be manufactured very rapidly by means of a circular knitting machine with latch needles and sinkers, in the manner hereinafter mentioned. The machine employed may be of the ordinary type as regards its general construction, a convenient machine for this purpose being that described in the specification of United States Letters Patent No. 670892 of Harry Clarke dated March 26, 1901. For the purpose of the present invention such a machine is provided with special sinkers, and with feeders for the surface or pile threads alternating with the feeders for the knitting threads. The special sinkers have one or more throats to act on the surface or pile yarns in addition to the usual single throat of an ordinary sinker, such extra or pile throat (or throats) being formed above the ordinary throat in an upwardly projecting portion of the sinker for instance. In addition to this the needles used have butts of different widths, some butts being wide and the others narrow, so that the latter remain down while the others are being raised or operated independently for a part of the time. The purpose of this is to permit of the surface or pile thread being passed in and out between the needles, so that in the finished work, it will cross the wales or connecting portions between the loops of the knit portion without however being itself knitted. The result of such an arrangement is that the said surface threads form open or pile loops all across the work, and are connected therewith at the ends of these open loops simply by the wales of the knit loops, and they do not themselves undergo any

knitting operation properly speaking. There may be as many feeder positions for the said surface or pile thread as convenient and these may alternate with a similar number of feeder positions for the knitting threads, and as, say, 12 or 16 yarns may be fed in during each revolution, it follows that a very large output is obtained. Two or more surface threads also may be fed in together at the same time, and the sinkers may have a throat for each such thread, or two or more of the latter may be acted on by a single throat.

In order that the invention may be clearly understood and readily carried into effect, reference will now be had to the accompanying drawings in which:

Figure 1 illustrates diagrammatically in front elevation the arrangement of the needles and sinkers and their action for one feeder set or section of the machine, there being as many of such sections as desired all around the machine. The view shown is supposed to be from the center of the work cylinder. Fig. 2 is a corresponding diagram in plan showing the manner in which the sinkers push the surface or pile yarn in loops around the alternate needles. Fig. 3 illustrates the special kind of sinker employed for carrying out the invention, the dotted lines indicating approximately the limits of the movement of the extra or pile throat relatively to the needles. Fig. 4 is an inside elevation of one element or section of the needle cam such as used for operating the needles alternately. Fig. 5 is a section on the line $x-x$ of Fig. 4. Figs. 6 and 7 show respectively one of the wide-butted and one of the narrow-butted needles. Fig. 8 shows on an enlarged scale a modified form of sinker having two extra throats as hereinafter referred to.

a a represent the sinkers whose motion is indicated by the dot and dash lines Figs. 2 and 3 and which as shown in Fig. 3 are provided as usual with a gap or recess a^* in the ordinary way to engage the cam piece that operates them. In addition they are also formed with an extra throat a' , or it may be with two or more such extra throats, (see Fig. 8) according as the pile or surface yarn b is fed in singly (as in the example illustrated) or as two or more such yarns are fed in together. The extra or pile throat a' is formed as shown at the front of a tip or pro-

jection above the ordinary throat a^2 which as usual takes the knitting yarn c .

d and e represent the needles which work between the sinkers, the latter being arranged opposite the spaces between the needles, and vice versa. These needles form two sets, which although in other respects exactly alike, differ as above indicated in the width of their respective butts d' and e' see Figs. 6 and 7. They are so arranged that those of one set alternate with those of the other, that is to say for example, one needle of one set and one of the other set are placed side by side all around the machine. For the sake of clearness the wide butted needles d are illustrated in Fig. 1 by a heavy line, and the narrow butted ones are shown by the light lines, while in Fig. 2, the needles d are shown in plan by black dots and the needles e by light circles. The needles d have their butts set to engage with and be operated by the deep portion f of the needle cam g (Figs. 4 and 5), while the needles e have the narrow butts to cooperate with the shallower portion h of the needle cam. In reference to the said needle cam g it will be seen that the two parts f and h only extend over a part thereof and this part corresponds to that stage of the travel of the needles at which the pile yarn c is being placed in and out between them by the sinkers. Beyond this stage the two parts f and h of the cam merge together at the part i which latter causes both sets of needles to operate together for the usual knitting operation.

The yarns are supplied by feeders of the usual type carried by a ring j . In the drawings, the feeders for the pile threads are lettered k k' , while of the ordinary knitting feeders, only one is shown as being sufficient for purposes of explanation. This feeder is lettered l and forms together with the left hand pile-feeder k a feeding set or section, the pile feeder k' on the right being associated with the next knitting feeder (not shown).

The foregoing being a general description of the parts, reference will now be made to the operation of the machine.

In the formation of the fabric according to the example illustrated, where the wide-butted and the narrow-butted needles, viz. d and e respectively, are arranged alternately, and the sinkers have a single extra or upper throat, the parts operate as follows:—On reaching the left hand feeder k for the pile or surface threads, the wide butt needles begin to move independently of the needles e , that is to say, they rise as shown in Fig. 1, and catching the pile thread b draw it down level with the upper or pile throats a' of the sinkers. The latter in the meantime have been gradually drawn back between positions 1 and 2, but they then move forward and at position 3 they

push the pile thread under the needle hooks and also press it behind the said needles (see position 4). The narrow butt needles e then rise (see position 5) in front of the pressed back portions of the surface or pile yarn. All the needles then rise still further as they reach the knitting yarn feeder, so that the surface or pile thread is left below the needle latches, and the sinkers then begin to go back (see position 6) leaving the pile thread still passing in and out between the needles. The needles having engaged the knitting thread, then go down between the sinkers and form the knit loops from position 6 to position 7, while the pile thread slips over the needle latches and hooks without being knitted at all, but owing to its passing in front of one needle and behind the next, it is laid across the wales or connecting portions in the finished work between the knit loops, and so is held in position. The operations are then repeated at the next surface or pile feeder k' , and so on. The action may also be modified by so arranging, the needles that while the pile thread is pressed around a wide butt needle (as in position 4 for instance) at one feeder, it will at the next feeder be pressed around a narrow butt needle next to the one it was previously pressed around. With such a mode of operation, a "one-and-one" arrangement of the loops is obtained, whereas with the arrangement illustrated the loops form a straight rib as it were. In either case if the wide and the narrow butt needles are arranged alternately, then the surface thread is laid in and out between alternate needles, but the arrangement may be varied as desired, so that there may be two or more wide butted needles and then a narrow butted one, and so on, thus giving longer open loops in the pile thread, or varying the pattern especially with the modified arrangement. Moreover two or more narrow and two or more wide butted needles may be arranged to alternate in groups as it were, as may be suitable for the kind of work required.

The fabric thus produced is suitable for various purposes for which such fabric is usually employed, and can be produced at a high rate in the manner indicated and can be made up into numerous patterns. Among other uses the surface or open-loop threads can be treated to imitate blanket or pile fabric. In fact the said surface or pile portion may be made as thick as required, while the knit portion may on the other hand be made as light and net-like as possible so long as it suffices to hold the surface portion or pile together.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a knitting machine for producing pile fabrics, the combination of two sets of

latch needles alternating with each other, two sets of yarn feeders actuating with each other, one being for the pile thread and the other for the knitting thread, radially operated sinkers having double throats arranged outside the path of the needles, means for causing the needles of one set to engage and pull down the pile thread level with the top throats of the sinkers, means for drawing back the sinkers prior to this pulling down of the pile thread and for thrusting them forward when it is down to cause the sinkers to engage and hold it, and means for then causing both sets of needles to rise and engage the knitting thread as in ordinary knitting machines.

2. In a knitting machine for producing pile fabrics, the combination of radially acting sinkers having each two throats, a series of wide-butted and narrow-butted needles, arranged alternately with each other oppo-

site the intervals between the sinkers, a feeder for delivering the pile thread to one set of needles which pull it down opposite the top throats of the sinkers but do not knit it, a second feeder at a higher level than the first for delivering the knit thread to both sets of needles so that they knit it simultaneously, means for first raising and lowering the needles of one set and for then raising both sets to the higher feeder, and means for operating the sinkers to cause them to engage the pile thread just prior to and during the actual knitting operation, substantially as described.

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

JOHN HENRY SCOTT.

Witnesses:

IRA ROBINSON,
G. E. COLLINSON.