Aug. 17, 1926. 1,596,527

A. A. GRUNDY

MACHINE FOR MAKING KNITTED PILE FABRICS

Filed March 27, 1925 2 Sheets-Sheet 1

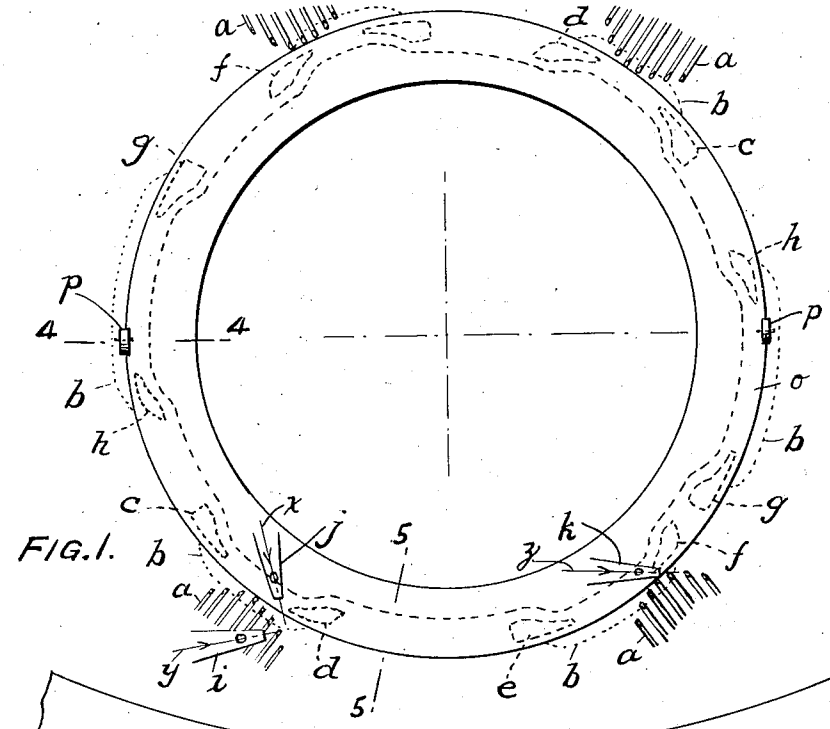


FIG. 1.

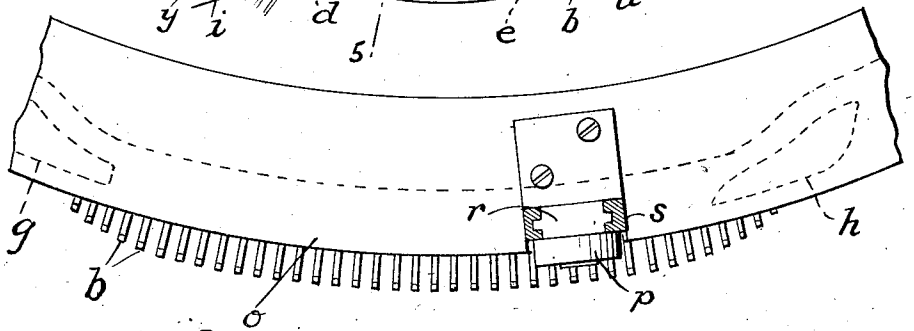


FIG. 2.

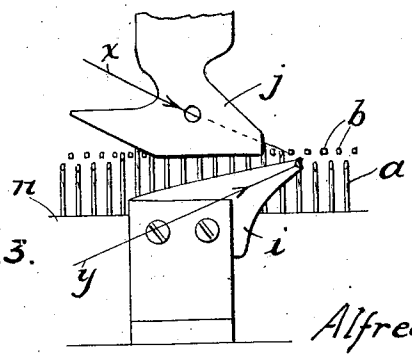


FIG. 3.

WITNESS:
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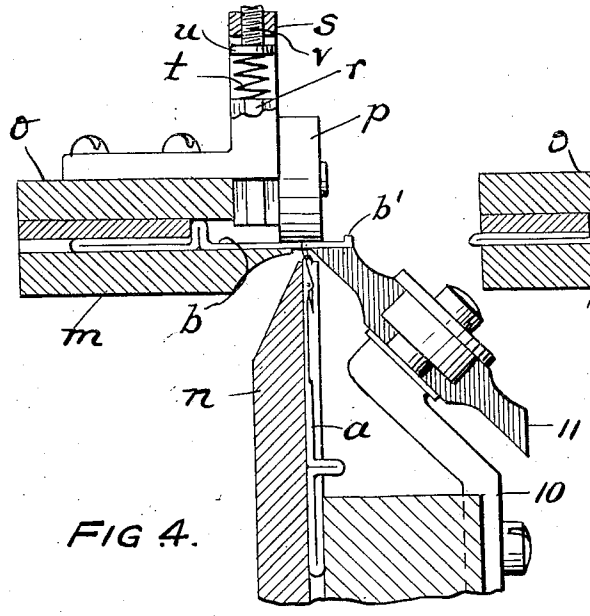


FIG 4.

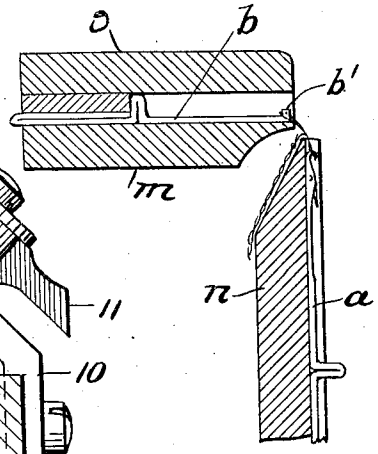


FIG. 5.

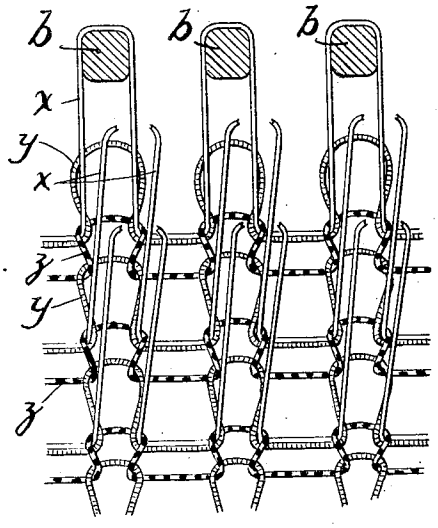


FIG. 6.

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Patented Aug. 17, 1926. 1,596,527

UNITED STATES PATENT OFFICE.

ALFRED A. GRUNDY, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR OF ONE-THIRD TO SAID ALFRED A. GRUNDY, ONE-THIRD TO GEORGE GRUSHLAW, AND ONE-THIRD TO JOHN SICHEL, ALL OF PHILADELPHIA, PENNSYLVANIA.

MACHINE FOR MAKING KNITTED PILE FABRICS.

Application filed March 27, 1925. Serial No. 18,664.

The object of this invention is to produce a knit pile fabric.

In a patent issued to me November 5, 1925, No. 1,560,229, I describe and claim a machine adapted to knit such a fabric. It comprises needles and yarn-holding bars adapted to cooperate to form elongated loops engaging the bars and a bite roller adapted to roll over the bars and press the yarn between it and the bars and thus sever the yarn.

More specifically, this machine is of the circular type and comprises a bank of vertically extending and reciprocating cylinder needles, a bank of dial bars or "dummy needles" extending and reciprocating radially, and two yarn feeds, one above, and the other below, the plane of the radial bars. The vertical cylinder needles and radial dial bars are operated in the same way that the vertical needles and dial needles of a rib knitting machine are operated. When so operated, the yarn fed to the needles from beneath the bars is knit by the vertical needles into a plain web, which the yarn fed to the needles from above the bars is engaged thereby to form elongated loops. The needles operate to draw both yarns through the loops formed by the first yarn, but are restrained by the bars from drawing yarn through the loops formed by the second yarn. There are thus formed from the first yarn normal, interconnected loops producing a plain web and long floating loops that are looped over the bars, and which, as above stated, are severed by the bite-roller that rolls over the bars.

The present invention is a modification of this machine whereby after a course of knitting is formed comprising normally, interconnected loops formed by one yarn and long floating loops formed by the other yarn, another course of knitting is formed comprising normally interconnected, tightly drawn or practically closed loops; these courses alternating throughout the fabric. Thereby is produced a fabric in which, after the long loops are cut, the pile threads will be very firmly bound and held in the fabric.

In the drawings which show a preferred embodiment of the invention:

Fig. 1 is a plan view of the dial cam plate, the actuating cams for the dial bars, the yarn carriers and the loop cutting rollers; certain of the vertical needles being also shown diagrammatically, in side view, to indicate the approximate points at which the stitches are formed relative to the operation of the other mechanism.

Fig. 2 is an enlarged plan view of part of the machine shown in Fig. 1.

Fig. 3 is a front view of part of Fig. 2.

Figs. 4 and 5 are radial cross-sections through the cylinder and the dial on the lines 4—4 and 5—5 of Fig. 1.

Fig. 6 is a diagram of the fabric.

a, *a* are the vertical cylinder needles, similar to those of a rib knitting machine and are reciprocable in the usual way by knitting cams (not shown).

b, *b* are bars corresponding to the radial or dial needles of such a machine and are similarly associated with the cylinder needles and are reciprocable radially by cams *c*, *d*, *e*, *f*, *g*, *h*. *i*, *j* and *k* represent yarn feeds or guides. One of these feeds *i*, delivers yarn *y* from below the plane of the dial bars. Another feed, *j*, delivers pile yarn *x* from above the plane of the dial bars. The remaining feed, *k*, delivers binder yarn *z* from above the plane of the dial bars.

The machine is one in which the needle-actuating cams and bar-actuating cams are stationary and the needles and bars rotate (although a reverse arrangement will be understood to be the full equivalent).

Assuming that certain dial bars *b* are retracted and approaching the cam *c*, as they travel into engagement with cam *c*, they are moved out. At this time the needles are actuated by the stitch cam and start to move up and then complete their upward movement and start to move down. At this time the yarns *x* and *y* are fed to the needles, feed *i* delivering yarn *y* from below the plane of the bars, and feed *j* delivering pile yarn *x* from above the plane of the bars (see

Fig. 3). The needles engage both yarns simultaneously and form plain loops, but in the projection of the dial bars b, the yarn x delivered from above the plane of the dial bars is laid over these bars, and therefore their yoke portions do not engage the necks of the loops of the adjacent course and do not unite adjacent courses of knitting. In Fig. 1 the letter b is applied to dotted lines indicating the positions of the outer ends of projected dial bars.

As the needles and bars continue to travel, cam d retracts the dial bars (see Fig. 5) but the projections b' on the ends of the bars prevent the loops formed by yarn x from slipping off the ends of the bars. The needles move down and the bars are retracted, and the loops are hence elongated, as shown in Fig. 5.

As the needles and dial bars continue to advance, the bars are moved out by cam e. The needles now move up and the bars are moved in (by cam f) and the needles moved down. In the downward movement of the needles, binder yarn z is fed to the needles by feed k. After the needles complete their downward movement, the bars are moved out by cam g. The bars are extended beyond the edge of the dial m and the loops formed by the yarn x are nearly in alignment with the outer edge of the dial, while the knitting fabric moves down between the periphery of the dial and the inside of the needle cylinder n. (See Fig. 4).

At the point of severance of the yarn x, the stationary overlying cam plate o is cut away to accommodate a roller p, turnable in roller bearings, on a shaft carried on a member r, slidable in a frame s secured to the dial plate o. A coil string t is confined between member r and a disc u adjustable by means of a screw v. The pile-severing mechanism is the same as in my said prior application.

As the dial bars continue to travel, roller p rolls over their upper surfaces and bites and severs all the loops successively.

To afford a support for the overhanging ends of the dial bars, there is secured to a fixed part of the machine, as in my said prior application, a bracket 10, on which is mounted a roller 11, whose periphery extends underneath the outer ends of the dial bars and affords a supporting surface over which each bar rolls as it is being subjected to the downward pressure of the bite roller p.

As the needles and bars continue to advance, cam h retracts the bars b, thus completing the cycle of operations.

In Fig. 6 is shown a diagram of a small section of fabric including several wales and several courses. The last knit course of loops formed by the yarn x is shown pulled taut over the bars b before they are cut by the bite roller p. The preceding courses containing yarn x are shown with the yarn x severed to form the upstanding pile.

It will be observed that the fabric comprises, in accordance with the foregoing description, alternating courses, one comprising normal loops formed by the yarn z, and the other comprising normal loops formed by the yarn y and elongated loops formed by the yarn x. It will also be observed that the normal loops binding in the pile threads are drawn comparatively tightly so as to securely hold the pile threads from pulling out. It should be understood that the drawing, Fig. 6, is a diagram and (in order that the structure may be understood) the openness of the fabric is greatly exaggerated. In fact the fabric is a closely knit one, the loops holding in the pile threads being closed tightly.

What I claim and desire to protect by Letters Patent is:

1. In a knitting machine, the combination with needles, of means to feed two yarns preparatory to knitting a course, loop-elongating means adapted to engage one yarn, means beyond the first means to feed a single yarn preparatory to knitting an adjacent course of yarn to engage the loops thereof with the necks of the loops of the yarn of the first course, and a loop-severing device beyond the second yarn feeding means.

2. In a knitting machine, the combination with needles and bars reciprocable at an angle to each other, of cams adapted to project the bars, a pair of yarn feeds adapted to feed yarn to the needles preparatory to knitting a course, the bars being adapted to engage one of said yarns and hold and elongate the loops thereof, a third yarn feed beyond the first two yarn feeds adapted to feed yarn to the needles preparatory to knitting a second course while the bars still hold the loops formed thereon, and a yarn-severing device adapted to sever the loops held on said bars after the second course is knitted.

3. In a knitting machine, the combination with needles and bars reciprocable at an angle to each other, of cams adapted to project and retract the bars, a pair of yarn feeds adapted to feed yarns to the needles preparatory to knitting a course, the bars being adapted to engage one of said yarns and hold and elongate the loops thereof, projections on the ends of the bars preventing the loops from slipping off after the bars are retracted, a third yarn feed adapted to feed yarn to the needles preparatory to knitting a second course, and a yarn-severing device beyond the third yarn feed adapted to sever the loops still held on the bars.

4. In a knitting machine, the combina-

tion with bars and needles reciprocable at an angle to each other, of cams adapted to project and retract the bars, a pair of yarn feeds adapted to feed yarns to the needles preparatory to knitting a course, the bars being adapted to engage one of said yarns and hold and elongate the loops thereof, cams beyond the first named cams adapted to project and retract the bars, a third yarn feed adapted to feed yarn to the needles preparatory to knitting a second course, a cam adapted to again project the bars and a yarn-severing device adapted to sever the loops still held on the bars.

In testimony of which invention, I have hereunto set my hand, at Philadelphia, Pennsylvania, on this 25th day of March, 1925.

ALFRED A. GRUNDY.