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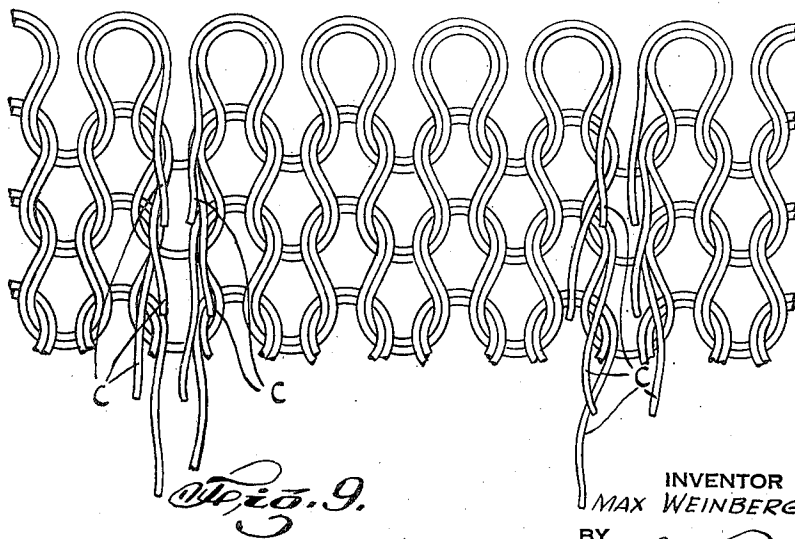
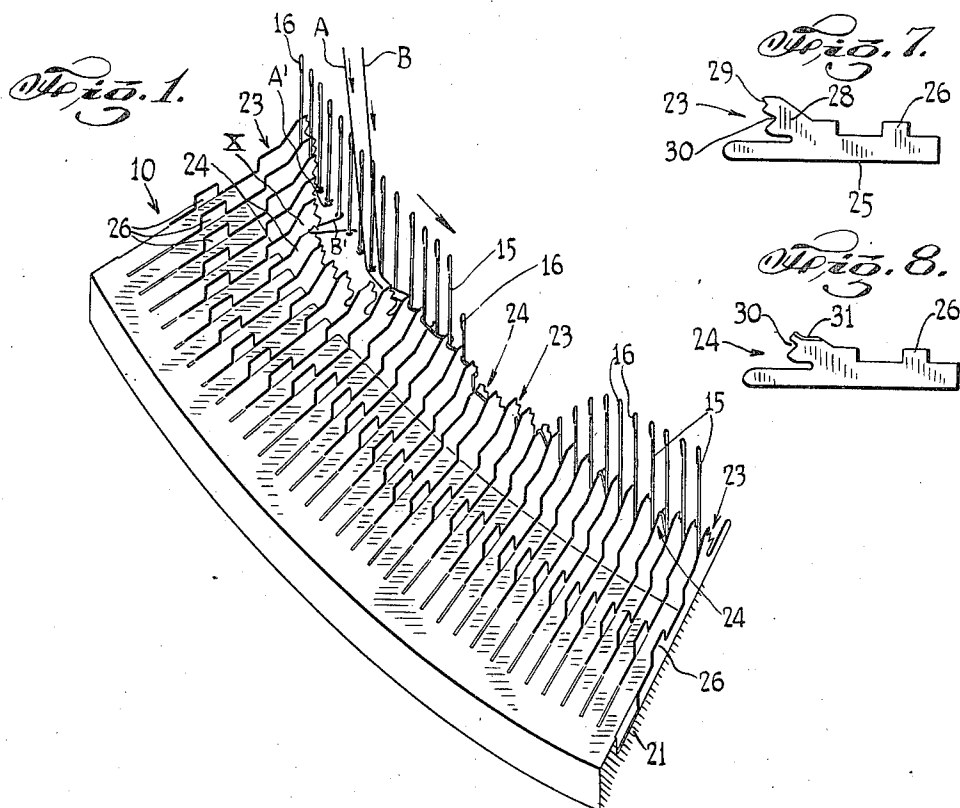
M. WEINBERG

2,184,088

KNITTING MACHINE

Filed June 29, 1938

2 Sheets-Sheet 1



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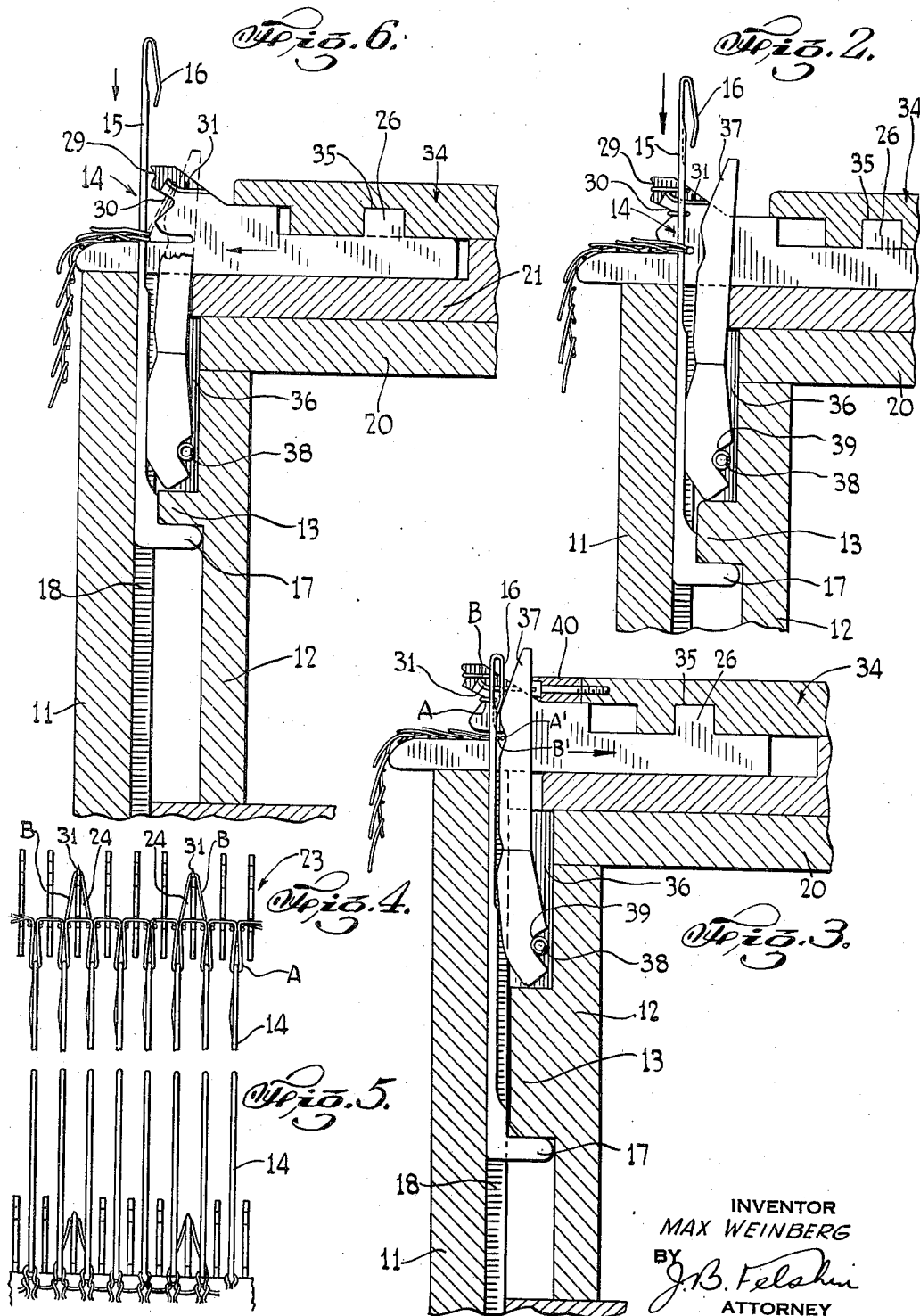
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2 Sheets-Sheet 2



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KNITTING MACHINE

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5 Claims. (Cl. 66—93)

This invention relates to knitting machines. It is particularly directed to a machine for making knitted velvet, and the like purposes.

An object of this invention is to provide in a knitting machine of the character described, means for knitting with a double yarn, means for producing loops at spaced intervals with one of the yarns, and means for splitting said loops during the knitting operation to produce a knitted velvet cloth.

A further object of this invention is to provide a compact and rugged machine of the character described, which shall be smooth and positive in operation, easy to assemble, which will produce an attractive velvet knitted cloth, and yet be practical and efficient to a high degree in use.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the following claims.

In the accompanying drawings, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a top, perspective view of a portion of a knitting machine, embodying the invention, with the sinker cam and presser bars removed;

Fig. 2 is an elevational, radial, cross-sectional view through a portion of the machine just after the yarn is fed to the machine.

Fig. 3 is a view similar to Fig. 2, but illustrating the position where the knitting needles come down, and the beard of the needle is closed by the presser bar, to pull down the yarn on the sinkers;

Fig. 4 is an inside, elevational view of a portion of the machine when the knitting needles are in their downmost position, after casting off one set of yarns and pulling down another set of yarns;

Fig. 5 is a view similar to Fig. 4, but showing the needles in their uppermost position, after the needles have again been moved upwardly, and illustrating the cutting or splitting of a loop;

Fig. 6 is a view similar to Fig. 2, and illustrating the cutting of a loop;

Fig. 7 is a side, elevational view of one of the regular sinkers;

Fig. 8 is a side, elevational view of one of the loop cutting sinkers; and

Fig. 9 is a plan view illustrating a piece of the knitted velvet made with the machine embodying the invention.

Referring now in detail to the drawing, 10 designates a portion of a circular rotary knitting machine. The same comprises an inner cylindrical rotary needle ring 11, and an outer cylindrical cam ring 12, spaced from the needle ring, and provided with cams 13 fixed thereto and projecting toward said needle ring, for raising and lowering the knitting needles 14 in desired phase, as will appear hereinafter.

The knitting needles 14 are each provided with a vertical shank 15 having an outwardly and downwardly bent beard 16, at its upper end, and a radially outwardly projecting butt 17, at its lower end, adapted to be engaged by the cams 13, for vertically moving the needles up or down. The knitting needles 14 are slidably mounted in spaced vertical slots 18 in the rotary needle ring 11, whereby said needles rotate about the axis of said ring.

Fixed to the upper edges of the outer fixed cylinder or ring 12 is a flat annular ring 20 extending outwardly therefrom. Rotatably mounted on the ring 20 is a ring 21 on which are slidably mounted a plurality of radial equally spaced sinkers 23 and 24, alternating between the needles 14. Thus, there is one sinker between each pair of adjacent needles.

Two types of sinkers are employed, the regular sinker 23 shown in Fig. 7, and the loop cutting or splitting sinker 24 shown in Fig. 8. Every fourth sinker is a cutting sinker 24 for cutting or splitting loops, in the manner hereinafter explained. Hence, between every pair of adjacent cutting sinkers 24 are three sinkers 23, which are not provided with means for cutting the yarn. The sinkers are slidable radially on member 21 between needles 14, in the manner, and for the purpose hereinafter appearing.

The sinkers 23 are flat and have a straight bottom edge 25 contacting the top of the ring 21. Each of said sinkers is provided with an upwardly extending projection 26 for engagement with a sinker cam, as will be explained hereinafter. Each sinker 23 furthermore has a projection 28, formed at the inner end thereof, with a pair of V-shaped grooves 29 and 30. The groove 29 is disposed above the groove 30, and radially inwardly of said groove.

The sinker 24 is similar to the sinker 23, except that the top of the projection 28 is cut away to form a curved knife edge or cutter 31. The sinker 24 hence has only one V-shaped groove 30, similar to the V-shaped groove 30 of the sinker 23. All of the sinkers are disposed in

vertical planes passing through the axis of the machine.

Fixed to the ring 20 in any suitable manner, and overlying the sinkers 23, 24, are sinker cams 34 formed with cam grooves 35 receiving the projections 26, for radially moving the sinkers inwardly and outwardly in a predetermined sequence or phase relative to the up and down movement of the knitting needles 14 by the cams 13, as the needles and sinkers rotate about the vertical axis of the machine. Cams 34 may be made in similar, repeated removable sections, one of which operates with the portion of the machine shown in Fig. 1.

Within the space 36, between the needle ring 11 and the cam ring 12, and above the cams 13, and in back of each needle 14, is a vertical presser bar 37, disposed between each pair of adjacent sinkers 23 or 24. The upper ends of the presser bars are normally held away from the beards 16 of the needles 14, by an annular coil tension spring 38 engaging within notches 39 in the lower ends of said bars, in the well known manner.

Fixed to each section of the cam plate 34 is a presser cam 40 adapted to press the upper ends of the presser bars inwardly to close the beards 16 when the needles are pulled downwardly, as shown in Fig. 3 of the drawings, to permit the needles to cast off the stitches already made.

The needles 14, as well as the sinkers 23, 24, and the presser bars 37, are disposed entirely around the cylindrical machine, and rotate about the axis of said machine. The fixed needle cams, sinker cams, and presser cams are repeated any suitable number of times around the machine to repeat the knitting operation as many times as yarn is fed to the machine.

In Fig. 1 there is shown one section of the machine indicating one complete phase of operation. In said figure, the presser bars and presser cam have been omitted for the sake of clearness. In Fig. 1 there is shown a pair of yarns A and B fed to the machine at repeated intervals around the machine, the same number of times as the needle cams, sinker cams and presser cams are repeated. In said figure, the arrow indicates the direction of movement of the needles and sinkers around the axis of the machine. The letters A and B indicate double yarn or threads fed to the machine at one phase, and A', B' indicate threads which were fed to the machine at a previous phase, it being understood that the action illustrated in Fig. 1 is repeated any desired number of times around the machine.

At the point where the yarn or threads A and B are fed downwardly to the machine, the sinkers have been pulled outwardly by the cam groove 35 to leave sufficient space between the projections 26 of the sinkers and the needles 14 for the passage of yarn between said projections and said needles. Yarn A is engaged by the grooves 30 of the sinkers 23, 24, and the yarn B is engaged within the grooves 29 of the sinkers 23. At this point the needles are in their uppermost position, and the upper ends of the presser bars are held back away from beards 16, by the coil spring 38.

As the machine and sinkers continue moving in the direction of the arrow of Fig. 1, the sinker cam 34 moves the sinkers radially inwardly between the knitting needles 14 to the position shown in Fig. 2 of the drawings. As the needles and sinkers continue moving further, the needle cam 13 begins to pull the needles downwardly,

and the presser cam 40 moves the presser bars against the beards 16 of the needles, as shown in Fig. 3 of the drawings, the yarns A and B being caught within said beards. As the needles continue rotating further they are pulled downwardly to pull the yarns A and B out of the grooves 29 and 30 of the regular sinkers 23, and the yarn A off the cutting sinkers 24. The yarns A and B are then pulled through the previous stitching made by yarns A' and B', during the casting off operation. The yarn B is not pulled off the cutting sinkers 24 however, being looped around the cutters 31 of said sinkers, as shown in Fig. 4 of the drawings.

It will be noted that because the grooves 29 of the sinkers 23 are located radially inwardly of the grooves 30, the yarn B will make longer loops than the yarn A when the sinkers are moved radially inwardly between the knitting needles, as shown in Figs. 2 and 3 of the drawings. However, when the needles 14 are pulled downwardly to the position shown in Fig. 4, the extra length of yarn is taken up by the cutting sinkers. The presser cam is located at the place where the knitting needles are pulled downwardly to permit the casting off operation.

At the cast off point, the sinkers are pulled back somewhat by the sinker cam to relieve the tension of the thread during the casting off operation. After the casting off operation, the needles are again moved upwardly by the needle cam, and the sinkers are held in the position shown in Fig. 3, until the needles reach the position shown in Figs. 5 and 6 of the drawings, where the sinker cams are again pulled back so that the inner upwardly curved portion of the cutting edge 31 of the cutting sinkers 24, will sever the looped portions of the yarn B resting on said cutting sinkers, to produce a pair of cut ends C every fourth loop on yarn B. The cutting of the yarn is done at the point marked X in Fig. 1 of the drawings.

Thereafter, the sinkers are pulled a little further back and two additional yarns are again fed to be engaged within the grooves 29 and 30 of the sinkers 23, 24; and the action described above is repeated.

It will be noted that every fourth loop of one yarn is split during the knitting operation, the other yarn of the same loop serving to hold the cloth together.

Heretofore knitted velvet has been made by first knitting cloth with loops, and thereafter removing the cloth from the knitting machine and cutting off the tops of the loops. With the improved machine disclosed herein, the cloth comes from the machine with the loops already cut.

Although the machine herein described illustrates three regular sinkers 23 interposed between a pair of adjacent cutting sinkers 24 to produce three uncut loops of double yarn between each pair of cut loops, any suitable number of sinkers 23 may be interposed between the cutting sinkers, it merely being necessary to produce enough uncut stitches or loops between the cut loops so that the pieces of cut yarn B between the split loops will not pull out between the cut loops.

Some sections of the machine may be provided only with regular sinkers to make cloth having sections with uncut loops.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawings is to be interpreted as illustrative and not in a limiting sense.

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

1. In a circular, rotary knitting machine, a cylindrical needle ring, means for rotating the same, a plurality of spaced knitting needles mounted on said ring for vertical sliding movement thereon, cam means for reciprocating said needles as said ring rotates with said needles, an annular ring fixed to said needle ring for rotation therewith, sinkers alternating with said needles, mounted on said ring for radial horizontal sliding movement, cam means to reciprocate said sinkers, certain of said sinkers having a pair of notches spaced, one at a higher level than the other, other sinkers located between a pair of the first sinkers having a notch similar to the lower of the pair of notches on said first sinkers, and a cutting edge above said notch and below the level of the higher notches in said first sinkers, means for feeding a pair of yarns between said sinkers and needles, the lower notches of the first sinkers and the notches of the second mentioned sinkers being adapted to receive one of said yarns, the upper notches of said first sinkers being adapted to receive the other of said yarns, the cutting edges of said second sinkers being adapted to move beneath said second yarn and to cut said yarn, upon reciprocating the second sinkers.
2. In a knitting machine for making knitted velvet, the combination of knitting needles having beards, means for reciprocating the same, sinkers between said needles, means for reciprocating said sinkers in a direction transverse to the direction of reciprocation of said needles, presser bars behind said needles, means for moving said presser bars to close the beards of said needles, when said needles are moved downwardly to cast off, means to feed a double yarn between said sinkers and needles, each of certain of said sinkers being provided with a plurality of notches to receive said yarns, each of other of said sinkers being provided with a cutting edge adapted to cut loops formed on one of said yarns, and with a notch to receive the other yarn, there being one or more sinkers with double notches between each pair of adjacent sinkers with the cutting edges.
3. In a circular, rotary knitting machine, a cylindrical needle ring, means for rotating the same, a plurality of spaced vertical knitting needles formed with beards, mounted on said ring for vertical sliding movement thereon, fixed cam

means for reciprocating said needles as said ring rotates, a flat annular ring fixed to said needle ring for rotation therewith, horizontal sinkers disposed between each pair of adjacent needles and mounted on said last mentioned ring for radial sliding movement, fixed means to reciprocate said sinkers horizontally, means for feeding a pair of yarns between said sinkers and needles, each of certain of said sinkers having a pair of notches adapted to receive said pair of yarns, each of other of said sinkers located between a pair of said first mentioned sinkers, having one notch to receive one of the yarns, and a cutting edge for cutting the other of said yarns.

4. In a knitting machine, a plurality of spaced knitting needles, sinkers alternating with said needles, means for reciprocating said sinkers, certain of said sinkers having a pair of notches spaced one at a higher level than the other, the upper notch in each of said sinkers being spaced longitudinally from the lower notch, longitudinally of the other sinker, other sinkers located between a pair of the first sinkers, having a notch similar to the lower of the pair of notches of the first sinkers, and a cutting edge above said lower notch, means for feeding a pair of yarns between said sinkers and needles, the lower notches of the first sinkers and the notches of the second mentioned sinkers being adapted to receive one of said yarns, the upper notches of the first sinkers being adapted to receive the other of said yarns, the cutting edges of the second sinkers being adapted to move beneath the second yarn and cut the same as said sinkers are reciprocated.

5. In a circular rotary knitting machine, a cylindrical needle ring, means for rotating the same, a plurality of spaced knitting needles mounted on said ring for vertical sliding movement thereon, cam means for reciprocating said needles as said ring rotates, sinkers alternating with said needles mounted on said ring for radial sliding movement, cam means to reciprocate said sinkers, certain of said sinkers having a pair of notches spaced one at a higher level than the other, the higher level notches being located radially inwardly of the lower level notches, other sinkers located between a pair of the first sinkers, each having a notch similar to the lower of the pair of notches on the first sinkers, and a cutting edge above said notch, means for feeding a pair of yarns between said sinkers and needles, the lower notches of the first sinkers and the notches of the second sinkers being adapted to receive one of said yarns, the upper notches of the first sinkers being adapted to receive the other of said yarns, the cutting edges of the second sinkers being adapted to cut said other yarn upon reciprocating said second sinkers.

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