July 7, 1942. L. SELIGMAN 2,289,052

KNITTING MACHINE

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Fig. 1

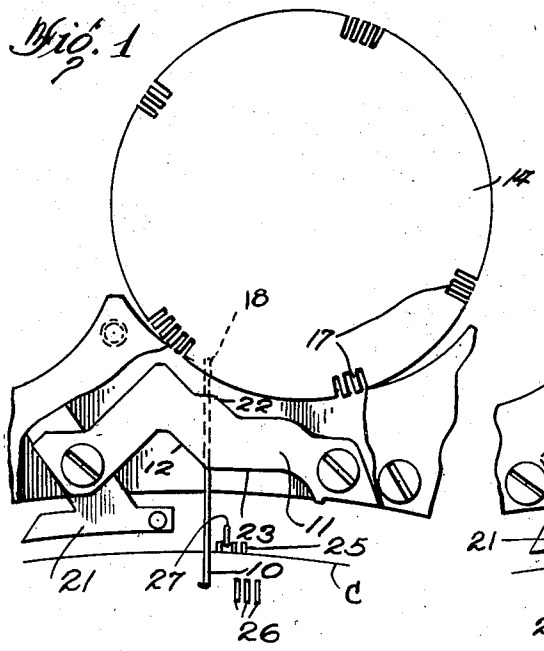


Fig. 2

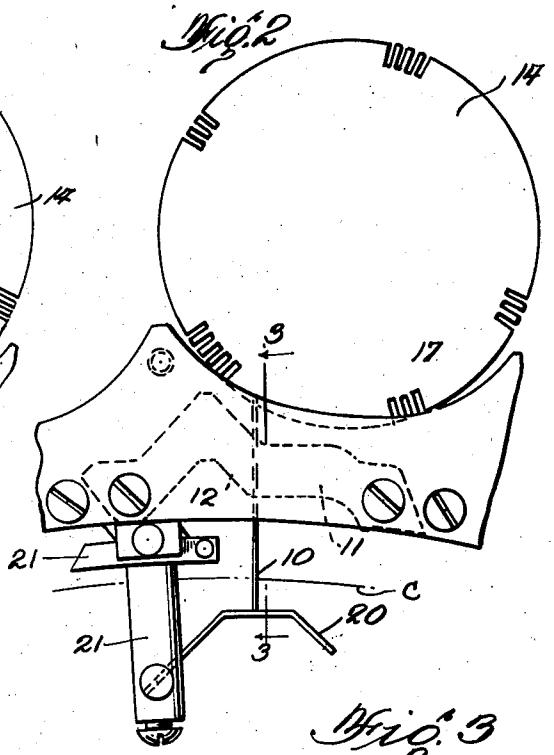


Fig. 3

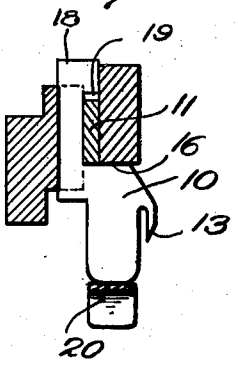


Fig. 4

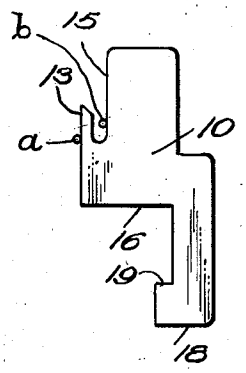
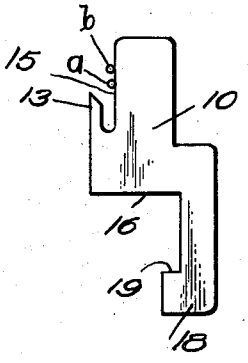


Fig. 5



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Fig. 6

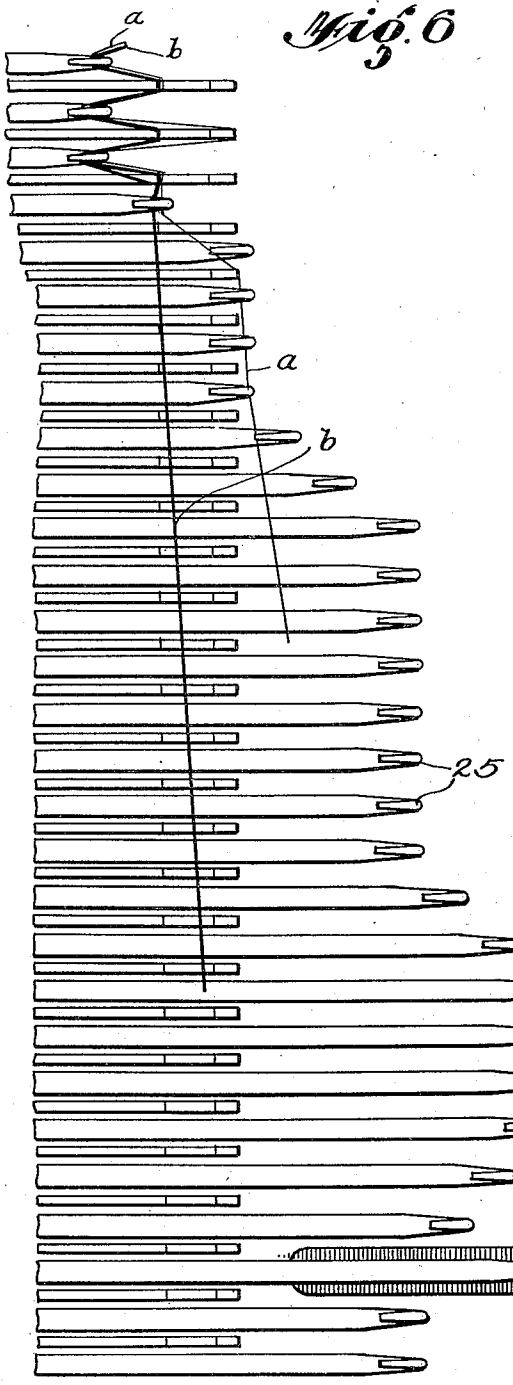
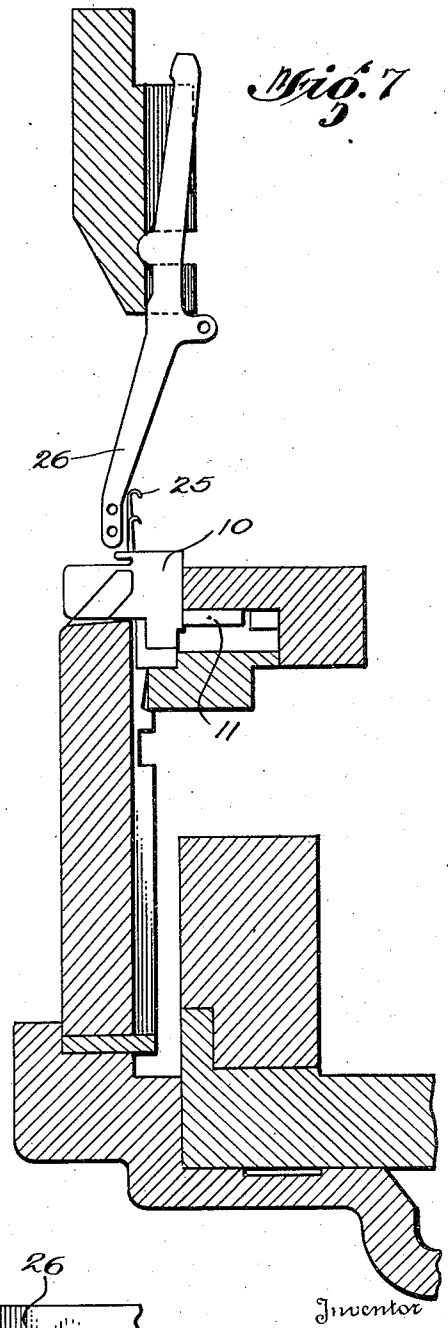


Fig. 7



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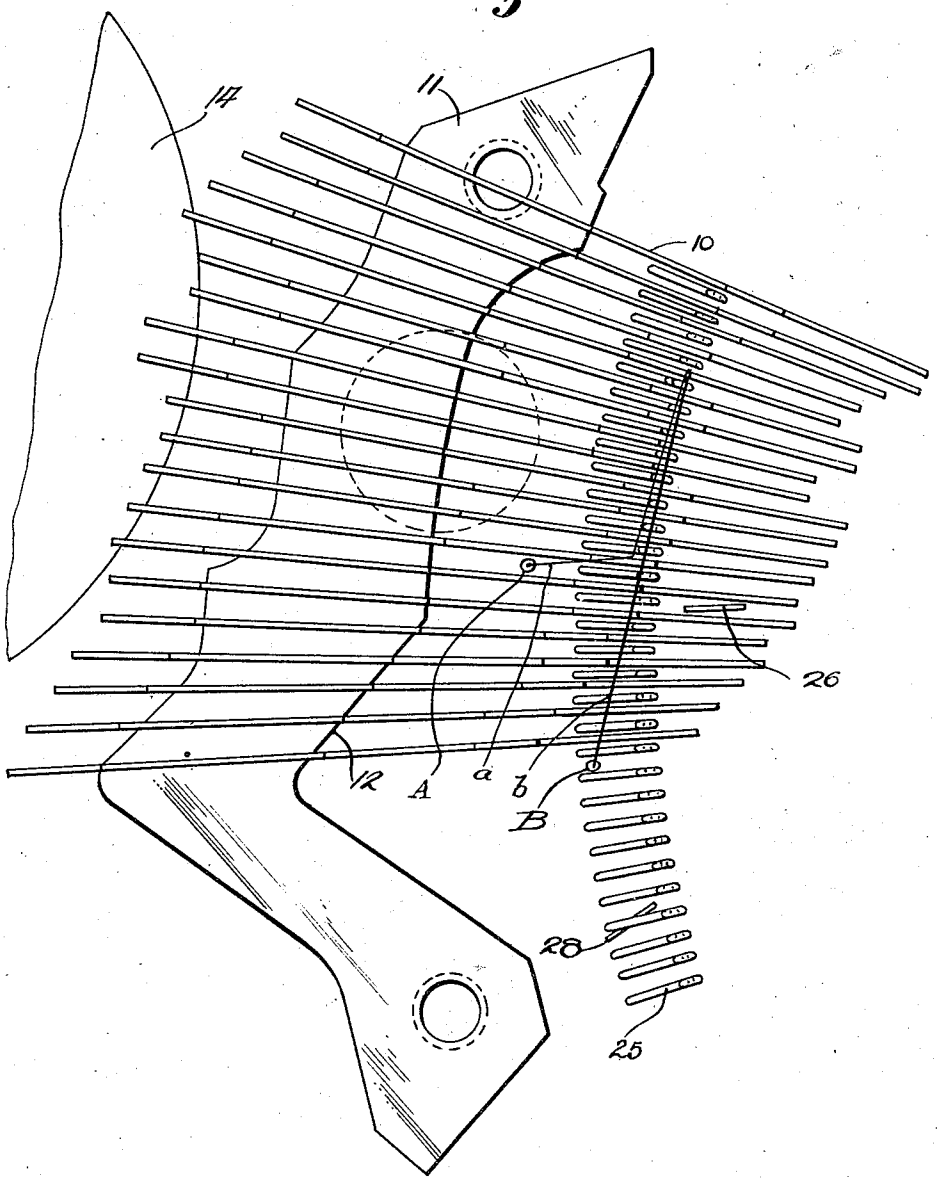
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Fig. 8



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Patented July 7, 1942

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UNITED STATES PATENT OFFICE

2,289,052

KNITTING MACHINE

Louis Seligman, New York, N. Y., assignor to H. Brinton Co., Philadelphia, Pa., a corporation of Pennsylvania

Application May 31, 1940, Serial No. 338,253

4 Claims. (Cl. 66—93)

My invention relates to knitting machines, and it is an object of the same to provide a circular independent needle machine with means for making a pattern of pile loops on its face, combined with figures made by wrapping needles with pattern yarns, said pattern yarns providing such figures as clocks, spots or vertical stripes in well known manner.

Another object is to provide improved means for controlling the action of sinkers in knitting pile or plush fabrics.

Another object is to provide an improved sinker cam for circular open-top knitting machines.

Referring to the drawings which are made a part of this application and in which similar reference characters indicate similar parts:

Fig. 1 is a horizontal section of a portion of a circular independent needle knitting machine, showing my improved construction;

Fig. 2 is a similar view of a known construction;

Fig. 3, a section on line 3—3 of Fig. 2 looking toward the left;

Figs. 4 and 5, side elevations of sinkers, illustrating their action on the two threads which are fed to the needles;

Fig. 6, an elevation showing the upper ends of the needles in a part of the circle and also showing the lower part of an idle wrap finger;

Fig. 7, a vertical section through the needle cylinder and the sinker bed, and

Fig. 8, a top plan with parts omitted, showing on an enlarged scale the arrangement of the sinkers and parts coacting therewith.

Circular knitting machine having means to produce pile patterns by the use of sinkers that are selectively advanced by a pattern wheel so as to cause two yarns to be knitted together in loops of equal length for the plain parts of the cloth, and to cause one of said yarns to be drawn into longer loops at the pile portions have long been known, such machines being of the general type shown by Holmes Patent No. 1,388,341, August 23, 1921, modified by the addition thereto of a pattern wheel for advancing the sinkers selectively as in Ellis Patent No. 697,098 and West Patent No. 999,074, July 25, 1911. Fig. 2 portrays the essential parts of such a machine. In that figure, reference character 10 indicates one of a circular series of sinkers which are advanced by a cam 11 having a sinker advancing edge 12.

In such circular independent needle knitting machines as were in use up to recent years the feeds were few and far apart and the slope of the needle and sinker cams was a gradual one. Up to recent years also the use of needle wrapping devices in circular machines was unimportant, and the making of plush or pile patterns on such machines by selective sinker action is a recent development. In the earlier machines which did use the principle of selective sinker advance to abnormal distances, whether for making pile patterns or for other purposes, there may have been but little difficulty in the way of marring of patterns by accidental advance of non-selected sinkers or, if they were imperfect, that was accepted as an unavoidable defect.

In recent years there has been a great increase in the number of feeds on circular machines of the type in question without increase in diameter of the machines, the purpose being to increase the production of the machine, and the feeds are now crowded together so that a machine of the same diameter now has four or more times the number of feeds that a machine of the same diameter would have had only a few years ago. As a necessary incident to the increase of number of feeds the needle and sinker cams have been made much steeper. This caused no particular difficulty in the case of the needles but it has caused (or greatly increased) the difficulty of making satisfactory clean patterns by selective special advance of sinkers, as practiced in making pile patterns, etc. That difficulty is due to the fact that when sinkers, which must be "free" in such machines, are suddenly advanced by the steepened sinker advancing cams they acquire such momentum that they are likely to advance to their outermost limit of movement inward or forward by reason of inertia, due to the mere action of the advancing cams, such advance taking place prior to any action of the pattern means which are intended to control such advance selectively, and which are usually so placed as to give a special or abnormal advance to selected sinkers after all sinkers have been advanced in the sinker wave by the usual cam. "Free" sinkers, like "free" needles, are such as do not have their movements precisely controlled by their cams, but have some additional freedom of movement.

Such undesired or accidental advance is known in the art as "firing" of the sinkers which would not be advanced selectively by the pattern means, which is usually a horizontal wheel with teeth that engage and advance selected sinkers, and in the case of patterned pile fabrics it results in the formation of pile loops at undesired places in the cloth, thus marring the pattern and making imperfect cloth. It is a primary object

of my invention to prevent such "firing" of sinkers, both when making plain patterned pile fabrics or the like and also when making cloth combining wrap patterns with the pile.

Each sinker, as usual in machines of this type, has a finger 13 over which the yarn *a* supplied by a feed indicated conventionally at A may be laid when the sinker is advanced as in Fig. 4 by a pattern wheel 14 so as to form an elongated pile loop of said yarn. The yarn *b* from feed B at this time lies on the usual supporting edge 15 of the sinker and is drawn by the adjacent needle to form a loop of the body or back fabric. Fig. 5 shows the position of a sinker that has been advanced only by the cam edge 12 bearing against an edge 16 of the sinker, and not by the pattern wheel, so that both yarns form only body or back fabric loops. The wheel may be cut in any pattern, as at 17, with slots to receive the rear ends of the sinkers so as not to advance them, while the intermediate segments may be roughened, etc., to engage the rear ends 18 of the sinkers and so to advance them to function as in Fig. 4.

In order that the wheel 14 may be able to advance sinkers beyond their normal advanced position at a feed it is necessary that the sinkers be free to advance, i. e., the space between edges 16 and 19 must be wider than the cam 11, as illustrated in Fig. 3 since otherwise they could not be moved by the selecting wheel. Usually the width of the cam is such that the sinkers are "free" at all positions along the cam. In the practical use of these machines, which of course run at rather high speeds, it is found as above stated that there is a strong tendency for all the sinkers to advance as far as permitted by the width of the slot between faces 16 and 19 (or to "fire" inward) and when that occurs pile loops of more or less imperfect character are formed at all the accidentally advanced sinkers, thus spoiling the pattern.

To prevent such accidental advance it has been customary to locate a spring 20 in such a position as to hold all the sinkers back against the level edge of the cam just beyond the advancing edge 12, after which sinkers may be selectively advanced by the wheel without danger of accidental advance of other sinkers. The spring 20 is mounted inside the needle circle *e* on a bracket 21' on the carrier 21, and necessarily must be within the needle circle *c* in order to be so positioned as to act on the inner ends of the sinkers. But because of the necessity of providing some such means to prevent formation of pile loops on undesired sinkers it is impossible to combine needle-wrapping means, such as the fingers shown for example in Langham Patent No. 201,024, March 5, 1878, with pile loop pattern forming means in the same machine, since the spring 20 and its supporting means would inevitably break off the needle wrapping warp yarns. In Fig. 1 I have indicated needles at 25, idle wrap fingers at 26 and an active wrap finger at 27. In Fig. 8, reference character 28 indicates a finger that is moving across the needle circle to wrap a thread about one or more needles.

My invention for the first time enables the same machine to knit a fabric having patterns formed with both wrap yarns and pile loops, which patterns may combine both methods of ornamentation in the same pattern or may merely have wrap patterns in some parts of the cloth and pile patterns in other parts, and it consists, as shown in Figs. 1 and 8, in widening the cam 11 at 22 at the portion just beyond the advancing edge 12 so that it fills the space between edges 16 and 19 of each sinker and insures that no sinker will move forward accidentally, due to the movements imparted to it during its advance or for any other reason, and thus cause the formation of undesired pile loops. The warp yarns from wrap fingers or other wrapping means are in no way interfered with, and clean cut pile patterns are formed in the same length of cloth or in combined patterns of pile loops and needle-wrapping warp yarns.

It will be understood that the widening of the cam portion 22 at the back or outside of the cam 11 extends partly beyond the region of the inner end of the cam edge 22 for smooth operation but the only essential feature is that it be so formed as to hold all the sinkers back until the time when they are passing along the level part 23 of the cam 11, so that they will no longer have a tendency to fire forward or inwardly of the needle circle. They must of course be free to be selectively moved farther in by the wheel at this time.

It will be obvious that while this construction is particularly valuable where pile loop patterns are to be made on the same machine that makes wrap patterns, either in combined patterns or in any desired sequence, it also provides improved means for knitting pile patterns, such means being simpler and more positive than means heretofore used, and being less liable to get out of order.

Various changes in the parts shown and described will be obvious to those skilled in the art and therefore I do not limit myself to the specific construction and arrangement shown and described but only as indicated by the appended claim.

Having thus fully described my invention what I claim is:

1. In a circular independent needle knitting machine, of the type having a series of sinkers with opposed edges for engagement by sinker cams, a sinker cam generally narrower than the space between said opposed edges for advancing sinkers to a predetermined distance and for retracting them, and means for selectively advancing sinkers of the series abnormally after their normal advance, said sinker advancing cam including an advancing portion so steep as to tend to cause abnormal advance of sinkers prior to the action of said selecting means, that improvement which consists in widening the sinker actuating cam in the region of said advancing portion so that it fits closely between said edges and prevents any abnormal advance of sinkers while passing said portion.

2. A device as in claim 1, said sinker cam including a level portion following said advancing portion, and said selecting means comprising a toothed wheel whose teeth act selectively to advance sinkers passing along said level portion.

3. In a knitting machine of the type having a circular series of independent needles, means for feeding a plurality of yarns to said needles at different levels, a series of sinkers with opposed edges for engagement by sinker cams, said series comprising sinkers each provided with a conventional yarn supporting edge and a finger extending over a part of said edge, a cam generally narrower than the space between said opposed edges for advancing sinkers to a predetermined normal distance and retracting them, and means for selectively advancing sinkers of the

series abnormally after their normal advance for causing their fingers to engage under one of said yarns to form pile loops thereof, said sinker cam including an advancing portion so steep as to tend to cause abnormal advance of sinkers prior to the action of said selecting means, that improvement which consists in widening the sinker actuating cam in the region of said advancing portion so as to fit closely between said edges and to prevent any abnormal advance of sinkers while passing along said portion.

4. A device as in claim 3, including yarn wrapping fingers movable across the needle circle in the region of abnormal advance of selected sinkers.

LOUIS SELIGMAN.