T. KOPP.

KNITTING APPARATUS.

APPLICATION FILED APR. 1, 1918.

1,286,349.

Patented Dec. 3, 1918

3 SHEETS—SHEET 1.

Fig. 1

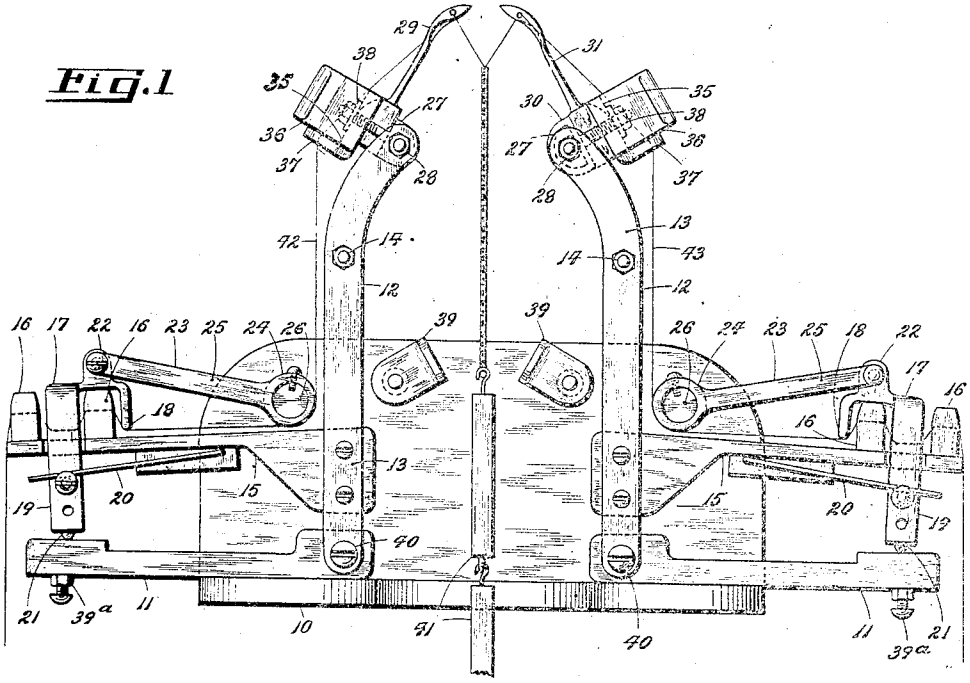
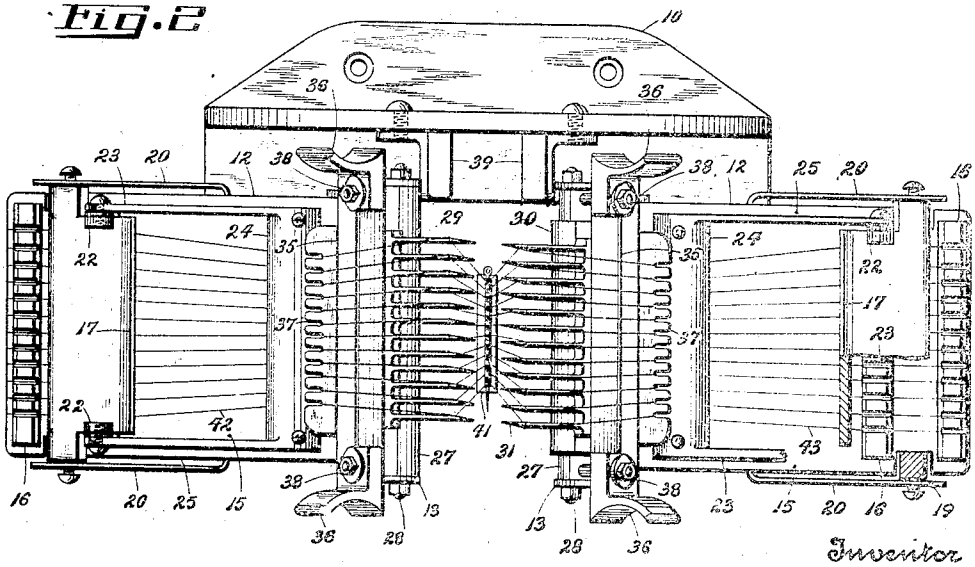


Fig. 2



Witness

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3 SHEETS—SHEET 2.

Fig. 3

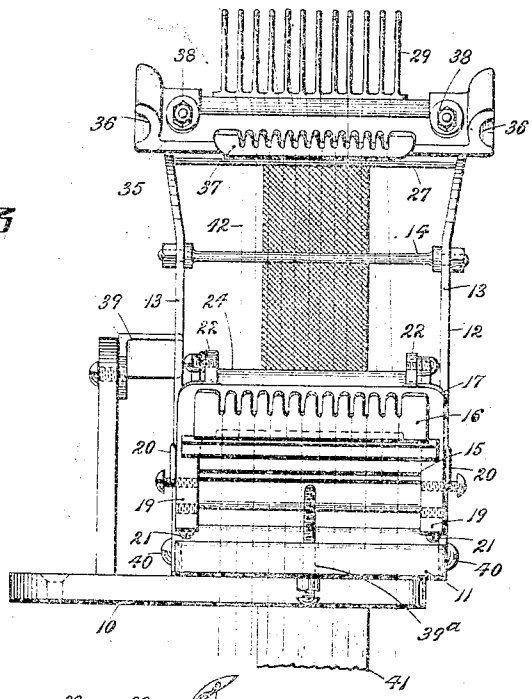
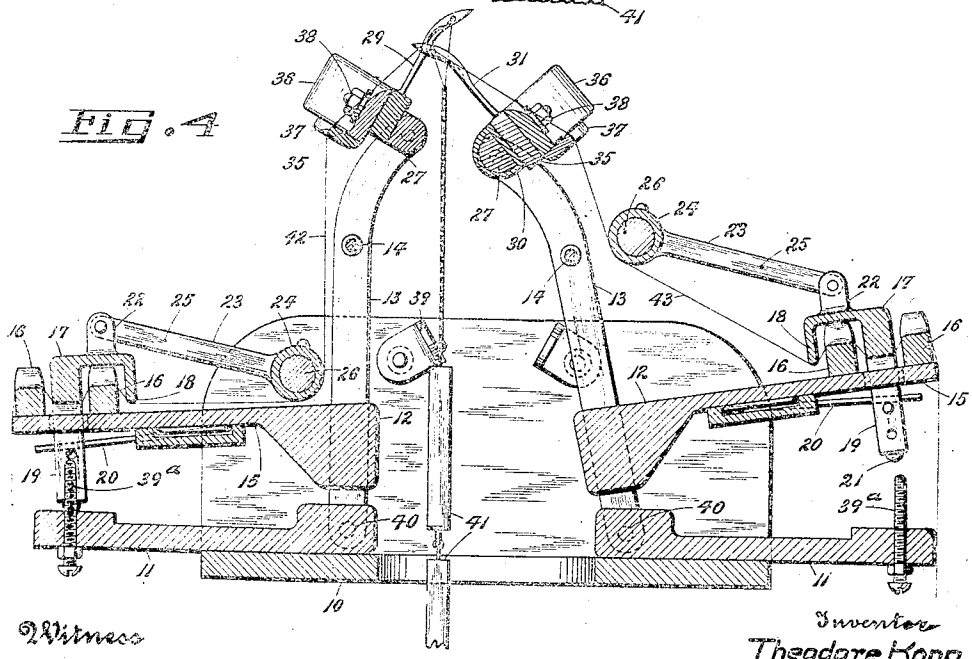


Fig. 4



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3 SHEETS—SHEET 3.

Fig. 5

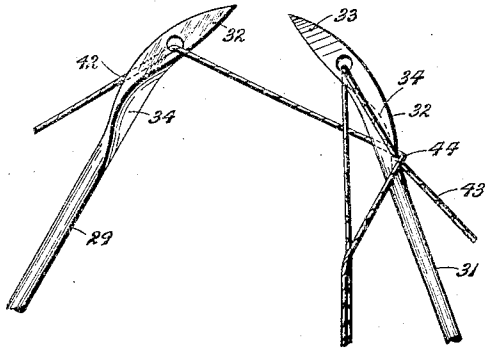


Fig. 6

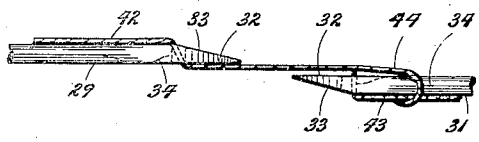


Fig. 8

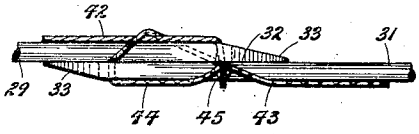


Fig. 7

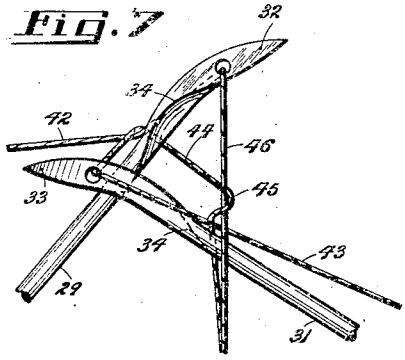


Fig. 10

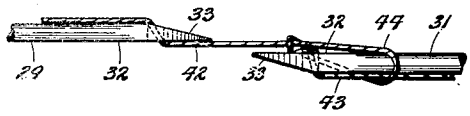


Fig. 12

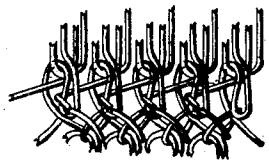


Fig. 11



Fig. 9

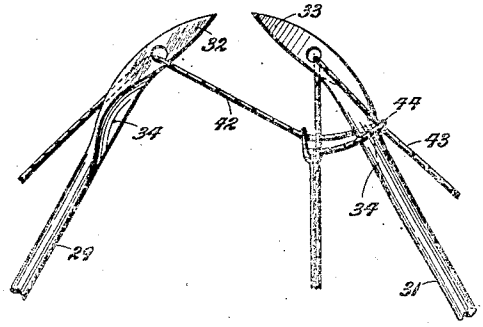
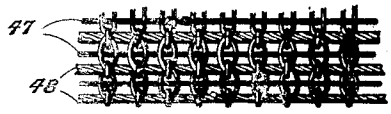


Fig. 13



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UNITED STATES PATENT OFFICE.

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KNITTING APPARATUS.

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Application filed April 8, 1918. Serial No. 227,271.

To all whom it may concern:

Be it known that I, THEODORE KOPP, a citizen of United States, residing at 633 Girard avenue, Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Knitting Apparatus, of which the following is a specification.

The invention relates to knitting machines and has for an object to provide an apparatus for knitting various kinds of yarns or threads into material, the operation being of a very simple nature to effect the desired result and one in which the parts of the apparatus cannot readily get out of order.

Among other features my invention comprehends a knitting apparatus that may be adapted to produce various kinds of fabric and of various designs. With it any simple form of chain or other cross loop stitch can be employed to produce a fabric and if desirable a filler can also be employed, it being further understood the machine is particularly designed and adapted to accommodate various kinds and characters of yarns.

To effect the desired results I provide a plurality of opposed sets of needles through which the thread or yarn is carried, and which in the operation of the machine cooperate to entwine or intermesh the strands of yarn, with suitable adjustable means for increasing or decreasing the tension of the yarn, and controlling the feeding of the yarn in the continued operation of the machine, certain of the needles being also movable transversely of other needles to overlap various stitches or strands of yarn in order to form the knots, meshes or loops necessary to produce the desired design, knit and strength of the finished produce.

My machine is so designed that it may be particularly adapted to work at home by individuals who need not necessarily be skilled, but of course it will be understood that the machine can also be constructed on a larger scale for use in textile factories, for the manufacture of large textile fabrics.

In the further disclosure of the invention, reference is to be had to the accompanying drawings, constituting a part of this specification, in which similar characters of reference denote corresponding parts in all the views, and in which—

Figure 1 is a front elevation of the knitting apparatus, several parts being shown in their inoperative positions.

Fig. 2 is a plan of the same.

Fig. 3 is an end view looking to the right of Fig. 1.

Fig. 4 is a vertical sectional elevation, parts being broken away for the sake of clearness.

Fig. 5 is an enlarged detail view showing the initial position of a pair of needles preparatory to making the stitch.

Fig. 6 is a plan of the same.

Fig. 7 is a similar view to Fig. 5, but showing the right-hand needle rocked over to form the loop or stitch.

Fig. 8 is a plan of the same.

Fig. 9 is a fragmentary view showing the completed stitch.

Fig. 10 is a plan of the same.

Fig. 11 is a detail showing the chain stitch formed by any pair of interwoven threads.

Fig. 12 is a fragmentary view showing the weave, when the shifter, hereinafter referred to, is moved to produce a continuous piece of fabric.

Fig. 13 is a fragmentary view showing a form of material produced by the machine, and having a face appearance resembling a chain stitch.

Referring more particularly to Figs. 1 to 4, the numeral 10 designates a base plate of any appropriate material or size, and which is adapted for clamping to a table or other suitable piece of furniture, to hold the apparatus in place. Mounted to extend laterally at each side of the aforesaid base plate 10 are leaves 11 which constitute stops, as hereinafter described. Mounted on these leaves 11 are rockable frames 12, said frames including uprights 13 braced together by spacing bars or rods 14. These frames 12 as will be clearly seen from Fig. 1, are reversely opposed to one another, and at or near their lower parts are secured laterally projecting tables or leaves 15, said leaves 15 having formed integral therewith, or appropriately secured to their upper outer ends, spaced projections 16 which constitute combs through which the materials to be woven are

threaded. Transversely of the aforesaid leaves 15 and at their outer ends, I arrange a spring-controlled clamping frame 17, said frame 17 being provided with a depending rib 18, and depending limbs 19, the latter being under the action or control of springs 20 conveniently secured in any suitable manner beneath the aforesaid leaves 15.

On reference more particularly to Figs. 1 and 3, it will be clearly seen that these frames 17 serve to firmly retain the thread in position, and in order to provide for the easy adjustment of said frames to accommodate threads or materials of various sizes, I provide the limbs 19 with adjusting screws 21, so that the gage may be accurately adjusted. Mounted on upstanding projections 22 on the frames 17 I pivotally connect the tensioning device 23 which preferably includes a tubular section 24 and spaced arms or levers 25. This tensioning device is made tubular in order to accomomdate weights 26 of various lengths so that the tension on the threads may be accurately adjusted. At the upper ends of the frames 12 and transversely thereof, I adjustably mount bars 27, said bars 27 being formed of segmental cross section and adapted for clamping in any desired position by the nuts 28. One of these bars 27, for example, the left-hand one of the drawings, has secured thereto a battery of needles 29, and the right-hand one is provided with a slide or shifter 30 which in turn carries the opposed series of needles 31. These needles 29, 31 are formed, as will be more clearly seen in Figs. 5 to 10, with a flat side 32, and a tapered or curved point 33, said needles also being formed with a notched out part 34 on the aforesaid flat sides 32. In order to porvide a ready means for removing or replacing the needles 29, 31 they are preferably clamped to the bars 27 by clamping plates 35, fashioned at their ends with finger holds 36 and provided at their rear parts with combs 37. These bars 35 are conveniently held in place by clamping nuts 38. Adjustable stops 39 are provided in connection with the suporting frame and they serve to limit the oscillation of the rocking frames 12 toward each other, whereas, adjustable stops 39^a limit the outward movement of the said frames, and said frames 12 are pivoted at 40 to the leaves 11. Any appropriate means may be employed for keeping the weaving material taut, such as one or more weights 41 which can be attached in any of the well-known ways to the end of the threads or the woven fabric.

Assuming that the apparatus is in its normal position, as shown in Fig. 1, the user first removes the frames 17 and then passes the threads 42, 43 through the needles 29, 31, over the combs 37, and down onto the leaves 15, and then draws each individual thread through the combs 16, taking care that said threads are not allowed to cross one another. The frames 17 are then replaced, when the threads will assume the position shown in Fig. 1, and after the weights 41 have been attached to the knotted ends of the threads depending from the needles 29, 31, the apparatus is then ready for use.

In order to more clearly understand the function of the stitch, I will now describe the same in connection with one pair of opposed needles 29, 31, as shown in Figs. 5 to 10 inclusive, it being readily understood that the entire battery will operate simultaneously.

Assuming the left hand frame 12, is in the position shown in Figs. 1 and 4, that is to say, it has been moved backward until the leaf 15 has contacted with the stops 39^a, and recoiled under the action of the spring 20, which causes the tension device 23 to descend and draw forward a feed of thread. The operator now swings the right hand frame 12, on its pivots 40, toward the left hand, and as the needle 31 approaches the needle 29, the tapered end 33 thereof is passed to the back of the thread 42, by slightly moving the shifter 30 and over the notched-out part 34 of the needle 29, thereby forming the loop 44. During this operation the right hand tension 23, is raised to the position shown in Fig. 4, and on the return movement of the right hand frame 12, the loop 44 is carried over by the needle 31 to the position shown in Figs. 5 and 6. The left hand frame 12 is now moved over toward the right hand, and the point 32 of the needle 29, caused to enter the notched-out part of the needle 31 to pick up the loop 44, which operation causes the thread 43 to be twisted around the thread 42, as shown at 45 in Fig. 7, whereupon both frames are moved over to the left hand carrying the loop 44 therewith, and at the same time holding up the left hand tension 23. The right hand frame 12 is now rocked back on to the stop 39^a, drawing the completed loop or stitch 44 back with it to the position shown in Figs. 9 and 10, whereupon the left hand needle 29, is moved to the right hand to pick up a fresh loop, and the see-saw operation above described is continued, thereby producing a continuous rope of knitted material as shown in Fig. 11.

To produce a fabric on my improved knitting apparatus, I first set up a series of loops or stitches 44 on the needles 29, whereupon I move the shifter 30 along the bar 27, with the points 33 of the needles 31 in contact with the threads 42 at 46, Fig. 7, over one or more needles 29, and then complete the stitch as above described, which will produce a type of chain stitch open work, as shown in Fig. 12. This movement of the shifter 30 is alternately to and fro in order to produce a uniform pattern.

In some instances I may wish to use a filler of weft thread or threads, said weft thread or threads as indicated by the numerals 47, 48 in Fig. 13, being threaded through or over the loops 44, as will be obvious; moreover, by the use of these weft threads the fabric produced may have any desired degree of firmness or pattern.

Although I have thus briefly outlined certain types of fabric which may be readily woven with my improved knitting apparatus, I wish it clearly understood that the patterns of the fabrics may be varied almost indefinitely, as by the employment of vari-colored threads, or a combination of various kinds and thicknesses of materials.

While I have described one particular embodiment of my invention, it is to be clearly understood that the details of construction may be varied within considerable limits without departing from the spirit and scope of my said invention, for instance, the rocking of the frames 12, as well as the movement of the shifter 30, may be effected mechanically.

It will now be seen that with a construction of the character described, the various adjustable parts coöperate to insure the proper feeding of the yarn, for instance, by means of the combs 16 and the clamping frames 17, together with the tensioning devices, the clamping frames being adjustable to constitute with the tensioning devices suitable yarn tensioning or feed-controlling means. Further, the tension on the yarn can be regulated or controlled by the insertion of the weights 26 in the tubular sections 24, the weights being of different calibers for different sizes or degrees of thickness of yarn. It will be seen that the bars 27 together with their associated parts forming needle carriers or frames for the needles, can be adjusted relative to each other, and this is a highly desirable feature in the use and operation of the machine, each needle frame being independently adjustable on the main or rockable frames which include the uprights 13 having the needle frames mounted thereon. In the feeding of the yarn it will be apparent, by reference to Fig. 4, that when the device is in operation one of the tensioning elements riding up on the yarn as it is pulled taut, will tend to hold the same in tension, but this will also cause an upward movement of the frame associated with the comb so as to permit the yarn to slide through the comb, while at the same time it will be kept in tension by the tensioning device mentioned heretofore.

Therefore, it will be seen that the machine described when taken in its entirety, and also in its detail parts, is indeed of a simple construction, whereby the parts cannot readily get out of order, and whereby they can easily be replaced when worn, or should they accidentally become broken, and it will be further clear that by the simplicity of construction the operation is made more simple, and thus in a short time it will be possible with a machine of this character, for an unskilled person to operate the machine to produce practical results, namely, designs and configurations of fabric, whose tensile strength, closeness of weave, thickness of material, and mesh, are all within the control of the operator and the machine, in order to produce a highly commercial finished article.

I claim:

1. A machine of the character described comprising a base, a plurality of frames mounted to swing on the base, tables mounted to swing with frames and carried thereby, needle carriers on the frames, means for positioning the yarn on the tables to guide the same over and into engagement with the needles, needles on the carriers, tensioning devices for tensioning the yarn, means for varying the tensioning effect of said tensioning devices on the yarn, means for relatively adjusting the needle carriers on the frames, and means for insuring the feeding of the yarn across the tables and to the needles on the needle carriers, when the tensioning devices are operated by the inclinations of the needle carrier frames.

2. A machine of the character described comprising a base, frames mounted to swing on the base, yarn tables mounted to swing with the frames and having the yarn stretched thereover, needle carriers on said frames and independently adjustable thereon, guides for guiding the yarn to the needle carriers, needles on said needle carriers and having the yarn associated therewith, and adjustable tensioning and holding devices on said tables and associated with the yarn for holding the yarn in tension, and for insuring the feeding of the yarn to said needles when said frames are actuated.

3. A machine of the character described comprising a base, opposed frames mounted to swing on the base, needle carriers on said frames, one of said needle carriers being movable transversely of the other, needles on said needle carriers with the needles on one needle carrier adapted to overlap the needles on the other needle carrier when the frames are relatively operated, tables movable with said frames, means on said tables and said frames for guiding the yarn to the needles, spring-actuated clamps holding the yarn on the tables, and tensioning devices movably mounted on the tables and bearing against the yarn to hold the yarn in tension.

4. A machine of the character described comprising a base, opposed frames mounted to swing on the base, needle carriers on said frames, one of said needle carriers being movable transversely of the other, needles

on said needle carriers, with the needles on one needle carrier adapted to overlap the needles on the other needle carrier when the frames are relatively operated, tables movable with said frames, means on said tables and said frames for guiding the yarn to the needles, spring-actuated clamps holding the yarn on the tables, tensioning devices movably mounted on the tables and bearing against the yarn to hold the yarn in tension, and means for varying the degree of tension of said tensioning devices.

5. A machine of the character described comprising a base, frames mounted to swing on the base, tables carried by the frames to swing therewith, needle carriers on said frames, one of said needle carriers being movable on one of said frames, means for stretching the yarn over said tables and said needle carriers to said needles, means for limiting the movement of the frames toward each other, means for limiting the movement of the frames away from each other, and tensioning devices on the tables and engaging the yarn to hold the same in tension.

6. A machine of the character described comprising a base, frames mounted to swing on the base, tables carried by the frames to swing therewith, needle carriers on said frames, one of said needle carriers being movable on one of said frames, means for stretching the yarn over said tables and said needle carriers to said needle, means for limiting the movement of the frames toward each other, means for limiting the movement of the frames away from each other; tensioning devices on the tables and engaging the yarn to hold the same in tension, and means for varying the degree of tension of said tensioning devices.

In testimony whereof I affix my signature.

THEODORE KOPP.