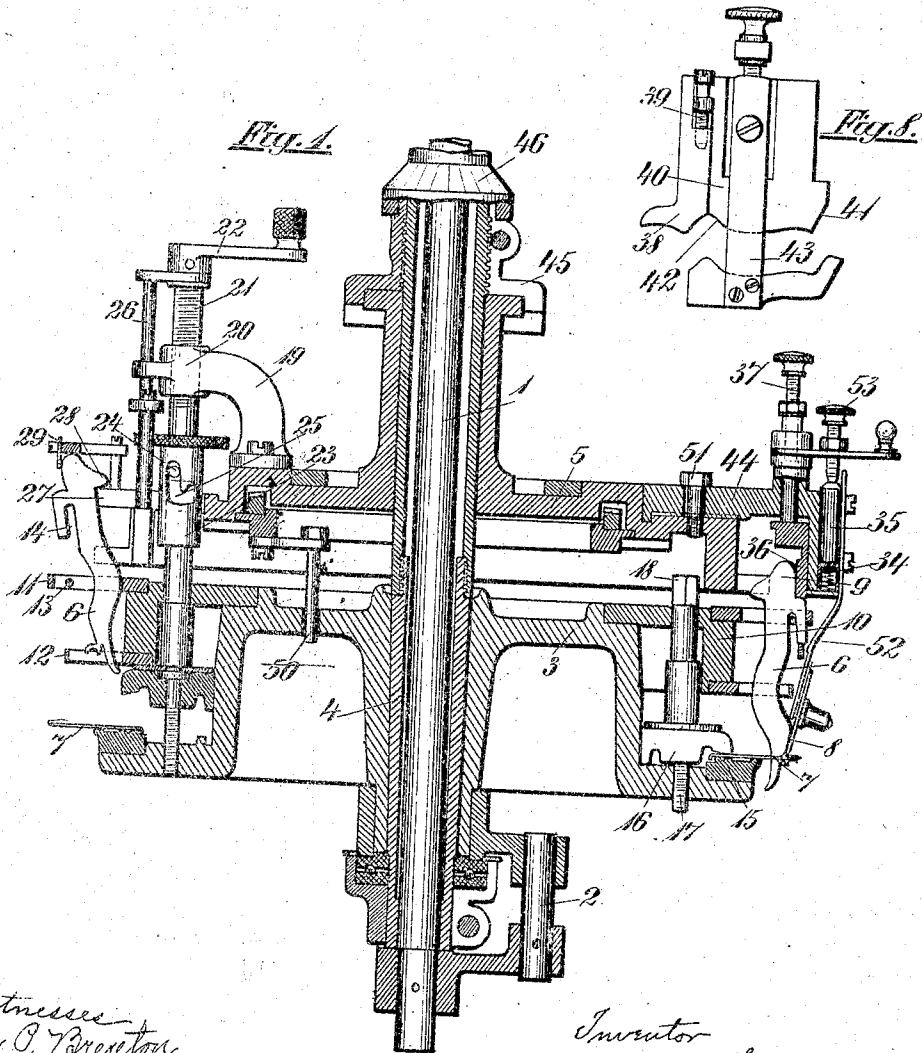
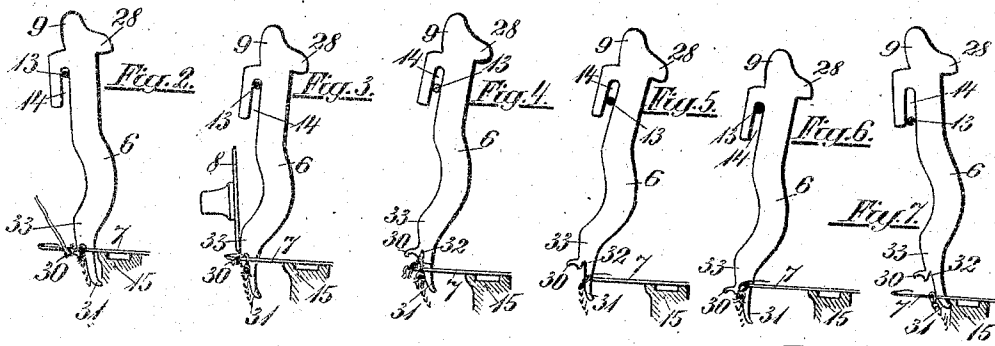


E. HAAGA.
CIRCULAR KNITTING MACHINE.
APPLICATION FILED MAR. 1, 1909.

1,019,632.

Patented Mar. 5, 1912.

2 SHEETS—SHEET 1.



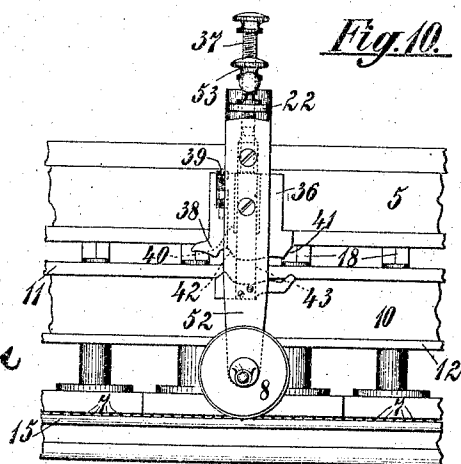
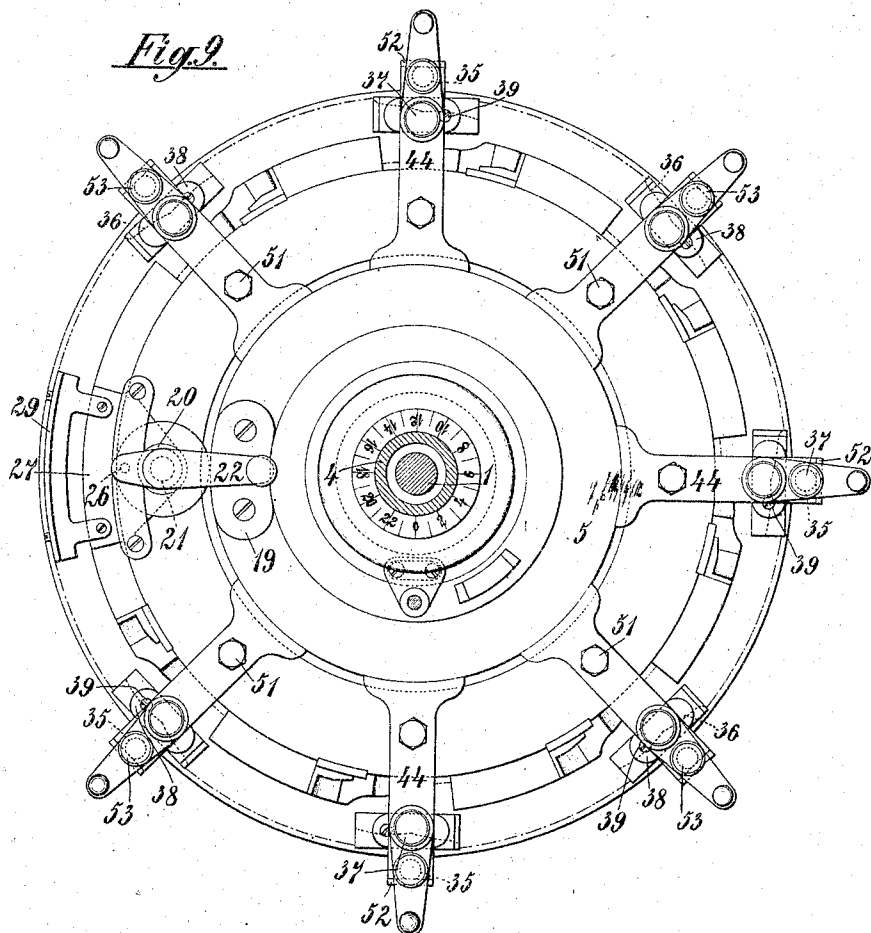
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EMIL HAAGA, OF STUTTGART, GERMANY.

CIRCULAR-KNITTING MACHINE.

1,019,632.

Specification of Letters Patent.

Patented Mar. 5, 1912.

Application filed March 1, 1909. Serial No. 480,556.

To all whom it may concern:

Be it known that I, EMIL HAAGA, a citizen of the German Empire, residing at Stuttgart, in the Kingdom of Wurttemberg, Empire of Germany, have invented certain new and useful Improvements in Circular-Knitting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention has for its object an improved circular knitting machine of the kind in which the yarn is sunk and the loops knocked over by sinkers arranged all around, which sinkers for this object are operated by fixed cams and act in conjunction with a number of carriers as well as a ring of horizontally placed fixed spring needles, the beards of which are pressed at a suitable moment by pressing wheels when taking off the old meshes.

The invention consists in the matters hereinafter described and referred to in the appended claims.

Now referring to the accompanying drawings which show in an axial vertical section one form of construction of the apparatus as an example, Figure 1 shows the improved form of construction of the circular knitting machine; Figs. 2-7, the improved form of the loopers and give a progressive picture as to how the meshes are formed; while Fig. 8 shows on an enlarged scale the device for operating the loopers. Fig. 9 is a plan view with the shaft shown in section; and Fig. 10 is a view of a part of the machine, showing the device for operating the loopers.

The improved machine is operated from a vertical shaft 1 set in rotation in any suitable way, which shaft transmits its rotation by means of a tappet 2 to the rotating dial 3. This rotates on a fixed axis 4, which is firmly connected with the machine frame 5, which is formed as a disk, and which carries the parts necessary for forming the meshes, et cetera, such as the yarn carriers, cams and the like. For forming the meshes there are also employed loopers 6, needles 7 and pressing wheels 8.

A plurality of sinker-operating devices are arranged on the machine frame 5. These devices consist substantially of a carrier 44, which is fastened by a screw 51 on the disk 5. On the outer end of the carrier 44 the pressing wheel holder 52 is arranged,

which carries the pressing wheel 8 and by means of an adjustable screw 53 which bears on a guide piece 35 located behind the pressing wheel holder 52, and which stands under the action of a spring 34, may be suitably adjusted higher and lower. A cam 36 which may be adjusted by a screw 37 is arranged on the carrier 44, and a cam 38 which may be vertically adjusted by a screw 39 is arranged on a displaceable piece 40 (Figs. 1 and 8). The cam 36 consists of an upper and a lower part, which has inclined surfaces 41 and 42, the lower part being carried by the displaceable piece 43.

For adjusting or altering the length of the meshes the disk 5 may be adjusted by means of a clamp 45, which may be screwed up and down by means of a thread on the machine bar, the length of the meshes being determined by means of a scale which is marked on a conical bush 46 mounted on the clamp 45.

Now in accordance with this invention the loopers 6 are suspended at their upper ends 9 and within the tubular fabric over the needles 7, so that they are easily accessible and their working and their engagement with the needles, may be watched when in operation. For this object a ring 10 carrying the loopers is firmly connected with the body 3 of the machine, which ring is provided with guides 11 and 12 for the loopers. In the upper guide 11 a circular ring 13 is mounted, to which the loopers 6 are suspended, for which object they have a slot 14, so that they can swing freely.

The needles 7 lie in the ordinary needle dial 15 and are retained by segmental upper fastening plates 16. Now in order to be able to release these in order to change the needles 7, they are arranged so as to be lifted. For this purpose the plates 16 are connected with screws 17, which pass through the ring 10 carrying the loopers, and their heads are provided with a rectangle 18, in order to allow of their being easily turned.

For raising the plates 16 a separate lifting device is also arranged on the disk-shaped part of the machine frame 5. This consists of a bearing frame or bracket 19 in the head 20 of which a spindle may be screwed, which for this object is provided with a hand crank 22. This spindle carries at its lower end a sleeve 23 having a rectangular aperture, which fits over the rectangle 18 of the screws 17. The sleeve 23

may be coupled with the spindle 21 and has for this object a pin 24 which engages in an angular slot 25 of the sleeve 23 and works after the manner of a bayonet joint. Now if one of the plates 16 is to be lifted, the machine is turned until the sleeve 23 comes over the screw 17 of the plate 16 in question. The sleeve 23 is then rotated until the pin 24 passes out of the horizontal arm of the slot 25 into the vertical one, whereupon the sleeve 23 is lowered, that is to say the coupling with the spindle 21 may be completed. Simultaneously with the lifting of the plates 16, the loopers 6 must also be lifted, as they would otherwise be in the way. For this object they are provided with a shoulder 28 beneath which a segment piece 27 engages, which is connected with the spindle 21 by a bar 26. Now if the spindle 21 be rotated, in addition to the plate 16 in question, the looper 6 belonging to it is also lifted, and thus rests against an elbow piece 29. The loopers 6 are provided at their lower end with a beak 30 by means of which they form the loops in the ordinary way, and also with a projection 31 for pushing forward the loops of the old meshes onto the beard of the needles 7. Now by this invention the loopers 6 are also provided with a notch 32, which equalizes the meshes in respect of exactness and brings them into the correct position, and finally with a flattened part 33, which allows of the pressing wheel 8 being arranged almost vertically and also allows of the loopers passing unimpededly.

Now the operation of the machine in accordance with this invention is as follows:—The loopers 6 located in the guide slots of the parts 11 and 12 of the ring 10 are conveyed to the fixed cams 36 and 38 by the rotation of the frame 3 and thereby the loopers 6 receive their up and down and lateral swinging movements by means of the inclines 41, 42, and also by means of the internal formation of the cam 36, whereupon the operation of forming the meshes takes place as follows:—At the commencement of the operation the loopers 6 drop into the needles 7 and form the loops (Fig. 2) in the ordinary way. The loopers 6 traveling on the cams now run up on the inner side of the latter, so that they are rocked forward (Fig. 3). The loops are thereby pushed forward by the beaks 30 of the loopers and pass under the beards of the needles 7 which are not yet closed. Immediately behind the loops the old meshes are brought by the projection 31 over the beards which are closed in the meantime by the pressing wheel. The loopers are now lifted by their cams (Fig. 4) whereupon the projection 31 takes off the old meshes on the looper 6 rocking farther forward, that is to say, throws them off over

the needles (Fig. 5). The loopers 6 then sink into their previous position and the notch 32 is pressed between the now finished meshes, thus preventing the meshes again passing back onto the needle beard, and simultaneously the meshes are thereby exactly equalized in length (Fig. 6). The old meshes being spread, and the new meshes formed, the loopers 6 are lowered once more, so that the beak 30, or its notch 32 enters between the meshes, thus effecting their equalization. The looper is lowered by means of the cam 38. In the meantime the pressing wheel has again released the latches, so that the meshes and the fabric, on the return of the loopers 6, are again carried back behind the needle latches. The loopers 6 are then lifted, so that they come into the previous initial position, whereupon the operation is repeated. The meshes are thus constantly under the action of the loopers during the entire formation of the meshes so that an incorrect formation of the meshes is avoided.

I declare that what I claim is:—

1. In a circular knitting machine, the combination with needles, of loopers supported above said needles having flattened portions, and pressing wheels engaging said flattened portions of said loopers co-acting with said needles.

2. In a circular knitting machine, the combination with the spring beard needles, of loopers, each provided at its upper end with a slot and a shoulder, and at the opposite end with a flattened part, pressing wheels co-acting with the flattened portions of said loopers, said loopers having a beak adapted to be pressed between the needles for forming the loop, and having a projection for taking off the old meshes over the closed needle beards.

3. In a circular knitting machine, the combination with the spring beard needles, of loopers, each provided at its upper end with a slot and a shoulder, and at the opposite end with a flattened part and having a beak adapted to be pressed between the needle for forming the loop, pressing wheels co-acting with the flattened portions of said loopers, and having a projection for taking off the old meshes over the closed spring beard needles, each of said loopers having also a notch, which at the end of the formation of the meshes again engages between the meshes, draws them entirely off, equalizes their tension and returns the material into its old position between the spring beard needles and means for operating said loopers.

4. In a circular knitting machine, the combination with a plurality of fixed spring needles, of loopers suspended above said needles, provided with beaks at their lower ends, and flattened side portions, means for operating said loopers, and pressing wheels

engaging the flattened portions of said loopers co-acting with said needles.

5 In a circular knitting machine, the combination with a plurality of spring fixed needles, of a plurality of loopers suspended
above said needles, a guiding ring having guides for said loopers, said loopers being
provided with beaks at their lower ends and
having flattened side portions, means for
10 operating said loopers and a spring ac-

tuated pressing roller engaging the flattened portion of said loopers co-acting with said needles.

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

EMIL HAAGA.

Witnesses:

JEAN GULDEN,
HERMANN HOPPE.