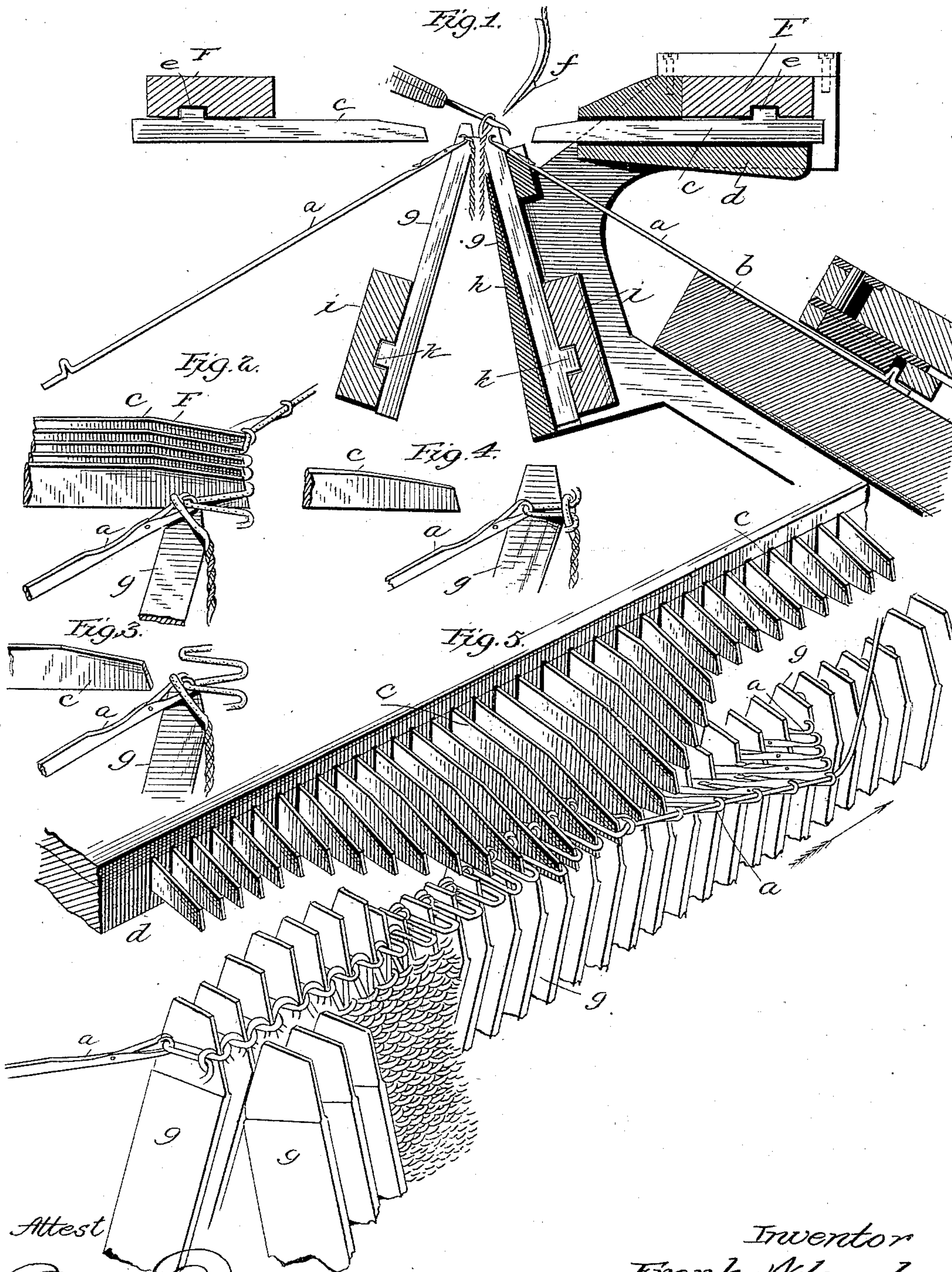


(No Model.)

F. WILCOMB.  
KNITTING MACHINE.

No. 397,408.

Patented Feb. 5, 1889.



Attest  
Mallory Maedson  
F. L. Middleton.

Inventor  
Frank Wilcomb.  
by Eli Spear  
Atty.



# UNITED STATES PATENT OFFICE.

FRANK WILCOMB, OF PROVIDENCE, RHODE ISLAND, ASSIGNOR TO THE WILCOMB MANUFACTURING COMPANY, OF SAN FRANCISCO, CALIFORNIA.

## KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 397,408, dated February 5, 1889.

Application filed February 29, 1888. Serial No. 265,723. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK WILCOMB, of Providence, in the county of Providence and State of Rhode Island, have invented new and useful Improvements in Knitting-Machines; and I do hereby declare that the following is a full, clear, and exact description of the same.

It is the object of the present invention to provide means for carrying into effect the method of knitting as described in an application filed by me in the United States Patent Office on the 17th day of February, 1888, Serial No. 264,348.

The purpose of my improved method of knitting and the results attained thereby in the fabric produced I have fully and particularly pointed out in the application referred to, and I need not, therefore, enlarge upon this in the present application.

My invention consists, broadly, of movable sinkers for measuring off a sufficient amount of yarn to form the loop before the old loop is cast off and movable bits for casting off the old loop after the formation of the new loop, the said parts acting in connection with latch-needles.

It also consists of sinkers for measuring off the yarn to form the loop and cast-off bits for removing the old loop from the needles after the new loop is formed, both sinkers and cast-off bits being movable, and adapted, after their respective operations, to return to positions where they will not interfere with the operation of fashioning.

The invention also consists of sinkers for measuring off the yarn, bits for casting off the old loops after the formation of the new, and operating mechanism for moving the sinkers and bits successively, the parts being combined with latch-needles.

The arrangement of needles herein shown is after the manner of the ordinary latch-needle machine; but it will be understood that the principle of my invention, as well as the specific means herein illustrated for carrying it into effect, may be employed in connection with other styles of machine for knitting either a flat or tubular fabric.

In the accompanying drawings, Figure 1 is

a transverse section showing the knitting devices and their supporting means, the fashioning devices, and the thread-carrier. Figs. 2, 3, and 4 represent the successive steps in the knitting and the different positions assumed by the knitting devices at each step. Fig. 5 is a perspective view illustrating the different simultaneous positions of the various parts during the knitting, and also a portion of the knitted fabric.

As I have set forth in my application heretofore mentioned, my aim is to produce a fabric of great lateral elasticity and of minimum longitudinal elasticity, of finer gage than has heretofore been found possible, by an improved method of knitting, which also enables me to use tender or knotted yarn without liability to rupture, and to produce a smooth even surface free from particles of dirt or loose strands, all foreign matter of this kind, as well as knots, being turned in the method of knitting to the inside of the fabric.

I now proceed to describe the devices I prefer to use in carrying out my improved method and the mechanism for operating the same.

In the drawings, *a a* represent the needles, of ordinary construction, supported, as usual, at an inclination by suitable needle-beds, *b b*, which are in turn supported by the upper frame-work of the machine. The sinkers *c c* are supported in suitable beds, *d d*, as shown, being duplicated upon the other side of the machine, and these sinkers are advanced and retracted in a horizontal plane by means of sinker-grooves in the slide-bars *F*, the sinkers being provided with heels *e*, fitting said sinker-grooves, the slide-bars being operated in a well-known manner.

In the knitting movement the needles are advanced successively, as shown in Fig. 5, to take the thread from a suitable thread-guide, *f*, and are then retracted, ordinary and well-known mechanism being used to give this movement to the needles. As the needles advance to take the thread, the sinkers begin to advance about the same time until they reach the limit of their movement in this direction, as shown in Fig. 2. As the needles are retracted, they recede between the sinkers,



which are then at rest, and an elongated loop is formed by the yarn being drawn in between the sinkers by the receding needle, the outer bights of the loop being formed over the ends of the sinker-bars. The length of these loops may be regulated by the amount of movement of the needles or of the sinkers to make it of greater or less length. In the receding movement of the needles they carry the old loop upon the latch, and this is not cast off until the new loop is fully formed. The movement of the parts is so timed that as soon as the new loop is fully formed the sinker-groove in the slide-bar acts upon the heels of the sinkers to retract them in succession to the position shown in Figs. 3 and 4, which leaves the bights of the formed loop exposed and allows the next step of casting off the old loops to be proceeded with. For this purpose I provide knock-over bits *g g*, supported in beds *h h*, and operated by slide-bars *i i*, having grooves engaging with heels *k k* of the bits. These bits are arranged at an angle to the sinkers, but in the same vertical plane, and in operation are moved by their slide-bars to rise and take the place of the retracted sinkers. I prefer to arrange them with inclined faces to better engage the loop and the upper part of the web. As the bits rise, they move alongside of the needle, carrying the old loop on its latch, and in their continued upward movement the inclined faces bear against the upper edge of the web and cast off the old loop, which passes over the length of the new loop until it reaches the bights thereof, as shown in Fig. 4. The old loop then forms a part of the web, and the former operation is repeated.

It will be seen that by operating the needles, sinkers, and knock-over bits successively only a small number are operated at any one time, and the action of knitting is not interfered with or interrupted during any of the steps described. As the needles are advancing to take the thread, other needles are being retracted to measure off a sufficient length to form the loop between the measuring-sinkers, adjoining sinkers are being retracted, and at another point the knock-over bits are rising to cast off the old loop, the movements of the parts being in succession and in proper progression.

After the operation of the needles, sinkers, and knock-over bits, as described, they recede, leaving the space between the duplicate rows of devices unobstructed for the action of the transfer devices for widening or narrowing the fabric. The transfer mechanism used in connection with this method of knitting may be that shown and described in Letters Patent granted October 12, 1887, No. 350,795, or the improved mechanism forming a part of an application filed by me April 18, 1888, Serial No. 271,026.

As described in my application covering the method of operation hereinbefore referred

to, there is no liability to rupture inferior or tender yarn containing knots, for the reason that each elongated loop is fully formed before the old loop is cast off, so that there is no strain placed upon it, as would be the case were the new loop formed by being drawn through the old, and as the knock-over bits rise their inclined faces tend to lift the old loops and cast them off over the new loop. Very little friction ensues from the passage of the old loop over the new, while an advantage is derived from this contact, as the old loop in its passage over the new carries all foreign matter—such as dirt or loose strands—with it to the bights of the new loop, and as this part of the loop forms the inner face of the fabric the outer face is left clean and smooth.

When knots occur in the yarn too large to pass through the old loop or the eye of the needle, the action of measuring off the yarn for the new loop and the casting off of the old loop is permitted without rupture or undue strain, as the needles in receding to form the new loop borrow sufficient yarn from the length on the next two needles following to allow the needle in operation to recede to its rear position, the knot thus remaining at the point of obstruction without strain upon it. As with the dirt and other foreign matter, so the knot also appears upon the inner face of the fabric.

Reference may be made to the pending application heretofore referred to, No. 271,026, for the best mechanical means now known to me for actuating the several slide-bars.

I claim as my invention—

1. The combination, with latch-needles, of movable sinkers for measuring off the yarn for the new loops, and movable knock-over bits for casting off the old loops from the needles, and means for operating the sinkers and knock-over bits, substantially as described.

2. The combination, with latch-needles, of movable sinkers for measuring off the yarn to form the new loops, operating means for giving said sinkers independent and successive action, knock-over bits for casting off the old loops, and operating means therefor to move them independently and successively, substantially as described.

3. The combination, with latch-needles, of movable sinkers for measuring off the yarn to form the new loops, operating means for said sinkers to retract them from their normal position, knock-over bits for casting off the old loops, and means for retracting said bits, whereby the needles and loops are left properly exposed to allow the operation of fashioning the fabric to be performed, substantially as described.

4. The combination, with latch-needles, of the sinkers for measuring off the yarn, and movable knock-over bits for casting off the old loops, and means for operating the sinkers and knock-over bits, the said bits being

supported in an inclined position, substantially as described.

5 In combination with latch-needles, the movable sinkers, and the movable knock-over bits provided with inclined faces, and means for operating said sinkers and knock-over bits, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK WILCOMB.

Witnesses:

GEO. L. BARNES,  
GEO. R. WILSON.