

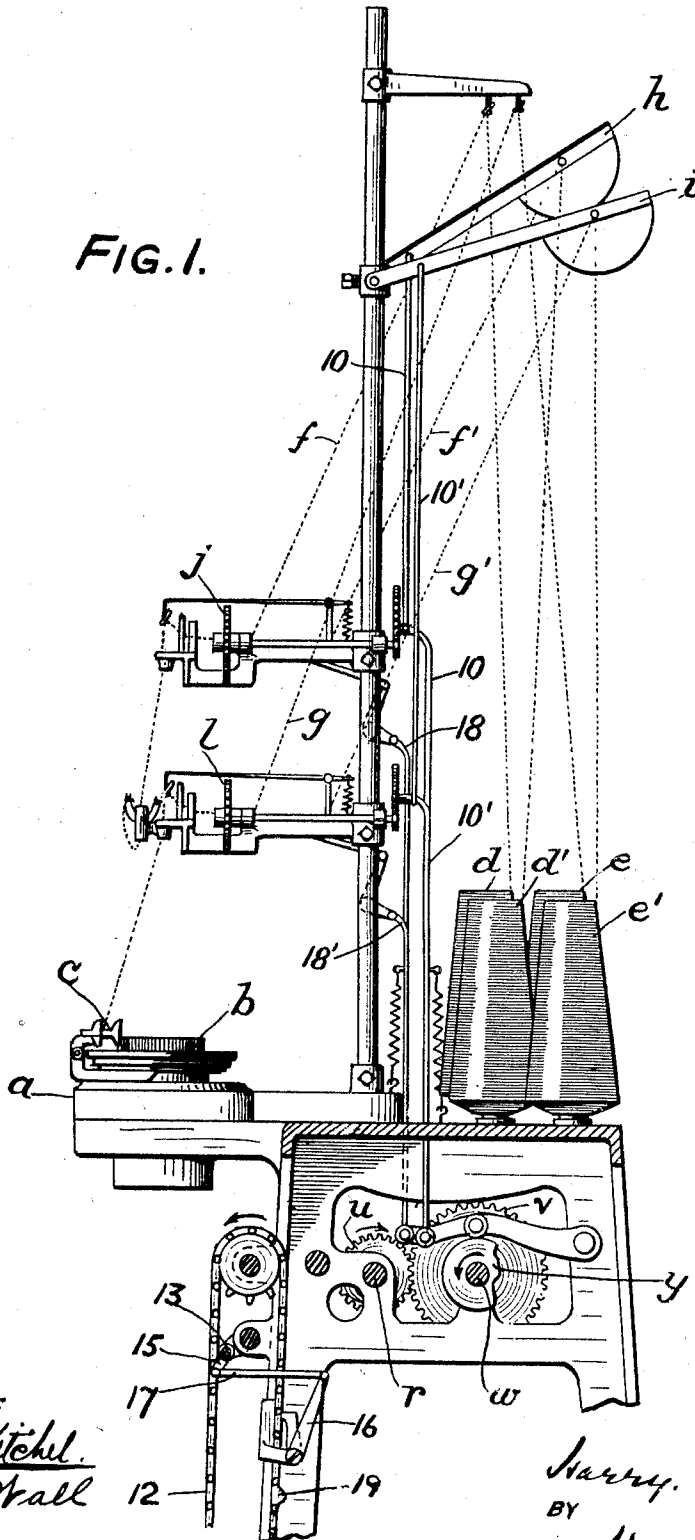
H. A. HOUSEMAN.
KNITTING MACHINE.
APPLICATION FILED OCT. 28, 1911.

1,025,980.

Patented May 14, 1912.

3 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

Robt. R. Kitchel.
E. E. Hall

INVENTOR

Harry A. Houseman
BY
Handing & Handing
ATTORNEYS.

H. A. HOUSEMAN.
KNITTING MACHINE.
APPLICATION FILED OCT. 28, 1911.

1,025,980.

Patented May 14, 1912.

3 SHEETS—SHEET 3.

FIG. 4.

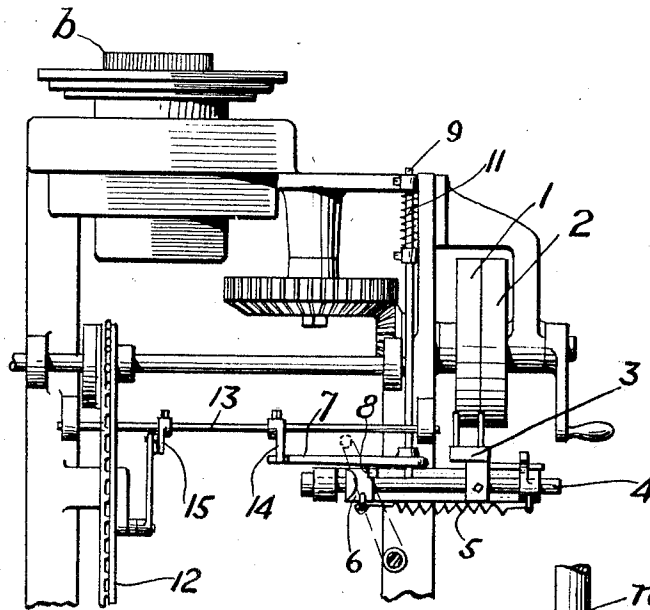


FIG. 5.

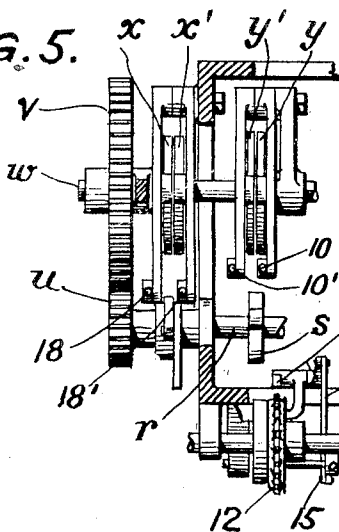


FIG. 7.

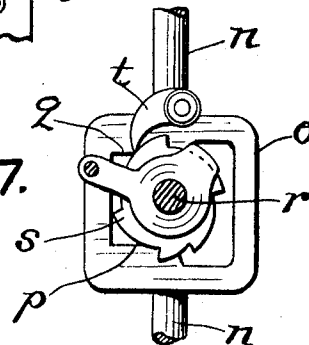
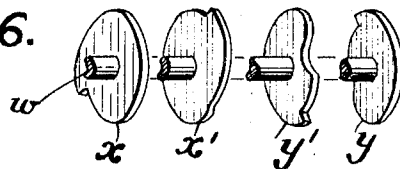


FIG. 6.



WITNESSES:

Robt. R. Mitchell.
E. E. Hall

INVENTOR

Harry A. Houseman
BY *Handley & Handley*
ATTORNEYS.

UNITED STATES PATENT OFFICE.

HARRY A. HOUSEMAN, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO STANDARD MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

KNITTING-MACHINE.

1,025,980.

Specification of Letters Patent.

Patented May 14, 1912.

Application filed October 28, 1911. Serial No. 657,326.

To all whom it may concern:

Be it known that I, HARRY A. HOUSEMAN, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Knitting-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to mechanism for making a stocking of a particular character. This stocking belongs to the class of stockings which are manufactured on a circular knitting machine, in which the leg and foot are formed by the rotation of the machine, and the heel and toe by the reciprocation of the machine, certain of the needles of the machine being out of action during the reciprocation of the machine in forming the heel and toe.

The object of my invention is to form a stocking of this character in which there shall be provided a spliced or reinforced heel and toe, that is, in which the heel and toe shall contain a double thread and in which the leg of the stocking will be formed of a single thread of one color, the heel of that thread and a spliced thread of the same color, the foot of a thread of another color, and the toe of the foot thread and a spliced thread of the same color as the foot thread, and to do this with a minimum stoppage of the machine so as to make the thread practically continuous with the exception of the change from one colored yarn to the other colored yarn. In general I accomplish this by forming the leg from one main yarn of a given color, and when the heel is being formed by bringing in the additional or splicing thread of the same color without stopping the machine, and knitting said heel with said main and its supplemental splicing thread. After the heel is formed, the splicing thread is thrown out of action automatically, and the same main thread used as for the leg, and is preferably carried in the foot for several courses, when the machine is automatically stopped and this main thread severed. The other main thread of another color is then connected with the previous main thread, and the ma-

chine then again thrown into action, and the foot knit with this second main thread, and when the toe is reached, the spliced thread corresponding to the main thread then in use is moved into operation and the toe formed with this spliced and main thread. Thus this character of stocking is formed continuously from one end to the other, with the exception of a single stoppage for the change of one main thread for the other main thread, and thus a practically continuous threaded stocking of this character is formed. The mechanism, speaking generally, which I use to accomplish this result is as follows: I use two sets of cops, each set comprising a cop of a regular or main thread and a cop of the supplemental or splicing thread. I also use two splicers or twisters, one for each splicing yarn. The machine is provided with means, as in the ordinary machine, for changing the operation from rotation to reciprocation, and vice versa. In the first shift from rotation to reciprocation the splicer for the splicing yarn corresponding to the regular thread then in action is thrown into action, and at the end of the reciprocation is thrown out of action. In the second shift from rotation to reciprocation (for forming the toe) the splicer corresponding to the splicing yarn for the other regular thread is thrown into action, and again thrown out of action, when the machine is returned from reciprocation to rotation. Thus the splicer for one yarn and the splicer for the other yarn are thrown into action and out of action at alternate shifts from rotation to reciprocation of the machine. Intermediate of these shifts the machine is provided with means to automatically stop the operation of the machine at which time the main thread then in action is broken, and a second or other main thread is coupled up with the thread to the needles.

I will now describe the circular knitting machine embodying the mechanism to produce this stocking shown in the accompanying drawings, in which—

Figure 1 is a side elevation partially in section of a portion of a knitting machine embodying my invention. Fig. 2 is a view similar to portion of Fig. 1 from the op-

posite side. Fig. 3 is a diagrammatic view of my improved stocking. Fig 4 is a front view of a portion of the knitting machine of Fig. 1. Fig. 5 is a plan view of a portion of the knitting machine of Fig. 1. Fig. 6 is a detail perspective view of the cams for operating the clamps, cutters and twister for the splicing yarn. Fig. 7 is a detail view from one side of the frame, shifting lever and its operating mechanism for shifting the operation of the machine from rotation to reciprocation and vice versa.

a is the cam cylinder, b the needles of the needle cylinder, and c the thread carrier. On one main-thread yarn holder is the cop d of one main yarn f and on one splicing-thread yarn holder is the cop d' of the splicing yarn f' corresponding to the main yarn f . On the other main-thread yarn holder is the cop e of the other main yarn g , and on the other splicing thread yarn-holder is the cop e' of the corresponding splicing yarn g' .

h is the slack arm for the splicing yarn f' , and i the slack arm for the splicing yarn g' .

j is the twister for the splicing yarn f' , and k the clamp and cutter for that splicing yarn.

l is the twister for the splicing yarn g' , and m the clamp and cutter for that splicing yarn.

The twister, the clamp and cutter, and its mode of operation, shown in the drawings, are clearly described in detail in Letters Patent No. 967,019, issued to me August 19, 1910, for specific details of which reference may be had, and make it unnecessary to set the same forth in detail here.

In that Patent No. 967,019, just mentioned, but a single splicing thread and a single twister, cutter and clamp appear. In my present invention I have two main yarns and two corresponding splicing yarns, and two twisters, clamps and cutters, one twister, clamp and cutter being superimposed above the other, so as to be substantially in vertical alinement. In that Patent No. 967,019, the twister is thrown into operation by the mechanism therein described at the time the clutch shifting mechanism is moved to shift the machine from rotation to reciprocation, and thrown out of action at the time the clutch shifting mechanism is operated to return the machine from reciprocation to rotation.

In my present machine, as before stated, in alternate shifts from rotation to reciprocation, and return, the first named twister and its appurtenant clamp and cutter is thrown into action, and returned out of action in the return to rotation, and in the next shift the other twister and its appurtenant clamp and cutter are thrown into and out of action. In order to accomplish

this alternate operation, I use the following mechanism: n is the clutch shifting rod for moving the clutch, not shown, into position to cause the machine to reciprocate and for moving the clutch into position to cause it to rotate. o is the frame carrying the cams p and q operated upon by a cam roller to shift the rod n in the rotation of this roller, first in one direction and then in the other. This roller is mounted on the shaft r upon which is the ratchet wheel s operated by the pawl t . These parts are all constructed and are operated in the manner described in Letters Patent No. 538,518, issued to me April 30, 1895, and need not here be further described. Upon that shaft r is a gear u meshing with the gear v on the shaft w so as to revolve the shaft w at one half the speed of the shaft r so that the shaft r will revolve twice for one revolution of the shaft w . Upon the shaft w are the cams x , x' and y , y' . The cam x operates the lever 18 which, as in my Patent No. 967,019, controls the operation of the clamp and cutter k . The cam x' , through the medium of the rod 18', controls the clamp and cutter m . The cam y' , through the medium of the rod 10', controls the operation of the twister l' . The cam y , through the medium of the rod 10, operates the twister j . These cams are set upon the shaft w so that in the first rotation of the shaft r to move the clutch shifting rod to move the machine from rotation to reciprocation and return it to rotation (that is, one half revolution of the shaft w), the twister j and the clamp and cutter k will be operated as described in my Patent No. 916,017, with respect to a single twister, clamp and cutter there described. In the next rotation of the shaft r to again shift to reciprocation and return to rotation, the other twister l and its clamp and cutter m will be operated as is the single twister, clamp and cutter of said patent.

1 is the driving pulley of the machine, and 2 an idle pulley.

3 is the clutch shifting fork for shifting the belt from the idle to the active pulley, and vice versa. This fork is mounted on the rod 4 and is acted upon by the spring 5, normally holding the clutch fork in such position as to hold the belt on the idle pulley 2. On the rod 4 is a fixed collar 6.

7 is a pivoted arm having a pin 8 against which, in one position of the lever, the collar 6 rests. The lever is normally held in this position by means of the rod 9 and spring 11, so that the rod 4 is normally held in such position against the action of the spring that the clutch fork holds the belt upon the operative pulley. When this lever 7 is moved against the action of its spring so as to release the spring from engagement with the collar, then the rod 4

moves so that its shifting fork moves the belt to the idle pulley. This lever is tripped as follows:

12 is the pattern chain of the machine.

13 is a rock shaft on which is fixedly mounted the projecting finger 14 in line with the lever 7. On this rock shaft 13 is mounted also the projecting finger 15, connected to the lever 16 by the link 17. The lever 16 is a bell crank lever, one member of which is in line with a lug 19 on the pattern chain. This lug 19 is set to strike the lever 16, intermediate of the successive operations of the clutch shifting rod to shift from rotation to reciprocation and return.

Assuming that the machine is forming the leg of the stocking, the operation is as follows: The main thread in operation, and its corresponding splicing thread, pass through their twister as in my Patent No. 916017, the main thread alone being in operation. When the first shift is made from rotation to reciprocation, the twister and the clamp and cutter are moved into action through the medium of the cams x and y , and are again thrown out of action when the clutch shifting rod is moved to return the machine from reciprocation to rotation. The lug 19 is set to trip the lever 7 through the medium of the mechanism described, at the desired point. After this rotation, the machine then stops, and the main thread, in operation, is broken and the part thereof connected with the needles is connected with the other main thread, and the machine again moved into operation. The second main thread is then knitted until, in the operation of the machine, the clutch shifting rod is operated to again shift from rotation to reciprocation (to form the toe). At this time, through the medium of the cams y and y' , the other twister and its appurtenant clamp and cutter are moved into action, and again thrown out of action when the clutch shifting rod moves to return the machine from rotation to reciprocation. A lug, similar to the lug 19, again operates the lever 7 through the mechanism described to stop the machine at the desired point after this last mentioned shift of the clutch shifting mechanism, and the second main thread is then broken and the original main thread coupled up with the needle end of this thread, and the operation repeated for a new stocking.

Having now fully described my invention, what I claim and desire to protect by Letters Patent is:

1. In a knitting machine, in combination, two main-thread yarn-holders, two splicing-thread yarn-holders, two splicers one for each splicing yarn, means to successively shift the operation of the machine from rotation to reciprocation and vice versa, and

mechanism, controlled by said means, to move said splicers respectively into operation at alternate shifts from rotation to reciprocation.

2. In a knitting machine, in combination, two main-thread yarn-holders, two splicing-thread yarn-holders, two splicers one for each splicing yarn, means to successively shift the operation of the machine from rotation to reciprocation and vice versa, and mechanism, controlled by said means, to move into and out of operation said splicers respectively at alternate shifts from rotation to reciprocation, and means adapted to operate intermediate of said shifts to stop the machine.

3. In a knitting machine, in combination, the needles, two main-thread yarn-holders, two splicing thread yarn-holders, a splicer, clamp and cutter for each pair of main-thread and splicing-thread yarn holders, means to twice shift the operation of the machine from rotation to reciprocation and vice versa, mechanism, controlled by said means, to throw one splicer and its appurtenant clamp and cutter into operative relation with one of said pairs of yarn-holders at one of said shifts and the other splicer and its appurtenant clamp and cutter into operative position at the other of said shifts, and means adapted to operate intermediate of said shifts to stop the machine to permit the yarn connection from the needles to be transferred from one main-thread to the other.

4. In a knitting machine, in combination, two sets of yarn-holders, each set comprising a yarn-holder for the main thread and a yarn-holder for a splicing thread, two splicers, a clutch shifting shaft and connections adapted in one rotation of the shaft to shift the machine from rotation to reciprocation and return it to rotation, a second shaft, connection between said shafts whereby said second shaft makes one half revolution in one rotation of the clutch shifting shaft, operating cams upon said second shaft adapted respectively to move into and out of action the respective splicers, one cam being operative in one half of the revolution of the second shaft, and the other cam in the other half of said revolution.

5. In a knitting machine, in combination, two sets of yarn-holders, each set comprising a cop for the main thread and a yarn-holder for a splicing thread, two splicers, a clutch shifting shaft and connections adapted in one rotation of the shaft to shift the machine from rotation to reciprocation and return it to rotation, a second shaft, connection between said shafts whereby said second shaft makes one half revolution in one rotation of the clutch shifting shaft, operating cams upon said second shaft

adapted respectively to move into and out
of action the respective splicers, one cam
being operative in one half of the revolution
of the second shaft, and the other cam in the
5 other half of said revolution, and means in-
termediate of the rotations of the clutch
shifting shaft to stop the machine.

In testimony of which invention, I have
hereunto set my hand, at Philadelphia, on
this 26th day of October, 1911.

HARRY A. HOUSEMAN.

Witnesses:

M. M. HAMILTON,
E. E. WALL.