

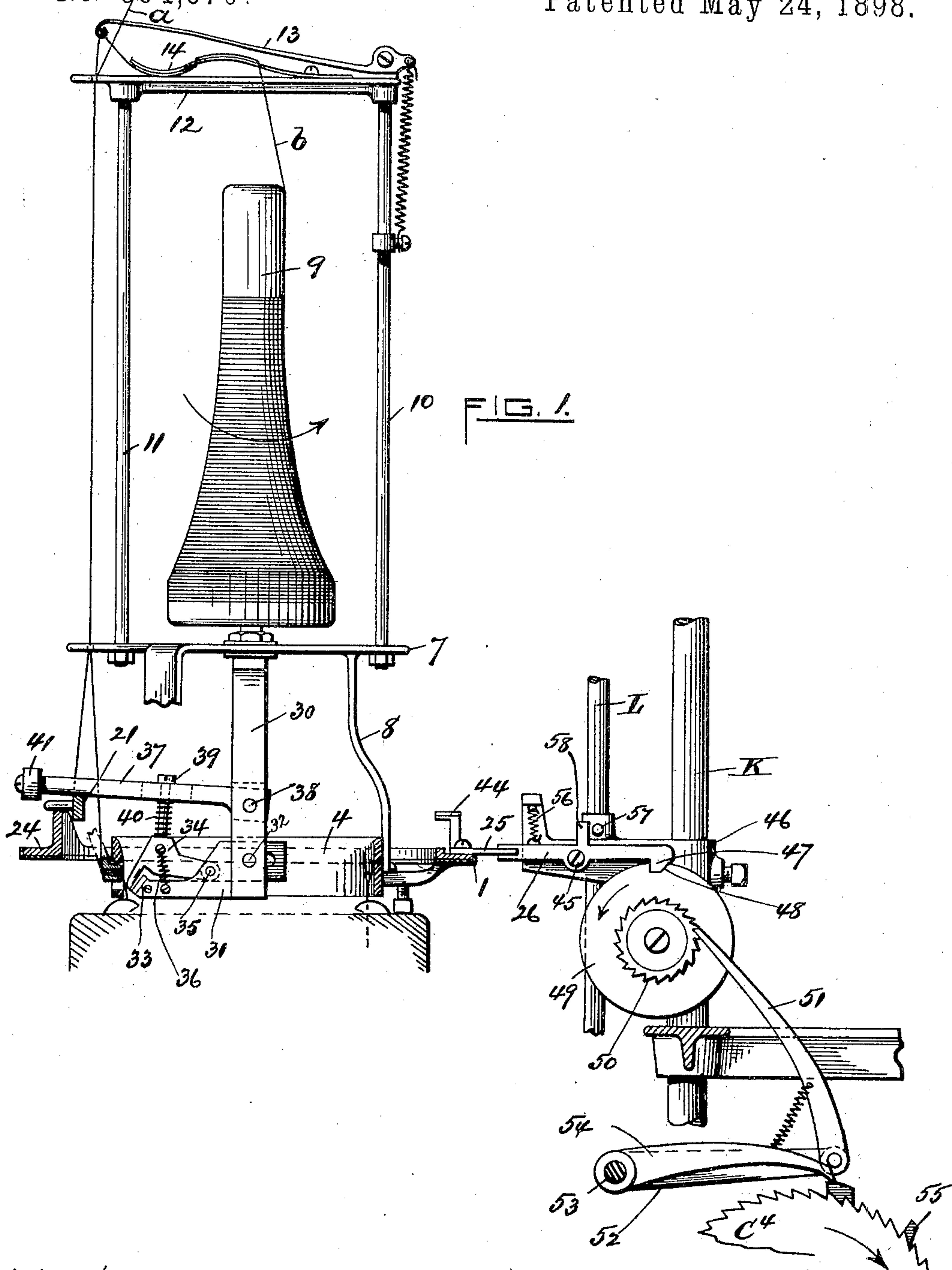
(No Model.)

3 Sheets—Sheet 1.

J. E. ROWE.
KNITTING MACHINE.

No. 604,570.

Patented May 24, 1898.



WITNESSES.

Charles T. Hannigan
Ira L. Fitch

Ira L. Fish

INVENTOR,

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By Wilmarth C. Thurston

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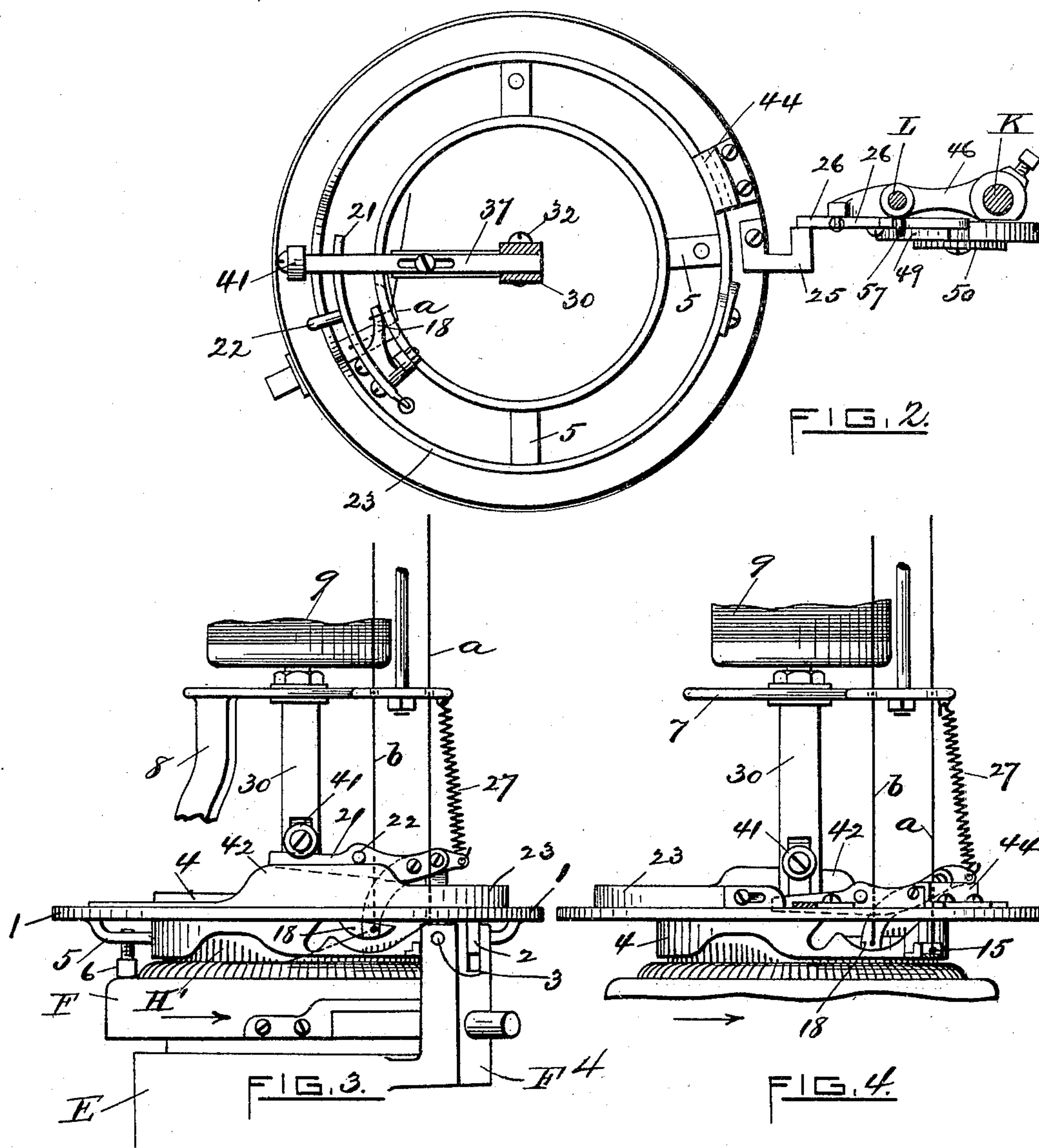
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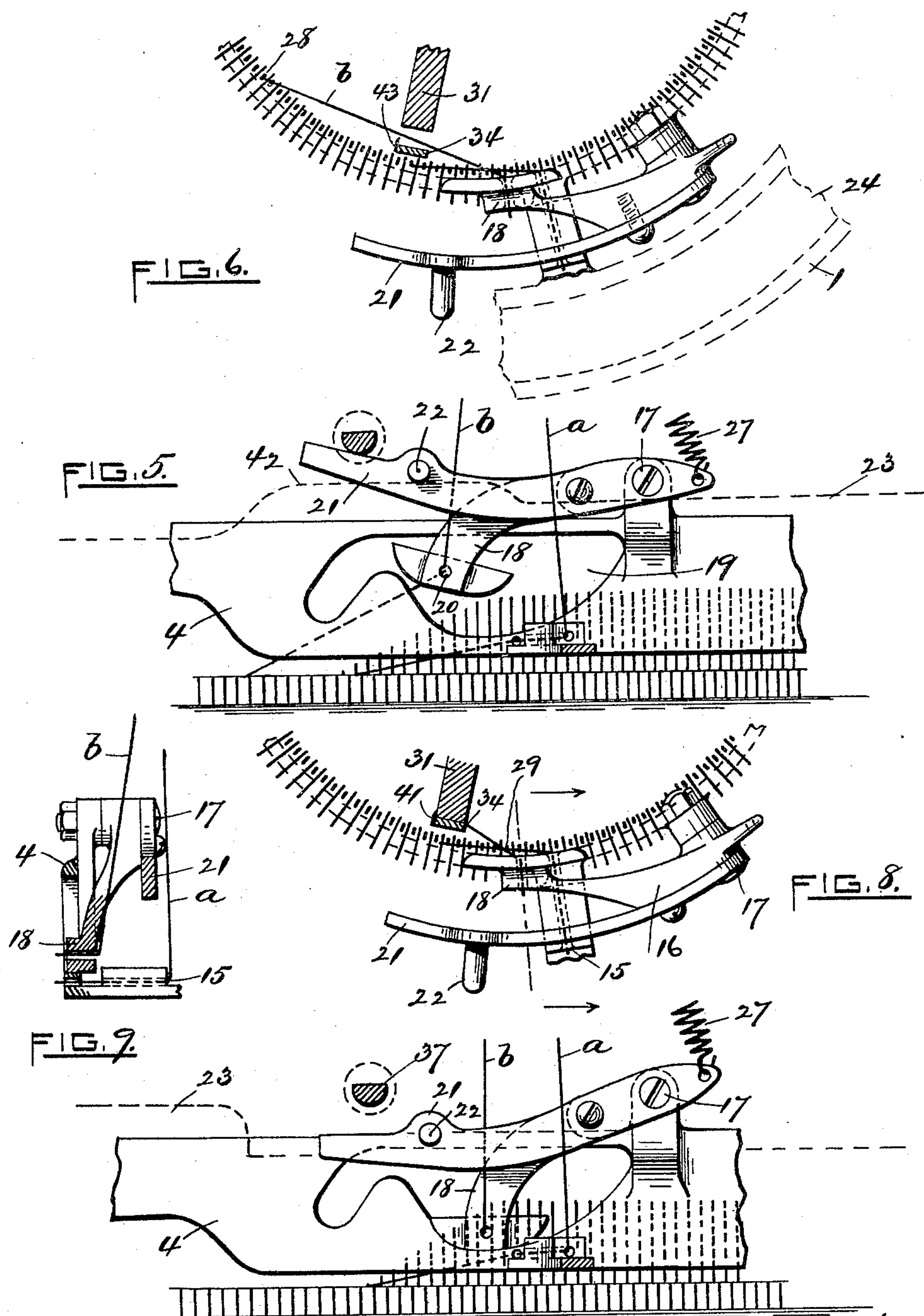
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FIG. 7.

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UNITED STATES PATENT OFFICE.

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KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 604,570, dated May 24, 1898.

Application filed March 17, 1897. Serial No. 628,005. (No model.)

To all whom it may concern:

Be it known that I, JAMES E. ROWE, of Pawtucket, county of Providence, and State of Rhode Island, have invented certain new and useful Improvements in Knitting-Machines; and I do hereby declare the following specification, taken in connection with the accompanying drawings, forming a part of the same, to be a full, clear, and exact description thereof.

This invention relates to devices for feeding thread or yarn to a knitting-machine, and more especially to means for introducing a reinforcing or splicing thread or yarn at certain portions of the knit fabric—as, for instance, above the heel and upon the sole of a stocking—and has for its object to provide means of the above character which shall be simple in construction and accurate and positive in action.

A further object of the invention is to provide a reinforcing mechanism which may be readily attached to or detached from a knitting-machine.

In the accompanying drawings a mechanism embodying the present improvements in their preferred form is shown applied to the knitting-machine shown in Patent No. 570,059, granted to me October 27, 1896; but it will be understood that the mechanism may be applied to other machines and that the invention is not limited to the form shown, which may be varied without departing from this invention.

The invention consists in certain features and combinations hereinafter described, and particularly pointed out in the claims.

The mechanism illustrated comprises a thread-carrier which travels with the cam-cylinder and is operated by a cam, which cam serves to reciprocate the thread-carrier to carry the thread to and from the needles. The thread-carrier is so arranged that it reciprocates outside the needles—that is to say, said carrier does not move back and forth over the tops of the needles, but its path is substantially parallel to the plane of the needles and does not cross said plane. The cam is formed on a cam-ring mounted in a support which travels with the thread-carrier, said cam-ring being held stationary when the

thread is to be inserted for a portion of each course and traveling with its support at other times. By mounting the cam-ring in a support which travels with the thread-carrier it is possible to deliver the splicing-thread to the needles continuously for any desired number of courses or to hold the thread withdrawn from the needles for any desired number of courses, since the cam-ring when released will travel with its support until again stopped, and the thread-carrier will continue in the position which it occupies when the cam-ring is released until said ring is again held stationary. When the carrier is reciprocated outside the needles, the splicing-thread is withdrawn at a certain needle and is inserted at a certain needle, and unless means are provided for severing the thread when withdrawn said thread will extend across one side of the fabric to the other and must be cut away after the fabric is finished. It is preferred, therefore, to provide means for severing the thread, and it is also preferred to locate this means inside the needle-cylinder and to also provide means for holding the severed end of the thread until the thread is again delivered to the needles. It will be understood that the severing and holding devices are not essential to the operation of the mechanism and may be omitted in cases where their use is inconvenient by reason of the size of the needle-cylinder or for any other reason.

In order that the mechanism for feeding the reinforcing-thread may be readily attached to and detached from the machine, it is preferred to connect all the devices comprising said mechanism with the same support and to connect said support to the arm to which the usual latch-guard and thread-guide are secured. By removing the pivot-screw from said arm the entire splicing mechanism may be readily removed and the usual latch-guard and thread-guide substituted, or vice versa.

Referring to the drawings, Figure 1 is a sectional view, partly in elevation, showing the present improvements in their preferred form and so much of a knitting-machine as is necessary to illustrate this application. Fig. 2 is a plan view. Figs. 3 and 4 are elevations showing the mechanism in two dif-

ferent positions. Figs. 5 and 6 are an elevation and plan view, respectively, showing the thread-carrier in a position to hold the thread withdrawn from the needles. Figs. 7 and 8 are an elevation and plan view, respectively, showing the thread-carrier in a position to deliver the thread to the needles. Fig. 9 is a detail sectional view.

E, F, and H', Fig. 3, represent the cam-cylinder, sinker cam-ring, and needles, respectively, of the machine illustrated in the patent above referred to. A support which consists, in the form shown, of an annular ring 1 is provided with a lug 2, adapted to fit within the recess formed in the top of the arm F⁴, projecting upward from the cam-cylinder, and is held therein by the usual pivoted screw 3. The latch-guard 4 is connected with the support 1 by means of the radial arms 5. Bolts 6 pass through the arms 5 opposite the arm F⁴ and rest upon the top of the sinker cam-ring, thus serving to assist in supporting the support 1. A plate 7 is supported from the latch-guard 4 by means of arms 8, and said plate carries a support for the thread-bobbin 9, which carries the splicing-thread. Two rods 10 and 11 extend upward from the plate 7 and support a cross-piece 12, to which is secured a spring take-up 13 and a tension-clamp 14. The main thread *a* passes from the usual thread-guide through guides in the piece 12 and plate 7 and through the main thread-guide 15 and is continuously delivered to the needles in the usual manner. The splicing-thread *b* passes from the bobbin 9 through the spring tension-clamp 14 to an eye at the end of the take-up 13 and passes through guides in the plates 12 7 to the reciprocating thread-carrier.

The thread-carrier in the form shown consists of a two-armed lever 16, pivoted to the latch-guard at 17. The free end of one arm 18 of said thread-carrier projects within a recess 19, formed in the latch-guard, and is provided with a thread-guide 20, through which the splicing-thread *b* passes. The other arm 21 of the thread-carrier is provided with a laterally-projecting pin 22, which is arranged to engage a stationary controller in the form of a cam 23. The cam 23 is formed upon an annular ring 24, which is revolvably mounted in a recess formed in the support 1. The ring 24 is provided with an arm 25, arranged to engage a movable stop 26. When the arm 25 engages the stop 26, the cam-ring 24 is held stationary, and as the cam-cylinder revolves the pin 22 rides over the cam 23 and the thread-carrier is reciprocated to carry the thread to and from the needles. When the pin 22 passes on to the cam 23, the thread-carrier is moved into the position shown in Figs. 3, 5, and 6, above the needles, and the splicing-thread is withdrawn from the needles. When the pin 22 passes off of the cam 23, a spring 27 moves the thread-carrier into the position shown in Figs. 4, 7, and 8, and the thread is delivered to the needles and is knit in with the main

thread until the pin 22 again passes on to the cam 23.

With the construction above described there will be a series of threads in that portion of the stocking in which the splicing-thread was inserted, extending from the needle 28, Fig. 6, to the needle 29, Fig. 8, and it will be necessary to cut away these threads after the stocking is completed. It is preferred, therefore, to provide means for severing the thread when it is withdrawn and for holding the severed end of the thread until said thread is again inserted, and in the form shown this means is as follows: A bar 30 projects downward from the plate 7, and an arm 31 is secured to said bar at its lower end by means of a screw 32, passing through said bar and through a slot in the end of arm 31. The outer end of arm 31 forms the stationary jaw 33 of a gripper, the movable jaw 34 of which is pivoted at 35 to the arm 31 and is drawn toward the stationary jaw by means of a spring 36. A lever 37 is pivoted at 38 to the bar 30 and is connected by means of a stud 39 to the movable jaw 34, said stud passing through a slot formed in the lever 37. A spring 40, interposed between the lever 37 and the jaw 34, holds said lever against the head of the stud 39. The lever 37 overlies and is arranged to be engaged by the arm 21 of the thread-carrier and carries at its outer end a roll 41, for a purpose to be hereinafter described.

The cam 23 is provided with a swell 42 at its forward end. When the pin 22 passes on to the swell 42 of the cam 23, the end of the arm 21 raises the lever 37 and lifts the movable jaw 34 of the gripper, and as the cam-cylinder continues to revolve the jaws of the gripper pass upon opposite sides of the thread *b*, which extends from thread-guide 20 to the needle 28, as shown in Fig. 6. When the pin 22 passes off of the swell 42, the jaws of the gripper close and a knife-blade 43, secured to the jaw 34, severs the thread *b*, the end of which is then held between the jaws of the gripper. The downward movement of the thread-carrier when the pin 22 passes from the swell 42 is not sufficient to carry the thread *b* to the needles. After the pin 22 has passed from the cam 23, as shown in Figs. 4, 7, and 8, to carry the thread *b* to the needles continued rotation of the cam-cylinder brings the roll 41 into engagement with the cam 44, secured to the ring 24, and the lever 37 is lifted to open the jaws of the gripper and release the end of thread *b*, which is now knit into the fabric with the main thread, until the pin 22 again engages the cam 23, when the above operation is repeated. The reinforcing-thread is thus knit into the stocking during a portion of each course as long as the stop 26 remains in the path of the arm 25. When the stop 26 is moved out of the path of the arm 25, the ring 24 will travel with the stop 1 and the thread-carrier will not be reciprocated. By properly timing the stop the thread-

carrier may be held in position to hold the thread *b* withdrawn or to deliver said thread continuously to the needles, the thread being held withdrawn if the pin 22 is upon the cam 23 when the stop 26 is moved and the thread being delivered continuously to the needles if the pin 22 is not upon the cam 23 when the stop is moved.

Any suitable mechanism may be used for operating the stop 26, and said mechanism may be timed as desired. In the accompanying drawings is shown one form of mechanism applied to the machine, illustrated in the patent above referred to, for operating the stop 26. In the construction shown the stop 26 consists of a lever pivoted at 45 to a bracket 46, secured to the vertical rod *K* and provided at its rear end with a shoe 47, arranged to engage a recess 48, formed in the disk 49, pivoted to the bracket 46. The disk 49 has secured thereto a ratchet 50, which is engaged by a pawl 51, pivoted to the end of an arm 52, secured to a rock-shaft 53. The rock-shaft 53 also has secured thereto an arm 54, the front end of which is arranged to be engaged by a series of lugs 55, formed upon a pattern-chain which is fed forward by means of the ratchet-wheel *C*⁴, as clearly shown in the patent above referred to. As the lugs 55 pass under the arm 54 the rock-shaft 53 is rocked and the pawl 51 operated, thus feeding forward the disk 49. The shoe 47 rides upon the periphery of the disk 49, and the stop 26 is thus held out of the path of the arm 25. When the recess 48 is in position to be engaged by the shoe 47, the spring 56, secured to the stop 26 and to the bracket 46, raises the stop 26 into position to be engaged by the arm 25 upon the cam-ring. The timing of the stop 26 may be regulated as desired and a reinforcing-thread thus inserted at any desired portion of the stocking.

When the reinforcing-thread is to be inserted on the back of the stocking above the heel and on the sole of the foot, it is desirable that the reinforcing-thread should also be knit in with the main thread continuously while the machine is knitting the heel and toe, and the operation of the disk 49 may be timed to secure this result. It is preferred, however, to provide a separate means for moving the stop 26 when the machine passes from rotary to reciprocating knitting, and in the form shown this means consists of a pin 57, projecting from the rock-shaft *L* and arranged to engage a vertical arm 58, projecting from the lever 26. As described in the patent above referred to, the shaft *L* is rocked when the machine passes on to reciprocating knitting, and at this time the pin 57 will engage the arm 58 and rock the stop 26 out of the path of the arm 25, at which time the position of the cam-cylinder will be such that the pin 22 will be off of the cam 23. When the machine passes from reciprocating to rotary knitting, the shaft *L* is returned to its normal position, and the stop 26 will return

into the path of the arm 25, and the thread-carrier will again be operated until the stop 26 is again thrown out of operative position either by the rotation of the disk 49 or the rocking of the shaft *L*.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a knitting-machine, the combination with a traveling main thread-guide, of a thread-guide traveling therewith, means for reciprocating said guide in a path which does not cross the plane of the needles, a clamp inside the needles and means for severing the thread, substantially as described.

2. In a knitting-machine the combination with a traveling main thread-guide, of a pivoted thread-guide traveling therewith and arranged to oscillate in a path which does not cross the plane of the needles, means for oscillating said thread-guide, and means for severing the thread, substantially as described.

3. In a knitting-machine the combination with a rotary cam-cylinder, of a thread-carrier carried therewith, a stationary cam for reciprocating said carrier, and means inside the needles for severing and holding the thread, substantially as described.

4. In a knitting-machine the combination with a rotary cam-cylinder, of a thread-carrier carried therewith, a cam for reciprocating said carrier, a support for said cam moving with the cam-cylinder, and means for automatically stopping and releasing said cam, substantially as described.

5. In a knitting-machine the combination with a rotary cam-cylinder, of a thread-carrier carried therewith for carrying the thread into engagement with the needles, a stationary cam for operating said carrier, means for automatically throwing said cam into and out of operative position, and means inside the needles for severing the thread, substantially as described.

6. In a knitting-machine, a thread-carrier, means for operating said carrier to carry the thread into and out of engagement with the needles, and a thread-holder inside the needles, and means for operating said holder from said carrier, substantially as described.

7. In a knitting-machine, a thread-carrier, a cam for operating said carrier to carry the thread to and from the needles, a support for said cam moving with the cam-cylinder, means for holding said cam stationary during one or more revolutions of the cam-cylinder, and means for throwing said holding means into and out of operation, substantially as described.

8. In a knitting-machine, a thread-carrier for carrying the thread into engagement with the needles, a cam for operating said carrier, a clamp inside the needles for the thread also operated from said cam, substantially as described.

9. In a knitting-machine, the combination of a thread-guide, means for operating said guide to carry the thread to and from the

needles at each revolution of the cam-cylinder, a support for said operating means traveling with the cam-cylinder, and means for automatically stopping and releasing said operating means, substantially as described.

10. In a knitting-machine, a thread-carrier, a ring carrying a cam for operating said carrier to carry the thread to and from the needles, a support for said cam-ring moving with the cam-cylinder, a stop for engaging said cam-ring, and means for moving said stop into and out of operative position, substantially as described.

11. In a knitting-machine, an annular ring secured to the cam-cylinder, a cam-ring mounted in said ring, means for holding said cam-ring stationary during one or more revolutions of the cam-cylinder, a thread-guide operated by said cam-ring, substantially as described.

12. In a knitting-machine, a cam-ring, a support therefor carried by the cam-cylinder, a pivoted thread-carrier operated by said cam-ring at each revolution of the cam-cylinder, substantially as described.

13. In a knitting-machine, a stationary cam, a traveling thread-carrier for carrying the thread into engagement with the needles operated by said cam, a thread-holder operated by said cam, and a cam for operating

said holder independent of said carrier, substantially as described.

14. In a knitting-machine, a cam partially surrounding the needles and provided with a swell at its forward end, a thread-carrier riding over said cam, a thread-holder operated from said carrier, and a cam for operating said holder substantially as described.

15. In a knitting-machine, a support traveling with the cam-cylinder, a thread-carrier supported by said support, a ring also supported by said support and carrying a cam for operating said thread-carrier, substantially as described.

16. In a knitting-machine, a support traveling with the cam-cylinder, a thread-carrier and a thread-holder supported by said support, a ring also supported by said support and carrying a cam for operating said carrier, substantially as described.

17. In a knitting-machine, a thread-carrier, a ring carrying a cam for operating said carrier, a main-thread guide, a latch-guard, and a support secured to the cam-cylinder for supporting all said devices, substantially as described.

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Witnesses:

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