

No. 713,370.

Patented Nov. 11, 1902.

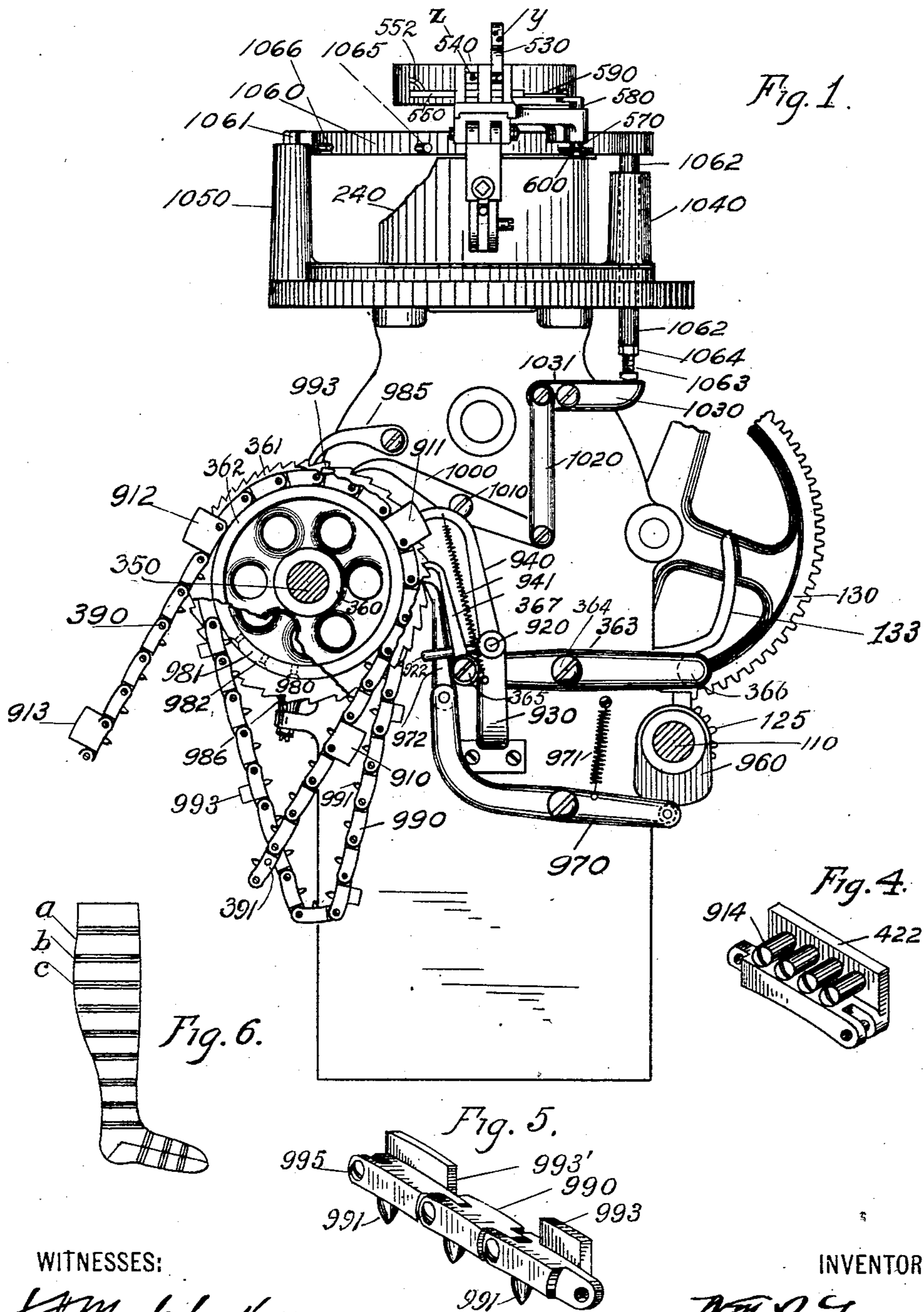
W. P. YOUNG.

STRIPING ATTACHMENT FOR CIRCULAR KNITTING MACHINES.

(Application filed May 16, 1901.)

(No Model.)

3 Sheets—Sheet 1.



WITNESSES:
J. S. Melbrouck.
L. F. Parkhurst.

INVENTOR
W. P. Young
BY *J. E. Jones,*
ATTORNEY

No. 713,370.

Patented Nov. 11, 1902.

W. P. YOUNG.

STRIPING ATTACHMENT FOR CIRCULAR KNITTING MACHINES.

(Application filed May 18, 1901.)

(No Model.)

3 Sheets—Sheet 2.

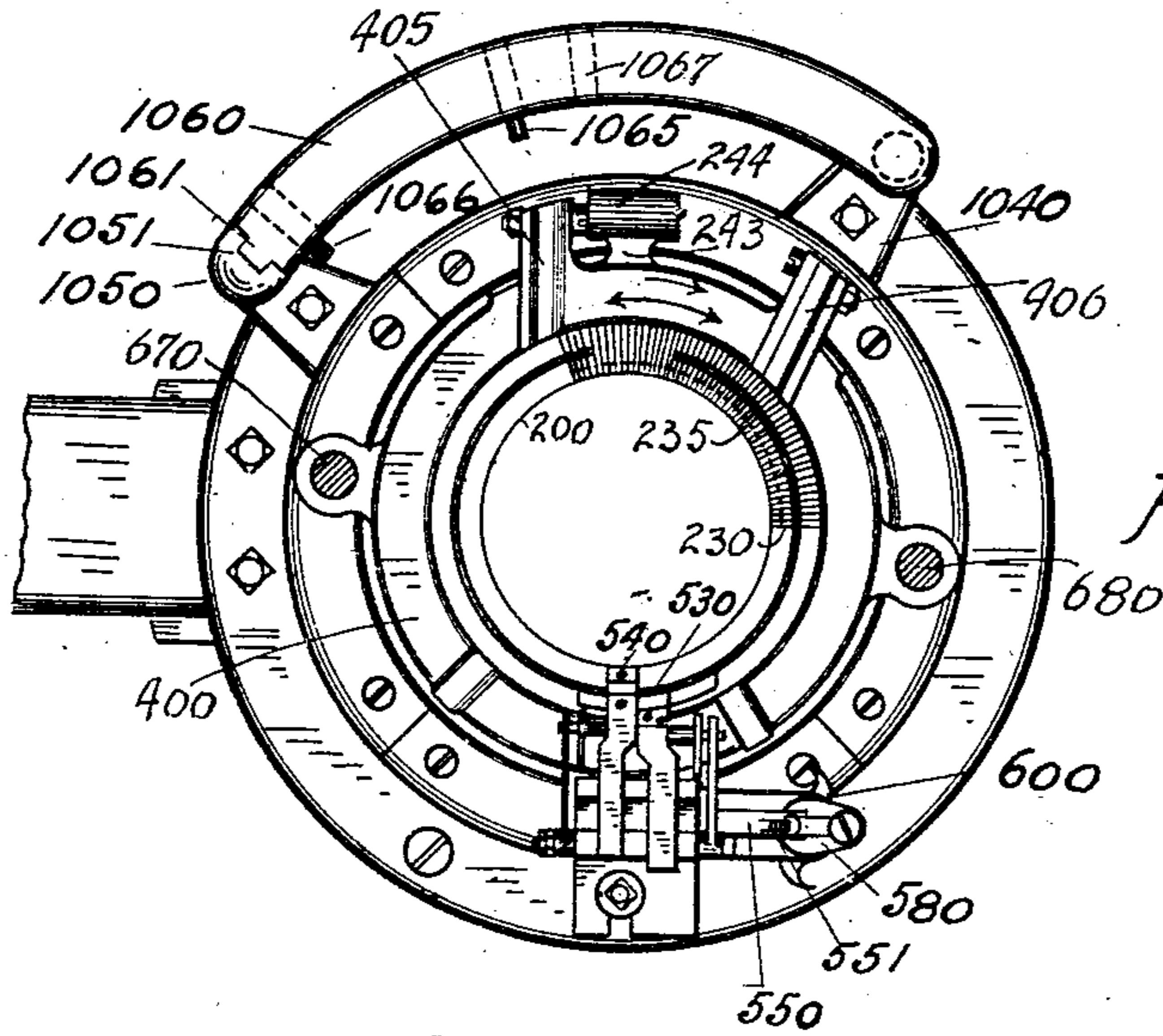


Fig. 2.

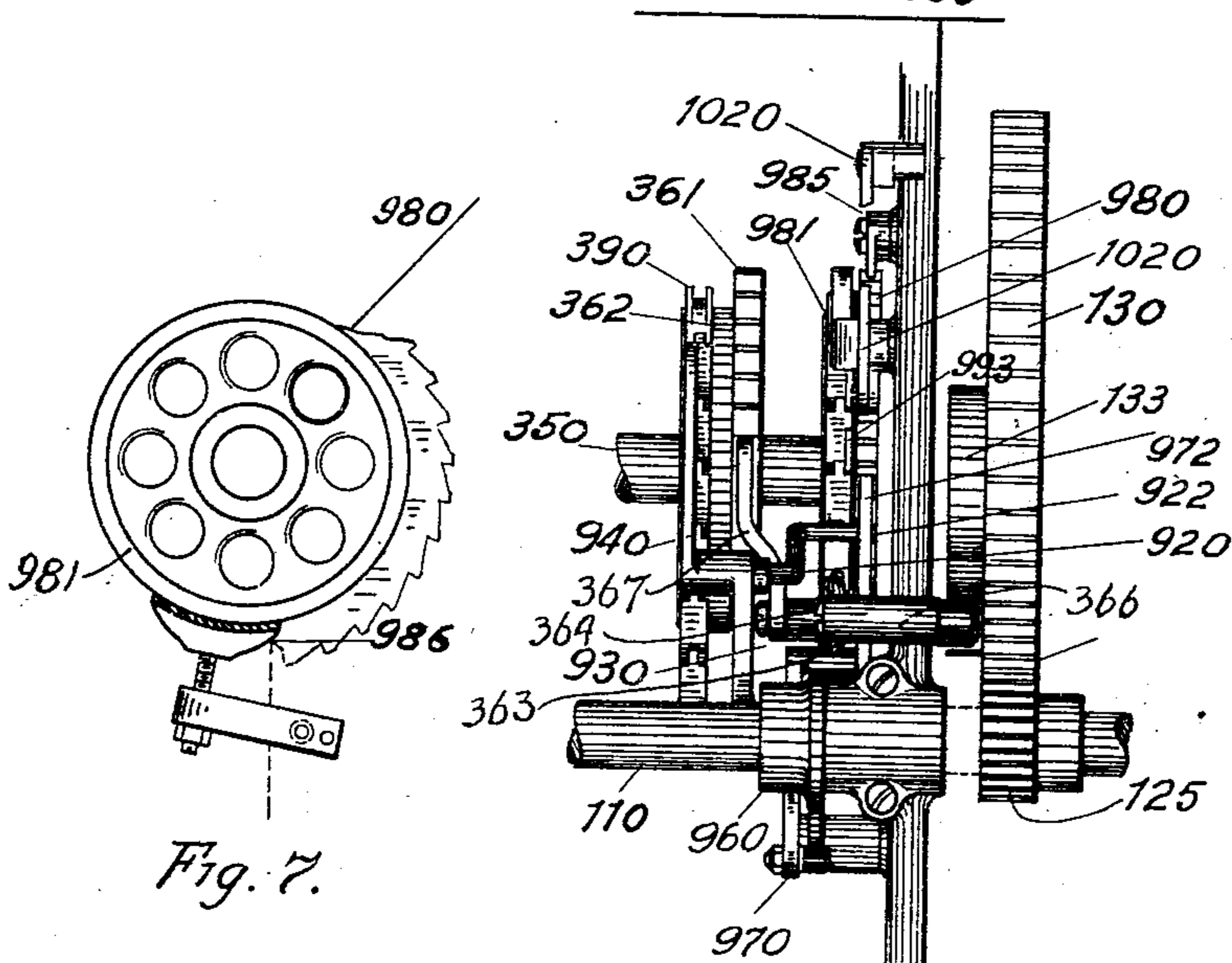


Fig. 3.

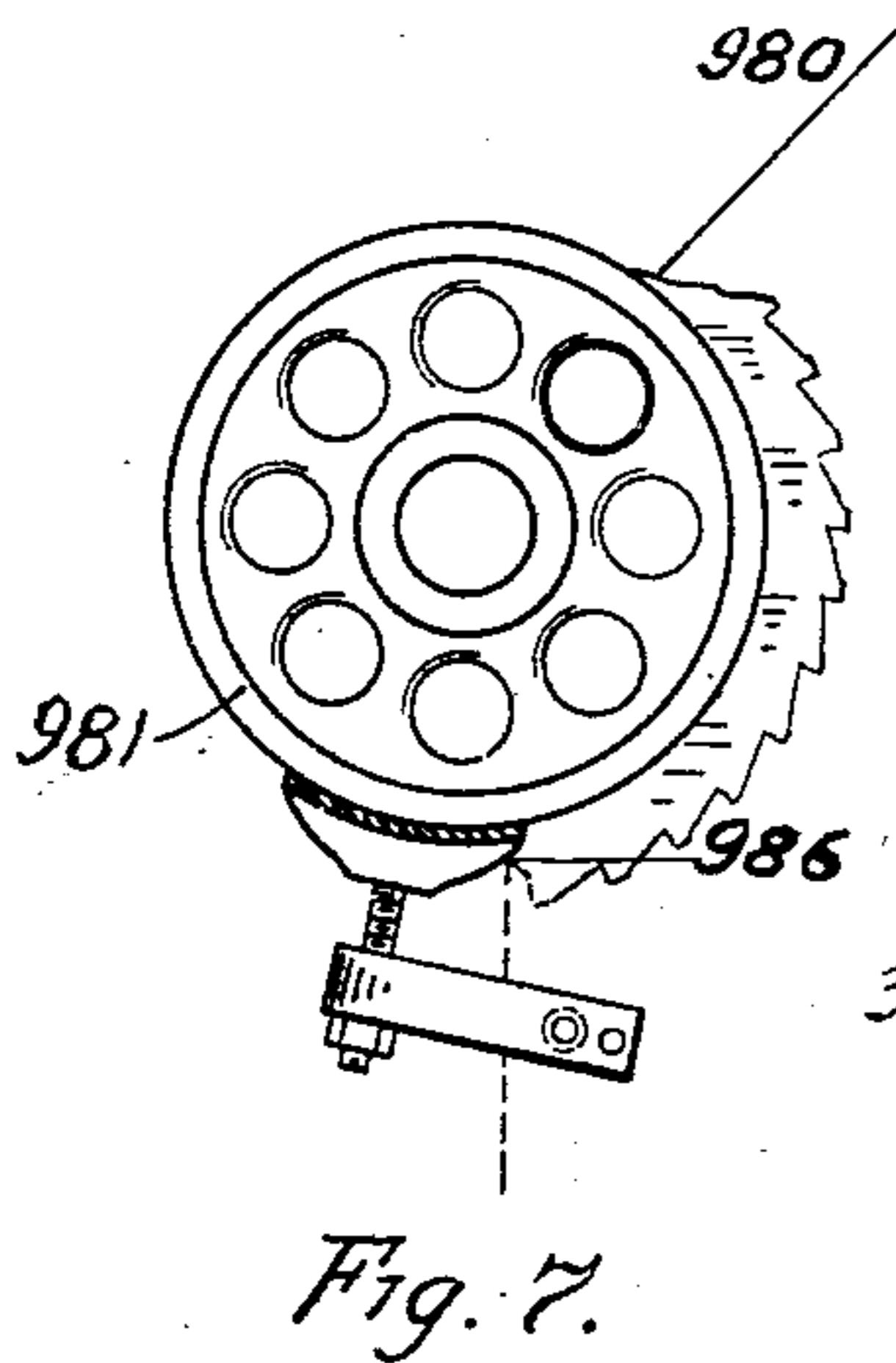


Fig. 7.

WITNESSES:

J. S. McBlaney.

L. F. Parkhurst.

INVENTOR

Wm. P. Young

BY

J. C. Somes,

ATTORNEY

No. 713,370.

Patented Nov. 11, 1902.

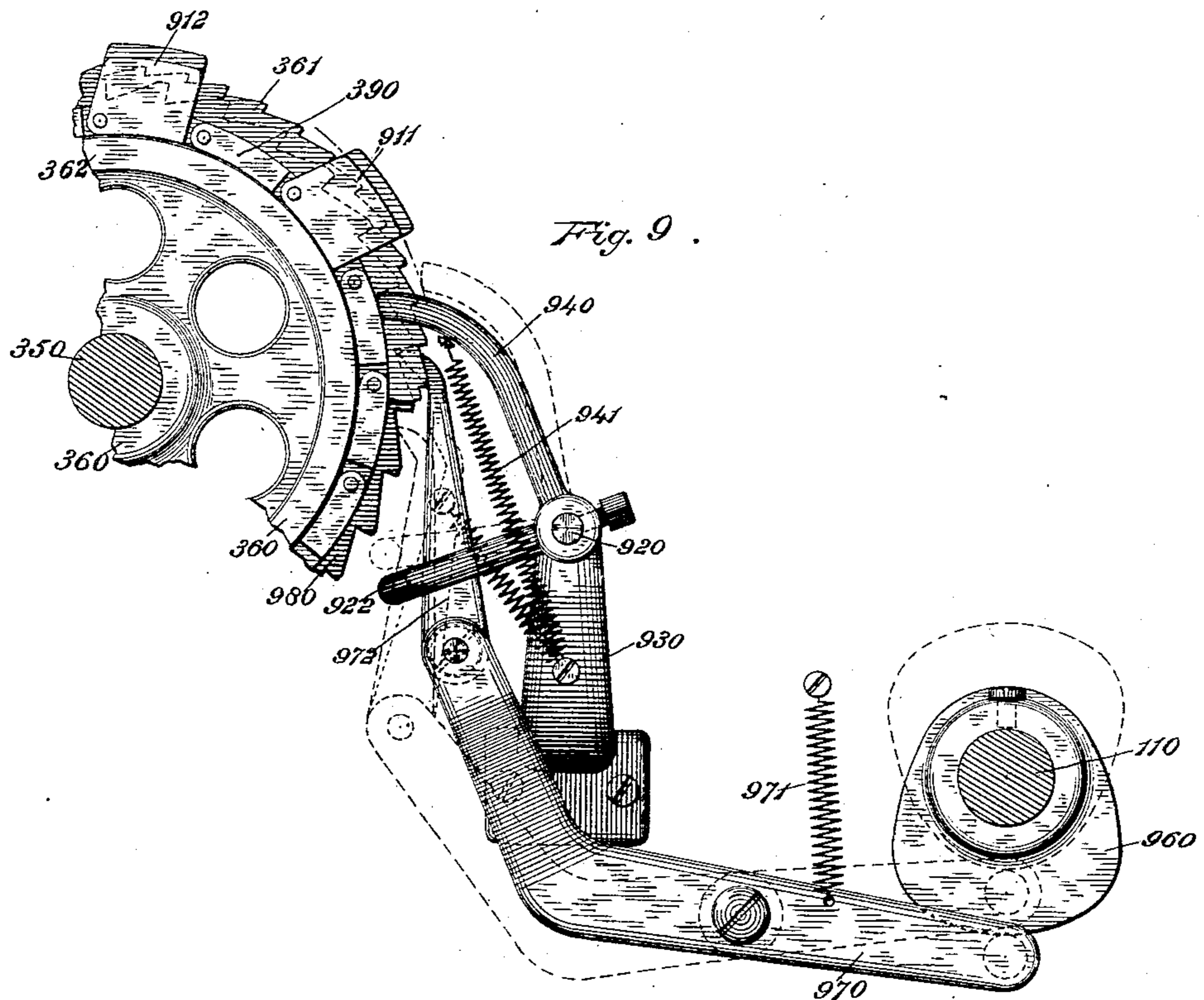
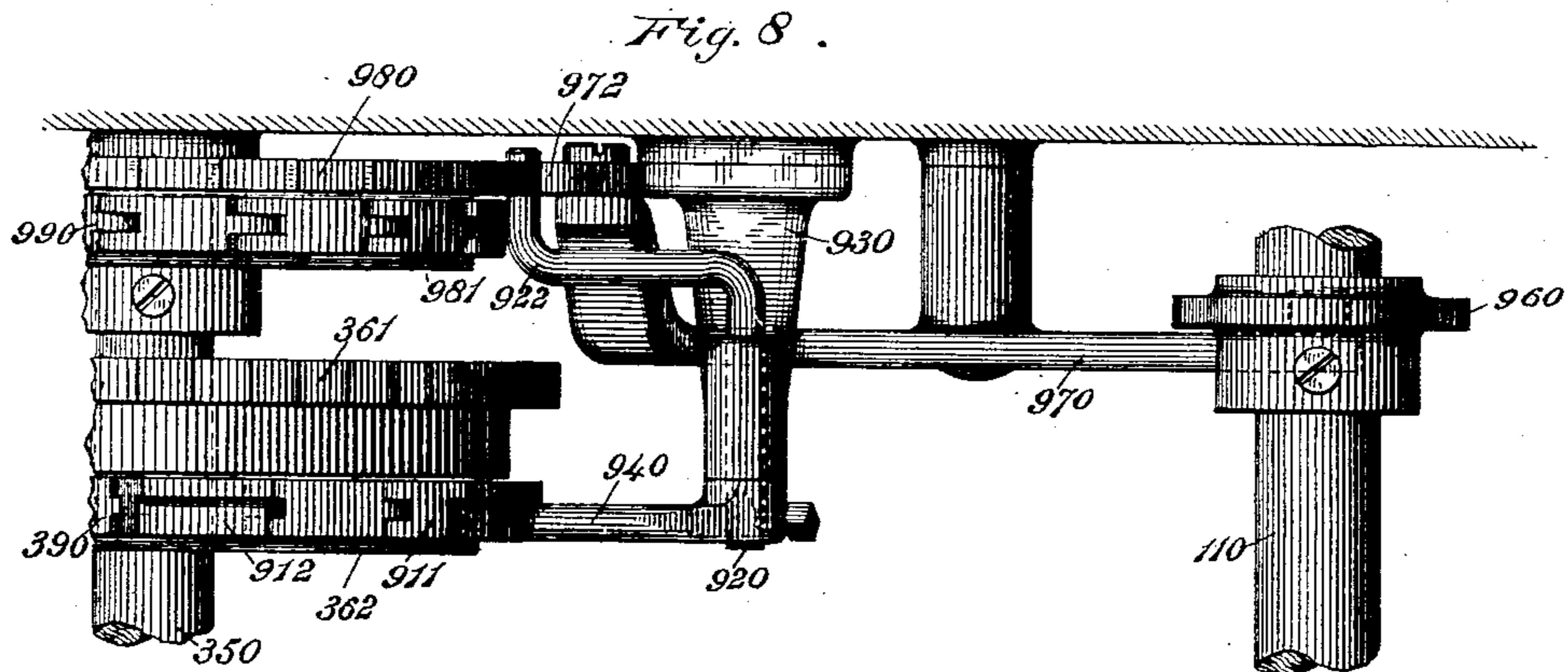
W. P. YOUNG.

STRIPING ATTACHMENT FOR CIRCULAR KNITTING MACHINES.

(Application filed May 16, 1901.)

(No Model.)

3 Sheets—Sheet 3.



WITNESSES

Harry King
E. W. Clarkson

INVENTOR

W. P. Young
By J. C. Somers
Attorney

UNITED STATES PATENT OFFICE.

WILLIAM P. YOUNG, OF WOONSOCKET, RHODE ISLAND, ASSIGNOR TO
AMERICAN KNITTING MACHINE COMPANY, OF PHILADELPHIA,
PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

STRIPING ATTACHMENT FOR CIRCULAR-KNITTING MACHINES.

SPECIFICATION forming part of Letters Patent No. 713,370, dated November 11, 1902.

Application filed May 16, 1901. Serial No. 60,446. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM P. YOUNG, a citizen of the United States of America, residing at Woonsocket, in the county of Providence, in the State of Rhode Island, have invented certain new and useful Improvements in Striping Attachments for Circular-Knitting Machines, of which the following is a specification.

10 This invention relates to a mechanism applied to a circular-knitting machine to effect changes of the yarns of different colors supplied to the needles during the knitting operation for the purpose of producing striped work.

15 The principal object of the invention is to provide a circular-knitting machine with a simple striping attachment which can be switched into and out of operation at will, so that the machine can be used without alteration for either plain or striped work, and to provide means for automatically controlling the pattern mechanism of the striping attachment from the main pattern mechanism which controls the knitting mechanism.

25 Figure 1 of the accompanying drawings represents a vertical transverse section of the body of a machine embodying these improvements and an elevation of the knitting-head thereof, portions of the latter being omitted and others broken away to show the slide for actuating the yarn-changing mechanism. Fig. 2 represents a plan or top view of the machine omitting the yarn-guides and including a cross-section of the yarn-frame which is mounted on and travels with the cam-cylinder. Fig. 3 represents a front elevation of a portion of the striping attachment and its connection with the main pattern mechanism.

40 Fig. 4 represents a perspective view of one of the links of the main pattern-chain of the machine provided with one form of cam or projection for bringing the striping mechanism into action. Fig. 5 represents a section of the striping pattern-chain having detachable cam-links. Fig. 6 represents one form of striped stocking produced by this machine. Fig. 7 represents the pattern chain-wheel and the brake in connection therewith for preventing said wheel from turning with the

shaft on which it is loosely disposed. Fig. 8 represents a plan view of portions of the main and auxiliary pattern mechanisms and their connecting devices. Fig. 9 represents a side elevation thereof.

The same reference characters indicate corresponding parts in the different figures.

This striping attachment may be applied to any circular-knitting machine to which it is applicable in which yarns of different colors are used in alternation. It is herein shown as applied to what is known to the trade as the "New Victor Knitting-Machine," the general structure of which is shown in United States Patent No. 537,802, having a yarn-changer similar to that shown in United States Patent No. 580,825 and a fashioning mechanism similar to that shown in United States Patent No. 596,933. These patents illustrate circular-knitting machines for knitting stockings and socks in which the knitting is performed by a circular series of needles which are moved up and down in vertical grooves in the needle-cylinder under the action of the cams on the cam-cylinder, which encircles the needle-cylinder, the knitting of the tubular portion of the work, constituting the leg and foot, being performed in continuous circular courses by all the needles under a continuous rotary motion of the cam-cylinder in the direction of the arrow *a* of Fig. 2 and the pouch-knitting or fashioning for the formation of the heel and toe being performed in arc-shaped courses by a part of the needles under a reciprocatory motion of the cam-cylinder, as indicated by the double arrow *b* of said figure. Any suitable or known means may be employed for changing the motion of the cam-cylinder.

The part of the machine shown comprises a needle-cylinder 200 for containing the circuit of independent needles 230, partially indicated in Fig. 2, and radially-sliding sinkers 235, also partially indicated in Fig. 2, and a rotary cam-cylinder 240, surrounding said needle-cylinder and containing the knitting-cams for moving the needles up and down in the vertical grooves of the needle-cylinder to form the stitches, the switch-cam, and the cams known as the "narrowing and widen-

ing or fashioning" cams for shifting individual needles into operative and inoperative positions. The fashioning movement is indicated in Fig. 2, where the boss 244 on the bracket 243, attached to the body of the cam-cylinder, alternately engages in the fashioning operation the lugs 405 and 406 on the sinker-cam ring 400, which is loose on the sinker-bed, the latter being attached to the needle-cylinder 200 and overhanging the cam-cylinder 240, said sinker-cam ring being thereby made to reciprocate with the cam-cylinder. The continuous rotary motion and the reciprocatory motions, respectively, of the cam-cylinder are imparted thereto by any suitable means—as, for instance, those shown in Patent No. 537,802—and the fashioning-cams may be of any suitable construction—as, for instance, like those shown in Patent No. 596,933.

The machine herein shown is provided with a main pattern mechanism for controlling the circular-knitting mechanism referred to, so as to perform circular and reciprocatory knitting at proper intervals. This mechanism is shown in the form of a main pattern-chain 390, supported on a chain-wheel 362, fast to a sleeve 360, which is loose on the cam-shaft 350. A ratchet-wheel 361 is fixed on or integral with the sleeve or hub 360 of the chain-wheel 362. Portions of the main pattern-chain 390 and chain-wheel 362 are broken out in Fig. 1 to show the chain-wheel and pattern-chain of the auxiliary pattern mechanism beyond. A lever 363, pivoted on a fixed stud 364, is provided at its inner end with a stud 365, carrying a driving-pawl 367, which engages the ratchet-wheel 361 and operates the main pattern-chain 390. The lever is oscillated by a cam 133 on the gear-wheel 130, which receives motion from a pinion 125 on the driving-shaft 110, said cam engaging a stud 366 at the outer end of said lever. This main pattern-chain may carry lugs, studs, or cams which actuate different mechanisms for controlling the operations of the circular-knitting mechanism as illustrated and described in said United States Patent No. 537,802. The stud 391, for instance, engages one of several radial arms shown in said Patent No. 537,802 locked to the cam-shaft 350 and operates said cam-shaft and brings it under control of its actuating-pawl, (not herein shown,) as described on page 9 of said patent. The parts above described and referred to are shown in the prior patents cited.

The yarn-changer of the previous patent includes two extensible pivoted yarn-carriers 530 and 540, which may be used for yarns of different colors as a part of this striping attachment. A suitable shifting mechanism is provided for shifting said yarn-carriers into operative and inoperative positions, respectively. The shifting mechanism for this purpose may be the same as that shown in Patent No. 580,825, comprising a cam-slide 550,

having two oppositely-inclined cams, as 551 and 552, disposed apart from each other, the cam 551 serving to lift or swing upward the carrier 530 into inoperative position and the cam 552 serving to likewise swing or raise to inoperative position the yarn-carrier 540, said carriers being depressed into operative positions by springs or otherwise. This cam-slide is connected by a link 590 with a crank 580 on a vertical shaft 570, which carries at its lower end a star-wheel 600. These parts are mounted on the cam-cylinder. The actuating mechanism for said shifting mechanism may comprise an arc-shaped or crescent slide 1060, provided with lateral studs 1065 and 1066. This slide is preferably raised to bring its studs into position for engagement of the star-wheel and depressed to permit said wheel to escape, being raised at proper intervals and held in elevated position for determined periods of time. In the form illustrated two upright brackets 1040 and 1050 are secured to the bed-plate of the machine at proper distances apart and serve as guides for said slide. The front bracket 1040 is preferably tubular, and the bracket 1050 has preferably a recess on one side. The crescent slide is provided with a tongue 1061 at one end and with a dependent post 1062 at the other end. The tongue and post slide in the recessed and tubular brackets, respectively. The post 1062 extends below the bed-plate and is provided at its lower end with an adjusting-screw 1063, having a set-nut 1064. The lower end of this post is engaged by the front end of a lever 1030, pivoted on a stud 1031 and suitably actuated from the cam-shaft or the pattern mechanism to lift the crescent slide and permit it to fall at proper intervals. The tonguing of the slide into a recess of one bracket allows play, so that the slide moves freely up and down, avoiding binding or cramping, such as occurs when both ends are supported on sliding posts. The studs 1065 and 1066 are preferably so disposed that the change of yarn is effected at the back of the stocking, which is the preferable point. The crescent slide is preferably provided with a series of holes, as 1067, in which these studs are adjusted into different positions relatively to each other and to the needle-cylinder, being placed farther apart when coarse needles are used to insure the engagement therewith of the yarn thrown in on the shifting operation.

When the arc-shaped slide 1060 is in raised position, the star-wheel 600 comes in contact first with the stud 1065 and is partially rotated, whereby one of the yarn-carriers, as 540, is thrown down into operative position and next into contact with the stud 1066, whereby the other yarn-carrier, as 530, is thrown up into inoperative position. The main yarn *y* for the body of the stocking—as white, for instance—which passes through the carrier 530, is thus substituted by the yarn *z* for the stripes—as black, for instance—passing through the yarn-carrier 540.

The yarn-changing mechanism above described may be used as indicated in Patent No. 580,825 for changing the yarn for the heel and toe.

5 The striping attachment comprises an auxiliary striping pattern-chain 990, provided with a series of lugs, as 993 or 993', in the form of high links or otherwise, disposed at certain distances apart, according to the number and width of the stripes it is desired to produce in the stocking. These lugs engage a striping-pawl 1000, which is pivoted at 1010 and rides on said chain. The tail end of this
10 lever 1030, which raises the crescent slide 1060 for actuating the star-wheel to change the yarn. This auxiliary pattern-chain is preferably supported on a perforated or socket flange 981, attached to a ratchet-wheel 980,
20 which is loose on the cam-shaft 350, the inner face of the chain being provided with sprocket-pins 991, which engage the sockets 982 in said flange. A pivoted lever 970 carries at its inner end a pawl 972 and at its outer
25 end is engaged by a cam 960 on the shaft 110. This pawl engages the ratchet-wheel 980 and serves as an actuating-pawl for the striping pattern-chain 990. A spring 971 holds said lever in contact with said cam. A check-
30 pawl 985 serves to prevent the ratchet-wheel from turning back, and an adjustable brake 986, which presses against the lower part of the socket-flange 981, serves to hold this ratchet-wheel against turning with the cam-shaft.
35 Each link of the striping-chain 990 is equal in length to two teeth of the ratchet-wheel 980, and it takes two picks of the pawl 972 to rotate said wheel the distance of one link. Each lug is equal in length to one-half the length of the
40 link, as 993, Fig. 5, or it may be the full length thereof, as 993'. In the use of the full-length lugs the stripes produced are narrower, and in the use of the short lugs the stripes are wider. These lugs bring into operative con-
45 nection the parts of the means for shifting the yarn-carriers. A long lug puts these parts in operative connection and causes a change of yarn and holds them so until the yarn is changed back again, whereas a short
50 lug after putting said parts in operative connection and causing a change of yarn then drops them out of connection, so that the changed yarn continues to be fed until a succeeding link puts the parts of the yarn-shifting mechanism again in operative connection,
55 as more fully described hereinafter.

The main pattern-chain 390 is provided with enlarged peripheral cams or lugs or any suitable projections, as 910 911 912 913, preferably disposed on the left side of said chain to avoid other lugs on the right thereof. The pattern-chain 390 has on its right side through a part of its length a series of high cam-plates 422 for a purpose described in said
60 prior patents on the Victor machine, and where said cam-plates occur lateral studs 914

may be inserted therein and project toward the left and constitute the suitable projections herein just referred to. A link of this form is shown in Fig. 4.

70 A shaft 920 is journaled in a bracket 930, secured to the right-hand end of the machine. This shaft has fixed at one end thereof an arm or starting-pawl 940, which rides on the periphery of the chain 390 and is engaged and
75 lifted by the cams, as 910 911, &c., thereon, being held in contact therewith by a spring 941. The other end of this shaft carries a rearwardly-projecting bent arm 922. These parts operate as a stopping and starting de-
80 vice for the yarn-changer-actuating mechanism.

The striping mechanism is held out of operation when knitting in a single color or without stripes by the bent arm 922, which
85 engages the pawl 972 and holds it out of contact with the ratchet chain-wheel 980, the pawl 949 then resting on the periphery of the pattern-chain 390.

When the pawl 940 is lifted by a lug, as 90 910, the bent arm 922 is swung upward and backward out of contact with the actuating-pawl 972, and the latter falls into contact with the teeth of the ratchet-wheel 980 and im-
95 parts a step-by-step motion thereto.

In the use of this striping attachment the links containing lugs, cams, or projections, as 910, may be so placed on the main pattern-chain 390 as to bring the striping mechanism into use only during the formation of the leg
100 and foot or only during the formation of either one of those parts, or during the formation of a heel or toe. When a cam 910 comes into contact with and raises the pawl 940, the bent arm 922 releases the pawl 972
105 and permits it to act on the ratchet-wheel 980, starting the striping mechanism. The striping mechanism continues to operate until the chain 390, in due course of its intermittent action, carries said projection 910 past said
110 pawl 940, and the latter then falls into inactive position and causes the arm 950 to pull said pawl 972 away from the ratchet 980, whereby the striping mechanism is stopped. When the striping mechanism is started, the
115 striping-chain 990, being put into motion, brings one of the cams 993 in contact with the shifting devices for the arc-shaped slide 1060, and the latter is shifted into operative position, so that the star-wheel engages both
120 its pins or studs successively on its next passage, thereby throwing out one yarn—say the white—and bringing in another—say the black. If the cam 993 be the length of a half-link or a half-length cam, the pawl 1000 will
125 be released before the star-wheel again passes the slide, and the black yarn thrown in, as above, continues to be fed to the needles until the striping-chain brings the next cam 993 in contact with said shifting devices and again
130 raises the arc-shaped slide, whereby the star-wheel is again actuated and the yarn-carriers

changed. The width of the black stripe will thus be determined by the space between the cams 993. If the cam 993 be a whole-length cam, the arc-shaped slide will remain in ac-
 5 tive position on the second round of the star-wheel and the yarn will be shifted back to white after a single course of black has been knit.

The cams on the machine-chain 390, which
 10 control the starting and stopping of the striping mechanism, are preferably so arranged that the wider solid-color portions *a* of the stocking shown in Fig. 6 are knit, say, in white while the striping mechanism is out
 15 of action and the narrow stripes *b*, say, of black, and the intermediate stripes *c*, of the same color as the solid portions, are knit while the striping mechanism is in action. The width of the solid portions *a* between these
 20 ries of stripes is controlled by the distance between the cams 910 911, &c., on the chain 390, and the number of stripes in each series or group of stripes is controlled by the length of said cams, as 910. The width of the stripes
 25 *b* is controlled by the length of the cams 993 and the width of the stripes *c* is controlled by the distance between said cams 993.

The main pattern-chain 390 of the machine moves the distance of one pick of its actuat-
 30 ing-pawl during each revolution of the cam-cylinder 240, and the auxiliary striping pattern-chain 990 moves one pick to each revolution of said cylinder. By arranging the cams on the chain 390 and the cams on the
 35 chain 990 at different distances apart on their respective chains and varying the width of said cams various relative combinations are obtained and an almost endless variety of stripes may be produced.

40 The chain-links are preferably detachable, so that the cam-links may be changed to different positions in the chain. Interchangeable striping-chains having differently-arranged cams may be employed for the same
 45 purpose.

The single-pointed arrow in Fig. 2 indicates the direction of the continuous motion of the cam-cylinder in knitting tubular work for the leg and foot, and the double-pointed arrow
 50 indicates the reciprocatory motion of the cam-cylinder in knitting the heel and toe.

I claim as my invention—

1. The combination of a circular-knitting mechanism, a main pattern device for controlling said mechanism, movable yarn-carriers, means for shifting said yarn-carriers, a striping attachment comprising a pattern device for controlling said shifting means, and means actuated directly by said main pattern
 55 device for starting and stopping the pattern device of the striping attachment.

2. The combination of a circular-knitting mechanism a main pattern device for controlling said mechanism, movable yarn-carriers, means for shifting said yarn-carriers to effect a change of yarn, an auxiliary pattern
 65 mechanism for controlling said shifting means

and means connecting the auxiliary pattern mechanism with the main pattern mechanism, said main pattern mechanism containing devices engaging said connecting means at predetermined intervals for starting and stopping the auxiliary pattern mechanism. 70

3. The combination of a circular-knitting mechanism, means for actuating said mechanism, a main pattern-chain for controlling said mechanism, movable yarn-carriers, a shifting mechanism for moving said yarn-carriers to effect a change of yarn-actuating mechanism for said shifting mechanism and
 75 a striping attachment comprising an auxiliary pattern-chain for controlling said actuating mechanism and means actuated directly by said main pattern-chain for starting and stopping the pattern-chain of the striping attachment. 85

4. The combination of a circular-knitting mechanism, means for actuating said mechanism, a narrowing and widening mechanism for causing said circular-knitting mechanism
 90 to perform segmental work at proper intervals, a main pattern-chain for controlling said narrowing and widening mechanism, movable yarn-carriers, shifting means for moving said yarn-carriers to effect a change of yarn,
 95 an auxiliary pattern-chain for controlling said shifting means, and means actuated directly by the main pattern-chain for starting and stopping the auxiliary pattern-chain.

5. The combination of a circular-knitting mechanism, a main pattern-chain for controlling said mechanism, a yarn-changing mechanism, an actuating mechanism therefor comprising a crescent slide provided with lateral studs, and an auxiliary pattern-chain and devices connected therewith for shifting said
 100 crescent slide into and out of operative position, and a mechanism actuated directly by said pattern-chain for stopping and starting said actuating mechanism. 110

6. The combination of a circular-knitting mechanism, a main pattern-chain provided with cams for controlling the circular-knitting mechanism, a yarn-changing mechanism, and an auxiliary mechanism for operating
 115 the yarn-changing mechanism comprising a ratchet-wheel, a lever provided with an actuating-pawl adapted to engage said ratchet-wheel, an arm engaging said actuating-pawl for lifting it out of engagement with said
 120 ratchet-wheel, and a starting-pawl connected with said arm, said main pattern-chain having cams engaging said starting-pawl for controlling said actuating-pawl.

7. The combination of a circular-knitting mechanism, a main pattern-chain provided with cams for controlling said circular-knitting mechanism, a yarn-changing mechanism, an auxiliary pattern-chain for controlling
 125 said yarn-changing mechanism, a supporting-wheel therefor, a ratchet-wheel in fixed relation to said supporting-wheel, a pivoted lever,
 130

a cam for actuating said lever, an actuating-pawl pivoted on said lever, and means directly actuated by said main pattern-chain for shifting said actuating-pawl to start and stop said auxiliary pattern-chain.

8. The combination of a circular-knitting mechanism, a main pattern device for controlling said mechanism, a yarn-changing mechanism, a striping attachment, comprising a pattern device for controlling said yarn-changing mechanism, and means directly actuated by said main pattern device for starting and stopping the pattern device of the striping attachment.

9. The combination of a circular-knitting mechanism, a yarn-changing mechanism, an auxiliary pattern mechanism for operating the yarn-changing mechanism, a main pattern mechanism which controls the circular-knitting mechanism, and means connecting the auxiliary pattern mechanism with the main pattern mechanism, said main pattern mechanism containing devices engaging said connecting means at determinate intervals

for starting and stopping the auxiliary pattern mechanism.

10. The combination of a circular-knitting mechanism, a main pattern-chain provided with cams for controlling said circular-knitting mechanism, a yarn-changing mechanism, an auxiliary pattern-chain for controlling said yarn-changing mechanism, a supporting-wheel therefor, a ratchet-wheel in fixed relation to said supporting-wheel, a pivoted lever, a cam for actuating said lever, an actuating-pawl pivoted on said lever, and a starting and stopping device for said auxiliary pattern-chain comprising a shaft provided at one end with a bent arm adapted to engage said actuating-pawl and at the other end with a starting-pawl riding on said main pattern-chain and a cam on said main pattern-chain for engaging said starting-pawl.

WILLIAM P. YOUNG.

Witnesses:

F. C. SOMES,
FRANK E. KELLEY.