

No. 751,213.

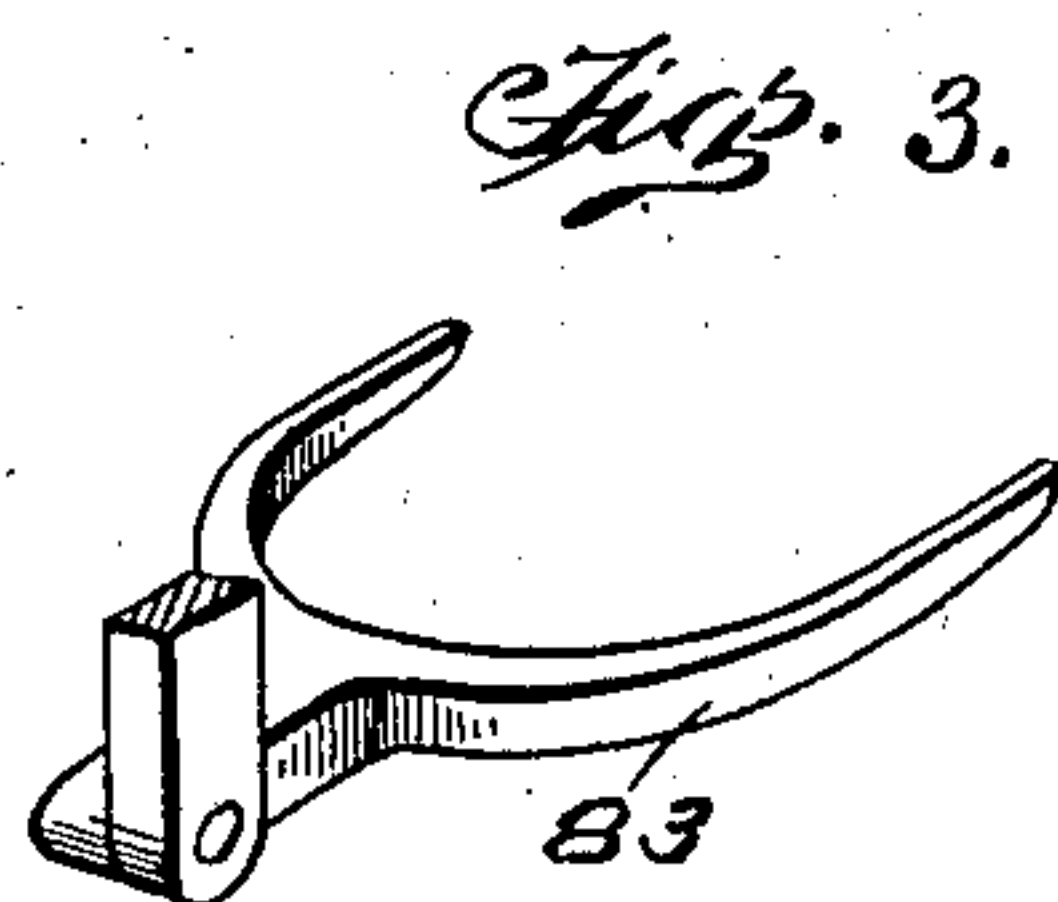
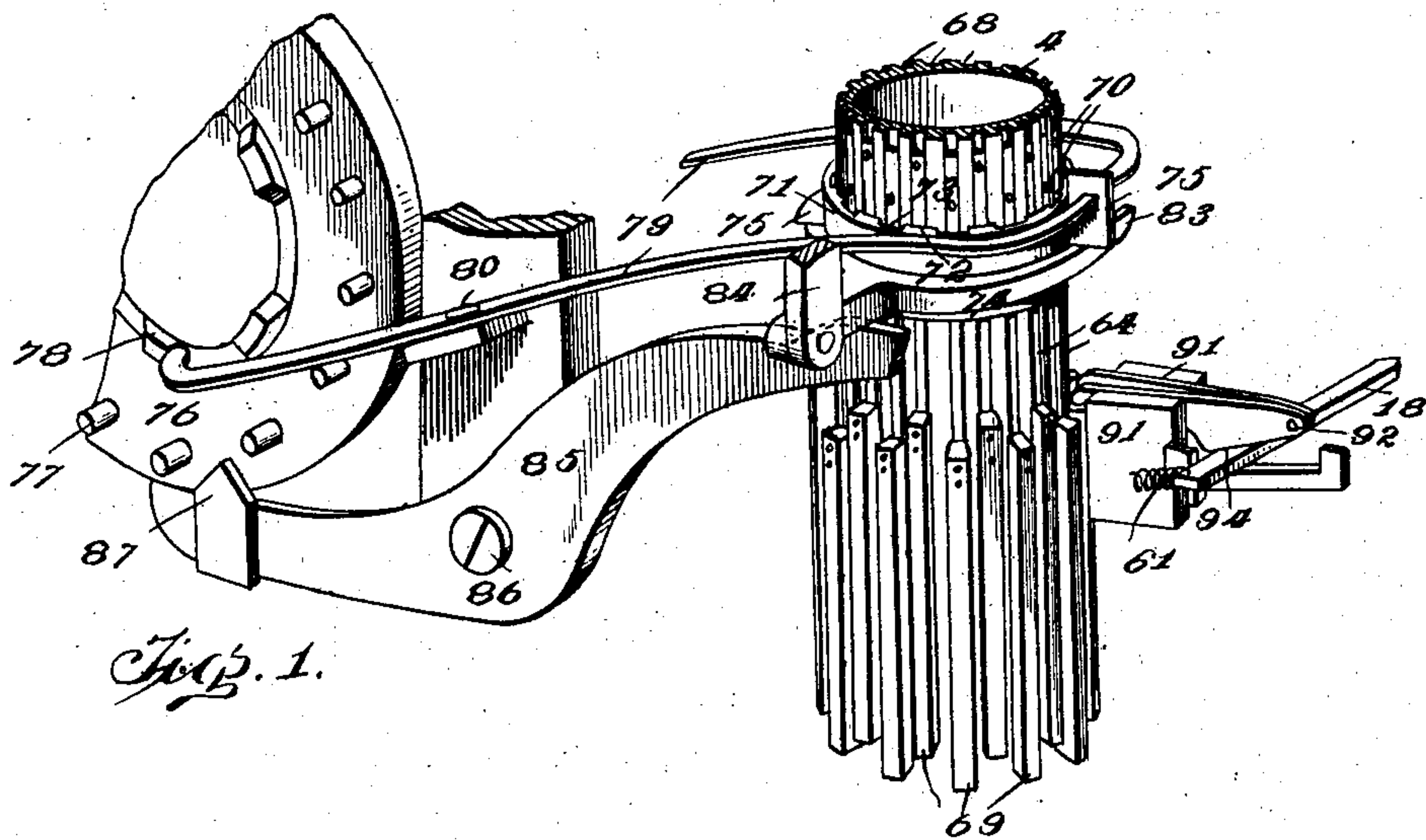
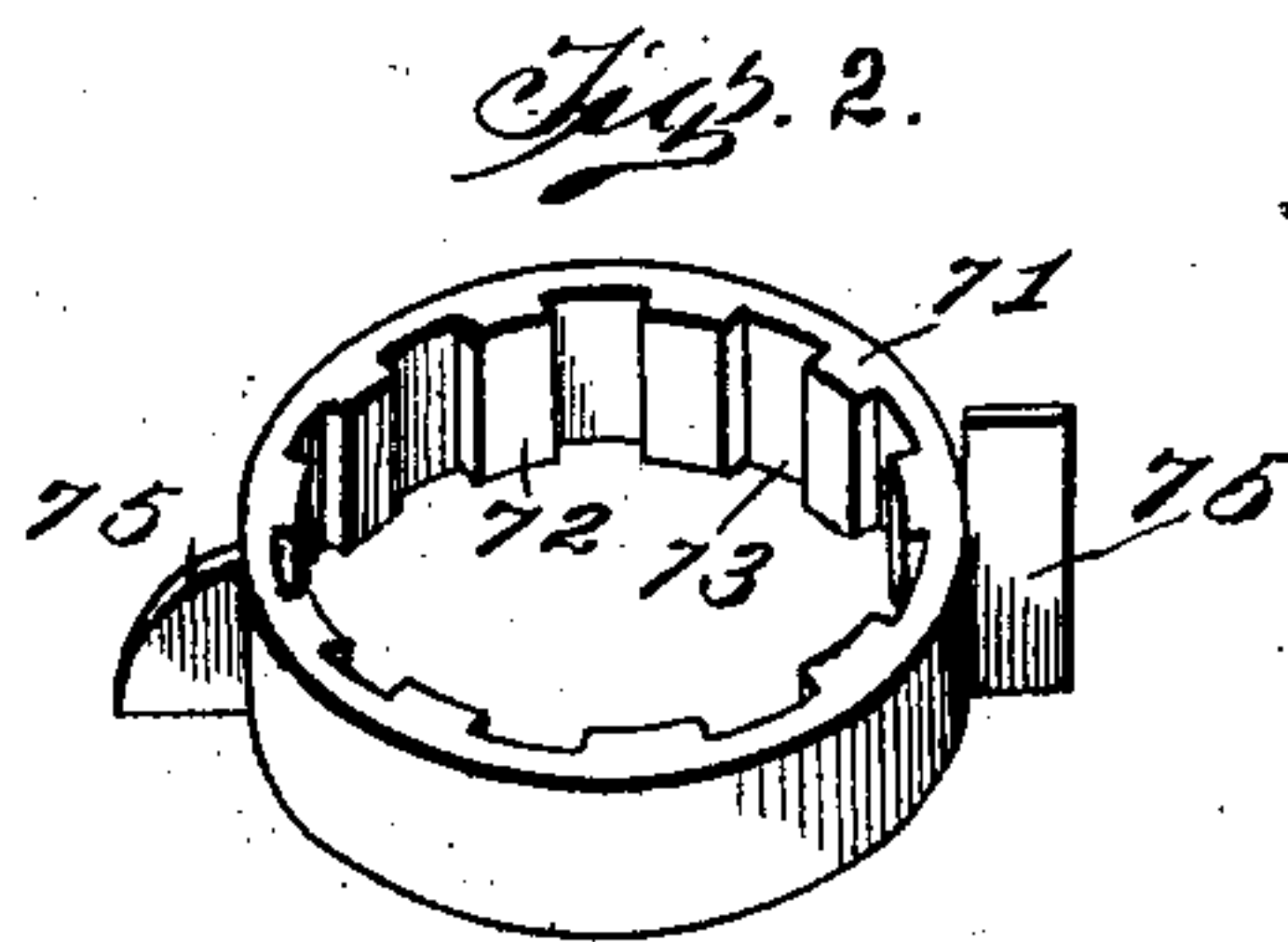
PATENTED FEB. 2, 1904.

B. T. STEBER.
KNITTING MACHINE.

APPLICATION FILED APR. 14, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



Witnesses
Lo. J. Handy
Bertha B. Beall.

Inventor
Bernard T. Steber
By *Mason, Fenwick Lawrence*
his Attorneys

No. 751,213.

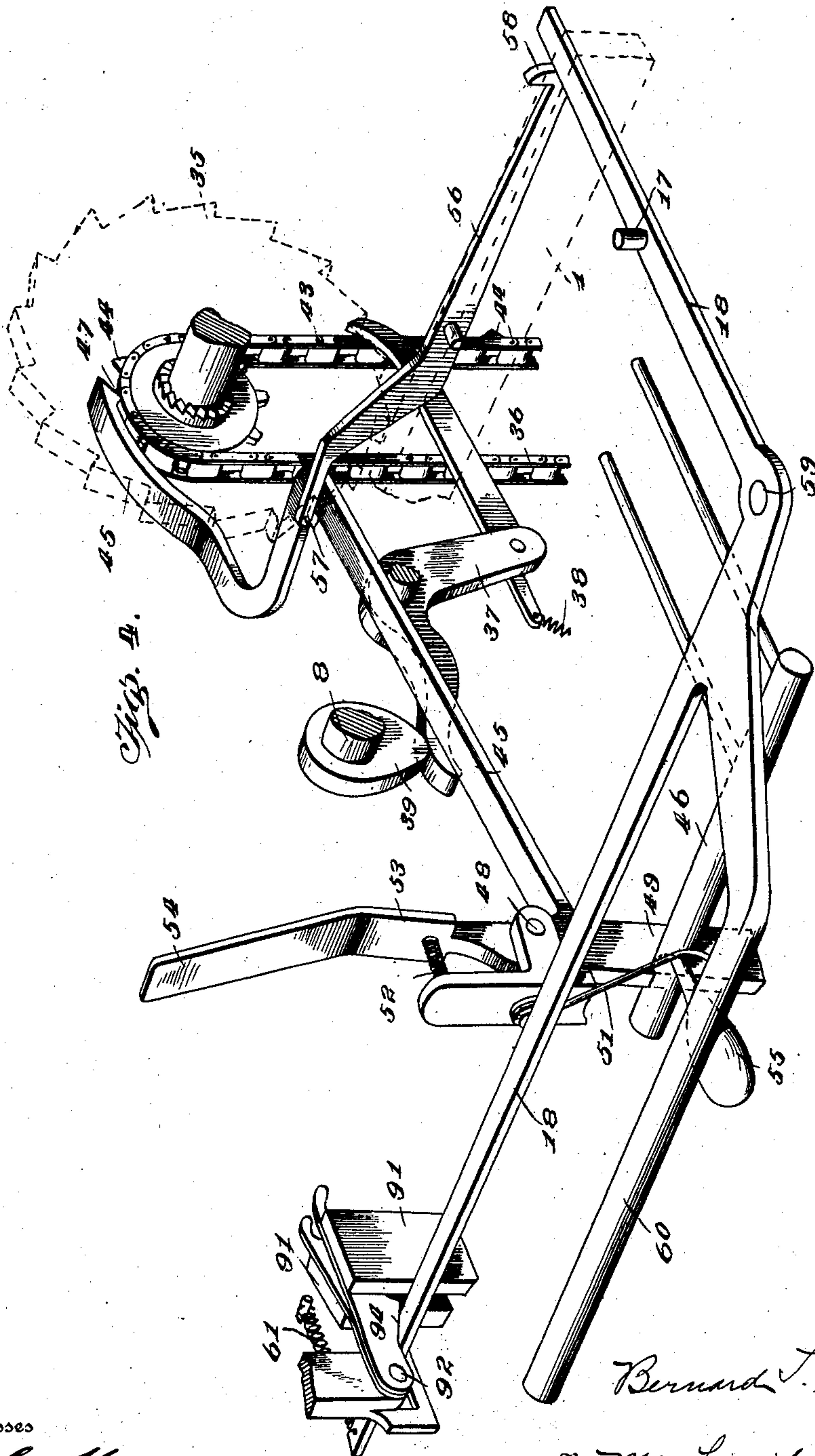
PATENTED FEB. 2, 1904.

B. T. STEBER.
KNITTING MACHINE.

APPLICATION FILED APR. 14, 1902.

NO MODEL.

4 SHEETS—SHEET 2.



Witnesses

L. G. Handy
Bertha B. Biall.

Inventor
Bernard T. Steber
By *Wm. Leunick Lawrence*
His Attorneys

No. 751,213.

PATENTED FEB. 2, 1904.

B. T. STEBER.
KNITTING MACHINE.

APPLICATION FILED APR. 14, 1902.

NO MODEL.

4 SHEETS—SHEET 3.

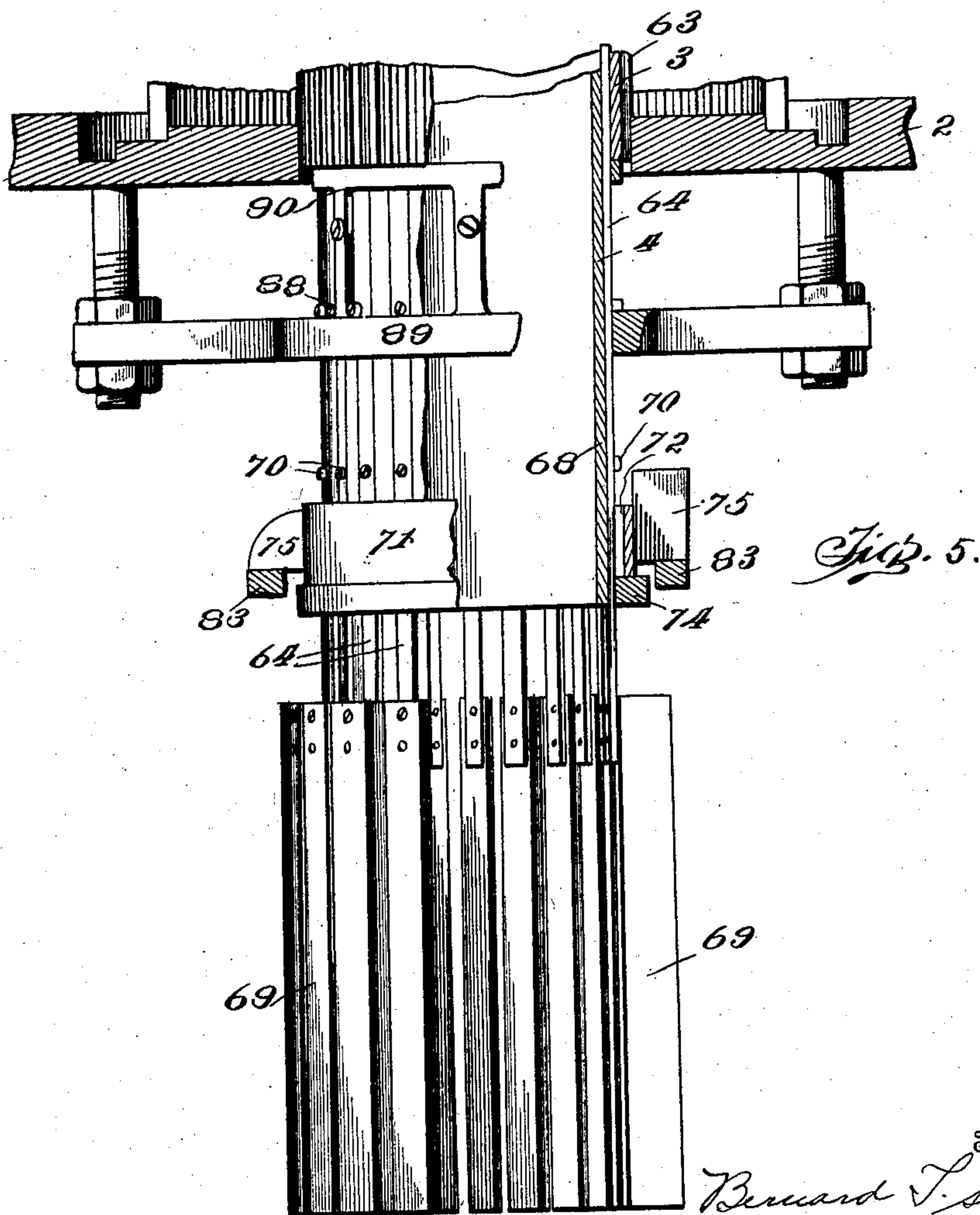
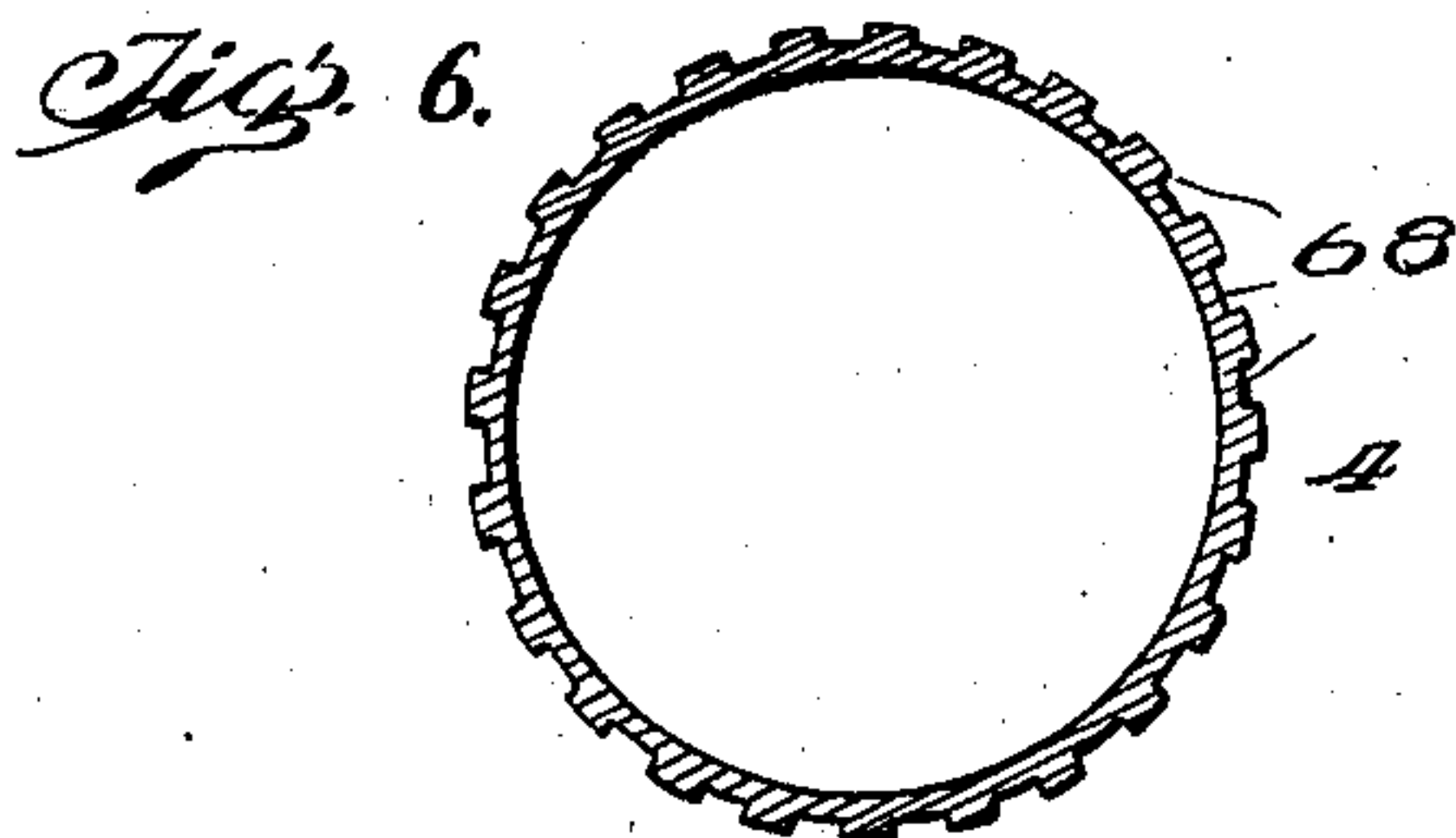


Fig. 5.

Witnesses

L. G. Handy

Bertha B. Beall

Inventor

Bernard T. Steber

By *Mason, Leavick, Lawrie*
his Attorneys

No. 751,213.

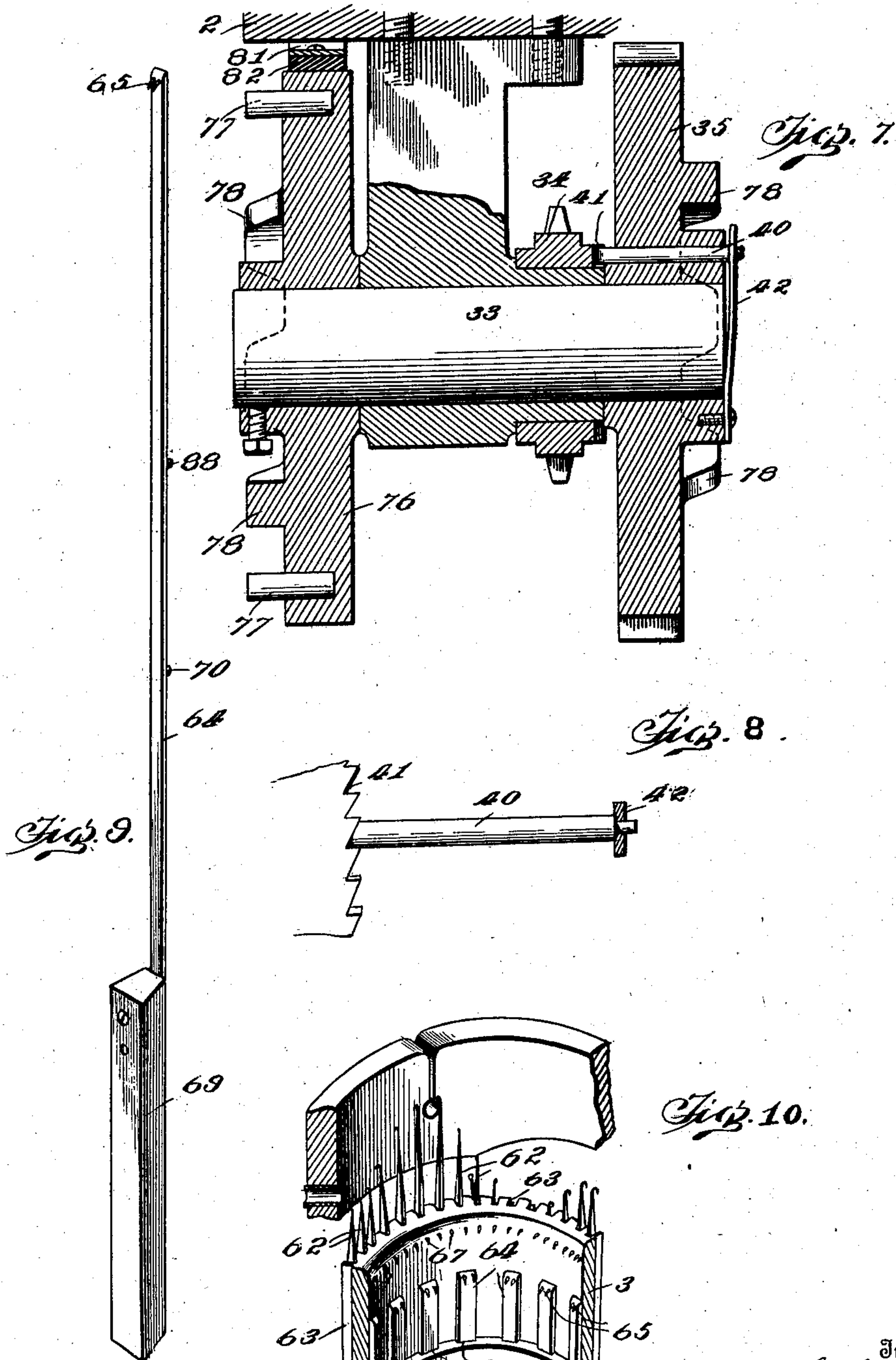
PATENTED FEB. 2, 1904.

B. T. STEBER.
KNITTING MACHINE.

APPLICATION FILED APR. 14, 1902.

NO MODEL.

4 SHEETS—SHEET 4.



Witnesses
L. G. Handy
Bertha B. Beall

Inventor
Bernard T. Steber
By *Wm. Mason, Lemuel Lawrence*
his Attorneys

UNITED STATES PATENT OFFICE.

BERNARD T. STEBER, OF UTICA, NEW YORK.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 751,213, dated February 2, 1904.

Original application filed January 18, 1902, Serial No. 90,363. Divided and this application filed April 14, 1902. Serial No. 102,908.
(No model.)

To all whom it may concern:

Be it known that I, BERNARD T. STEBER, a citizen of the United States, residing at Utica, in the county of Oneida and State of New York, have invented certain new and useful Improvements in 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.

The present invention relates to improvements in knitting-machines, and particularly to mechanism for maintaining a proper tension upon the fabric knitted for drawing it through the cylinder of the machine. The mechanism is especially adapted for use in connection with a knitting-machine such as that described in my previous application for a patent filed January 18, 1902, Serial No. 90,363, the present application being a division thereof.

It consists in certain novel constructions, combinations, and arrangements of parts, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this application, Figure 1 is a detail perspective view of the web-holding mechanism for keeping the work taut in the machine, also showing a portion of the mechanism for operating the same. Fig. 2 is a detail perspective view of the ring for raising the web-holders. Fig. 3 is a detail perspective view of the lever employed for raising the web-holder-operating ring. Fig. 4 is a detail perspective view of a portion of the mechanism for stopping or starting the machine and controlling its operation. Fig. 5 is a detail sectional view of a portion of the machine, showing the web-holder cylinder and the means employed for limiting the movement of the web-holders. Fig. 6 is a detail horizontal sectional view through the web-holder cylinder. Fig. 7 is a detail sectional view through the cam wheels or disks which operate the web-holder mechanism. Fig. 8 is a detail view of the spring-pressed pin for controlling the chain mechanism. Fig. 9 is a detail perspective view of one of the web-holders. Fig. 10 is a detail perspective view,

looking at the inside, of a portion of the cylinder and the feed-ring for delivering yarn to the needles.

In knitting-machines which are capable of producing a fabric such as a stocking or sock, knitting the different parts thereof continuously without removing the fabric from the machine, it is necessary to use a tension device upon the fabric for keeping the same taut at the knitting-needles which will be capable of varying the tension in accordance with the part of the fabric being knitted. Such a device is embodied in the present application. The knitting-machine with which such a tension device is employed is operated in any usual and well-known manner and is provided with a ratchet-wheel 35, which receives its motion from a shaft 8 of the machine through the agency of a cam 39 carried thereby, a lever 37, actuated by the said cam, and a pawl 36, carried by the said lever. The nose of the pawl engages the teeth of the ratchet-wheel 35 and is held in engagement therewith by means of a spring 38, secured to the said pawl and connecting the same with any suitable portion of the machine. The ratchet-wheel 35 thus operated in conjunction with the knitting mechanism of the machine is mounted upon a shaft 33 in the frame of the machine and is thus connected with a second disk or wheel 76, the two wheels 35 and 76 being employed for controlling the action of the mechanism for raising and lowering the web-holders, as will be hereinafter more fully described. The knitting-machine is also provided with a sprocket-chain 43, carrying a series of projecting lugs 44, which engage a lever 45. The lever 45 controls the belt-shifting mechanism of the machine, so as to automatically stop the machine at suitable intervals. A lever 56 is also engaged by the lever 45, the end 57 of said lever overhanging the lever 45. The other end of the lever 56 is provided with a catch or upturned hook 58, which can be brought into engagement with a lever 18, pivoted in the frame of the machine, for holding said lever out of engagement with certain auxiliary weights, which will be hereinafter more fully described. The

lever 18 is also provided with an operating-handle 60, so that it can be actuated by hand when desired. The lever 18 is also connected with the starting mechanism of the machine, 5 being arranged to throw a clutch by means of a pin 17 for starting the operation of the machine.

The knitting-machine preferably knits a cylindrical fabric, the same passing downwardly through the knitting-cylinder, as is usual in such machines. As the fabric is formed it passes downwardly inside the needle-cylinder, and in order to continually draw the fabric away from the needles as it is formed I use a series of web-holders 64, which are formed with inwardly-extending fabric-engaging points or teeth 65. The needle-cylinder 66 is formed near its upper edge, interiorly thereof, with a series of inwardly-projecting points or hooks 67, which prevent the fabric from drawing upwardly again after it has once been pulled down, and the said hooks serve to hold the fabric while the web-holders are raised from time to time to obtain new holds upon the fabric. The web-holders pass downwardly through grooves 68, formed in the outer surface of the web-holder cylinder 4, the upper ends of the web-holders projecting a short distance above the upper edge of said cylinder. The lower ends of the said web-holders have weights 69 attached to them, so that the web-holders are normally drawn downwardly with sufficient force to exert a proper tension upon the fabric. The web-holders are raised from time to time by suitable mechanism for obtaining new holds upon the fabric; but it is preferable not to raise them all at the same time, so that some will be suspended to hold the fabric taut while others are raised. In order to raise the web-holders, I provide each one of the bars 64 with an outwardly-projecting stud, as 70, which is in position to be engaged by a ring 71, which surrounds the web-holder cylinder. This ring 71 is provided on its inner surface with a series of inwardly-projecting ribs 72, having grooves or spaces 73 between them. The said ribs 72 are so arranged that they will engage alternate studs 70, and will therefore only lift every other web-holder. The said ring 71 is free, however, to be turned so that it may be brought beneath the other alternate set of studs which were not previously engaged. Thus the second set of web-holders may be lifted, while the first set remain in their lowered positions. The ring 71 rests upon a circular support 74, which surrounds the web-holder cylinder and is rigidly secured thereto. The said ring 71 is provided with diametrically opposite projecting lugs or ribs, as 75, by which the said ring may be turned to bring it alternately under different sets of studs 70 and then lifted. The mechanism which operates the ring 71 acts in conjunction with the ratchet-wheel 35, heretofore described. Upon

the same shaft with the ratchet-wheel 35 is a second wheel of the same diameter, as 76, the said wheel having a series of laterally-projecting studs 77 arranged around its periphery. On the opposite outer faces of the two wheels 35 and 76 are arranged laterally-extending cams 78, which are formed with beveled faces at each end and are adapted to strike a pair of levers 79, which are pivoted to the frame 1 of the machine at 80. The outer ends of the levers 79 embrace the web-holder cylinder and are bent inwardly, so that their ends engage the opposite faces of one of the lugs 75. The cams 78 on the ratchet-wheel 35 are arranged so as to be opposite the spaces between the cams 78 on the wheel 76. In this way one lever 79 will be moved in one direction, while the other lever 79 is moved to accommodate itself thereby, and the rib 75 will thus be actuated first in one direction and then in the other by the joint action of the lever 79. The ring 71 will thus be swung so that its ribs 72 first come beneath one alternate set of studs 70 and then beneath the other alternate set of studs 70. The disks 76 and the ratchet-wheel 35, connected therewith, are kept from revolving in the wrong direction by a spring 81, carrying a shoe or washer of leather or other suitable material, as 82, which bears against the periphery of the said disk. In order to lift the web-holders, the ring 71 is arranged so that its oppositely-extending lugs 75 are supported by a forked lever 83. This lever 83 is pivoted to a standard 84 on the frame of the machine. Between the said standard and the web-holder cylinder the said forked lever 83 is engaged by a lever 85, pivoted to the frame 86, its other end being formed with a beveled projection 87, which is engaged by the studs 77 of the disk or wheel 76. As each stud 77 engages the projection 87 the ring 71 will be raised and one set of web-holders will be lifted to get a new grip upon the fabric being formed. The feeding of the fabric downwardly through the machine will thus be automatically controlled at all times. The extent of the movement of the web-holders is controlled by a second set of studs 88, projecting therefrom above the actuating-studs 70, and these limiting-studs are engaged by a frame 89, which is secured to the bed-plate 2 beneath the same. The studs 88 engage this frame in their lowest points and when raised are limited in their upper movement by a structure or framing 90, rising from said lower frame, as clearly illustrated in Fig. 8. The web-holders will thus be prevented from being raised too high or dropping too low in the machine.

When the tension device is drawing the fabric through the cylinder and at the time when the heel and toe portions are being knitted, a greater weight is required for holding the parts taut, as heretofore intimated. I therefore arrange additional weights 91, so as to

strike upon the upper ends of the weights 69. These auxiliary weights are pivoted, as at 92, to the frame of the machine and extend inwardly between suitable guides 93, being free to move up and down at their inner ends. Each of these auxiliary weights is formed with an inclined under surface 94, which is adapted to be engaged by the bell-crank lever 18, as above set forth, when the same is in position to prevent the back-and-forward movement of the cam-cylinder. When the machine is knitting the heel or toe portion of a sock or stocking, it is necessary to employ a back-and-forth movement, and so at this time the lever 18, which holds the parts in position for securing this movement, is withdrawn from beneath the auxiliary weights 91 and they are permitted to augment the heft of the weights 69. As soon as the back-and-forth movement ceases and a straight portion of the fabric is being operated upon by a continuous revolution of the cylinder the lever 18 will be returned to its first position and will lift the weights 91 out of engagement with the weights 69, as heretofore explained.

The machine will be seen to be well adapted for the desired purpose and capable of maintaining a proper tension upon the fabric as it is formed by the knitting-machine, varying the weight which is placed upon the same automatically.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A tension device for knitting-machines, comprising a series of web-holders, weights carried by the said web-holders for pulling them downwardly, the upper ends of said web-holders being adapted to engage a knitted fabric, an oscillating ring member provided with means for engaging the web-holders, a swinging arm for moving the said ring member in one direction, and a swinging arm for moving said ring member in the other direction for lifting different sets of the web-holders, substantially as described.

2. A web-holding mechanism for knitting-machines, comprising a series of reciprocating web-holders for feeding a fabric through the knitting-machine, a ring for raising the said web-holders having a series of ribs upon its inner surface arranged to engage alternate web-holders, levers fulcrumed on each side of the said ring and engaging the opposite sides thereof, the said levers turning the ring first in one direction and then the other so that the ribs will engage first one set of web-holders and then another, and means for lifting the said ring, substantially as described.

3. In a knitting-machine, a series of reciprocating weighted gravity-actuated web-holders, a ring for engaging said holders in alternate sets for raising the said sets alternately, laterally-projecting lugs on said ring, a forked

lever for engaging said lugs in order to raise and depress the ring, a lever operating in a different plane for engaging one of the lugs and oscillating it in one direction and another lever for engaging the lug and oscillating it in the other direction so that the ring is turned back and forth beneath the alternate sets of web-holders, and means for operating the said turning-levers in accordance with the operation of the knitting-machine, substantially as described.

4. A web-holding mechanism for knitting-machines, comprising a series of weighted web-holders adapted to engage a knitted fabric, a ring adapted to engage the web-holders in alternate sets, means for positively moving the ring back and forth, oppositely-projecting lugs on the said ring, and a lever engaging the same for lifting the ring when a set of web-holders is to be raised, substantially as described.

5. In a knitting-machine, a series of web-holders having projecting studs extending therefrom, one set of studs being operated for raising and lowering the web-holders, and the other set of studs being employed for limiting the movement of the same, a frame for engaging the limiting-studs, a ring for engaging the lifting-studs, and means for oscillating and lifting the said ring, substantially as described.

6. In a knitting-machine, a series of web-holders, a ring for raising them, a bifurcated lever for raising the ring, a lever engaging said bifurcated lever at one end, a wheel or disk provided with a series of studs for engaging the other end of the lever, and means for operating said disk in connection with the operation of the machine, substantially as described.

7. In a knitting-machine, a series of web-holders, a ring for operating them having diametrically opposite lugs, a bifurcated lever for supporting the said ring and lugs, a lever for lifting the bifurcated lever, a pair of levers pivoted on the frame and engaging one of said lugs on the opposite faces thereof, the other ends of said levers being operated by suitable mechanism, comprising a pair of disks, cams on the opposite faces of said disks for moving said levers, one of said disks also carrying means for operating the ring-lifting levers, substantially as described.

8. In a knitting-machine, a series of web-holders, a ring for raising them, oppositely-projecting lugs on said ring, means for lifting the ring, means for rotating the ring, comprising levers pivoted to the frame of the machine and engaging the opposite faces of one of the lugs, disks having cams arranged on their faces alternately with respect to each other for engaging the other ends of said levers, and means for rotating said disks in connection with the operation of the machine,

whereby the ring will be rotated for alternately raising alternate web-holders, substantially as described.

9. In a knitting-machine, web-holders, a ring
5 for operating them, means for lifting the ring,
means for oscillating the same, disks secured
to a common shaft, for actuating said lifting
and oscillating means, ratchet-teeth on one
10 of said disks, a pawl for engaging the said
teeth, a bell-crank lever for operating the
pawl, and a cam carried by one of the oper-
ating-shafts of the machine for engaging said
bell-crank lever and moving the said pawl so
15 as to feed the ratchet-teethed disk step by step,
substantially as described.

10. In a knitting-machine, a series of web-
holders, adapted to reciprocate within the
needle-cylinder of the machine, a row of fixed
20 teeth or projections extending inwardly in the
cylinder and arranged near the upper edge
thereof for preventing the fabric from mov-
ing upwardly after it has once been drawn
down, weights secured to the lower ends of
the web-holders, auxiliary weights pivoted
25 upon the frame of the machine and adapted
to rest upon the upper ends of the weights of
said web-holders when certain portions of the
fabric are being operated upon which require
heavier web-holders than other portions do,
30 and means for throwing said auxiliary weights
into or out of operation, substantially as de-
scribed.

11. In a knitting-machine, web-holders,
means for reciprocating the same, weights se-
35 cured to the lower ends of said holders and
having their ends projecting to one side
thereof, auxiliary weights pivoted to the ma-
chine and having inclined under surfaces, a
lever mounted upon the machine and adapted
40 to engage the inclined faces of said auxiliary
weights, a lever constructed to hold the
weights out of operation when the additional
tension is not needed, and releasing the said
weights when fabric or portions of fabrics are
45 being knitted which need considerable weight
upon the tension device, substantially as de-
scribed.

12. In a knitting-machine, the combination
with a knitting mechanism, of reciprocating
web-holders for drawing the web downwardly 5
in the machine, means for raising the web-
holders, wheels carrying a plurality of cams
and operated by the machine for actuating
the web-holder-operating mechanism, addi-
tional weights for affecting the web-holders, 5
levers controlling the same, and gearing ac-
tuated by one of the cam-wheels for operating
said levers, substantially as described.

13. In a knitting-machine, the combination
with a series of web-holders for maintaining 6
a tension on the fabric being knitted, of wheels
having projecting cams, means for rotating
them, and levers operated by the said cam-
wheels for controlling the web-holders, sub-
stantially as described. 6

14. In a knitting-machine, the combination
with a mechanism for driving the machine
with a back-and-forth movement or a contin- 7
uous movement, of means for stopping said
movement at the proper time, a tension mech-
anism, comprising web-holders for drawing
the knitted web downwardly in the machine,
auxiliary tension-weights arranged to engage
said web-holders at certain times, and a lever
for changing the machine-driving mechanism, 7
the said lever also engaging said auxiliary
weights so that they will be actuated in cor-
respondence with the knitting operation of the
machine, substantially as described.

15. A tension device for knitting-machines 8
comprising a series of web-holders, weights
carried by the web-holders for pulling them
downwardly, the upper ends of said web-
holders being adapted to engage a knitted
fabric, an oscillating ring provided with means 8
for engaging the web-holders and means for
oscillating the said ring member for alter-
nately lifting different sets of the web-holders.

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

BERNARD T. STEBER.

Witnesses:

W. A. BURNOP,
C. W. JONES.