

No. 656,218.

Patented Aug. 21, 1900.

J. E. ROWE & L. A. BENTZ.

KNITTING MACHINE.

(Application filed Feb. 4, 1899.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1

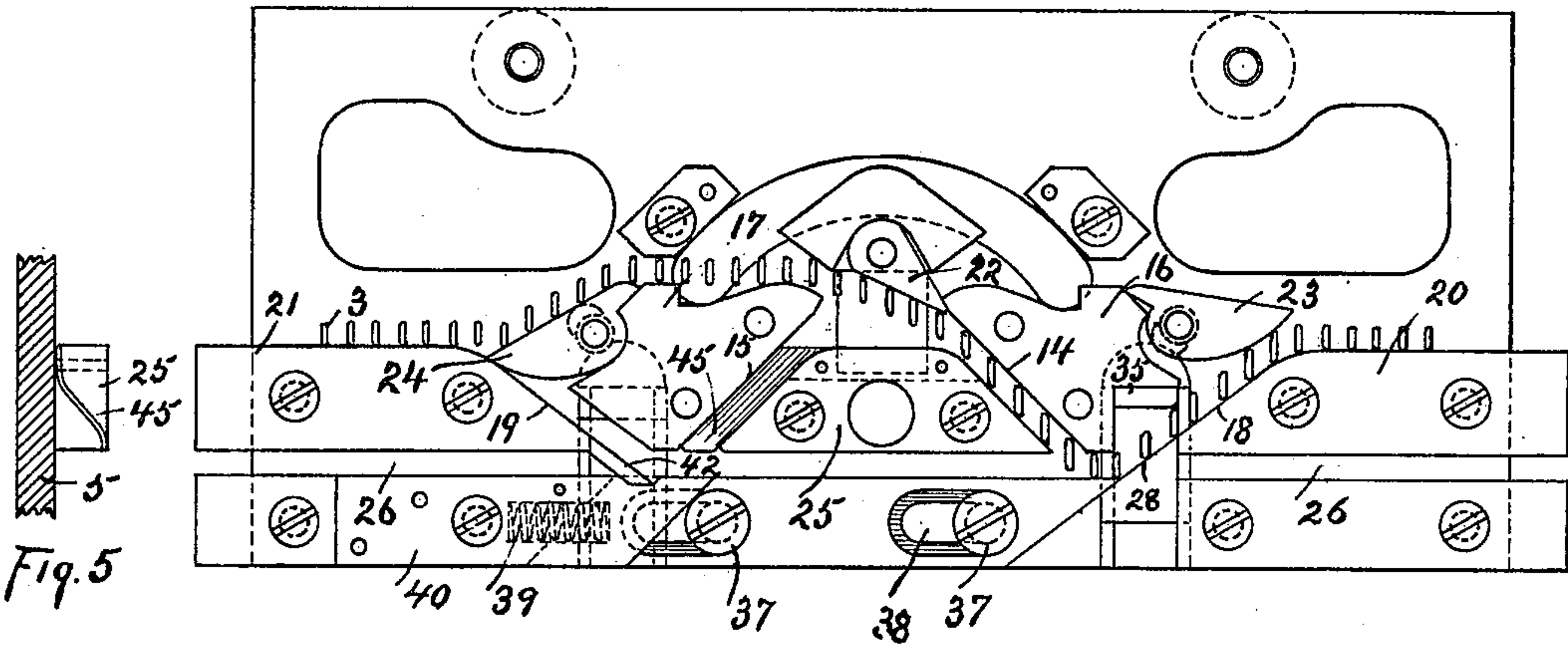


Fig. 6

Fig. 2

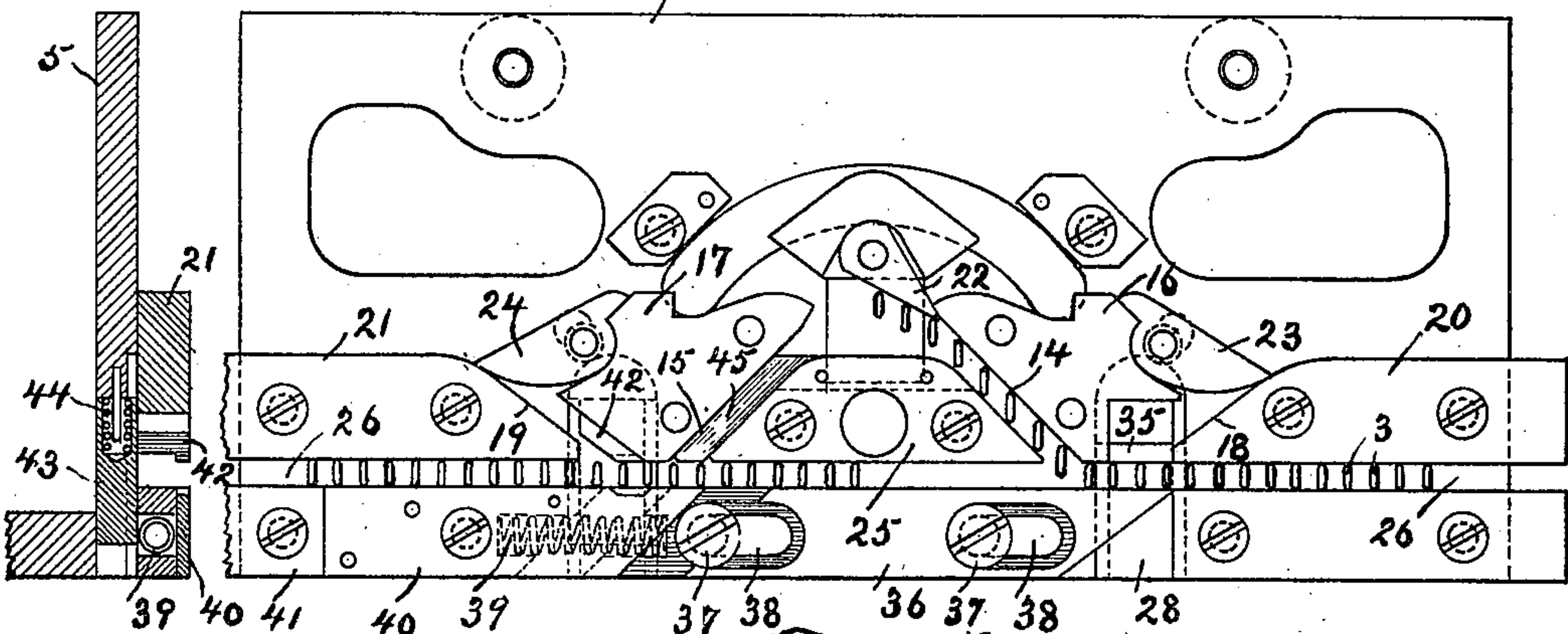
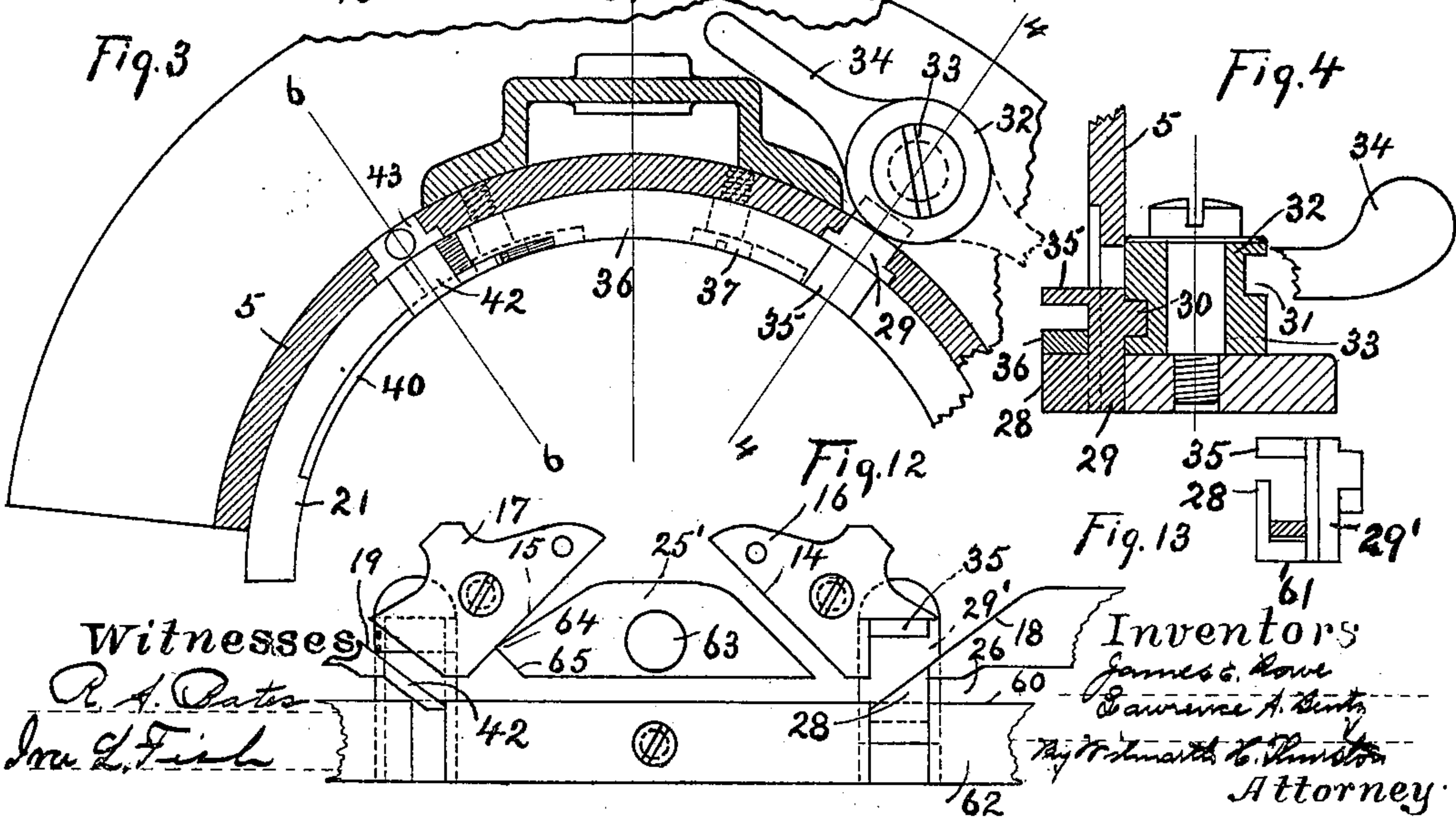


Fig. 3

Fig. 4



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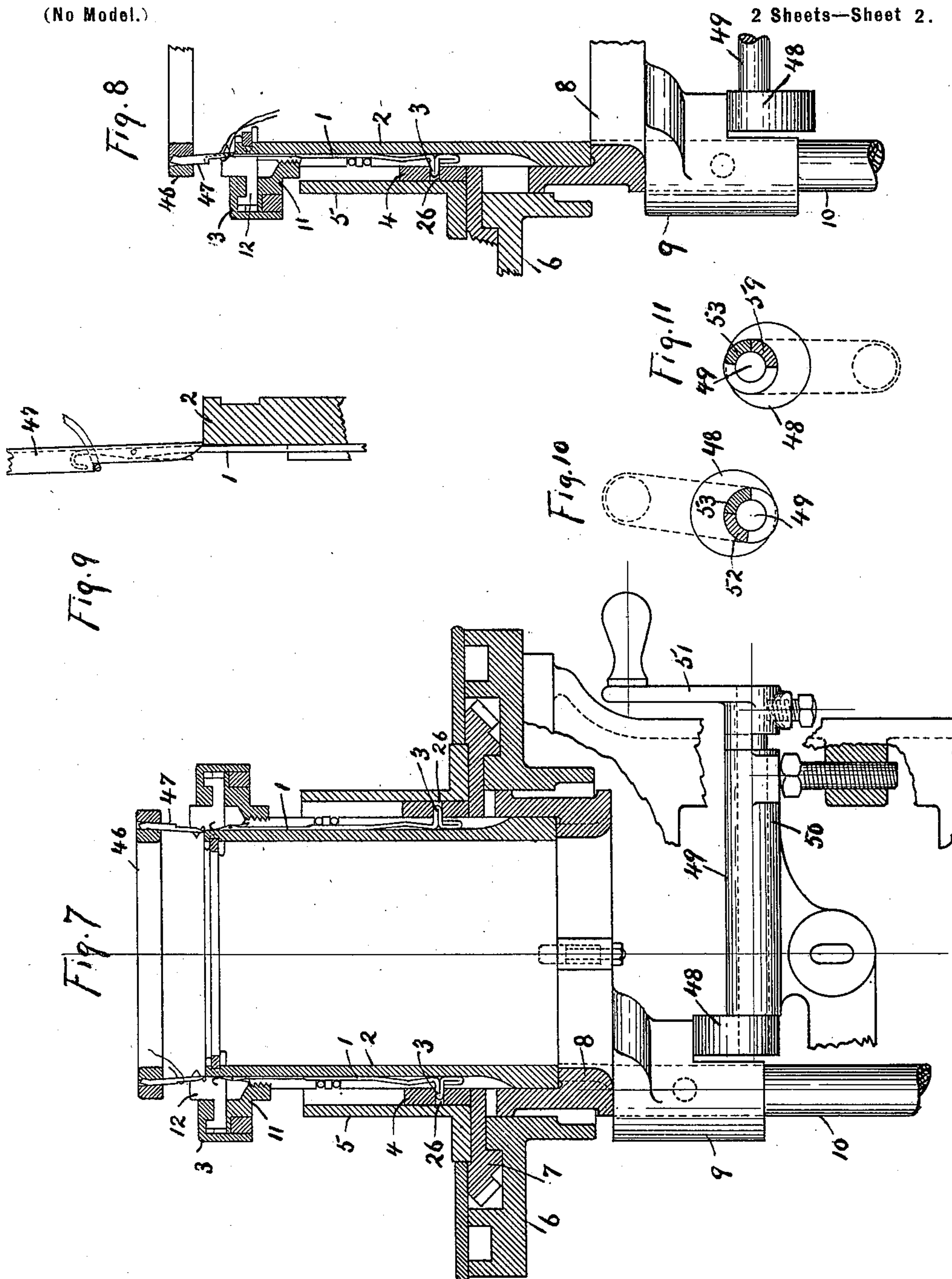
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JAMES E. ROWE AND LAWRENCE A. BENTZ, OF PAWTUCKET, RHODE ISLAND, ASSIGNORS TO THE E. JENCKER MANUFACTURING COMPANY, OF SAME PLACE.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 656,218, dated August 21, 1900.

Application filed February 4, 1899. Serial No. 704,578. (No model.)

To all whom it may concern:

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

The invention relates to knitting-machines, and more especially to circular-knitting machines commonly used in the manufacture of stockings and half-hose; and its object is to facilitate the transfer of the stitches of a top or cuff to the needles in using the machine for knitting half-hose. This is accomplished by utilizing the sinkers to center the quill-cup, from which the top is transferred, and to hold the quills of said cup in proper relation to the needles. By thus using the sinkers to center and hold the quill-cup said cup may be quickly and conveniently placed in position without the use of a uniformer to hold the needles and without any danger that the needles will fail to enter the proper quill, as sometimes happens when the quill-cup is applied directly to the needles without any other support or centering device. The normal position of the needles with relation to the sinkers is such that the quill-cup cannot be applied to the sinkers, and means are provided for moving the needles to bring them into such relation with the sinkers that the quill-cup may be applied to and centered by the sinkers. In order that the sinkers may coact with the quills of the quill-cup in centering said cup, the needles should either project but a short distance above the sinkers or be below the sinkers, and in case they project slightly above the sinkers they should be leveled, so that their ends will all be in substantially the same plane. It is also preferable to level the needles even if their ends are drawn down below the sinkers, as in such case less relative movement between the sinkers and needles is necessary after the quill-cup has been applied to bring the needles up into the quills and into position for the transfer of the stitches. It is preferred to move the sinkers

after the quill-cup has been applied to bring the needles and quills into proper relation for the transfer of the stitches, although it will be understood that the needles might be moved instead of the sinkers for this purpose without departing from the invention. After the stitches have been transferred to the needles the parts are returned to their normal position—that is, into knitting relation.

In the accompanying drawings the invention is illustrated embodied in a machine substantially such as shown in Patent No. 570,059, dated October 27, 1896, although it will be understood that the invention may be employed in other forms of machines.

In embodying the invention in this machine it is preferred to level the needles and bring them all below the sinkers by guiding the butts out of and below the knitting-cams, and it is preferred to bring the hooks of the needles above the sinkers by depressing the sinkers. After the stitches have been transferred the needles are returned into the knitting-cams and the sinkers raised to their normal position.

In said drawings, Figure 1 is an elevation showing that portion of the inner surface of the cam-cylinder which carries the knitting-cams, the narrowing and widening cams being removed. Fig. 2 is a similar view showing the parts in position to level the needles. Fig. 3 is a horizontal sectional view through the cam-cylinder. Fig. 4 is a sectional detail on line 4 4, Fig. 3. Fig. 5 is a detail of the spring 45. Fig. 6 is a sectional detail on line 6 6, Fig. 3. Fig. 7 is a vertical sectional view showing the means for raising and depressing the sinkers. Fig. 8 is a detached sectional view showing sinkers in their lower position. Fig. 9 is a detail of a needle and a quill of the quill-cup. Figs. 10 and 11 are details of the cam for raising and lowering the sinkers. Figs. 12 and 13 are details of a modified construction.

Referring to the drawings in detail, the needles 1 are guided in grooves in the needle-cylinder 2 and are provided with butts 3, which ride upon a ledge 4 on the inner surface of the cam-cylinder 5 and are acted upon by the knitting-cams carried by the cam-cyl-

inder. The cam-cylinder 5 is suitably mounted in the bed-plate 6 and is driven through a bevel-gear 7, secured thereto. The needle-cylinder 2 is secured in a ring 8, provided with boss 9, by which it is secured to a rod 10, suitably guided in the frame of the machine. A ring 11 is secured to the upper end of the needle-cylinder and carries the sinkers 12, which are operated by a sinker-cam ring 13, said cam-ring being connected with the cam-cylinder, as clearly set forth in the patent referred to. The knitting-cams are substantially the same as the cams of said patent and consist of the inclined surfaces 14 and 15, formed on the plates 16 and 17, and the inclined surfaces 18 and 19, formed on plates 20 and 21, located at the ends of the ledge 4. A pivoted switch-cam 22 is located between the cams 14 and 15, and switch-cams 23 and 24 are located at the ends of the cams 18 and 19.

An inverted V-shaped plate 25 is located between the cams 14 and 15 and serves to prevent the needle-butts from dropping away from said cams. The action of these cams during rotary and reciprocating knitting is well understood and need not be herein set forth.

A groove or guideway 26 is formed in the inner surface of the cam-cylinder, and the needle-butts are all directed into this groove when it is desired to level the needles and to bring all the needles below the sinkers. The groove 26 extends circumferentially around the ends of cams 14 and 15 and is so located that the needle-butts 3 pass directly from the end of cam 14 into said groove. The needle-butts are prevented from entering the groove 26 during rotary knitting by a cam 28, which bridges over the end of said groove and forms an extension of the cam 18. The cam 28 is carried by a plate 29, which is guided in the cam-cylinder and is provided with a lug 30, which projects into a cam-groove 31, formed in a sleeve 32. The sleeve 32 is mounted on a stud 33, secured in the flange of the cam-cylinder and is provided with a handle 34, by which said sleeve may be turned to raise and lower the plate 29. The plate 29 also carries a flange or gate 35, which projects into the cam-cylinder and normally stands in a recess formed in the plate 16, as shown in Fig. 1. When the plate 29 is lowered to carry the cam 28 down out of the path of the needle-butts, the gate 35 is moved down and fills the space between the plates 20 and 16, as shown in Fig. 2. In order to bridge over the space which would otherwise be left in the lower side of the groove 26 by the withdrawal of the cam 28, a longitudinally-movable plate 36 is mounted on the inner surface of the cam-cylinder, being held and guided by screws 37, which pass through slots 38 in said plate. The end of plate 36 adjacent the cam 28 is inclined and overlaps the edge of said cam, as shown in Fig. 1. A spring 39 bears against plate 36 and tends to force said plate against cam 28.

When the cam 28 is withdrawn, the plate 36 is forced over said cam, as shown in Fig. 2, and when the cam is raised it acts against the inclined end of the plate and forces said plate back against the spring. The other end of plate 36 is reduced in thickness and slides back of a plate 40, which is secured to the rib 41, which is secured to the cam-cylinder and forms the lower side of the groove 26. By this construction a continuous support for the needle-butts is formed when the cam 28 is withdrawn.

When the cam-cylinder is reversed in reciprocating knitting, the needle-butts pass down cam 15 and are prevented from entering the groove 26 by a switch-cam 42, which extends from the end of cam 19 across said groove and has its lower end located in a notch in the plate 40. The switch-cam 42 is carried by a plate 43, which is guided in the cam-cylinder and is yieldingly held in position by a spring 44. (See Fig. 6.) When the needle-butts pass off the end of the cam 15, they strike cam 42, which forms an extension of cam 19, and are directed up onto cam 19. When the butts pass around groove 26, they will strike the back of cam 42, which will yield and ride on the tops of said butts, as shown in Fig. 2. To prevent the butts in the groove 26 from passing upward under cam 15, a yielding gate is provided at the lower end of said cam, which in the form shown consists of a leaf-spring 45, the upper end of which is secured against the inner surface of the cam-cylinder and the lower end of which extends out substantially flush with the surface of plate 17 and above the butts in the groove 26. When the butts pass down the cam 15, the spring will yield to allow them to pass, but will normally stand over the groove 26 and bridge the space between the plates 17 and 25. It will be seen from the foregoing that the upper edge of the groove 26 is continuous, except between the plates 25 and 16, and that the butts in groove 26 cannot rise except the few directly below this space, and that these can rise only a very short distance. Any butts which may rise at this point, however, will be in the usual path of the butts during rotary knitting and will follow that path when the cam 28 is raised and the cam-cylinder rotated.

When it is desired to transfer a top to the needles, the machine is stopped and the lever 34 is turned into the dotted-line position shown in Fig. 3, which rotation causes the cam 31 to draw the plate 29 down and withdraw the cam 28 from the path of the needle-butts. The cam-cylinder is now given a rotation, and the needle-butts all pass down the cam 14 and into the groove 26, the cam 42 yielding to allow the passage of the butts. This movement of the needles brings the upper ends of the needles into the same plane, and the groove 26 being below the knitting-cams the ends of the needles are also below the sinkers, as shown in Fig. 7. The quill-

cup 46, with the stitches of the top on the quills 47, is now placed in position upon the sinkers, the quills passing between the sinkers, which serve to center and support said cup and hold the quills in proper relation to the needles. The needle-cylinder is now lowered to bring the needles up above the sinkers and into the quills of the quill-cup, and the stitches are transferred to the needles and the quill-cup removed. The cam 28 is now returned to the position shown in Fig. 1 and the cam-cylinder given a single revolution. As the cam-cylinder revolves the butts of the needles pass up the cam 28 and cam 18 and are thus returned into their usual path and into operative relation with the knitting-cams. The needle-cylinder is now raised into its normal position, and the machine is started.

Any suitable means may be employed for raising and lowering the needle-cylinder, and the means shown consists of a cam 48, upon which the boss 9 rests. The cam 48 is secured to a shaft 49, journaled in a bearing 50 and provided with a handle 51, located in a convenient position. The hub of the handle 51 is provided with a lug 52, which is arranged to engage the opposite sides of a lug 53 on the bearing 50, said lugs forming stops for limiting the movement of the cam 48. The cam normally—that is, during the knitting—stands in the position shown in Fig. 7; but when the needles are to be brought above the sinkers the cam is turned into the position shown in Fig. 8 and the needle-cylinder and sinkers lowered or depressed.

In Figs. 12 and 13 is shown a slightly-modified construction, in which the leaf-spring 45 and the yielding plate 36 are not used, but other means employed for keeping the needle-butts in the groove 26. In this construction the ledge 60, which forms the lower side of the groove 26, extends continuously about the cam-cylinder. The cam 28 is formed on a thin plate carried by an arm 61, extending from the slide 29', which also carries the bridge 35. The plate 62 is recessed for the passage of the arm 61, and cam 28 slides in a groove formed in the face of the plate 62. When cam 28 is depressed, the needle-butts are supported by that part of ledge 60 back of said cam.

The cam-plate 25' is mounted to swing on the pivot 63 and is so constructed that when the butts of the needles are passing down cam 14 the end 64 of said plate bears against the cam 15. When the motion of the cam-cylinder is reversed, the needle-butts in passing down cam 15 swing cam-plate 25' away from cam 15, the friction on the pivot 63 serving to hold said plate in position until it is acted on by the needle-butts. When the needle-butts are directed into the groove 26, the plate 25' is in the position shown, and when the needle-cylinder is raised the end 64 prevents any needle-butts passing up between cam 15 and said plate 25'. The end 64 is preferably beveled off at 65, so that there

will be no danger that a needle-butt will catch on the point of said cam-plate.

By employing the sinkers to support the quill-cup and hold the quills the correct position of the quills in relation to the needles is insured without the use of any uniformer, and the quill-cup may be quickly and conveniently placed in position and the stitches transferred without danger that any of the needles will fail to enter the proper quill and receive its proper stitch.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. In a knitting-machine, the combination with the needles, sinkers and knitting-cams, of means for moving the needles to bring the needles into such relation with the sinkers that a transfer quill-cup may be applied to and be centered by the sinkers, substantially as described.

2. In a knitting-machine, the combination with the needles, sinkers, and knitting-cams, of means for moving the needles to bring them into such relation with the sinkers that a transfer quill-cup may be applied to and centered by the sinkers, and means for bringing the needles and quills into proper relation for the transfer of stitches from the quills to the needles, substantially as described.

3. In a knitting-machine, the combination with the needles, sinkers, and knitting-cams, of means for moving the needles to bring the ends of all the needles below the sinkers, means for lowering and raising the sinkers, substantially as described.

4. In a knitting-machine, the combination with the needles, sinkers and knitting-cams, of means for leveling the needles and simultaneously bringing them into such relation with the sinkers that a transfer quill-cup may be applied to and be centered by the sinkers, substantially as described.

5. In a knitting-machine, the combination with the needles, sinkers, and knitting-cams, of means for leveling the needles below the sinkers, means for moving the sinkers below the plane of the needle-hooks, and means for returning the parts into knitting relation, substantially as described.

6. In a knitting-machine, the combination with the needles, sinkers, and knitting-cams, of means for guiding the needle-butts into a plane below the knitting-cams, means for lowering the sinkers to bring the hooks of the needles above the sinkers, and means for returning the parts into knitting relation, substantially as described.

7. In a knitting-machine, the combination with the needles, sinkers, and knitting-cams, of means for guiding the butts of the needles into substantially the same plane below the knitting-cams, means for raising and lowering the sinkers, and means for returning the needle-butts into the path of the knitting-cams, substantially as described.

8. In a knitting-machine, the combination

with the cam-cylinder and needle-cylinder, of knitting-cams carried by the cam-cylinder, needles guided in the needle-cylinder, sinkers supported by the needle-cylinder, a circumferential groove in said cam-cylinder, means for directing the needle-butts into said groove, and means for raising and lowering the needle-cylinder, substantially as described.

9. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of knitting-cams carried by the cam-cylinder, needles guided in the needle-cylinder, sinkers supported by the needle-cylinder, a circumferential groove in the cam-cylinder below the knitting-cams, means for directing the needle-butts into said groove, and means for raising and lowering the needle-cylinder, substantially as described.

10. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of knitting-cams carried by the cam-cylinder, needles guided in the needle-cylinder, sinkers supported by the needle-cylinder, a circumferential groove in the cam-cylinder, and movable cams extending across said groove and forming extensions of the knitting-cams, substantially as described.

11. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of knitting-cams carried by the cam-cylinder, needles guided in the needle-cylinder, sinkers supported by the needle-cylinder, a circumferential groove in the cam-cylinder, and a movable cam extending across said groove and forming an extension of one of the knitting-cams, substantially as described.

12. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of needles guided by the needle-cylinder knitting-cams 14 and 18 carried by the cam-cylinder, a groove 26 in the cam-cylinder, cam 28, extending across the entrance of groove 26, and bridge 35, for bridging the space between cams 14 and 18, substantially as described.

13. In a knitting-machine, the combination with the knitting-cams, of a swinging cam-plate bridging the space between them and having one end arranged to engage one of said knitting-cams, substantially as described.

14. In a knitting-machine, the combination with the knitting-cams 14 and 15, of a cam-plate 25' pivoted between said cams and bridging the space between them said cam-plate having one end arranged to engage cam 15, substantially as described.

15. In a knitting-machine the combination with the knitting-cams 14 and 15, of a cam-

plate 25' pivoted between said cams and having the end 64 beveled off as at 65, substantially as described.

16. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of needles guided in the needle-cylinder, knitting-cams 14, 15, 18 and 19 carried by the cam-cylinder, cam-plate 25' pivoted between cams 14 and 15, groove 26 and cam 28, substantially as described.

17. In a knitting-machine the combination with the knitting-cams, of a groove 26, a continuous ledge 60 forming the lower side of said groove, a slide 29' having an arm 61 and a cam 28 carried by said arm, substantially as described.

18. In a knitting-machine, the combination with the cam-cylinder and needle-cylinder, of needles guided in the needle-cylinder, cams 14, 15, 18 and 19 carried by the cam-cylinder, a groove 26 in said cam-cylinder, and cams 28 and 42, substantially as described.

19. In a knitting-machine, the combination of the cam 19, groove 26 and yielding cam 42 extending from cam 19 across said groove, substantially as described.

20. In a knitting-machine, the combination of cam 14, cam 18, groove 26, cam 28, and means for withdrawing and returning said cam 28, substantially as described.

21. In a knitting-machine, the combination with the needle-cylinder, the sinkers, the cam-cylinder, two sets of knitting-cams carried thereby, and a switch-cam between said sets of knitting-cams, of means for guiding the needle-butts out of and below the knitting-cams, means for lowering and returning the sinkers, and means for guiding the needle-butts into the knitting-cams, substantially as described.

22. In a knitting-machine, the combination with the needle-cylinder, the sinkers, the cam-cylinder, a ledge therein for supporting the needle-butts, two sets of knitting-cams at the ends of said ledge, and a switch-cam between said knitting-cams, of a circumferential groove in said cam-cylinder below said ledge, cams for directing the needle-butts into and out of said groove, and means for lowering and returning the sinkers, substantially as described.

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Witnesses:

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R. A. BATES.

It is hereby certified that the name of the assignee in Letters Patent No. 656,218, granted August 21, 1900, upon the application of James E. Rowe and Lawrence A. Bentz, of Pawtucket, Rhode Island, for an improvement in "Knitting-Machines," was erroneously written and printed the "E. Jencker Manufacturing Company," whereas said name should have been written and printed the *E. Jenckes Manufacturing Company*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 11th day of September, A. D., 1900.

[SEAL.]

F. L. CAMPBELL,
Assistant Secretary of the Interior.

Countersigned:

C. H. DUELL,
Commissioner of Patents.