

No. 608,040.

Patented July 26, 1898.

A. V. GROUPE.
KNITTING MACHINE.

(Application filed Dec. 21, 1897.)

(No Model.)

2 Sheets—Sheet 1.

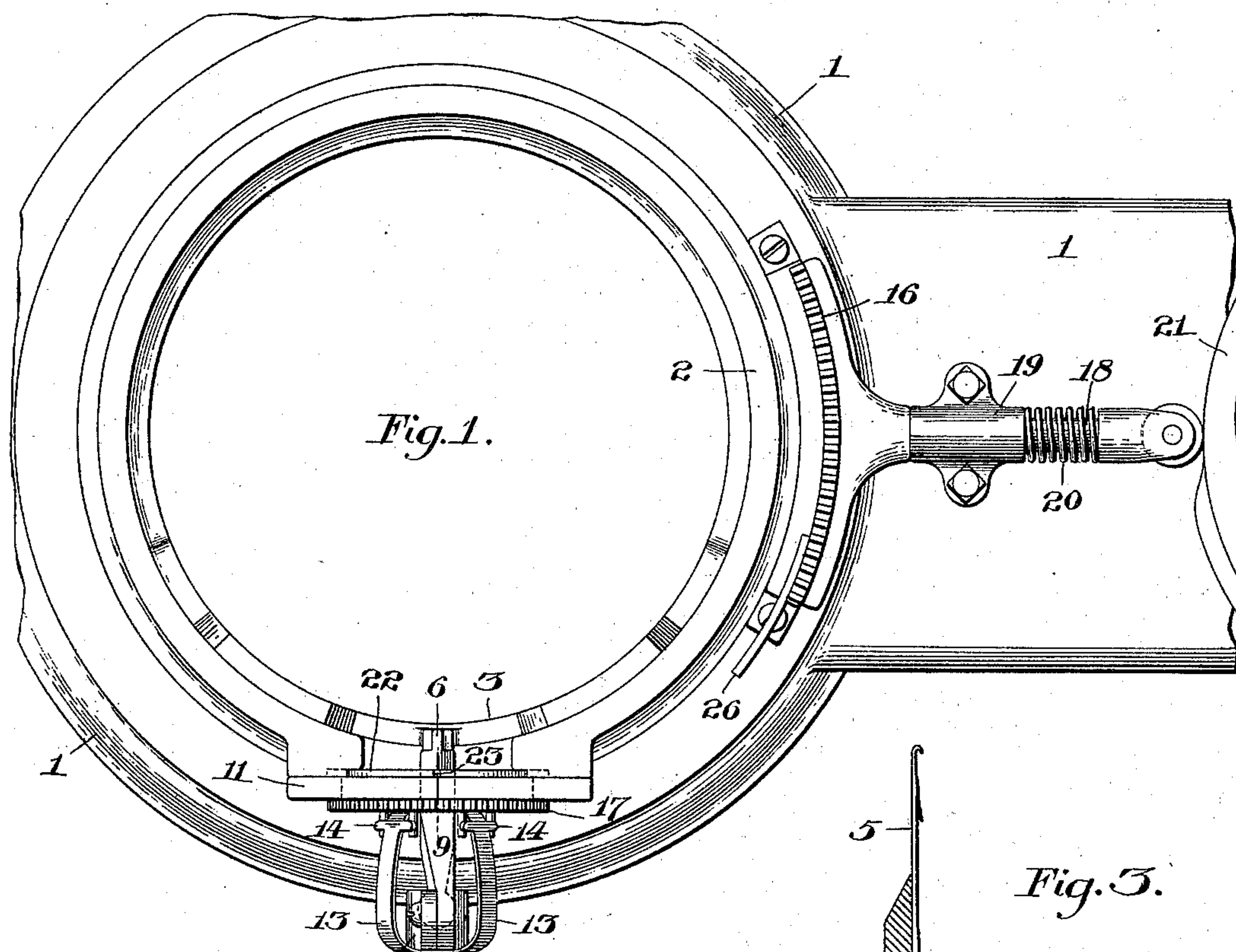


Fig. 2.

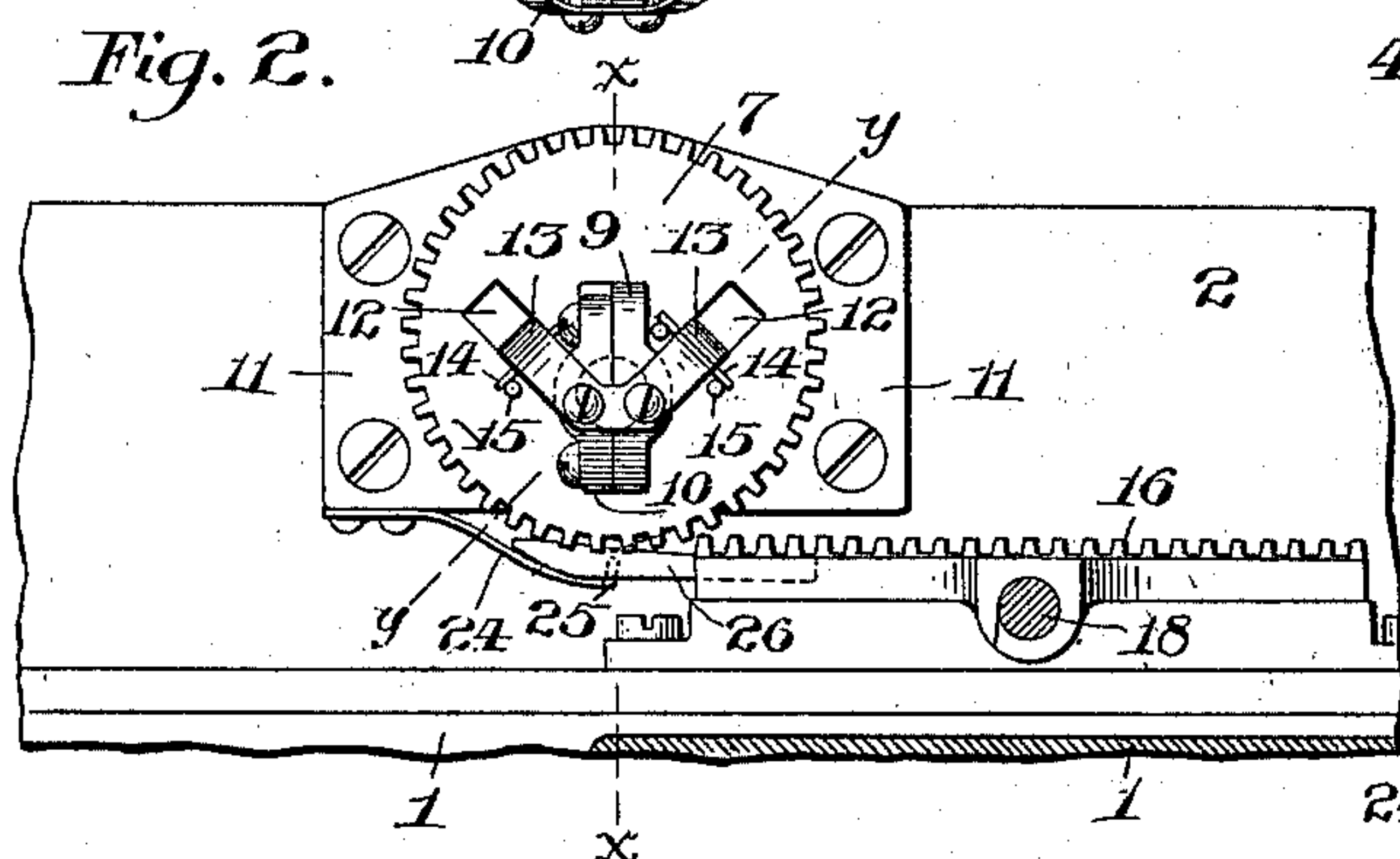
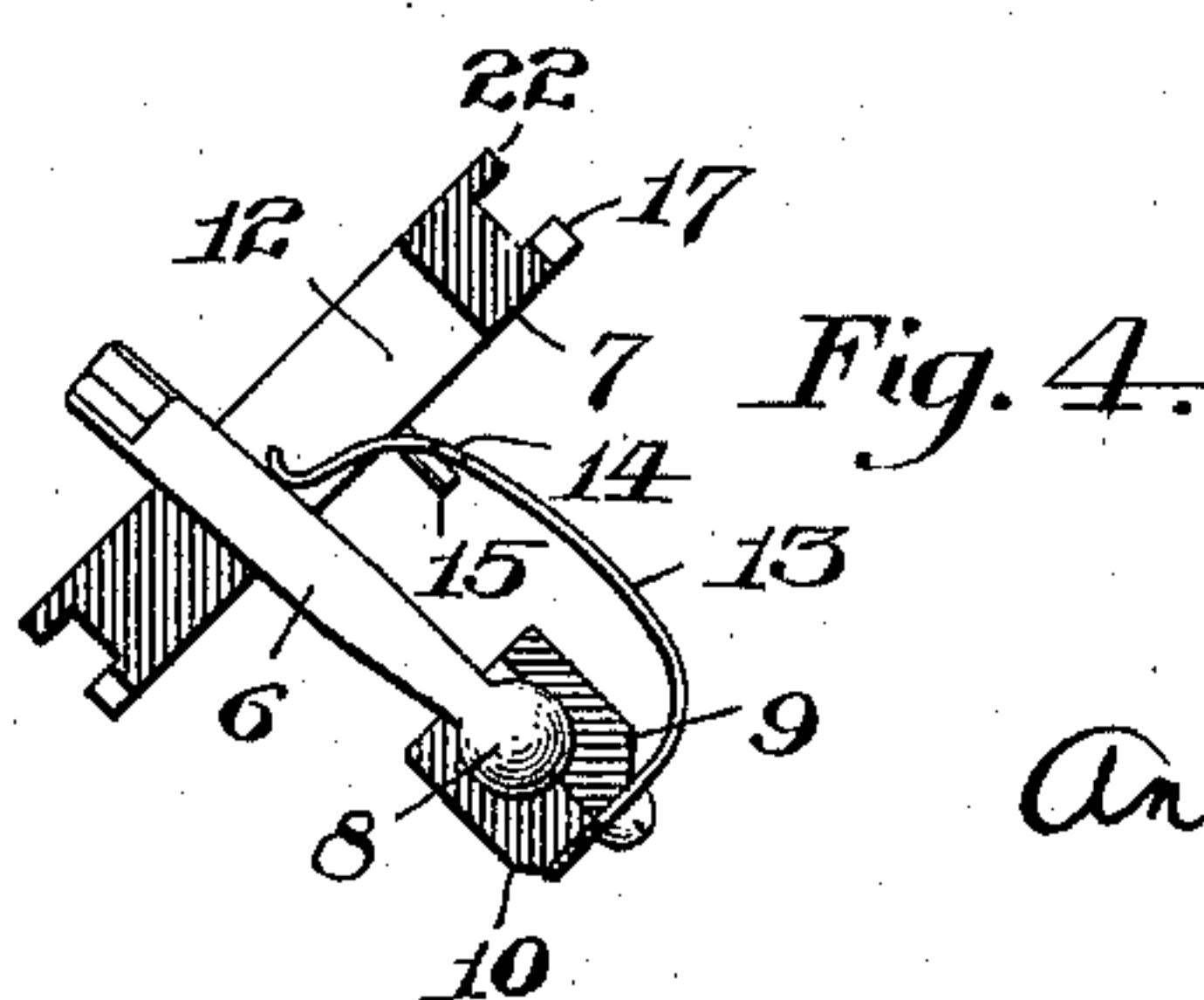
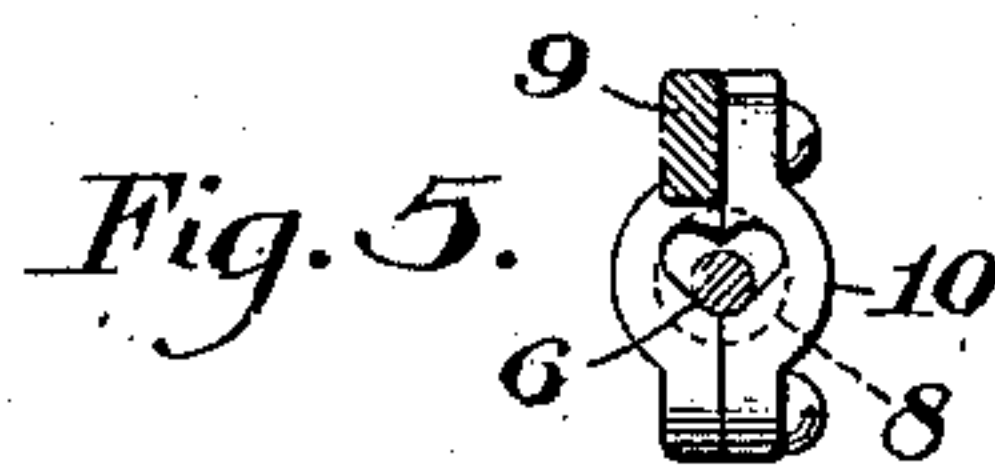
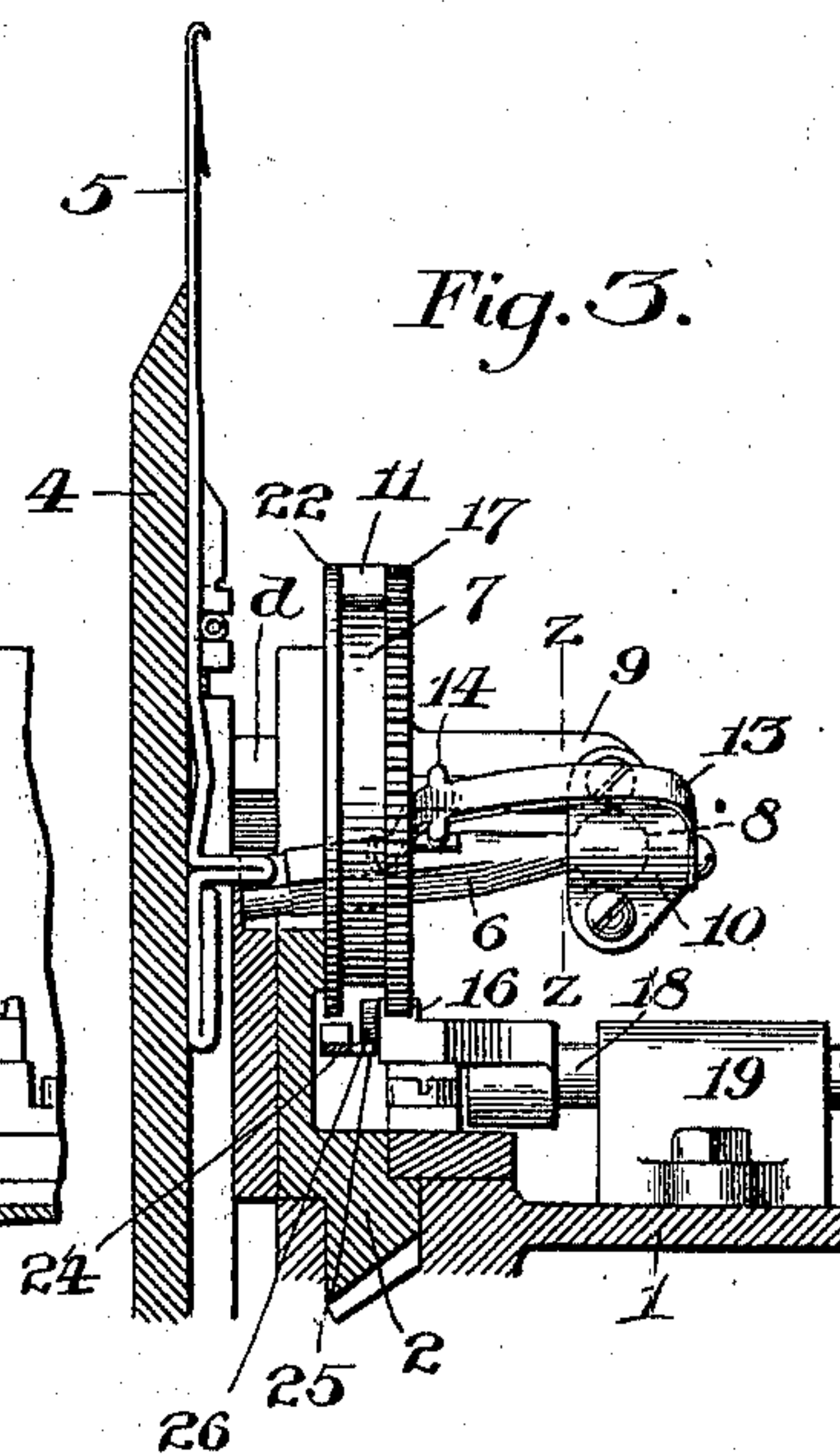


Fig. 3.



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No. 608,040

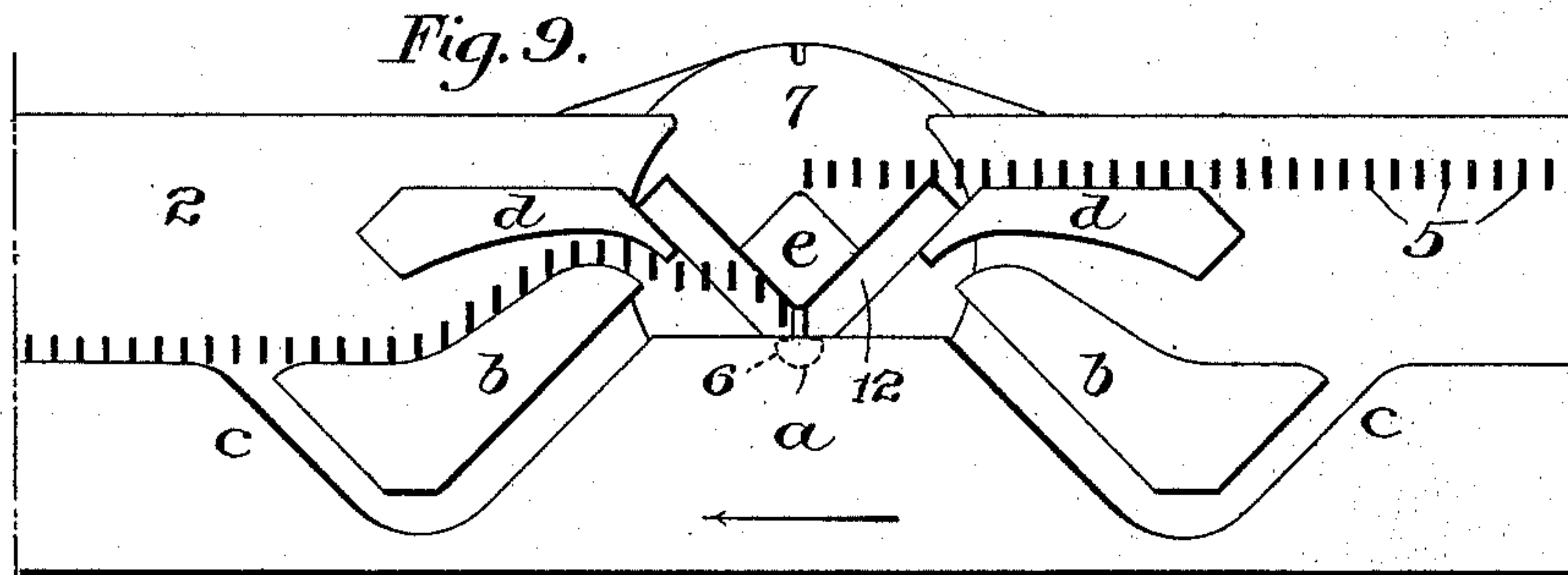
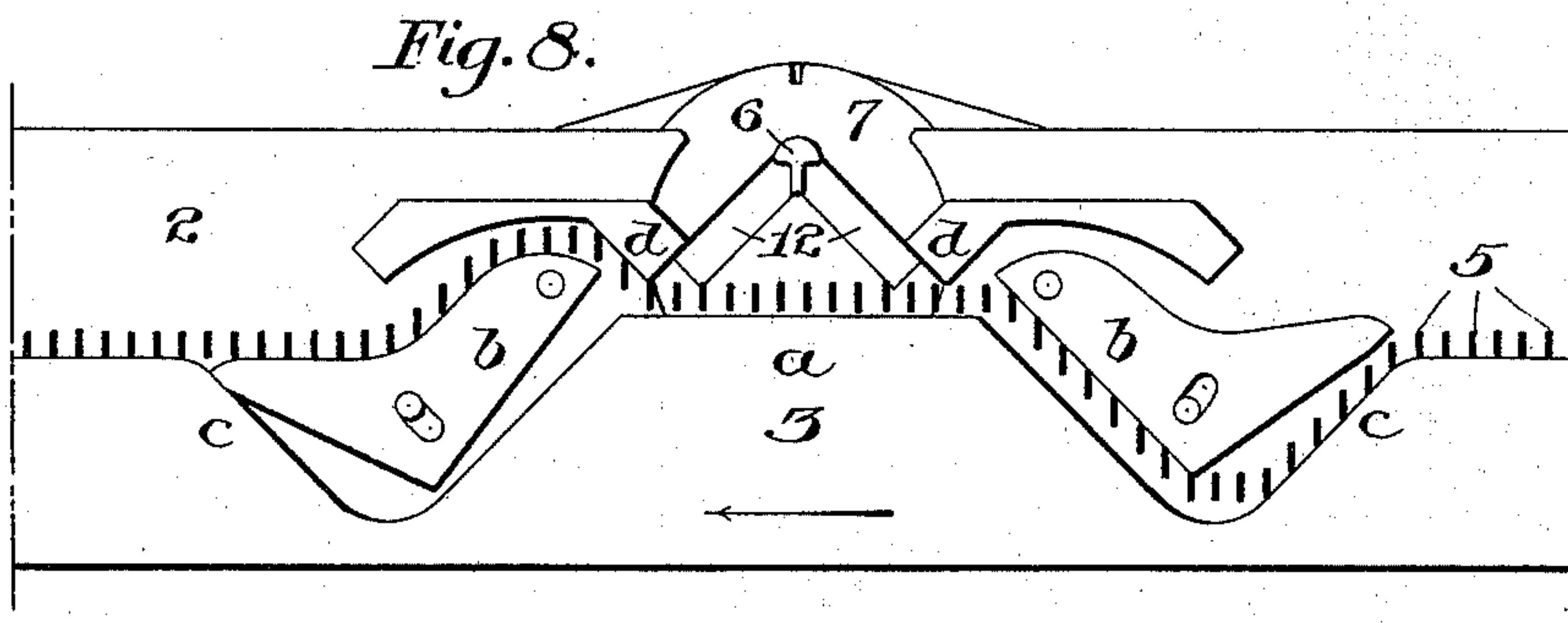
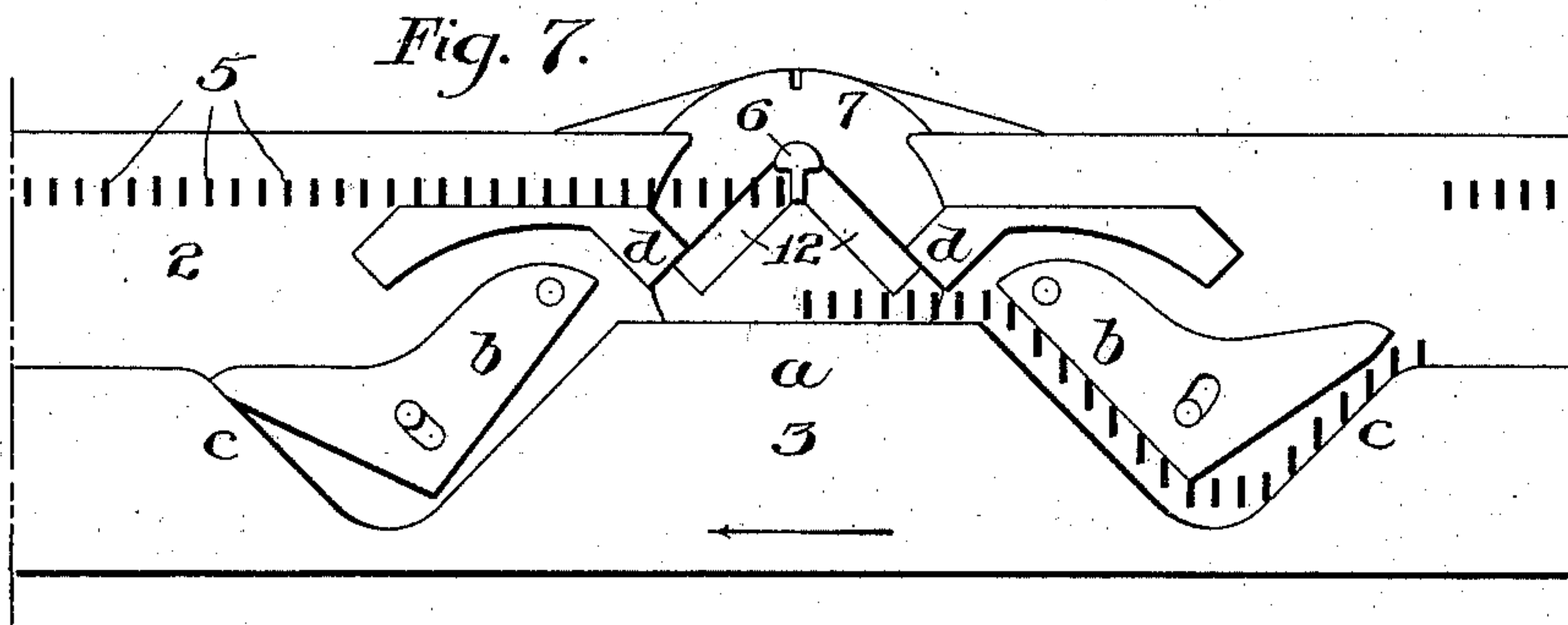
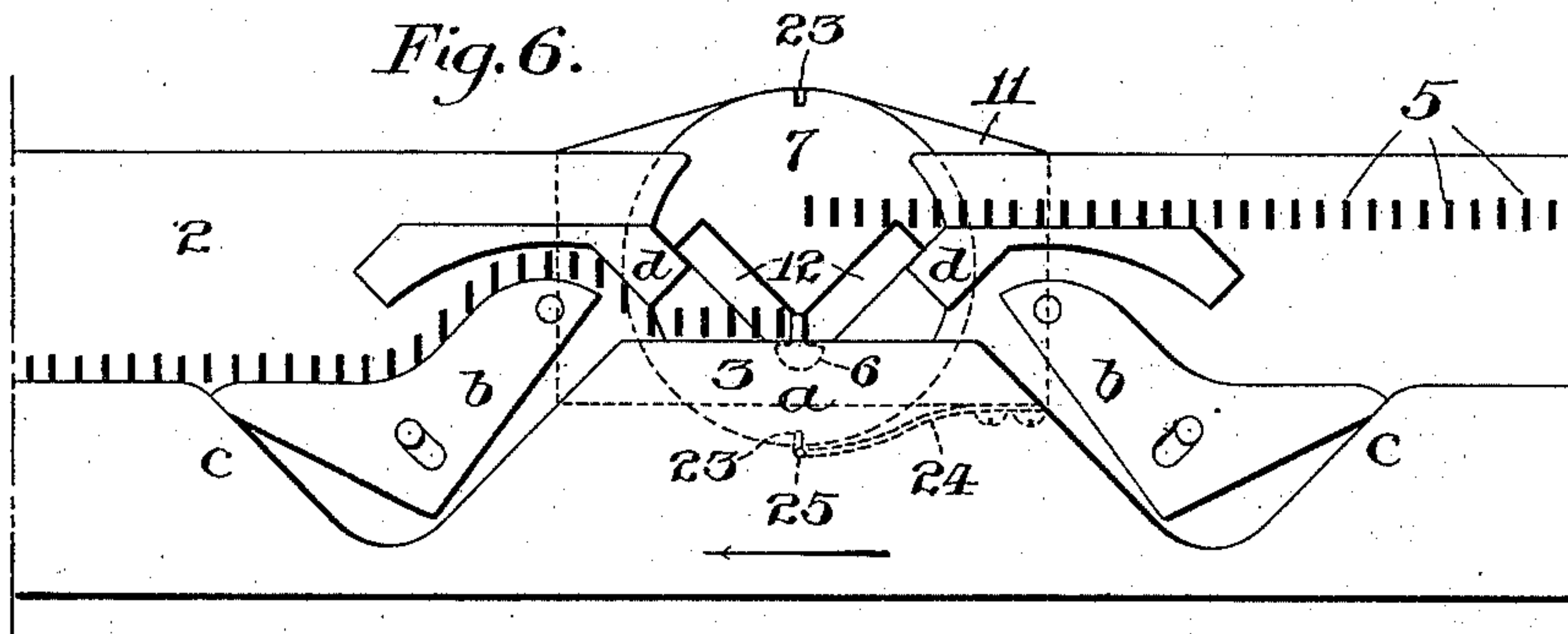
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UNITED STATES PATENT OFFICE.

ANDREW V. GROUPE, OF MOORE, PENNSYLVANIA, ASSIGNOR TO JAMES L. BRANSON, OF PHILADELPHIA, PENNSYLVANIA.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 608,040, dated July 26, 1898.

Application filed December 21, 1897. Serial No. 662,810. (No model.)

To all whom it may concern:

Be it known that I, ANDREW V. GROUPE, a citizen of the United States, residing at Moore, in the county of Delaware and State of Pennsylvania, have invented certain new and useful Improvements in Knitting-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

The object of this invention is to provide, in a knitting-machine, simple and efficient means for moving certain needles into and out of action at predetermined intervals, generally during the formation of the heel and toe parts of stockings, as will hereinafter be fully described and claimed.

In the drawings, Figure 1 is a plan of a portion of a circular-knitting machine embodying the invention. Fig. 2 is a partial development of the exterior of the cam-cylinder, showing the picker mechanism as about to engage with the actuating means therefor. Fig. 3 is a vertical section as on the line $x x$ of Fig. 2 with the needle-cylinder and a needle included. Fig. 4 is a detail in section of the picker mechanism as on the line $y y$ of Fig. 2. Fig. 5 is a section of the picker-arm as on the line $z z$ of Fig. 3, showing the joint therefor. Fig. 6 is a development of the interior of the cam-cylinder and the needle-heels therein, showing the picker as adjusted to engage the active needles and lift them successively out of action. Fig. 7 is a similar view showing the picker as adjusted to engage idle or upthrown needles and depress them successively into action. Fig. 8 is a similar view showing the position of the picker in respect to the needle-heels during straight-ahead or tubular knitting. Fig. 9 is a similar view showing a slight modification of the cams.

1 designates the bed of the machine; 2, the cam-cylinder; 3, the knitting-cams; 4, the needle-cylinder, and 5 the needles. The knitting-cams comprise the central cam a , the side or stitch cams $b b$, the raising-cams $c c$, and the upper depressing-cams $d d$, which latter are constructed in two parts with an intervening space between their opposing beveled ends. Otherwise the cams are or may

be of usual construction. Within this space is a picker device, which is so constructed and arranged as to effect the raising and the lowering of active and inactive needles, respectively, as the requirements of the work may demand. In the present instance this device embodies an arm or lever 6, the free end of which is oppositely notched, so as to engage the needle-heels in its path irrespective of the direction of its movement. This end projects into the cam-cylinder, its outer end being pivoted to a rotary head 7, fitted to an opening in the wall of said cylinder. The fulcrum or pivotal connection of the lever is preferably, though not essentially, a ball-and-socket joint, whereof the ball 8 is formed on the end of the lever and the socket is formed partially on an outwardly-extending arm 9 on the rotary head, the ball being maintained in place by a socketed cap-plate 10 or the like. The head is flanged for the reception of a two-part retaining-plate 11, that is secured to the wall of the cylinder by screws or other means. In the head is formed a V-shaped opening 12, through which extends into the cylinder the free or needle-engaging end of the lever, whereby the latter may be moved and guided in diverging paths. Normally this end of the lever is yieldingly maintained at the apex of the opening. For this purpose there is herein represented a bow-spring 13, which is affixed to the end of the arm 9 by screws or the like, so as to embrace the lever. The limbs of the spring are provided with teats 14, which, bearing upon suitably-located stubs 15 on the rotary head, limit the forward movements of the limbs, yet the lever when it is moved in either of the paths bears against the opposing limb and travels in opposition thereto, which limb upon the release of the lever returns the latter to its normal position. When the rotary head is in one position, the paths diverge upwardly. When it is moved a half-turn, the paths are inverted—i. e., they diverge downwardly. Thus irrespective of the position of the head the lever is capable of movement in the diverging paths.

The V-shaped opening is so formed that when the head is in one position the apex of the opening is adjacent to the top of the cam

a , and the diverging paths extend to and above the noses of the upper cams $d d$, respectively, as indicated in Fig. 6, and that when the head is in the reverse position the apex 5 is above the top of the cams $d d$, and the diverging paths extend below the noses of said cams, as indicated in Figs. 7 and 8.

During the knitting of straight-ahead or tubular work—as, for example, in the formation of the leg or the foot of a stocking—the head is in the position illustrated in Fig. 8—*i. e.*, with the paths diverging downwardly and the picker, perforce, above the knitting-cams. Preparatory to the narrowing and 15 widening operation—as, for example, in the formation of the heel or the toe of a stocking—the head is turned a half-revolution, in which case the head occupies the position shown in Fig. 6, the picker thus riding upon 20 the underlying needle-heels, one-half of the entire series of needles is raised out of action in the usual manner, and the cam-cylinder is then turned sufficiently to allow the knitting-cams to clear the active needles, the picker 25 thereupon assuming its position at the apex of the opening. The cylinder is then reciprocated. In the first stroke—assuming the movement to be in the direction of the arrow—the picker impinges against the first needle-heel in its path and is thrust upward thereby, the engaged needle being lifted by and 30 with the picker until the latter recedes from the knitting-cams, in which case the needle-heel is released at a point above the nose of the upper cam and is directed thereby out of 35 action. Upon the escape of the needle the picker being depressed by the spring rides upon the underlying needle-heels until the knitting-cams reach the open space at the end 40 of the stroke, in which case the picker resumes its normal or active position. In the reverse stroke the picker engages the first opposing needle-heel, recedes in the opposite path against the action of the spring, and 45 carries the engaged needle above the nose of the upper cam, which needle is thereby directed out of action. In this way during the reciprocations of the cam-cylinder the picker acts upon the end needles of the two fashion- 50 ing series and lifts them out of action in alternate succession until the requisite narrowing has been effected. This being done the head is rotated to reverse the position of the picker, in which case during the succeeding 55 reciprocations of the cam-cylinder it acts upon and is actuated by the previously up-thrown or idle needles and returns them successively to action in inverse order to that in which they were upthrown as above described. 60 Obviously the rotary head may be either manually or automatically adjusted, and it may be retained in positions of adjustment by friction or otherwise.

Mechanism for automatically operating the 65 head is herein shown, the same comprising a segmental rack 16, movable toward and from the outer flange 17 of the head, which is ser-

rated or toothed similarly to a pinion, as illustrated. When the rack is moved inward, the 70 toothed head engages the same and is thereby partially turned. When the rack is retracted, the head in its traverse is unaffected thereby. In the present instance the rack is 75 formed on or secured to a slide 18, which is fitted to a guide 19 on the bed-plate and is maintained normally retracted by a suitably-located spring 20, so as to lie in the path of 80 a pattern or cam wheel 21 or the like, which at certain stages coacts with the slide to effect the requisite adjustments of the rack.

The inner flange 22 on the head is provided with two diametrically opposite notches 23 23. A spring-dog 24 is affixed to the bracket, so as to bear against the flange and engage either 85 of the notches moved thereto and thereby retain the head in either position of adjustment. The dog is provided with a projecting stud 25, and the rack is provided with an extension 26, having a beveled end portion, which when 90 the rack is moved inward lies in the path of the stud and thereby upon the advancement of the cam-cylinder depresses the stud and disengages the dog from the notch in the 95 head to permit the partial rotation of the latter. When the head has been turned a half-revolution, as above explained, the dog engages the then opposing notch to lock the head in place.

In the knitting-cams illustrated in Figs. 6 to 8, inclusive, the stitch-cams are represented 100 as pivoted wing cams.

In Fig. 9 the stitch-cams are shown as fixed, and the rotary head is represented as provided with a cam e at or adjacent to the apex 105 of the V-shaped opening, which cam is designed to direct the needle-heels to the picker, as shown.

I claim—

1. The combination, with a cam-carrier, its 110 cams, a needle-cylinder and its needles, of a single needle-picking device provided with oppositely-disposed needle-engaging portions, and diverging guides with which the said device coacts during the forward and reverse strokes of the carrier. 115

2. The combination, with a cam-carrier, its 120 cams, a needle-cylinder and its needles, of a single needle-picking device provided with oppositely-disposed needle-engaging portions, and a movable support therefor provided with diverging guides with which the said device coacts, during the forward and reverse strokes of the carrier. 125

3. The combination, with a cam-carrier, its 130 cams, a needle-cylinder and its needles, of a single needle-picking device provided with oppositely-disposed needle-engaging portions, and a rotary supporting-head therefor provided with diverging openings which afford guides for said device in the forward and reverse strokes of the carrier. 135

4. The combination, with the cam-carrier and its knitting-cams, including lateral stitch-cams, of a single needle-picking device

located intermediate said stitch-cams, and invertible means to guide said device in upwardly-diverging paths to lift the needles, and in downwardly-diverging paths to depress the needles.

5 5. The combination, with a cam-carrier and its knitting-cams, including lateral stitch-cams, of an invertible supporting and guiding head, and a single needle-picking device
10 thereon located intermediate said stitch-cams and adapted, when the head is in one position, to move two series of needles out of action in alternate succession, and when
15 in another position to move said needles into action in alternate succession.

6. The combination, with a cam-carrier and its cams, of a needle-picker with oppositely-disposed needle-engaging portions, means for guiding said picker in diverging paths, and
20 means for maintaining said picker normally at the junction of said paths.

7. The combination, with a cam-carrier and its cams, of a needle-picker, with oppositely-disposed needle-engaging portions, means for
25 guiding said picker in diverging paths, means for maintaining said picker normally at the junction of said paths, and a movable support for said picker.

8. The combination, with a cam-carrier and
30 its cams, of a needle-picker, with oppositely-disposed needle-engaging portions, means for guiding said picker in two downwardly-diverging paths and in two upwardly-diverging paths, and means whereby the picker may be
35 held yieldingly at the junctions of the respective diverging paths at predetermined intervals.

9. The combination, with a cam-carrier and its cams, of a rotary head, a needle-picker
40 thereon, with oppositely-disposed needle-engaging portions, means for guiding said picker in two diverging paths, and means for maintaining said picker normally at the junction of said paths.

45 10. The combination, with a cam-carrier and its cams, of a rotary head, a needle-picker thereon, with oppositely-disposed needle-engaging portions, means for guiding said picker in diverging paths, means for main-

taining said picker normally at the junction 50 of said paths, and means for rotating said head.

11. The combination, with a cam-carrier and its cams, including a two-part top cam, of a needle-picker, invertible means for
55 guiding said picker in diverging paths intermediate the parts of said top cam, and means to maintain said picker at the junction of said paths.

12. The combination, with a cam-carrier 60 and its cams, of a lever jointed exteriorly of the carrier, provided with oppositely-disposed needle-engaging portions, and extended into said carrier, means to guide said lever in
65 diverging paths, and means to maintain said lever at the junction of said paths.

13. The combination, with a cam-carrier and its cams, of a lever extending into said carrier and having a ball-and-socket connection exteriorly thereof so as to swing in di-
70 verging paths, means to guide said lever, and means to maintain said lever at the junction of said paths.

14. The combination, with a cam-carrier and its cams, of a rotary head, a needle-
75 picking lever jointed thereon, provided with oppositely-disposed needle-engaging portions, and extended into the carrier, means to guide said lever in diverging paths, and means to maintain said lever at the junction
80 of said paths.

15. The combination, with a cam-carrier and its cams, of a rotary head, means for rotating the same, a needle-picking lever
85 jointed on said head, provided with oppositely-disposed needle-engaging portions, and extended into the carrier, means to guide said lever in diverging paths, and means to maintain said lever at the junction of said
90 paths.

In testimony whereof I have hereunto affixed my signature in the presence of two subscribing witnesses.

ANDREW V. GROUPE.

Witnesses:

WALTER C. PUSEY,
JOHN R. NOLAN.