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 APPLICATION FILED MAR. 15, 1904.

905,488.

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 3 SHEETS—SHEET 1.

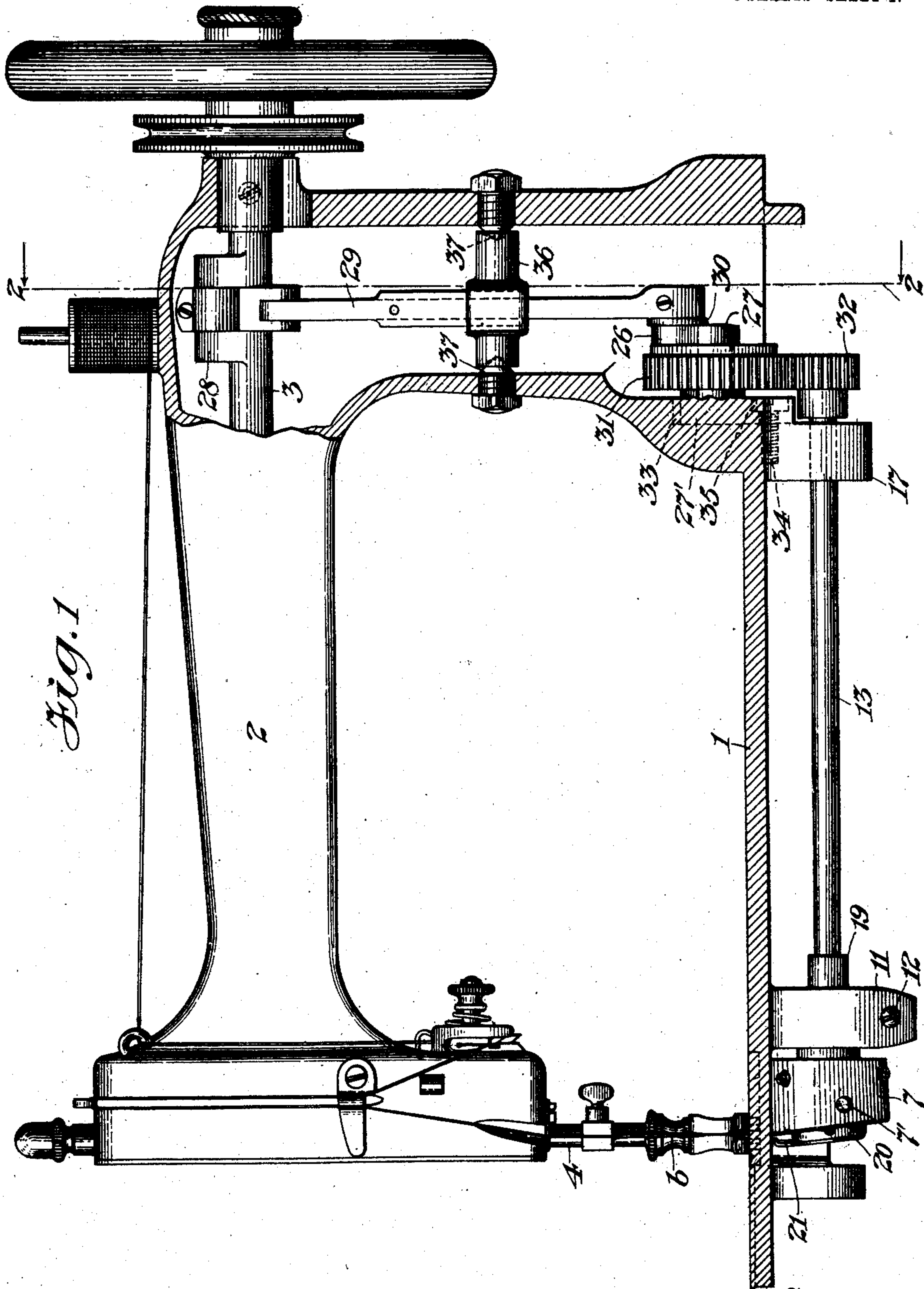


Fig. 1

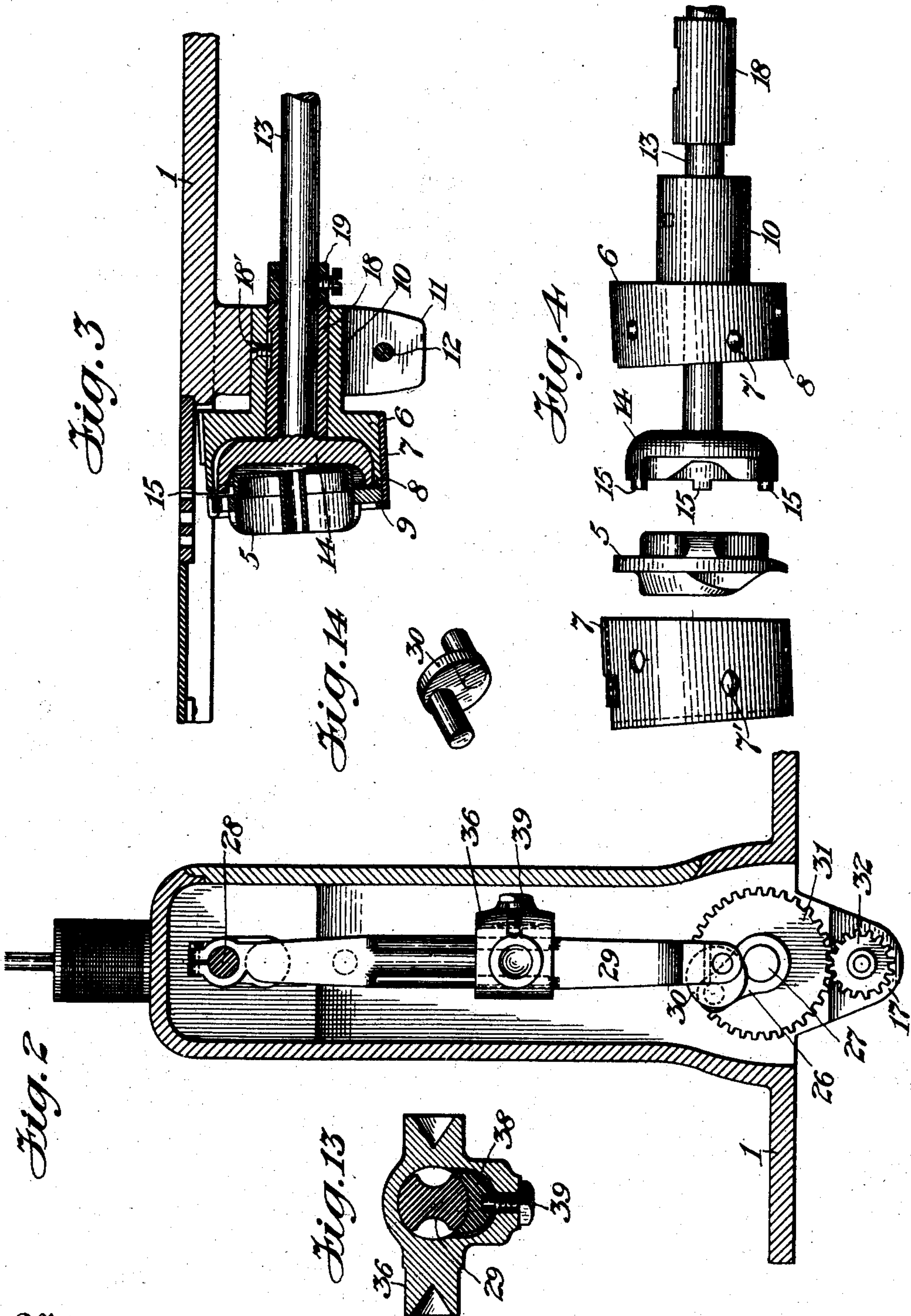
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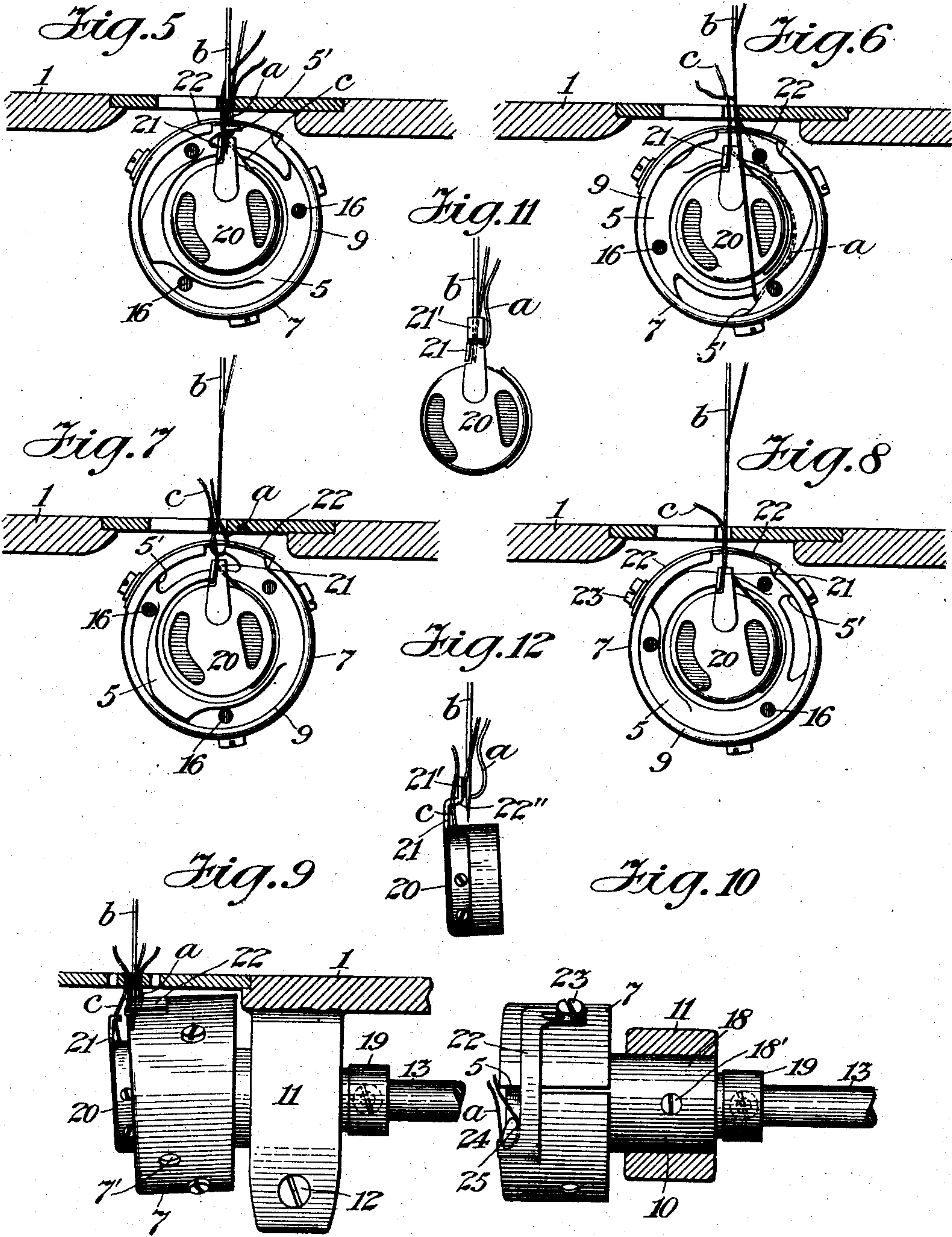
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# UNITED STATES PATENT OFFICE.

WILLIAM M. AMMERMAN, OF NEW HAVEN, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO ANNIE ELIZABETH AVERY, ADMINISTRATRIX.

## LOOPER MECHANISM FOR SEWING-MACHINES.

No. 905,488.

Specification of Letters Patent.

Patented Dec. 1, 1908.

Application filed March 15, 1904. Serial No. 198,184.

*To all whom it may concern:*

Be it known that I, WILLIAM M. AMMERMAN, a citizen of the United States, and resident of New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Looper Mechanism for Sewing-Machines, of which the following is a specification.

10 This invention relates to sewing machines of the rotary shuttle class, and more particularly to sewing machines included in said class in which the shuttle is rotated by a driver having a plurality of shuttle-engaging pins and is arranged with its axis at an angle to the axis of the driver whereby said shuttle-engaging pins, during the rotation of the parts, will be caused to alternately enter and withdraw from openings formed for their reception in the shuttle so as to permit of the free and unobstructed passage of the shuttle through the needle-thread loop.

25 This invention has for its principal object to improve the shuttle mechanism in sewing machines of this class, and it consists in the novel features of construction and combinations of parts as hereinafter set forth in detail and pointed out in the claims.

30 Referring to the accompanying drawings forming part of this specification, Figure 1 is a front elevation, partly in section, of a sewing machine embodying my invention. Fig. 2 is a vertical section through line 2—2 of Fig. 1. Fig. 3 is an enlarged longitudinal section through the bed-plate and adjacent shuttle mechanism at the front end of the machine. Fig. 4 is a side elevation of the several principal parts of the shuttle mechanism shown in Fig. 3, unassembled. Figs. 40 5, 6, 7 and 8 are detail views showing the shuttle and its adjacent parts in end elevation and the work-plate in section and illustrating the operation of the shuttle at different times during the formation of a stitch. Fig. 9 is a side elevation of the parts shown in Fig. 5 and in corresponding relative positions, the work-plate however being in section on a line at right angles to that shown in Fig. 5. Fig. 10 is a top plan view of the shuttle-race frame with an attached thread-holder. Fig. 11 is a front elevation of the bobbin-case and of the needle, illustrating a modification of my invention.

Fig. 12 is a side elevation of the same parts. 55 Fig. 13 is an enlarged cross-section through a vertical pitman-lever and its fulcrum-block forming part of the shuttle actuating mechanism, and Fig. 14 is a detail perspective view of one of the parts of the shuttle 60 actuating mechanism.

Similar reference characters designate like parts in all the figures of the drawings.

In said drawings, the frame of the machine, comprising the bed-plate 1 and the overhanging bracket-arm 2, the upper driving-shaft 3 supported in bearings in said bracket-arm, and the vertically reciprocating needle-bar 4 actuated from the driving-shaft through the medium of suitable connections, 70 are all of usual construction and arrangement.

The rotary shuttle, indicated at 5, is supported in the usual position at the under side of the bed-plate by a race-way frame 75 comprising a housing 6 and a casing 7, the said housing having a race-bearing surface 8 at its front end, and the casing being fitted over the housing with one end projecting beyond the front end thereof and having an inwardly projecting race-bearing flange 9 between which and the said race-bearing surface 8 of the housing is formed the race-way within which the shuttle is supported and operates. The race-way frame, as thus 85 formed, is supported in position by means of a tubular extension 10 at the rear end of the housing which extends into an opening in a split bracket 11 on the under side of the bed-plate and is clamped in an adjustable 90 stationary position therein by means of a clamping-screw 12. As a means to prevent the undue accumulation of lint, dust, or other similar foreign substances within this race-way frame, a plurality of discharge 95 passages 7' are provided therein adjacent to its lower side, these passages being formed by openings in the walls of both the housing 6 and casing 7 registering with each other.

The driver for rotating the shuttle in its race-way frame comprises the rotary shaft 100 13 having at its forward end a plate or head 14 provided with a plurality of fingers 15 for engaging the shuttle within openings 16 therein, the said shuttle being arranged with its axis at an angle to the axis of the driver whereby the driver fingers during the rotation of the parts will alternately enter and 105



withdraw from the openings in the shuttle so as to permit of the free passage of the shuttle through the needle thread loop in the usual manner, the inclination of the shuttle  
 5 relatively to the driver being such that the driver fingers enter the shuttle openings during the lower part of their revolution and withdraw therefrom during the upper part of their revolution, as most clearly indicated  
 10 in Fig. 3.

The shuttle-driver shaft 13 is journaled at its rear end in a suitable bearing formed in a bracket 17 depending from the under side of the bed-plate, and at its forward end is  
 15 journaled in a bushing 18 which is supported for longitudinal adjustment within the tubular extension 10 of the housing 6. A set-collar 19 on the driver shaft 13 engages with the rear end of the bushing 18 and oper-  
 20 ates to hold the rear side of the driver head 14 in engagement with the forward or opposite end of the said bushing. A connection is thus effected between the shuttle driver and the bushing whereby a longitudinal ad-  
 25 justment of the bushing within the tubular extension of the housing 6 will operate to adjust the position of the shuttle driver relatively to the shuttle so that its fingers 15 may be caused to enter and withdraw from the  
 30 shuttle openings the proper distance, it being necessary that the said fingers should withdraw from the shuttle a sufficient distance to permit of the passage therebetween of the inner side of the needle thread loop.  
 35 The bushing 18 may be secured in its adjusted position by any suitable means, the means as herein shown being a set-screw 18', as most clearly shown in Fig. 3.

The shuttle and shuttle-driver, together  
 40 with the described shuttle-driver adjusting means, all being associated with the shuttle race-way frame as shown, permits of such parts being completely assembled and adjusted prior to their being placed in connection  
 45 with the machine, so that when such connection is effected it is only necessary to adjust the position of the race-way frame in its supporting bracket 11 relatively to the path of movement of the needle.

50 The shuttle in machines of the class herein described are usually rotated with a variable or differential movement so as to properly cooperate with the other parts of the stitch-forming mechanism. Such movement is ob-  
 55 jectionable, however, in that it obviously increases the vibration of the machine and also causes a greater strain and wear on the operating parts than would be caused if the shuttle were operated at a uniform speed of  
 60 movement. Therefore, in order to avoid such objectionable features incident to the use of a differentially operated shuttle, I provide means in my present machine for ro-  
 65 tating the shuttle at a uniform speed of movement, and, in order that the shuttle

when so rotated may be timed in its movements to properly cooperate with the other parts of the stitch-forming mechanism, I also provide means for imparting two revolutions to the shuttle to each reciprocation of  
 70 the needle.

In imparting two revolutions to the shuttle to each reciprocation of the needle, the increase in speed of the shuttle relatively to the cooperating parts of the stitch-forming  
 75 mechanism is such that the usual space provided between the beak and the heel of the shuttle for permitting the unobstructed drawing up of the needle-thread loop by the  
 take-up after being cast off by the beak 5' of  
 80 the shuttle, may be reduced more than one-half. In other words, in single-beak shuttles having one revolution to each reciprocation of the needle, the space between the beak  
 and the heel is about one-third of its circum-  
 85 ference, whereas, in the shuttle of my present machine, which is operated to have two revolutions to each reciprocation of the needle, the space between the beak and the heel may  
 be reduced to about one-eighth of the cir-  
 90 cumference. This is important in that it causes the shuttle to be more evenly balanced and thereby assures its easier running at a high rate of speed, and also in that it provides an increased race-bearing surface of  
 95 the shuttle.

A further advantage resulting from the reduced space between the beak and the heel of the shuttle as described, is the fact that it enables me to employ three equidistant  
 100 driver fingers for engagement with the shuttle, instead of two fingers as is usual in machines of this class where a single-beak shuttle is employed. The use of three driver  
 fingers is desirable in that it permits of the  
 105 shuttle being supported at less of an angle to a vertical plane than is required where two driver fingers are employed, for the reason that one of the driver fingers is at practically  
 its full depth in its opening in the shuttle at  
 110 a time when the other two are respectively entering and withdrawing from their openings in the shuttle.

In the operation of the machine, with the shuttle and its driver constructed and organ-  
 115 ized as described, the shuttle enters the thread-loop (a) thrown out by the needle (b), as shown in Fig. 5, and passes through the same in the usual manner in carrying it  
 around the under or bobbin thread, the pas-  
 120 sage of the inner side of the loop between the shuttle and the driver fingers being indicated in Fig. 6, and the withdrawal of the loop by the take-up from the space between  
 the beak and heel of the shuttle being indi-  
 125 cated in Fig. 7. This first revolution of the shuttle in carrying the loop around the under or bobbin thread occurs during the raising of the needle after having thrown out  
 the thread loop, and its second or succeeding  
 130



revolution, which occurs during the descent of the needle to throw out the next loop, is an idle one, as indicated in Fig. 8.

In order that the bobbin thread *c* in its passage from the bobbin to the needle opening in the throat-plate may not be accidentally caught by or entangled upon the shuttle or the needle, I have provided the bobbin-case 20 with a thread-guiding arm 21 having an opening therein through which the thread is passed, the said arm being arranged to hold and guide the thread in a path at one side of and away from the paths of movement of the shuttle and needle, as clearly shown in Fig. 9. The bobbin-case arm 21 is also adapted to be loosely engaged by any usual and suitable means (not shown) for holding the bobbin-case against rotary movement within the shuttle.

At the commencement of the sewing operation, when the shuttle enters the first thread loop thrown out by the needle and draws downwardly upon the same, in carrying it around the bobbin, it is liable to draw the loose end of the thread down through the work and so prevent the formation of a stitch unless such end is held by the operator or some part of the machine until the first stitch has been completed and the thread locked in the work. In my present machine, I provide a holder for such loose end of the thread which is in the form of a spring 22 secured at one end upon the outer wall of the shuttle-race frame by suitable fastening means, such as the screw 23, and at its opposite or free end arranged in near relation to the periphery of the shuttle through an opening 24 in the shuttle-race frame and being provided with a notch 25 located in a position to receive the inner side of the needle-thread loop as the latter is entered and about to be drawn downwardly by the shuttle. The movement of the shuttle draws the loose end of the needle-thread loop to one side and into the notch 25 which forms a drag on that side of the loop greater than on the opposite side of the loop, so that the loose end of the thread will not draw down. When the inner side of the loop, which terminates at the loose end of the thread, is received in this notch of the holder, as shown in Fig. 10, it is guided thereby between the periphery of the shuttle and the holder and held by the spring pressure of the latter from being drawn downward through the work by the shuttle. The effective action of the spring 22 takes place during the movement of the shuttle from the position shown in Fig. 5 to that shown in Fig. 6 and until the loop is, or is about to be, cast off by the shuttle, after which and when the loop is drawn up by the take-up the inner side of the loop held between the spring and the shuttle will be withdrawn from such position, as will be obvious. After the first

stitch has been completed, the loose end of the thread will then be locked in the work.

The shuttle has hereinbefore been described as being rotated at a substantially uniform speed of movement and as having two revolutions to each reciprocation of the needle. Any suitable means may be employed for thus operating the shuttle, the means as herein shown comprising a crank 26 mounted on a stationary bearing stud 27 in the arm of the machine and being actuated from a crank 28 in the upper driving shaft through the medium of a pitman lever 29 and a link 30 to revolve at a uniform speed of movement, and transmitting such uniform speed the medium of gears 31 and 32, the proportion of movement to the shuttle driver through tions of said gears being such as to impart two revolutions to the shuttle driver to each revolution of the driving shaft 3 and thereby two revolutions to the shuttle to each reciprocation of the needle. The crank 26 and the gear 31, in the present case, are made fast to each other whereby the movement of the crank will be imparted to the gear, and the bearing-stud 27 upon which these parts are mounted is carried by a supporting block 27' which is vertically adjustable within a groove 33 in the arm of the machine whereby the position of the gear 31 may be adjusted relatively to the gear 32 to assure their proper meshing; a set-screw 34 tapped into the machine frame and engaging with the block through an elongated slot 35 therein serving as a means to hold the block in adjusted position.

The pitman lever 29 in transmitting motion from the driving crank 28 to the driven crank 26 slides through a centrally located fulcrum-block 36 in the arm of the machine which is pivotally mounted upon conical bearing studs 37, 37, and provided with an adjustable bearing block 38 for engagement with one side of the pitman-lever, as most clearly shown in Fig. 13, this bearing-block being adjustable relatively to the pitman-lever so as to provide for wear, etc. by means of an adjusting-screw 39 which is threaded into the block 36 with its end engaging the bearing-block 38 within an opening therein, as shown.

In the operation of the machine, the needle descends in a position at the forward side of the path of movement of the shuttle beak and in rising throws out a loop to be entered by the latter. In this operation, the loop is liable to be thrown out at either side of the needle and, in the event of being thrown out at the wrong side thereof, cause the machine to skip stitches. To prevent this, the thread-guiding arm 21 of the bobbin-case may be provided with a vertical extension 21' at the inner side of its eye-containing off-set portion 22'' which extends into a position adjacent to the path of the needle at



the forward side thereof, as shown in Figs. 11 and 12, and acts as a guard to prevent the loop being thrown out at such side of the needle, or in other words, operates to  
 5 insure the loop being thrown out at the inner side of the needle and in position to be seized by the shuttle beak.

What I claim is:

1. A rotary shuttle race-way frame, comprising a housing having a race-bearing surface, and a casing fitted over said housing and having a race-bearing flange in a position opposite the race-bearing surface of the housing and forming therewith a race-way,  
 10 the said housing and casing being each provided with an opening registering with each other and forming a discharge passage from the interior of the housing at a point adjacent to the race-way.

2. A rotary shuttle race-way frame, comprising a cylindrical-shaped housing having a race-bearing surface, and a cylindrical-shaped casing fitted over said housing and having a race-bearing flange in a position  
 25 opposite the race-bearing surface of the housing and forming therewith a race-way, the said housing and casing being each provided with an opening in its periphery registering with each other and forming a discharge passage from the interior of the housing  
 30 at a point adjacent to the race-way.

3. In a sewing machine, the combination, of a rotary shuttle having openings therein, a race-way frame therefor having a supporting stem, a rotary shuttle-driver comprising  
 35 a shaft having a head provided with fingers for entering the shuttle openings, an adjusting sleeve on the shuttle-driver shaft supported in a longitudinally adjustable position within the stem of the race-way frame and engaging at one end thereof with the shuttle-driver head, means for holding the adjusting sleeve in fixed connection with the shuttle-driver shaft, and means for holding the adjusting sleeve in adjusted position  
 45 relative to the shuttle.

4. In a sewing machine, the combination with a rotary shuttle, of a shuttle race having an opening in line with the needle and in which the shuttle is exposed, and a spring  
 50 holder arranged over said opening to permit the holder to press one side of the needle thread loop at the initial stitch upon the periphery of the shuttle.

5. In a sewing machine, the combination with a rotary shuttle, of a spring having a thread receiving notch and cooperating directly with said shuttle for holding one side of the needle-thread loop, for the purpose set forth.  
 60

6. In a sewing machine, the combination with a stitch-forming mechanism including a reciprocating needle and a rotary shuttle, of a bobbin-case carried by said shuttle and having an arm extending into a position  
 65 adjacent to the path of the needle at one side thereof and cooperating with said needle in throwing out the thread loop, for the purpose set forth.

Signed at New York in the county of New York and State of New York this 10th day of March A. D. 1904.

WILLIAM M. AMMERMAN.

Witnesses:

CHAS. F. DANE,  
 E. M. FAITH.