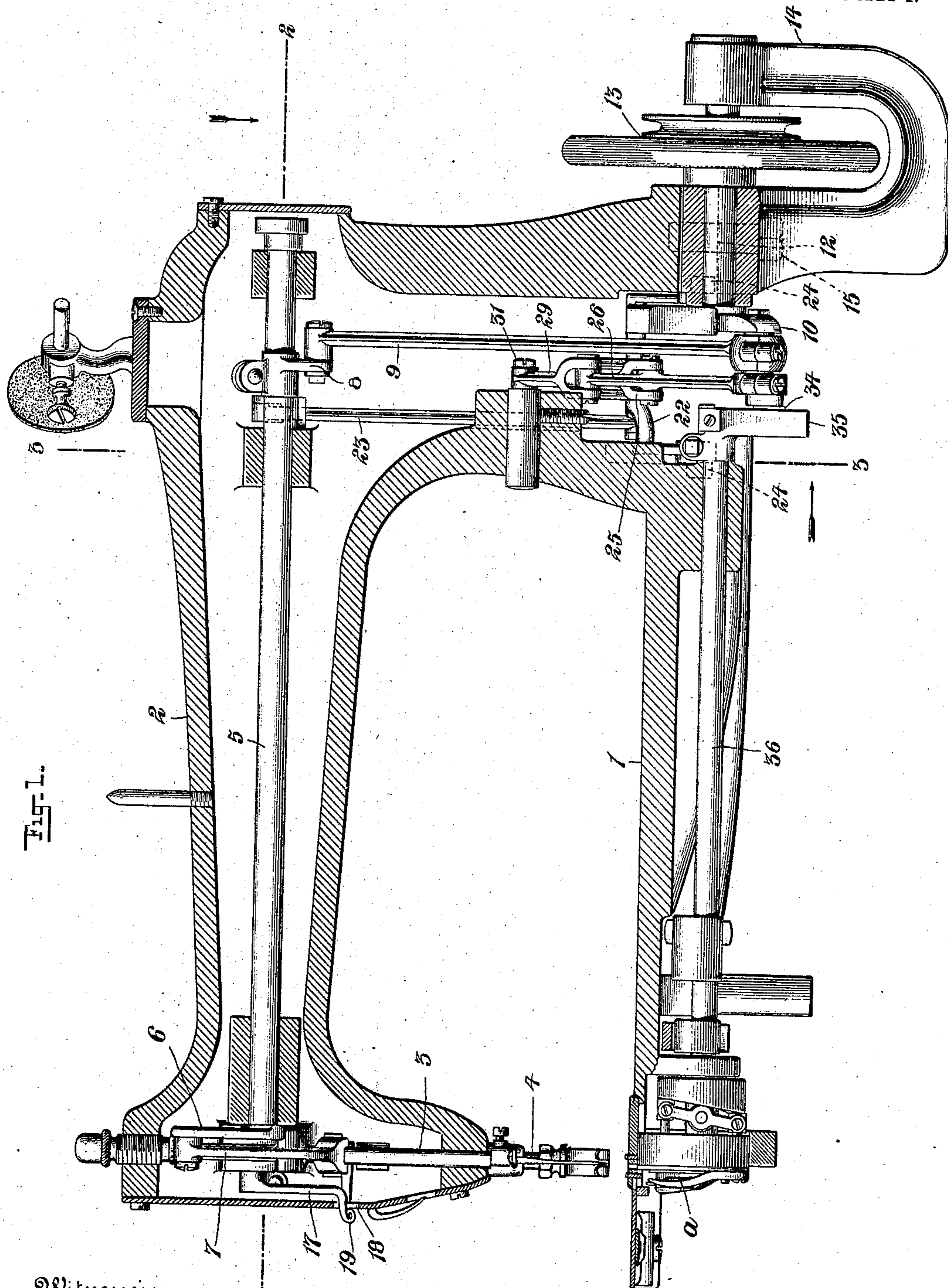


No. 894,486.

PATENTED JULY 28, 1908.

J. DIEHL.  
SEWING MACHINE.  
APPLICATION FILED FEB. 18, 1899.

4 SHEETS—SHEET 1.



Witnesses:  
Geo. W. Naylor.  
C. Stevens.

By his Attorney

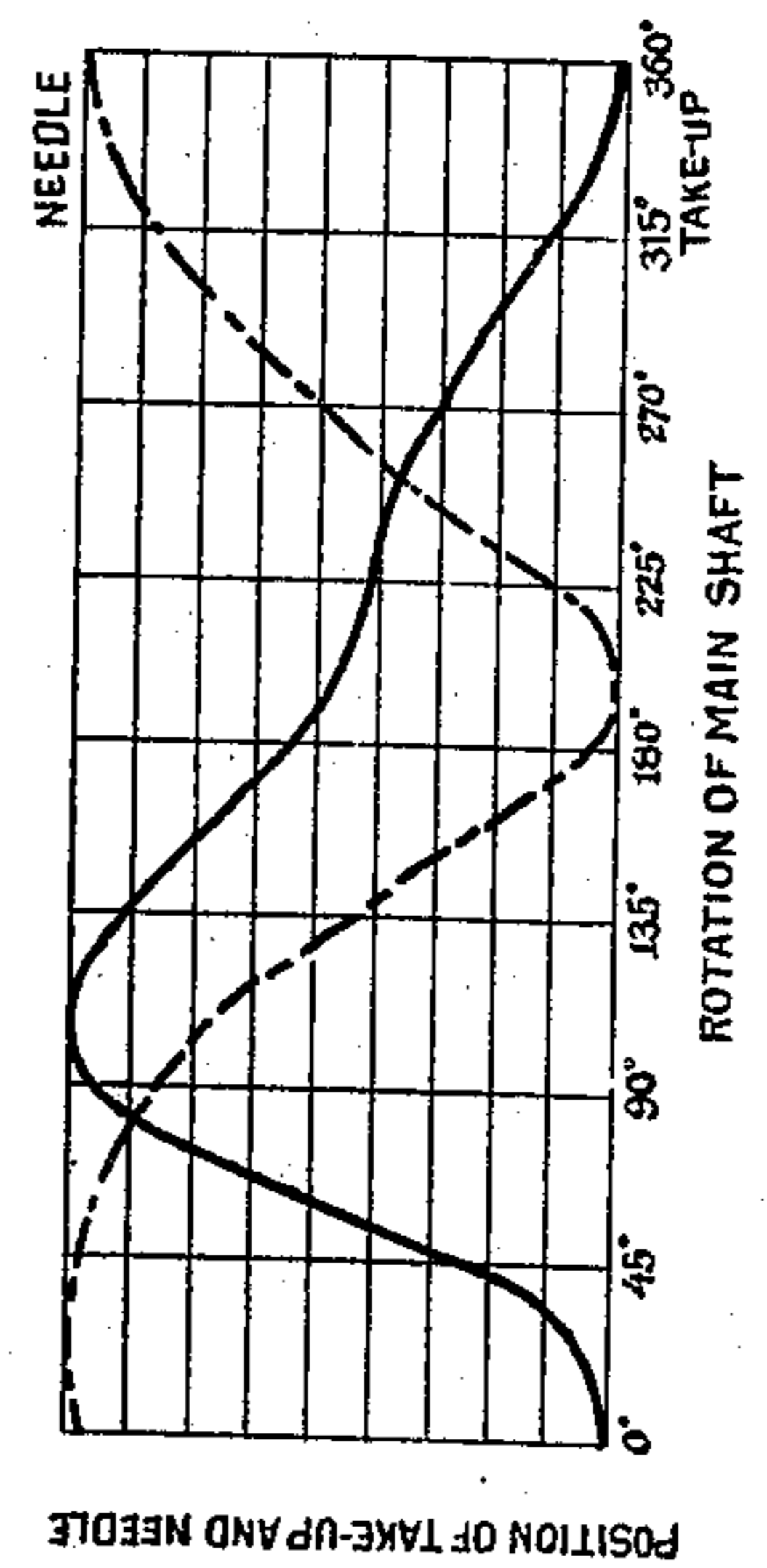
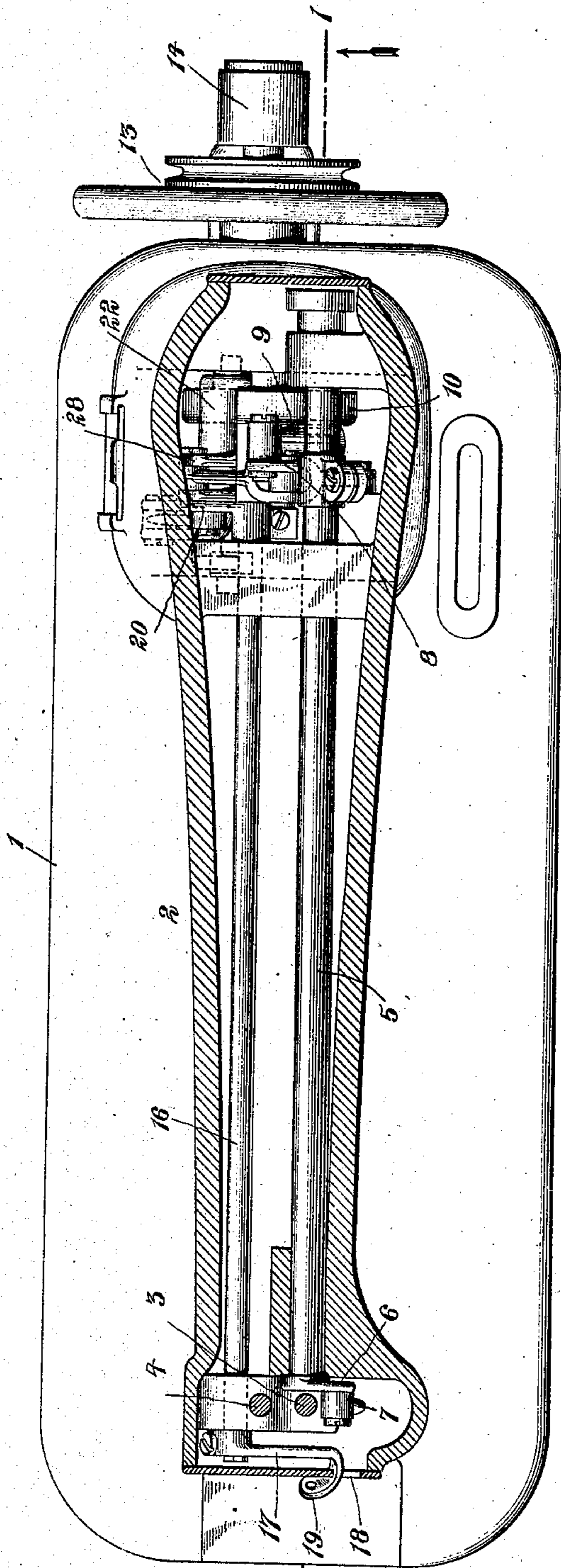
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4 SHEETS—SHEET 2.



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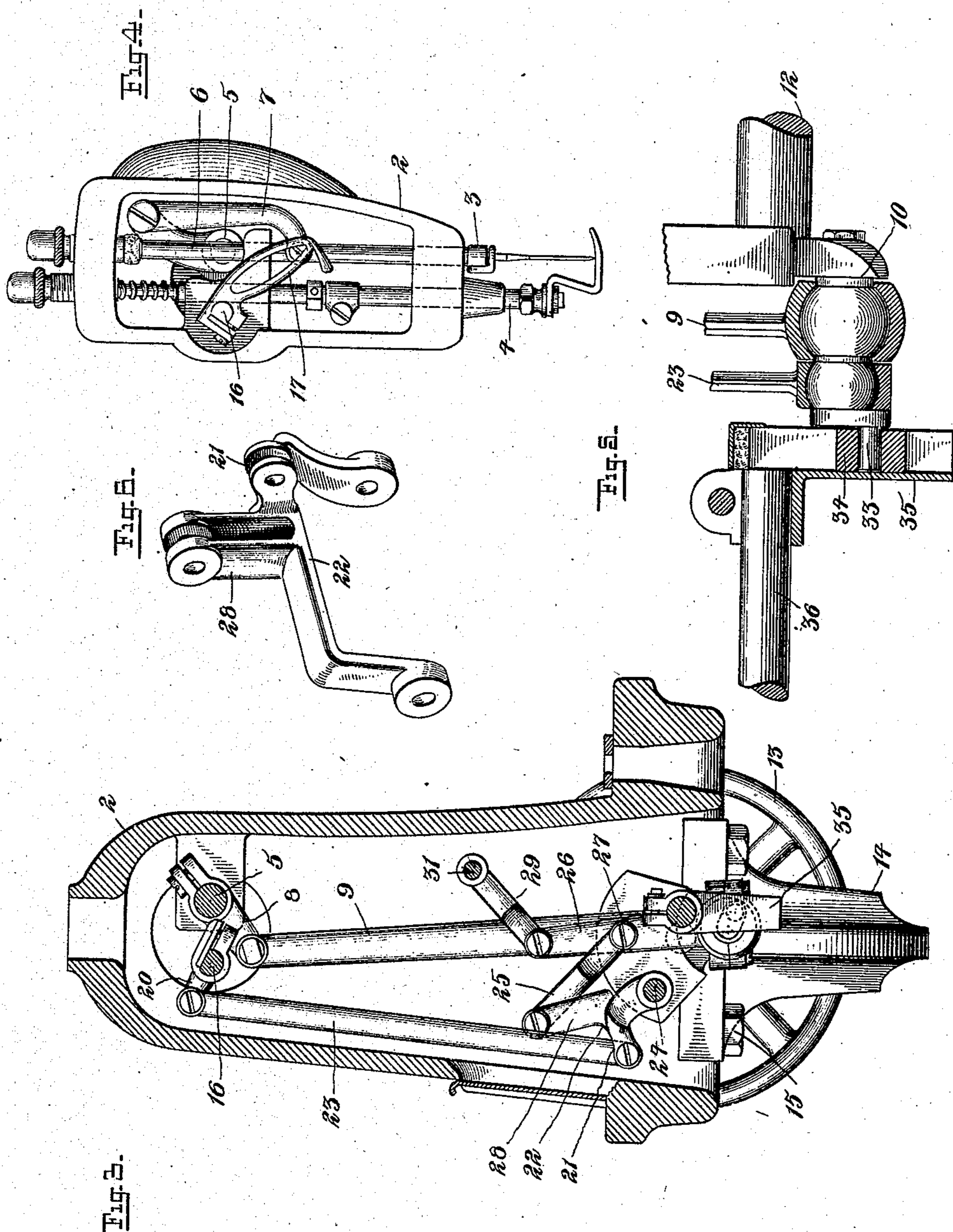
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4 SHEETS—SHEET 3.



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PATENTED JULY 28, 1908.

4 SHEETS—SHEET 4.

Fig. 6.

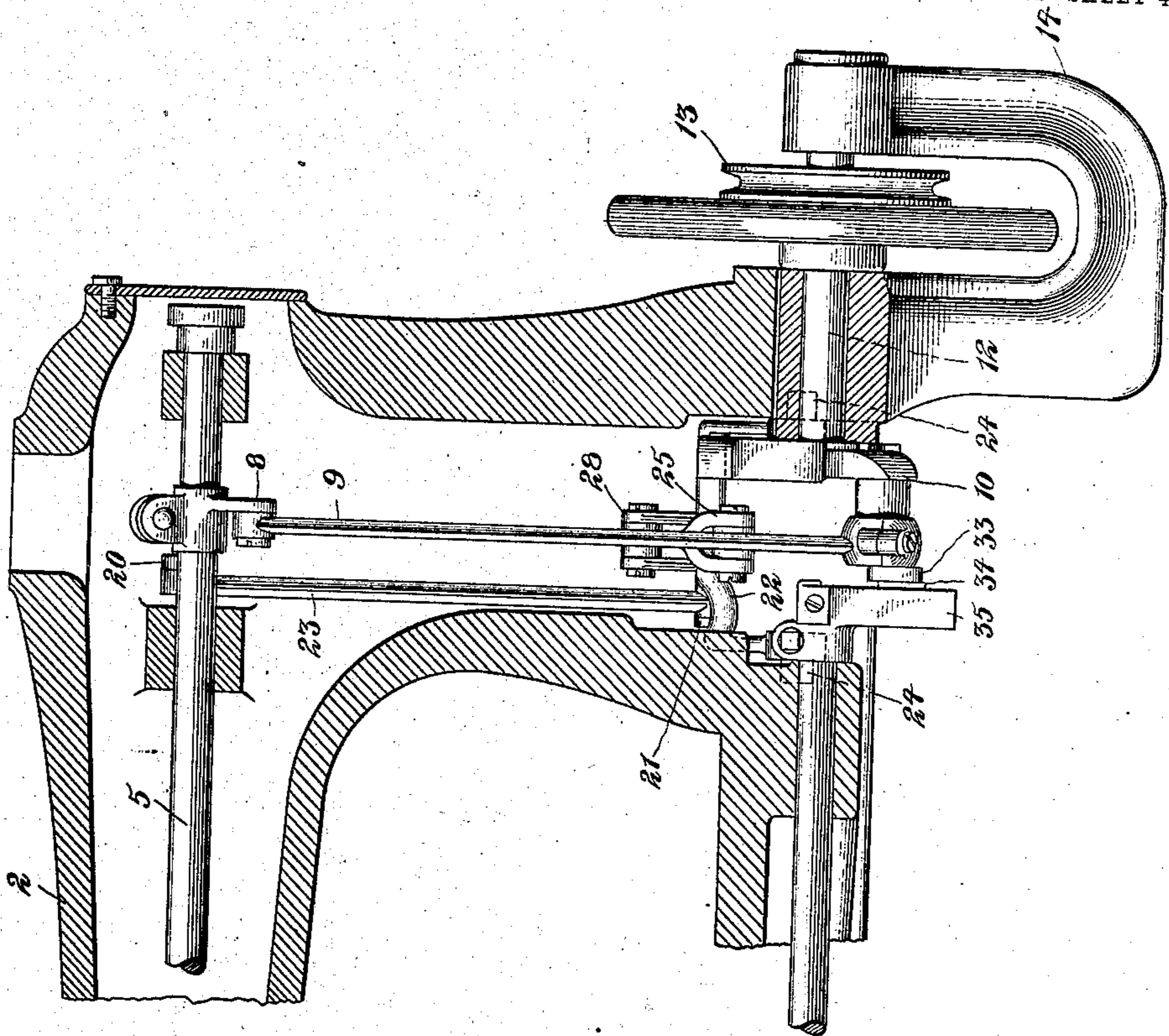
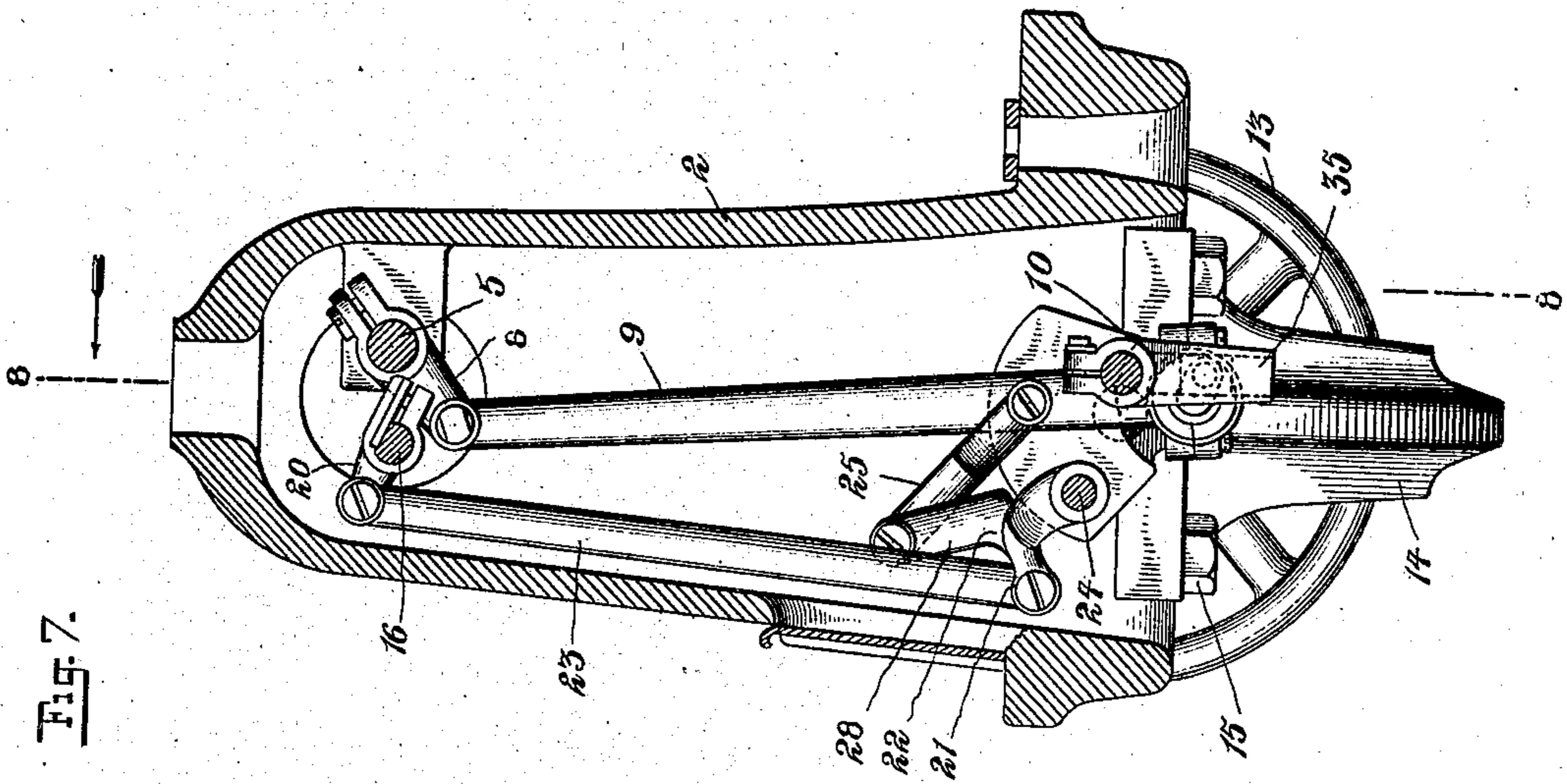


Fig. 7.



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# UNITED STATES PATENT OFFICE.

JACOB DIEHL, OF CLEVELAND, OHIO, ASSIGNOR TO THE STANDARD SEWING MACHINE COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

## SEWING-MACHINE.

No. 894,486.

Specification of Letters Patent.

Patented July 28, 1908.

Application filed February 18, 1899. Serial No. 706,053.

*To all whom it may concern:*

Be it known that I, JACOB DIEHL, citizen of the United States, residing at Cleveland, Cuyahoga county, State of Ohio, have invented new and useful Improvements in Sewing-Machines, of which the following description, taken in connection with the drawings herewith accompanying, is a specification.

10 This invention has for its object to improve the stitch-forming mechanism of the machine so as to render it capable of sewing at a very high rate of speed, say about 3000 stitches and upwards a minute, without undue jar or strain on the operating parts, and also to insure the certain and proper co-  
15 operation of the needle, shuttle, and take-up in forming the stitch when the machine is being operated at such high rate of speed.

20 This object I secure by means of the novel construction and combination of parts as herein after set forth in detail and pointed out in the claims.

Referring to the drawings: Figure 1 is a side elevation of a sewing machine embodying my invention, with the frame in section. Fig. 2 is a plan view of the same, with the frame in horizontal section through line 2—2 of Fig. 1. Fig. 3 is a vertical cross section through line 3—3 of Fig. 1, looking in the direction indicated by the arrow. Fig. 4 is a front view with the face plate removed. Figs. 5 and 6 are enlarged detail views of certain of the operating parts. Fig. 7 is a vertical cross section through the head of the machine, on line 3—3 of Fig. 1, showing a modified form of construction, and Fig. 8 is a side elevation of the construction shown in Fig. 7, with the frame in section through line 8—8 of said figure. Fig. 9 is a diagram showing the relative positions of the needle and take-up during the various angles of the rotation of the main shaft.

45 To explain in detail, 1 represents the bed-plate of the machine, 2 the overhanging arm thereof, and 3 and 4 the needle and presser bars respectively.

50 A horizontally arranged rock-shaft 5, mounted in suitable bearings in the arm 2, is provided with a crank-arm 6 at its forward end which is operatively connected with the needle-bar through the medium of a pitman 7, and adjacent to its opposite end is provided with a second crank-arm 8 which is  
55 operatively connected, through the medium

of a pitman 9, with a crank 10 carried by the rotating driving shaft 12. Rotation of the latter communicates a vertically reciprocating movement to the pitman 9 and thereby a like movement to the needle-bar through the medium of the rock-shaft 5 and its connections as described. The driving shaft 12 with its pulley 13 is, as herein shown, mounted in a bracket 14 which is secured to the frame of the machine by means of screws  
60 65 15 15.

A second rock-shaft 16, also mounted in suitable bearings in the arm 2 and parallel with the shaft 5, is provided with a fixed arm 17 at its forward end which acts as the take-up. This arm is located behind the face-plate of the machine and is bent at its end so as to project outwardly through a slot 18 in the face-plate and operates on the front side of the latter, the projecting end of the take-up arm being provided with an eye 19 to receive the thread therethrough. The rock-shaft 16 adjacent to its rear end is provided with a crank-arm 20 which is operatively connected, through the medium of a pitman 23, with the arm 21 of a rock-lever 22. Said lever 22 (shown in detail in Fig. 6) is, as herein shown, made with a part thereof in a substantially U-shape form so as to extend across the opening in the arm of the machine without interfering with the operating parts therein and be pivotally supported in the opposite walls of the opening, as indicated by dotted lines at 24 24 in Figs. 1 and 8. A firm support of the lever is thus insured to permit of the connection therewith of the pitman 23, and a second pitman or rod 25 to be referred to, which are considerably out of alinement with each other.

The lever 22 receives a rocking movement from the main driving shaft 12, so as to communicate a vertical movement to the pitman 23 and thereby operate the rock-shaft 16 and its connected take-up arm, through the medium of a rod 26 which is operatively connected at one end with the crank 10 of the driving shaft, and a second rod 25 which is pivotally connected at one end with said rod 26 at 27, and at its opposite end with an arm 28 of the rock-lever 22. A link 29, pivoted at one end on a stationary pin 31 supported in the frame of the machine and at its opposite end connecting with the upper end of the rod 26, serves to control the movement of the latter when operated by the driving crank 10.

The operation of the take-up relative to the needle and shuttle, secured by its actuating mechanism as described, is as follows: When the needle is at its upward limit of movement, as shown in Figs. 1 and 4, the take-up is at its lowest limit so as to entirely slacken the thread, and the shuttle (a) has just passed through the thread loop and is about to cast off the same. As the latter operation occurs, the take-up is moved upward quickly to take up the slack thread and tighten the stitch, such take up action being effected during about a one-fifth revolution of the shuttle and its driving shaft. After the take-up has thus acted to complete the stitch, it begins to move downward in about the same time with the needle so as to control the thread and prevent undue slack until the needle has reached its lowest limit of movement, then, as the needle rises and throws out the thread loop in the usual manner to be seized and entered by the shuttle, the take-up continues its downward movement in control of the thread while the shuttle is passing through the loop and until it casts off the latter, when it again quickly operates to draw up and tighten the stitch as before described. In this manner, the thread is controlled with the greatest nicety at all times so as to insure perfect stitching when the machine is operated at a very high rate of speed (Fig. 9).

The timing of the take-up relative to the other stitch-forming parts of the machine as described is effected in a manner as follows: The rod 26 being connected at its lower end with the revolving crank 10 and at its upper end with the pivoted link 29, is caused to have a compound vibratory movement in a substantially elliptical path which is transmitted to the rock-lever 22 through the rod 25 into a rocking or vibrating movement of a desired variable or differential speed, which latter is communicated to the take-up through the connections described. For instance, during the upward and lateral movement of the rod 26 (from the position shown in Fig. 3) in a direction toward the rock-lever 22, the link 25 is given a combined longitudinal and lateral movement in a manner to cause a quick rocking movement of the lever 22, which movement is communicated to the take-up to cause its described upward movement. Thereafter, and as the rod 26 is being moved at its lower end by the crank 10 in a direction away from the lever 22, its action in giving the latter its return rocking movement is obviously slower and is such as to communicate to the take-up its described downward movement.

Instead of operating the rock-lever 22 from the driving crank 10 through the medium of the several connections as described, the rod 26 and its controlling link 29 may be dispensed with and the rod 25 be

connected directly with the needle bar connection 9, as shown in Figs. 7 and 8, which has substantially the same movement as the rod 26 described. This arrangement of the parts secures about the same timing in the take up action of the take-up as that secured by the construction before described, there being a slight difference in its downward throw. I prefer the first described construction, however, for machines, like that forming the subject-matter of this application, which are adapted to be operated at a very high rate of speed.

The shuttle a, as herein shown, is operated to act in proper time with the other parts of the stitching mechanism from the driving crank 10, the latter being provided with a second crank 33 which engages with a sliding block 34 located in the grooved arm 35 of the shuttle driving shaft 36 and communicates the desired differential rotary movement to the latter.

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

1. A sewing machine, including in combination, a work-support, a standard rising therefrom, an overhanging arm carried by said standard, a needle mounted in said overhanging arm, means for reciprocating said needle, a looper, means for operating said looper, a take-up arm mounted at the forward end of said overhanging arm, and devices for operating said take-up arm comprising a member located in said standard, means for operating said member whereby parts thereof move in substantially an elliptical path, a pitman in said standard having operative connection with the take-up arm, and devices between said pitman and said member for transmitting the movement of the member to the pitman and imparting to the connected take-up arm a vibrating movement of a variable or differential speed.

2. A sewing machine, including in combination, a needle, means for reciprocating said needle, a looper, means for operating said looper, a take-up, and devices for operating said take-up comprising a revolving crank, a rod connected at one end to said crank, a link pivoted to a fixed support and connected to the other end of said rod, and devices connecting said rod intermediate its ends to the take-up for transmitting the movement of said rod into a rocking or vibrating movement of the take-up of a variable or differential speed.

3. In a sewing machine, the combination, with the needle and looper and their actuating mechanism, of a take-up, and actuating mechanism for said take-up, comprising a revolving crank, a rod connected at one end with said crank, a link pivoted on a fixed support and connecting with the other end of said rod and coöperating with the crank in

causing a part of the intermediate rod to move in a substantially elliptical path, and means, including a rock-lever and a link, for transmitting the movement of said rod into  
5 a rocking or vibrating movement of the take-up of a variable or differential speed.

4. In a sewing machine, the combination of the driving and take-up shafts, a take-up, a rock-lever mounted on a stationary support, an arm on the take-up shaft, a link connecting said arm with said rock-lever, a pitman rod connected with and operated by the driving shaft, a link connecting said pitman  
10 rod with a fixed support and a link connecting said pitman rod with said rock-lever, substantially as and for the purpose set forth.  
15

5. In a sewing machine the combination of a take-up, a reciprocating rod 26, actuating and controlling means for the rod which actuate both ends of the rod in curved paths, 20 the path of one end of the rod having greater lateral extent than the path of the other end of the rod, a link pivoted to and extending laterally from said rod, and actuating mechanism connecting the link with the take-up, 25 substantially as and for the purposes described.

JACOB DIEHL.

Witnesses:

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PHILIP A. SAMPLINERS.