No. 882,266. PATENTED MAR. 17, 1908.

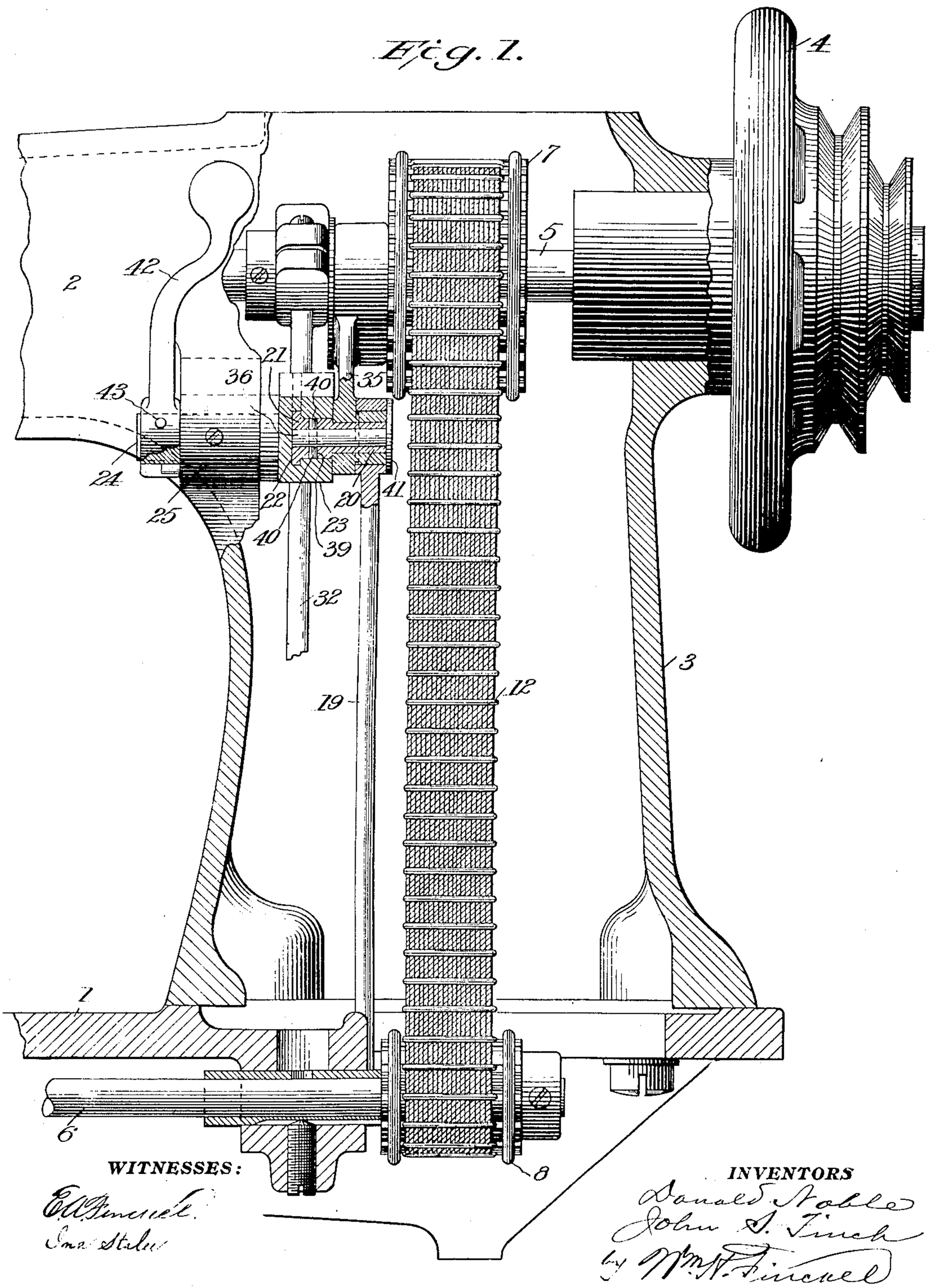
D. NOBLE & J. S. FINCH.

FEEDING MECHANISM FOR SEWING MACHINES.

APPLICATION FILED DEC. 4, 1905.

5 SHEETS—SHEET 1.

Fig. 1.



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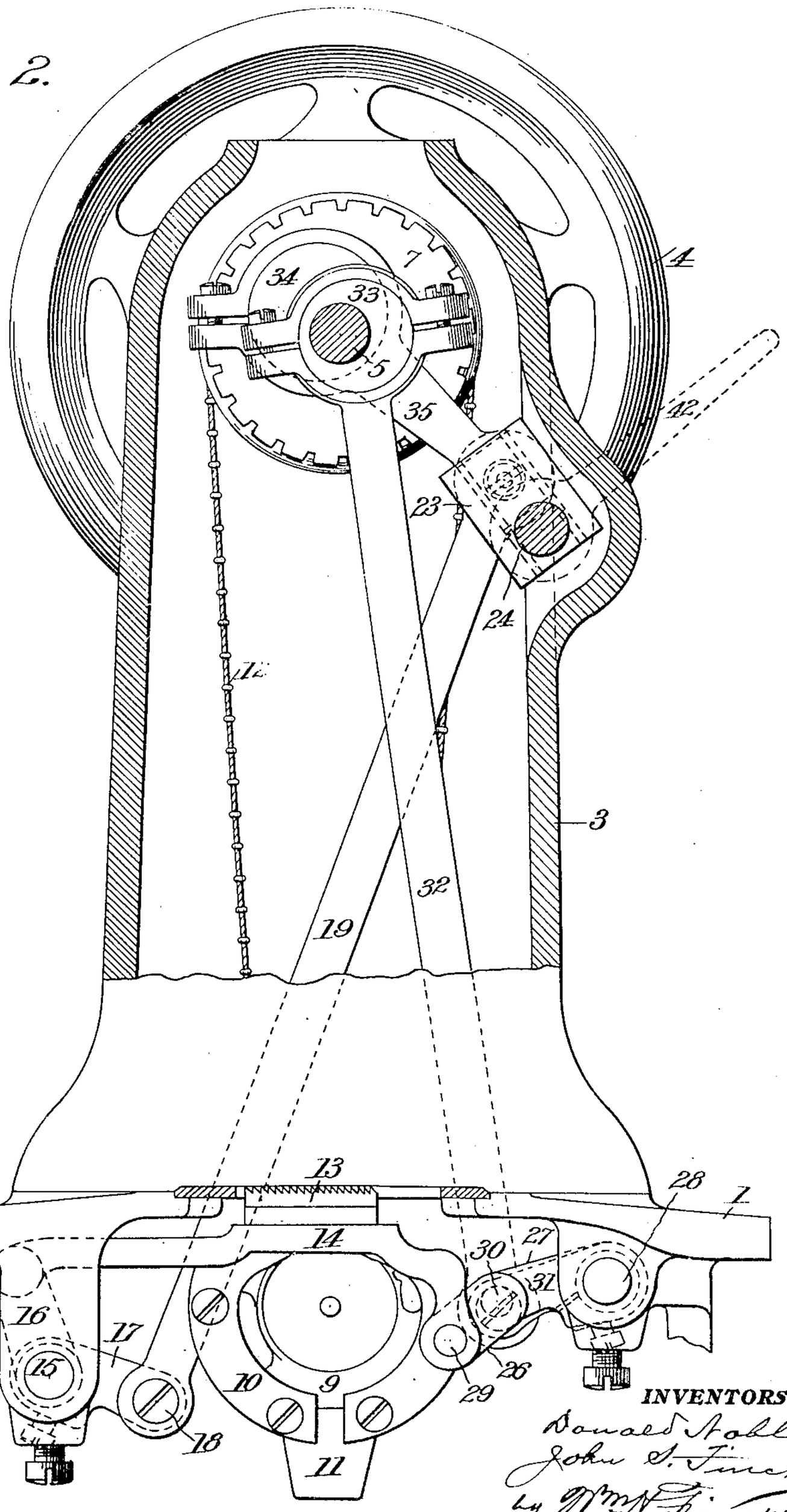
5 SHEETS—SHEET 2.

Fig. 2.



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5 SHEETS—SHEET 3.

Fig. 3.

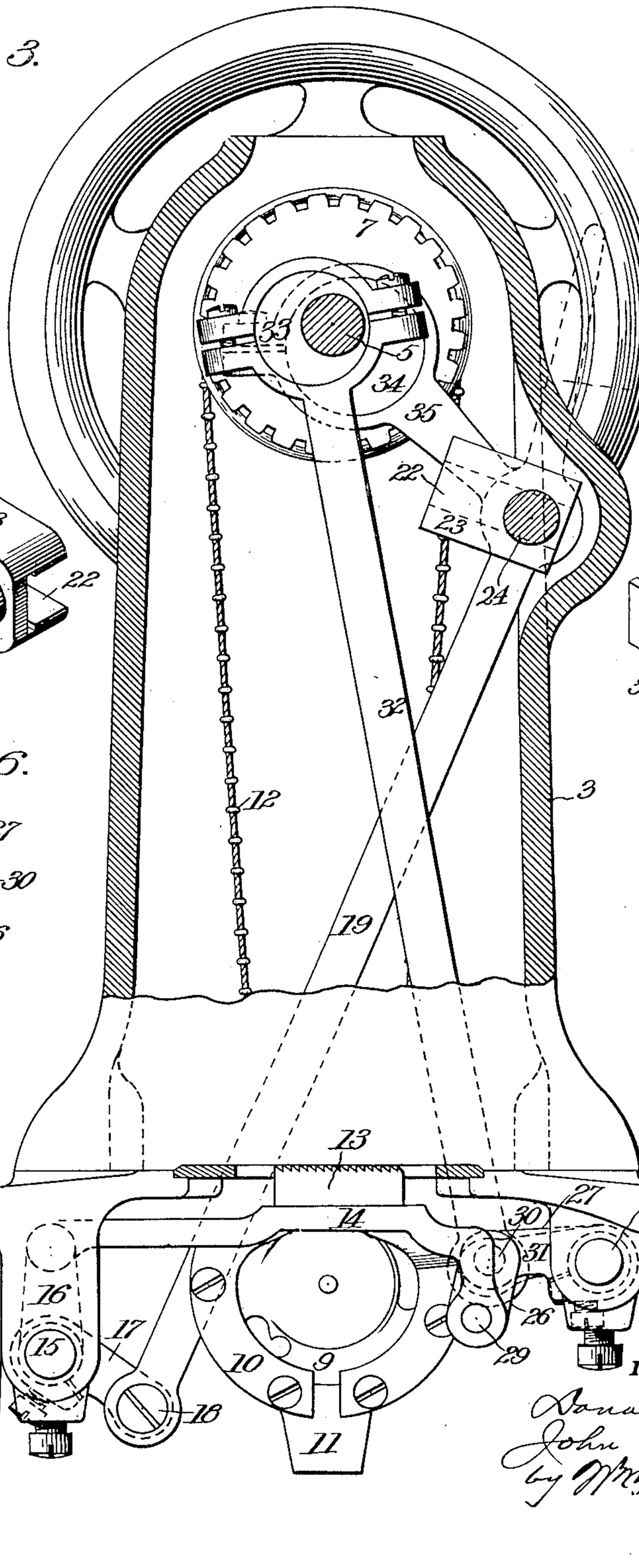


Fig. 4.

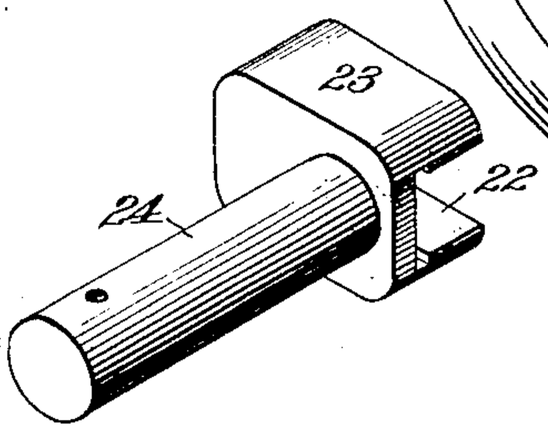


Fig. 5.

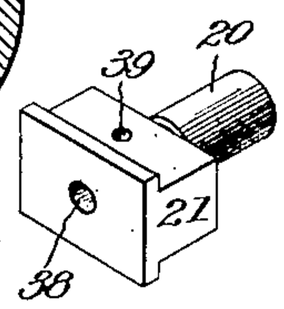


Fig. 6.

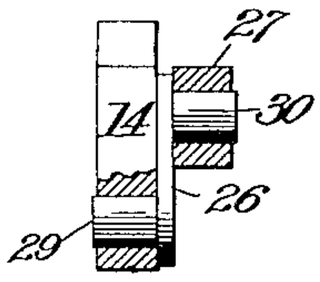
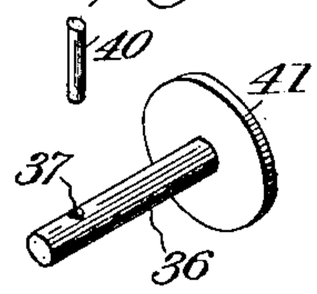


Fig. 7.



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FEEDING MECHANISM FOR SEWING MACHINES.

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5 SHEETS—SHEET 4.

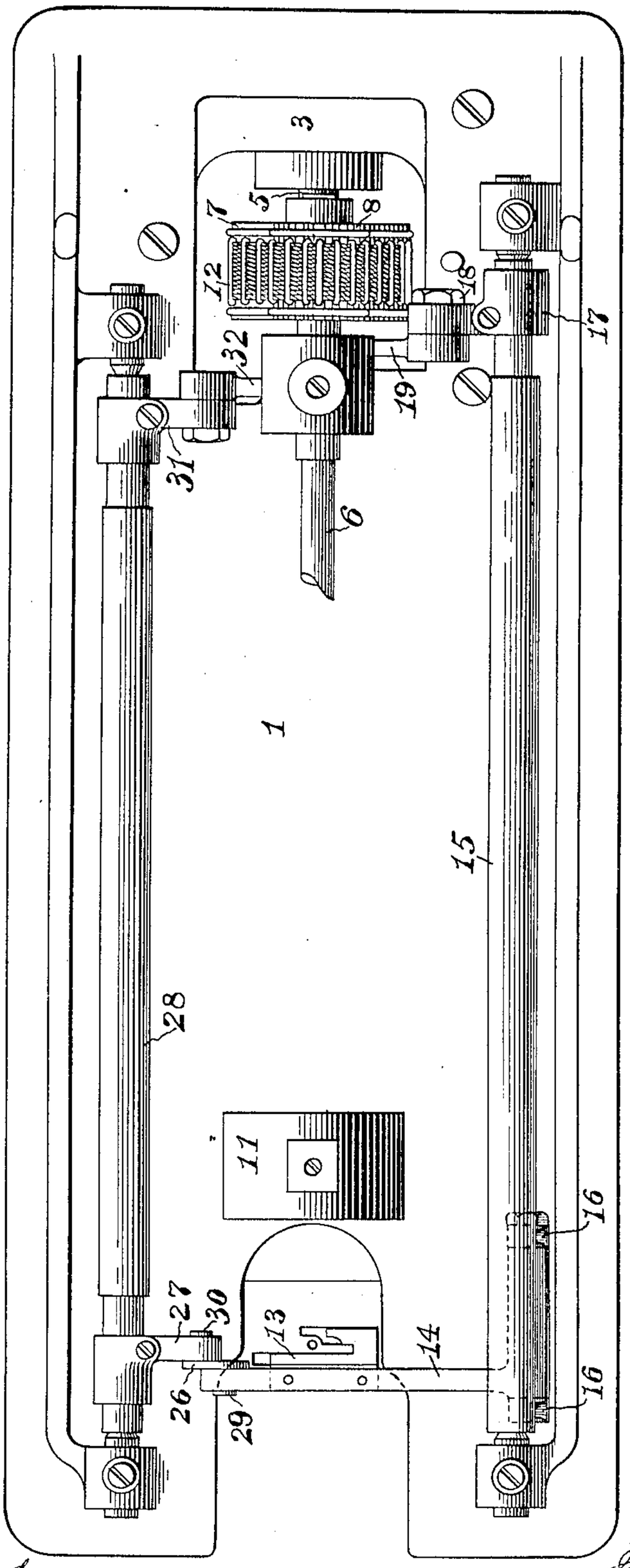

Fig. 8.

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No. 882,266. PATENTED MAR. 17, 1908.

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5 SHEETS—SHEET 5.

Fig. 9.

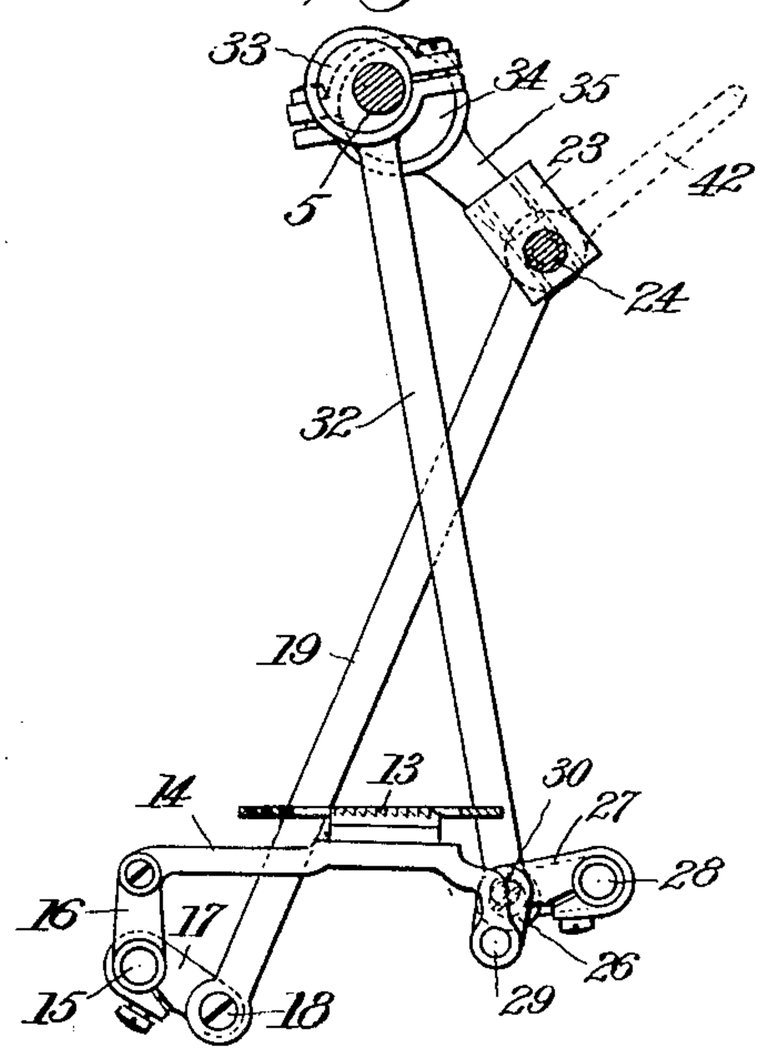


Fig. 10.

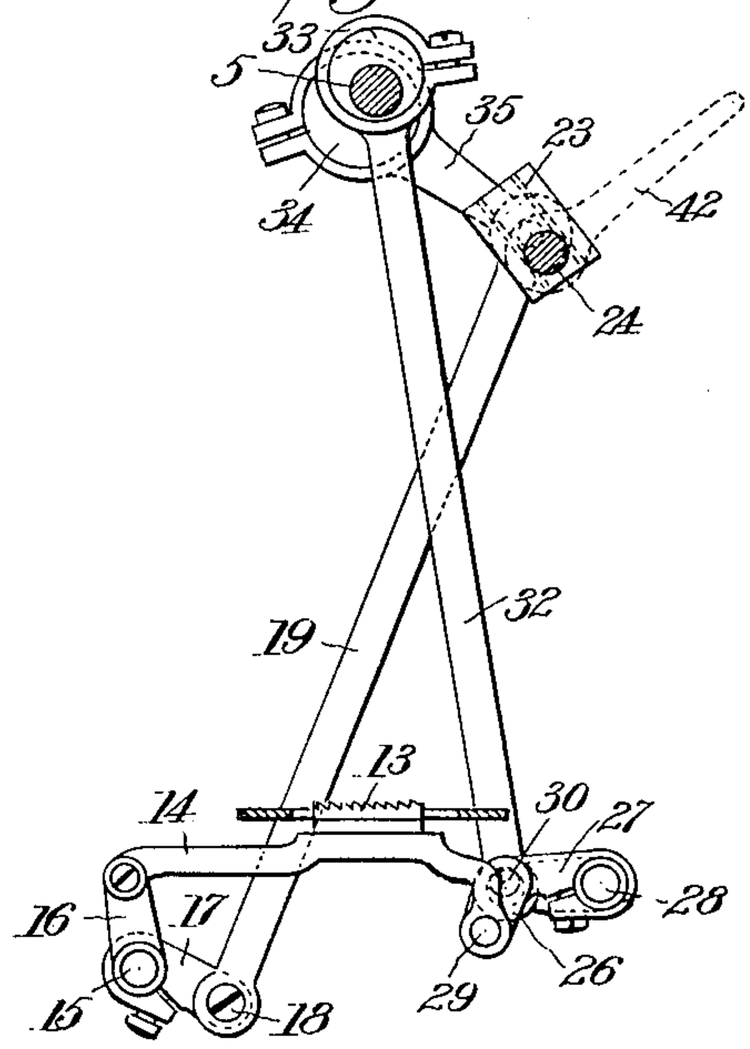


Fig. 11.

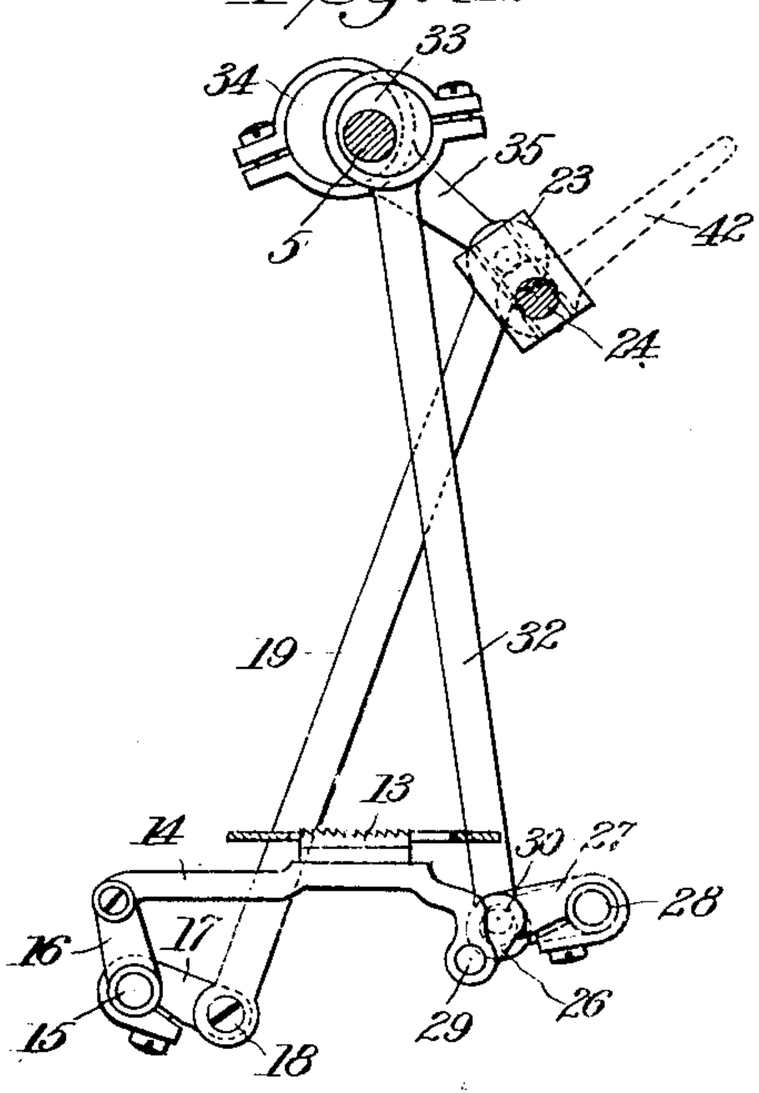
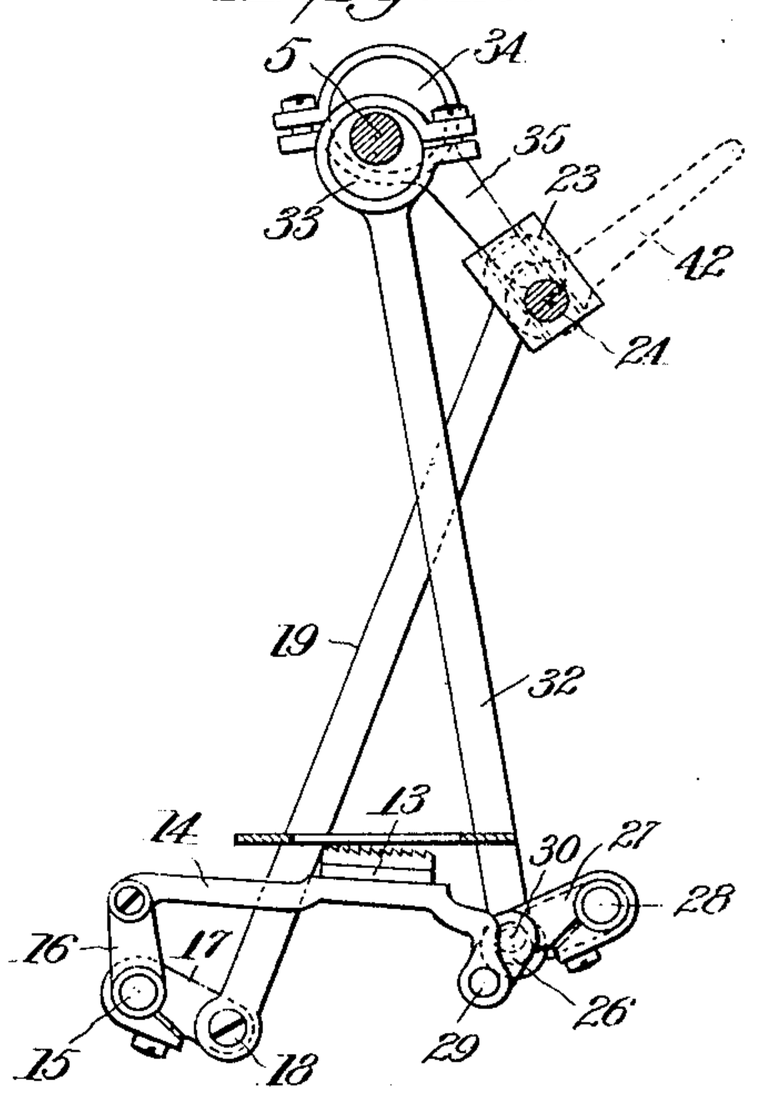


Fig. 12.



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UNITED STATES PATENT OFFICE.

DONALD NOBLE AND JOHN S. FINCH; OF BRIDGEPORT, CONNECTICUT, ASSIGNORS, BY MESNE ASSIGNMENTS, TO THE SINGER MANUFACTURING COMPANY A CORPORATION OF NEW JERSEY.

FEEDING MECHANISM FOR SEWING-MACHINES.

No. 882,266. Specification of Letters Patent. Patented March 17, 1908.

Application filed December 4, 1905. Serial No. 290,131.

To all whom it may concern:

Be it known that we, DONALD NOBLE, a subject of the King of Great Britain, and JOHN S. FINCH, a citizen of the United States, both residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented a certain new and useful Improvement in Feeding Mechanisms for Sewing-Machines, of which the following is a full, clear, and exact description.

The object of this invention is to provide means for adjustably controlling the length of the feed movements, and means whereby an eccentric may be employed to give to the feed-dog its vertical movements, instead of the usually employed feed lift-cam.

In the accompanying drawings illustrating the invention, in the several figures of which like parts are similarly designated, Figure 1 is a sectional elevation of the rear portion of a sewing machine. Fig. 2 is a front elevation, with the throat plate in section, and all that portion of the overhanging arm broken away back into the upright, and showing the feed-dog intermediate its vertical movement and after completing its feed movement. Fig. 3 is a front elevation, with the throat-plate in section, and with all that portion of the overhanging arm broken away back into the upright and showing the feed-dog intermediate its vertical movement and in position to begin the feed movement. Fig. 4 is a perspective view of the feed regulating-lever. Fig. 5 is a perspective view of the slidable block which is carried by the feed regulating-lever. Fig. 6 is a sectional elevation of a portion of the feed-dog lifting connections. Fig. 7 is a perspective view of a connection-bolt and pin for connecting the slide-block, feed-dog connecting-rod and the eccentric connection. Fig. 8 is a bottom plan view, showing the lower portion of the feeding mechanism. Figs. 9, 10, 11 and 12 are diagrammatic views representing the feed movement.

The invention is shown as applied to a Wheeler & Wilson sewing machine of the type represented in the patent granted to Donald Noble, assignor to the Wheeler & Wilson Manufacturing Company, No. 780,725, dated January 24, 1905, but of course the invention is not limited in its application to that one form of sewing machine.

1 indicates the bed-plate of the sewing machine, 2 a portion of the overhanging arm, 3 the upright or standard of the overhanging arm, 4 the band wheel, 5 the needle-bar actuating-shaft, 6 the loop-taker shaft, 7 the pulley secured on the needle-bar actuating-shaft, and 8 the pulley secured on the loop-taker shaft, said pulleys 7 and 8 being of the ratio of two to one, thus giving to the loop-taker shaft two revolutions to one revolution of the needle-bar actuating-shaft.

9 is the loop-taker, 10 the loop-taker raceway, 11 the loop-taker bracket, 12 the belt for operatively connecting the needle-bar actuating-shaft 5 with the loop-taker shaft 6, and 13 is the feed-dog suitably secured to the feed-bar 14 which, in turn is operatively connected with the feed rock-shaft 15 through the crank 16, the latter being fixed to or made integral with the feed rock-shaft 15. The rear end of said rock-shaft 15 is provided with a crank 17 to which is pivotally connected, by a pivot-screw 18, a feed connecting-rod 19, the upper end of which is mounted upon a bearing 20 forming part of a slide-block 21. The slide-block is mounted to move in a groove 22 formed in a feed regulating-lever 23, said lever being provided with a shaft 24, which is mounted in a suitable bearing 25 formed on the side of the standard 3. The end of the feed-bar 14, opposite the end operatively connected with the arm 16, is connected, through a link 26, with an arm 27 fast on the lift rock-shaft 28. The link 26 is provided at its opposite ends with studs 29 and 30, the former entering a suitable hole in the end of the feed-bar 14 and the latter entering a suitable hole in the end of the arm 27, (see Fig. 6) thus permitting movements of the feed-bar 14 vertically and in the direction of the feed. To the rear end of the lift rock-shaft 28 is secured an arm 31 to which is pivotally secured a feed-lift connection-rod 32, the upper end of said rod encircling an eccentric 33 fast on the shaft 5, whereby, through the rotation of the shaft 5, rocking movements are transmitted to the rock-shaft 28, and consequently vertical movements to the feed-dog 13.

On the needle-bar actuating-shaft 5 is secured a second eccentric 34, operatively connected with one end of an eccentric connection-rod 35, the opposite end of said connection-rod being pivoted upon the bearing 20 of the slide-block 21, thereby connecting, through the parts 14 to 24, inclusive, and eccentric connection 35, the eccentric 34 with

the feed-dog 13, thus converting the rotary movements of the eccentric 34 into longitudinal movements of the feed-dog 13.

36 is a guard-bolt provided with a pin hole 37 and when in position in the hole 38, formed in the slide-block 21, as illustrated in Fig. 1, the pin hole 37 registers with a pin hole 39 (see Fig. 5) formed in the slide-block 21 to receive the pin 40. The guard-bolt has a head 41, and when the parts are arranged as in Fig. 1 this guard-bolt serves to hold the connections 19 and 35 against displacement off the bearing 20.

42 is a hand lever, secured by pin 43 to the shaft 24 of the feed-regulating-lever 23, so that at the will of the operator the regulating-lever 23 may be adjusted to bring its slot 22 to the desired angle relatively to the connection-rod 19 and thereby change the position of the fulcrum of the connection rod relatively to the axis of the shaft 24 and consequently the length of stroke of said connection rod with relation to the rock-shaft 15.

From the foregoing it will be understood that the eccentric 34, through the connection 35, moves the block 21 in opposite directions in the slot 22 during the formation of each stitch and that the extent of feed movement given the feed-dog 15, through the connections, 14, 16, 17, 19 and 21, depends upon the angle given the slot 22 through the adjustment of the lever 42.

Referring to Fig. 2, the feed-dog actuating mechanism is shown in the position which it occupies at the completion of the feed movements of the material, with the upper toothed surface of the feed-dog in the same plane as the cloth-plate and intermediate its downward movement, as will be understood by reference to the relative positions of the eccentrics 33 and 34 with their respective connections 32 and 35.

Referring to Fig. 3, the feed-dog actuating-mechanism is illustrated in the position which it occupies at the commencement of the feed movement of the material, with the upper toothed surface of the feed-dog in the same plane as the cloth-plate intermediate its upward movement.

In the construction of the ordinary four motion feed, there is usually employed an eccentric for effecting the feed or horizontal movements and for the return or backward movements of the feed-dog, and a lift-cam for effecting its vertical movements, such lift-cam being profiled to give a quick upward movement, then a dwell in the vertical movement during the feeding operation, then a return downward movement of the feed-dog; accordingly, there is first a quick upward movement, then a horizontal movement in the same plane followed by a downward return movement of the feed-dog.

In the construction of sewing machines to be run at high speed, it is desirable to employ a lifting eccentric as well as a feeding eccentric cam, but the action of a lifting eccentric without the employment of some form of readjusting mechanism would give to the feed-dog feed movements in the form of an ellipse, as is well understood, and such elliptical movement of the feed-dog is undesirable for use in connection with sewing machines for manufacturing standard goods. In the present construction, the elliptical form of feed movement would be given the feed-dog were it not for the use of the link 26, or its equivalent, combined so as to readjust or hold the feed-dog in its feeding position above the cloth-plate during the feeding operation.

Since the link 26 is pivotally mounted between the end of the arm 27, fast on the lift rock-shaft 28, and the end of the feed-dog carrying bar 14, it follows that when the feed-dog actuating mechanism is in the position, Fig. 9, for commencing the feed, if the feed-dog carrying bar 14 is moved in the direction for advancing the material, the link 26 will be swung in the same direction on its pivot 30, and such radial movement of the link will, owing to its pivoted relationship to the arm 27 and bar 14, cause the bar 14 to be moved vertically, so that during the last half of the upward movement and the first half of the forward feed movement of the feed-dog, the movements of both the eccentric 33 and the link 26 act to move the feed-dog carrying bar 14 vertically, Fig. 10 but when this point in the feed and vertical movements of the feed-dog is reached, the eccentric 33, in its rotation, reverses the vertical movement of the arm 27 and, consequently, the link 26; but owing to the continued feed movement of the feed-dog, there is a continued radial movement of the link 26 on its pivot 30 (see Fig. 2) in the direction of the feed of the material, which, owing to the relative positions of the pivots 29 and 30, causes the link 26 to hold the feed-dog in its elevated position until the completion of the feed movement, Fig. 11, when the action of both the arm 27 and link 26 will permit a quick return of the feed-dog to its lowest position, Fig. 12. The serrated surface of the feed-dog remains above the plane of the cloth-plate during the entire feed movement. By comparing Figs. 2 and 3, it will be seen that the axis of the pivot 29 is in substantially the same plane, although the arm 27, Fig. 2, occupies a much lower position than in Fig. 3.

The link 26 is a main factor in modifying the feed motion, and as a result of its employment, the feeding of the material occurs when the feed-dog is moved forward and the eccentric 33 is passing over its center. At this time the feed-dog will be moved vertically by reason of the fact that the link 26 swings on its stud 30, and this swinging movement serves to hold the feed-dog ele-

vated even when the arm 27 first begins to drop, and this occurs during the last half of the forward feed movement of the feed-dog. The lowering action of the feed-dog takes place as the feed-dog approaches the finish of its forward feed movement and enters slightly into the return movement. In other words, there is a combined forward feed movement and lowering movement at substantially the completion of the feed movement, merging into and followed by a combined lowering and return movement at substantially the beginning of the return movement.

Referring again to the diagrammatic views, and as a summary of the foregoing, it may be said that Fig. 9 represents the parts at the extreme limit of the down stroke of the feed eccentric 34, at which point the feed-dog is rapidly rising during slow action of feed eccentric 34 in crossing the dead center; Fig. 10 represents the parts at the extreme limit of uplift of eccentric 33 during the continuation of the feed, from which point the action of the link 26 causes the feed-bar and dog to be raised while the lift eccentric 33 is tending to lower the same, thereby causing one action to offset the other and make the feed-dog remain approximately level until the conclusion of the feed movement; Fig. 11 represents the position of the parts at the termination of the feed movement, the feed-dog at this position being caused to rapidly fall through the combined resultant action of the lift eccentric 33 and link 26, and Fig. 12 represents the parts at the extreme downward limit of the lift eccentric 33, with the feed-dog on its return movement considerably below the throat-plate. In this connection, it is to be understood that the path of movement of the feed-dog is all-important in connection with the feeding movements, but that the path of the balance of its cycle of movement is unimportant, so that, as in the present construction, the downward, and if necessary the return movement of the feed-dog, may be in a path of extreme elliptical form, as such movements are below the material and in no way influence the feed movements of the material.

What we claim is:—

1. In a feeding mechanism for sewing machines, a feeding eccentric, a feed-dog, and connections between said eccentric and feed-dog for effecting horizontal movements of said feed-dog, in combination with a lifting eccentric, and connections between said lifting eccentric and said feed-dog for giving vertical movements to said feed-dog, said connections between the lifting eccentric and feed-dog including means coacting with the means for effecting the horizontal movements of the feed-dog for maintaining said feed-dog in active feeding elevation above the cloth-plate throughout its feeding movements.

2. In a feeding mechanism for sewing machines, a feeding eccentric, a feed-dog, and connections between said eccentric and feed-dog for effecting horizontal movements of said feed-dog, in combination with a lifting eccentric, and connections between said lifting eccentric and said feed-dog for giving vertical movements to said feed-dog, said connections between the lifting eccentric and feed-dog including a link coacting with the means for effecting the horizontal movements of the feed-dog for maintaining said feed-dog in active feeding elevation above the cloth-plate throughout its feeding movements.

In testimony whereof we have hereunto set our hands this 20th day of November A. D. 1905.

DONALD NOBLE.
JOHN S. FINCH.

Witnesses:
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