

No. 705,327.

Patented July 22, 1902.

P. DIEHL & M. HEMLEB.
ROTARY TAKE-UP FOR SEWING MACHINES.

(Application filed May 7, 1901.)

(No Model.)

2 Sheets—Sheet 1.

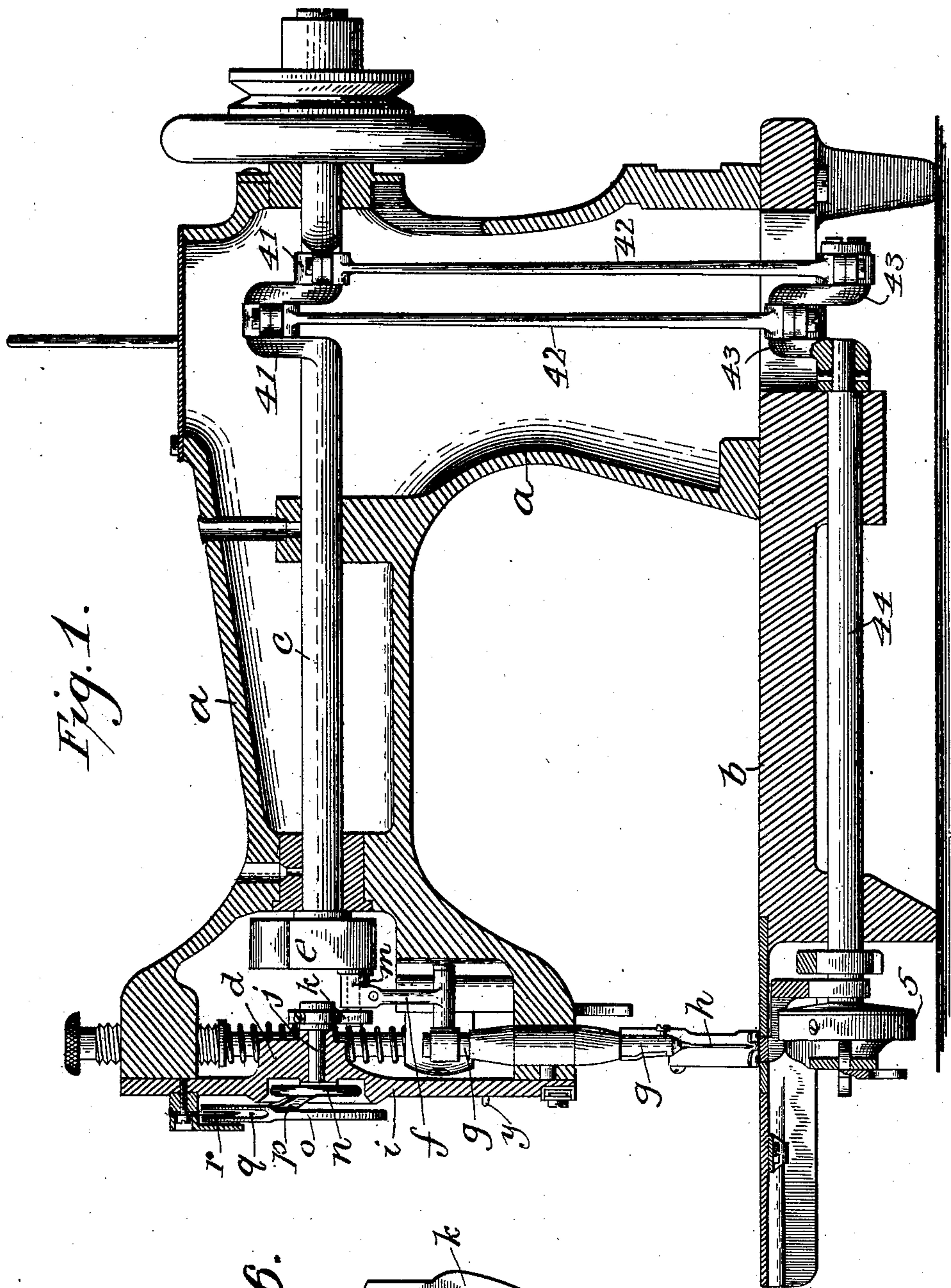


Fig. 1.

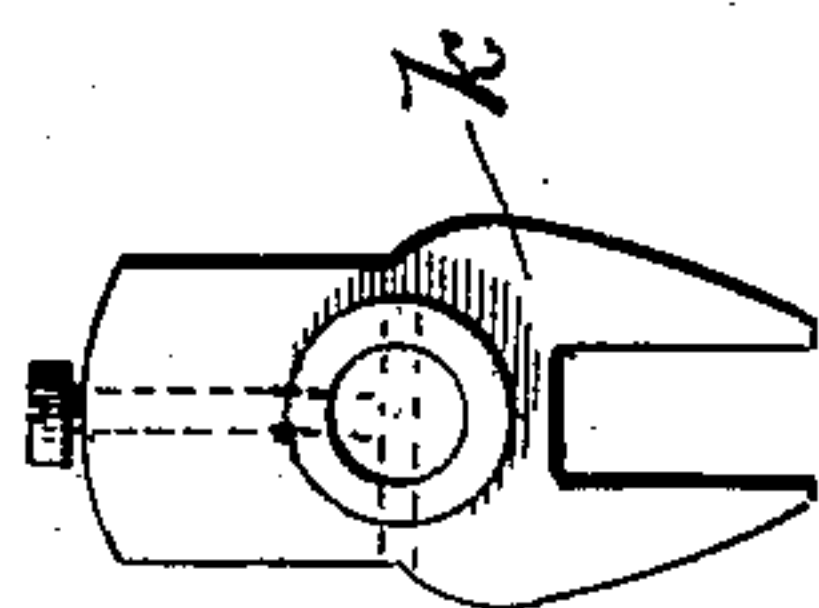


Fig. 6.

Witnesses:
J. B. McGarr.
L. M. Sweeney.

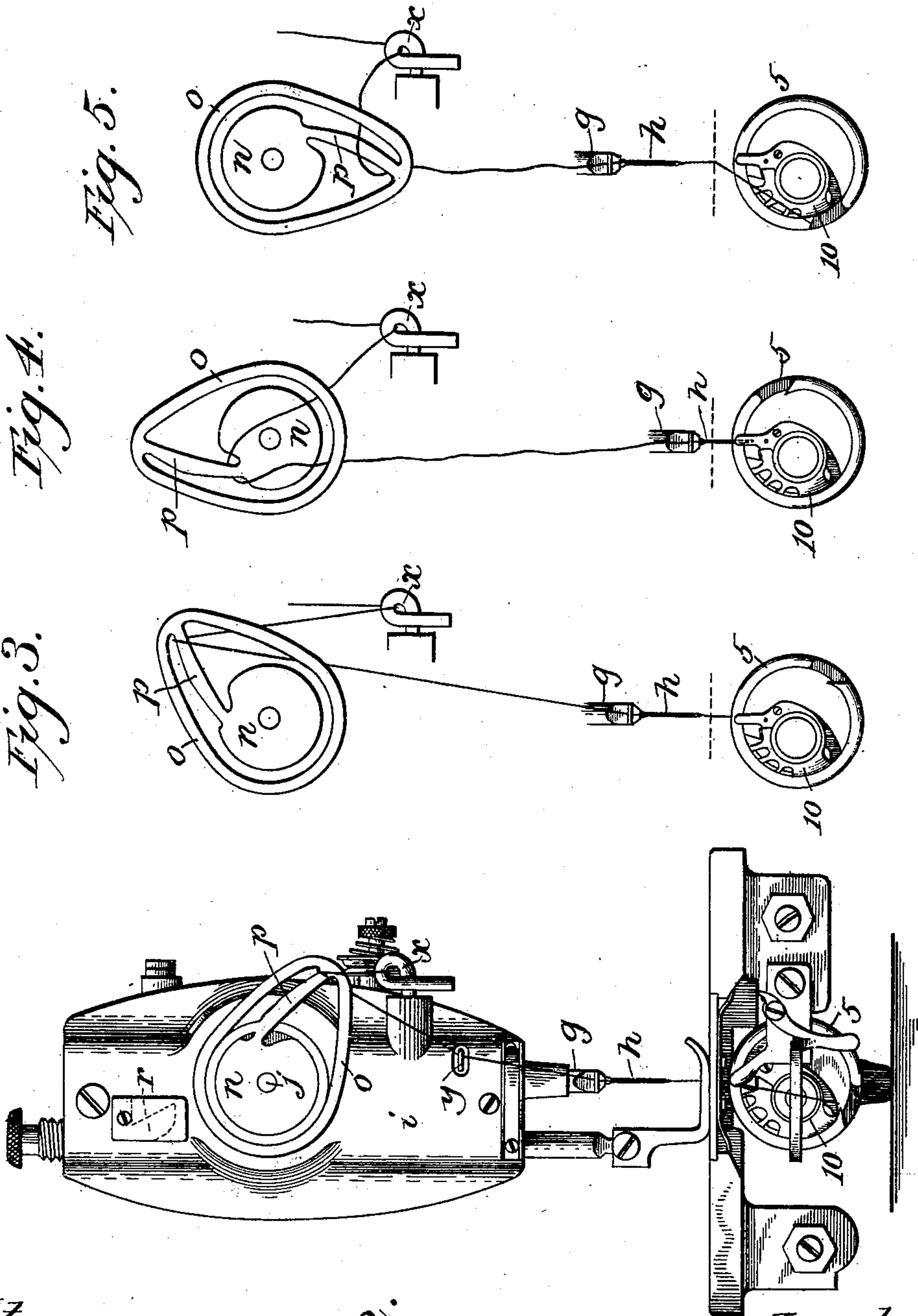
Inventors:
Philip Diehl & Martin Hemleb,
by *[Signature]* Attys.

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2 Sheets—Sheet 2.



Witnesses:
J. B. McGirr.
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Fig. 2.

Inventors:
Philip Diehl & Martin Hemleb,
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Att'y.

UNITED STATES PATENT OFFICE.

PHILIP DIEHL AND MARTIN HEMLEB, OF ELIZABETH, NEW JERSEY, ASSIGN-
ORS TO THE SINGER MANUFACTURING COMPANY, A CORPORATION OF
NEW JERSEY.

ROTARY TAKE-UP FOR SEWING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 705,327, dated July 22, 1902.

Application filed May 7, 1901. Serial No. 59,119. (No model.)

To all whom it may concern:

Be it known that we, PHILIP DIEHL and MARTIN HEMLEB, citizens of the United States, residing at Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Rotary Take-Ups for Sewing-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 This invention relates to rotary take-ups for sewing-machines, and has for its object to provide a rotary take-up of simple construction which is more particularly adapted for coöperation with a stitch-forming mechanism comprising a rotary loop-taking device (preferably a rotary hook) which always moves at a uniform speed and which performs one rotation to each reciprocation of the needle-bar.

20 To this end the improved take-up in its preferred form comprises a hub or disk carried by a small shaft mounted in the head of the machine and carrying an offset ring or guard which is pear-shaped or of irregular oval form and which is partly concentric with and partly eccentric to the said shaft, the eccentric portion of the said ring being connected with said hub or disk by a take-up arm between each side of which and the said eccentric portion of said ring or guard is a free thread-space. The take-up shaft is preferably out of line with the needle-bar operating or driving shaft, from which said take-up shaft is actuated, so that the take-up will

30 have a differential rotary movement to accelerate the take-up action to secure the proper timing in tightening the loops of needle-thread.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a revolving-hook sewing-machine embodying the invention. Fig. 2 is a front end view of the same. Figs. 3, 4, and 5 are diagrammatic views illustrating in connection with Fig. 2 the operation of the improved take-up. Fig. 6 is a detail view to show the slotted crank of the take-up shaft.

Referring to the drawings, *a* denotes the arm; *b*, the work-plate; *c*, the rotating driv-

ing-shaft, journaled in the upper portion of the arm and provided at its forward end with a crank *e*, connected by a pitman *f* to the needle-bar *g*, carrying the needle *h*. The shaft *c* is provided near its rear end with twin cranks 41, connected by pitman 42 with similar twin cranks 43 at the rear end of a shaft 44, journaled beneath the work-plate *b* and carrying at its forward end the revolving hook 5, within which is peripherally supported the thread-case 10, arranged eccentrically to or at one side of the axis of said hook, so as to secure an early discharge of the loops of needle-thread around or over the said thread-case by said hook. The above-described connection of the hook-shaft 44 with the driving-shaft *c*, which operates the needle-bar, enables the hook 5 to have a regular or uniform rotary movement in unison with the shaft *c*, so that said hook will perform one rotation to each reciprocation of the needle.

The parts thus far described are or may be essentially the same as the correspondingly-designated parts of the machine shown and described in United States Patent No. 663,808, December 11, 1900, and which machine is the invention of Philip Diehl.

Journaled in a bearing portion *d* of the face-plate *i* is a take-up shaft *j*, provided at its inner end with a slotted crank *k*, engaged by the needle-bar-operating crank-pin *m* of the crank *e*, said take-up shaft carrying at its outer end a hub or disk *n*, offset from which is a ring or guard *o* of irregular oval outline or pear-shaped form connected with said disk by a tangential take-up arm *p*, which is preferably integral with both said disk and ring. One part of said offset ring or guard is preferably concentric with the disk *n*, while the other part of the said ring or guard projects eccentrically from the said disk, and the entire ring or guard is joined to the said disk by the take-up arm *p*, on both sides of which, within the eccentric part of said ring or guard, is a clear thread-space. The ring *o* serves not only as a thread or loop guard to maintain the needle-thread constantly around or on the said take-up arm *p*, but also serves as a thread-controller to

prevent the thread from flopping about when slack. Guide-eyes x and y are provided upon the face-plate adjacent to the take-up, the operative arm of which is located and operates in substantially the same plane therewith, and the needle-thread passes from the tension through the guide-eye x , over the take-up arm, and then through the guide-eye y to the needle, as illustrated in the drawings. The axis of the take-up shaft j is out of line with the axis of the driving-shaft c , so that an irregular or differential rotary movement is imparted to said shaft, the more rapid movement of the said shaft and of the take-up occurring during the take-up action of tightening a stitch and the slower movement when the slack thread is being carried by the hook 5 around the thread-case 10. The eccentric part of the ring or guard o and the outer portion of the arm p are preferably formed double to provide a recess or slit q , with which registers a stationary knife or thread-cutter r to sever the thread should it accidentally be broken and become wound upon or entangled with the take-up. This feature is, however, not herein claimed, as it is not our joint invention, but is embraced by the application of Martin Hemleb, Serial No. 59,111, filed simultaneously herewith.

The operation of the improved take-up will be readily understood from Figs. 2, 3, 4, and 5 of the drawings. Fig. 2 shows the position of the parts when a loop of needle-thread has just been discharged from the beak 8 of the revolving hook 5 around the lower extremity of the thread-case 10 and the loop is free to be drawn up by the take-up to tighten the stitch. At this time the needle in the machine shown has completed its upstroke and is about to commence its descent. Fig. 3 shows the position of the parts just as the take-up action is completed and the stitch tightened, and a very little further forward travel of the take-up from the position shown in Fig. 3 brings the latter into such position as to allow the thread to slip freely down or inward on the take-up arm p to become loose or slackened, as in Fig. 4, and as the take-up moves from the position shown in Fig. 4 to the reversed position, (shown in Fig. 5,) sliding down or outward on the said take-up arm p , sufficient slack thread is afforded for the next loop to be carried by the hook 5 around the thread-case 10. Fig. 5 shows the take-up in such a position as to yield all the slack thread necessary to enable the hook to carry a loop of needle-thread around the stationary thread-case. The left-over slack thread is all taken up by the time the take-up has again reached the position shown in Fig. 2 and the stitch-tightening take-up operation is about to commence.

Owing to the conjoint cooperation of the regularly or uniformly moving rotating hook operatively connected with the driving-shaft and needle-bar, so as to perform one rotation to each reciprocation of the needle, the thread-

case supported by the hook and arranged eccentric to the axis of said hook, so as to secure an early discharge of the loops of needle-thread around the thread-case, and thus leave sufficient time in the rotation of the driving-shaft for the proper and easy operation of the take-up and the said rotary take-up preferably differentially operating, as described, the present invention contributes in a very important degree to the production of a smooth-running and comparatively silent very high-speed lock-stitch machine which is a decided advance in the art of mechanical sewing and is adapted, as has been demonstrated, to be successfully operated at a speed of four thousand stitches per minute or over. This improvement in the art is in a measure due to the cooperative action of the uniformly-rotating loop-taker and the differentially-rotating take-up and which cooperative action results in a better relative timing of these parts than would otherwise be secured, thereby contributing toward increasing the speed capacity of the machine.

From the foregoing description it will be seen that the take-up proper offers constructive features of radical novelty in the combination, with the rotary supporting-shaft, of an outwardly-projecting take-up arm mounted thereon and affording a slideway or cast-off in contact with which the needle-thread is constantly maintained, so as to slide to and fro lengthwise thereof during each rotation, thereby producing for each stitch a quick take-up action but a slow two-stage paying-out action which prevents the giving out of slack thread at any time sufficient to endanger the kinking or snarling thereof previous to the drawing-down operation of the loop-taker. While the take-up arm is preferably formed upon an inner hub and carries at its outer end the ring or guard, it is evident that the hub is an unessential part of the device and that it is immaterial whether or not the guard be carried by the take-up arm or, in fact, whether or not it be attached to any moving part of the machine.

It is to be observed that the supporting-shaft for the take-up is not necessarily separate and independent of the shaft of the machine by which it is actuated, excepting in the preferred form of the present improvement, wherein it is given a differential movement, as hereinbefore described.

Having thus described our invention, we claim and desire to secure by Letters Patent—

1. In a sewing-machine, the combination with a needle and its operating mechanism, of a revolving loop-taker, a rotary take-up, and means for imparting a regular or uniform rotary motion to said loop-taker and an irregular or differential rotary motion to said take-up.

2. In a sewing-machine, the combination with a needle and its operating mechanism, of a rotary loop-taker, a rotary take-up, and means for imparting a single rotation to said

loop-taker at a regular or uniform speed and a single rotation to said take-up at an irregular or differential speed to each reciprocation of said needle.

5 3. In a sewing-machine, the combination with the stitch-forming devices thereof, of a rotary take-up comprising a take-up shaft mounted in the head of the machine and operatively connected with the needle-bar shaft, a disk or hub on said take-up shaft, a ring or guard offset from said disk or hub and of irregular oval form, and a take-up arm joining said ring or guard with said disk or hub.

15 4. In a sewing-machine, the combination with a needle and its operating mechanism, of a continuously-revolving hook, a thread-case supported by and arranged eccentric to the axis of said hook, a rotary take-up, and means for imparting a single rotation to said hook at a regular or uniform speed and a single rotation to said take-up at an irregular or differential speed to each reciprocation of said needle.

25 5. In a sewing-machine, the combination with a needle and its operating mechanism, of a rotary take-up comprising a rotary shaft and a take-up arm extending outward from the axis of said shaft and affording a longitudinal slideway or cast-off for the thread and on which arm the thread is in an outer position when the take-up action occurs and from which outer position the thread moves inward, and then again outward, when the said arm is reversed, during the thread-slackening operation.

35 6. In a sewing-machine, the combination with a needle and its operating mechanism, of a rotary take-up comprising a rotary shaft and a take-up arm extending outward from the axis of said shaft and affording a longitudinal slideway or cast-off for the thread, and on which arm the thread is in an outer position when the take-up action occurs and from which outer position the thread moves inward and then again outward, when the said arm is reversed, during the thread-slackening operation, and a thread-guard surrounding said take-up arm.

7. In a sewing-machine, the combination 50 with a needle and its operating mechanism, of a rotary take-up comprising a rotary shaft and a take-up arm extending outward from the axis of said shaft and affording a longitudinal slideway or cast-off for the thread, and on which arm the thread is in an outer position when the take-up action occurs and from which outer position the thread moves inward and then again outward on said arm, when the latter is reversed, during the thread-slackening operation, and a rotary guard 60 fixed upon and supported by the outer end of said take-up arm.

8. In a sewing-machine, the combination with a needle and its operating mechanism, 65 of a rotary shaft, two thread-eyes arranged adjacent thereto, a take-up arm extending outward from said shaft and located substantially in the plane of said thread-eyes and affording a longitudinal or in-and-out slideway 70 for the thread and on which arm the thread is in an outer position when the take-up action occurs, and from which outer position the thread moves inward and then outward, when the arm is reversed, during the thread-slackening operation. 75

9. In a sewing-machine, the combination with a needle and its operating mechanism, of a rotary shaft, a take-up arm extending outward from said shaft and affording a longitudinal or in-and-out slideway for the thread, and on which arm the thread is in an outer position when the take-up action occurs, and from which outer position the thread moves inward and then outward, when the 85 arm is reversed, during the thread-slackening operation, and means for maintaining the thread constantly around or on said take-up arm throughout each complete rotation of the same, while permitting it to slide freely lengthwise thereof. 90

In testimony whereof we affix our signatures in presence of two witnesses.

PHILIP DIEHL.

MARTIN HEMLEB.

Witnesses:

H. J. MILLER,
LULU GROTE.