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FEEDING MECHANISM FOR SEWING MACHINES.

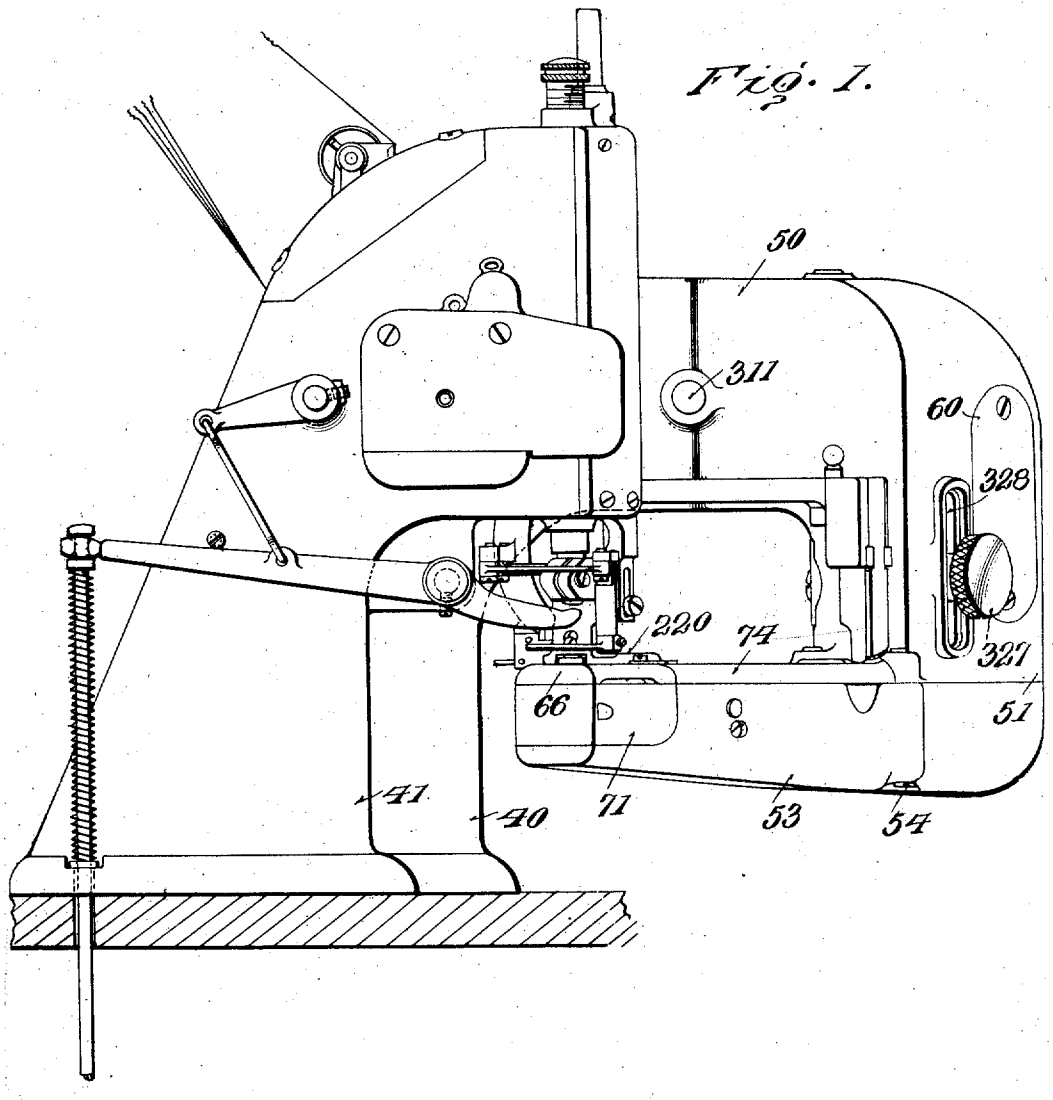
APPLICATION FILED JAN. 28, 1910. RENEWED AUG. 9, 1912.

1,041,658.

Patented Oct. 15, 1912.

8 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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Fig. 2.

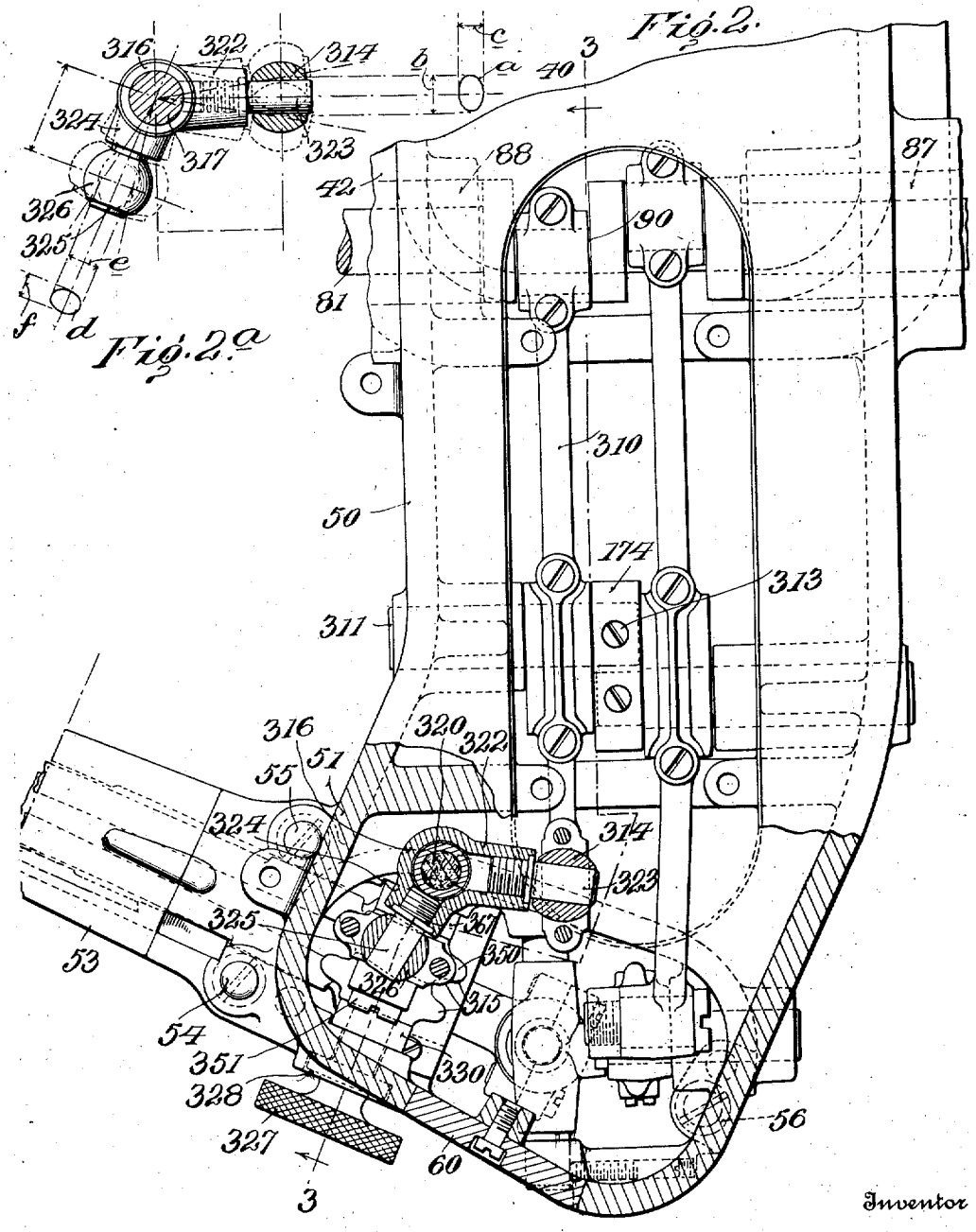

Fig. 2a.

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Fig. 3.

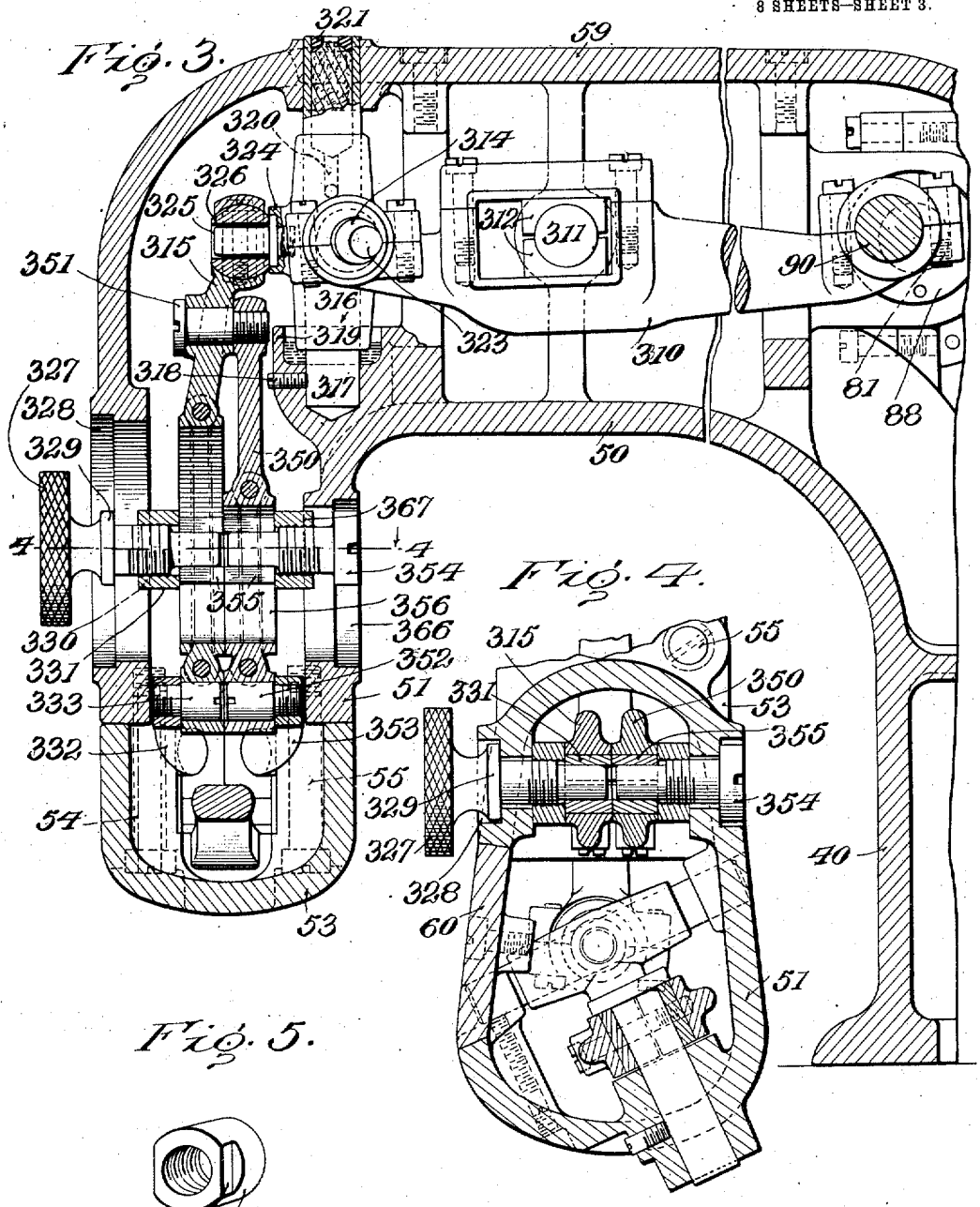

Fig. 4.

Fig. 5.

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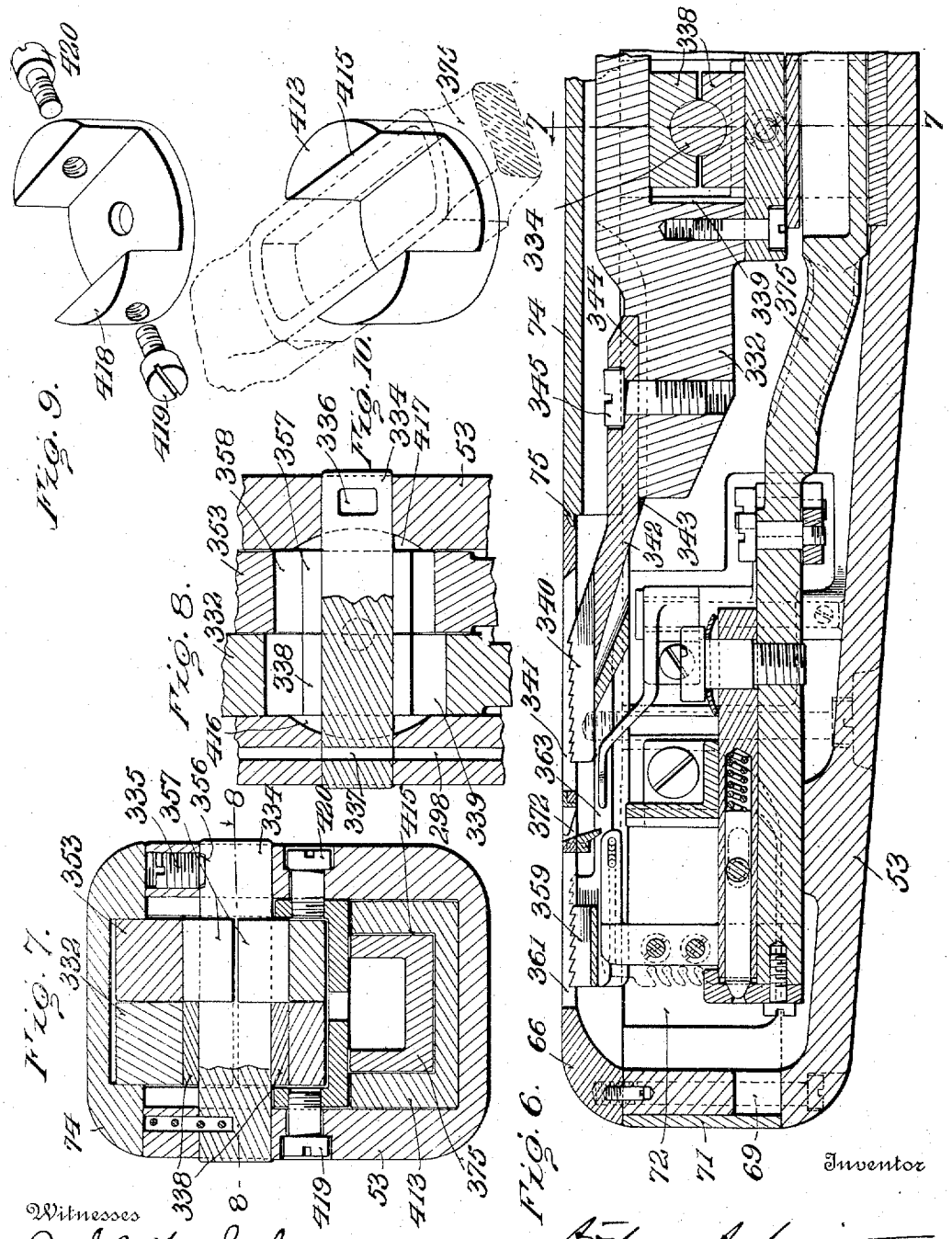
8 SHEETS—SHEET 4.



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8 SHEETS—SHEET 5.

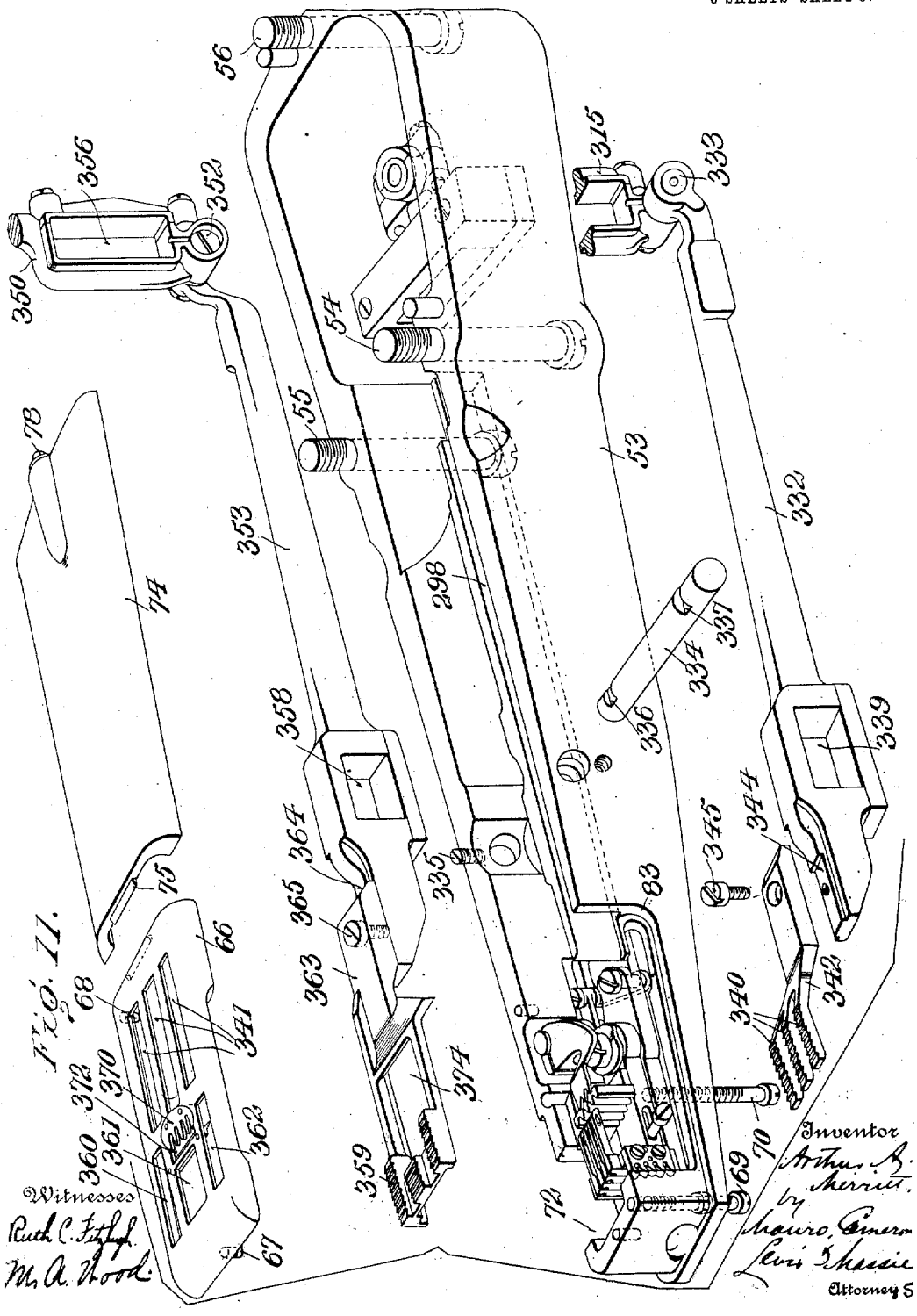

FIG. 11.

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8 SHEETS—SHEET 6.

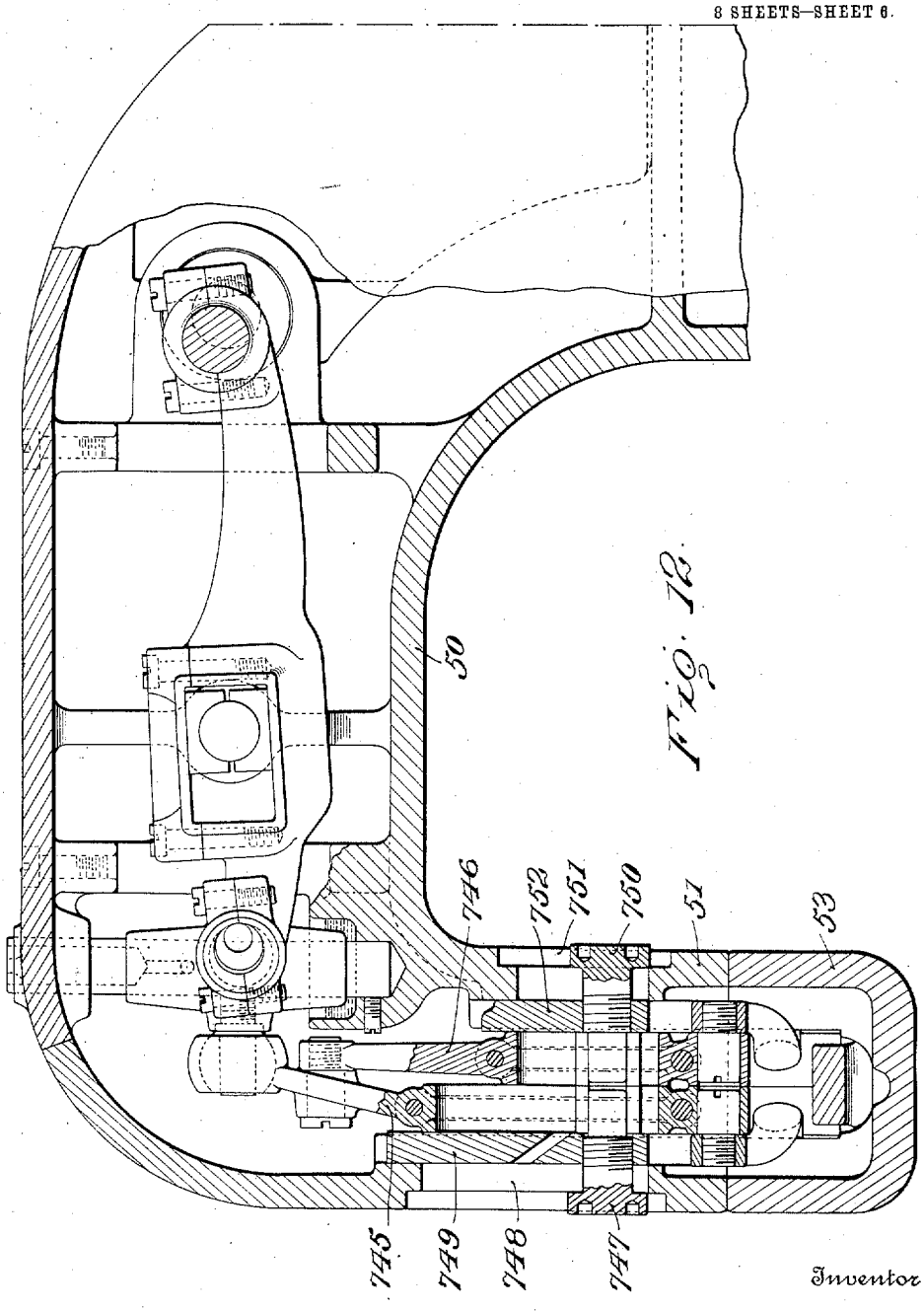

Fig. 12.

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8 SHEETS—SHEET 7.

Fig. 13.

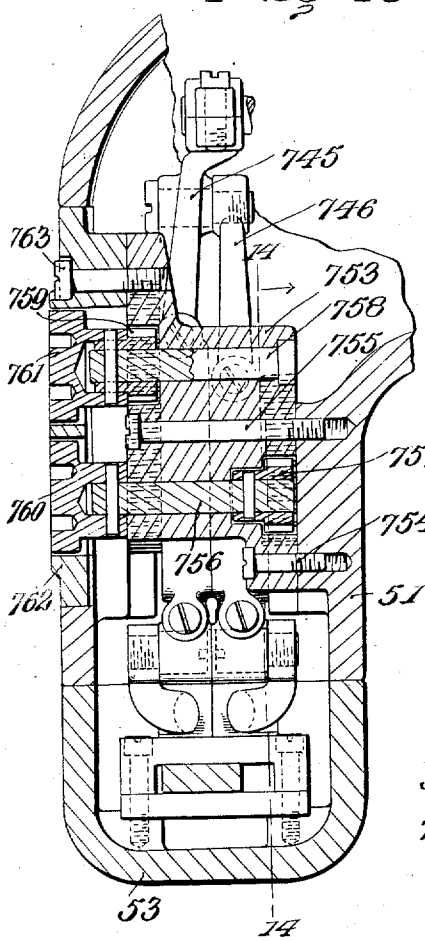


Fig. 15.

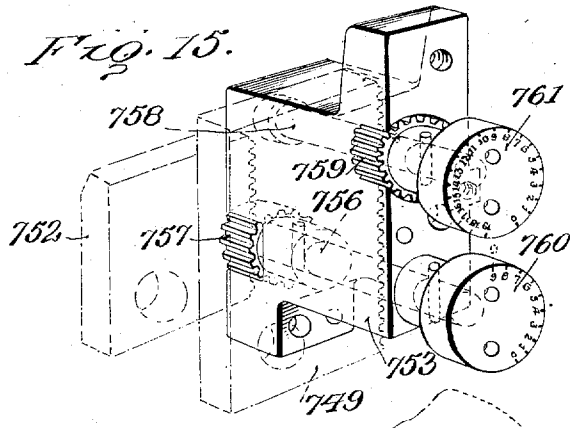
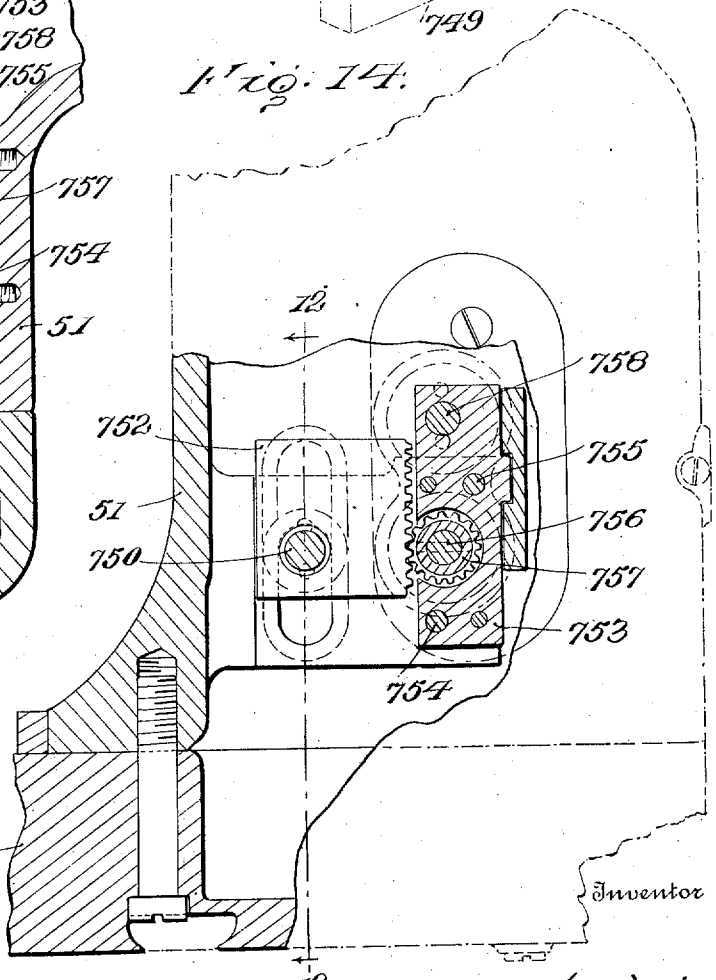


Fig. 14.



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8 SHEETS—SHEET 8.

Fig. 18.

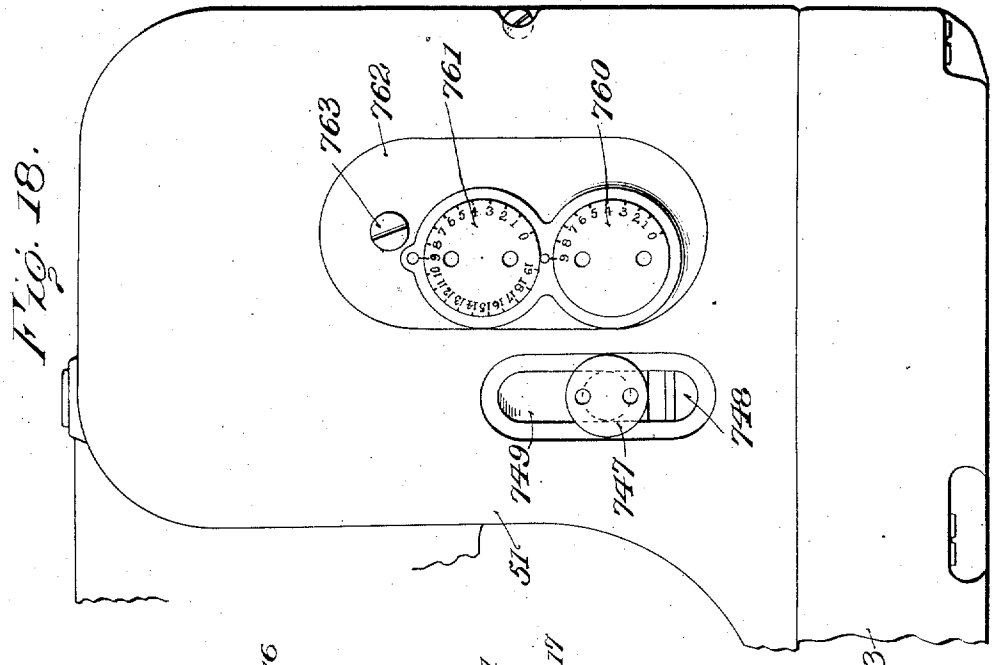

Fig. 17.

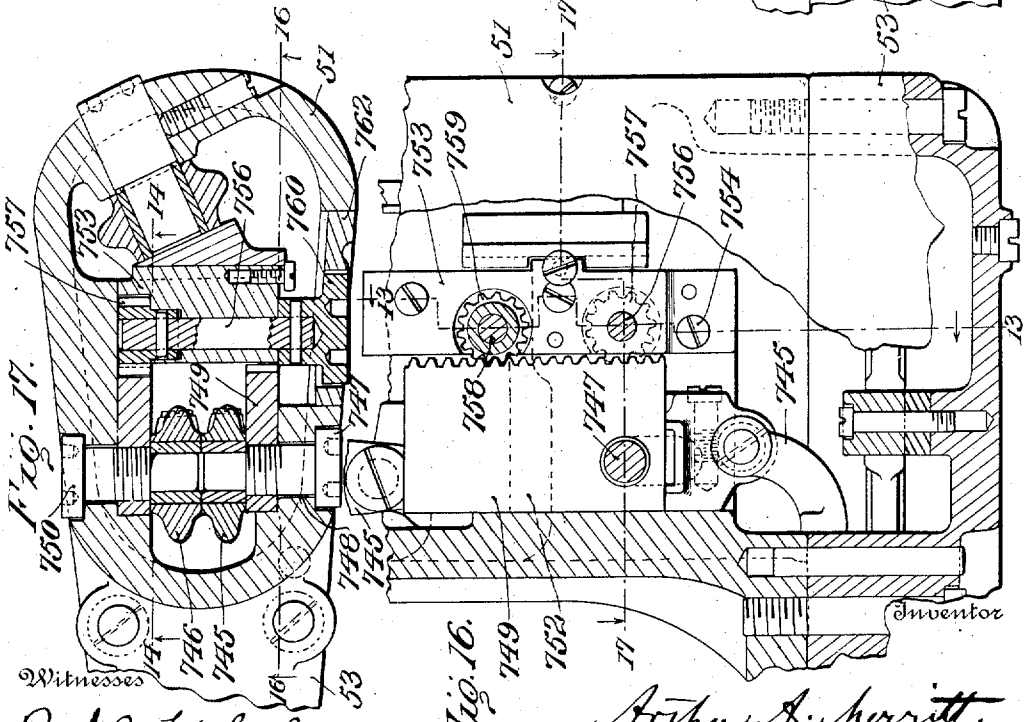

Fig. 16.

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UNITED STATES PATENT OFFICE.

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FEEDING MECHANISM FOR SEWING-MACHINES.

1,041,658. Specification of Letters Patent. Patented Oct. 15, 1912.

Original application filed December 12, 1908, Serial No. 467,163. Divided and this application filed January 28, 1910, Serial No. 540,598. Renewed August 9, 1912. Serial No. 714,307.

To all whom it may concern:

Be it known that I, ARTHUR A. MERRITT, of Worcester, Massachusetts, have invented a new and useful Improvement in Feeding Mechanism for Sewing-Machines, which invention is fully set forth in the following specification.

This is a division of my application filed December 12th, 1908, Serial No. 467,163, for improvements in sewing machines.

The present invention, which relates to improvements in feeding mechanisms for sewing machines, will be readily understood by reference to the illustrations in the accompanying drawings of what are at present regarded as preferred embodiments thereof.

In said drawings—Figure 1 is an end elevation, looking from the left, of a machine to which the invention is applied; Fig. 2 is a plan view with parts in section, of a portion of the work-arm of the machine, a cover for closing an opening in the top of the arm being omitted to expose parts within the arm; Fig. 2^a is a top view with parts in section of the coupling shown in section in Fig. 2; Fig. 3 is a vertical sectional view on line 3—3 of Fig. 2; Fig. 4 is a transverse section on line 4—4 of Fig. 3; Fig. 5 is a detail view of a nut referred to in the detailed description; Fig. 6 is a vertical section through the free end of the work-arm; Fig. 7 is a transverse section on line 7—7 of Fig. 6; Fig. 8 is a horizontal section on line 8—8 of Fig. 7; Figs. 9 and 10 are detail views of parts by which the looper-lever is fulcrumed; Fig. 11 comprises a collection of detail perspective views of parts of the work-arm and the mechanism associated therewith; Figs. 12–18 illustrate an embodiment of means for adjusting and determining the positions of the fulcrums of the two vertical feed-levers, to vary the throw of the two feed-members, different from corresponding means illustrated in Figs. 1–11; Fig. 12 is a longitudinal vertical section (similar to Fig. 3) through a part of the work-arm on line 12—12 of Fig. 14; Fig. 13 is a similar section on line 13—13 of Fig. 16; Fig. 14 is a vertical section on line 14—14 of Figs. 13 and 17; Fig. 15 is a detail perspective view of gearing, racks and associated parts of Fig. 13; Fig. 16 is a vertical section on line 16—16 of Fig. 17; Fig. 17 is a horizontal section on line 17—17 of Fig. 16; and Fig. 18 is an elevation from the left of Fig. 12.

The drawings illustrate the feeding-mechanism of this invention as embodied in a sewing machine of the character fully described and illustrated in the aforesaid original application of which the present is a division. Enough of said complete machine has been shown herein to afford a clear understanding of the positioning and operation of the parts of the feeding-mechanism with relation to neighboring and associated parts of the machine. The framework of the machine comprises two hollow standards 40 and 41 connected by a hollow bridge 42, preferably formed in one casting. The standard 41 is shown only in Fig. 1; only a small portion of the bridge 42 is shown in Fig. 2; the standard 40 appears in a number of the figures of the drawings. A hollow work-arm extends forward from the upper end of the standard 40 in an upper horizontal part 50, and from the outer end of the latter a part 51 depends vertically. These parts 50 and 51 are, as shown, preferably a continuation or extension of the hollow standard 40, being cast integrally therewith and as a part of the single main casting which also embraces the bridge 42 and the standard 41. A lower horizontal part 53 extends from the lower end of part 51 toward the left and rearward (Figs. 1 and 2), terminating at its free end—which constitutes the free end of the entire work-arm—beneath an overhanging portion of the head of the machine, from which latter the presser-foot 220 (Fig. 1) depends. As illustrated, part 53 of the work-arm is preferably a trough-like casting secured to part 51 by screws 54, 55 and 56. To facilitate the assembling of the parts, and to afford access thereto for inspection, adjustment and repairs, there is provided an opening in the top of the part 50 of the work-arm closed by

the cover 59 (omitted in Fig. 2, but shown in Fig. 3); an opening at the front of part 51 of the work-arm closed by a cover 60 (Fig. 2); openings 72 and 83 (Fig. 11) in the side walls of the free end of the part 53 of the work-arm closed by a longitudinally slidable U-shaped cover 71; a plate 66, secured in place by screws 69 and 70, covering the free end of the work-arm and constituting a work-plate or throat-plate of the machine, and having openings through which the feed teeth and needles operate, as later explained; and a slightly arched cover 74 for closing the trough-like part 53 of the work-arm from the throat-plate 66 to part 51. A lip 75 at one end of the cover 74 engages an undercut notch in plate 66, and a spring-actuated bolt-latch 78 at its other end has a conical point adapted to seat in a shallow conical depression in the wall of part 51 of the work-arm.

In the feeding-mechanism of the present invention two separate feed devices or surfaces are given relatively different movements, for purposes more fully explained hereafter.

The embodiment of the invention shown in Figs. 1 to 10 inclusive will first be described in detail.

Referring particularly to Figs. 2 and 3, 310 is a pitman fulcrumed on a pin 311, and also movable longitudinally on said pin through the intermediary of bearing-blocks 312 working in a capped opening of the pitman. The inner end of pin 311 is secured in a socket in a wall or flange 174 by a set screw 313. A capped bearing at the inner end of pitman 310 embraces crank 90 of main shaft 81. A capped bearing at the outer end of the pitman embraces a spherical bearing 314 of a coupling device through which motion is transmitted to a vertical lever 315 extending longitudinally within the part 51 of the work-arm. The coupling referred to (see also Fig. 2[a]) comprises a sleeve 316 embracing and vertically movable on a short shaft 317 extending through an opening in the top wall of the part 50 of the work-arm, its lower end being fixed by a set screw 318 in a socket in the lower wall of said part of the arm, as clearly shown in Fig. 3. An upwardly projecting flange 319 around said socket forms a cup for lubricant which lubricates the contacting surfaces of the lower end of sleeve 316 and the shaft 317. The upper end of shaft 317 is hollow, and from the lower end of the hollowed portion a passage 320 leads to the surface of the shaft, its outer end being preferably closed with a leather plug not shown. The hollow portion of the shaft is preferably filled with a fibrous material, such as waste, held in position by a plug 321 at the outer end of the shaft, said plug having a central opening through which lubricant may be introduced to saturate the fibrous material. Sleeve 316 has two short arms projecting therefrom at an angle of approximately 115° with relation to each other, the arm 322 consisting of a part cast integral with the sleeve and a pin 323 screw-threaded into said part and at its outer end slidably engaging in an opening through the spherical bearing 314 heretofore mentioned. The other short arm 324 on the sleeve also comprises a part cast integral with the sleeve and a pin 325 screw-threaded into a socket in said part and at its outer end slidably engaging in an opening through a spherical bearing 326. The latter is embraced by a capped bearing at the upper end of the lever 315. From the construction thus described, it will be readily understood that the slightly elliptical motion imparted to the outer end of pitman 310 acts upon the arm 322 (Fig. 2) of the coupling, causing the outer end of said arm to describe a similar slightly elliptical movement, during which the pin 323 has slight longitudinal movement in the opening in the spherical bearing 314, and the sleeve 316 slides up and down on the shaft 317. This elliptical movement of arm 322 is approximated in Fig. 2[a] by the ellipse marked *a*, the major axis of which, equal to the line *b*, represents the distance of movement in a horizontal direction, while the minor axis, equal to line *c*, represents the distance of movement in a vertical direction. The arm 324 of the coupling, which acts upon the upper end of the lever 315 (Fig. 3), describes an elliptical movement approximated in Fig. 2[a], by ellipse *d*, the major axis of which, equal to line *e*, represents the distance of horizontal movement imparted to the outer end of arm 324, and the minor axis of which, equal to line *f*, represents the distance of vertical movement. It will be seen that the minor axes of both ellipses, equal to lines *f* and *c*, are of equal length, corresponding to the vertical sliding movement of the coupling on the shaft 317. On the other hand, the major axis, equal to line *b*, is longer than the major axis equal to line *e*, due to the fact that arm 324 is relatively shorter than the arm 322. The lever 315 is fulcrumed to turn on the inner reduced end of the stem of a milled thumb wheel 327. The stem of said wheel passes through a slot 328 in the front wall of the part 51 of the work-arm, and has thereon a flange 329 which bears against a shoulder around said opening formed by counter-sinking the latter. The stem of thumb-wheel 327 has a screw-threaded portion engaging a clamping nut or plate 330 (Figs. 3, 4 and 5), a part of said nut extending into the slot 328, as shown in Fig. 3, in order to prevent the nut from turning with the stem. Through the intermediary of two bearing blocks 331 embracing the re-

duced end of the stem of the thumb-wheel, and working in an elongated capped bearing opening in the lever 315, the latter is free to move longitudinally during its rocking movement about its fulcrum. At its lower extremity this lever is pivoted to the upwardly bent end of a horizontal feed lever 332, this pivot consisting of a screw 333, the threaded end of which engages the lever 332 and the headed end of which engages an opening through the lever 315, as clearly shown in Figs. 3 and 11. The feed lever 332 extends longitudinally within the horizontal part 53 of the work-arm, and near its end is fulcrumed to turn and move longitudinally upon a pivot pin 334, Figs. 6, 7, 8 and 11, which is supported in openings through the side walls of the part 53 of the arm. A set-screw 335, Figs. 8 and 11, is adapted to seat in a notch 336 at one end of fulcrum pin 334 to secure the latter in place. A deeper notch 337 near the other end of the pin registers with the longitudinal thread channel 298 so as not to obstruct the passage of the four looper-threads. Two bearing blocks 338 embrace the fulcrum pin 334, and are in turn embraced by an elongated capped bearing opening 339 in the lever 332. 340 is a feed surface comprising three parallel rows of teeth adapted to work through three parallel slots 341 respectively, in the throat-plate 66 (see particularly Fig. 11), which are positioned in front of the needle-opening 372 and the chaining-finger plate 370. The shank 342 of feed surface 340 has a groove 343 (see Fig. 6) in its under surface embracing rib 344 (Figs. 6 and 11) on the end of lever 332 to hold the feed surface against lateral movement, a screw 345 serving to secure the parts together. Through the connections explained, the feed surface 340 is given what is known in the art as a four-motion feed describing a circle or ellipse. The extent of this feed movement, or what is known as the throw of the feed, may be adjusted to increase or decrease the same by loosening the thumb wheel 327 (Fig. 3), and moving the same, its stem and the bearing blocks 331, upward to increase the throw of the feed surface, and downward to decrease the same.

The feed thus far described may be designated the "fulling feed", inasmuch as the feed surface 340 operates in advance of the point of formation of the stitches, and by being adjusted to have greater movement than the stitch-feed, acts to full the material at this point, with the object of presenting the material (particularly such as relatively flexible knit-goods) to the action of the needles in an unstretched condition and thereby avoiding formation of the stitches on the material when in a stretched condition. It will, of course, be understood that when a fulling feed such as described is used, it must be so adjusted with relation to the stitch feed as to have a feed stroke in excess of that of the latter, in order to insure a proper fulling of the material in advance of the needles.

The feed which advances the work to determine the length of the stitches will now be described.

350, Figs. 3 and 4, is an auxiliary lever pivoted at its upper end, by a screw pivot 351, to the lever 315 and at its lower end pivoted by a screw-pivot 352 (similar to screw pivot 333, heretofore described), to the upwardly bent end of a feed lever 353, which latter extends longitudinally within the horizontal part 53 of the work-arm parallel to the feed lever 332. Intermediate of its ends the lever 350 is fulcrumed to turn on the reduced end of the stem or shank of screw 354 (Figs. 3 and 4). The lever 350 is longitudinally movable on its fulcrum through the intermediary of two bearing blocks 355 embracing the pivot end of the screw 354 and located in an elongated capped bearing slot 356 in the lever 350. The stem or shank of the screw 354 passes through a vertical slot 366 (Fig. 3) in the rear wall of the vertical part 51 of the work-arm, the head of the screw engaging the counter-sunk outer portion of said slot and bearing against an offset or shoulder formed around the slot by the counter-sinking. A screw-threaded portion of the stem of the screw engages a clamping nut or plate 367, which like the nut 330, has a part projecting into the inner end of the slot 366 to prevent the nut turning with the screw. By tightening the screw to draw the nut against the inner surface of the wall of the arm at the sides of the slot, the screw is secured in any position to which it may be adjusted. The horizontal feed lever 353 (like feed lever 332) is fulcrumed to turn on pivot pin 334 (Figs. 7, 8 and 11), and also to move longitudinally with reference to said pin through the intermediary of two bearing blocks 357 embracing the pin and working in a capped bearing opening 358 of the lever 353.

359 is the stitch feed surface, divided into three parallel rows of teeth adapted to work in slots 360, 361 and 362, respectively, of the throat-plate. The shank 363 has a longitudinal groove in its under surface fitting over a rib 364 (Fig. 11) on the end of lever 353 to prevent lateral movement of the parts when they are secured together by the screw 365.

From the construction described, it will be understood that the auxiliary lever 350 is rotated and moved longitudinally on its fulcrum, causing its lower end to describe an elliptical movement, which is in turn imparted to the upwardly bent end of the feed lever 353. This movement of the lat-

ter lever transmits to its forward end, to which the stitch feed surface 359 is attached, a circular or elliptical movement the outline of which depends upon the location of fulcrum pin 334 and of the fulcrum pin 354 of lever 350. During a portion of the movement thus imparted to the feed surface 359, its teeth are projected through the slots 360, 361 and 362, engage the under side of the work, and advance the same to determine the length of the stitches. This length of the stitches may be varied by adjusting the screw pivot 354 vertically in its slot 366, thus changing the location of the fulcrum of lever 350; moving the screw pivot 354 downward in Fig. 3, thus bringing the fulcrum nearer the lower end of lever 350, will correspondingly reduce the movement of the feed surface 359 and correspondingly shorten the stitches.

As shown in Fig. 7, the two horizontal feed levers 332 and 353, pass through a recess in a circular block 418 (Fig. 9) which fits in curved recesses 416 and 417 (Fig. 8) in the inner surfaces of the side walls of the work-arm. Screws 419 and 420 secure block 418 in place. Beneath the block 418, also in recesses 416 and 417 is a cylindrical block 413 (Figs. 7 and 10) which is rotatable in its seat and constitutes a fulcrum for the looper bar 375 which extends through the recess of said block 413.

In Figs. 12 to 18 inclusive of the drawings, Sheets 6–8, there is illustrated a construction which includes means for vertically moving the fulcrum of the vertical feed levers in adjusting their positions to vary the throw of the feed-members, the parts illustrated in said figures being otherwise substantially like corresponding parts heretofore described. The vertical levers 745 and 746 correspond to the levers 315 and 350 previously described. The head of a screw 747 is movable in the countersunk outer end of a vertical slot 748 in the wall of the vertical portion of the work-arm. The shank of this screw passes through slot 748, is screw-threaded through an opening in a rack-plate 749, and has a reduced inner end constituting the fulcrum for lever 745. A similar screw 750 passes through a counter-sunk vertical slot 751 in the opposite wall of the work-arm, is screw-threaded through a rack-plate 752, and has a reduced inner end constituting a fulcrum for lever 746. By tightening screws 747 and 750, they draw rack-plates 749 and 752 tightly against the inner surfaces of the wall of the work-arm rigidly fixing the positions of the fulcrums the rock-plates thus also serving as clamping plates or nuts. When the screws are loosened the rack-plates may be moved vertically in their slide-ways carrying with them the screws to change the positions of the fulcrums.

The means for moving the rack-plates will now be explained.

753 is a block secured within the vertical part of the work-arm to its rear wall by screws 754, 755 (Fig. 13). A shaft 756, journaled in an opening through the block carries at one end a pinion 757 which meshes with rack-teeth along one edge of rack-plate 752. A second shaft 758, also journaled in an opening through block 753, carries at one end a pinion 759 meshing with rack-teeth along one edge of rack-plate 749.

760 and 761 are wheels fixed to the ends of shafts 756 and 758 respectively and free to turn in circular openings in a plate 762, which latter is secured to block 753 by a screw 763 and closes an opening in the front wall of the vertical part of the work-arm. Each wheel is provided with two openings for engagement of a spanner by which the wheels, their shafts and pinions may be rotated to move the rack-plates up and down to correspondingly adjust the positions of the fulcrums carried by said plates. Rotation of wheel 761 adjusts the fulling-feed, and of wheel 760 the stitch-feed. The face of each wheel is marked about its periphery with a scale (Fig. 18), the divisions of which are marked by numerals and serve as guides in adjusting the mechanism. Thus setting wheel 760 to its "2" mark and wheel 761 to its "4" mark, preferably effects a relative adjustment which gives to the fulling-feed a feeding movement twice the distance of the feeding movement of the stitch-feed, and so on.

What I claim is:

1. In a sewing machine, the combination of stitch-forming elements, a work-arm extending outward from the frame-work or casing of the machine in an upper approximately horizontal part, thence depending in an approximately vertical part, and thence continuing in a lower approximately horizontal part to its free end at which said stitch-forming elements operate, a feed-member operating at said free end of the work-arm, and driving connections for said feed-member extending along the work-arm from the frame or casing of the machine and including a lever extending along the approximately vertical part of the arm and having its fulcrum adjustable to different positions to vary the throw or feeding movement of the feed-member.

2. In a sewing machine, the combination of stitch-forming elements, a hollow work-arm free at one end at which said stitch-forming elements operate and supported from its other end which joins the frame-work or casing of the machine, two feed-members operating at said free end of the work-arm, and driving connections for said feed members extending within the work-arm from said frame-work or casing and in-

cluding two levers corresponding to said feed-members respectively, each lever having a fulcrum pin adjustable to different positions in an opening in the wall of the work-arm to vary the throw or feeding-movement of its corresponding feed-member.

3. In a sewing machine, the combination of stitch-forming elements, a hollow work-arm extending outward from the frame-work or casing of the machine in an upper approximately horizontal part, thence depending in an approximately vertical part, and thence continuing in a lower approximately horizontal part to its free end at which said stitch-forming elements operate, a feed-member operating at said free end of the work-arm, and driving connections for said feed-member extending through said hollow work-arm from the frame or casing of the machine and including a lever in the approximately vertical part of the arm having a fulcrum pin adjustable to different positions in an opening in the wall of the work-arm to vary the throw or feeding-movement of said feed-member.

4. In a sewing machine, the combination of stitch-forming elements, a hollow work-arm extending outward from the frame-work or casing of the machine in an upper approximately horizontal part, thence depending in an approximately vertical part, and thence continuing in a lower approximately horizontal part to its free end at which said stitch-forming elements operate, two feed-members operating at said free end of the work-arm, and driving connections for said feed-members extending through said hollow work-arm from the frame or casing of the machine and including two levers in the approximately vertical part of the arm corresponding to the feed-members respectively and each having a fulcrum pin adjustable to different positions in an opening in the wall of the work-arm to vary the throw or feeding-movement of its corresponding feed-member.

5. In a sewing machine, the combination of stitch-forming elements, a work-arm free at one end at which the stitch-forming elements operate and supported from its other end which joins the frame-work or casing of the machine, two feed-members operating at the free end of the work-arm, driving connections extending along the work-arm to one feed-member, and other driving connections extending along the work-arm to the other feed-member and adjustable to vary the throw or feeding movement of its feed-member.

6. In a sewing machine, the combination of two feed-members; two feed-levers carrying said feed-members respectively; a main driving lever connected at one end to one of said feed-levers; an auxiliary driving lever connected at one end to the other of said driving levers, said auxiliary driving lever at its other end being pivoted to the main driving lever; a driving shaft; and driving connections from said shaft to the main driving lever.

7. In a sewing machine, the combination of two feed-members; two feed-levers carrying said feed-members respectively; a main driving lever and an auxiliary driving lever each having a fulcrum pin adjustable to different positions to vary the throw or feeding movement of its corresponding feed-member, said main driving lever being connected at one end to one of said feed-levers, and said auxiliary driving lever being connected at one end to the other of said feed-levers and at its other end pivoted to the main driving lever; a driving shaft; and driving connections from said shaft to the main driving lever.

8. The combination of two levers; an inclosing wall or casing therefor; two rack-plates within said casing; a fulcrum pin for each lever said pins being carried by the rack-plates respectively; two shafts supported in bearings within the casing; and a pinion on each shaft, said pinions engaging the teeth of the rack plates respectively, whereby rotation of the shafts shifts or adjusts the position of the fulcrum pins with relation to their levers.

9. The combination of two levers; an inclosing wall or casing therefor; two rack-plates within said casing; a fulcrum pin for each lever, said pins being carried by the rack-plates respectively; two shafts supported in bearings within the casing; a pinion on each shaft, said pinions engaging the teeth of the rack-plates respectively, whereby rotation of the shafts shifts or adjusts the position of the fulcrum pins with relation to their levers; and a wheel or head on one end of each shaft rotatable in closely positioned circular openings through the wall of the casing.

10. The combination with an inclosing casing; two rack-plates movable respectively in guide-ways on the inner faces of opposing walls of the casing; two approximately parallel levers lying between said rack-plates; a fulcrum pin carried by and projecting inward from each rack-plate, said pins engaging the levers respectively; a pinion engaging each rack-plate; and means for rotating said pinions to shift the positions of the fulcrum pins with relation to their levers.

11. The combination of a lever; a casing wall having a slot therein; a stem passing through said slot having an enlargement at its outer end bearing against the outer surface of the casing wall at the sides of the slot, the inner end of said stem constituting the fulcrum of the lever; and a clamping

plate or nut through which the stem is screw-threaded and which is adapted by the turning of said stem to be drawn tightly against the inner surface of the casing wall at the side of the slot to fix the stud in any position of its adjustment in the slot.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

ARTHUR A. MERRITT.

Witnesses:
W. B. KERKAM,
F. A. HOLTON.

Correction in Letters Patent No. 1,041,658.

It is hereby certified that in Letters Patent No. 1,041,658, granted October 15, 1912, upon the application of Arthur A. Merritt, of Worcester, Massachusetts, for an improvement in "Feeding Mechanism for Sewing-Machines," an error appears in the printed specification requiring correction as follows: Page 4, line 60, for the compound word "rock-plate" read *rack-plate;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of November, A. D., 1912.

[SEAL.]

C. C. BILLINGS,

Acting Commissioner of Patents.

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