(Model.)

3 Sheets—Sheet 1.

R. WHITEHILL.

SEWING MACHINE.

No. 279,621. Patented June 19, 1883.

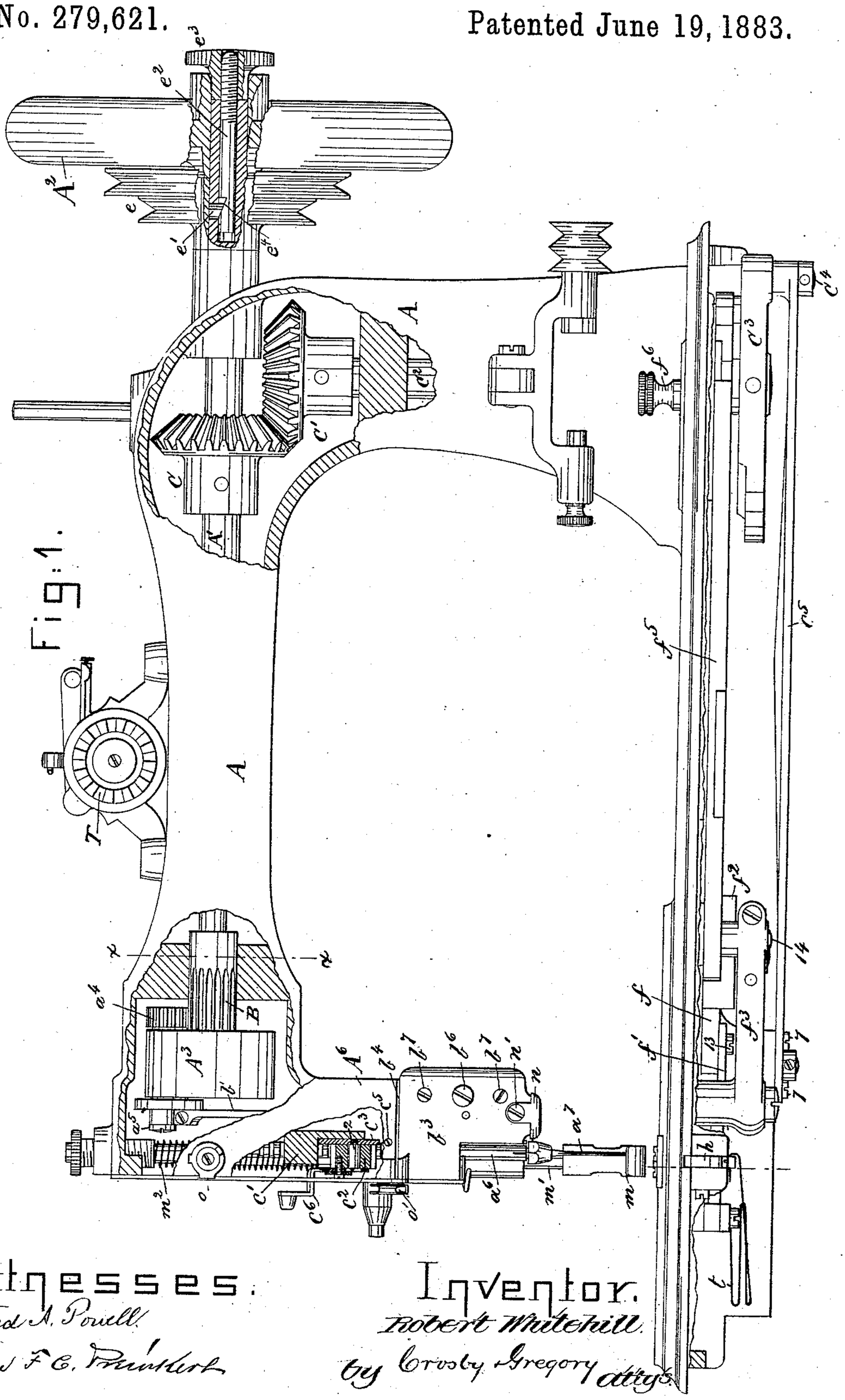


Fig. 1.

Witnesses:

Fred A. Powell.

Edwd F. C. Brinkerhoff

Inventor.

Robert Whitehill.

by Crosby Gregory attys.

(Model.)

3 Sheets—Sheet 2.

R. WHITEHILL.

SEWING MACHINE.

No. 279,621. Patented June 19, 1883.

Fig. 2.

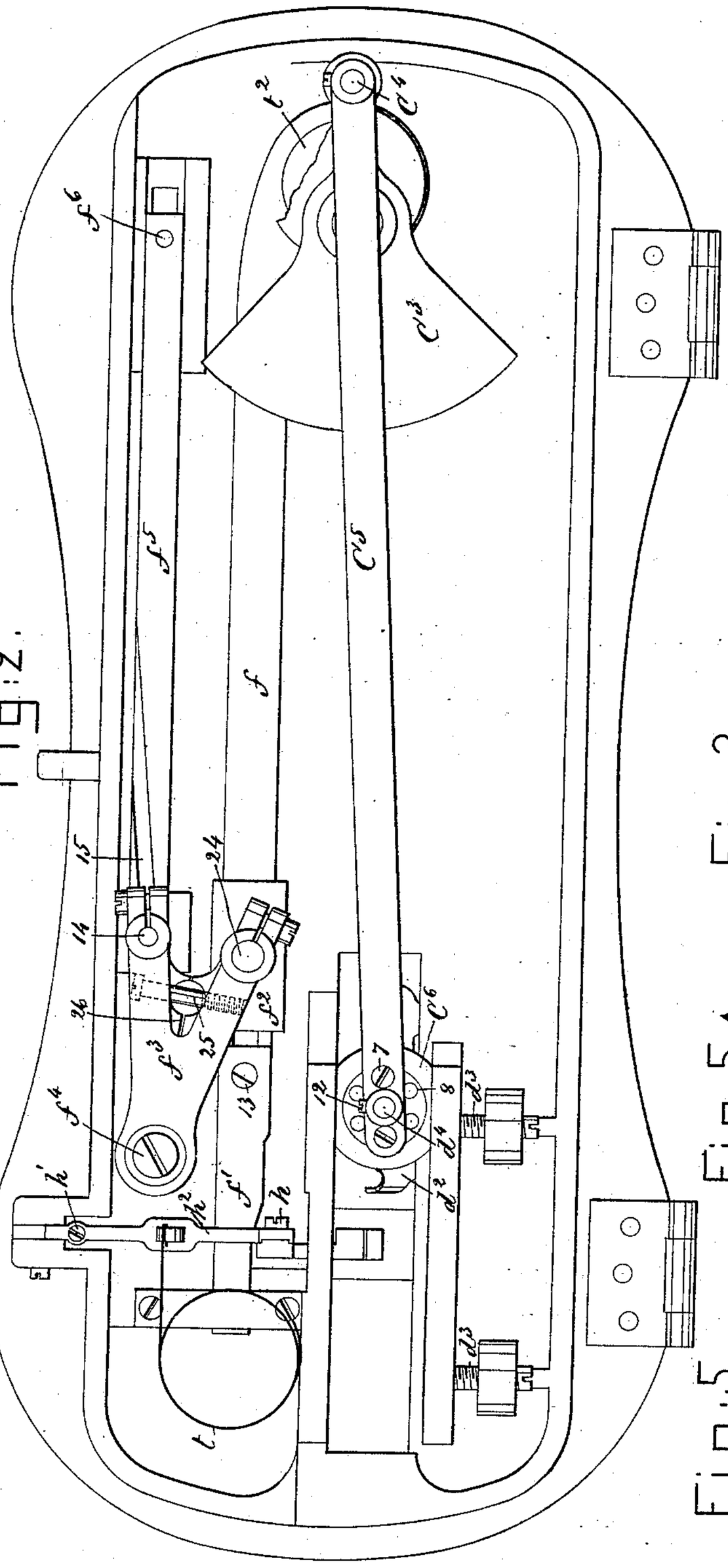


Fig. 4.

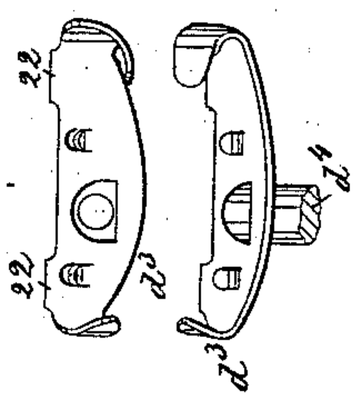


Fig. 3.

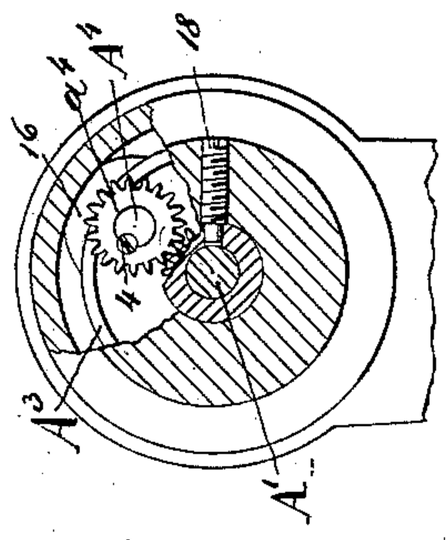


Fig. 5.

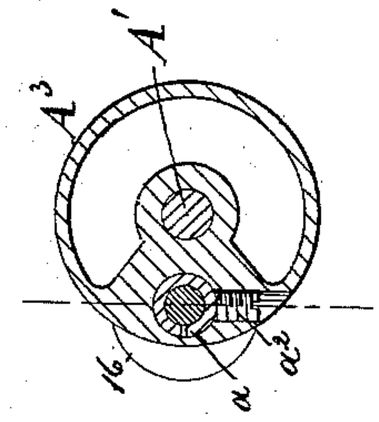
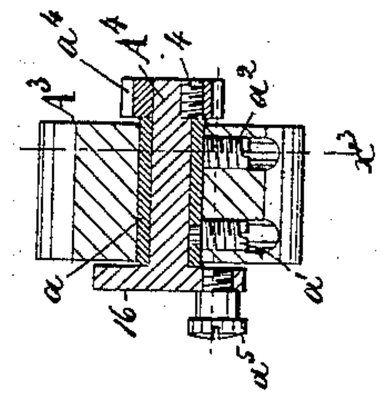


Fig. 5. A.



Witnesses.

Fred A. Powell

John F. C. Brinkerhoff

Inventor.

Robert Whitehill

by Crosby & Gregory attys.

(Model.)

3 Sheets—Sheet 3.

R. WHITEHILL.

SEWING MACHINE.

No. 279,621.

Patented June 19, 1883.

Fig. 12.

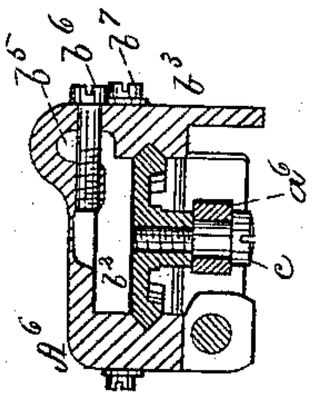


Fig. 7.

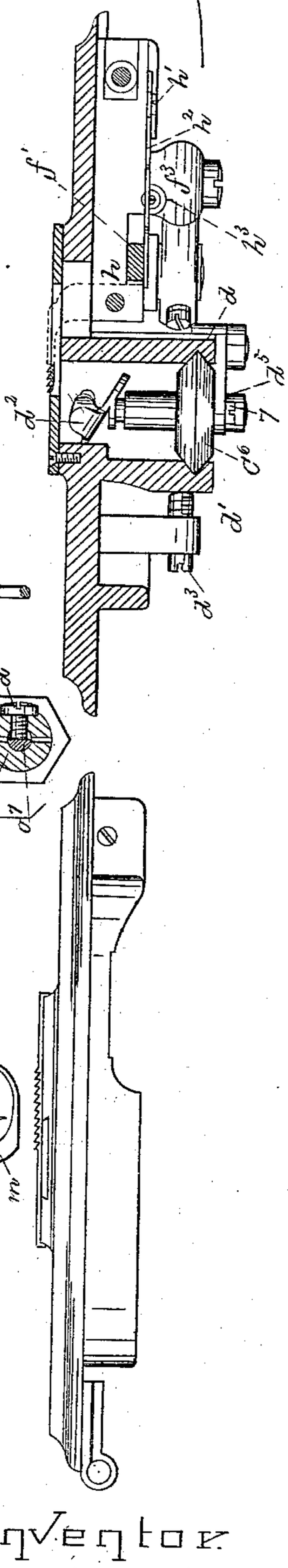


Fig. 9.

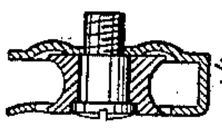


Fig. 8.

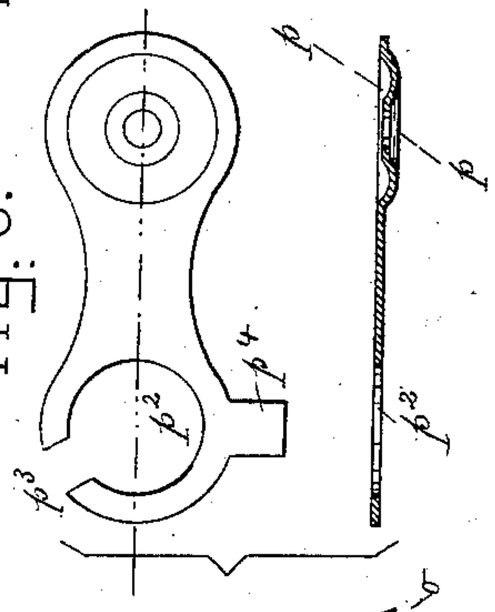


Fig. 10.

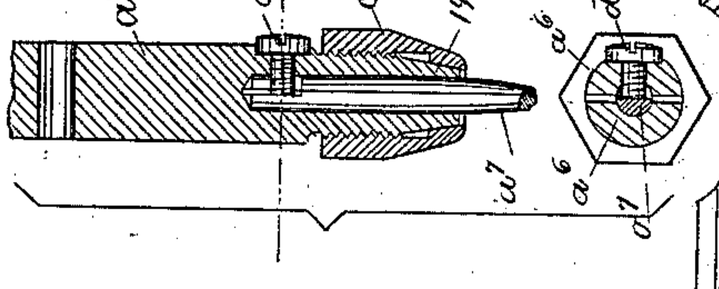


Fig. 11.

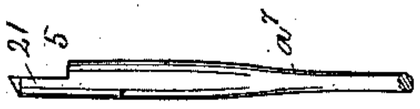
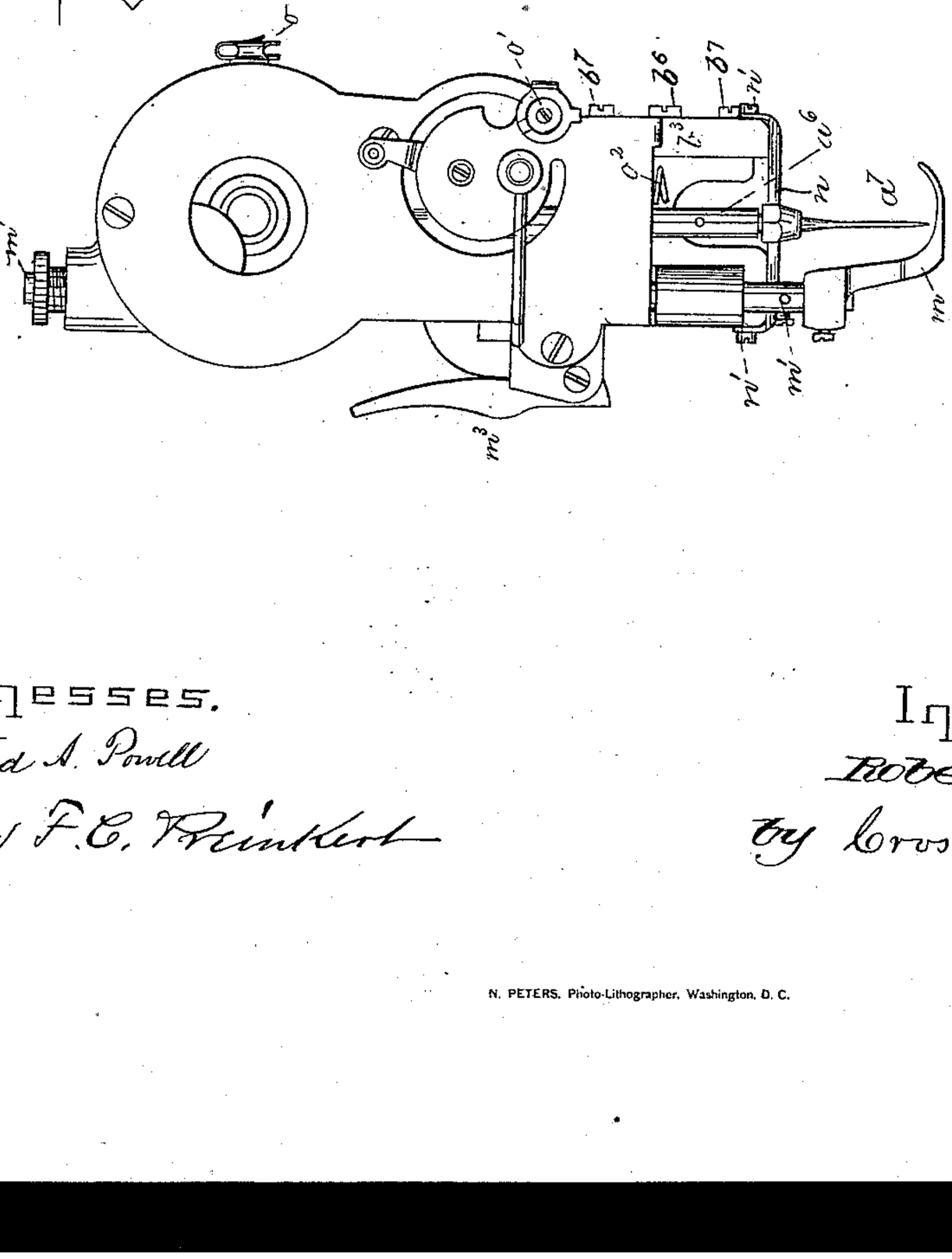


Fig. 6.



Witnesses.

Fred A. Powell

John F. C. Reinkert

Inventor

Robert Whitehill

by Crosby & Gregory

Attys.

UNITED STATES PATENT OFFICE.

ROBERT WHITEHILL, OF MILWAUKEE, WISCONSIN.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 279,621, dated June 19, 1883.

Application filed October 20, 1882. (Model.)

To all whom it may concern:

Be it known that I, ROBERT WHITEHILL, of Milwaukee, county of Milwaukee, State of Wisconsin, have invented an Improvement in Sewing-Machines, of which the following description in connection with the accompanying drawings, is a specification.

My invention is an improvement on the class of sewing-machines represented in United States Patent Nos. 166,172 and 184,938, granted to me.

In the Patent No. 166,172 the center of the needle-bar-operating crank-pin of the planet-shaft is shown as located in the plane of the pitch-line of the gear attached to the said shaft. The location of the crank-pin as shown in the said patent fails to afford as much dwell as is desirable when the shuttle is passing through the loop of needle-thread. To increase the dwell of the needle at the end of its downward stroke, to afford more time for the passage of the shuttle through the loop of needle-thread, and at the same time enable the use of a longer shuttle than heretofore used in the class of machines referred to, and also to impart as short a stroke as possible to the needle-bar, I have arranged the said crank-pin so that it has a greater throw, and, as herein shown, I have placed the center line of the said crank-pin farther from the center of the planet-shaft than the pitch-line of the gear thereon, and such location of the said crank-pin constitutes one part of this present invention.

My invention also consists in the combination, with a split bushing for the planet-shaft, of screws to both close the said bushing and to prevent it from being moved longitudinally, as will be described.

My invention also consists in the combination, with the needle-bar and a guide for its upper end, of a reciprocating connecting-rod having one end attached to a crank-pin and its other end guided in ways, the said connecting-rod having a stud by which the needle-bar is reciprocated. The devices referred to enabling the needle-bar to be driven without being twisted in its bearings, and being subjected to the strain only in the direction of the longitudinal axis of the needle-bar, the said bar may be made lighter or of smaller diameter; and having but one fixed guide, and that located at its upper end, the said bar may be made shorter.

My invention also consists in a take-up gear mounted upon an adjustable carrier, whereby the said wheel may be kept properly in contact with the rack-teeth which rotates it.

My invention also consists in the combination, with the main shaft provided with a longitudinal hole at its end and a rod having a beveled notch arranged in said hole, of a radially-movable beveled locking-stud operated by said rod and adapted to engage the interior of the hub of the band-wheel, as will be described, whereby the said band-wheel, running directly on the main shaft, may be made fast to drive the machine, or be left to run loosely when it is desired to run bobbins, the arrangements of the parts being such that there will be no danger of the displacement and loss of the rocking rod and stud.

My invention also consists in means for operating the shuttle-carrier in its race, the same including a crank and pitman having at its end a fixed disk or head which enters guide-ways parallel with the shuttle-race, the said disk both oscillating and reciprocating and holding the shuttle-carrier loosely.

My invention also relates to improvements in means for operating the usual four-motioned feeding device, and for regulating the length of stitch; also, to improvements in construction of the thread-guides, and to details of mechanical construction, to be hereinafter specified and claimed at the end of this specification.

Figure 1 represents a broken side elevation of a sewing-machine embodying my improvements; Fig. 2, an under side view thereof; Fig. 3, a section on the dotted line *x*, Fig. 1, looking toward the left, a part of the frame-work being broken out to show the gear on the planet-shaft; Fig. 4, details of the shuttle-carrier detached from the machine; Fig. 5, a longitudinal sectional detail of the planet-hub, planet-shaft, and their connected parts, and the needle-bar-actuating crank-pin; Fig. 5^a, a section of Fig. 5 in line x^3; Fig. 6, an elevation of only the front end of the machine; Fig. 7, a view in elevation of the front of the machine with the face-plate removed, the bed of the machine being shown below it in section, the said

figure also showing parts of the mechanism for moving the shuttle and the feeding device; Fig. 8, enlarged details of the blank for the thread-guide; Fig. 9, an enlarged section of the thread-guide; Fig. 10, sectional details of the needle-bar and means for holding and adjusting the needle; Fig. 11, a detail of the shank of the needle; Fig. 12, a section of Fig. 7 on the dotted line x^2.

The frame-work A, of usual shape, has a main shaft, A′, provided at one end with a fixed fly-wheel, A^2, and at its other end with the planet hub A^3, which carries the planet-shaft A^4. The planet-shaft A^4 has its bearing in a split bushing, a, placed in a passage in the planet-hub, and the said hub has two adjusting-screws, a' a^2, to bear by their ends against the said split bushing, as shown in Fig. 5, to force the bushing closely in contact with the planet-shaft, and one of the said screws—the one marked a'—has a teat to enter a hole of corresponding size in the said bushing to prevent the bushing moving longitudinally or rotating. The planet-gear a^4 is attached to the planet-shaft by a screw, 4, after the same has been inserted through the planet-hub and split bushing, and the said bushing is made longer than the said hub, so that the crank and gear on the planet-shaft rest against opposite ends of the said bushing. The planet-shaft crank or disk 16, at its other or outer end, is provided with a needle-bar-actuating crank-pin, a^5, the center line of which, it will be noticed in Fig. 5, is at a greater distance from the center of the planet-shaft than the pitch of the teeth of the gear a^4, such location of the said crank-pin beyond the arc described by the pitch of the teeth of the said gear enabling me to give to the needle-bar a^6 and its attached needle a^7 a longer period of rest at the end of its downward stroke, whereby the shuttle which carries the usual under thread is allowed more time to enter and pass through the loop of needle-thread than were the center line of the said crank-pin only at the level of the line of the pitch of the planet-gear thereon, as in my former patent referred to. By placing the crank-pin farther from the center of the planet-shaft than the pitch-line of the gear on the said shaft, which engages the stationary sun-gear B, I am enabled to produce a longer dwell in the needle-bar when at the end of its descent. The greater the dwell when the needle-bar and needle are in their lowest position, the longer the time for the shuttle to enter and pass through the loop of needle-thread, and the longer may be the shuttle.

Attached to the crank-pin a^5 is the connecting-rod b', having its lower end, as herein shown, enlarged to form a head, b^2, (shown clearly in Figs. 7 and 12,) the said head having its edges entered into grooves or guideways formed in the head of the machine. The edges of the said head are shown as made V-shaped, and one of the V-shaped grooves by which the said head is guided is formed in a yielding part or wing, b^3, of the casting forming the arm-head A^6. Viewing Fig. 1, it will be seen that the part b^3 referred to is separated from the main part of the arm-head by the slot b^4, and in Fig. 12 it will be noticed that the said part b^3 is cast with a curve, a core having been used, leaving an open space, b^5, which permits the said part b^3 to be sprung or moved as a lever by suitable screws. The screw b^6, passed through the part b^3, or "adjustable wing of the guideway," as I shall call it, and screwed into the arm-head, as shown best in Fig. 12, enables the said wing to be forced inward to fit the head b^2 closely. The screws b^7, one above and the other below the screw b^6, and having their ends placed against the fixed part of the arm-head, while their threaded shanks engage screw-threads in the wing, are employed to force the wing away from the fixed part of the arm-head, and by the employment of the said screws b^6 b^7, adapted to operate upon and move the said wing in opposite directions positively, the said wing may be adjusted so that its inner grooved face will occupy a position parallel with the inner face of the opposite or fixed part of the said guideway in which the head b^2 is reciprocated. This head b^2, forming part of the connecting-rod b', has a stud, c, which is extended loosely through the needle-bar a^6, and the upper end of the needle-bar is extended into the guide c', which is the only fixed guide employed for the said bar. A needle-bar held and reciprocated in this manner is not subjected to other than longitudinal strain, and consequently may be made smaller in diameter, and by the employment of but one fixed guide it is possible to shorten the length of the needle-bar, thus reducing its weight and momentum.

The sun-gear B is fastened to the arm or frame-work A by a screw, 18, (see Fig. 3,) and is made as a sleeve. The said sun-gear forms one bearing for the main shaft A′.

The needle-bar, at one side, is provided with a series of teeth forming a rack, as shown in Figs. 1 and 7, to engage the teeth of and reciprocate the take-up gear c^2, mounted on a stud, 2, inserted in a carrier, c^3, pivoted on a fixed part of the arm-head, and the said carrier is moved or adjusted by the screw c^5 in order to insure the proper meshing of the said gear and rack. The take-up lever or arm c^6 is attached to this gear c^2 and operates as in my former patents. The needle-bar is split at its lower end for a short distance upward. Its extreme end is tapered at 19, and above its tapered portions its cylindrical but reduced end is provided with screw-threads to receive a screw-threaded nut, c^7, having a tapering inner surface at its lower end to act against the tapering ends 19 of the split bar and cause the said ends to close upon and grasp the shank of the needle a^7, inserted into a longitudinal hole in the needle-bar and hold the needle firmly in place.

The upper end of the needle-shank is notched

or shouldered, as at 5, Fig. 11, to form a flat surface, 21, against which acts the end of the needle-adjusting screw *d* to hold the needle in such position that the axis of its eye will point in the proper direction. The vertical position of the eye of the needle, or its distance from the end of the needle-bar, is determined by the end of the needle-shank striking the end of the longitudinal passage in which it is inserted. (See Fig. 10.)

The main shaft A′ has a bevel-gear, C, which engages a bevel-gear, C′, on an upright shaft, C^2, provided at its lower end with a balanced crank, C^3, of usual construction, having a crank-pin, C^4, on which is placed the shuttle-moving pitman C^5, having a disk, C^6, (see Fig. 7,) attached to its other end by screws 7; but, if desired, the said disk may be made as an integral part thereof. The disk having its edges beveled, as herein shown, is fitted to guideways in the walls *d d′*, forming the raceway for the shuttle-carrier d^2. The wall *d′* is acted upon by adjusting devices d^3, (shown as screws,) which act to keep the said walls and the edges of the said disk in proper contact, and afford means to take up any wear between them. As the disk C^6 becomes worn the screws 7 may be taken out and the disk be turned partially around to present a new or unworn surface in the guide-grooves, when the said screws will be again inserted, but this time in other holes, 8, therein. (See Fig. 2.) The disk oscillates somewhat as it slides in the guideways of the walls *d d′*. The shuttle-carrier d^2 has a stem, d^4, which is inserted loosely into a hole made through a hub rising from the upper side of the disk at its center, (see Fig. 7,) and below the said disk the said stem has applied to it a collar, d^5, which is attached thereto by a set-screw, 12. The shuttle-carrier d^2 travels in a straight line in its race, and as it is so moved its disk C^6 oscillates on the said stem. The carrier d^2 has straight edges 22, which bear against the back wall of the shuttle-race, and to compensate for wear at such point I may, if desired, provide the said back wall with a gib.

The band-wheel *e*, placed directly on the main shaft A′, is held thereto by a radial stud, *e′*, carried by the said shaft, and having its lower end beveled to rest upon a correspondingly-beveled notch, e^4, in a longitudinally-adjustable screw or rod, e^2, placed in a longitudinal opening drilled into the main shaft, as best shown in Fig. 1, the said screw or rod having upon it a nut, e^3, the end of which jams against the end of the main shaft, so that rotation of the said nut enables the said screw to be moved longitudinally. When drawn outward the beveled surface of the screw or rod, acting against the bevel of the stud *e′*, forces the latter out in contact with and holds the band-wheel securely upon the said shaft, and the force exerted by the stud to hold the band-wheel in place is directly at right angles to the shaft, and is applied, it will be noticed, at or in a plane intersecting the axial center of the hub of the band-wheel, thus enabling the latter to be drawn squarely to the shaft. The combination of the beveled notch e^4 in the screw-rod e^2 and the beveled stud *e′*, as shown, effects the prevention of displacement or loss of the parts, since the notch is always in engagement with the stud, and the two can only be disconnected by the removal of the band-wheel. The band-wheel being placed directly upon the main shaft, rather than upon a hub of the fly-wheel, will, when loosened, run more easily on and with less liability of turning the said shaft with it.

The upright shaft C^2 has upon it, above the crank C^3, a single eccentric, t^2, which is embraced by an eccentric-strap of the feed-lever *f*, as described and shown in my Patent No. 184,938; but herein, instead of providing the said lever with a crook or compound cam for imparting the vertical and forward movements to the feed-dog, as therein described, I have joined to its end, by the screw 13, an indedependent crooked part, *f′*, preferably made from steel. The part *f′*, having the said crook, being a separate piece attached to the said lever by a screw, 13, enables me, by a mere change of the portion *f′*, to effectually renew the feed-lever. This feed-lever reciprocates in a guide-block, f^2, swiveled in one arm of a swivel-lever, f^3, pivoted to the bed at f^4, another arm or part of the said swivel-lever having a pin or stud, 14, which enters a diagonal slot or groove, 15, in a stitch-regulating bar, f^5, or vice versa, fitted at its end to suitable guideways, and having connected with it a thumb-nut, f^6, by which to adjust the said bar longitudinally according to the length of stitch desired, and to fasten the said bar in place. The swivel-lever, as it is turned, moves the guide-block f^2 laterally instead of longitudinally, as similar swivel-blocks have heretofore been moved. It is a great desideratum to insure the backward movement of the feed-bar always to a certain point for all lengths of stitch, and to move the feed-bar or device forward from such established point the distance desired for the stitch to be made, and by moving the guide-block laterally instead of longitudinally I am enabled to accomplish this desired object. Longitudinal change of position of the guide-block changes the fulcrum of the lever *f* with relation to its actuating-eccentric, and consequently the backward position of the feed-bar varies at each variation of length of stitch.

The under side of the feed bar or device *h* has attached to it, by screw *h′*, a small plate, h^2, which bears against the under side of the crooked part *f′* of the feed-lever, thus obviating the formation of a completely-walled slot in the said feed-bar, as in my Patent No. 184,938 referred to.

The single eccentric t^2 referred to operates the feed-lever and its crooked end *f′*, so as to produce the upward, forward, and downward motions of the feed-bar, a spring, *t*, producing the backward movement.

The presser-foot *m*, carried by the presser-

bar m', is pressed down by an adjustable spring, m^2, and may be lifted by the lever m^3. Oil used in the arm-head of the machine will be caught in the drip-cup n, attached thereto by the screws n'.

The needle-thread is led from the tension device T over the sheaves o, thence through the eye of the take-up lever, and over o', and through the wire-eye o^2 to the eye of the needle.

The thread-guides containing the sheaves o o' are of peculiar construction, as I will now describe. The frame part of each of the said guides is composed of a piece of sheet metal cut to form the blank shown in Fig. 8. This blank has at one side, near one end, the depression p, to receive one end of the sheave, as represented in Fig. 9, so that the end of the sheave terminates in a plane back of the surrounding part of the frame part, to obviate the passage of thread between the sheave and frame part. The blank at its left-hand end, as in Fig. 8, has a hole, p^2, a slot, p^3, and a projection, p^4. The metal of the blank about the hole p^2, when the blank is folded, as shown, surrounds the outer end of the sheave, as in Figs. 1, 6, and 9. The projection p^4 is bent at right angles to the main part of the blank, and when the blank is folded the said projection extends to the opposite side of the blank under the sheave, as in Fig. 9. The slot p^3 serves for the passage of the thread about the sheave.

In the manufacture of my sewing-machines the bed is planed to form guides for the stitch-regulating bar f^5, and bored to receive the stud f^4, and the bearings for the shaft C^2 are also bored, so these parts are established when the swivel-lever is put in place. To enable the pin 14 and the connecting-pin 24 to be adjusted exactly into position to time the feed, I have split the swivel-lever, as at 26, and made it to present two arms, and to these arms I have added an adjusting-screw, 25, by which the arms of the swivel-lever may be moved toward and from each other, such adjustment of the lever permitting wear of the feed-bar with the part f' of the feed-lever, to be compensated for, so that the feed must always be started at just the proper time with relation to the movement of the other parts of the machine.

I claim—

1. The shaft A, the planet-hub, the sun-gear, the planet-gear, and the planet-shaft, combined with the needle-bar-operating crank-pin having its longitudinal center at a greater distance from the center of the planet-gear than the pitch-line of the planet-gear, to increase the dwell of the needle-bar, as and for the purposes set forth.

2. The planet-hub, the split bushing inserted therein, and the planet-shaft placed in the said bushing, combined with the screws to close the said bushing upon the said shaft, one of said screws having a teat to positively engage and thereby prevent the longitudinal movement of the bushing, as set forth.

3. The planet-hub and the bushing inserted therein with its ends extended beyond the planet-hub, combined with the planet-shaft and its attached gear and crank, adapted to take bearing against the ends of the bushing, as set forth.

4. The needle-bar connecting-rod and means to move it, and the needle-bar, combined with the arm-head provided with a guide for the needle-bar and with guideways for one end of the connecting-rod, to enable the same to be operated as and for the purpose described.

5. The needle-bar connecting-rod, the crank-pin, the planet-shaft, planet-gear, planet-hub, the main shaft, the sun-gear, the needle-bar, and a guide for it, combined with the arm-head and a guide for the lower end of the said connecting-rod, substantially as shown and described.

6. The needle-bar connecting-rod, means to move it, and the arm-head provided with the wing and guideways for the lower end of the said connecting-rod, combined with means to adjust the said wing to maintain in proper position the guideways for the connecting-rod, substantially as described.

7. The needle-bar and its rack-teeth, combined with the take-up gear c^2, its carrier, and means to adjust the said carrier, as described, to insure proper mesh of the said gear and rack-teeth, as set forth.

8. The needle-bar and a guide for its upper end, combined with a connecting-rod having a stud entered through a transverse hole in the needle-bar, and with means to guide and reciprocate the said connecting-rod, as set forth.

9. The longitudinally-bored shaft A′ and band-wheel, arranged directly thereupon, combined with the beveled stud e', the rod e^2, having the beveled notch e^4, to engage said stud and by such engagement prevent its own displacement or loss, and to move said stud to bind or loosen the band-wheel on its shaft, and the nut e^3, engaging a screw-thread on said rod e^2 to effect the movement of the stud, substantially as shown and described.

10. The shuttle-moving crank, the pitman, and its connected disk, combined with the shuttle-carrier and with the raceway and guides for the said disk, substantially as described.

11. The shuttle-raceway, the disk fitted therein, and the connected pitman to reciprocate the said disk, combined with the shuttle-carrier held loosely in the said disk, as and for the purposes set forth.

12. The guideways and the pitman, combined with the disk C^6, adjustably attached to the said pitman, whereby it may be turned about its center to bring an unworn part of the disk into the grooves of the guideways, substantially as described.

13. The shuttle-race and its guides and the shuttle-carrier and disk, combined with screws to force one wall of the guideway toward its opposite wall, as and for the purposes set forth.

14. The feed-lever *f* and the single eccentric to move it, as described, and the feed-bar slotted to receive the crooked end of the said lever, combined with the swiveling guide and means to move it and the feed-lever laterally, substantially as described.

15. The feed-lever *f* and its detachable crooked end *f'*, combined with the feed-bar into which the said crooked end *f'* enters, as and for the purposes set forth.

16. The eccentric t^2, the feed-lever *f*, operated by it, the feed-bar, and the swiveling block, combined with a lever to move the swiveling block and with means to move the said lever, substantially as described.

17. The feed-lever and swiveling block and lever f^3, combined with the stitch-regulating bar and a pin-and-slot connection between them to move the said lever f^3, substantially as described.

18. The thread-guide composed of the sheave *o* and metal frame, formed from a block shaped and slotted as described, to inclose the ends of the sheave and to insure the retention of the needle-thread on the said sheave, and slotted at p^3 to facilitate threading, as shown and described.

19. The swivel-block, the feed-lever *f*, and the stitch-regulating bar, the pins 14 and 24, and the pivoted two-armed swivel-lever f^3, split as described, combined with the adjusting device, and a screw to change the distance of the pins 14 and 24 from each other, as and for the purpose set forth.

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

ROBERT WHITEHILL.

Witnesses:
G. W. GREGORY,
B. J. NOYES.