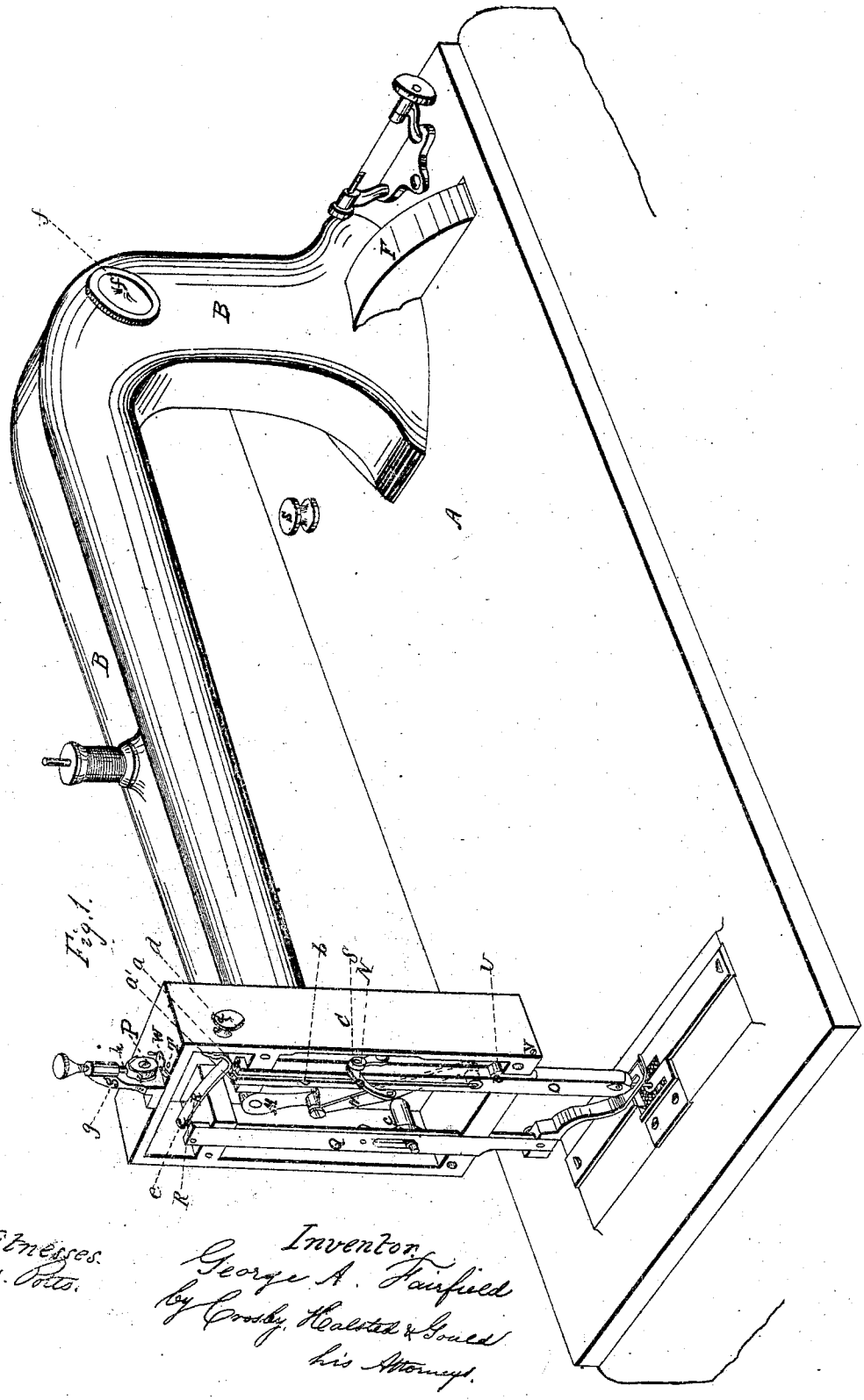
Sheet 1. 3. Sheets

G. A. Fairfield.

Sewing-Machine.

No 78729 Patented Jun. 9, 1868.



Witnesses.
W. M. Coes.

Inventor.
George A. Fairfield
by Crosby, Halsted & Gould
his Attorneys.

Sheet 2-3 Sheets

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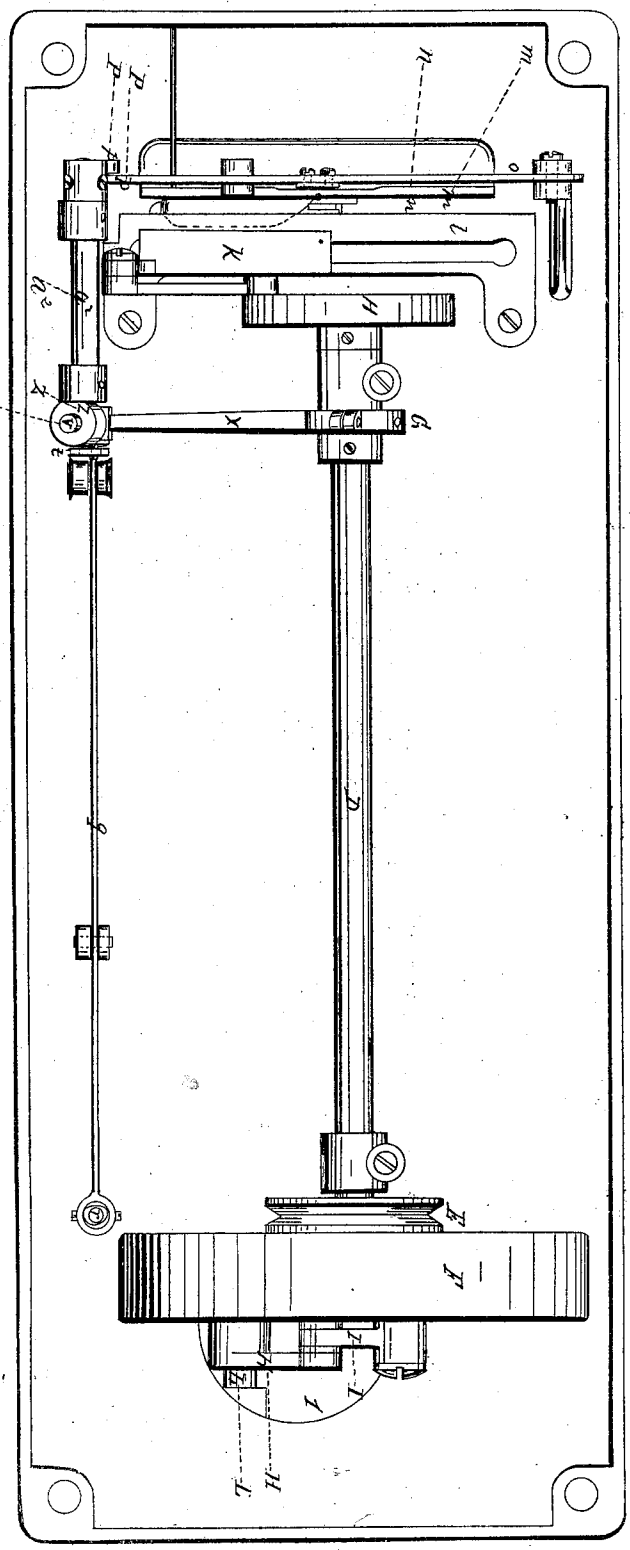

Fig. 2.

Witnesses.
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Sheet 3-3 Sheets

Sewing-Machine.

No. 78729

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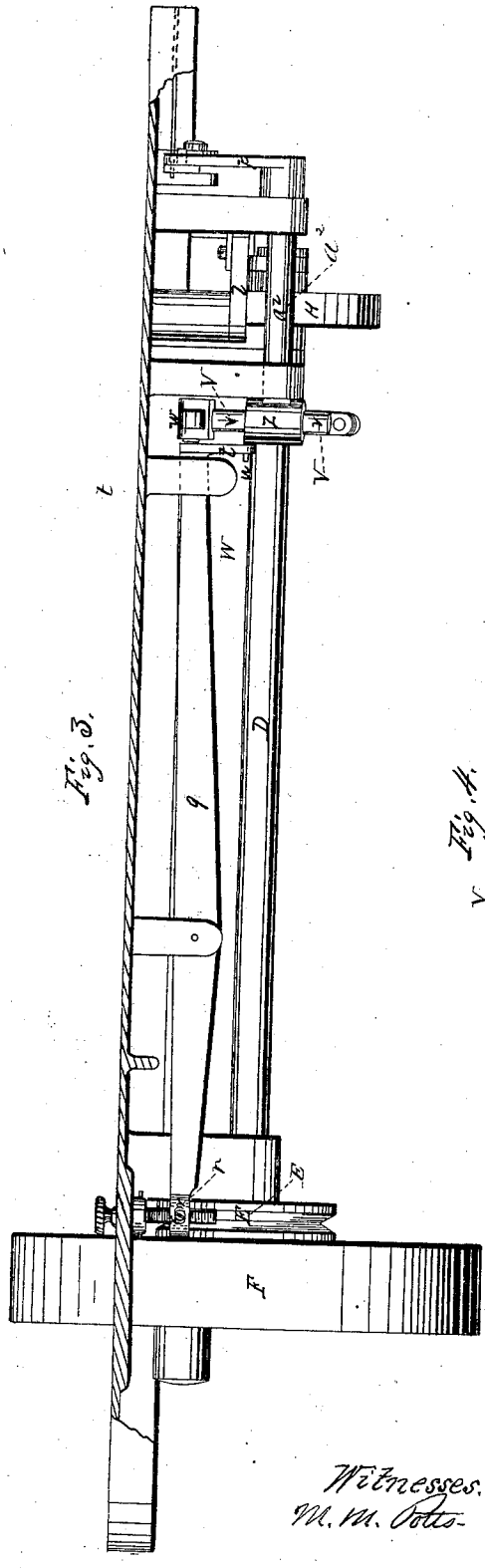

Fig. 3.

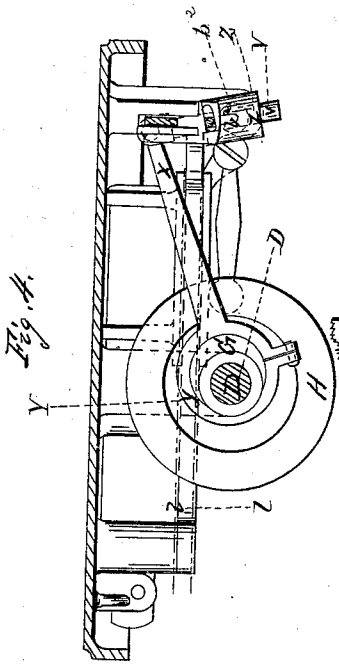

Fig. 4.

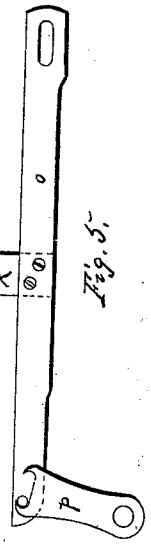

Fig. 5.

Witnesses.
M. M. Potts.

Inventor.
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his Attorneys.

United States Patent Office.

GEORGE A. FAIRFIELD, OF HARTFORD, CONNECTICUT.

Letters Patent No. 78,729, *dated June* 9, 1868.

IMPROVEMENT IN SEWING-MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, GEORGE A. FAIRFIELD, of the city of Hartford, county of Hartford, and State of Connecticut, have invented certain Improvements in Sewing-Machines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practise it.

Figure 1 represents in perspective the parts of the machine which are above the bed-plate.

Figure 2 represents a plan view of the parts below the bed-plate.

Figure 3, a side view of the parts below the bed-plate.

Figure 4, a cross-section, showing the devices for operating and graduating the movements of the feeding-dog.

Figure 5 represents the feeding-bar, and the vibrating-arm, which imparts motion to it.

A is a table or bed-plate; B, the goose-neck or supporting-arm firmly secured thereon, and which, with the box, C, at the forward end thereof, and forming part of the same, is cast hollow and in a single piece. D is the main shaft, located beneath the bed-plate, and upon which is a driving-pulley, E, a fly-wheel, F, an eccentric, G, for actuating the feed-bar or dog, and a disk, H, for actuating the shuttle. From the rear side of the fly-wheel a link, I, connects with a crank, K, through a sleeve, upon the end of which the needle-actuating crank-shaft L is passed, and then secured in proper position by a set-screw. This shaft, and the sleeve, crank, and link, are shown plainly in fig. 2, through the circular opening 1 in the bottom of the bed-plate.

Each end of the hollow goose-neck has a bearing cast in it for the support of the shaft, which, upon being introduced into the machine, is inserted through a tubular opening formed in the rear of the arm, and which thus forms the rear bearing, and by reason of my peculiar construction of this arm, and the parts to be encased therein, the shaft can be readily inserted with one hand, whilst the other hand is enabled so to hold the crank and its sleeve that the shaft can with facility be passed through it, and thus this part of the machine may be put together within an enclosed tubular covering, or taken apart and removed, without the necessity, as heretofore, of casting such covering-arm in two longitudinal sections, requiring afterwards to be screwed together.

By these means the enclosed devices are placed absolutely beyond the reach of dust, and cannot come in contact with the person or the clothing, and require very rarely any oiling or attention.

To the forward end of the shaft L is secured a crank, M, to which is connected a link, N, pivoted to the needle-bar O, the crank M being affixed to the shaft in such position as to be carried (after the lowest descent of the needle) beyond a vertical line or plane drawn through the axis of the shaft, so as to rise a little, and thus insure a slight rise of the needle in order to bow the loop for the entrance of the shuttle, and then a slight descent to ease its passage through the loop, preparatory to the rising of the needle to its highest point of elevation, in readiness for its next descent. Such a motion has been, heretofore, given to needles by various devices, but not, that I am aware of, by this very simple and efficient means.

Within the arm B and box C are securely housed, and kept safe from exposure and dust, all the operative parts located above the bed-plate, excepting the tension-roller P and the lower ends of the presser-bar Q and needle-bar, and also the bearings of them all, the parts so enclosed being as follows; The shaft and its crank and link heretofore mentioned, the presser-bar and its lifting-lever, and adjustable pressure-spring R, the needle-bar, and the devices which operate it; the thread-controller, S, and its bearings, and the oil-passages for conducting oil, (admitted through a single small opening, T, in the top of the box,) to eight bearings of the needle-bar, and to the bearings of the thread-controller and lifting-link.

The lower bearing of the needle-bar is made somewhat broader than the bar itself, and the space between them is fitted snugly with a removable piece or gib, U, which affords a simple and ready means of compensating for wear, and for adjustment of the position of the needle, either by introducing something to tighten the piece, or by substituting an unworn one for it. But, as a better mode than either, I have devised an efficient means for compensation in the machine itself, by introducing from the outside of the box a screw, V, whose inner end abuts against the lower end of the gib, and thus permits an instantaneous adjustment to any degree found necessary.

When the front plate or cover of the box (which is removable) is fitted or screwed tightly to its place, it is next to impossible for the smallest motes or dust to effect an entrance, so closely is it covered on all sides. As this front plate forms a bearing-surface for the front sides of the presser-bar and needle-bar, it may, also, by tightening or loosening slightly the screws which hold it to the box, be adjusted to ease up or tighten these bars in their bearings or supports.

Through the top of the case, immediately above the centre or axis of the needle-bar, is made a small opening, T, protected by a pivoted cover, W; this is the single oil-hole for lubricating the needle-bar and its connections, by means as follows: The top of the needle-bar has two grooves, *a a'*, crossing each other at the centre, and which are made gradually deeper and broader as they recede from the centre, so as to afford an easy flow of the oil by four distributing-channels, to each vertical side of the bar, and hence to its four upper and four lower bearings. A vertical groove, *b*, connects one of these cross-grooves with a downwardly-inclined opening in the bar, which conducts the oil to the main working bearings of the thread-controller, and also to the bearing which connects the needle-bar to its crank, making in all ten important points lubricated from a single source of supply—an item of considerable consequence, even in a family machine, or where but a single machine is occasionally used, but of very great consequence in factories where scores or hundreds of machines are almost constantly run, both in the saving of time and oil.

The needle-bar in rising (even if there were no vertical groove *b*) carries the oil-opening for the controller high enough to meet the oil on the front face-plate which has been carried down by the top grooves in its descent.

The presser-foot is lifted by a lever, *c*, whose handle is located outside of and at the rear side of box C. The adjustment of the pressure upon the presser-bar I also control from the outside of the box by means of a thumb-screw, *d*, operating upon the spring-lever, R, of novel construction, located within box C. This lever is made of steel and in a single piece, its butt being rigid, and its forward end, *e*, which bears upon the top of the presser-bar, or upon a pin thereon, being thin enough to yield. Through the butt is a screw-thread to receive the screw. The upper end only of the butt touches the inner face of the box, and in this end is a small hole to receive a corresponding pin or projection on the inner face of the box, for the purpose of steadying it in position. The screw being turned in one or the other direction tightens or loosens, as the case may be, the rigid butt, and so increases or diminishes the pressure, as may be needed, and, at the same time, serves to preserve the spring in its true position.

The cap *f* is preferably screw-threaded, and covers the opening, which, in the process of casting the goose-neck and box, admits of supporting the core. This cap-nut, by being properly ornamented, makes a very convenient and attractive trade-mark or escutcheon.

In my peculiar construction of the goose-neck, and the devices which are encased and operate therein, this opening may also, by reason of its locality, be made serviceable in the act of fastening the crank to its shaft, and in adjusting it so as to time properly the movements of the needle. It is thus of great convenience, but the shaft and its crank can, even when this opening is closed, be placed in position and adjusted properly from beneath the base-plate, as hereinbefore mentioned.

The tension-device, P, consists of a double-flanged loose roller on an axis projecting from an upright or bracket, *g*. Through an overhanging top of this upright is drilled a hole to receive a spindle, *h*, of a flat, bent, curved piece or yoke, *i*, whose breadth is such as to fit snugly between the flanges, and whose curvature is such as to coincide with the roller for about one-third of its circumference. The spindle at its upper end is made smaller than at its lower end, to permit a spiral spring to surround it, this spring being lodged within the cavity in the upright. A thumb-screw (made hollow) fits a screw-thread cut in the bracket, and serves to compress the spring, and so to increase or diminish at will the pressure of the yoke upon the thread as it passes between it and the roller, the upper end of the spindle being free to enter the hollow part of the thumb-screw. This device is a fixture upon the stationary box, and is not attached, as tension-devices usually are, to the needle-bar, and so moving with it. It, therefore, is not disturbed by such movements, nor does it, as in such cases, exert any pull upon the thread.

I will now proceed to describe the devices beneath the bed-plate. At the forward end of the main shaft is firmly secured a stout metal disk, H, to which is pivoted a link, connected with one end of the shuttle-driver *k*. The disk affords greater durability than a crank, and prevents any liability to break or get deranged, such as is incident to a crank, when applied for a similar purpose. It also allows a means for shifting, at any time, the point of its connection with the link when the bearing has worn too much, but its greater value for the purpose of driving a shuttle in so delicate a mechanism as a sewing-machine is, that it acts uniformly during its revolutions like a fly-wheel, and has no dead-point to overcome, whilst with a crank, its own weight has to be overcome when rising, and when descending it adds to the velocity, thus rendering the movements irregular and jarring.

The shuttle-race *l* is cast in one and the same piece with that in which the shuttle-driver or carrier runs, and it is sustained in position by screwing the same to two studs or bearings projecting downwards from the bed-plate. The race, and the bearing or ways on which the carrier runs, are not strictly parallel with each other, but incline a little towards each other in the direction of their lengths, so that if projected a sufficient distance, they would meet. This inclination should be such only that while it allows sufficient room for the thread to pass freely between the carrier and the nose of the shuttle at the time the loop is forming, it has sufficient taper to close the forward horn of the carrier down upon and in positive contact with the nose of the shuttle while the stitch is being tightened, thus effectually preventing the nose of the shuttle being raised in the race against the horn of the carrier, and thus avoiding that noise and rattling, so disagreeable in shuttle-sewing-machines, as usually constructed, and also dispensing with the need of pads and all other similar devices heretofore used, (but from various causes found objectionable,) to check such motions and deaden the noise. This

rattling noise, where large numbers of machines are run, has been found to be so great at times as to make the adjacent apartments of a building almost untenantable; and it, with all the other customary jarrings of sewing-machines driven in numbers, and at a high velocity, shakes a building almost as much as very heavy machinery. Hence the importance of every improvement, slight though it may appear when alone considered, which contributes towards the making of a sewing-machine practically noiseless, and such a machine I claim mine to be, its noiselessness being due to the several improvements in the working parts herein described. This gradual and perfect arresting of such rattling, by a gentle and almost imperceptible incline, costs nothing in power, or in extra machinery or devices, or in money, and is absolutely perfect in accomplishing its end. Its simplicity and impossibility of getting out of order, so long as the race itself, of which it is a component part, shall endure, render this one of that class of inventions which are the ultimatum in simplicity and perfection.

The shuttle-race is open at its bottom for the whole distance the shuttle travels, so that whilst the shuttle is securely supported by the flat side of the vertical plate *m*, and by the concave bed of the race-plate, the space between these two plates is entirely open to the floor, as shown at *n* in fig. 2, thus permitting all dust, lint, and motes, which are wont to settle in close-bottomed races, to escape, the motions of the shuttle always keeping its track clear.

The feeding-bar *o*, and the rocking-lever *p* which actuates it, are like those heretofore patented to me, but the means which I have invented for regulating the feed are novel, and are as follows:

q is a long lever, connected by a swivel-nut or universal joint, *r*, to a thumb-screw, *s*, the head of which is above the table, for facility of access by the operator. The turning of this screw raises or lowers the longer and forward end of the lever. On this forward end, which rides securely in a bracket projecting from the bed-plate, is a plate, *t*, at right angles to the lever, and in which is a curved slot, to receive a pin, *u*, upon an adjustable rod or piston, *v*, connected by a hinge-joint, *w*, with the arm *x* of the eccentric, *y*, on the main shaft. The rod *v* fits snugly in a tubular piece, *z*, cast in one piece with and at right angles to the rock-shaft a^2. Through a longitudinal slot, b^2, in one side of this tubular piece, passes the pin *u*, which, also, as above stated, enters the slot b^2.

The mode of adjustment of the feed by these devices is as follows: By turning the feed-regulating screw *s*, so as to lift the forward end of the lever *q*, the slotted plate thereon, by means of the pin in its slot, lifts also the rod or piston *v*, and so lengthens that arm of the rock-shaft which derives motion from the eccentric. Now, as the throw of the eccentric is a constant, the longer the arm it actuates, the smaller will be the arc of the circle it describes, and hence the less will be the rocking of the shaft, and the consequent movement of the feed-bar, but by turning the regulating-screw in the reverse direction, the rock-shaft is turned further on its axis by the eccentric-rod, and the greater is the feed.

A modification of this plan would be to dispense with the curved slot in plate *t*, and to form it instead with a curved face, and to use a coiled spring on the rock-shaft lever; the curved face, when moving down, acting like one side of the curved slot, and the coiled spring on the rod returning it back, when the curved face moves up.

For the purpose of overcoming the action of the cam on the feed-bar, a leather or rubber washer is inserted in the bearing through which the feed-bar slides, at its back end, and at which point it swings on a pivot, the pivot passing through the washer, and being capable of being screwed up, and so tightening it up, and passing through a slot in said bar.

The upper or spool-thread passes from the spool to and through the tension-device, thence down in front of the needle-bar box to an eye at its bottom, thence upwards to the eye on the thread-controller, then down to an eye on the needle-bar, just above the needle, and thence to the needle-eye.

It will be observed, therefore, that it passes through but one eye between the tension-device and thread-controller.

1. I claim the combination, with the oil-hole above the needle-bar, of the crossing distributing-passages in the top of the needle-bar, whereby all the sides or faces of the bar may be oiled at the same time from a single orifice and from the outside of the casing.

2. Also, the combination, with the oil-grooves in the needle-bar, of the orifice for conducting oil to the axis or pivot of the thread-conductor, substantially as shown and described.

3. Also, the combination, with the devices last above claimed, of an oil-passage, for lubricating the link which actuates the needle-bar.

4. Also, the tension-device described, the same consisting of a flanged roller, and a rigid curved yoke spanning part of its periphery, and adjustable, as to its pressure, by a spring.

5. Also, as a means for varying the feed, the employment of an adjustable rod, having a pin or projection thereon, movable within a slotted sleeve upon the rock-shaft, that imparts motion to the feed-bar, substantially as shown and described.

6. Also, the combination, with the lever *q*, and its plate, of the rod, sleeve, and rock-shaft, substantially as and for the purpose set forth.

7. Also, the spring R, for imparting adjustable pressure to the presser-foot, when constructed, arranged, and operating as described.

8. Also, a shuttle-race, slightly inclined to the line of traverse of the shuttle-driver, as and for the purpose set forth.

9. Also, a shuttle-race and shuttle-driver race, cast in one piece, when the same are in lines which approach each other.

G. A. FAIRFIELD.

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