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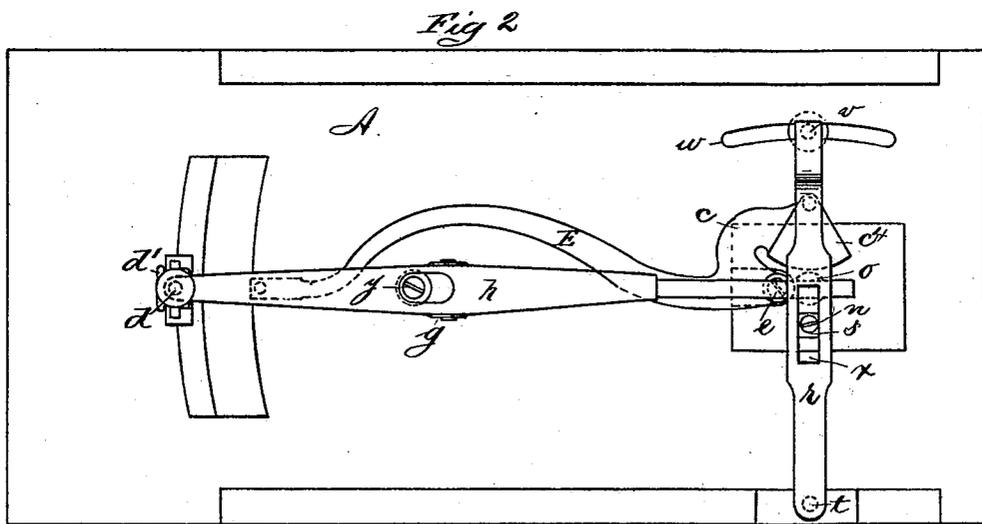
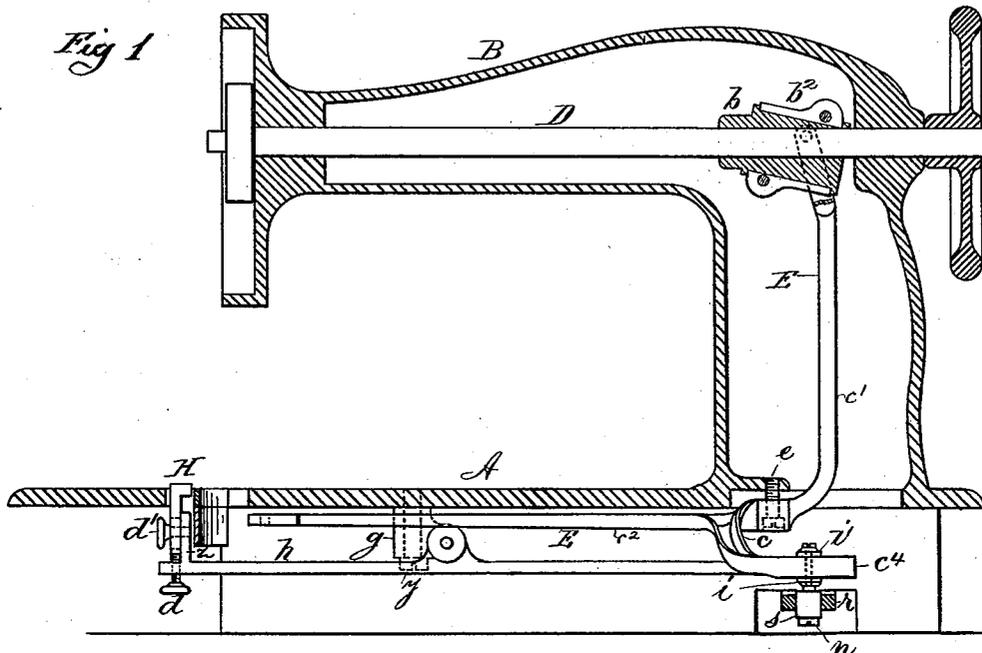
3 Sheets—Sheet 1.

F. H. RICHARDS.

SEWING MACHINE.

No. 251,136.

Patented Dec. 20, 1881.



Witnesses
 Wm H Chapin
 J. P. Garfield

Inventor
 Francis H Richards
 By Henry A Chapin
 Atty

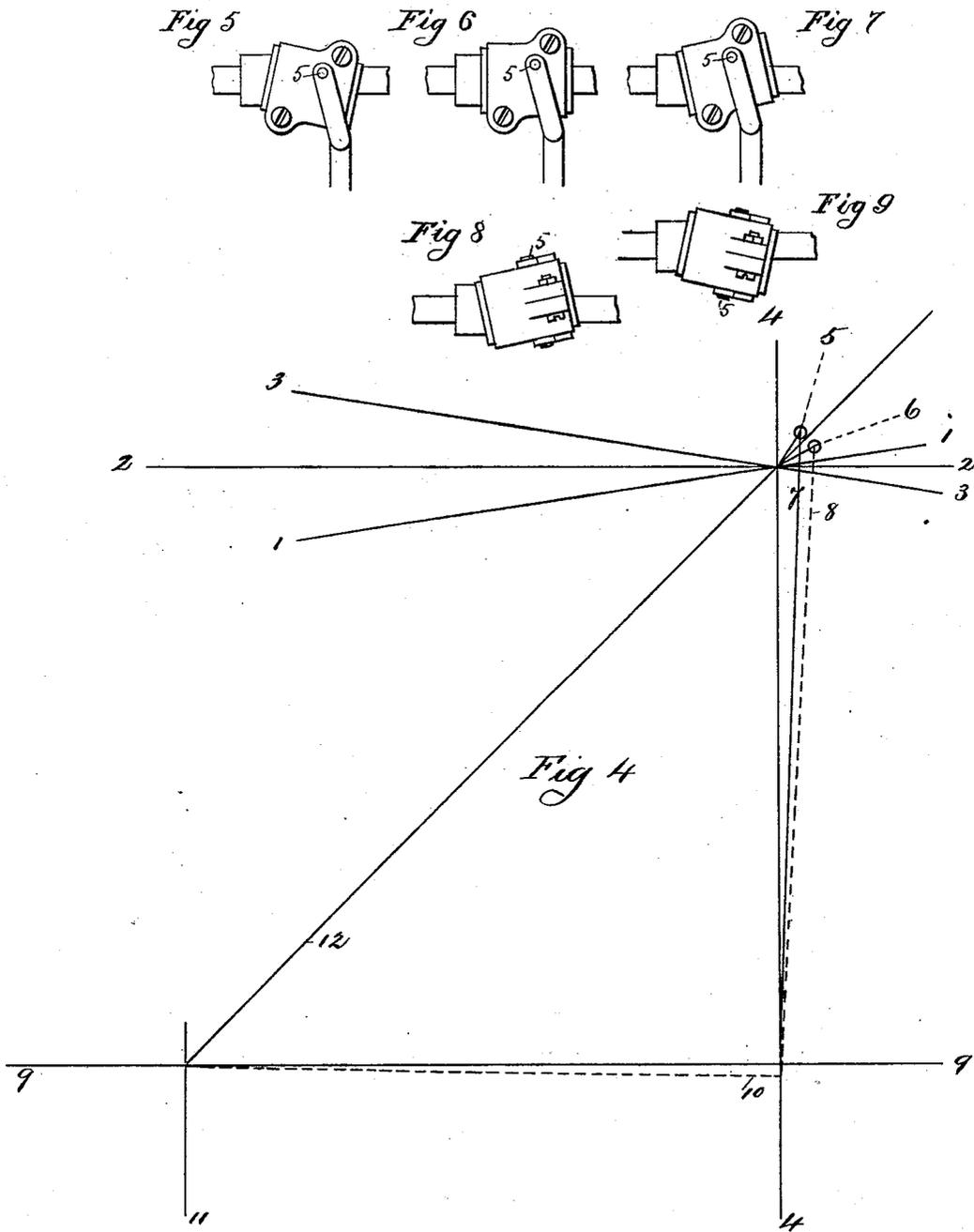
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UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO
CLARA V. DOLE, OF SAME PLACE.

SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 251,136, dated December 20, 1881.

Application filed August 20, 1880. (Model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Sewing-Machines, of which the following is a specification.

My invention consists in the novel construction and operation of the shuttle-lever and of the feeding devices of a sewing-machine, and the construction and arrangement of the same will be fully described in detail hereinafter.

My invention is illustrated in the accompanying drawings, in which Figure 1 is a side elevation, partly in section, of a sewing-machine embodying my invention. Fig. 2 is a plan view of the under side of the machine. Fig. 3 is a perspective view of the operative parts of the machine, with the upper part of the bed delineated in dotted lines. Figs. 3^a and 3^b are detached sections, respectively, on the lines *x x* and *y y*, Fig. 3. Figs. 4 to 9 are diagrams illustrating some of the movements of the shuttle-lever and its connection with its actuating device.

Like letters refer to like parts in the different figures.

In the drawings, A is the bed of the machine, and B is the bracket-arm, in which the main shaft D of the machine has its bearings, and said bed and arm are cast in one piece, securing greater steadiness and reducing the labor and cost of finishing. A cylinder, *b*, is arranged obliquely on the shaft D; or the latter is bent to form an oblique bearing, upon which is secured a block, *b*², and within the latter said cylinder turns freely. Said block *b*², as shaft D and cylinder *b* revolve, serves to impart reciprocating vertical, torsional, and tilting motions to the shuttle-lever E, and thereby operate the shuttle and feed devices. The upper end of lever E is forked, to straddle said cylinder from below, and the ends of the forks are pivoted to trunnions 5, projecting from opposite sides of said block. The said trunnion-pins are set in the sides of block *b*², to one side of its vertical center, as more clearly shown in the diagrams Figs. 4 to 9.

The shuttle-lever E consists of the vertical arm *c*¹, a long horizontal bent arm, *c*², reach-

ing forward under the bed A to the rear edge of the segmental shuttle-race, and of a curved arm, *c*, projecting at one side to the rear and terminating in a quadrant-shaped plate, *c*⁴, all formed in one piece. This shuttle-lever is pivoted to the bed A by the pivot *e*, upon which the arm can turn, rock, and move vertically. The end of the lever next to the shuttle-race is perforated to provide for securing the usual shuttle-carrier to it.

Two short bars, *i i'*, constitute a clamp with a spherical socket for the reception of a ball, *o*, sliding freely on the end of the feed-lever *h*. The outer ends of bars *i i'* are pivoted to the end of the quadrant-shaped plate *c*⁴, and are clamped by a screw, *n*, which passes into a hole in a block, *s*, that slides in a slot, *x*, of a stitch-regulating lever, *r*. The lever *r* is pivoted at one end, *t*, to the bed of the machine, and its opposite end is provided with a thumb-screw, *v*, which passes through a slot, *w*, in bed A. The feed-lever *h* is hung beneath bed A to a vertical pivot-block, *g*, that turns freely on a screw, *y*, so that the lever *h* may oscillate vertically and in a horizontal plane. Near the forward end of lever *h*, which extends beyond the shuttle-race, is a short vertical arm, *z*, carrying a vertically-adjustable feed-dog, H, and the end of lever *h* beyond arm *z* is perforated to receive the vertical screw *d*, by which said dog may be raised and lowered. As thus constructed the revolution of the shaft D, by its action on the block *b*², turns, tilts, and elevates and depresses the lever E. Thus, referring to the diagrams 4 to 9, it will be seen that as the block *b*² takes its different positions 5 6 7 the trunnions 5 are raised and lowered, also elevating and depressing the rear end of the lever E. As the block *b*² takes the positions shown in the plan diagrams Figs. 8 and 9 the lever E is swung or receives its torsional motion.

The line 8, Fig. 4, and the dotted line 10 represent the stopping points of lever E in its tilting and vertical movements. As the lever E is tilted as it is raised and lowered the forward end has little or no vertical movement, as will be seen on inspecting the lines 7, 8, 9, 10, Fig. 4, showing the different positions of the lever. Line 9 is the horizontal center line of the shuttle.

Care has been taken to thus fully describe and illustrate by diagrams the manner of hanging the shuttle-lever on block b^2 and on its pivot e on bed A, so that it may be clearly understood how the required vertical motion is given to the heel of the shuttle-lever at or near pivot e , which is demanded to operate the feed device, and at the same time compel the end of said lever next to the shuttle-race to reciprocate in a uniform horizontal plane under bed A.

It will be seen that the vertical movements of that part of the shuttle-lever under block b^2 by raising and lowering the arm c^4 and its clamp cause the rear end of the feed-lever h to be reciprocally operated in the same direction, and that the turning movement of lever E upon its pivot e causes the end of arm c^4 , to which the bars i are attached, to move with it, swinging the rear end of the feed-lever h reciprocally in a direction across the bed A. Thus the above-named movements of the rear end of the feed-lever, derived from those of the shuttle-lever, produce in its opposite end the "four-motion" feed. The length of the feed is adjustable by swinging the lever r on its pivot t , to carry the ball o nearer to or farther from the end of the feed-lever, and the quadrant-shaped plate c^4 serves to keep the arms $i i'$ in a proper plane and afford such an amount of bearing-surface for them as to cause them to move rigidly up and down with the heel of the shuttle-lever, and so properly actuate the end of the feed-lever.

My improvement as embodied in the shuttle-lever E, constructed in one piece from the driving-shaft to the shuttle-carrier, pivoted to the bed A at e , and in the block b^2 , set on the cylinder or inclined bearing b , as shown and set forth, and pivotally connected to lever h , may be employed as novel and advantageous means for producing a transverse shuttle motion consisting of very few mechanical elements, and in combination with any suitable feed devices other than those described. When said lever and block b^2 are so connected as to fulfill the above requirements only and not affect the feed, the trunnions connecting lever E to said block are set at the center of the vertical oscillatory movement thereof, in which case no vertical motion will be imparted, and the lever E has only a reciprocating torsional movement.

What I claim as my invention is—

1. In a sewing-machine, a shuttle-lever constructed with a horizontal and a vertical arm rigidly attached one to the other and pivoted to the bed of the machine near the junction of said two arms, in combination with the main shaft of the machine and appliances for imparting reciprocating vertical, torsional, and tilting motions to the said vertical arm of the shuttle-lever, substantially as set forth.

2. In a sewing-machine, the combination, with a shuttle-lever constructed with a horizontal and a vertical arm rigidly attached one to the other and pivoted to the bed of the machine, and appliances for imparting reciprocating vertical and torsional motions to said vertical arm of the shuttle-lever, of a feed-lever hung to the bed of the machine by a vertical and horizontal pivot-connection, and appliances for connecting the rear end of said feed-lever to the shuttle-lever, substantially as and for the purpose set forth.

3. In a sewing-machine, the combination, with the vertical arm of the shuttle-lever and of arm c of the main shaft of the machine, and appliances for imparting to said vertical arm reciprocating vertical and torsional motions, of the feed-lever centrally hung under the bed of the machine and of appliances for connecting the rear end of said feed-lever to the said arm c , substantially as and for the purpose set forth.

4. The combination, with the main shaft of the machine and with the shuttle-lever thereof having a vertical bifurcated arm, of cylinder b , perforated longitudinally in a line oblique to its axis, and of the block b^2 , mounted upon cylinder b , provided with trunnion-pins for securing said bifurcated arm thereto, all substantially as set forth.

5. In combination, the shuttle-lever provided with arm c , the feed-lever pivoted to bed A, the slotted stitch-regulating lever r , and bars $i i'$, inclosing ball o , pivotally attached to arm c , and lever r , substantially as and for the purpose set forth.

FRANCIS H. RICHARDS.

Witnesses:

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