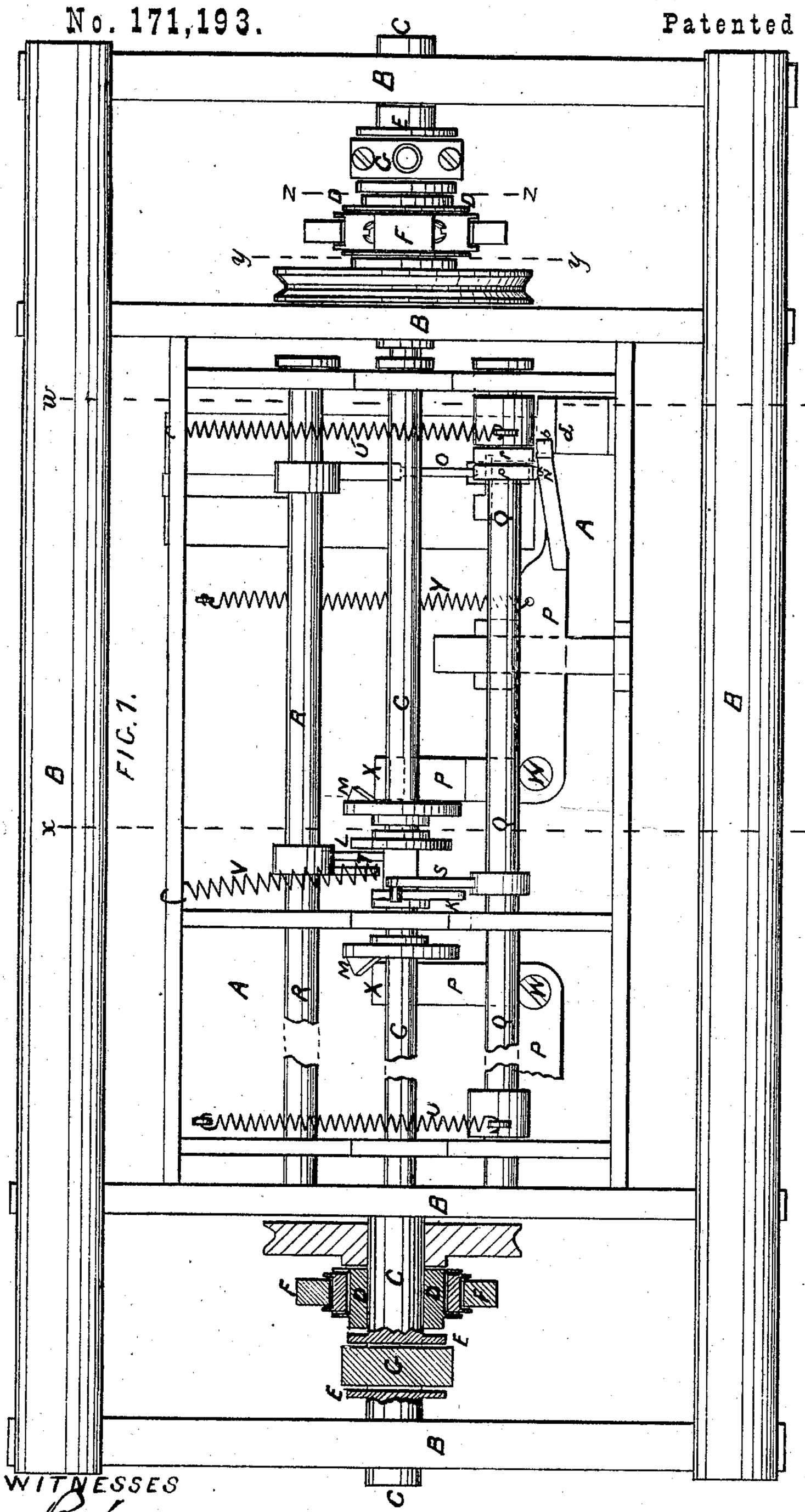
3 Sheets—Sheet 1.

C. F. TOLL.

SEWING-MACHINE.

No. 171,193. Patented Dec. 14, 1875.



WITNESSES

Robert Moms.

Geo. H. Earl.

INVENTOR.

Charles F. Toll

per

Brown Brothers

Attorneys.

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C. F. TOLL.

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FIG. 2.

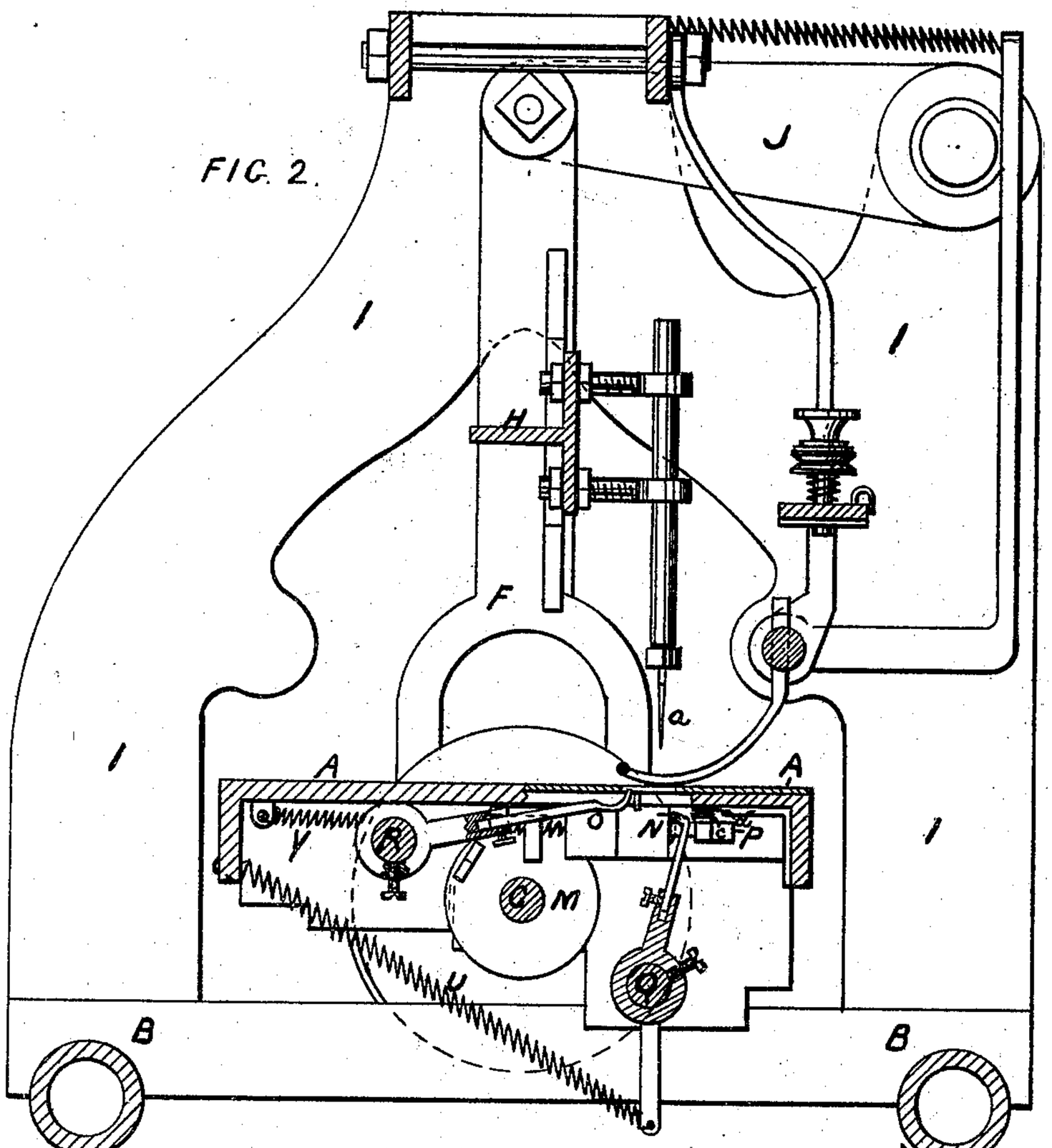

FIG. 3.

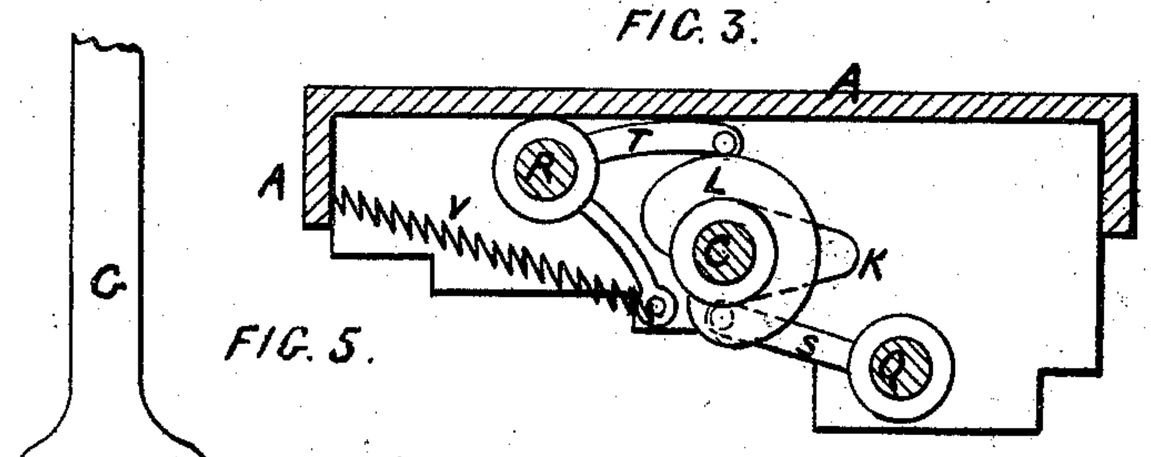

FIG. 5.

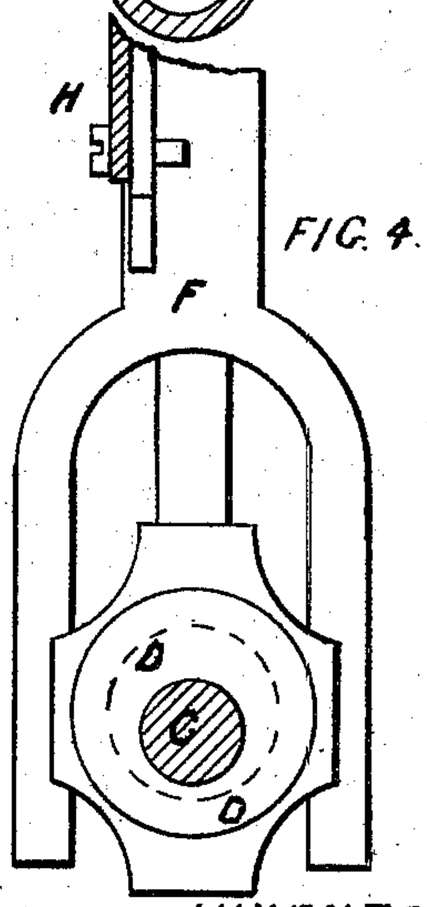

FIG. 4.

WITNESSES

Robert Morris

Geo. H. Earl.

INVENTOR.

Charles F. Toll

per Brown Brothers

Attorneys.

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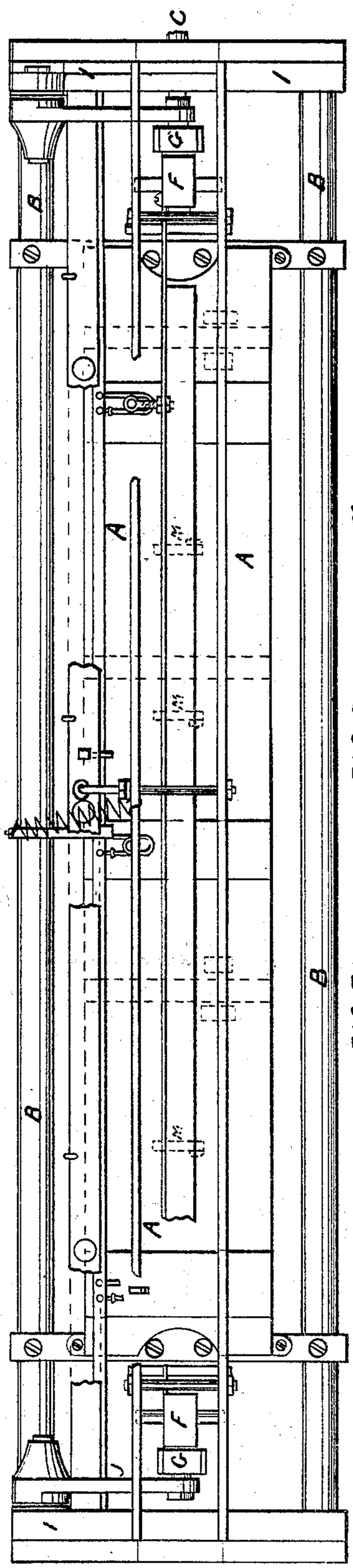


FIG. 6.

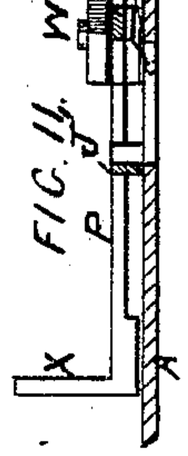


FIG. 11.

FIG. 12

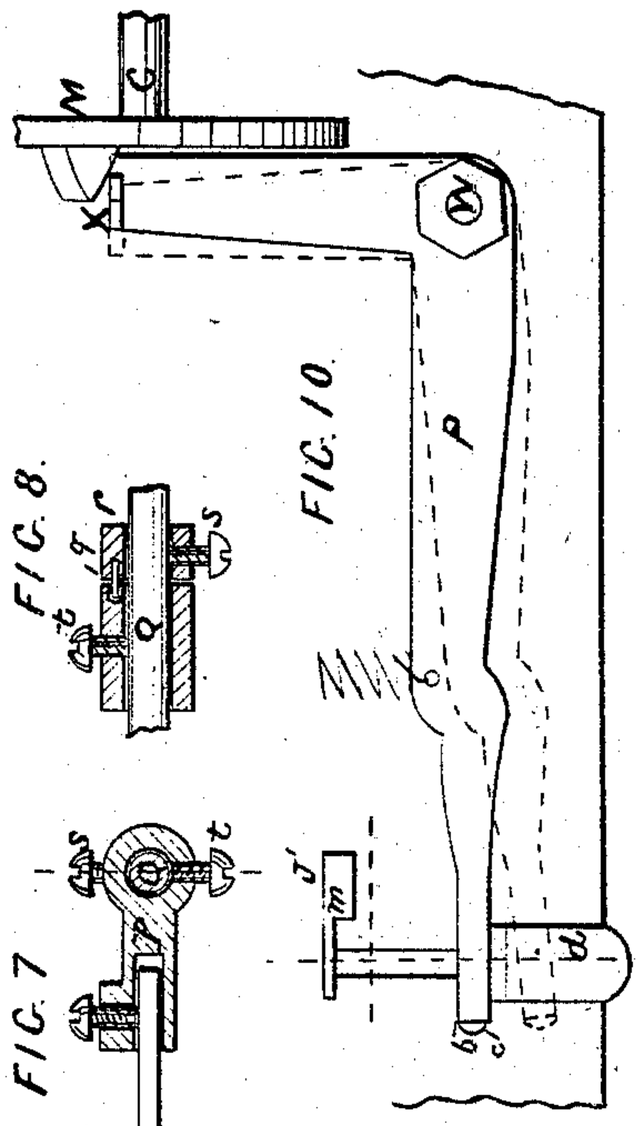


FIG. 10.

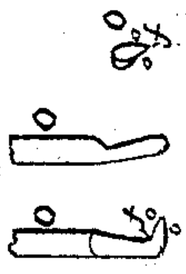
FIG. 8.

FIG. 7

FIG. 9

Newton

FIG. 13.



WITNESSES.

Robert Morris.

Geo. H. Earl

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Charles F. Toll

per

Brown Brothers

Attorneys.

UNITED STATES PATENT OFFICE.

CHARLES F. TOLL, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN SEWING-MACHINES.

Specification forming part of Letters Patent No. **171,193**, dated December 14, 1875; application filed July 16, 1875.

To all whom it may concern:

Be it known that I, CHARLES FREDERICK TOLL, of Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Sewing-Machines, of which the following is a specification:

This invention relates to improvements in chain-stitch sewing-machines of that class which use two needles, operating alternately, one working vertically and the other horizontally, as, for instance, see Letters Patent of the United States, dated February 11, 1851, No. 7,931, to William O. Grover and William E. Baker, and they are more especially designed for stitching and sewing carpet-lining made of sheets of paper and cotton-bat, and also quilts, although, as will be obvious from the description hereinafter given of them, they are applicable to stitching and sewing other articles of manufacture.

The invention consists, first, in a novel attachment or connection of the under-thread carrier or horizontal working needle to its operating-shaft or other operating device, whereby, when desired, it can be brought into a convenient position to be threaded at and from the under side of the cloth-plate, and then again fixed in position for its necessary and proper operation without trouble or inconvenience, and with the greatest facility and dispatch; and, secondly, in the combination, with the under-thread carrier or horizontal working needle, of a device, constructed, arranged, and operating substantially as hereinafter described, for taking up the slack of the under thread at the proper time relatively to the operation of the stitching mechanism.

In the accompanying plates of drawings my improvements in sewing-machines are illustrated.

In Plate 1, Figure 1 is a plan view of the under side of the cloth plate or bed of a sewing-machine, constructed according to the present invention, and by this plan view it is shown as extended for additional stitching mechanisms, and as provided with driving mechanism at both ends of the cloth plate or bed. In Plate 2, Figs. 2, 3, 4, and 5 are all cross-vertical sections on lines *w w*, *x x*, *y y*, and *z z*, respectively, of Fig. 1, Plate 1. In Plate 3, Fig. 6 is substantially a plan view of sewing mechanism, arranged under this invention for making three parallel lines of stitches, and as adapted more especially for sewing carpet-lining, such as referred to; Figs. 7, 8, and 9, views in detail of the under and horizontal working needle; Figs. 10 and 11, views in detail of the take-up for under thread; Fig. 12, a view in detail of the bridge or ridge over which the loop of the under thread is drawn; Fig. 13, views in detail of the loop-spreading hook.

In the drawings, A represents the cloth or bed plate of the machine, which plate is attached to and supported by an outside frame, B, of suitable construction; C, the driving-shaft. This shaft is arranged to turn in suitable bearings of the frame B under the cloth-plate A, and at each end it is provided with similar mechanism, consisting in each case of an eccentric, D, and crank E, which eccentrics and cranks carry, respectively, vertical arms F and G that are connected to a common horizontal arm, H, carrying the upper or vertical working needle *a*, and to the upright frame-work 1 of the bed-plate A, through swinging arms J, all so as to give both an up and down and swinging movement to the upper needle, in a manner substantially well known, and therefore needing no more particular description; K, L, and M, three cams, which are all attached to the driving-shaft C, to turn therewith, and by these cams, respectively, are driven the under-thread carrier or horizontal working needle N, the hook O for seizing and spreading and opening out the loop of the under thread, and the device P for taking up the slack of the under needle; and for such purpose, in each instance, these cams are suitably formed to give to the parts of the stitching mechanism, respectively operated by them, the required and proper movements relatively to each other to stitch and sew in connection with the operation of the needle, the material passing over the bed-plate of the machine.

The under needle N is secured to a horizontal shaft, Q, turning in suitable bearings of the frame B, and the spreading-hook O for the loop of the under thread is secured to another horizontal shaft, R, turning in suitable bearings of the frame B, and these two shafts rock,

because of their respective cams K and L of the driving-shaft C, against which they bear through their respective arms, S and T, and are held to such bearing by spiral springs U and V, connected and arranged to operate on said shafts Q and R, respectively.

The under-thread take-up P is arranged to horizontally turn on a fulcrum, at W, of the bed-plate, and its operating-cam M works on it through its stud X, and it is held and brought by a spiral spring, Y, in position to be operated by the said cam. The take-up P is of the angular form shown, and at its free end *b* there is a bent spring, *c*, which is suitably applied to confine and hold the under thread between it and the opposite face of the take-up bar against escape, and to tightly nip said under thread, as the take-up bar travels up over and in one direction along the stationary surface *d* of the under side of the cloth or bed-plate A, and to open from and loosen its hold on the under thread, as the take up bar travels along the said stationary surface in the other direction, and both of these movements of take-up bar are because of its actuating-cam M and its spring Y. The under needle N rocks horizontally back and forth across the vertical plane of travel of the upper needle. The loop-spreading hook O, for the under-needle thread, rocks vertically toward and away from the under side of the cloth or bed-plate A, and it is situated so that its hook *f* shall pass toward the bed-plate A, and by and along the side or face *g* of the arm *h* of the under needle, when the under needle has passed forward by and across the plane of movement of the upper needle, in its downward stroke, and just before the under needle begins to move backward. This movement of the hook O, by and along the side *g* of the under needle N, is for seizing and spreading out the loop of the thread of such needle, and to make it certain of seizing the said loop, the side *g* of the needle-arm *h*, by which it passes, as described, is made concave from end to end, as shown in Fig. 9, Plate 3, so as to receive the hook between such concave face, and the then extended line of thread, as will hereinafter appear, from end to end of such concave face.

The hook having passed by the under needle, as above described in the continuation of its movement toward the bed-plate, passes back of a stationary bridge or ridge-bar, J′, of the under side of the bed-plate A, which bridge, on its edge *m*, for one part, and end *n* of its length, inclines toward the bed-plate A. (See Fig. 12, Plate 3.)

The operation of the parts of my described improved mechanism relatively to each other, and to the up-and-down movement of the upper needle, supposing the machine when started to have the upper needle at the extreme limit of its upward stroke, and to have the under thread properly fixed under the spring of take-up bar P, at which position of the upper needle, the hook O, under needle N, and take-up bar P, and connecting parts, are then situated all as shown in Fig. 2 of Plate 2 of the drawings, is as follows, to wit: The upper needle *a* now travels downward through the material on the cloth-plate, and thence through the throat of cloth-plate, and at the same time the hook O moves away from the bed-plate and its position back of the bridge J′.

These movements of the upper needle *a* and hook O substantially begin together, and, continuing in the directions stated, as the needle approaches the limit of its downward stroke, and as the hook completes about one-half of its stroke away from the bed-plate the under needle N begins to move forward across the travel of the upper needle *a*, and toward that of the hook O, and also the take-up begins to move away from the travel of the upper needle up and over the surface *d* of bed-plate.

All these several movements continuing as described, the under needle finally crosses the upper needle and enters the loop of its thread just as the upper needle reaches the limit of its downward stroke, and, continuing in the same direction through the said loop, it is at last intersected and crossed in its path by the hook O in its travel then toward the bed-plate, and the loop of said under thread thereby is seized and carried by said hook to and drawn over the edge *m* of the bridge J′, where it is held in the then rest of the hook O while the under needle is traveling back to its normal position and the upper needle is completing its upward stroke for another downward stroke, and, furthermore, it, the said loop, is also sufficiently retained on the hook and the bridge in the then travel of the hook away from its position back of the bridge for the upper needle, which, as before stated, moves in its downward stroke substantially simultaneously therewith, to pass on its then downward stroke through the loop on the hook and at rest on the edge *m* of bridge J′ before the hook has traveled sufficiently away from the bed-plate for the loop thereon to have escaped from it, as the loop afterward does under the continued movement or travel of the hook away from the bed-plate. The loop of the under needle-thread is spread and opened out by the side inclines *o* of the hook, (see Fig. 13, Plate 3,) and in this spreading out by the hook O of the said loop the bridge J′ assists, and such assistance is greatly increased by the inclination *n* of bearing-edge *m* to the bridge J′.

In conjunction with the above-described movements of the under needle N and hook O in reference to each other and to the upper needle, and just before the under needle N intersects and crosses the upper needle *a*, as described, the take-up bar P has passed back to its normal position, and thus the nip of its spring on the under thread is released, and so remains until the escape of the loop of under thread from the hook, when it again moves back from the needle, as before described, and then nipping the under thread draws up and

tightens said under thread, and thus, so far as such thread pertains to the stitch, completes the stitch, which, as to the thread of upper needle, is also completely, by any ordinary and suitable take-up device, provided therefor. The under needle, (see Fig. 8, Plate 3,) has its carrier or arm *p* interlocked by pin and socket *q* with a collar, *r*, which is fastened by set-screw *s* to the operating-shaft Q, and the carrier *p* is also fastened in its interlock with collar *r* by turning its screw *t* up against the operating-shaft. In this connection of under needle to its operating-shaft, after properly adjusting the under needle, then interlock the collar *r* with it by setting such collar against it, and then fasten its set-screw, and also the set-screw of the collar against movement or escape from each other and from the shaft. Under this connection of the under needle, to thread such needle, first loosen its set-screw and swing it on the shaft into a convenient position to reach its eye. After passing the thread through the eye, thereby simply swinging the needle back and interlocking it with the collar *r*, it is in position for operating without trouble or labor, in which position it may be fastened by its set-screw.

The bridge J′ may be dispensed with, but it is best to use it, as it greatly assists in the spreading or opening out of the loop of the under thread, as such loop is brought against it by the movement of the hook O.

Having now described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a sewing-machine employing two needles, the upper one moving vertically and the under one horizontally, the combination, with the under needle and its operating-shaft, of a connecting mechanism between the two, whereby the said under needle can be moved and brought to and from the under side of the cloth plate of the machine into a convenient position to be threaded, substantially as described.

2. The take-up bar P and its spring *c*, in combination with the surface *d*, arranged and operating together to nip and free the under thread, substantially as described, for the purpose specified.

C. F. TOLL.

Witnesses:
EDWIN W. BROWN,
GEO. H. EARL.