

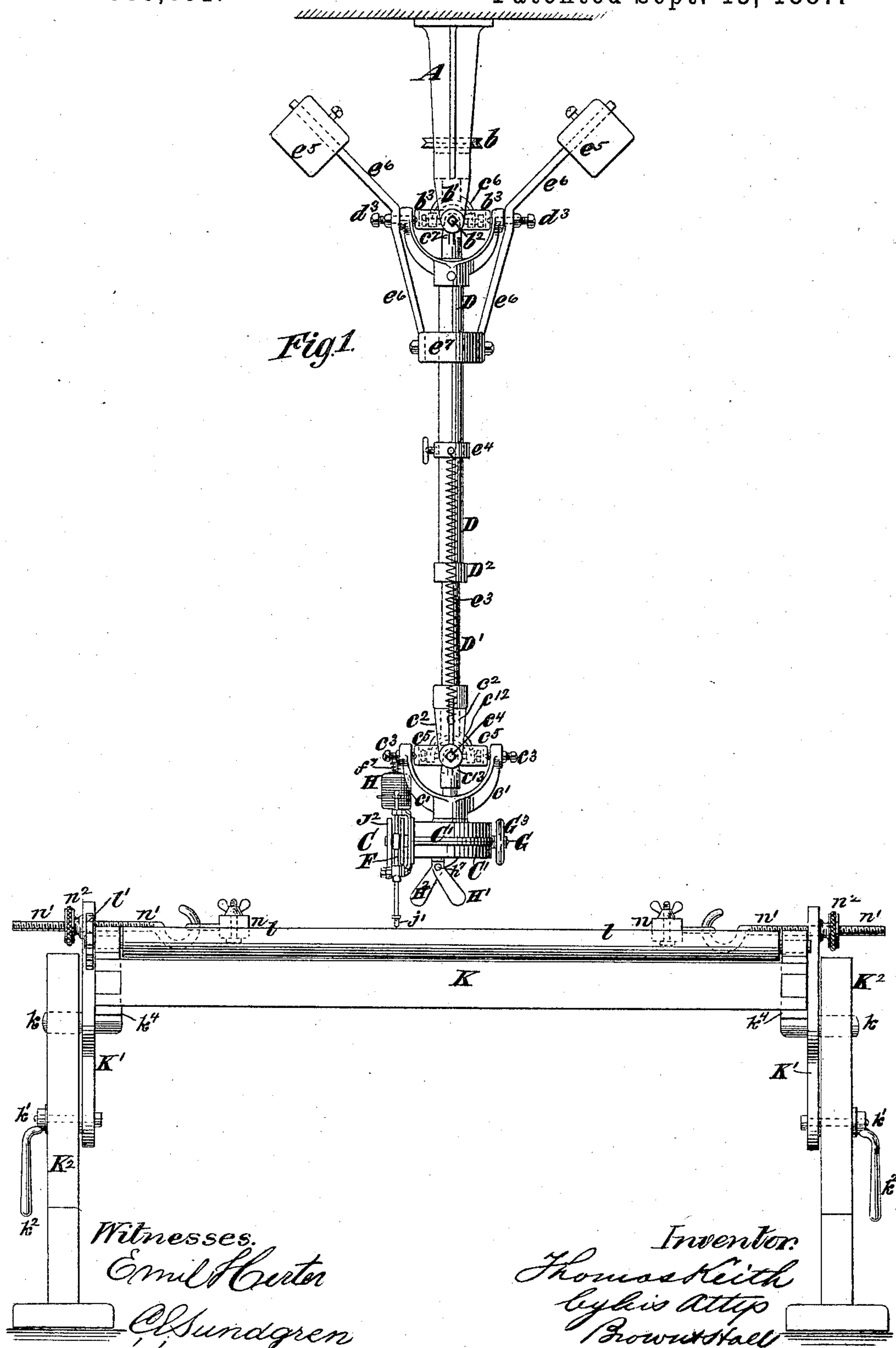
(No Model.)

4 Sheets—Sheet 1.

T. KEITH.
EMBROIDERY MACHINE.

No. 369,861.

Patented Sept. 13, 1887.



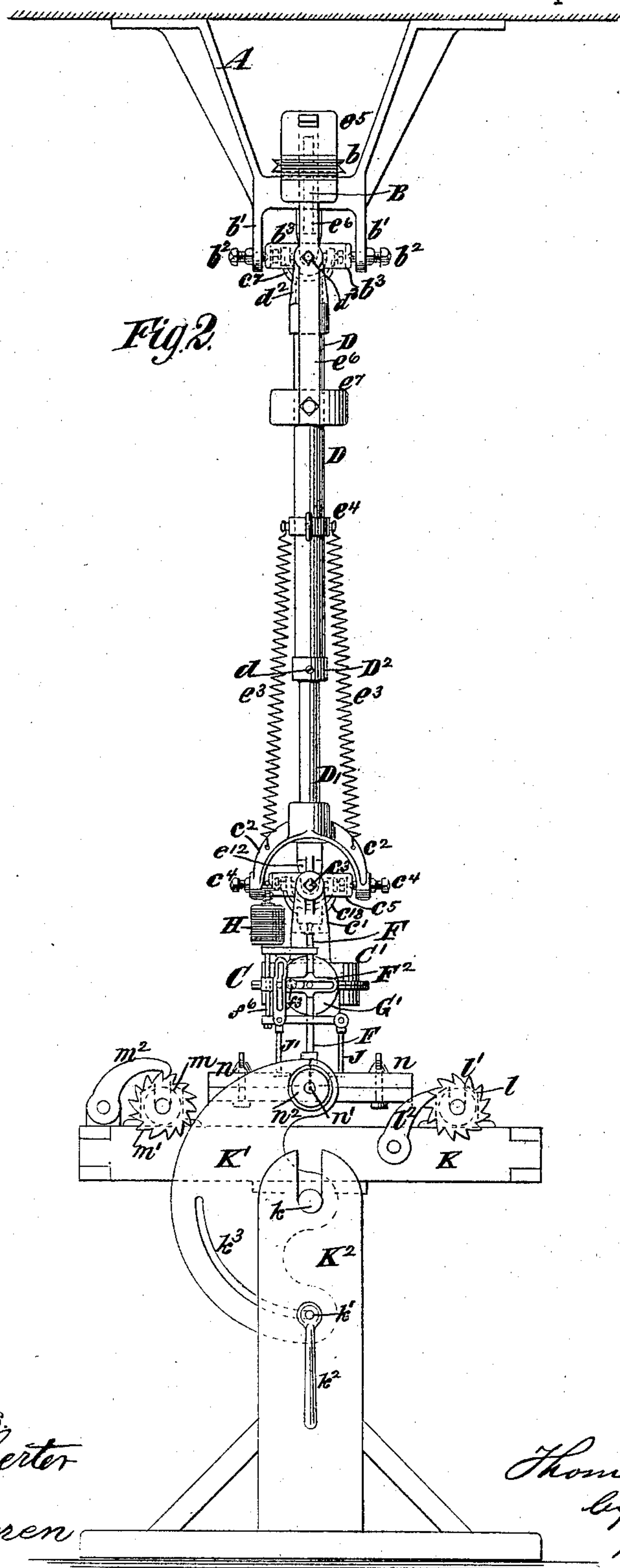
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4 Sheets—Sheet 2.

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No. 369,861.

Patented Sept. 13, 1887.



Witnesses
Emil Herter
O. Sundgren

Inventor
Thomas Keith
by his attys
Brown & Hall

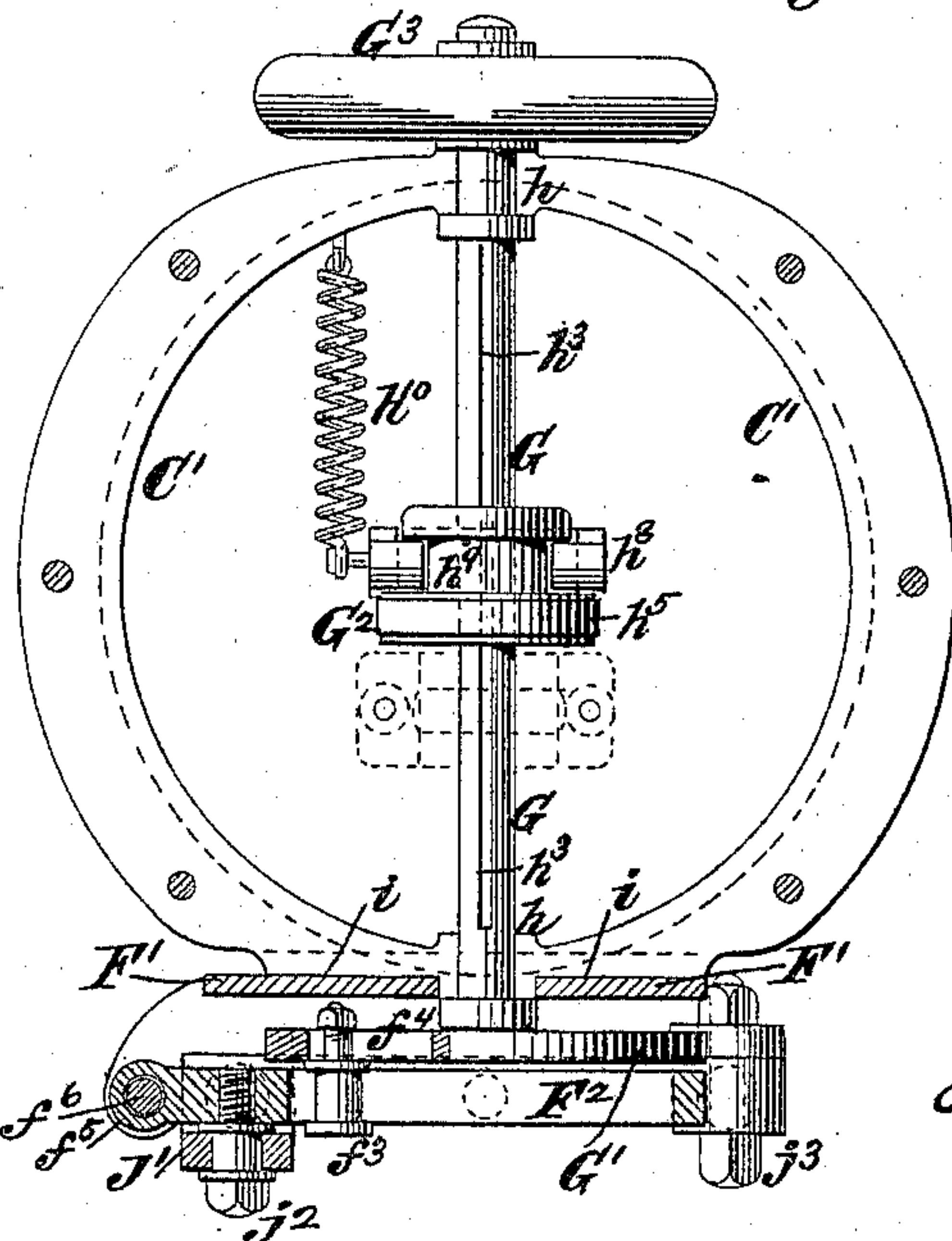
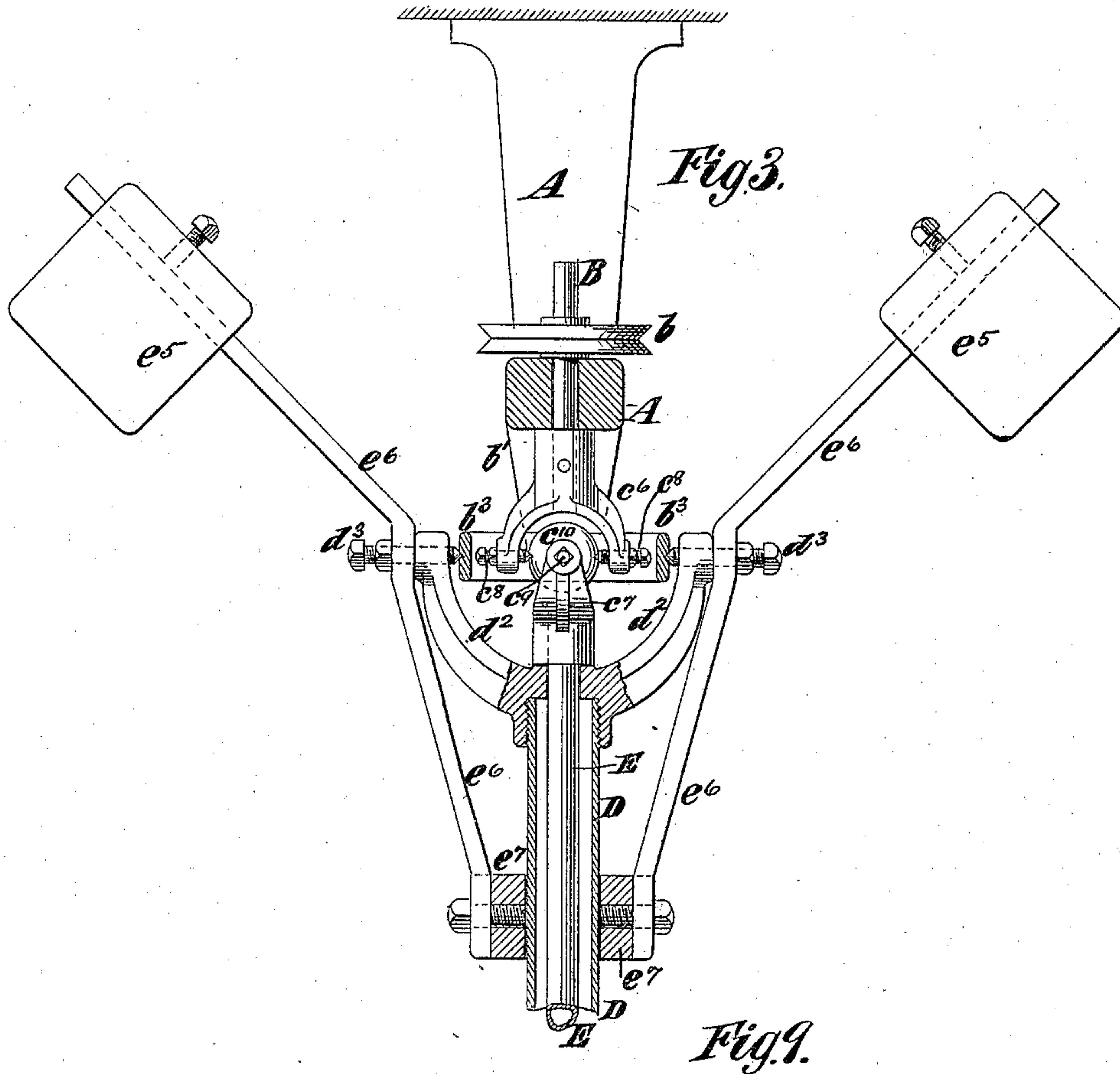
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4 Sheets—Sheet 3.

T. KEITH,
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No. 369,861.

Patented Sept. 13, 1887.



Witnesses.
Emil Renter.
O. Sundgren

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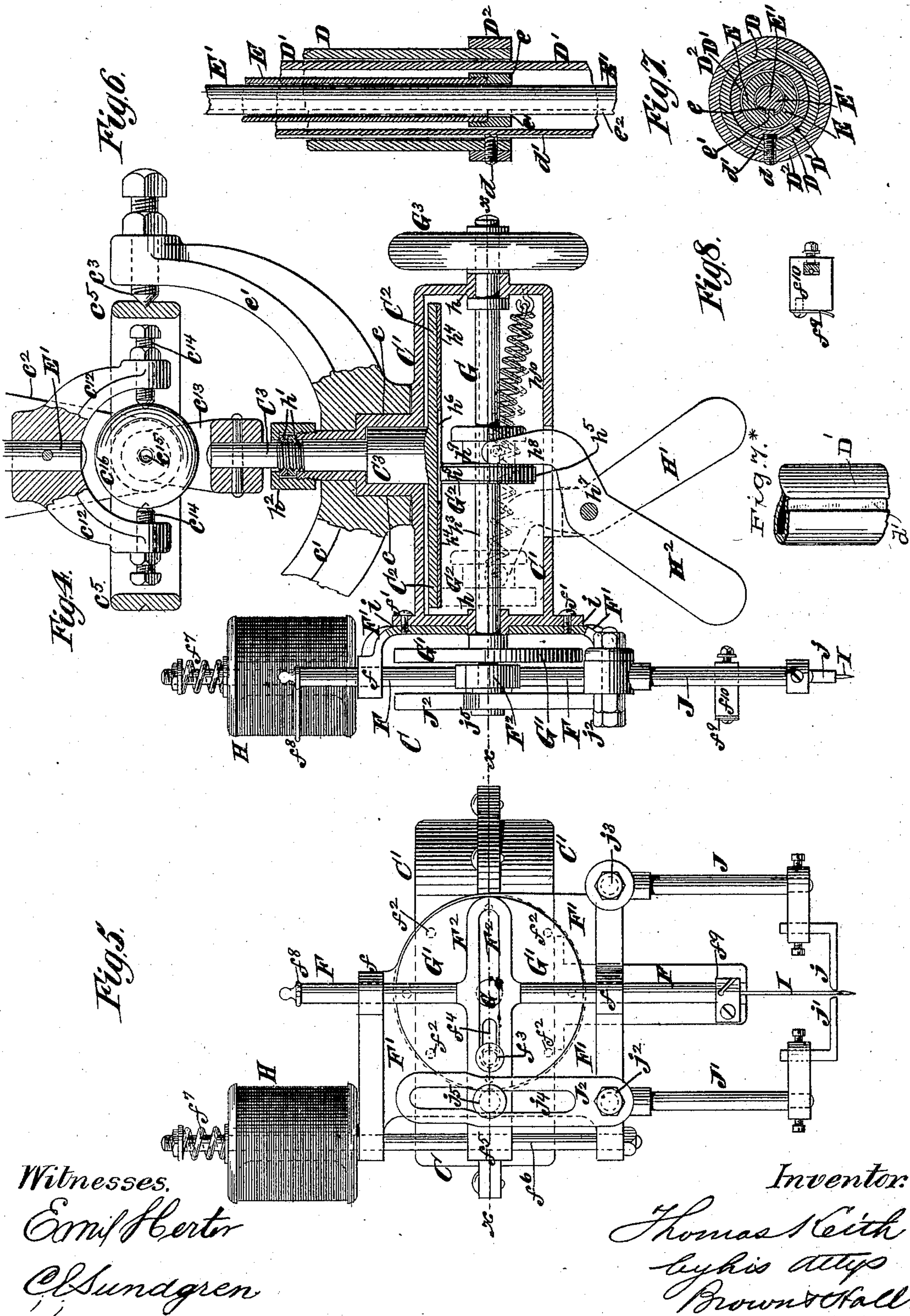
(No Model.)

4 Sheets—Sheet 4.

T. KEITH.
EMBROIDERY MACHINE.

No. 369,861.

Patented Sept. 13, 1887.



UNITED STATES PATENT OFFICE.

THOMAS KEITH, OF NEW YORK, N. Y.

EMBROIDERY-MACHINE.

SPECIFICATION forming part of Letters Patent No. 369,861, dated September 13, 1887.

Application filed June 14, 1886. Serial No. 205,059. (No model.)

To all whom it may concern:

Be it known that I, THOMAS KEITH, of the city and county of New York, in the State of New York, have invented a new and useful
5 Improvement in Tufting-Machines, of which the following is a specification.

My invention is, as a whole, intended for machines for making loop-stitch embroidery or tufting by a single needle and thread, and
10 in which the thread after being passed through the fabric in a loop is grasped by a pair of clamps as the needle leaves the goods, so as to prevent the loop from drawing out, while the thread at the next downward movement of
15 the needle is drawn from the spool by a thread clamp or tension on the needle-bar. In such a machine the goods are usually clamped in a frame or between rollers and held under tension, and the entire sewing-machine is moved
20 by hand over the goods to follow a design or pattern delineated thereon.

Certain features of the invention—such, for example as the means employed for supporting and driving the machine while it is movable
25 by hand over the goods, the means employed to balance the machine to enable it to be readily handled and controlled, and the means for driving the needle-bar at different speeds and stopping and starting it—may be employed
30 in any machines where the sewing-machine proper is movable by hand or otherwise over the goods, and whatever be the character of the stitch produced.

The invention consists in novel combinations of parts, whereby the sewing-machine is supported from a fixed hanger above the machine and its needle-bar operated from a shaft in fixed bearings in said hanger, such combinations including a column composed of telescopic tubes and universal joints arranged as
40 hereinafter described, and pointed out in the claims, whereby the machine is supported, and a telescopic shaft and other universal joints whereby power is transmitted from the driving-shaft in the overhead hanger to the sewing-machine proper. This part of my invention also includes a novel arrangement of adjustable weights for balancing the column-support with its shaft and the sewing-machine
50 when the column is inclined from the perpendicular, whereby the operator is relieved of the weight of the movable parts and may

easily guide and hold the sewing-machine steadily and without material effort.

This invention also consists in novel combinations of parts whereby motion at a quicker or slower speed, as desired, is transmitted from the telescopic shaft to the needle-operating shaft, and whereby said needle-operating shaft may be set in motion by the movement of
60 the handle, and is automatically stopped when the handle is released.

The invention also consists in a novel combination, with a needle-bar, of a movable thread-clamp separate from and independent of the
65 needle, and mechanism, as hereinafter described, and pointed out in the claims, whereby such movable clamp is operated positively in connection with a fixed clamp, which is also separate from and independent of the needle, to
70 clamp and release the thread without making frictional contact with the needle as the needle alternately recedes from and advances into the work, as distinguished from other machines heretofore in use in which the thread-clamps are operated to clamp the thread by
75 spring-power only and bear with frictional contact on the needle.

The invention also consists in novel combinations of parts, in the means employed for
80 holding the goods stretched or extended, including a table or frame mounted on pivots or trunnions to swing in a vertical plane, and rollers and clamps for holding the goods; and it further consists in the combination, with
85 such a pivoted work table or frame, of a sewing-machine having a pivoted or swiveled head, so that whatever be the position of the work in an inclined plane the needle-bar will move at right angles thereto.
90

The invention also includes other combinations of parts and details of construction, hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figures 1 and 2 are elevations, in planes at right angles
95 to each other, of a machine embodying my invention. Fig. 3 is a sectional elevation of the upper part of the machine on a larger scale. Fig. 4 is a sectional elevation of the sewing-machine proper and the lower portion of its
100 movable supports. Fig. 5 is a face or front view of the parts shown in Fig. 4. Fig. 6 is a sectional elevation, and Fig. 7 a transverse section, of portions of the telescopic column

and shaft, showing the connections between their inner and outer sections upon a larger scale. Fig. 7* is a side elevation of a portion of the inner column-section. Fig. 8 is a plan of the needle-clamp and a thread clamp or tension carried thereby; and Fig. 9 is a horizontal section, principally on the plane of the dotted line $x x$, Figs. 4 and 5.

Similar letters of reference designate corresponding parts in all the figures.

A designates a hanger, which may be fixed to overhead beams or other fixed support, and B designates a shaft which is supported in a stationary bearing in said hanger, and to which motion may be conveyed by a belt running around a pulley, b . From this hanger the sewing-machine proper, C, is supported so as to permit of its bodily movement in any direction, and from this shaft B the sewing-machine or the needle-operating shaft thereof has motion transmitted to it during the bodily movement of the sewing-machine.

The support for the sewing-machine consists of a telescopic column comprising an outer tubular section, D, and an inner tubular section, D', sliding thereinto. The outer tubular section, D, may have at the lower end a collar, D², and through it and the collar extends a set-screw or pin, d , which engages a groove, d' , or a corresponding slot in the inner tubular column-section, D', thus providing for the free movement of the section D' within the section D. This screw does not bear at its end on the bottom of the groove, and does not, therefore, act as a set-screw, but simply as a guide to the section D'. I have in Fig. 7* shown a portion of the tubular column-section D' as having formed in it the groove d' , which receives the point of the screw d . At its upper end the outer tube, D, of the column is connected by a universal joint with the hanger A.

As best shown in Fig. 2, the hanger A has jaws or a fork, b' , through which pass set-screws or pivot-pins b^2 , supporting a ring, b^3 ; and the tube-section D of the column has a fork, d^2 , which, by means of set-screws or pivots d^3 , at right angles to the set-screws or pivots b^2 , is supported from the ring b^3 . This construction provides for the swinging of the telescopic column in any direction from its upper end.

At the lower end of the telescopic column is a cylindric box or casing, C', which forms a part of the frame of the sewing-machine, and which is supported from the lower end of the inner column-tube, D', by a universal joint. Upon the frame or casing C' is an upwardly-projecting hub, c , to which is fitted a fork or yoke, c' , and on the lower end of the inner column-tube, D', is a yoke or fork, c^2 . The two yokes or forks c' c^2 are connected at right angles to each other and by set-screws or pivots c^3 c^4 with a ring, c^5 , thus enabling the sewing-machine to be held with its needle-bar vertical while moving it in different directions.

Within the frame or casing C' of the machine is a rotary disk, C², which I shall here-

inafter describe, and to which motion is transmitted from the shaft B in the hanger A through a transmitting-shaft composed of an outer tube, E, and an inner tube or rod, E', the outer tube being connected at its upper end by a universal joint with the driving-shaft B, and the inner tube or rod being connected at its lower end by a similar universal joint with the shaft C³, on which is the disk C². The upper universal joint may consist of yokes or forks c^6 c^7 , secured at right angles to each other, one to the shaft B and the other to the outer tubular section, E, and provided, respectively, with set-screws c^8 c^9 , engaging a body or center, c^{10} , this universal joint being arranged within the ring b^3 . The lower universal joint may consist of yokes or forks c^{12} c^{13} , secured, respectively, to the inner rod, E', of the transmitting-shaft and to the disk-shaft C³, and provided, respectively, with set-screws c^{14} c^{15} , engaging a center or body, c^{16} , at right angles to each other. This lower universal joint is arranged entirely within the ring c^5 of the column-joint.

As shown in Fig. 6, the tubular shaft-section E may have at its lower end a cap, e , whereby it is strengthened, and which, by fitting with comparative snugness in the inner tube, D', of the column, guides the transmitting-shaft and holds it centrally within the column. The cap e has a feather, e' , engaging a groove, e^2 , in the inner rod-section, E', of the transmitting-shaft, and by means of this feather and groove the two parts E E' of the transmitting-shaft are locked to turn together, while at the same time permitting free sliding movement of the inner rod, E', within the tubular section E of the transmitting-shaft.

The weight of the sewing-machine, together with the inner column-section, D', and the inner shaft-section, E', may be supported by springs e^3 , attached, as shown in Fig. 2, to a collar, e^4 , on the column and to the column yoke or fork c^2 . The operator will thereby be relieved of all weight of the parts in moving the sewing-machine to follow a pattern. It is also desirable to have the weight of the movable parts balanced when they are swung into an inclined position, and this may be effectively and simply done by means of balance-weights e^5 , adjustably secured upon the arms e^6 . The arms e^6 may be supported by the same screws, d^3 , which form a part of the upper universal joint of the column, and they may be prolonged downward and attached to a collar, e^7 , upon the column. The effect of the weights is thereby applied to the column below its upper end, and in whatever direction the column is swung from a perpendicular position the adjustable weights e^5 will balance the weight of the column and all the parts supported thereby.

I will now describe the construction and mode of operation of the sewing-machine proper, which is supported at the lower end of the adjustable column D D'.

F designates the needle-bar, which is fitted

to guides f in the frame or swinging head F' .

As here represented, the frame portion or casing C' is of cylindric form, with a vertical axis, and is divided horizontally at about the center of its height, the two parts being provided with flanges, whereby they may be secured together by screws or bolts.

G designates the needle-operating shaft, which is fitted to bearings h . (Here shown as formed in the meeting faces of the two sections, composing a frame or casing, C' .) Upon one side or the front of the frame or casing C' is a flat flange-face, i , on which is secured the head or head-frame F' by means of screws f' . In the head-frame F' are a circular series of holes, f^2 , with any of which the screws f' may engage, and by this means of attachment provision is afforded for turning the head F' so that the needle-bar F will stand at an angle relatively to the axis of the box or casing C' . The needle-bar F has a crank-pin yoke, F^2 , which receives a crank-pin, f^3 , carried by a crank-disk, G' , on the end of the needle-operating shaft G . As best shown in Figs. 5 and 9, the crank-pin f^3 is secured in a radial slot, f^4 , formed in the crank-disk G' , and by adjusting said crank-pin toward and from the center of the crank-disk the throw or stroke of the needle-bar may be varied in length, as desired. The crank-pin yoke F^2 may be prolonged and provided with an eye, f^5 , fitted to an upright guide-rod, f^6 , in the head-frame F' , and thereby the crank-pin yoke may be held in true parallel position with the face of the crank-disk. The guide-rod f^6 may be prolonged upward, so as to receive a spool, H , and have applied to its upper end a tension-spring, f^7 , for controlling the rotation of the spool.

From the spool H the thread may be conducted through a guide-eye in the arm f^8 on the needle-bar, thence through a thread-clamp, f^9 , on the lower end of the needle-bar, and through the eye of the needle I . The thread-clamp f^9 may consist simply of a plate of metal secured to the needle chuck or holder f^{10} , and having an oblique slot, as shown at Fig. 5, in which the thread is introduced. This clamping-plate may have its free edge curved outward slightly, as shown in Fig. 8, so as to facilitate the ready introduction of the thread into it.

As best shown in Fig. 4, the shaft-section C^3 , on which is the driving-disk C^2 , is held against longitudinal movement by a collar, h' , formed by two jam-nuts secured thereon and fitting between the end of the hub c and the cap h^2 , secured thereon.

Motion is transmitted from the disk C^2 , which rotates in a horizontal plane, to the needle-operating shaft G through a friction-wheel, G^2 , locked to said shaft by a feather or key engaging a groove, h^3 , therein and free to slide lengthwise on the shaft in a direction toward and from the center of the friction-disk C^2 . This disk may have a face, h^4 , of leather, rubber, or other friction-producing material, and the

sliding friction-wheel G^2 may have a friction-producing ring or band, h^5 , of similar material sprung into a groove in its surface. When the sliding friction-wheel G^2 is adjusted outward toward the edge of the disk C^2 , as is shown by dotted lines in Fig. 4, the friction-disk C^2 will transmit a rapid motion to the needle-operating shaft G , and as said friction-wheel G^2 is moved toward the center of the disk the speed of rotation transmitted to the shaft G will diminish. I have shown the friction face or material h^4 of the disk C^2 as omitted at h^6 around the center of the disk, and when the friction-wheel G^2 is moved inward to this recessed portion of the disk, as shown in Fig. 4 by full lines, the shaft G will not be driven.

Secured to the frame or casing C' is a divided handle or a double handle, one part, H' , of which is rigidly secured to the frame or casing, and the other part, H^2 , of which is pivoted at h^7 , and has its end portion h^8 , which enters within the frame or casing, forked and provided with projections to engage a circumferential groove, h^9 , in the friction-wheel G^2 for the purpose of moving it. When both handles are grasped in the hand, the handle H^2 will be moved into coincidence or parallel with the handle H' , and the sliding friction-wheel G^2 will be moved outward toward the edge of the disk C^2 , as shown by dotted lines, Fig. 4, thereby driving the shaft G at a quick speed. When the hand is removed from the handle H^2 , the sliding friction-wheel G^2 will be drawn back to an inoperative position near the center of the disk C^2 by a spring, h^{10} , and the movable handle H^2 will be brought to the position shown in Fig. 4. Upon the shaft G , I have represented a hand-wheel, G^3 , by which the shaft may be turned to set the needle by hand when desired.

For making loop-stitch embroidery, I employ a pair of clamps, one of which, j , is adjustably secured in the arm or holder J , depending from the head-frame F' , and the other of which, j' , is adjustably secured to an arm or holder, J' , pivoted to said head-frame at j^2 . The arm J may be secured to the head-frame F' by a bolt, j^3 , providing for its adjustment to bring the bearing-face of the clamp j in proper relation to the needle; but after adjustment the bolt j^3 is screwed up tightly to clamp the arm J against movement relatively to the head-frame F' , and thereafter during the operation of the machine the clamp j remains stationary.

The arm J' , which carries the movable clamp j' , has connected with it a second arm, J^2 , extending above the fulcrum j^2 and provided with a cam-slot, j^4 , receiving an actuated roller or pin, j^5 , on the crank-pin yoke F^2 of the needle-bar. Consequently, as the needle-bar reciprocates upward and downward, the roller j^5 , acting in the cam-slot j^4 , will move the movable clamp j' slightly toward and from the needle. As the needle recedes from the goods, the clamp j' will be advanced toward the fixed clamp j and will firmly grasp the thread, and

during the ascent of the needle-bar a sufficient portion of thread will be drawn from the thread-clamp f^9 to make the next loop. At the next downward movement of the needle-bar the movable clamp j' will be moved away from the needle, and by the hold of the thread-clamp f^9 on the thread a sufficient portion of thread will be drawn off from the spool H to form a loop. This positively-operated thread-clamp j' is an important element of my invention, as by it I am enabled to grasp the thread firmly by means of clamps having smooth faces destitute of serrations or projections, and I also avoid any rubbing of the needle against the clamp, as is usual where the clamp is operated by a spring, and thereby obviate the friction and wear of the needle and clamp which result from the clamp being pressed by the spring against the reciprocating needle.

The table, frame, or work-holder whereby the goods are supported in position to be operated on by the needle is shown in Figs. 1 and 2. This consists of a frame or table, K, having secured to it at opposite ends plates or bearers K', provided with pivots k , which have their bearings in suitable standards, K². In each standard there is a clamping-screw, k' , and a clamp-handle, k^2 , provided with a nut, and each plate K' has in it a curved or arc-shaped slot, k^3 , receiving through it the clamping-screw k' . By loosening the clamping-screws provision is afforded for swinging the table or frame K upon its pivots k , and by tightening the clamping-screws the table or frame may be held fixed in the horizontal or inclined position to which it is adjusted. The end plates, K', may be provided with flanges k^4 , which lap upon the under side of the frame or table K, and through which the end plates may be secured to the said frame or table.

It is advantageous to employ the pivoted or swinging table or frame for the work in connection with a sewing-machine having a pivoted or swinging head carrying a needle-bar, because then the needle-bar may be adjusted into position at right angles to the goods while the goods are in an inclined position, where the effect of the work can be more clearly determined.

The table or frame K may be provided with any suitable means for holding the goods stretched or extended. I have here represented two rollers, $l m$, which are provided with ratchet-wheels $l' m'$ and pawls $l^2 m^2$, and by which the rollers may be held against turning, and the tension may be kept upon the portion of goods extended between the rollers. The goods may be stitched at the edges to flaps projecting from the rollers and then wound upon one of the rollers, the portion of goods between the rollers being held under tension and being drawn from one roller to the other periodically until the whole piece has been embroidered. In order to provide for stretching and keeping tension on the goods in a direction parallel with the axis of the rollers $l m$, I have represented two parts, clamps n , which

are each connected by a screw, n' , with the corresponding head-plate, K', and by means of nuts n^2 the clamps n may be drawn away from each other to put tension on the goods.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a fixed hanger, a driving-shaft therein, and a movable sewing-machine, of a telescopic column connected at its top and bottom by universal joints with the hanger and the frame of the sewing-machine, whereby the weight of the machine is sustained, and a telescopic shaft connected at the top and bottom by universal joints with the driving-shaft and the sewing-machine shaft and arranged within the column and its joints for transmitting motion to the sewing-machine shaft, substantially as herein described.

2. The combination, with a fixed hanger, a driving-shaft therein, and a sewing-machine, of a telescopic shaft connected at the top and bottom by universal joints with the driving-shaft and with the sewing-machine shaft, and through which power is transmitted to the sewing-machine, a telescopic column connected at top and bottom by universal joints with the hanger and with the frame of the sewing-machine and surrounding the shaft and carrying the sewing-machine, and springs connecting the sections of the column and serving, by their contractile force exerted lengthwise of the column, to sustain the weight of the extensible sections of the column and shaft and the sewing-machine, substantially as herein described.

3. The combination, with a fixed hanger and a driving-shaft therein and a sewing-machine, of a concentric column and shaft, respectively connected at their upper ends by universal joints with the hanger and driving-shaft and respectively supporting and driving the sewing-machine, and arms attached to the universal joints of the column and projecting upward from the universal joints at an inclination to the column and provided with adjustable balancing-weights, substantially as and for the purpose herein described.

4. The combination, with a fixed hanger, a driving-shaft therein, and a sewing-machine, of a concentric column and shaft, respectively connected at their upper ends by universal joints with the hanger and driving-shaft, and serving, respectively, to support and drive the sewing-machine, the arms e^6 , attached at the universal joint of the column and extending thence upward and downward, their lower ends being secured to the column, and the balancing-weights e^5 , applied to the arms above the universal column-joint, substantially as herein described.

5. The combination, with the inner grooved shaft-section, E', of the outer section, E, having applied to it the cap e , provided with a feather or key, e' , engaging the groove in said inner section, the driving-shaft B, with which the outer section is connected by a universal

joint, a sewing-machine, and mechanism, substantially as described, for imparting motion from said inner shaft-section to the needle-operating shaft of said machine, substantially as herein described.

6. The combination, with the inner grooved shaft-section, E', and the inner grooved or slotted column-section, D', of the outer shaft-section, E, provided with a cap, e, whereby it is guided in the inner column-section, and which has a key or feather fitting the grooved shaft-section E', the outer column-section, D, provided with a pin or screw engaging the groove or slot in the inner column-section, a hanger and driving-shaft with which the outer column and shaft sections are respectively connected by universal joints, a sewing-machine supported upon the inner column-section, and mechanism, substantially as described, through which the needle-operating shaft of the sewing-machine is driven from the inner shaft-section, substantially as herein set forth.

7. The combination, with the needle-bar, needle-operating shaft, and frame of a sewing-machine, of supports and a transmitting shaft providing for the bodily movement of the machine, a disk having a friction-face on the transmitting-shaft and arranged to rotate in a horizontal plane, a friction-wheel sliding upon the needle-operating shaft and in frictional engagement with said disk, and means, substantially as described, for controlling the movement of the friction-wheel, substantially as herein set forth.

8. The combination, with the needle-bar, needle-operating shaft, and frame of a sewing-machine, of supports and a transmitting-shaft providing for the bodily movement of the machine, a disk having a friction-face on the transmitting-shaft, a friction-wheel sliding on the needle-operating shaft in frictional contact with said disk, a handle whereby said wheel may be moved outward toward the periphery of the disk, and a spring for drawing said wheel to an inoperative position at or near the center of said disk, substantially as herein described.

9. The combination, with the sewing-machine needle-operating shaft G and frame C', of the transmitting-disk C², the friction-wheel G², sliding on said shaft, the spring for moving said wheel toward the center of the disk, and the divided handle H' H², the portion H' thereof serving to move the sewing-machine bodily and the portion H² serving to move the

wheel G² toward the periphery of the said disk, substantially as herein described.

10. The combination, with a reciprocating needle-bar, of two thread-clamps separate from and independent of the needle and arranged above the work table or bed, and between which the needle reciprocates, one of said clamps being movable transversely to the path of the needle, and a cam and connections whereby the movable clamp is operated positively to cause it, in connection with the other clamp, to clamp, hold, and release the thread at the proper time during the reciprocating movements of the needle and to hold the movable clamp out of contact with the needle as the latter passes between the clamps, substantially as herein described.

11. The combination, with the needle-bar F and the pin j³, carried thereby, of a fixed clamp, j, and a movable clamp, j', pivoted at j² and having an arm, J², with its cam-slot to receive said pin, substantially as herein described.

12. The combination, with a work table or frame mounted on pivots or trunnions to swing in a vertical plane, in order to adjust the fabric at any desired inclination to a horizontal plane, of a sewing-machine having a pivoted or swiveled head, providing for the adjustment of the needle-bar to positions at right angles to the inclined fabric, substantially as herein described.

13. The combination, with standards and a work table or frame pivoted thereon to swing in a vertical plane, in order to adjust the fabric at any desired inclination to a horizontal plane, of rollers on the table or frame, to which goods may be attached, and locking devices on the rollers for holding the goods under tension, and a sewing-machine having a pivoted or swiveled head, providing for the adjustment of the needle-bar to positions at right angles to the inclined fabric, substantially as herein described.

14. The combination, with the needle-operating crank and the needle-bar F, provided with a crank-pin yoke, F², of the upright rod f⁶, whereon the yoke is guided and which is prolonged upward to receive a spool, substantially as herein described.

THOMAS KEITH.

Witnesses:

C. HALL,
FREDK. HAYNES.