

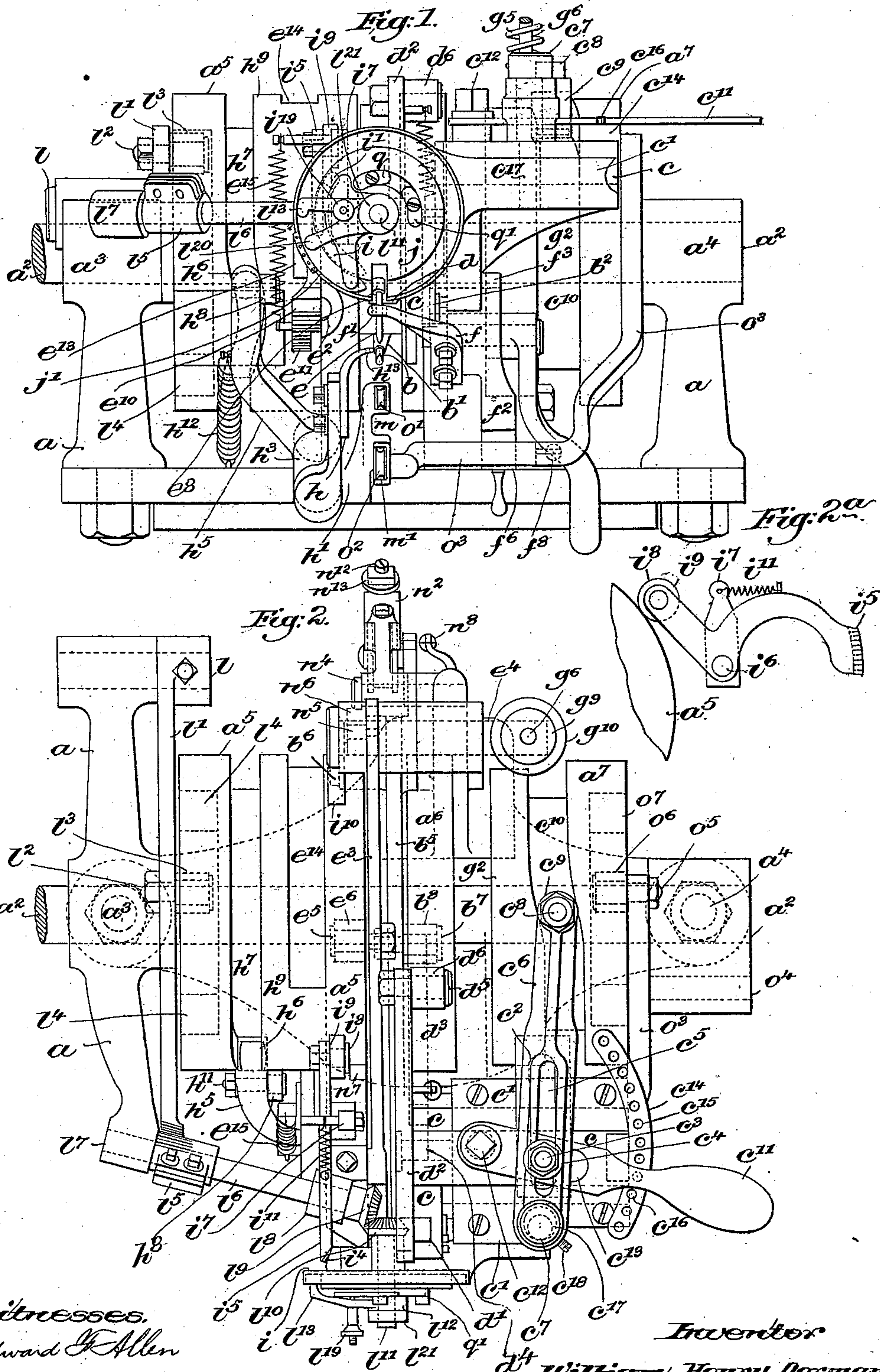
(No Model.)

3 Sheets—Sheet 1.

W. H. DORMAN.
SOLE SEWING MACHINE.

No. 556,177.

Patented Mar. 10, 1896.



Witnesses.
Edward Allen

Thomas J. Grinnard

Inventor

William Henry Dorman
by Crosby Gregory. attys

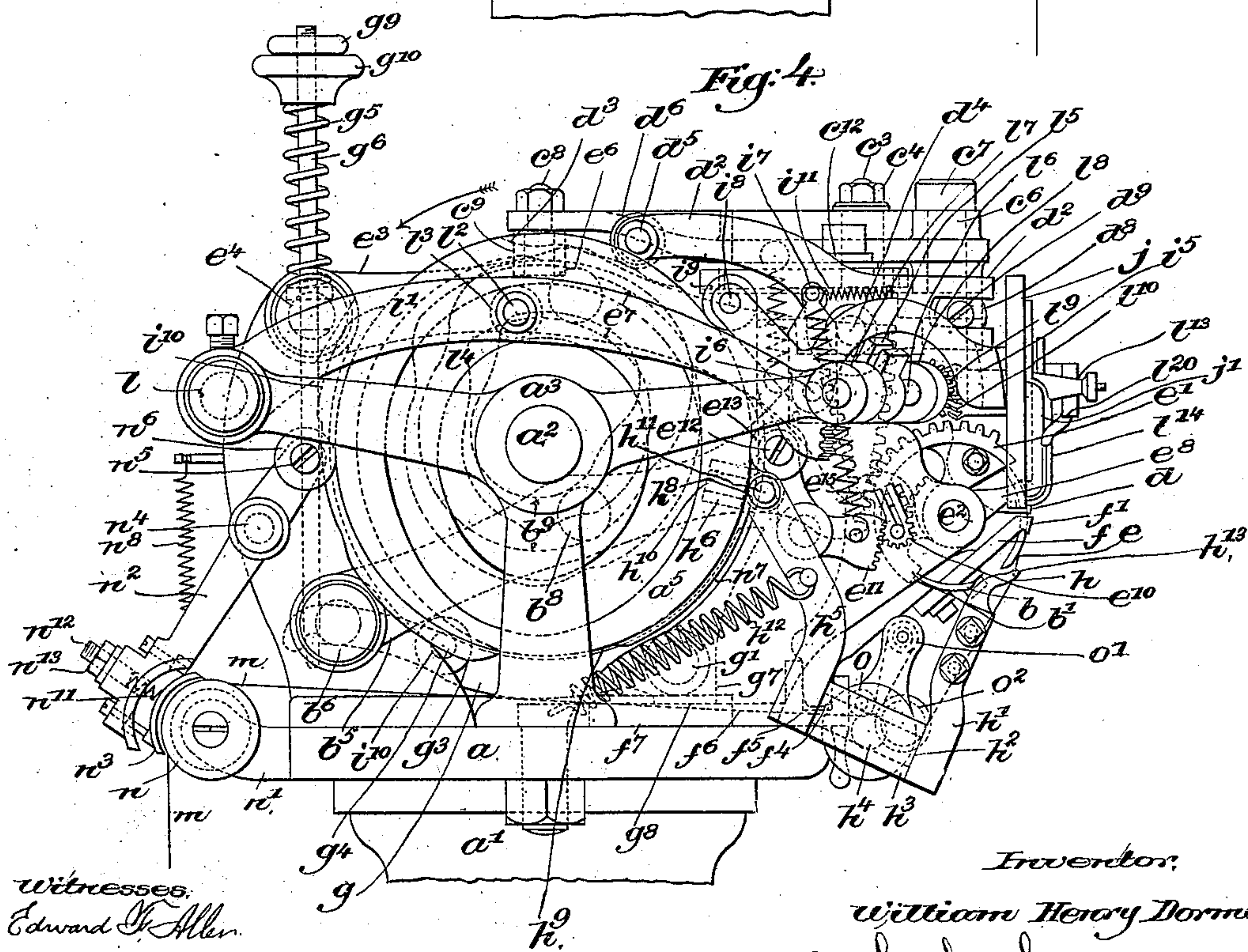
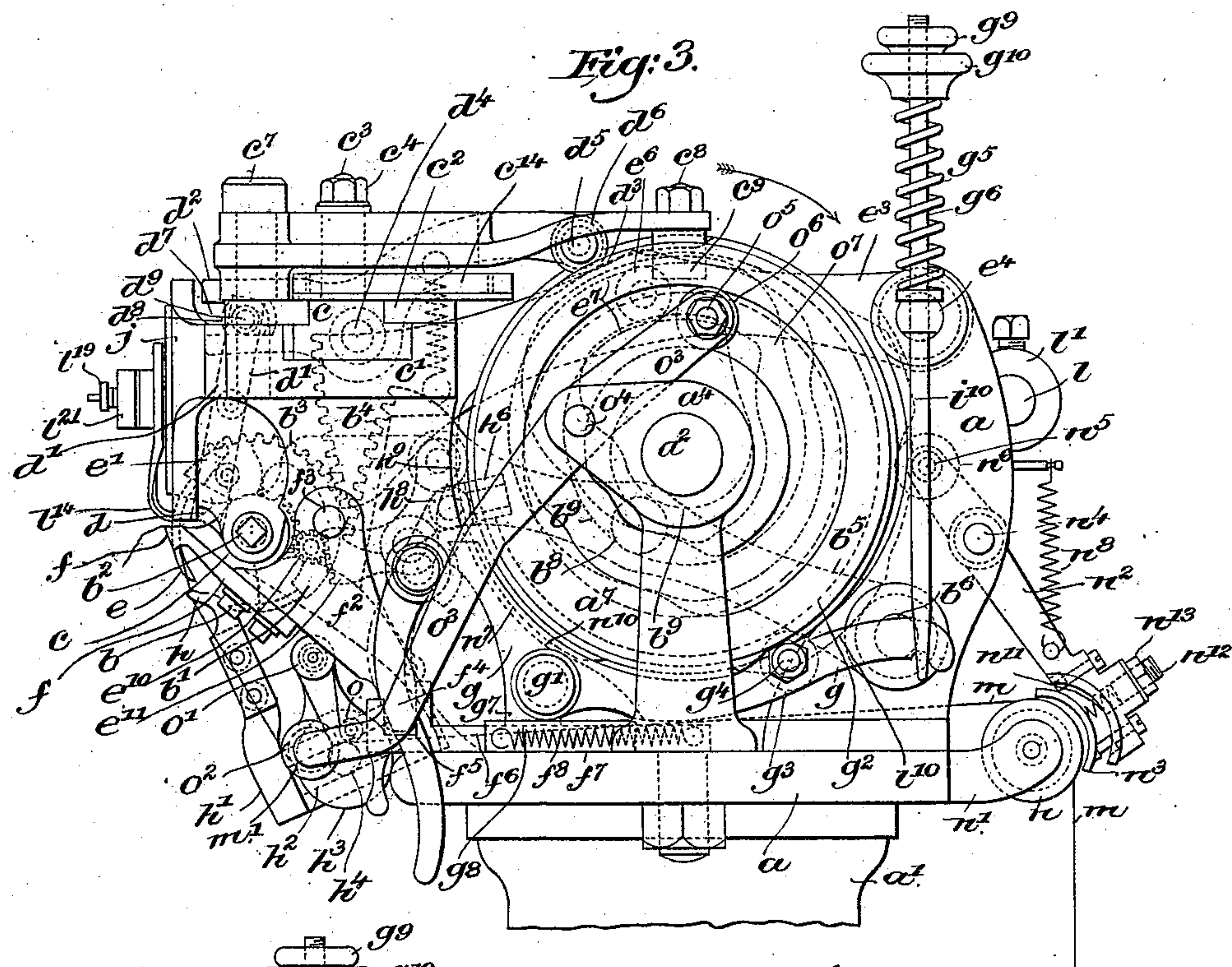
(No Model.)

3 Sheets—Sheet 2.

W. H. DORMAN.
SOLE SEWING MACHINE.

No. 556,177.

Patented Mar. 10, 1896.



Witnesses:
Edward G. Allen.

Thomas Summord.

Inventor,

William Henry Dorman
by Crosby & Gregory, attys.

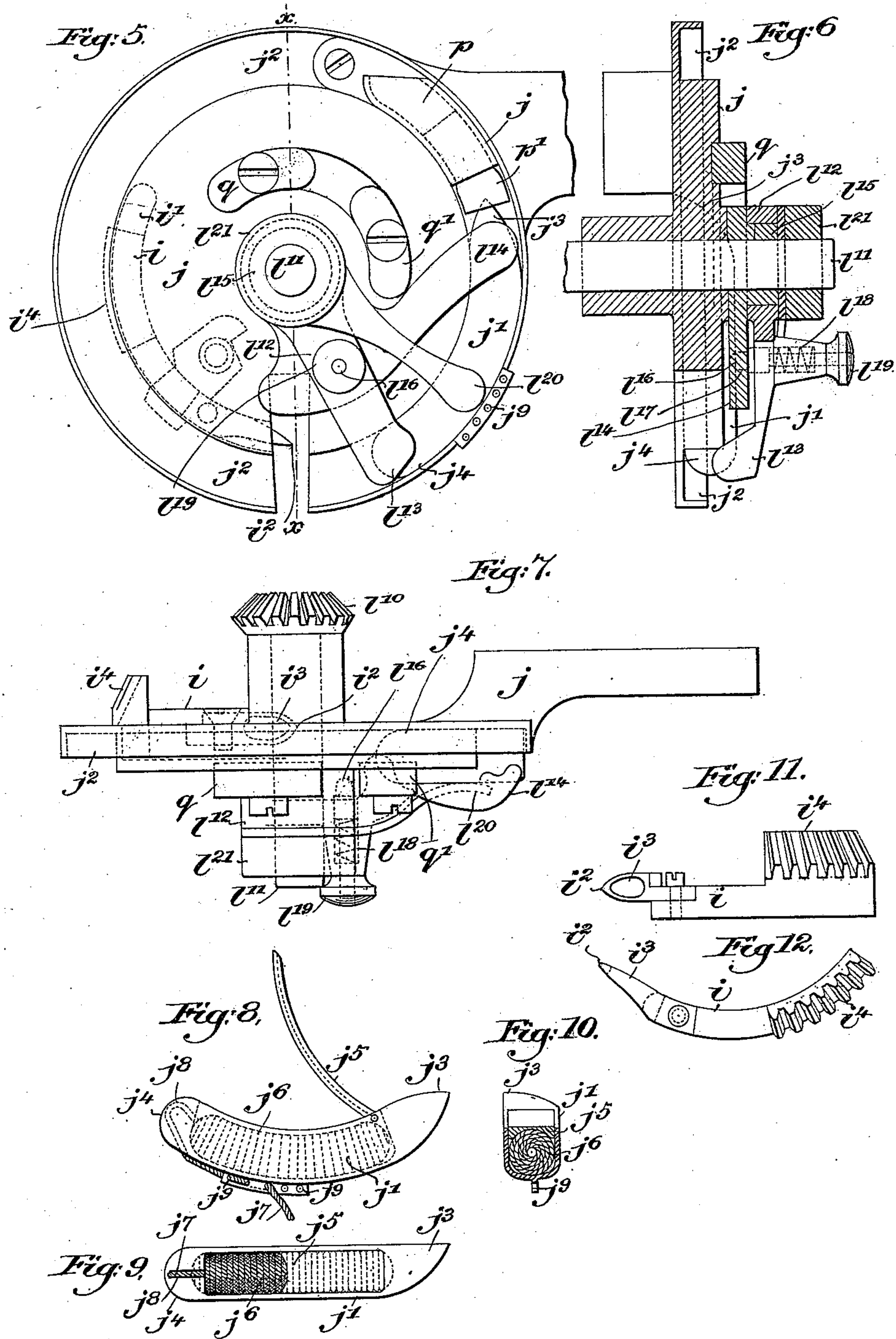
(No Model.)

3 Sheets—Sheet 3.

W. H. DORMAN.
SOLE SEWING MACHINE.

No. 556,177.

Patented Mar. 10, 1896.



Witnesses.
Edward G. Allen.
Thomas J. Drummond.

Inventor
William Henry Dorman
by Crosby Gregory, attys.

UNITED STATES PATENT OFFICE.

WILLIAM HENRY DORMAN, OF STAFFORD, ASSIGNOR TO CHARLES F. GARDNER, OF LONDON, ENGLAND.

SOLE-SEWING MACHINE.

SPECIFICATION forming part of Letters Patent No. 556,177, dated March 10, 1896.

Application filed December 1, 1894. Serial No. 530,583. (No model.) Patented in England December 17, 1892, No. 23,267.

To all whom it may concern:

Be it known that I, WILLIAM HENRY DORMAN, a subject of the Queen of Great Britain, residing at Stafford, England, have invented
5 an Improvement in Sole-Sewing Machines, (for which I have obtained a patent in Great Britain, No. 23,267, dated December 17, 1892,) of which the following description, in connection with the accompanying drawings, is a
10 specification, like letters on the drawings representing like parts.

The machine herein to be described is intended for sewing the sole to the welt or to such other part of the boot or shoe taking the
15 place of the welt, the machine employing two threads, one taken from a spool or ball, the other being contained in a curved reciprocating shuttle.

The needle and awl are of curved form and
20 work in a circle, the awl being driven up through the work against the resistance of the foot or channel-gage so as to pierce a hole for the needle.

The work is supported upon a table on
25 which the welt rests and against the front of which the upper takes, the boot being held by the operator with its sole uppermost, the table having a slotted throat through which the needle and awl work. The work is fed
30 by moving the awl and the foot or channel-gage sidewise while the awl is in the work. The table is automatically locked fast while the needle and awl are passing through the work, but it is released and only supported
35 against downward movement by the pressure of a spring while the feeding movement is taking place. The needle is provided with a barb or hook near its point, and when this barb is down through the work the thread is
40 laid into it by a looper which moves around the point of the needle for this purpose. The needle in its ascent through the work draws up a loop of thread above the surface of the work. The loop of thread is opened and cast
45 off from the needle-barb by a loop-opener, and to facilitate this the needle returns a little and the shuttle with its thread is passed through the loop. A take-up draws down the loop of thread into the work so as to form
50 a stitch. The thread from the spool or ball, as the case may be, is controlled by a friction-

brake, which at one time puts tension on the thread and at another time locks the thread fast, as the requirements of the stitching operations demand. The needle has co-operat- 55 ing with it a needle-shield.

Figure 1 is a front view of the machine. Fig. 2 is a plan view; Fig. 2^a, a detail of segment *i*⁵. Fig. 3 is a right-hand side view. Fig. 4 is a left-hand side view. Fig. 5 is an
60 enlarged front view of the shuttle and loop-opener with their driving mechanism. Fig. 6 is a section through the same on the dotted line *x*. Fig. 7 is a plan view of the parts shown in Figs. 5 and 6. Figs. 8, 9, and 10
65 are views of the shuttle. Figs. 11 and 12 are views of the loop-opener.

The frame *a*, conveniently supported on a suitable pillar *a'*, carries a shaft *a*², which is free to revolve in bearings *a*³ *a*⁴. Upon this
70 shaft are mounted cams *a*⁵, *a*⁶, and *a*⁷, which operate the various working parts of the machine.

The awl *b* is clamped fast in the awl-stock *b'*, which is mounted on a pivot *b*², (see Figs. 75 1 and 3,) carried in the feed-slide *c*.

The awl *b* is curved to conform to a portion of a circle struck from the center of the pivot *b*².

The awl-stock *b'* is furnished with teeth *b*³,
80 (see Fig. 3,) into which gear the teeth *b*⁴ of an awl-segment *b*⁵, which is mounted on a pivot *b*⁶, carried in the frame *a* of the machine. Near the center of the awl-segment *b*⁵ is a pin *b*⁷, which carries a cam-roll *b*⁸, adapted to
85 work in the groove *b*⁹ of the cam *a*⁶.

The feeding of the work is performed by a to-and-fro side movement of the awl *b* and channel-gage *d*, the movements being given to the feed-slide *c*, which carries them. The
90 feed-slide *c* is carried in a way *c'* prepared for it in the frame *a* and is furnished with a projection *c*² having a cross-slot, engaging with which is a pin *c*³, which by means of a nut *c*⁴ can be clamped fast in any desired position
95 in another slot *c*⁵ prepared in the feed-cam lever *c*⁶. This lever *c*⁶ is pivoted on a pin *c*⁷, mounted in the frame *a* of the machine, and at its other end the lever is furnished with a pin *c*⁸ and roll *c*⁹, engaging the cam-groove
100 *c*¹⁰. To facilitate the adjustment of the pin *c*³ in the slot *c*⁵ a handle *c*¹¹ is provided mounted

on a pivot c^{12} (see Fig. 2) in the feed-slide c and having a slot c^{13} through which the pin c^3 passes. A quadrant c^{14} , fixed to the feed-slide c , is provided and furnished with holes c^{15} , in which pegs c^{16} (see Fig. 2) may be placed to keep the handle c^{11} from moving. The pin c^7 (see Fig. 2) is made with an eccentric end c^{17} , so that by giving it a partial turn and then clamping it fast by the set-screw c^{18} the awl b may be set in regard to the needle e .

The channel-gage and foot d (see Figs. 3 and 4) is mounted on a slide d' , (see Figs. 2 and 3,) which is worked up and down in the feed-slide c by means of a lever d^2 and cam-surface d^3 . The lever d^2 (see Fig. 4) is mounted on a pivot d^4 , carried in the feed-slide c , and is furnished with a pin d^5 and a cam-roll d^6 , and at its front end it has a slot d^7 , engaging a block d^8 , mounted on a pin d^9 in the slide d' .

The table f , which supports the work, has a suitable slot f' , through which the needle e and awl b operate.

The table f is mounted on a piece f^2 , carried upon a pivot f^3 (see Figs. 1 and 3) in the machine-frame a , and is furnished at its lower end with a tooth f^4 , which engages a notch f^5 prepared for it in a slide f^6 , arranged to move in a way f^7 formed in the frame a of the machine, a spring f^8 tending to keep the slide f^6 forward and the table f up against the work.

For the purpose of holding the table f stationary while the needle and awl are passing through the work and releasing the same, in order to allow the feed to take place, the lock-lever g (see Figs. 3 and 4) is provided, it being carried on a pivot g' in the machine-frame a and operated by the cam g^2 , (see Fig. 3,) acting on the roll g^3 , which is carried on the pin g^4 . The lever g is held in action so as to lock fast the slide f^6 , and consequently the table f , by the spring g^5 , which is suitably supported and bears up the rod g^6 , which is connected to the lever g so as to press down the toe g^7 of the lever upon a liner or thin plate g^8 placed between the slide f^6 and the toe g^7 of the lever g . Adjusting-nuts g^9 g^{10} serve to regulate the amount of pressure exercised by the spring g^5 . When the cam g^2 comes into action upon the roll g^3 , it compresses the spring g^5 , and by lifting slightly the toe g^7 releases the slide f^6 and frees the table f .

The needle e is curved similarly to the awl b and is carried in a stock e' , like the awl-stock b' , in such a manner that the points of the needle e and awl b oppose each other. The needle-stock pivot e^2 (see Fig. 4) is carried in the machine-frame a directly in line with the awl-stock pivot b^2 , and the needle e is operated by means of the needle-segment e^3 carried on the pivot e^4 in the machine-frame. The segment has a pin e^5 , provided with a roll e^6 , which enters a groove e^7 in the cam a^5 .

The needle e is supported and steadied by a needle-shield e^8 surrounding the hub of the

needle-stock e' by a toothed gearing e^{10} , (see Figs. 3 and 4,) engaged by a segment e^{11} mounted on the machine-frame a , said segment e^{11} being furnished with a pin e^{12} and a cam-roll e^{13} (see Fig. 4) engaging the cam e^{14} formed on the surface of the cam a^5 , said roll being kept in contact with said cam by the spring e^{15} .

The looper h is adjustably mounted on a lever h' , which is secured to an inclined rock-shaft h^2 mounted in a bearing h^3 pivoted at h^4 in the machine-frame a and free to turn in a vertical plane parallel with the plane of the needle movement. The rear end of the inclined pivot h^2 has an arm h^5 , furnished at its upper end with a cam-roll h^6 , which enters a groove h^7 of the cam a^5 , and a second roll, h^8 , (see Figs. 2 and 4,) on said lever being acted upon by the surface h^9 of the same cam a^5 . These cam-rolls h^6 and h^8 are mounted on suitable pins h^{10} and h^{11} , and are kept in engagement with the cam a^5 by a spring h^{12} . (See Fig. 1.)

The looper h has a hole h^{13} at its tip, through which the thread passes.

The devices so far described by letter are substantially the same as in the so-called "Goodyear" machine.

I will now specifically describe my invention.

The loop-opener consists essentially of a finger i^2 , provided with a recess i^3 and attached to a short bar i curved to work in the circular race of the plate j . The point of the needle e enters the recess i^3 to cast off the loop. The bar i is furnished with teeth i^4 , which are engaged by a toothed segment i^5 (see Fig. 2^a) mounted on a pin i^6 , (see dotted lines Fig. 4,) carried on a stand on the frame a of the machine. The segment i^5 is provided with a pin i^8 and a roll i^9 , which engages the cam projection i^{10} of the cam a^5 and is kept in contact with the cam i^{10} by means of a spring i^{11} . The shuttle j' containing a suitable thread is suitably curved to slide in the circular race j^2 formed in the shuttle-plate j , which is carried in the frame of the machine. The shuttle has a boat-shaped point j^3 , as best shown in Figs. 8 to 10, and the rear end j^4 of the shuttle is rounded.

Fig. 10 is a cross-section near the middle of the shuttle.

A hinged lid j^5 is provided for the insertion of the cop j^6 , and the thread j^7 issues through a slot j^8 at the rear, and to afford tension the thread is led in and out through the holes j^9 provided for the purpose.

The shuttle j' is operated in the following manner: Carried in the machine-frame a is a pivot l , (see Figs. 2 and 3,) on which is mounted the shuttle-segment l' furnished with a pin l^2 having a roll l^3 to enter the cam-groove l^4 in the cam a^5 . The segment l' gears into a clamping pinion l^5 , (see Fig. 2,) fast upon the shuttle-shaft l^6 , which is carried in the bearings l^7 l^8 on the machine-frame. Upon one end of the shaft l^6 is mounted a bevel-gear l^9 , which

gears into the shuttle-driving pinion l^{10} , formed on one end of the shaft l^{11} , on which is mounted the shuttle-carrier l^{12} , it having two arms l^{13} l^{14} and a spring-arm l^{20} , the arm l^{13} moving the shuttle forward and the arm l^{14} backward. The arm l^{13} is movable about the hub l^{15} of the arm l^{14} to allow of inserting and withdrawing the shuttle, said arms being held in engagement with one another by means of a pin l^{16} , which enters a hole l^{17} (see Fig. 6) in the arm l^{14} , the pin being maintained in position by means of a spring l^{18} ; but it may be withdrawn by engaging the knob l^{19} . The spring-arm l^{20} retains the shuttle in the race j^2 , and the collar l^{21} keeps the whole from sliding forward off the shaft l^{11} .

To facilitate the passage of the shuttle j' through the loop of thread drawn up by the needle e , and to prevent the wax used with the thread from adhering to the shuttle, an oil-cup or lubricator p (see Fig. 5) is fastened in the shuttle-race j^2 , or may be formed thereon, and is provided with a piece of felt p' or other absorbent material, against which the point j^3 of the shuttle presses at each forward reciprocation.

As the machine wears and the parts become loose, or when the machine is run at high speed, it is desired to overcome any overthrow of the shuttle-carrier, and to exactly limit the motion of the shuttle j' adjustable stops q and q' are provided, against which the shuttle-carrier l^{12} takes at each end of its movement.

The thread m from the usual wax pot or spool, as the case may be, is led to the machine over a tension-truck n mounted on a bracket n' at the rear of the machine. This truck is at times retarded and at times held fast by means of a lever n^2 provided with a brake n^3 and mounted on a pivot n^4 in the machine-frame a . The lever n^2 is furnished with a pin n^5 and cam-roll n^6 operated by the surface n^7 of the cam a^5 and held in engagement therewith by a spring n^8 . The part n^9 of the cam-surface n^7 which leads is fuller or of greater radius than the part n^{10} which follows. When the roll n^6 is upon the full part, n^9 , of the cam n^7 the brake n^3 holds the tension-truck n fast; but when the roll n^6 is upon the lower part, n^{10} , of the cam n^7 the lever n^2 is released somewhat, and the brake n^3 is then only held in contact with the truck by the pressure of the spring n^{11} , which simply retards the movement of the truck n . The amount of this brake-pressure is regulated by the screw n^{12} and lock-nut n^{13} . When the roll n^6 is upon the circular surface of the cam a^5 , the brake n^3 is held out of action by the spring n^8 and the truck n is altogether free. The thread m passes from the tension-truck n under a guide-truck o over another guide-truck o' and under a take-up truck o^2 , from which it passes to the work, the take-up truck o^2 acting in a bight of the thread m to pull back to the work the loop drawn out by the needle. The take-up truck o^2 is carried in the end of

a take-up lever o^3 , which is mounted on a pivot o^4 in the machine-frame a and is furnished with a pin o^5 and roll o^6 entering the groove o^7 of the cam a^7 .

The machine operates in the following manner: The work being properly held in position by the operator upon the table f and between it and the channel-gage d , the machine is set in motion in the direction shown by the arrows, the awl b rises and pierces a hole in the work, and then, together with the channel-gage d , the awl b is moved sidewise toward the needle e by the feed-slide, carrying the work with it, the lock-lever g having been previously released by the cam g^2 , so as to free the work from the pressure of the table f . The feed-movement having been completed, the table f is again locked and the needle e is made to descend through the hole just pierced by the awl b , which latter retires before the advancing needle e . When the needle e is in its lowest position, the barb is exposed below the work, and into it the looper h now lays the thread by making a turn around the needle-point. The needle e then ascends and draws up a loop of thread above the surface of the work, the take-up o^2 rising at the same time, so as to yield up the thread to the needle. When the loop of needle-thread has been fully drawn up by the needle, the point i^2 of the loop-opener advances into the loop and is immediately followed by the point of the shuttle j' , and the needle e then descends a little way into the hole i^3 formed near the point of the loop-opener, the thread held by the hook of the needle meeting the sides of the hole i^3 and being prevented from descending with the needle e , and the loop is cast off the hook, after which the needle e rises again out of the way. The thread-tension truck n is locked fast while the shuttle j' passes through the loop, and the loop remains supported on the point of the loop-opener until the shuttle j' is through it, but thereafter the loop-opener retires, casting off the loop, which is drawn down by the take-up o^2 almost to the surface of the work, at which point the tension-brake n^3 is relaxed, leaving the thread-tension truck n retarded only by the pressure of the spring n^{11} , while the take-up o^2 completes its downward movement and pulls home the stitch. The tension-truck is then altogether released until the shuttle j' is again ready to traverse the loop. The awl b rises again and pierces the work for the next stitch during the passage already described of the shuttle j' through the loop of thread drawn up by the needle e , and before the descent thereof the shuttle j' is returned, while the lifting of the channel-gage d and the return of the feed-slide c take place after the retirement of the awl b from the work.

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

1. The circular shuttle-race, the shaft l^{11} , and the shuttle-driving arms l^{13} , l^{14} , combined

with the adjustable stops q , q' , to operate, substantially as described.

2. The circular shuttle-race, the curved shuttle therein, means to reciprocate said shuttle, a hooked curved needle, and means to move it, combined with a loop-opener connected to a curved toothed bar, and means to reciprocate said loop-opener in a circular path alongside of said shuttle-race, substantially as described.

3. The circular shuttle-race, the curved shuttle therein, means to reciprocate said shuttle, a hooked curved needle, and means to move it, combined with a loop-opener provided with a recess i^3 , and connected to a curved toothed bar, and means to reciprocate said loop-opener in a circular path alongside of said shuttle-race, said loop-opener also acting as a cast-off, substantially as described.

4. The combination with a circularly-movable curved needle, a looper to provide it with thread, and a curved shuttle to enter and pass through the loop drawn through the material by the said needle, of a device having a recess adapted to be entered by the needle as the latter is approaching the material after having drawn a loop of thread through the material, the loop of thread held

in the hook of the needle as the latter enters said recess striking said device and being thereby removed from the hook of the needle, substantially as described.

5. A curved hooked needle, a circular shuttle-race, a shuttle therein, and a loop-opener mounted on a curved bar, combined with devices to move said bar back and forth in the arc of a circle about the center of motion of the said shuttle and across the path of movement of said needle, substantially as described.

6. The circular shuttle-race, the curved hooked needle, and the loop-opener attached to a curved toothed bar i adapted to be reciprocated next said race, and in a curved path in a plane at right angles to the plane of movement of the needle in sewing, combined with the toothed sector i^5 , and means to move it, substantially as described.

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

WILLIAM HENRY DORMAN.

Witnesses:

ALAN BERTRAM HANBURY SPARROW.
GEORGE FEGAN.