(No Model.)

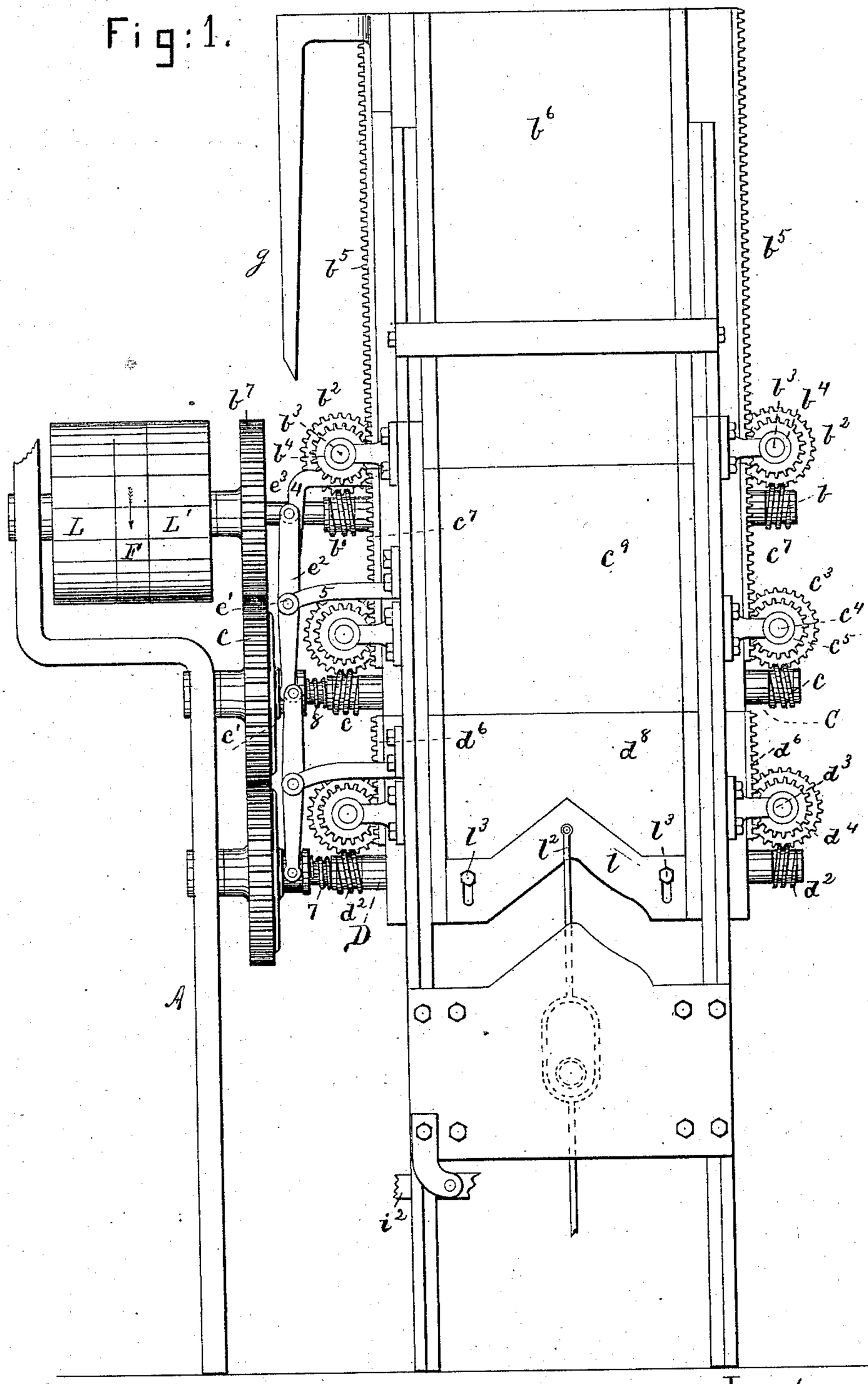
4 Sheets—Sheet 1.

# J. W. D. FIFIELD.

## Crimping Machine for Boots and Shoes.

No. 239,377. Patented March 29, 1881.

Fig: 1.




Witnesses:

L. F. Connor.

Arthur Reynolds

Inventor.

John W. D. Fifield

by Crosby & Gregory Attys.

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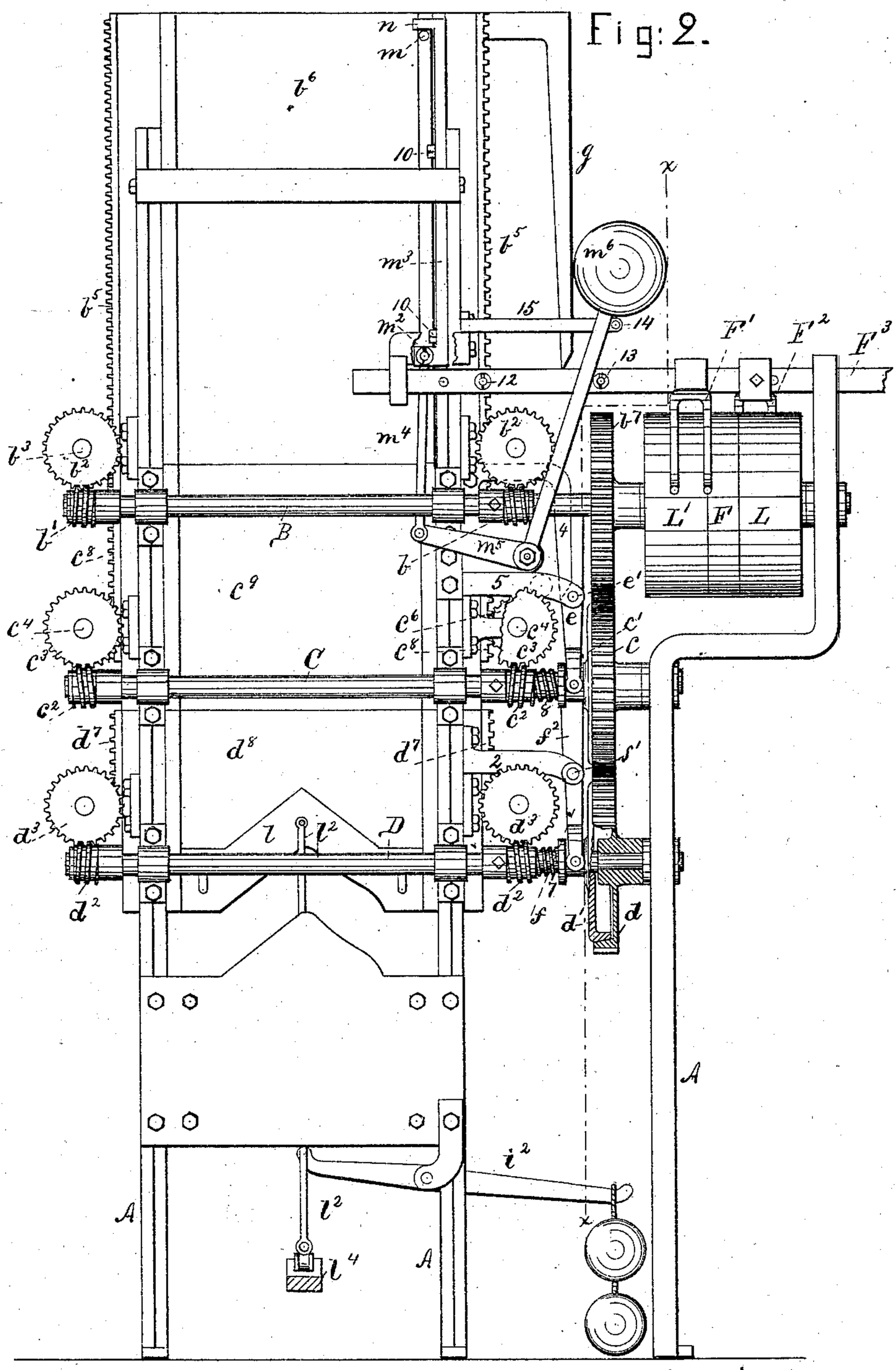
# J. W. D. FIFIELD.

## Crimping Machine for Boots and Shoes.

**No. 239,377.** **Patented March 29, 1881.**

Fig: 2.

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L. F. Connor.

Arthur Reynolds

Inventor.

John W. D. Fifield.

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## Crimping Machine for Boots and Shoes.

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Fig: 4.

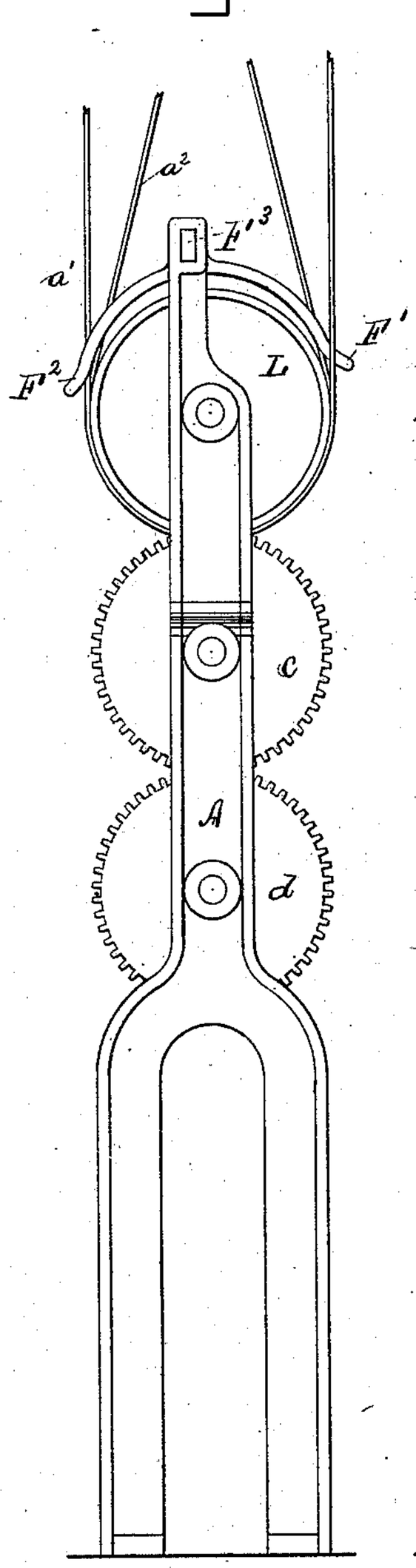



Fig: 3.

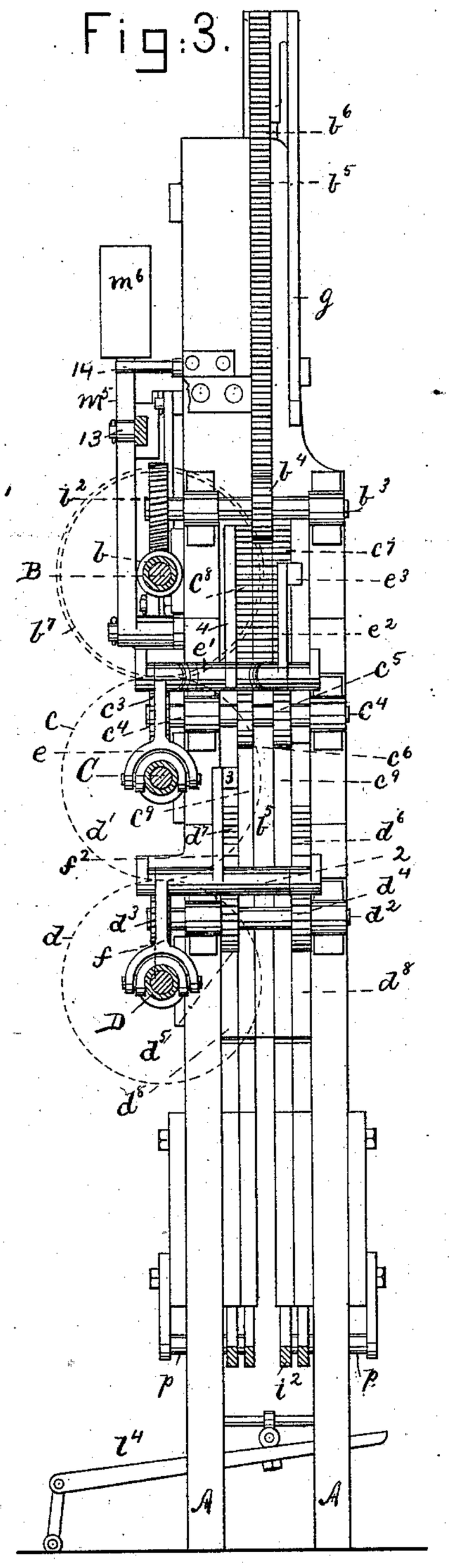



Fig: 10

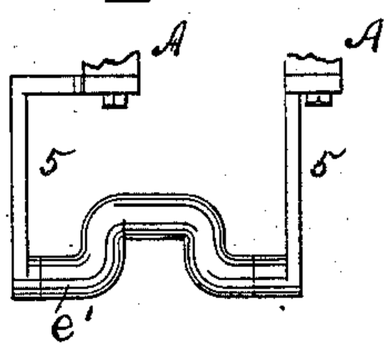
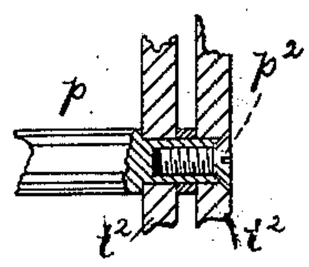



Fig: 12.


Fig: 11

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L. F. Connor.

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(No Model.) 4 Sheets—Sheet 4.

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## Crimping Machine for Boots and Shoes.

**No. 239,377.** **Patented March 29, 1881.**

Fig: 5.

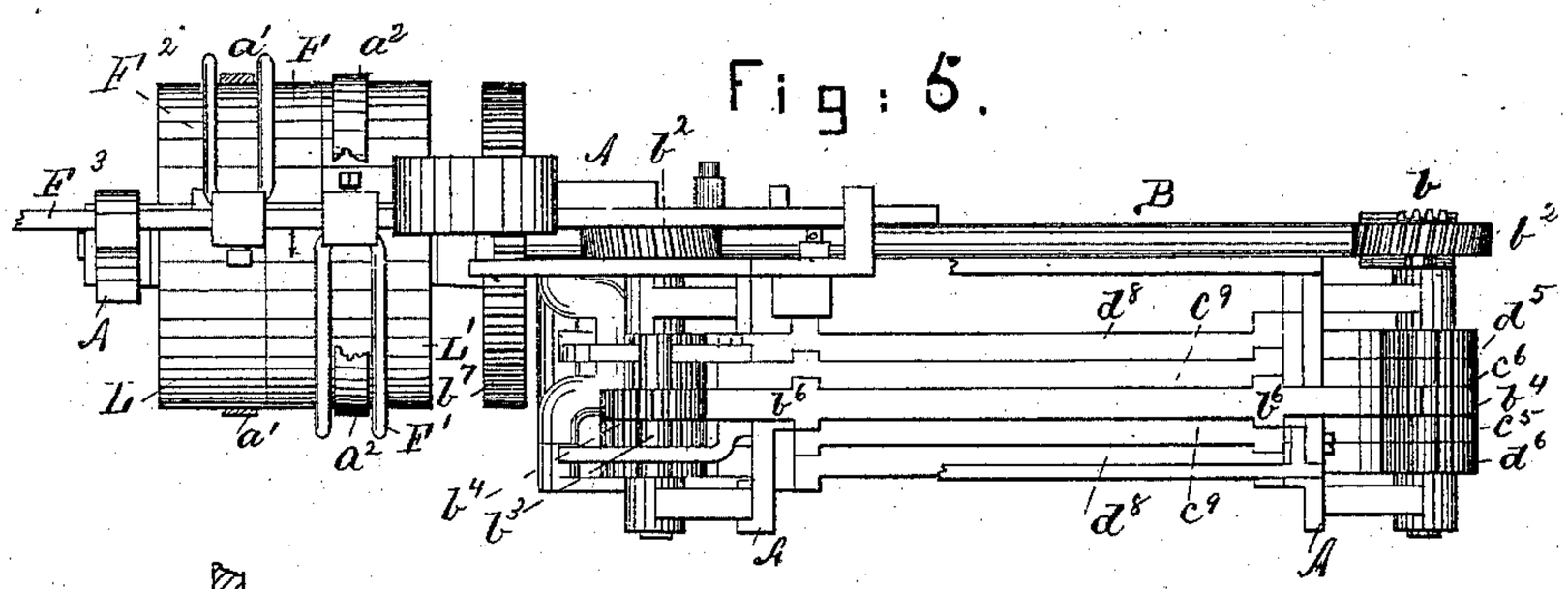



Fig: 6.

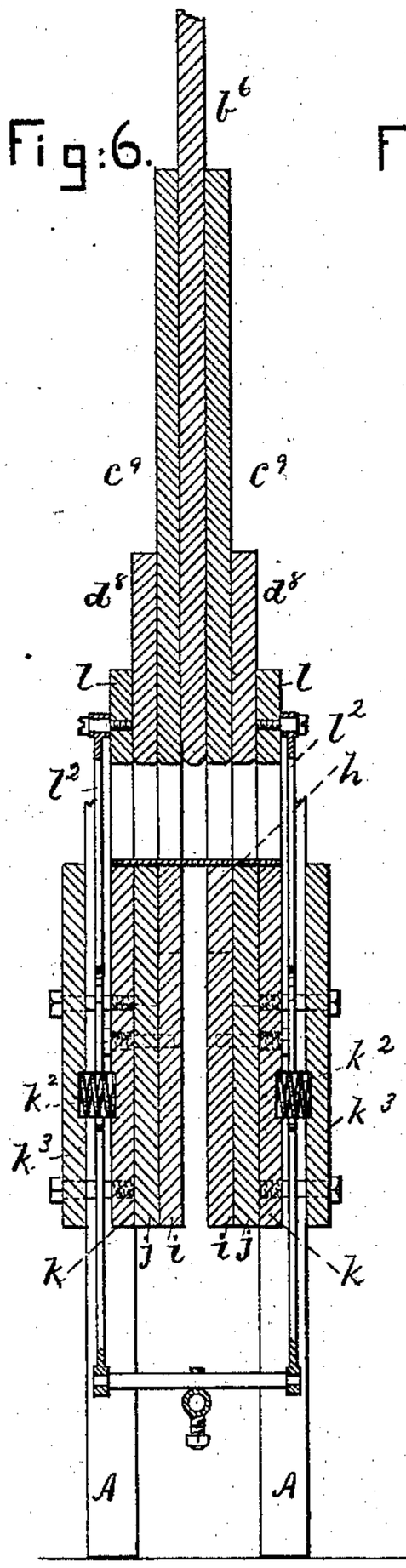



Fig: 7.

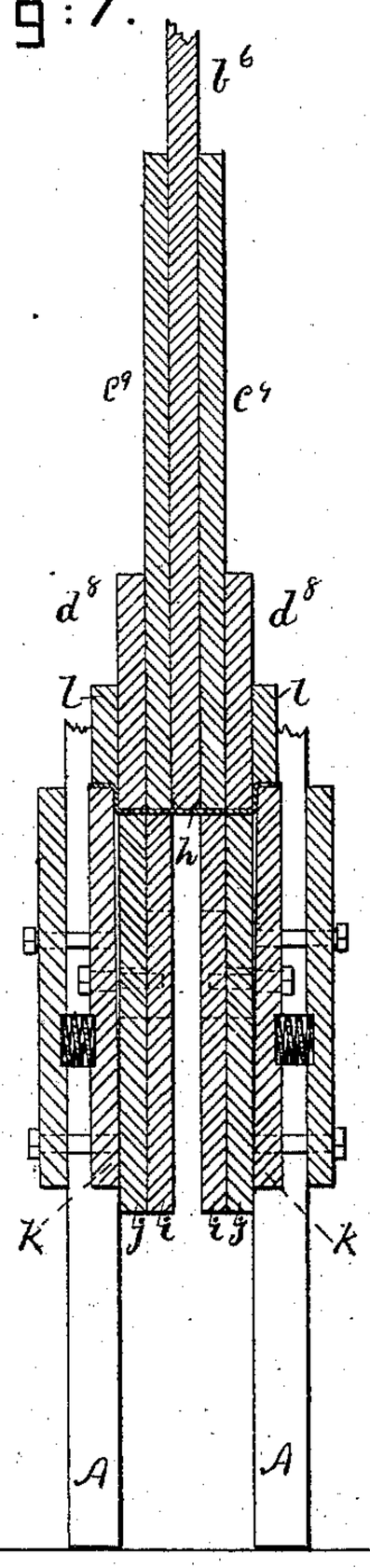



Fig: 8.

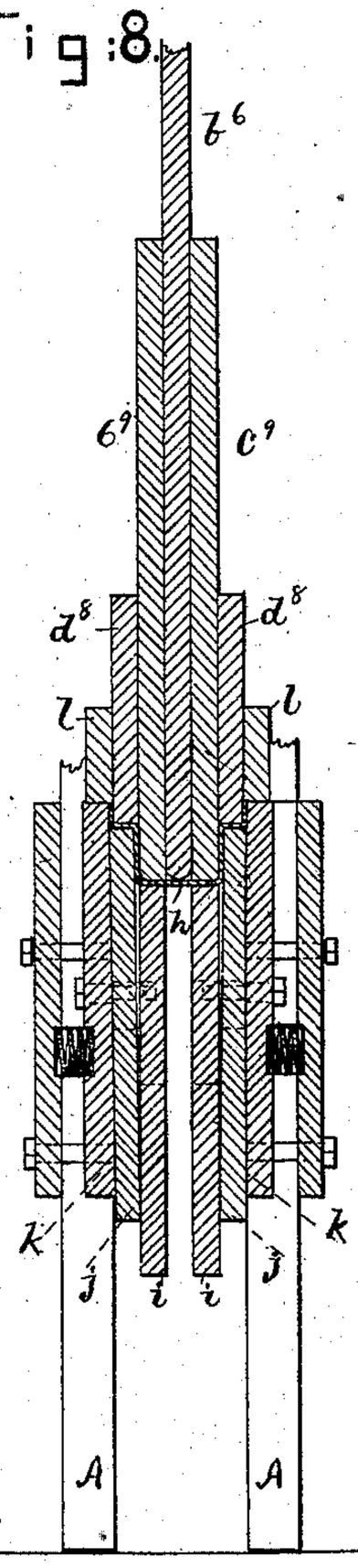
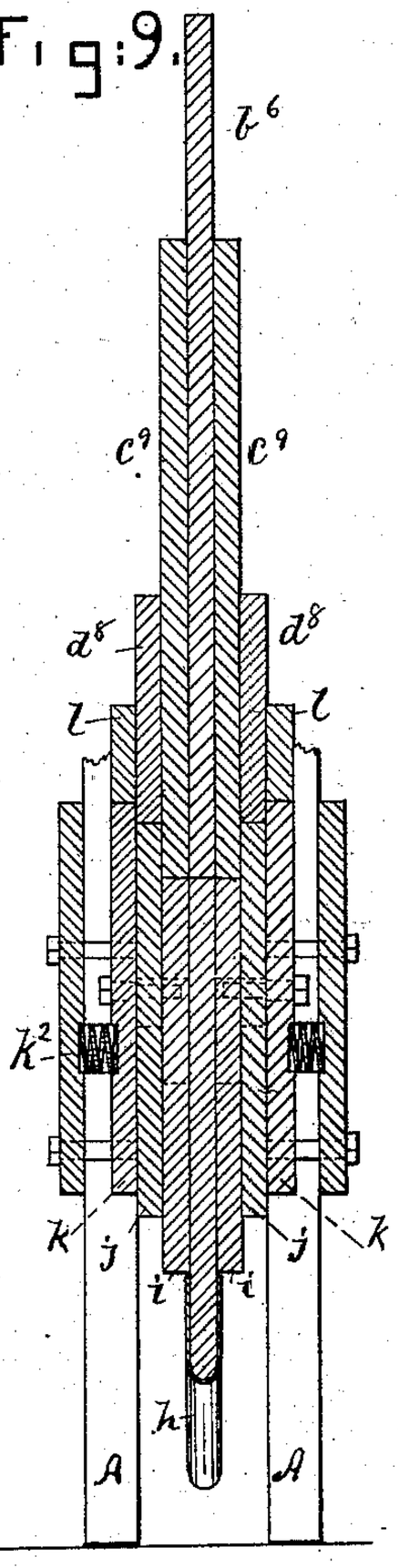



Fig: 9.




Witnesses.

L. F. Connor.

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John W. D. Fifield

by Crosby & Gregory Attys

# UNITED STATES PATENT OFFICE.

JOHN W. D. FIFIELD, OF NORTH BROOKFIELD, MASSACHUSETTS.

## CRIMPING-MACHINE FOR BOOTS AND SHOES.

SPECIFICATION forming part of Letters Patent No. 239,377, dated March 29, 1881.

Application filed December 2, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN W. D. FIFIELD, of North Brookfield, county of Worcester, and State of Massachusetts, have invented a new and useful Improvement in Crimping-Machines for Boots and Shoes, of which the following description, in connection with the accompanying drawings, is a specification.

This invention in crimping-machines for boots and shoes has for its object the production of a machine to so hold the front or upper as to cause it to be stretched, first, at or along its edges, and then from a point nearer the median line of the front or upper toward its edges, and, finally, from the median line to its edges.

In this my improved machine I employ a compound "former," composed of a series of slides, some of which are moved for a less distance than the others, the slides of the compound former co-operating with a series of slides forming compound jaws, each set of jaw-slides moving over different distances, all the former-slides and jaw-slides acting gradually during the stretching and crimping operation.

Figure 1 represents, in front elevation, a crimping-machine containing my invention, all the "former-slides" and jaw-slides being in elevated position, the belt-shipping devices shown in Fig. 2 being omitted. Fig. 2 is a rear side elevation of Fig. 1, the belt-shipper not having been moved quite far enough toward the right to place the driving-belt of the machine on the central or fast pulley. Fig. 3 is a section of Fig. 2 on the dotted lines *x x*, looking at it from the right. Fig. 4 is a detail, showing from the right the devices at the right of the dotted line *x x*, Fig. 2. Fig. 5 is a top view of Fig. 2. Figs. 6, 7, 8, and 9 are vertical sectional details, showing successively the various positions of the former-slides and jaw-slides from the commencement to the completion of the crimping operation; and Figs. 10, 11, and 12 are details to be referred to.

The frame-work A of the machine is of proper shape to support the operative parts.

The main shaft B of the machine has a fixed pulley, F, to be driven by one of two power-operated belts, $a'$ $a^2$, placed under the control of the forks $F'$ $F^2$ of the shipper-slide $F^3$.

At the sides of the said fixed pulley are two loose pulleys, L L′, which receive the driven belts when not on the fast pulley, and rotating the shaft B, the said belts running in opposite directions, so that one belt placed on the fast pulley will rotate the shaft B in one direction, and when the other belt is on the said pulley it will turn the said shaft in the opposite direction. This shaft B has two worms, $b$ $b'$, which engage worm-gears $b^2$ $b^2$ on short shafts $b^3$, having toothed pinions $b^4$, that engage toothed racks $b^5$, secured to the vertical ends of the main or central former-slide, $b^6$, of the set of former-slides, the said gear $b^4$ reciprocating the said slide up and down in the frame-work.

The shaft B has fixed upon it a pinion, $b^7$, that engages and drives the toothed part $c$ of the clutch on the shaft C, the said toothed part $c$ being placed loosely thereon, and having its face recessed and made conical, as shown of toothed part $d$ in Fig. 2, to enable it to receive the complementary part $c'$ of the clutch, the part $c'$ being made the same as the part $d'$ of the clutch on the shaft D. These parts $c'$ $d'$ are each feathered upon their respective shafts C D, so as to be moved thereon at the proper times into engagement with the continuously-rotating toothed parts $c$ $d$, when it is desired to turn the said shafts C or D, they remaining at rest when the parts $c$ and $d$ are not pressed in engagement with their fellow parts $c'$ $d'$. These clutch parts $c$ $c'$ and $d$ $d'$ are of usual construction, and instead of them I may employ any other usual or well-known clutches, I preferring, however, to always employ friction-clutches.

The shaft C has two worms, $c^2$, that engage worm-gears $c^3$ on shaft $c^4$, having fixed to them pinions $c^5$ $c^6$, that engage two toothed racks, $c^7$ $c^8$, and reciprocate the intermediate or central pair of auxiliary former-slides, $c^9$, there being one such slide at each side of the main former-slide $b^6$, and a worm-gear, shaft $c^4$, and pinions $c^5$ $c^6$ (see Fig. 3) at each vertical end of the pair of slides $c^9$.

The shaft D has two worms, $d^2$, on shafts $d^3$, at each end of the machine, each shaft having two pinions, $d^4$ $d^5$, (see Figs. 3 and 5,) to engage the two toothed racks $d^6$ $d^7$, made at each vertical end of the two outermost auxiliary former-slides $d^8$, they moving together as a pair.

The clutch part $d'$ has its grooved hub em-

braced by the forked end of an arm, *f*, of a rock-shaft, *f'*, having its journals in bearings 2. When a second arm, $f^2$, provided at its upper end with a roller, 3, and connected with the said rocker-shaft, is first struck by the clutch-disconnector 4, (made as a bevel-ended finger,) attached to one of the pair of auxiliary former-slides $c^9$ during their descent, the rocker-shaft *f'* is turned to move the clutch part *d* out of engagement with the clutch part *d'*, and stop the rotation of shaft D and the descent of the auxiliary former-slides $d^8$.

The grooved hub of the clutch part *c'* is embraced by a yoke at the end of an arm, *e*, of a crank-shaped rocker-shaft, *e'*, (see Figs. 3 and 10,) having its bearings in arms 5.

When the roller $e^3$ at the upper end of a second arm, $e^2$, of the shaft *e'* is struck by the beveled lower end of the second clutch-disconnector *g*, attached to the descending main former-slide $b^6$, the rocker-shaft *e'* is turned to disengage the second clutch *c c'*, and stop the shaft C and the descent of the auxiliary former-slides operated by it.

As long as the first and second clutch-disconnectors remain in contact with the arms 4 and $e^2$ they hold the clutches *d d'* and *c c'* out of engagement and the shafts D C at rest; but as soon as the arms 4 and $e^2$ are free from the clutch-disconnectors the springs 7 and 8 on the shafts D C act to press the clutch parts *d'* or *c'* into engagement with the parts *d* or *c*, and start the shafts D or C, and the auxiliary former-slides in connection with them, upward.

The shaft *e'* is cranked, as shown, to permit the clutch-disconnector 4 to pass it.

When a boot-front is to be crimped the parts are brought into the position designated in Figs. 1 and 6.

In Fig. 6 the upper end of the jaw-slides *i i j j*, made in pairs, are held up level with the tops of the side pieces or edge-rests *k k* by the pressure of a series of weighted levers, $i^2$. The edge-rests *k k*, which also constitute the surfaces against which the jaw-slides *j j* move as they and the jaw-slides *i i* are reciprocated vertically between the said edge-rests, are backed up by suitable springs, $k^2$, held at their outer ends by the cross-plates $k^3$, fixed to the frame-work. The edge-rests *k k* move horizontally and compress the springs $k^3$ more or less, according to variations in the thickness of the boot-front being crimped.

The upper-clamps *l*, guided by pins $l^3$ in slots in the said clamps, are depressed by the treadle $l^4$ and rod or link $l^2$.

A boot-front, *h*, having been laid into the machine, as in Fig. 6, the clamps *l* are depressed to hold the edges of the front *h* firmly upon the upper ends of the edge-rests or side pieces, *k k*. The belt $a^2$, Fig. 5, being supposed to be on the fast pulley F, the shaft B will be turned in the direction of the arrow, the belt *a'* then resting on the loose pulley L.

When the shaft B is set in rotation to lower the main former-slide $b^6$, the clutches *c c'* and *d d'* are in clutch, and rotation of the shaft B by the gearing *c d* turns shafts C D, and causes them to lower the auxiliary former-slides $c^9$ $d^8$ at the same rate of speed as the main slide $b^6$, until they all descend together upon the inner face of the front, clamped at its edges, as described, between the clamps *l* and rests *k*, the central part of the front lying on the jaw-slides *i j*, held up by weights, as described. The main and auxiliary former-slides $b^6$ $c^9$ $d^8$ move down together until their lower ends pass below the upper edges of the rests *k*, as in Fig. 7, and give the front its first stretch. On reaching the position Fig. 7, the first clutch-disconnector 4 strikes the roller 3 of the arm $f^2$ and operates the rock-shaft 2, to disengage the clutch *d d'*, and stop the rotation of shaft D and the descent of the pair of auxiliary former-slides $d^8$. In such position the edges of the partially-stretched front will yet be held between the clamps *l* and rests *k*. As the shafts B and C continue to rotate, the main and auxiliary former-slides $b^6$ and $c^9$ continue to descend and draw the edges of the front through between the auxiliary former-slides $d^8$ and jaw-slides *j*, and completely from between the clamps *l* and rests *k*, and by the time the parts reach the position Fig. 8 the extreme edges of the front are held only between the auxiliary former-slides $d^8$ and the jaw-slides *j*, the central part of the front being then stretched or folded about the main former-slide $b^6$ and the pair of auxiliary former-slides $c^9$. As the slides arrive at this last position the second clutch-disconnecter *g* strikes the roll $e^3$ of arm $e^2$, and operates the rock-shaft *e'*, to disconnect the clutch *c c'* and arrest the rotation of shaft C and the further descent of the auxiliary former-slide $c^9$; but the shaft B continues to rotate and the main former-slide $b^6$ continues to descend from the position Fig. 8 to the position Fig. 9, drawing the edges of the front from between the ends of the auxiliary former-slides $d^8$ $c^9$ and jaw-slides *i j*, stretching the front while its ends are so clamped or held, and forcing the front, folded, stretched, and bent about the said main former-slide $b^6$, as shown, down between and out from below the jaw-slides *i i*, as in Fig. 9. The main former-slide in its descent first meets and bears upon the front, substantially at its median line, and during its further descent the main former-slide carries the front down with it, and crimps and effects its discharge from the machine. As the main former-slide descends, the edges of the front are first held by the clamps and rests, and subsequently by the auxiliary former-slides $d^8$ and $c^9$, and the opposed or co-operating upwardly-pressed jaw-slides *j i*, they together and in turn acting as clamps to hold the edges and parts of the front at each side of its median line, thus insuring from the commencement to the ending of the crimping operation a constant pull or stretch of the upper from its median line in each direction, and about the angular corners of the slides, which form sharp bends in front, thus holding or pinching it more firmly.

The action of the corners of the slides on

the front or vamp (they bending it as it is being drawn between the holding or clamping faces or ends of the slides and over their corners) is most beneficial in taking all the stretch out of the leather, and is more effective than the old plan of depending upon the friction of one face of the front against smooth or corrugated jaws, between which the front is forced.

The upward pressure of the jaw-slides may be varied at will, according to the character of the front, by adjustable weights and levers, or it might be by a system of springs.

Just as the main former-slide $b^6$ reaches its lowest position, a pin, *m*, (see Fig. 2,) connected with the said slide near its top, strikes a shoulder, $m^2$, of a slide-bar, $m^3$, slotted and guided on pins 10, and causes the link $m^4$, connected with one end of the bell-crank lever $m^5$, weighted at $m^6$, to turn the said lever from its position Fig. 2 toward the left until it passes its center of gravity, when the weight will continue the movement of the bell-crank lever toward the left, causing it to strike the pin 12 on the shipper-slide $F^3$, move it toward the left, and place the belt $a'$ on the fast pulley F. This change of position of the belt $a'$ upon the fast pulley, the said belt being an open belt, while the belt $a^2$, previously operative, was a crossed belt, automatically reverses the direction of rotation of the shaft B, and immediately commences to elevate the main former-slide $b^6$. As soon as the second clutch-disconnector rises from contact with the arm $e^2$ the clutch $c\ c'$ becomes engaged, the shaft C is set in rotation, and the auxiliary former-slides $c^9$ commence to rise with the main former-slide $b^6$. As soon as the first clutch-disconnector 4 leaves the arm $f^2$, the clutch $d\ d'$ is automatically engaged by the spring 7, the shaft D is set in rotation, and the auxiliary former-slides $d^8$ commence to rise with the other slides, $b^6\ c^9$. Just before the main former-slide $b^6$ reaches its highest position the pin *m*, before referred to, strikes the projection *n* at the top of the slide-bar $m^3$, lifts it, turns the elbow-lever $m^5$ from its extreme left-hand position beyond its vertical center, when the weight $m^6$, carried by the said lever, continues the movement of the elbow-lever toward its right until it strikes the pin 13 of the shipper-slide, carries the belt $a'$ from the fast pulley, and brings the belt $a^2$ up to the edge of the fast pulley, when further movement of the shipper-slide for a short distance, by hand or otherwise, will place the belt $a^2$ on the fast pulley, reverse the direction of rotation of shaft B, and again cause the slides to descend.

The outermost position of the weighted upper end of the bell-crank shipper-lever is controlled by a shipper-regulating stop, 14, made adjustable on an arm, 15, by a slot and screw, or in any usual way, and by setting this shipper-regulating stop more or less distant from the rack $b^5$ the bell-crank will be permitted to turn a greater or less distance about its center, and move the shipper-slide more or less toward the right, to bring the belt $a^2$ just to the edge of the fast pulley, or place it a distance, more or less, upon the said fast pulley, according as it is desired to determine the time of the descent of the main and the auxiliary former-slides by hand, or have it done automatically, in which latter event the change of direction of movement of the said former-slides will be continuous, the reverse of movement of the parts being entirely automatic.

It frequently happens that one edge of the upper or front of a boot is thicker than its other edge. When this happens, as crimping-machines are now constructed, the thinner edge is stretched the most, and the corners to be united on the side seams of the boot overlap, or one projects back farther than the other. This I obviate by scoring the acting faces of the clamps *l*. (Indicated in Fig. 12.) The lower ends of the auxiliary former-slides are scored in like manner. This scoring prevents the upper or front moving on the main former-slide in the direction of the length of the upper or boot-front, and prevents it being drawn or twisted out of proper shape as it is being gradually folded and fitted to the main former-slide.

By the term "upper," as herein employed, I mean to designate that part of a boot or shoe which covers the top of the foot and front of the leg more or less.

Fig. 11 represents the manner of supporting the ends of the studs *p*, which constitute the fulcra for the levers $i^2$. Each stud *p*, properly held in the frame-work, has its inner end reduced to receive two levers, $i^2$, side by side, with a washer between them, and two levers being held on the studs by the heads of screws $p^2$.

In other crimping-machines heretofore made the inner side of the front is placed in direct contact with the end and sides of the former which is to shape it, and the front, acted upon at its median line, is stretched and pulled closely to the said former by means of jaws, which rub against the outer side of the front; but in this my machine the crimping process is different; for instead of forcing the front folded on the former between jaws, the front is held or clamped at its edges, and while so held is stretched, and it is again and again clamped nearer and nearer its center or median line, and drawn from between the surfaces so clamping it, thus gradually stretching the front, and finally permitting it to be lapped or folded, in the usual way, about the main former and against its sides, after which the action is as usual.

The ultimate crimped form is not given to the front until after its entire inner surface is brought in contact with and pulled about the main former.

I claim—

1. An upper-crimping machine containing the following instrumentalities, viz: a vertically-movable main former-slide, one or more sets of vertically-movable auxiliary former-slides located at the sides of the main former-slides, means to automatically move the main and auxiliary former-slides, the latter for a less

distance than the former, and one or more sets of jaw-slides located below the former-slides, to co-operate with the former-slides and stretch the front, the front being held at its edges by, and being drawn laterally from between, the ends of the auxiliary former-slides and the jaw-slides, substantially as described.

2. The vertically-movable main former-slide, one or more sets or pairs of vertically-movable auxiliary former-slides located outside the main former-slide, and a clamp or rest, between which the edges of the upper or front are held, combined with one or more sets of upwardly-pressed but yielding jaw-slides, to co-operate with the former-slides and stretch the front or upper, substantially as set forth.

3. The main former-slide provided at its ends with toothed racks, combined with the rotating shaft B, worms, worm-gears, and pinions, to cause the descent and ascent of the said slide, substantially as described.

4. The main former-slide provided at its ends with toothed racks to be engaged by gearing, substantially such as described, set in movement by the shaft B, one or more auxiliary former-slides provided with toothed racks to be engaged by gearing, substantially such as set forth, in connection with shaft B, and a clutch for the actuating-shaft of each set of auxiliary former-slides, combined with a clutch-disconnector for each clutch, the said disconnector or disconnectors being carried by one or more of the movable former-slides, to automatically arrest the movements of the auxiliary former-slides and permit the main former-slide to thereafter continue its movement, substantially as described.

5. In a machine for crimping boot-fronts, a main former-slide, one or more auxiliary former-slides at the sides of the main former-slide, one or more sets of upwardly-pressed jaw-slides, a rotating shaft, and intermediate gearing to reciprocate the main former-slide, belt-shipping devices operated by the main former-slide, to automatically shift the driving-belt and reverse the rotation of the shaft, producing the reciprocation of the main former-slide at one or both of the extreme positions of the main former-slide, a rotating shaft to operate each set of auxiliary former-slides, clutches to control the periods of movement or rest of the shaft for moving the auxiliary former-slides, and clutch-disconnectors adapted to disconnect the said clutches and arrest the descent of the auxiliary former-slides before the completion of the descent of the main former-slide, to operate substantially as and for the purpose described.

6. That improvement in the art or method of crimping fronts and uppers of boots and shoes which consists in successively clamping and holding the boot-front along its edges and between its edges and median line, as described, and then, by pressure on the said front at or near its center, gradually drawing the edges of the front or upper out and down from between the surfaces, which act to hold the said edges as described, so as to stretch and pull the entire front in the direction of its width, and finally folding it above the main former, which gives to the front its ultimate crimped shape, substantially as described.

7. In a boot-crimping machine, the rests *k*, combined with the transversely-scored clamps *l*, to hold the edges of the front during the commencement of the crimping operation, or while the front is first being bent to be crimped, to thus prevent the front from being twisted out of position, substantially as set forth.

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

JOHN W. D. FIFIELD.

Witnesses:

G. W. GREGORY,

B. J. NOYES.