(No Model.) 2 Sheets—Sheet 1.

F. L. WILSON.

HOOP FASTENING MACHINE.

No. 405,517. Patented June 18, 1889.

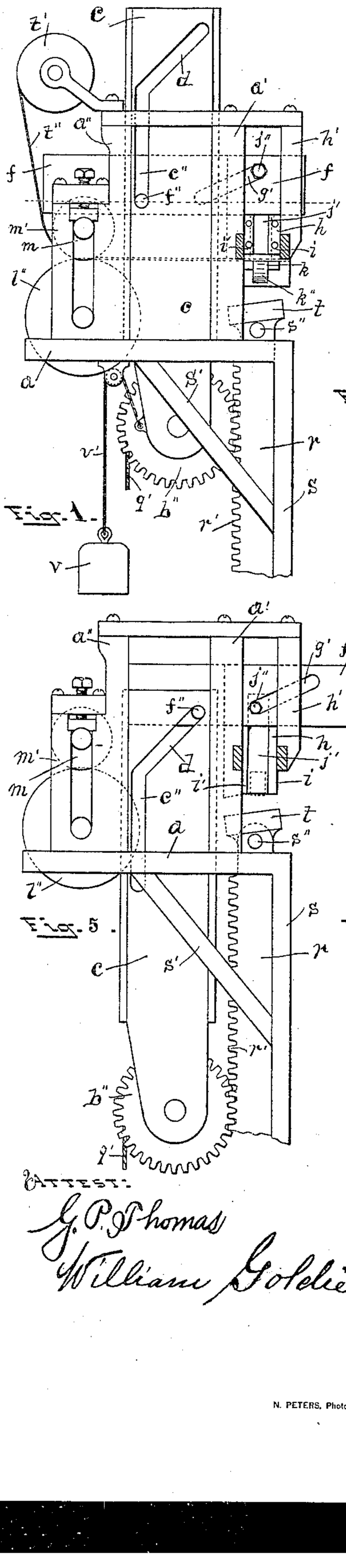

Fig. 1.

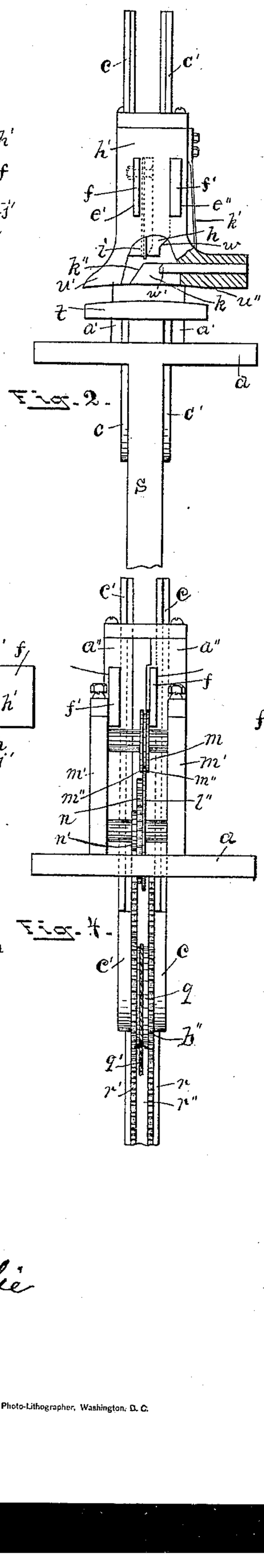

Fig. 2.

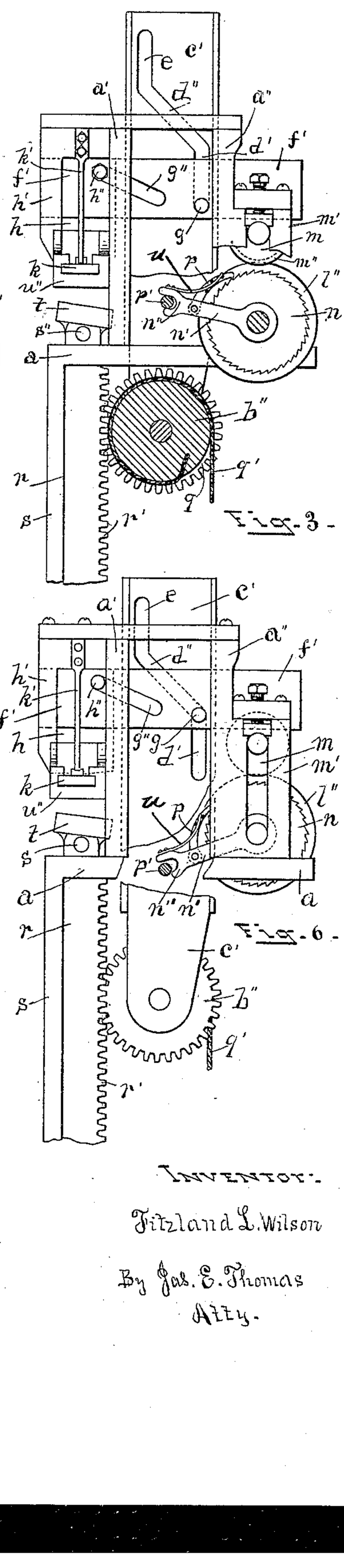

Fig. 3.

Fig. 5.

Fig. 4.

Fig. 6.

Attest:

G. P. Thomas

William Goldie

Inventor:

Fitzland L. Wilson

By Jas. E. Thomas

Atty.

(No Model.)

2 Sheets—Sheet 2.

F. L. WILSON.

HOOP FASTENING MACHINE.

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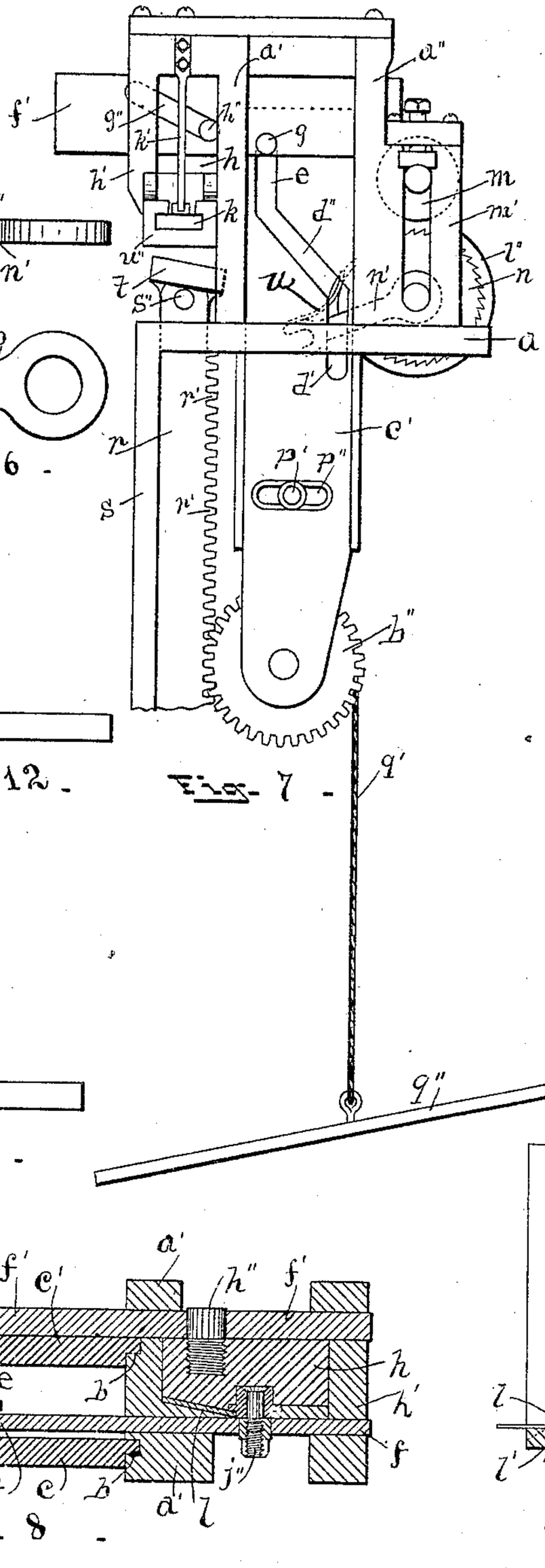

Fig. 7.

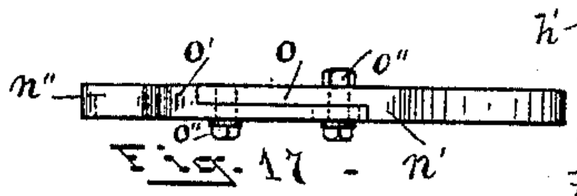

Fig. 17.

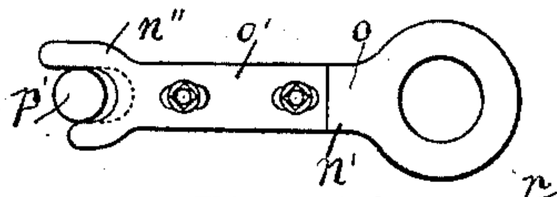

Fig. 16.

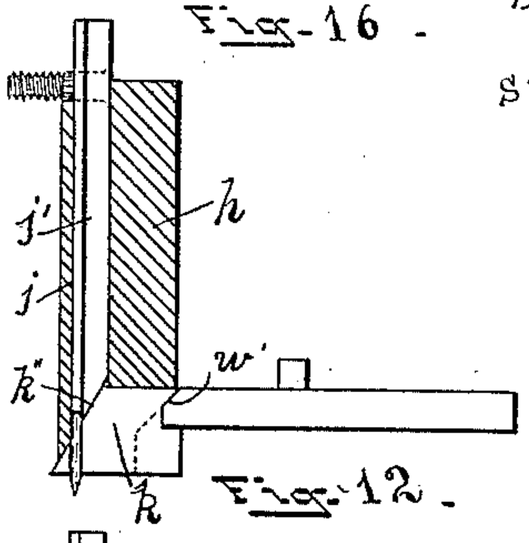

Fig. 12.

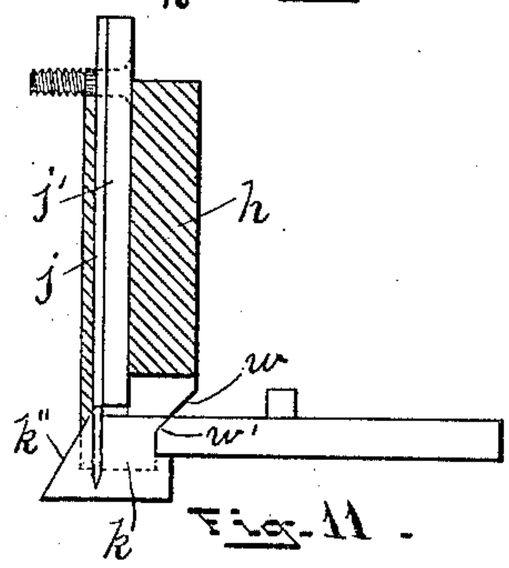

Fig. 11.

Fig. 8.

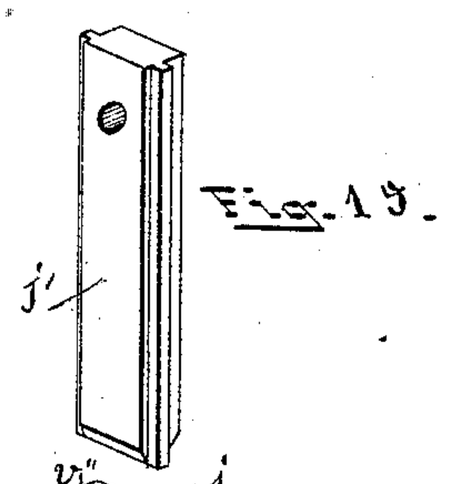

Fig. 15.

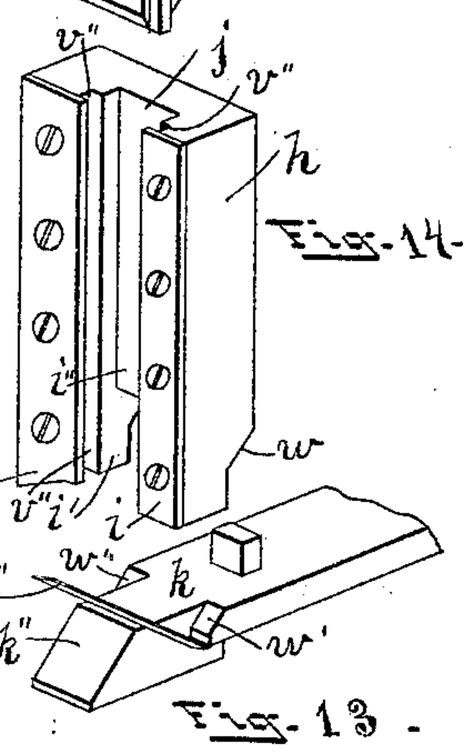

Fig. 14.

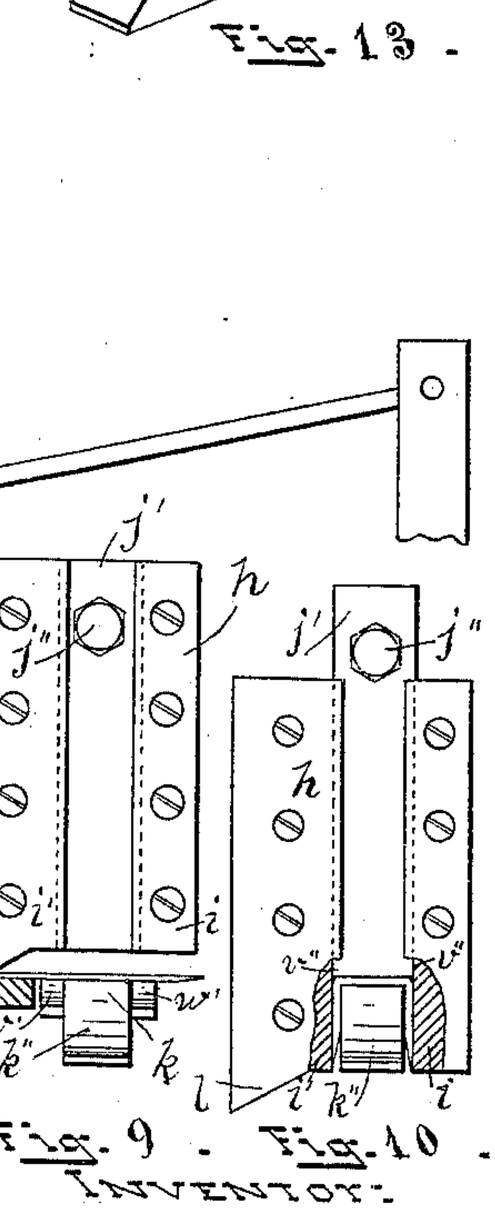

Fig. 13.

Fig. 9.

Fig. 10.

ATTEST:

G. P. Thomas.

William Goldie

INVENTOR:

Fitzland L. Wilson

By Jas. E. Thomas,

Atty.

UNITED STATES PATENT OFFICE.

FITZLAND L. WILSON, OF WEST BAY CITY, MICHIGAN.

HOOP-FASTENING MACHINE.

SPECIFICATION forming part of Letters Patent No. 405,517, dated June 18, 1889.

Application filed May 7, 1888. Serial No. 273,014. (No model.)

To all whom it may concern:

Be it known that I, FITZLAND L. WILSON, a citizen of the United States, residing at West Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Hoop-Fastening Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates to improvements in hoop-fastening machines; and it consists, first, in improved devices for clamping and retaining in position the lapped ends of the hoop during the fastening operation; second, in improved devices whereby the wire of which the fastening is composed is fed to the forming devices at the proper time and the length thereof is properly adjusted; third, in devices for forming the fastening-staple and of supporting the same during the driving operation; fourth, in the combination and arrangement of the several devices which are used in the construction of the machine, as I hereinafter more fully describe, and especially set forth in the claims.

The objects of my invention are, first, to provide a machine for fastening the lapped ends of a hoop, which will form the fastening device, and drive and clinch the same with one operation or movement of the lever; second, to provide a new and improved device for forming the fastening-staple, whereby a uniform and reliable fastening is produced.

A third object of this invention is to arrange devices for clamping and retaining the lapped ends of the hoop during the operation of fastening the same that will operate more rapidly and effectually than those in common use.

A fourth object is to construct and arrange the staple forming and driving devices so that the staple or fastening will be rigidly supported in position when being driven, whereby a lighter or thinner wire may be used and produce a more superior and stronger fastening.

I attain these objects by means of the devices illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of my improved hoop-fastening machine, looking from the left, and showing the parts in position for clamping a hoop. Fig. 2 is a front view of the same. Fig. 3 is a view in elevation of the same, looking from the right. Fig. 4 is a rear view of Fig. 1. Fig. 5 is the same as Fig. 1, but showing the position of the parts when the fastening operation is completed. Fig. 6 is the same as Fig. 1, showing the position of the parts after the fastening-staple is formed. Fig. 7 is the same, showing the position of the parts after the fastening-staple is driven in place, with a portion of the frame removed. Fig. 8 is a horizontal section of Fig. 1, taken through the horizontal plates and with the upper roll removed. Fig. 9 is a side view, in enlarged detail, of the forming device and driver detached and in position for beginning the operation of forming the fastening. Fig. 10 is the same with the fastening-staple formed and ready for driving. Fig. 11 is a vertical section of the former-head in the position shown in Fig. 10. Fig. 12 is the same with the staple partly driven. Fig. 13 is a view in perspective of the former-die detached. Fig. 14 is a view in perspective of the former and cutter detached. Fig. 15 is a view in perspective of the driver detached. Fig. 16 is a side view of the feed-operating lever detached. Fig. 17 is a top or plan view of the same.

a represents a base-plate, which is secured to a bench or other convenient support.

a' are front and *a''* are rear vertical posts extending upwardly from the plate *a*, and the posts *a'* are provided on their rear sides with a longitudinal groove *b*, and the posts *a''* have on their front sides a similar groove *b'*.

c and *c'* are vertical plates placed between the posts *a'* and *a''*, and are arranged with their edges fitted to slide in the grooves *b* and *b'*, and between their lower ends, which extend below the base *a*, is journaled a gear-wheel *b''*, for a purpose which I presently explain. The vertical plate *c* is provided in its upper portion with a slot *c''*, the lower portion of the slot being located near and parallel with the rear edge of the plate, while its upper portion *d* reaches diagonally across the

plate nearly to its front edge. The plate c' is provided with a slot d', the lower portion thereof being located near and parallel with the rear edge of the plate for a short distance. A diagonal portion d'' then reaches nearly to the front edge of the plate, where it again turns upward, with a portion e parallel with the front edge of the plate.

Near the upper ends of the posts c and c' are formed (horizontal from front to rear) openings e' and e'', of a suitable dimension to receive the horizontal bars or plates f and f', and in such a location as to allow the plate f to pass the plate c closely, and the plate f' to pass the plate c' in a like manner. The plate f is provided with a stud f'', projecting outwardly and through the slot c'', and is so located that when it rests in the lower portion of the slot the plate f will project beyond the rear posts a'', as shown in Fig. 1. The plate f' is also provided with a stud or roller g, which is arranged to project through the slot d', and is located to rest in the lower portion of the slot when the plate f' projects rearwardly, as shown in Fig. 3. The plate f is provided with a slot g', which begins near the lower edge of the plate at a point just forward of the posts a' and extends diagonally upward and forward, and the plate f' is provided with a similar slot g''.

h is a vertical former-head placed between the front ends of the plates f and f', and is held in position to allow a vertical reciprocating movement of the head by a supporting-slide h', which is rigidly secured to and supported by the front posts a'.

h'' is a stud or roller, which is rigidly secured to the head h and projects through the slot g'', and is located to rest in the upper portion of the slot when the head is raised, as shown in Figs. 3 and 6.

As shown in Figs. 13, 14, and 15, the lower end of the head h is provided with a front portion i and a rear portion i', extending below the central portion i'', and the side of the head is provided with a vertical groove j, in which is placed a driver j', the driver being fitted to move vertically in the slot, and upon the upper end of the driver is arranged a stud j'', which projects outwardly and through the slot g' in the plate f.

k is a former-die, (shown in detail in Figs. 9, 10, and 13,) and is of a suitable size and so located in a horizontal position as to pass between the portions i and i' of the former-head, and is supported in position by the portion w', and, as herein shown, is arranged to move in the direction of its length toward the right, and is held in position beneath the head by the spring k', which may be constructed and placed as herein shown, or in any other convenient position or form. The end of the former-die which projects beyond the former-head and the driver is provided with an inclined portion k'', for the purpose which will be presently explained. Upon one side of the portion i' is secured a cutter l, having an inclined lower edge which passes an opposing fixed cutter l', secured to and supported by the post a', the cutters being located coincident with the driver j'.

At the rear of the posts a'', and between the posts and in alignment with the driver j' and the cutters, is placed the roll l'', provided with suitable journals resting in supporting-boxes which are secured to the posts and form an unyielding support for retaining the roll rigidly in position, and directly above the roll l'' is arranged an opposing roll m and provided with journals which rest in slots in the side supports m', and devices of a common form are provided to adjust the opposing roll m downwardly, as desired, and the periphery of the roll m is provided upon each edge with outwardly-projecting flanges m'', which reach over the edges of the periphery of the roll l''.

Upon the side of the roll l'' and concentric with the journals supporting the same is placed a ratchet-wheel n, provided on its periphery with teeth, and n' is a lever having on one end an opening passed over the arbor supporting the roll l'', and with its opposite free end provided with a fork n'', the upper prong of the fork extending beyond the end of the lower prong. This lever n' is composed of the pieces o and o', lapped by each other and secured together by screws o'', which pass through slots in the piece o, and are tapped into the piece o' or are secured in position by nuts.

p is a dog pivoted by one end to the lever n' and with its opposite free end engaging with the teeth of the wheel n in such a manner that when the lever is oscillated the pawl operates to intermittently revolve the roll l'', and a spring u is arranged to retain the pawl in engagement with the teeth of the wheel.

p' is a stud secured to the vertical plate c', from the inner side of which it projects inwardly in such a position as to engage with the fork n'' when the plate is in the position shown in Fig. 3, and to be disengaged therefrom when the plate is moved downward to the position shown in Fig. 6, the stud being adjustably secured in the slot p'' in the plate, which permits the stud to be moved to coincide with any changes made in the length of the lever n'.

Attention is here again called to the gear-wheel b'', in the center of the periphery of which is formed a groove q, and q' is a rope or chain, which is placed in the groove over the wheel, with one end secured to the periphery thereof, and with its opposite end leading downward and secured to the foot-lever q'', as shown in Fig. 7.

r is a vertical bar, provided on one side with a rack r' the teeth of which engage with the teeth of the gear-wheel b'', the rack side of the bar being provided with a groove r'', which coincides with the groove q and allows a free movement of the rope or chain q'. This bar r is suitably supported by a portion s, which is secured to or cast integral with the

base-plate, and its lower end is supported by braces s', the said supports allowing a vertical reciprocating movement of the bar, and upon the upper end of the bar is pivotally secured at s'' a supporting anvil-die t. This supporting-die is located so as to be centrally beneath the former-head h and the driver j', and is provided with an upper surface of a convex form, so it will nearly conform to the inner surface of a hoop, while the pivot s'' allows the die to adjust itself laterally to conform to the different bevels of the hoop. The upper surface of the die is also provided with suitable depressions beneath the driver, which operate to form a clinch upon the ends of the fastening-staple after it is driven.

As it is necessary that the plates c and c' shall be lifted to and retained in the position shown in Fig. 1 when the machine is not in operation, a line v' is arranged with one end secured to the plates and with the opposite end secured to a weight v, the line being, however, passed over a pulley which is suitably located and supported to permit the line and weight to draw upwardly upon the plates, the power of the weight v being sufficient to greatly overbalance the weight of the plates and the parts connected thereto; but I do not propose to be confined entirely to this weight for returning the plates to their original position, as a spring may be used instead, or either may be placed in some other position and effect the same purpose.

Having described the construction of the several parts of the machine, I now proceed to explain its operation.

Wire t'', of a suitable size, is provided, wound upon a spool t', which is shown in Fig. 1 as supported by brackets upon the upper ends of the posts a'', and the end of the wire is passed between the rolls l'' and m and beneath the cutters l and l', the roll m being adjusted to bear the wire heavily upon the periphery of the rigid roll l''. The lapped ends of the hoop are then placed in position upon the anvil-die t and beneath the supports u' and u''. The lever q'' is then moved downward by the foot of the operator, which rotates the gear-wheel b'' by means of the chain q', and the resistance of the weight v, being considerably greater than is required for retaining the plates c and c' and gear-wheel b'' in position, affords a leverage or opposing power which, as the gear-wheel rotates, causes the rack-bar r to move upward and lift the hoop to a bearing against the parts u' and u'', and the resistance of the weight then forms a clamping-power, which retains the lapped ends of the hoop firmly in position, as the clamping of the hoop stops the upward movement of the rack-bar. The wheel b'' then moves downward upon the bar r, drawing downward also the plates c and c', and the stud p', operating upon the lever n', rotates the roll l'' by means of the pawl p and the ratchet u, and feeds the end of the wire across the former-die k to the proper length for forming a fastening-staple. The plate c' has then reached a position to bring the stud g at the lower end of the diagonal portion d'' of the slot d'. The plate c', still moving downward by means of the diagonal portion d'', causes the plate f' to move forward and slide the diagonal slot g'' upon the stud h'', which causes the former-head h to descend, and the cutters l and l' then sever the wire diagonally, (which forms suitable points for the legs of the staple,) and the portions i and i', passing upon each side of the former-die k, bend the staple to the required form, the legs of the staple resting in the grooves v'', and as the head h reaches nearly to the end of its downward movement, and after the horizontal portion of the staple is formed, the inclined portion w, which is formed on the side of the head, engages with the projecting portions w' of the former-die, moving the die for a short distance backwardly until the inclined portion k'' is beneath the horizontal portion of the staple. The diagonal portion d'' of the slot has then been passed and the parts remain in this position during the further downward movement of the plate c', the vertical portion e of the slot moving over the stud; but when the said receding movement of the die k is finished the diagonal portion d of the slot c'' is reached, and which, passing over the stud f'', actuates the plate f forward, and the diagonal slot g', passing over the stud j'', actuates the driver j' downwardly, and the end of the driver, operating upon the staple, forces the staple into and through the hoop and forms a clinch upon the inner side of the hoop against the anvil-die t, and the staple, acting upon the inclined face k'', causes the die to recede and allow the staple to pass. At the same time the die forms a support for the horizontal portion of the staple and prevents a downward depression of the same, and the vertical sides of the projecting portion of the former-die, which remains between the legs of the staple until it is entirely driven, operates to support the legs and prevent their doubling inwardly or buckling during the driving operation, and it will be observed that the projecting end of the former-die receding as the staple is forced into the hoop, together with the vertical grooves v'', operates to support the legs of the staple upon all sides during the driving operation, so that all liability of bending the legs is avoided, whereby a much lighter wire can be successfully used for forming the fastening-staple and a more uniform and reliable fastening is obtained for the hoop. The parts are then in the position shown in Fig. 7, and the staple being thus formed, driven, and clinched, the lever q'' is released, and the weight v then operates to lift the plates c and c', and the slots therein operate upon the studs with the reverse movement, and returns the several parts to their original position, as shown in Figs. 1, 2, and 3, the spring k' operating to return the former-die

k when the driver is drawn upward. It will be seen, as the plates c and c' move downward with the stud p' engaging with the fork n'', that the stud passes the lower shorter prong of the fork when a certain position is reached, and is disengaged from the fork while making a further downward movement, the parts actuated by the lever remaining at rest until the plates move upward. Then the stud p' engages with the upper longer prong of the fork and lifts the lever to its original position, the pawl passing over the ratchet-teeth without engagement. The parts having returned to their original position, the hoop is released, and, being moved upon the anvil-die, the operation is repeated and another fastening-staple is formed, driven, and clinched.

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

1. In a hoop-fastening machine, in combination, the supporting frame or standards, the vertical plate c, provided with a slot having a diagonal portion d, the horizontal plate f, provided with a rigid stud projecting into the said slot and with a diagonal slot g' near its outer end, and the staple-driver j', arranged to slide vertically and provided with a stud j'', projecting into the said slot g', substantially as and for the purpose set forth.

2. In a hoop-fastening machine, in combination, the supporting-standards, the vertical plate c', provided with a longitudinal slot having a diagonal portion d', the horizontal plate f', provided with a rigid stud g, projecting into the said slot, and with a diagonal slot g'' near its outer end, with a former-head h, capable of a vertical movement and provided with a rigid stud h'', projecting into the said slot g'', and having on its lower end the projecting portions i' and i, a staple-forming die k, and the staple-driver, substantially as set forth.

3. In a hoop-fastening machine, the combination, with the staple forming and driving mechanism, the fixed roll and the opposing roll, and a ratchet-wheel coincident with and secured to the fixed roll, of the lever n', pivotally supported by one end and provided on its free end with a fork n'', a pawl, as p, pivoted to the lever and engaging with the ratchet-wheel, and the vertically-sliding plate c, provided with a fixed stud engaging with the said fork n'', substantially as and for the purpose set forth.

4. In a machine for fastening hoops, the combination, with the supporting-frame, the vertical plate c', capable of a vertical movement and provided with a slot having the diagonal portion d'' and the vertical portions d' and e, the horizontal plate f', provided with a stud g, projecting into the said slot and having the diagonal slot g'', and the head h, capable of a reciprocating movement and provided on its lower end with staple-forming devices and upon its front side with a vertical groove j, of the plate c, capable of a vertical movement, and provided with the slot c'', having the diagonal portion d, the plate f, provided with a stud f'', projecting into the said slot c'', and having the diagonal slot g', the vertical driver j' within the said groove j, and provided with the stud j'', projecting into the said slot g', the former-die k, and the anvil-die t, substantially as and for the purpose set forth.

5. In a hoop-fastening machine, the combination, with the plates c and c', capable of a vertical movement for actuating the staple forming and driving devices, of the gear-wheel b'', journaled between the said plates and provided on its periphery with a line connected to a foot-lever, the vertical rack-bar r, provided with teeth engaging with the said gear-wheel, and having the anvil-die t, pivotally secured to its upper end, and clamping-supports, as u' and u'', above the anvil-die, substantially as set forth.

6. The combination, with the staple forming and driving mechanism for fastening hoops, of the fixed roll, the opposing roll, a ratchet-wheel secured to and coincident with one of the said rolls, a lever having a pawl engaging with the said ratchet, and suitable devices for operating the said lever to intermittently revolve the said roll with the rigidly-supported cutter l, and the cutter l', secured to the vertically-sliding former-head, substantially as set forth.

7. The combination, in a hoop-fastening machine, with the staple-driver, the former-die k, capable of a receding movement horizontally, and a vertically-sliding former-head provided with devices for moving the said former-die horizontally after the staple is formed, and having on its lower end downwardly-projecting portions passing on each side of the said former-die, of the cutter l, secured to the side of the former-head, and with its cutting-edge projecting below the said downwardly-projecting portion, and a fixed cutter l', secured to the machine-frame, substantially as and for the purpose set forth.

8. The combination, in a hoop-fastening machine, of the driver, the vertically-reciprocating former-head having on its lower end downwardly-projecting portions i and i', and a beveled portion w, the former-die k, having a projecting beveled end k'', and provided with the projections w'', engaging with the portion w when the former-head is near the end of its downward movement, and a spring k', for retaining the said former-die in position, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

FITZLAND L. WILSON.

Witnesses:

WM. A. WRIGHT,

JAS. E. THOMAS.