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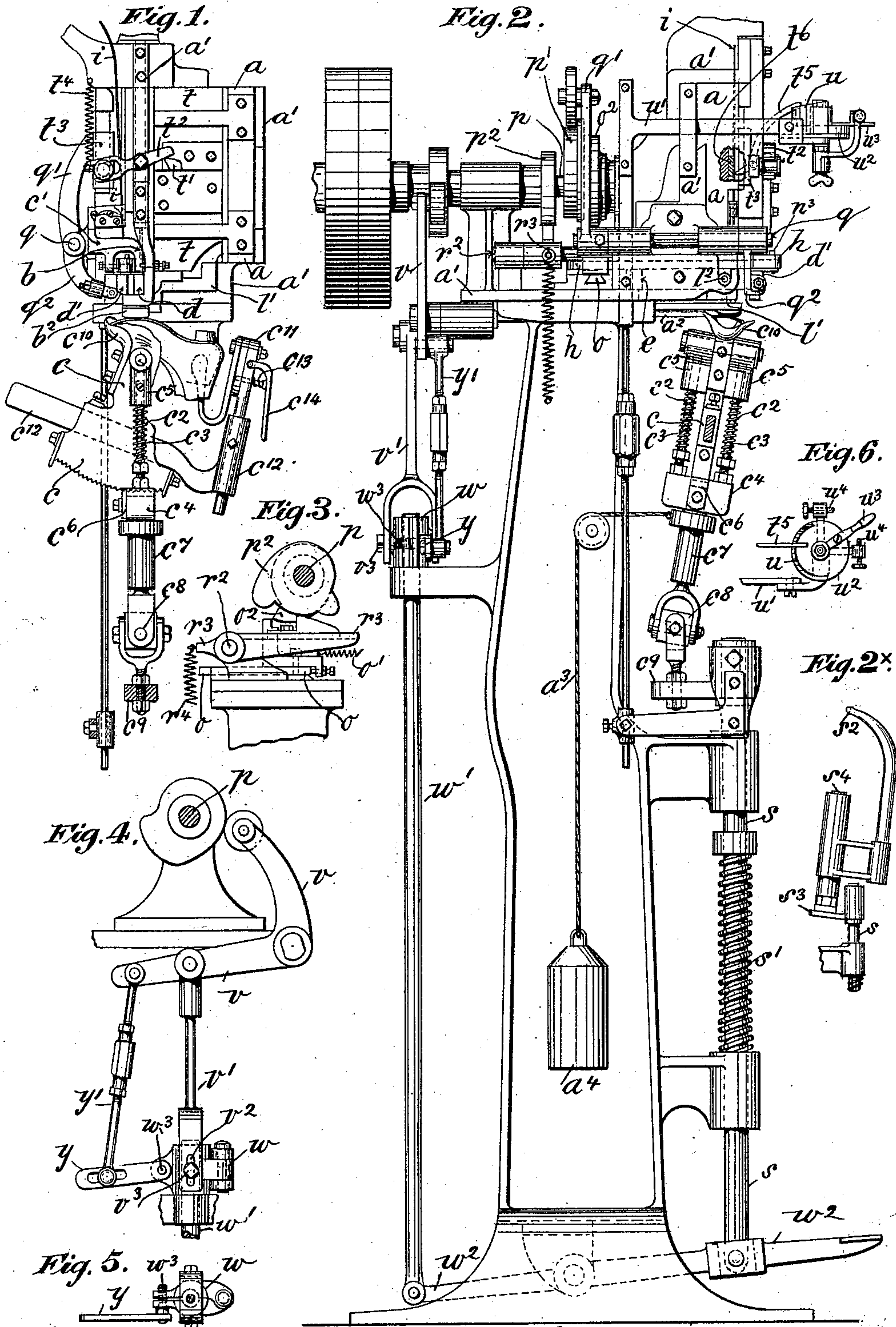
2 Sheets—Sheet 1.

T. GARE.

MACHINE FOR FORMING AND DRIVING RIVETS, &c., INTO SOLES.

No. 551,118.

Patented Dec. 10, 1895.



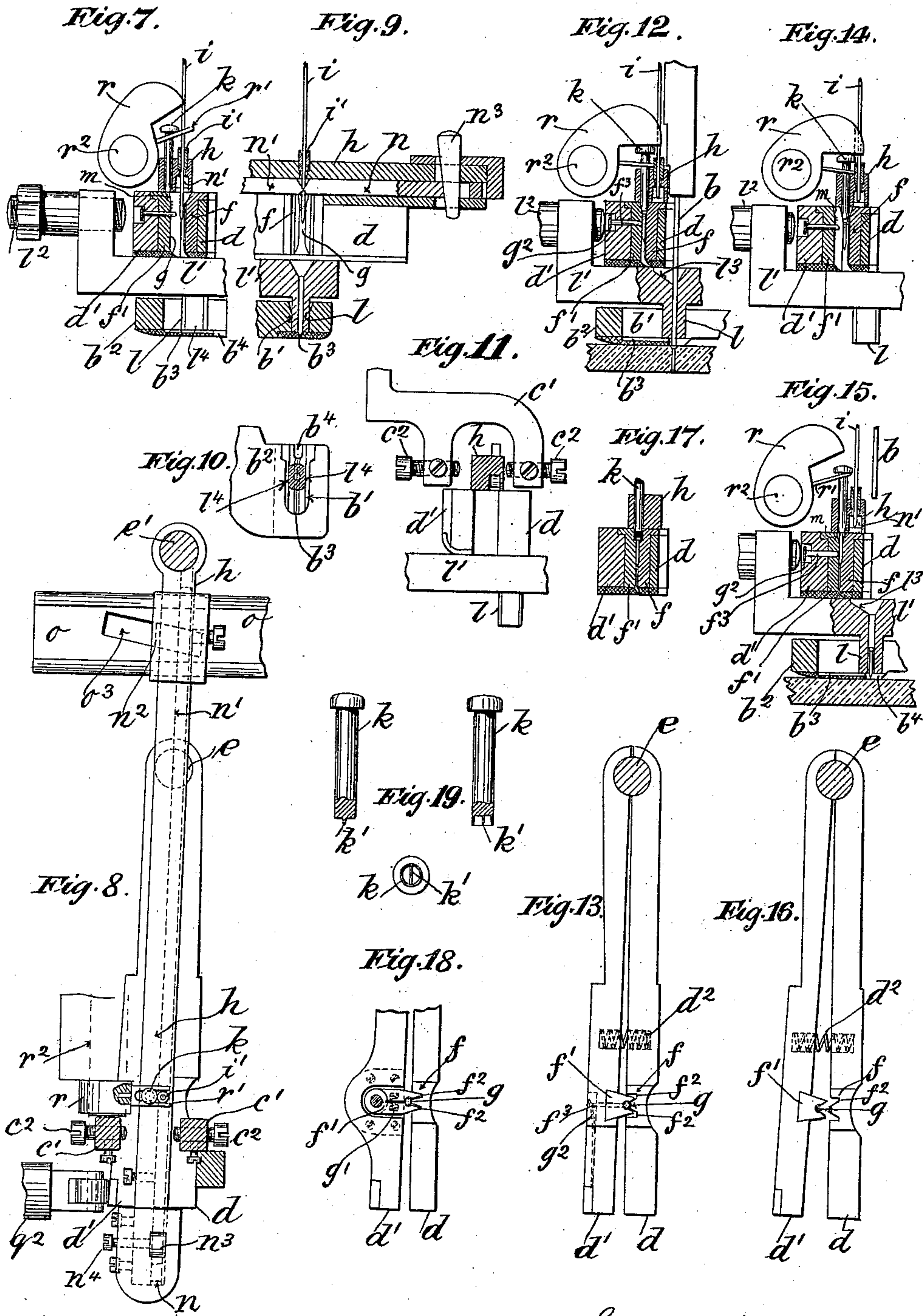
Witnesses:
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H. van Oldenbeek

Inventor:
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(No Model.)

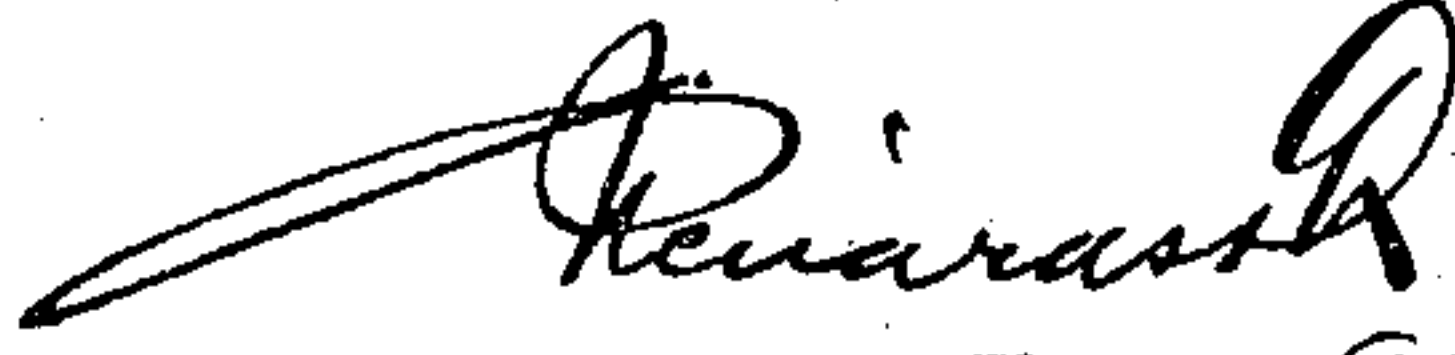
2 Sheets—Sheet 2.

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Inventor:
Thomas Gare,

by  Attorney

UNITED STATES PATENT OFFICE.

THOMAS GARE, OF STOCKPORT, ENGLAND, ASSIGNOR TO THE GARE
MACHINE COMPANY, LIMITED, OF SAME PLACE.

MACHINE FOR FORMING AND DRIVING RIVETS, &c., INTO SOLES.

SPECIFICATION forming part of Letters Patent No. 551,118, dated December 10, 1895.

Application filed May 28, 1895. Serial No. 550,932. (No model.) Patented in England March 10, 1894, No. 5,037, and
January 18, 1895, No. 1,195.

To all whom it may concern:

Be it known that I, THOMAS GARE, a sub-
ject of the Queen of Great Britain, and a resi-
dent of Stockport, in the county of Chester,
5 England, have invented new and useful Im-
provements in Machines for Forming and
Driving Rivets, Studs, or Nails used Princi-
pally in the Manufacture of Coverings for the
Feet, (for which I have obtained in Great
10 Britain Provisional Protections No. 5,037,
dated March 10, 1894, and No. 1,195, dated
January 18, 1895,) of which the following is
a specification.

My invention relates to improvements in
15 machines for forming rivets, studs, nails, or
pegs, and for driving the same into material
to be fastened together or to be furnished
therewith, principally such as the soles and
heels in the manufacture of coverings for the
20 feet.

The object of my invention is chiefly to
provide means for forming and driving in
one machine, successively, headed rivets,
studs, or nails without waste of material, and
25 which means will produce a better head and
point and are more reliable in action than
heretofore has been the case, and always a
rivet, &c., in advance.

My invention comprises also means for
30 driving rivets, studs, nails, or pegs at an in-
cline, for feeding the material, and varying
more readily either by hand or automati-
cally, in accordance with the varying thick-
ness of the work, the length of the rivets,
35 studs, nails, or pegs to be driven, and means
for reliably varying automatically the drop
of the work-support shaft according to the
thickness of the work.

I attain these objects by the mechanism
40 illustrated in the accompanying drawings, in
which—

Figure 1, Sheet I, is a front view, Fig. 2 a
side view, and Figs. 3 and 4 back views, of a
machine constructed in accordance with my
45 invention. Fig. 2^x is an improved construc-
tion of work-support. Figs. 5 and 6 are de-
tached plans in connection with Figs. 4 and
2, respectively. Figs. 7, 11, 12, 14, 15, and 17,
Sheet II, are enlarged front views, partly in
50 section, of the rivet, &c., pointing and head-

ing bars, and adjacent parts. Fig. 9 is a sec-
tional side view of Fig. 7; Fig. 10, a plan of
the presser-foot and rivet, &c., throat. Figs.
8, 13, and 16 are plans of Figs. 7, 12, and 14,
respectively, and Fig. 18 a plan of a modi- 55
fication of the heading-die. Fig. 19 are de-
tails of the heading-punch.

Similar letters refer to similar parts through-
out the several views.

In carrying out my invention and referring 60
to Figs. 1 and 3, I employ a movable head
part *a*, carrying an awl-slide, and actuated
laterally intermittently by a suitably-shaped
cam fixed on the driving-shaft *p*, a station-
ary head part *a'*, carrying a laterally-station- 65
ary driver *b*, operated by a suitable cam or
projection, and a "jack" or "last" or "horn-
support" for the work to be operated upon.
The head part *a* is actuated laterally inter-
mittently by a cam fixed on the driving-shaft 70
p, positioned inside the same and formed and
timed to actuate it during one revolution, as
follows, viz: First, to move the said head to
the left to permit the heading-die to open
slightly, and then cause the head to dwell 75
while the rivet, &c., previously made is re-
leased from the grip of the said die and
pushed down the same; second, to move the
said head farther to the left, and bring the
rivet, &c., material guide over the die and 80
the throat in line with the latter, and then
cause the said head to dwell while the rivet,
&c., material is fed into the heading-dies, a
rivet-blank is severed, and the respective
end of the material is pointed and the head- 85
ing-die preliminary closed; third, to move
the said head to the right and cause it to
dwell while the previously-formed rivet, &c.,
is driven into the work and the blank in the
dies is headed, thus producing always a rivet, 90
&c., in advance.

Upon the stationary head part *a'* I employ
a two-part die-bar *d d'*, the part *d* being sta-
tionary and the part *d'* laterally movable and
under the influence of a spring. By prefer- 95
ence I hinge the die-bar *d d'* to a fulcrum or
stud *e*, screwed into the stationary head part
a'. The inner side of each of the bar parts
d d' I furnish with a die *f f'*, (see more par-
ticularly Figs. 7 to 18,) respectively, having a 100

vertical groove g , which when brought together form a die-hole, which, in connection with another bar h , serves for the formation of the rivet, stud, or nail. The grooves g may be roughened near their upper ends, so as to grip the rivet, &c., material i more securely during the formation of the head and point, and to provide it with impressions which give the rivet, &c., more security in the work into which it is afterward driven.

The dies $f f'$ I form in "he" and "she" fashion, (see Figs. 13 and 16,) so as to interlock and thus guide the rivet, &c., material and prevent the rivet, &c., formed from falling sidewise out of the die. The "she" part I may form in two parts f' , hinged together, (see Fig. 18,) under the influence of a spring g' , the "he" part f having two recesses f^2 , adapted to engage and lock the said "she" parts on the die-bars $d d'$ being closed, and thus grip the rivet, &c., material from three sides in lieu of two only, while on the die-bars $d d'$ opening the spring g' quickly releases the rivet, &c., from the grip of the "she" die parts f .

If deemed necessary, I may employ in the back of the "she" die part a stud f^3 , (see Figs. 12 to 15,) with beveled end and under the influence of a spring g^2 , which when the dies $f f'$ open pushes the rivet, &c., formed laterally out of the "she" die f' .

The bar h is employed above and in contact with the dies $f f'$ and adapted to move laterally, preferably on the fulcrum e' . The bar h has a vertical hole i' , which serves as a guide in feeding the rivet, &c., material i into the dies $f f'$, and a hole for the reception of a punch k , which operates in conjunction with the dies $f f'$ and serves to head and afterward push the rivet, stud, or nail formed a short distance down the dies $f f'$, or altogether into the throat l , employed below the latter. The upper ends of the dies $f f'$ are formed with a countersunk part m , adapted to receive the respective end of the punch k . The bottom of the said countersunk part may be beveled and the face of the punch k formed level, as shown in Figs. 7 to 15, or the bottom of the said countersunk part may be formed level, as shown in Fig. 17, and the face of the punch k slightly hollow, so as to produce rivets, studs, or nails with raised heads of any suitable shape and design. The latter form of dies and punch is, however, preferable, as the rivet, &c., will be laterally retained by the punch k and thus released from the grip of the dies when they open, owing to the rivet-head being in the punch k . It also obviates the necessity of imparting a second thrust to the punch to punch the rivet, &c., down the dies.

The lower end of the punch in shape and diameter corresponds with that of the countersunk part in the die $f f'$, and is thereby always retained in a line with the rivet, &c., thus insuring the head being formed concentrically on the same. In some cases I may

form the face of the punch k with a projecting rib k' , (see Fig. 19,) adapted to press a slit across the head of the rivet, &c., in imitation of a screw or split head. In the underside of the bar h is employed in connection with the feed or guide hole i' , a combined die and cutter $n n'$, formed in two parts and rendered interchangeable, the part n being in action stationary and the part n' movable. The bar h has thus three functions—viz., that of guiding the rivet, &c., material i , when being fed, that of carrying the die and cutter combined, which simultaneously points the rivet, &c., material i and severs a blank therefrom, and that of carrying and guiding the punch k . The inner ends of the combined die and cutter $n n'$, (see Fig. 9,) are beveled off, and in severing the rivet, &c., material press a chisel-point onto the end of the same. The movable part n' of the pointing and severing die $n n'$ is employed in the bar h behind the rivet, &c., material i , and is reciprocated by means of a slide o , guided in the framework of the machine, under the influence of a spring o (see more particularly Figs. 2, 3, and 8,) and actuated by a cam o^2 , fixed on the driving-shaft p , the said slide having a diagonal slot o^3 , which engages a projection n^2 , formed on the die part n' . The die part n is rendered adjustable by such as a wedge n^3 and set-screws n^4 , (see Figs. 8 and 9,) so as to be able to compensate for the wear thereof.

At the side of the stationary head part a' of the machine (see Figs. 1 and 2) is mounted a rocking-shaft q , having fixed at each end a lever q' and q^2 , the lever q' being acted upon by a cam p' on the driving-shaft p , and the lever q^2 , adapted to contact with the movable part d' of the die-bars d and d' for the purpose of preliminary closing the same.

The punch k in the die-bar h is actuated by a hammer r , having a fork r' embracing it and fixed upon a shaft r^2 , carrying at its back end an arm r^3 , (see Figs. 2 and 3,) under the influence of a spring r^4 , and acted upon by a cam p^2 , secured upon the driving-shaft p , which cam is formed with two throws, when it is intended to impart two thrusts to the punch k . The throat l , which is secured to the movable head part a , is formed with a bracket or extension l' , (see Figs. 1, 2, 7 to 11,) which serves as a support for the front ends of the die-bars $d d'$, and being furnished with an adjustable stud l^2 , as an abutment for the movable die-bar d' . Another bracket c' (see Figs. 1, 8, and 11) is secured to the movable head part a in front of the bracket l' , which is furnished with adjustable studs $c^2 c^2$, and serves as an abutment for the bar h .

The upper end of the throat l is formed with an elongated mouth l^3 , (see Fig. 12,) which causes the rivet, &c., formed to drop readily into the same. The lower end is formed with two flats l^4 , (see Figs. 7 and 10,) adapted to fit into a corresponding groove b' in the presser-

foot b^2 , which forms a guide for and gives great steadiness to the throat l . The surface of the presser-foot b^2 against the throat l I form with a V-groove b^3 , and in front thereof with a slot b^4 through the presser-foot, through which the rivet, &c., is driven, the said V-groove b^3 serving to receive and guide the point of the rivet, &c., before being driven, in lieu of permitting it to ride on the work, and thus insure it meeting its hole in the same.

The jack or last work support (shown in Figs. 1 and 2) for facilitating the driving of rivets, &c., into the different parts of the work at various angles, I form as follows: The upper part of the said "support," which carries the work, I mount upon springs c^2 and the lower part upon a vertical shaft s under the influence of a spring s' , and adapted to receive a horn in lieu of the jack, if desirable, as hereinafter described, and to be depressed automatically when the work is fed. By preference I place the springs c^2 upon rods c^3 , the lower ends of which are secured to a cross-head c^4 and the upper ends adapted to slide in sockets c^5 , the said springs being in compression between the said cross-head and sliding sockets. Between the sockets c^5 is employed to swivel a toothed quadrant c and upon the cross-head c^4 a toothed bit c^6 . The quadrant c is locked in position during the driving of the rivet, &c., by the bit c^6 , which is raised in gear by the spring s' on the jack or horn-shaft s and is unlocked while feeding the work, and the shaft s is depressed by the springs c^2 raising it out of gear with the bit c^6 . The cross-head c^4 is adapted to swivel on a socket c^7 , connected by means of a universal coupling c^8 to a bracket c^9 , secured to the top of the aforesaid shaft s . The front of the boot is supported on a curved rest c^{10} attached to the quadrant c , and the back on a bracket c^{11} , pivoted to and rendered adjustable on the slide c^{12} by means of a spring-pin c^{13} and handle c^{14} . To hold the said jack or last support against the sole-guide a^2 and thus balance it, I attach to the same a band or its equivalent a^3 under the influence of a weight a^4 or spring.

The jack or last support described obviates the necessity of holding the work against the presser-foot or locking and unlocking the said quadrant c by hand, or both, as hereinbefore has been the case, thus rendering both actions automatic.

In lieu of the jack or last support described for certain class of work where the rivet, &c., requires to be driven into the work at one angle I employ a horn-support s^2 , adapted to swivel at an incline to the horn-shaft s , (see Fig. 2^x), preferably by furnishing the top of the horn-shaft s with a bracket s^3 , having a shaft or stud s^4 positioned at an incline to the horn-shaft s , or the upper end of the latter may be cranked at an incline and the horn s^2 permitted to swivel thereon. The object under operation placed upon the horn s is thus presented at an incline to the rivet, stud, or

nail in the throat l , so as to cause the same to be driven into the work under operation inclined thereto.

The feeding of the rivet, &c., material is effected by the following means, (see Figs. 1 and 2:) Upon the vertically-reciprocal awl-slide t I employ a cam-piece t' , adapted to strike one end of a lever t^2 , pivoted to the stationary head-part a' of the machine, the other end of the lever t^2 engaging a slide t^3 under the influence of a spring t^4 , carrying a feed-lever t^5 under the influence of a spring and operating in connection with a projection t^6 on the slide t^3 , between which the rivet, &c., material i passes on its way to the die-bar h and d d' . The awl-slide t on its upward movement, through the intermediate lever t^2 , causes the feed-lever t^5 to be depressed, and thus grip the rivet, &c., material i and draw it down, the duration of the grip being controlled by a projection u , against which the feed-lever t^5 is timed to abut when the rivet, &c., material has been fed the required distance. The projection u may be rendered adjustable on a vertically stationary part of the head a' of the machine, or on an arm u' connected to the jack or horn shaft s , adapted to rise and fall with the same.

When rendering the projection u adjustable, it takes the form of an incline on a disk u^2 , (see Figs. 2 and 6,) having a handle u^3 in connection with two adjustable screws u^4 , which form an abutment for the handle u^3 , by means of which the said incline can be set, and thus the time of contact of the feed-lever t^5 , varied as may be required to vary the length of rivet, &c., to be formed.

To the jack or horn cam-lever v I hinge a rod v' , the free end of which is forked and engages in slot v^2 , studs v^3 , secured upon the sides of a clip or gripper w , placed on the upper end of a rod w' , connected to the jack or horn-shaft lever w^2 . The said clip or gripper is adapted to be drawn tight on the rod w' , and to release the same alternately by a screwed stud w^3 , furnished with a lever y , connected by means of a rod y' to the free end of the jack or horn cam-lever v .

The means described for feeding the rivet, &c., material for pointing, heading, and driving the rivets, studs, or nails, and the cam on the driving-shaft p , which actuates the movable head part a operate in conjunction with each other, as follows: When feeding the rivet, stud, or nail material i , the feed or guide hole i' in the bar h and the hole g in the two-part heading-die f f' are positioned vertically in a line with each other, as shown in Figs. 7, 8, and 9, f f' being slightly open, so as to allow of the rivet, &c., material i being fed a certain distance into it while the head part a is dwelling. The cam p' on the driving-shaft p , through the connections q q' , then preliminary closes the die-bars d d' while the movable part n' of the combined die and cutter is forced toward its stationary part n by the cam o^2 on the driving-shaft

and its connections o , o^3 , and n^2 , so as to point a rivet, &c., and sever a blank from the rivet, &c., material i simultaneously by pressure. (See more particularly Fig. 9.)

5 The head part a by the respective cam on the driving-shaft p is then caused to move to the right and the stud l^2 abutting against the movable die-bar d' locks the heading-dies $f f'$ securely together, (see Figs. 12 and 13,) and the left stud c^2 on the bracket c' abutting in the meantime against the die-bar h brings the heading-punch k in line over the rivet, &c., blank severed, while the head a dwells and the previously-made rivet, &c., is driven into the work under operation. (See Fig. 12.) While the head a is still dwelling, the punch k is actuated by the hammer r and punches a head onto the rivet-blank. The movable head part a is then caused to move a little to the left by the aforesaid cam, sufficient to release the die-bar d' , (see Fig. 14,) in which position the head a dwells. The punch k then being still over the head of the rivet, stud, or nail in the heading-die $f f'$ receives a second thrust, pushing down and thereby releasing the rivet, &c., from the grip of the die $f f'$. The heading-punch k is then lifted out of the latter by its fork r' , so as to permit the head part a being moved by the aforesaid cam farther to the left. The right stud c^2 on the bracket c' contacting with the die-bar h brings its feed or guide hole i' in line over the die-hole g and throat l again. (See Fig. 7.) The head part a then dwells and the feeding of the material takes place, which causes the finished rivet, stud, or nail, if not previously removed by the punch k , to be pushed into the throat l , which on the return movement of the head a to the right, caused by the said cam, brings the said rivet, stud, or nail below the driver b of the machine. (See Fig. 15.)

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

45 1. In combination with a laterally movable head part a , a two part heading die bar d, d' , and a rivet, &c., material guide bar h arranged above the die bars one of the die bars d, d' , being stationary and the other as well as the guide bar h movable laterally with the laterally movable head, all substantially as and for the purpose set forth.

2. In combination, a laterally movable bar h having a feed hole i for the material, the cutters n, n' carried in the bar with means for operating the cutters, a driver, the heading dies, a punch carried by the laterally movable bar, means for operating the punch, and a laterally movable head, arranged to operate the bar, substantially as described.

3. In combination, the laterally movable bar having the feeding hole, the cutters carried by the bar, means for operating the same, the punch also carried by the bar and means for operating the punch, substantially as described.

4. In combination, the die, a bar h having

a feeding hole and a punch reciprocating through the bar and means for operating the punch, substantially as described.

5. In combination, the two part die f, f' adapted to receive the nail blank between them, one of said dies being movable toward and from the other and forming between them a counter sunk recess to receive the end of the nail blank and a punch with means for operating it in a direction lengthwise of the die cavity, the said dies being separated for the passage of the headed nail between them, substantially as described.

6. In combination the nail driver with operating means, nail feeding means and the two part die, one of which is movable toward and from the other, one of said die members having a **W**-shaped projection and the other an **M**-shaped recess, substantially as described.

7. In combination, the nail punch and the two part die, one part movable toward and from each other and having the movable jaws adapted to receive the nail blank between them and the other member having a recess to receive the projections, substantially as described.

8. The rivet, &c., throat l formed with two flats l^4 in combination with a presser foot b^2 having a groove b' adapted to receive the said throat and a **V** groove b^3 below the latter ending in a slot b^4 for guiding the rivet, &c., all substantially as set forth.

9. In combination, a punch, a nail material feeding means, a two part die one member of which is movable toward and from the other to clasp the nail material on its opposite sides and means for positively operating the movable die member, said die members separating for the passage of the headed nail between them, the punch and nail material feeding means being moved alternately into line with the space between the dies, substantially as described.

10. In combination, in a nailing machine, a cutting mechanism comprising the two cutters n, n' , one of which is movable and is provided with a projection and a slide having an inclined slot receiving the said projection with means for operating the slide, the swinging support carrying the cutters and the punch carried by said support, substantially as described.

11. A jack or last support comprising a quadrant C , springs c^2 for applying a pressure to the same, a toothed bit engaging the quadrant, a shaft or main support s connected with the bit and a spring s' on the shaft adapted to hold the bit engaging the quadrant, the said springs c^2 acting to release the quadrant from the said bit, substantially as described.

12. In combination in a nailing machine, cutting and driving mechanism and feeding mechanism comprising a slide t^3 a lever t^5 carried thereby and adapted to grip the nail material, a lever t^2 connected to the slide, a

reciprocating awl slide t and a cam piece thereon to operate the lever t^2 , substantially as described.

13. In combination, in a nail feeding mechanism, a slide t^3 a lever carried thereby to grip the material to feed the same, means for operating the slide and means for determining the engagement of the feed lever with the nail material comprising an adjustable projection or arm u in the path of the feed lever, substantially as described.

14. In combination, with the last supporting standard, a lever v with operating means, the two rods v' y' suspended therefrom, the lower end of the rod v' being forked and slotted, a clip w having studs v^3 engaging the slots, a rod w' carrying the clip, a connection between the rod and the standard, a screw for tightening the clip and a lever y for tightening the screw said lever being connected with the depending rod y' , substantially as described.

15. In combination, the two part die, one

part of which is movable toward and from the other, means for closing the die, on the nail material, a laterally movable head adapted to lock the die members in closed position, a throat carried by the head to move the completed nail laterally from the dies and nail feeding and punching mechanism, substantially as described.

16. In combination, the two part die, one member of which is movable toward and from the other, the guide carrying a punch, and a feeding hole, a throat piece, a laterally movable head carrying the same, and having projections to contact with the guide to move it laterally and also to lock the dies and means for moving the head, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

THOMAS GARE.

Witnesses:

ALFRED BOSSHARDT,
STANLEY E. BRAMALL.