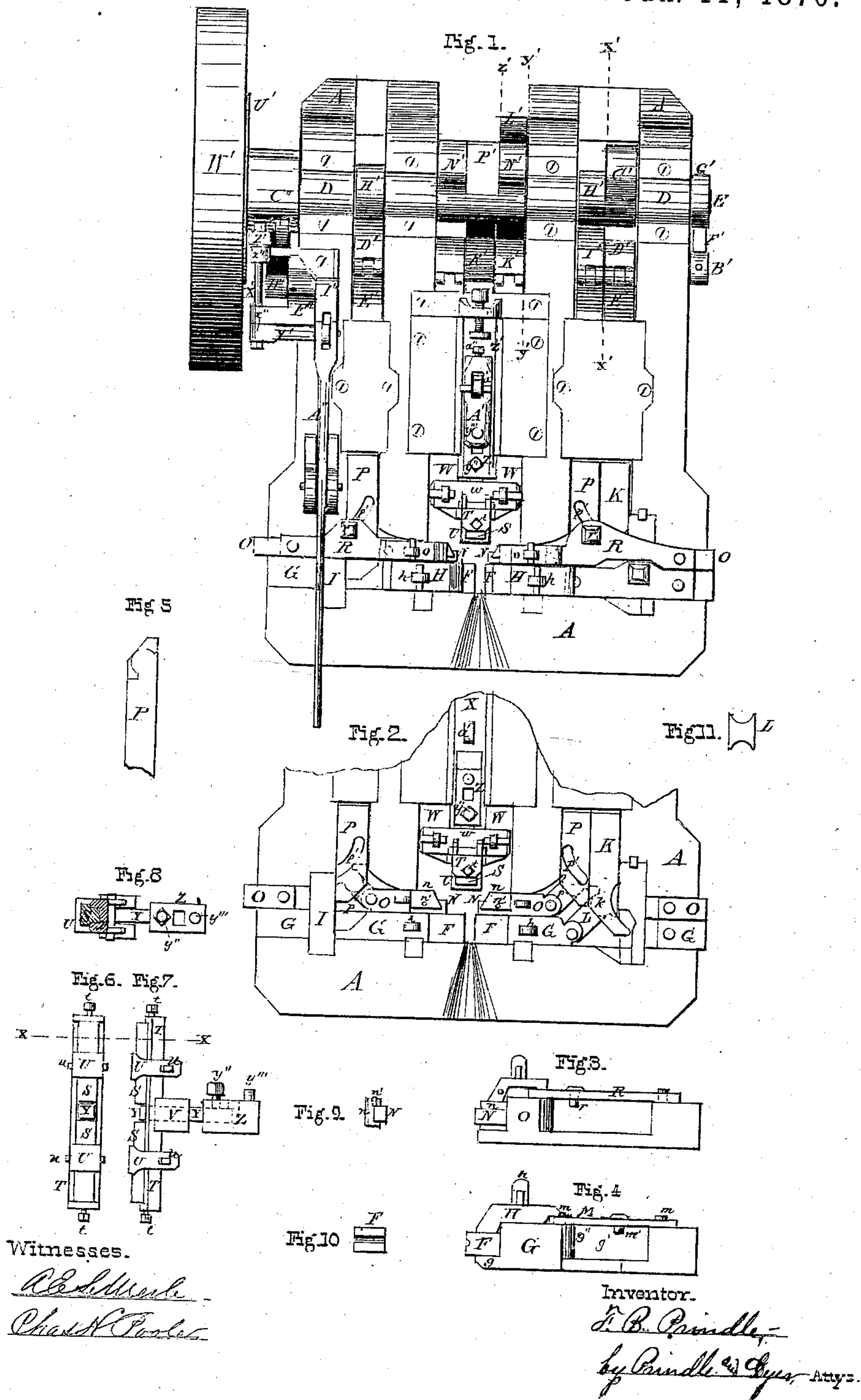


F. B. PRINDLE.  
BOLT HEADING MACHINE.

No. 98,798.

Patented Jan. 11, 1870.



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Fig. 20.

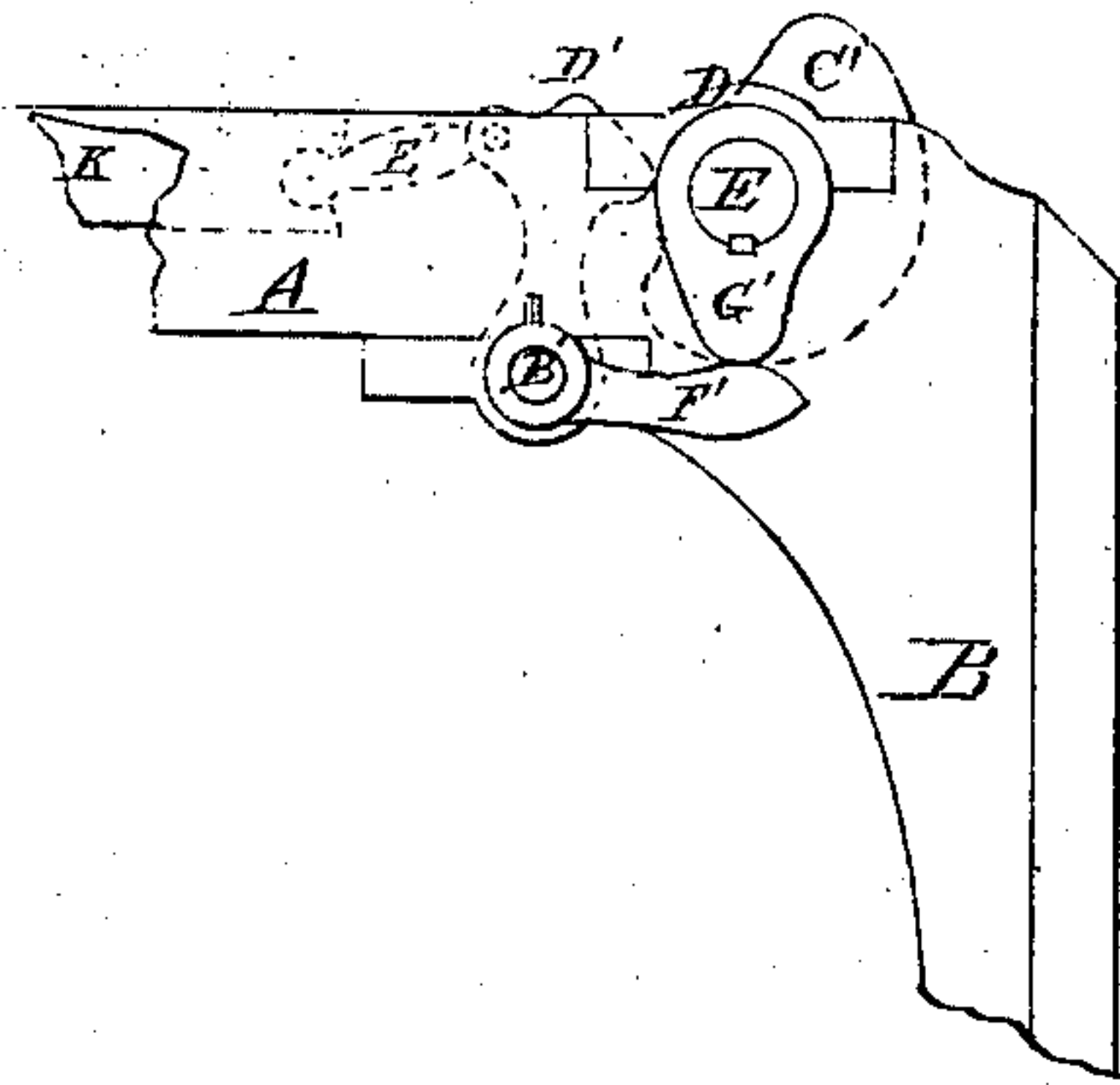


Fig. 21.

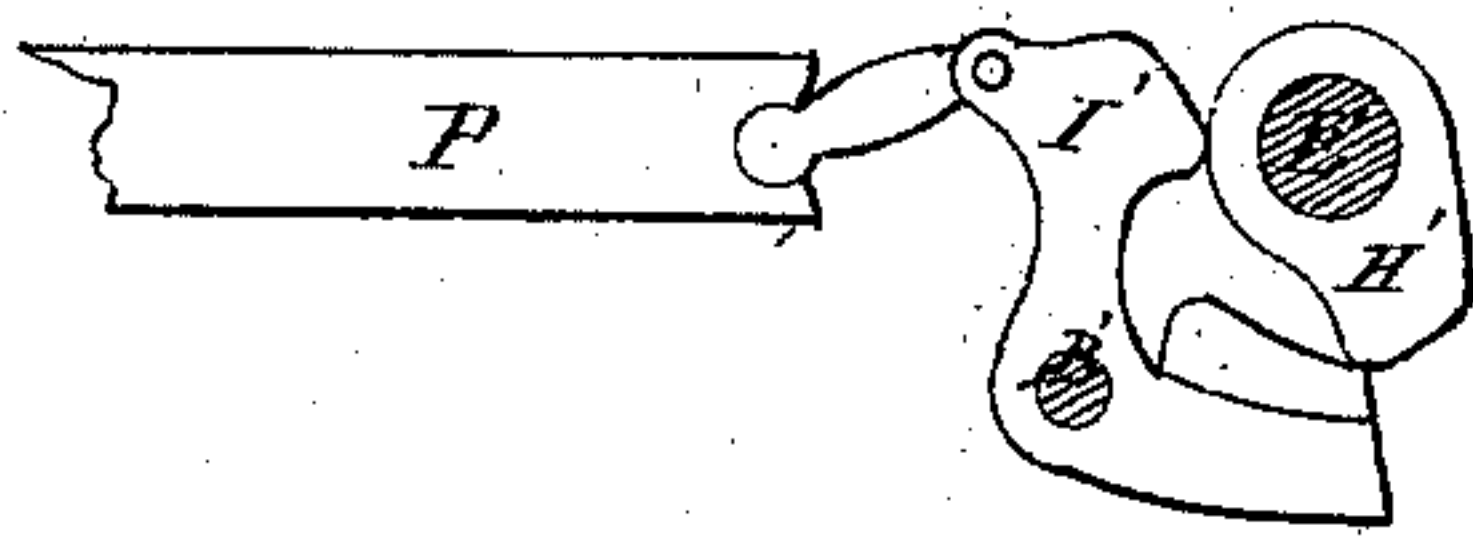


Fig. 22.

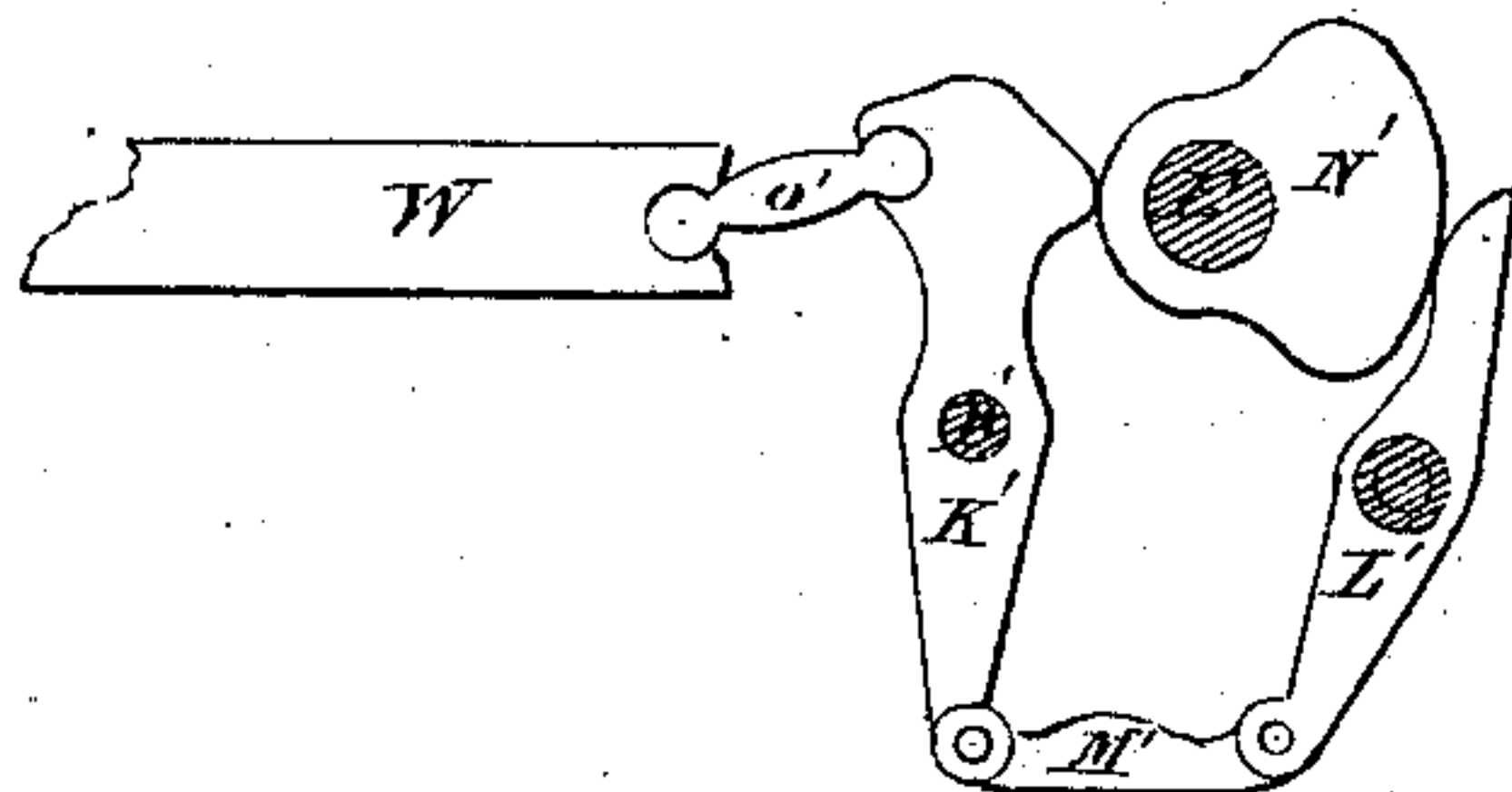
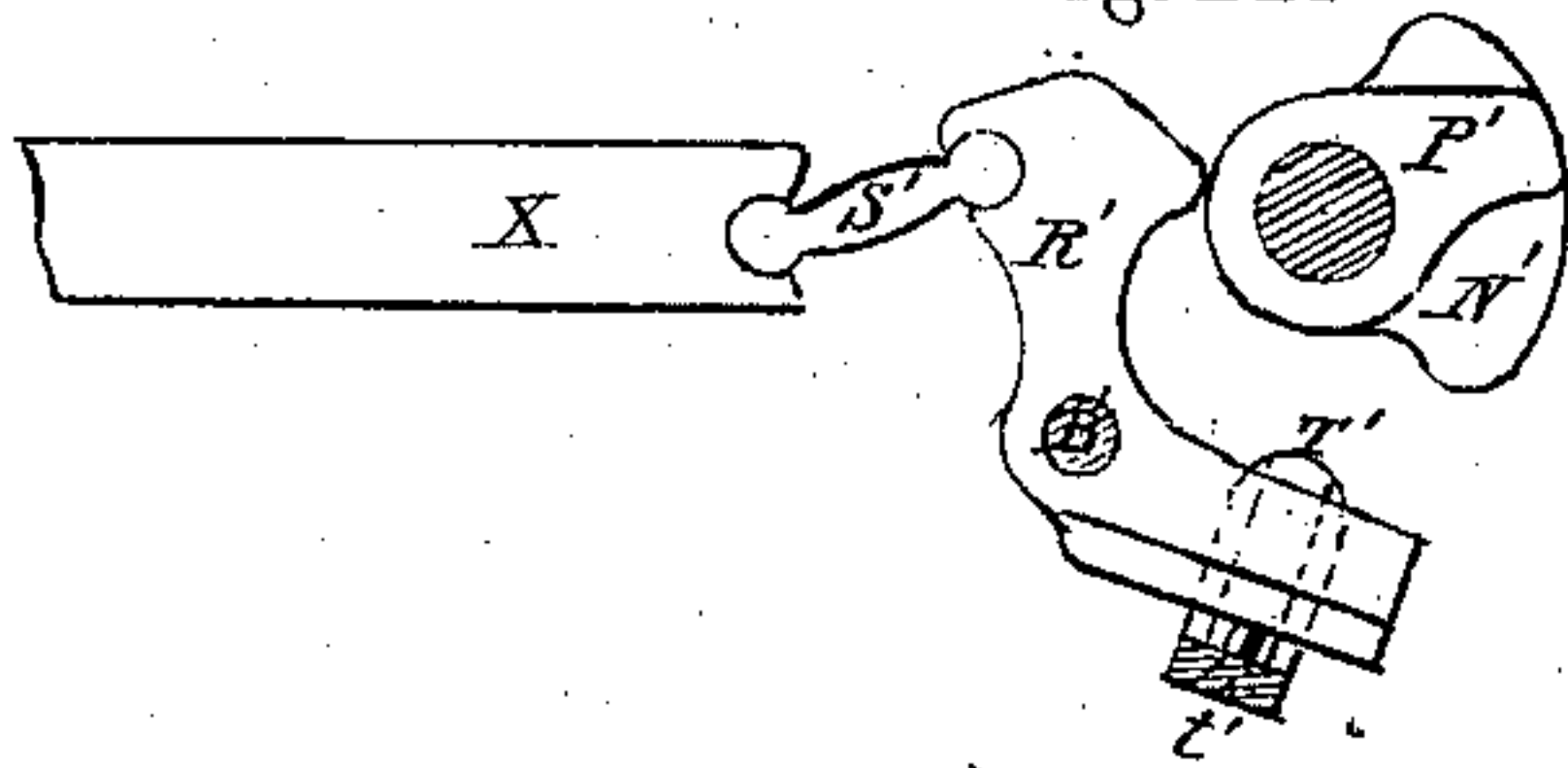


Fig. 23.



Witnesses.

*W. L. Mearns*  
*Chas. H. Poole*

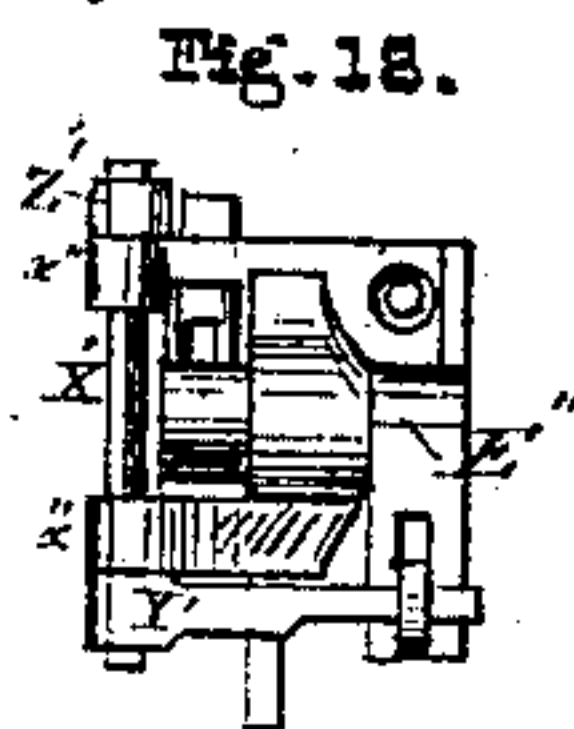
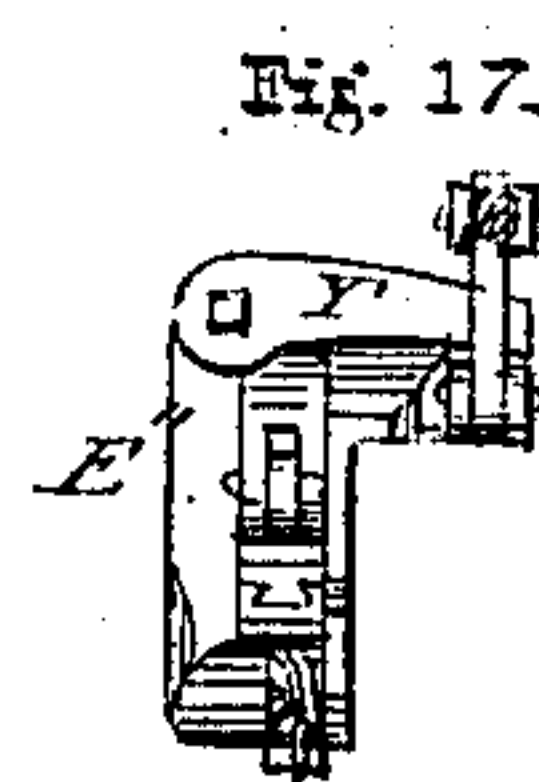
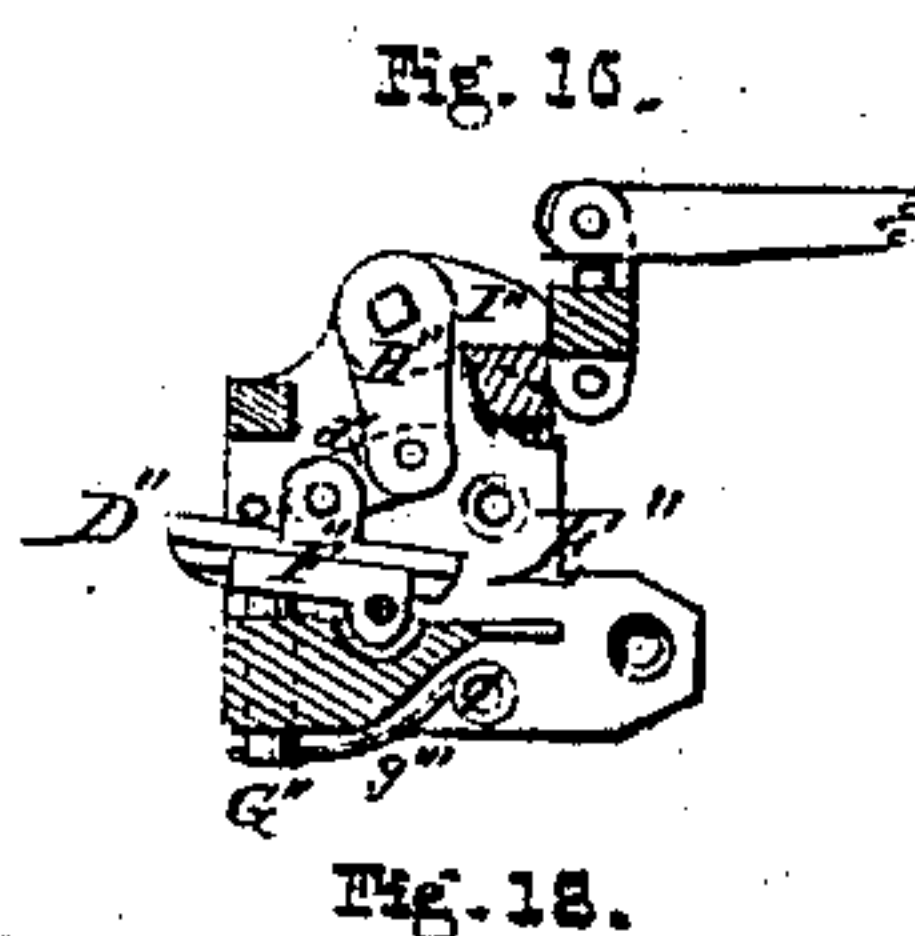
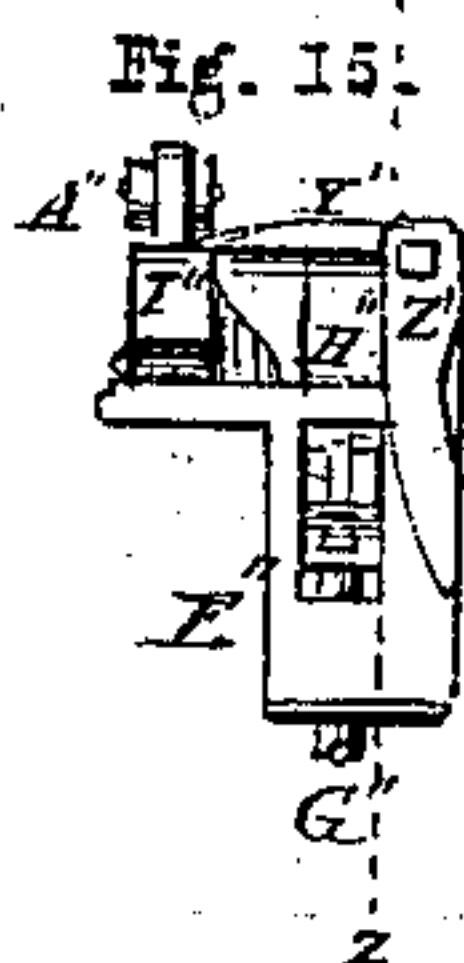
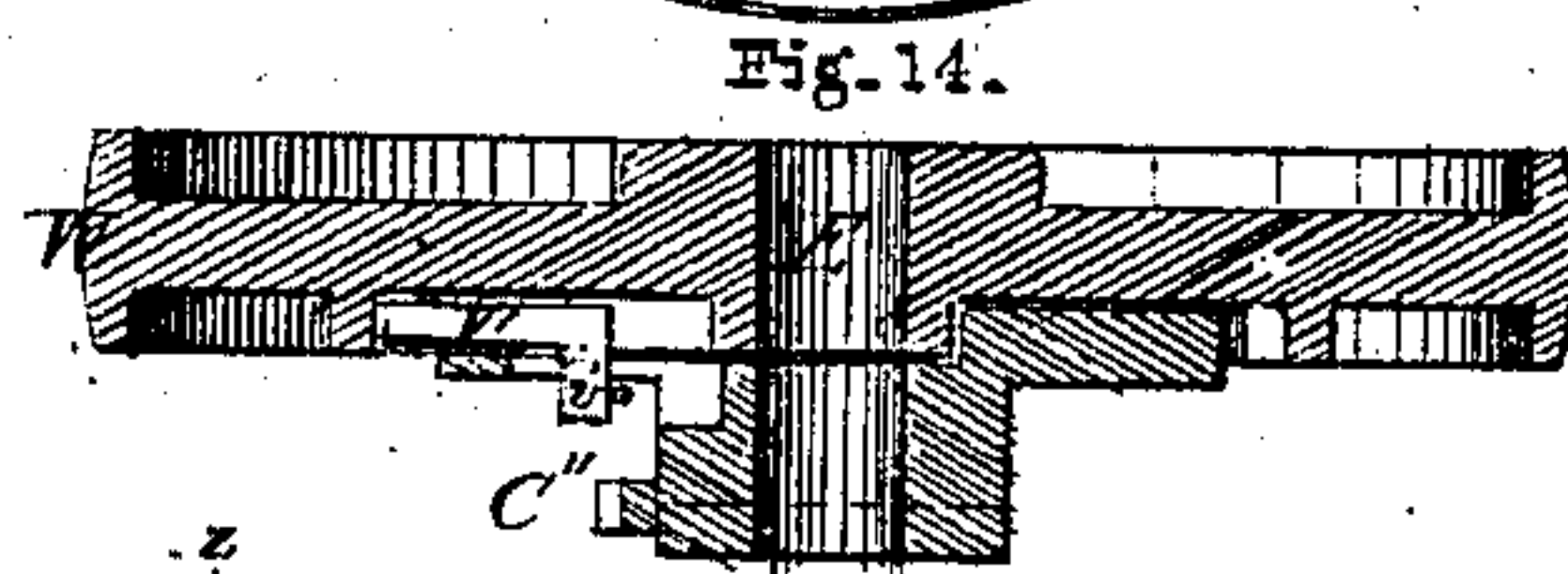
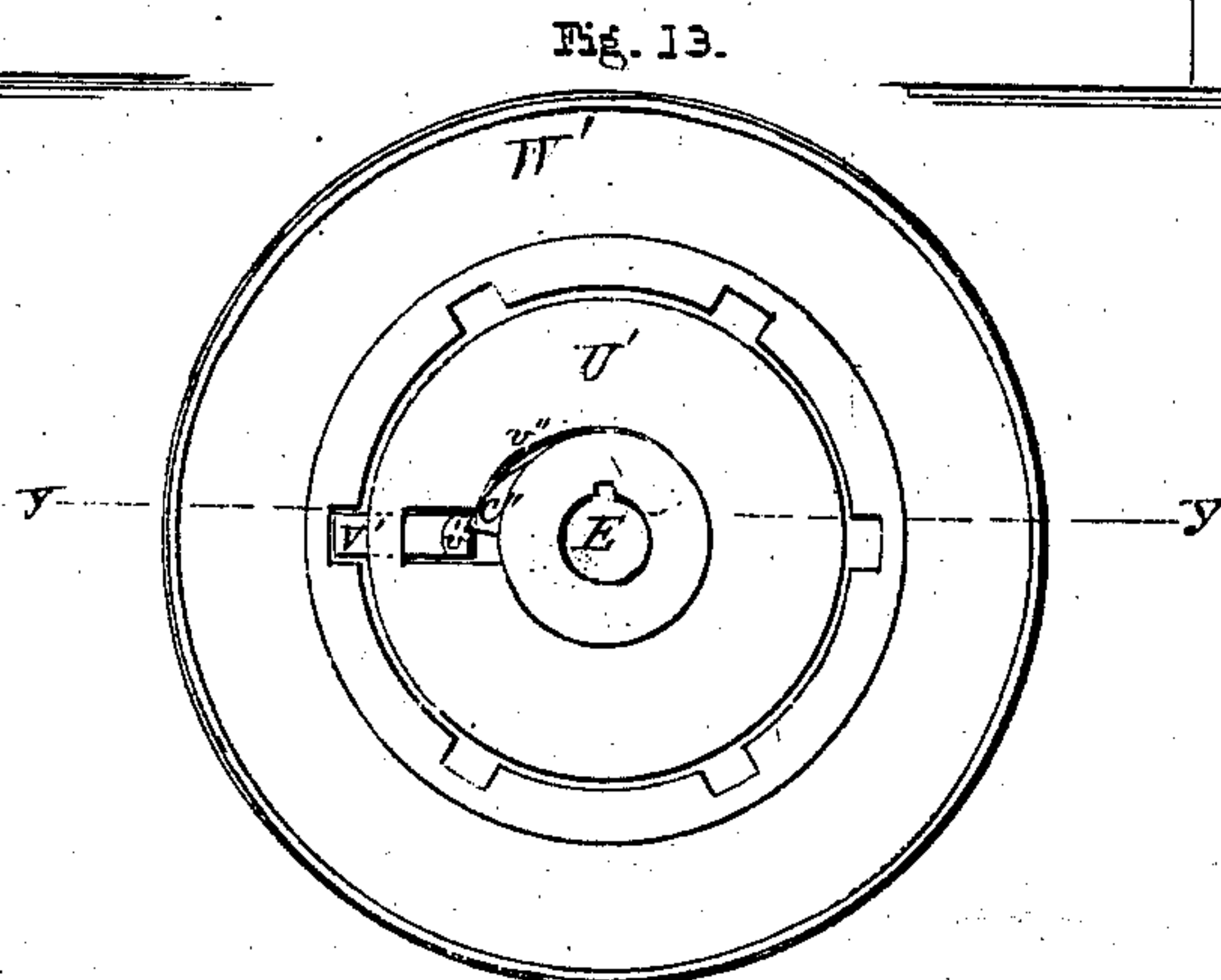
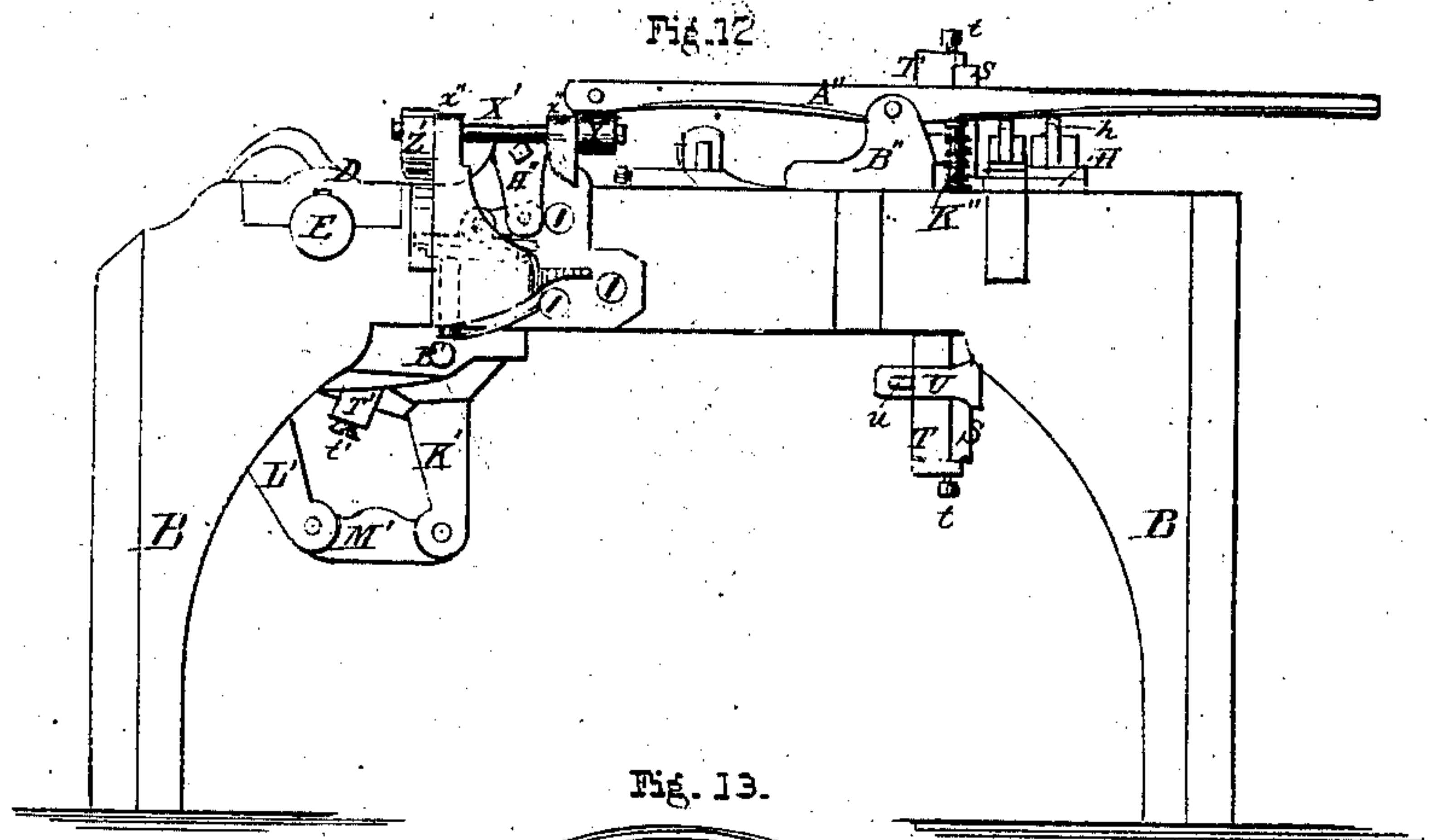
Inventor.

*F. B. Prindle*  
*by Prindle & Hyer* Attys.

F. B. PRINDLE.  
BOLT HEADING MACHINE.

No. 98,798.

Patented Jan. 11, 1870.



Witnesses.

*A. B. Ward*  
*Chas. F. Pool*

Inventor.

*F. B. Prindle*  
*by Prindle & Gyer* Attys.



# United States Patent Office.

FRANKLIN B. PRINDLE, OF SOUTHTON, CONNECTICUT.

Letters Patent No. 98,798, dated January 11, 1870.

## IMPROVED BOLT-HEADING MACHINE.

Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, FRANKLIN B. PRINDLE, of Southington, in the county of Hartford, and in the State of Connecticut, have invented certain new and useful Improvements in Bolt-Heading Machine; and do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing, making a part of this specification, in which—

Figure 1 is a plan view of the upper side of my improved device.

Figure 2 is a broken section of the same, with some of the attachments to the side-swages and holding-dies removed.

Figures 3 and 4 are side elevations of the carriers for a side-swage and holding-die, respectively.

Figure 5 is a plan view of a connecting-bar for communicating a positive motion to the side-swages.

Figures 6 and 7 are a front and side elevation, respectively, of the end-die and plunger.

Figure 8 is a cross-section of the same, on the line  $z z$ , of figs. 6 and 7.

Figures 9 and 10 are front elevations of a side-swage and a holding-die, respectively.

Figure 11 is a plan view of an elbow-connection.

Figure 12 is a side elevation of the machine, with the driving-pulley removed.

Figure 13 is a side elevation of the driving-pulley, clutch, and pawl.

Figure 14 is a cross-section of the same, on the line  $y y$  of fig. 13.

Figure 15 is a front elevation of the devices for operating the clutch and arresting the motion of the shaft.

Figure 16 is a vertical longitudinal section of the same, on the line  $z z$  of fig. 15.

Figure 17 is a rear elevation, and

Figure 18, a plan view of the same.

Figure 19 is a cross-section of the detent and guide for arresting the motion of the shaft.

Figure 20 is a broken side elevation of the frame, showing the cam and arm for releasing the holding-dies, and

Figures 21, 22, and 23, are vertical cross-sections of the shaft, on the lines  $x'$ ,  $y'$ , and  $z'$ , respectively.

Letters of like name and kind refer to like parts in each of the figures.

My invention belongs to a class of devices used for heading bolts; and

It consists, principally, in the peculiar arrangement and operation of the side-swages and end-dies, and of the plunger, by means of which the iron is first upset, so as to fill the end-dies vertically, and form two sides of the head, which is afterward completed by the action of the side-swages, as is hereinafter set forth.

It further consists in the construction of the carriers for the holding-dies and side-swages, and in the means employed for securing said dies and swages therein.

It further consists in the construction of the carrier for the end-dies, and in the means employed for securing and adjusting said dies.

It further consists in the means employed for communicating a positive motion from the cam-bars to the carrier of the side-swages and holding-die, and, in connection therewith, in the means employed for withdrawing said carriers.

It further consists in the means employed for converting a rotary motion of the shaft into an intermittent reciprocating motion of the swages, plunger, and holding-die, as is hereinafter specified.

It further consists in the construction and operation of the devices employed for releasing the driving-wheel from engagement with the shaft, and for arresting the motion of the latter, as is hereinafter set forth.

It finally consists in the construction and arrangement of the various parts of the machine, substantially as shown, and for the purpose specified.

In the annexed drawing—

A represents the bed-plate, constructed of cast-metal, and supported by four legs, B.

Journaled within suitable boxes, D, near the rear end of the bed-plate, is a shaft, E, extending transversely across the same, having secured upon, and revolving with it, a number of cams, by means of which the various parts of the machine are operated.

Extending transversely across the upper surface of the bed-piece A, near its front end, is a groove or channel, in which the carriers for the side-swages and holding-dies are contained, while three other grooves, extending rearward from, and at a right angle with the former, contain the connecting-bars for operating said dies and swages.

As seen in fig. 4, the holding-dies F are held between a tenon or lip,  $g$ , projecting forward from the carrier G, and an angular end of a clamp, H, the opposite end of which rests upon said carrier, the whole being firmly secured together by means of a bolt,  $h$ , attached to said carrier, and extending upward through said clamp, where its upper end is provided with a slot and key, or with a screw-thread and nut.

The left-hand holding-die is secured in position by means of a clamp, I, extending across its carrier, in which a corresponding groove is provided, the ends of said clamp being let into the bed-plate, while the opposite die is alternately moved to and from the other by means of a bar, K, operated by a cam upon the shaft, and connected with said carrier in the manner hereinafter described.

As seen in fig. 4, the carrier G has a recess,  $g'$ , ex-



tending transversely across the same, from its upper side nearly to its bottom, the front end of which has the form of a half-round pin,  $g''$ .

A short bar,  $L$ , corresponding in thickness to the depth of the recess, is provided with concave ends, one of which fits over of upon the pin  $g''$ ; while the opposite end, in like manner, fits over a corresponding half pin,  $k$ , provided upon the end of the bar  $K$ .

As thus constructed, it will be seen that if the bar  $K$  be moved forward, the carrier  $G$  will be pushed toward the centre in a corresponding degree, and that from the slight motion of the joint-bar  $L$  upon the pins  $g''$  and  $k$ , but little friction is created.

In order that the carrier may be withdrawn when the bar  $K$  is drawn backward, a clamp,  $M$ , is placed across the recess in the former, and secured thereto by means of dowel-pins,  $m$ , extending upward from said carrier, and passing through suitable openings in said clamp.

A pin,  $m'$ , passes downward through the clamp  $M$ , outside of, and in contact with the edge of the bar  $K$ , which, at that point, curves outward and forward at a suitable angle, so that as said bar is drawn backward, said pin, and consequently the carrier  $G$ , are drawn outward.

The side-swages  $N$  consist of suitable blocks of steel, fitting into a dovetailed groove in the face of the block  $n$ , so as to be adjustable longitudinally within the same.

A pin,  $n'$ , having one end just above the upper side of the block  $n$ , and its lower end resting upon the upper side of the swage, is made to hold the latter in place, and firmly secure the whole to its carrier  $O$  by means of an angular clamp,  $o$ , one end of which rests upon said pin,  $n'$ , while the other rests upon said carrier, said clamp being held in place by means of a key passing through the upper projection of said carrier  $O$ .

The carrier  $O$  is constructed and operated in the same manner as is the carrier  $G$ , being connected with a cam-bar,  $P$ , by means of a short elbow-connection,  $p$ , so as to receive the forward or positive motion, and having a pin,  $r$ , projecting downward from a clamp,  $R$ , into a curved slot,  $p'$ , within said bar  $P$ , by which means said carrier is moved backward.

It will be readily seen that direct pressure upon the side-swages or holding-die will cause an outward pressure of the carriers and cam-levers, and create a certain amount of friction between the same and their contiguous bearing-surfaces, which friction is reduced, and all unnecessary wear avoided, by the application of steel plates upon said bearing-surfaces.

In figs. 6, 7, and 8, are shown the end-dies  $S$ , secured vertically within a groove in the face of the carrier  $T$ , and rendered adjustable to or from the centre by means of a set-screw,  $t$ , passing inward through a projection upon either end of the carrier.

Two straps,  $U$ , passing around both dies and carrier, and provided at their rear ends with a key,  $u$ , hold said dies firmly in place, when adjusted.

Secured to and projecting rearward from opposite sides of the carrier  $T$ , are two lugs,  $V$ , which just fill the space horizontally between two cam-bars,  $W$ , and vertically between two clamps,  $w$ , secured to and connecting the upper and lower sides of said bars, the upper clamp  $w$  being removable, and secured in place by means of slotted bolts and keys, or any other equivalent device.

Working in the space between the cam-bars  $W$ , is another bar or carrier,  $X$ , to which is attached the plunger  $Y$ , in the manner hereinafter shown.

The rear end of the plunger  $Y$  passes into a corresponding opening in one end of the block  $Z$ , and is secured therein by means of a set-screw,  $y''$ , while, in turn, said block  $Z$  is fitted into a corresponding recess within the front end of the carrier  $X$ , and secured

therein by means of a clamp,  $A'$ , which, passing over a round dowel-pin,  $y'''$ , projecting upward from the rear end of said block, and an oblong dowel-pin,  $a'$ , projecting upward from the carrier, is firmly locked down upon the upper side of said block and carrier, by a key, passing through an opening in the upper end of said pin  $a'$ .

A set-screw,  $a''$ , passing through the rear end of the clamp  $A'$ , bears against the pin  $a'$ , and as the slot in said clamp, through which said pin passes, is lengthened somewhat, the block  $Z$  is drawn firmly against the rear end of the recess in the carrier.

By this method of connecting the plunger to the carrier, the former can be readily removed when desired, without interfering with or removing the latter.

As before stated, the means employed for actuating the swages, plunger, and holding-dies, consists of a series of cams, secured upon the shaft  $E$ , and operating upon the cam-bars through suitable angular arms, pivoted upon three shafts,  $B'$ , resting in boxes attached to the lower side of the bed-plate; but in order to better illustrate the same, the operation of each portion will be described.

In case of the holding-dies, it being necessary that they should be closed, and retained in such position during the entire process of heading the bolt, the actuating-cam  $O'$ , having about three-fifths of an entire circle, is caused to press against and throw forward the upper end of an arm,  $D'$ , secured upon and projecting upward from the shaft  $B'$ , and thus produce a corresponding motion of the cam-bar  $K$ , which is connected with said arm  $D'$ , by means of a short connection,  $E'$ , pivoted at either end to one of said parts.

In order that the holding-die may be withdrawn at the proper moment, a second arm,  $F'$ , is secured upon the outer end of the shaft  $B'$ , and, projecting to the rear, is caused to engage with a pointed cam,  $G'$ , secured upon the end of the shaft  $E$ , the adjustment of the parts being such as to cause said cam  $G'$  to press downward the arm  $F'$ , and, by partially rotating the shaft  $B'$ , withdraw the cam-bar  $K$  at the instant that the cam  $O'$  releases the arm  $D'$ .

As the side-swages require to be closed and instantly opened again, the cam  $H'$  is somewhat short, while the arm  $I'$ , with which it engages, is angular, and is pivoted loosely upon the shaft  $B'$ .

When in operation, the arm  $I'$  (remaining stationary during about three-fifths of each revolution of the shaft  $E$ ) is thrown forward, by the action of the cam  $H'$ , upon its vertical portion, and immediately thereafter is returned to position by the striking of said cam upon the horizontal portion thereof.

The end-dies, unlike those just described, are moved forward and remain in position during about one-third of a revolution of the shaft  $E$ , after which they are withdrawn.

To accomplish this result, two arms,  $K'$  and  $L'$ , pivoted near their centre, lengthwise, and connected together, at their lower ends, by a short bar,  $M'$ , are thrown back and forth by a cam,  $N'$ , and, by means of a connection,  $O'$ , pivoted to the rear end of the cam-bar  $W$ , and to the upper end of the arm  $K'$ , produce a corresponding motion of said bar and the end-dies.

The motion of the plunger is similar to that of the side-swages, but, from its position in the machine, the result is produced in a different manner.

A short cam,  $P'$ , is caused to throw forward the vertical portion of an angular arm,  $R'$ , pivoted upon the shaft  $B'$ , and connected with the carrier  $X$ , by means of a short connection,  $S'$ , while the return-motion is produced by the action of the cam  $N'$ , striking against the upper end of two bars,  $T'$ , which, being connected together at their lower ends, pass upward



within suitable grooves, upon opposite sides of the horizontal portion of the arm R'.

A set-screw, *t'*, passing upward through the connecting-portion of said bars T' into said arm R', serves not only to hold the former in place, but also to adjust its position vertically upon said arm, and thus determine the amount of downward motion given to the latter.

The operation of this device is as follows:

The blank, properly heated at its forward end, is placed between the holding-dies, with said end resting against the plunger, in which position it is firmly seized by said dies.

The end-dies now move forward against the inner vertical face of the holding-dies, and are immediately followed by the plunger, which, passing between said dies, upsets the end of the blank, and causes it to fill the space vertically between the same, after which said plunger is quickly withdrawn.

Upon the removal of the plunger, the side-swages are moved toward the centre, and passing between the end-dies, form the sides of the head, when they are withdrawn, and the holding-dies opened, so as to release the bolt, which is then turned one-fourth of a revolution, and submitted a second time to the before-described operation, by which means a head is formed having a perfect shape, and with all of its corners sharp and exact.

It will be observed, that by upsetting the blank between the end-dies, before the side-swages are moved forward, the iron, after filling the space vertically between the said dies, is permitted to expand laterally, by which means the necessary enlargement is secured for forming the under side of the head, which result would not be obtained if both side-swages and end-dies were moved into place simultaneously, and the plunger depended upon to fill the space between the same, as, in the latter event, the outer end of said space would be filled at once, and prevent the spreading of the iron within.

By the employment of suitable swages, any form of head desired may be produced with equal facility and exactness.

Secured upon and revolving with one end of the shaft E, is a circular disk, U', having within its outer face a radial groove, in which is placed a corresponding bolt or detent, V'.

Projecting horizontally inward, through a suitable opening in the disk, is an arm, *v'*, forming a part of the detent V', which rests upon a spring, *v''*, and is thereby passed outward, together with said detent, so as to cause the outer end of the latter to engage with one of a series of corresponding recesses, *w'*, within the face of a band-wheel, W', that is fitted loosely upon the end of the shaft E, and over the periphery of the disk, by which means said wheel and disk are locked together, and motion given to the former is communicated, through the latter, to the shaft.

In order to release the detent from engagement with the wheel, and thus arrest the motion of the shaft, when desired, the hereinafter-described devices are employed.

A short shaft, X', journaled within suitable bearings *x''*, on a line with the inner face of the disk U', and somewhat above and in rear of the shaft E, is provided, at its forward end, with an arm, Y', which, projecting inward in nearly a horizontal line, has a radial movement, with said shaft for an axis.

A second arm, Z', is attached to and extends downward from the rear end of said shaft, and, when caused to bear against the inner face of the disk U', receives and presses inward the arm *v'*, and with it the detent V', as the former is forced against said arm by the revolution of said disk.

A lever, A'', pivoted upon the frame B'', and connected to the inner end of the arm Y', furnishes a

means whereby the arm Z' may be operated so as to bear against the disk U', and, pressing inward the detent, release the shaft from engagement with the wheel, or, by being turned away from said disk, allow said detent to pass unmolested.

It being desirable that the motion of the machine should always be arrested at one point, or with the holding-dies open, a tooth, C'', is secured to and projects radially from the hub of the disk U', so as to engage with a detent, D'', projecting forward from the frame E'', which supports the releasing-devices, hereinbefore described.

The detent D'' is fitted into a dovetailed groove within a block, F'', and has a longitudinal motion therein, while said block F'' is pivoted, at its front end, and rests, at its rear end, upon a stud or pin, G'', which, passing downward, is supported by a spring, *g'''*.

Pivoted to the upper side of the detent D'', is one end of a short link, *d''*, the opposite end of which is pivoted to the vertical arm H'' of a rocker-shaft, which has, upon its opposite end, a second arm, I'', projecting rearward, where it is pivoted to or upon the rear end of the lever A'', so that when said lever is depressed at its forward end, said detent D'' is withdrawn from engagement with the tooth C'', and when the forward end of said lever is raised, said detent is thrust forward so as to engage with said tooth, and arrest the motion of the shaft.

It will be observed, that when the forward end of the lever is depressed, it not only withdraws the detent D'', but also removes the arm Z' from contact with the detent V', so that while the band-wheel and shaft are locked together, no obstruction is offered to the motion of the latter; but if said lever be raised, so as to cause said arm Z' to release said detent V' from engagement with the wheel, the same movement thrusts forward the detent D'', and arrests the motion of said tooth C'', and of the shaft.

A spiral or other spring, K'', placed beneath the forward end of the lever A'', holds the latter in such a position as to suspend the operation of the machine, except when said lever is depressed by a slight pressure of the hand.

When in operation, the shaft E would acquire considerable velocity, and, by its momentum, when released from engagement with the driving-wheel, would cause a considerable shock when the tooth C'' was arrested by the detent D'', unless the latter was, in some manner, rendered elastic.

This result is produced by means of the pivoted block F'', the pin G'', and the spring *g'''*, and so well do they perform their office that in stopping the machine no perceptible jar is experienced.

Having thus fully set forth the nature and merits of my invention,

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

1. The combination of the holding-dies F, the end-dies S, the plunger Y, and the side-swages N, constructed, arranged, and operating in the order, as to time, substantially as described, and for the purpose specified.

2. Also, the carriers G and O, constructed as described, in combination with the clamps H and *o*, and their binding-keys, substantially as shown and described.

3. Also, the carrier X, constructed as described, and provided with the clamp A', in combination with the block Z and plunger Y, substantially as herein shown, and for the purpose specified.

4. Also, the means employed for securing in place the side-swages, consisting of the grooved block *n* and pin *n'*, in combination with the carrier O and clamp *o*, substantially as herein specified.

5. Also, the means employed for securing in place and rendering relatively adjustable the end-dies S,



consisting of the carrier T, provided with the set-screws *t*, and the straps U, provided with the key *u*, substantially as shown, and for the purpose set forth.

6. Also, the means employed for imparting to the movable holding-die and side-swages a positive forward motion, in a line at a right angle to that of the cam-bars, and for withdrawing said die and swages, consisting of the elbow-bars L and *p*, the half-round pins or bearings *g'' o'' k p''*, the pins *m* and *r*, the curved edge *k'*, and slot *p'*, in combination with the carriers G and O, and the cam-bars P and K, substantially as shown and described.

7. Also, the means employed for operating the holding-dies, end-dies, plunger, and side-swages, in the order required, consisting of the cams C', G', H', N', and P', secured to and revolving with the shaft E, and the pivoted arms D', F', I', K', L', and R', suitably connected to the cam-bars, all constructed and arranged to operate substantially as and for the purpose specified.

8. Also, the means employed for arresting the motion of the shaft E, when not in gear with the pulley

W', consisting of the tooth C'', the detent D'', the pivoted block F'', the link *α''*, the arms H'' and I'', and the lever A'', substantially as and for the purpose shown.

9. Also, in combination with the subject-matter of the last above-mentioned clause, the loose pulley W', the disk U', the detent V' provided with the angular arm *v'*, the shaft X' provided with the arms Y' and Z', and operated by means of the lever A'', all constructed and arranged substantially as described, and for the purpose of throwing said pulley W' in and out of gear with the shaft E.

10. Also, the construction and arrangement of the various parts of the hereinbefore-described bolt-heading machine, substantially as shown, and for the purpose set forth.

In testimony that I claim the foregoing, I have hereunto set my hand, this 12th day of November, 1869.

FRANKLIN B. PRINDLE.

Witnesses:

GEO. S. PRINDLE,  
EDM. F. BROWN.