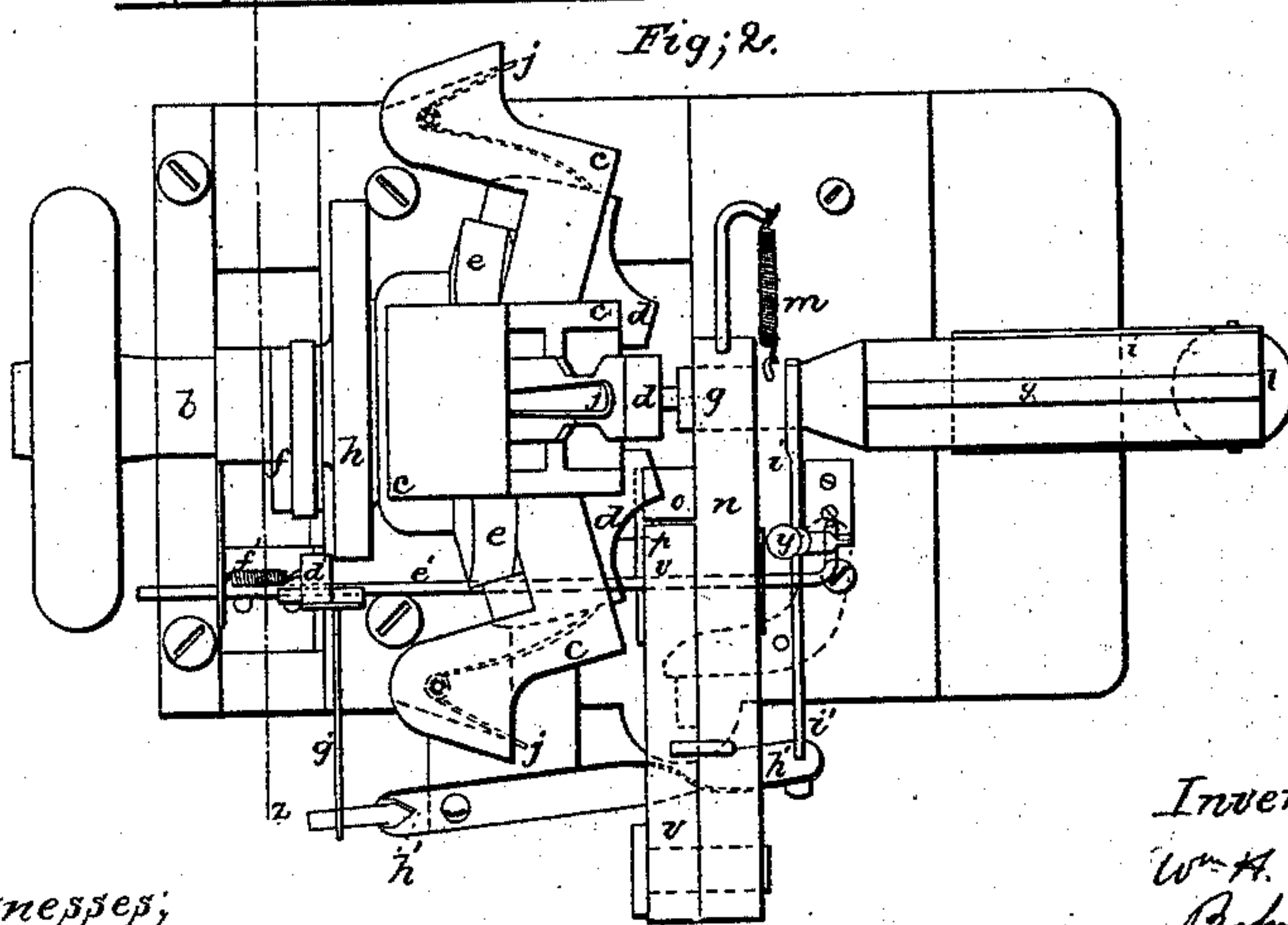
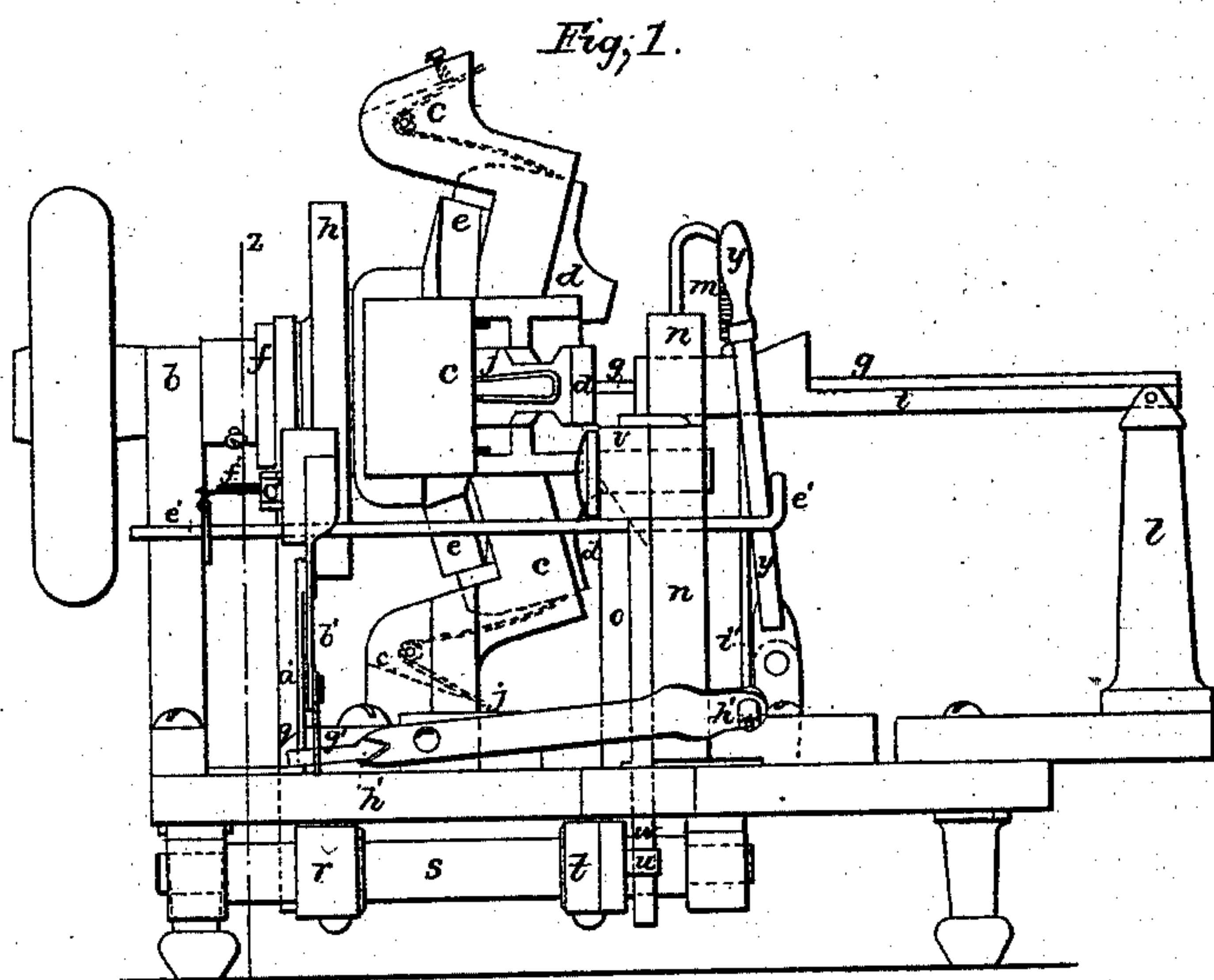


2 Sheets—Sheet 1.

**W. F. DEFREES.**  
**FORGING MACHINE.**

No. 78,266.

Patented May 26, 1868.



Witnesses;  
J. B. Kidder  
M. W. Frothingham

Inventor;  
Wm. H. DeFries  
By his Attor.  
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W. F. DEFREES.  
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Fig. 3.

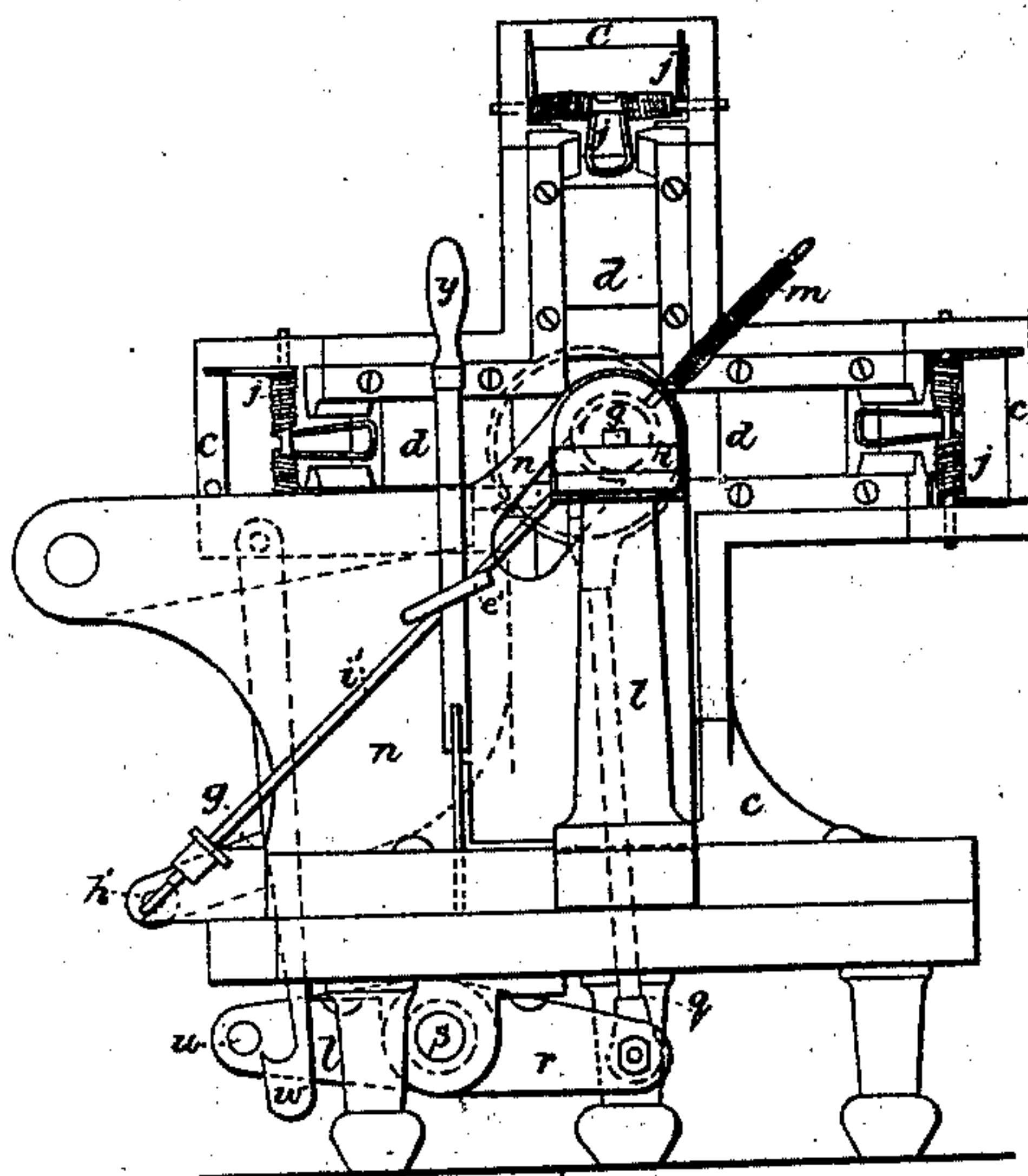
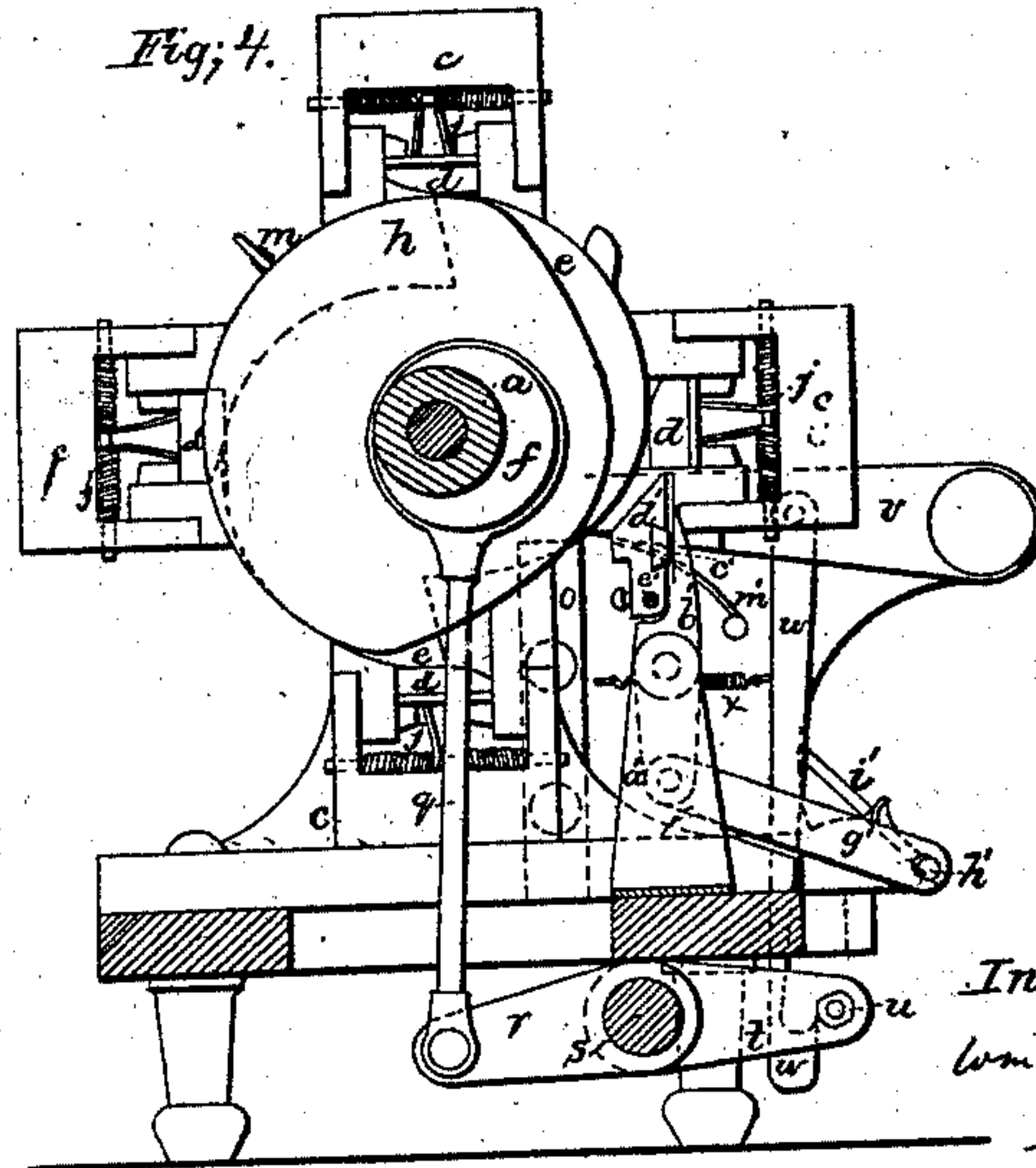


Fig. 4.



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# United States Patent Office.

WILLIAM H. DEFREES, OF ANDOVER, MASSACHUSETTS.

*Letters Patent No. 78,266, dated May 26. 1868.*

## IMPROVED FORGING-MACHINE.

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

### TO ALL WHOM IT MAY CONCERN:

Be it known that I, WILLIAM H. DEFREES, of Andover, in the county of Essex, and State of Massachusetts, have invented an Improved Forging-Machine; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practise it.

Prior to my invention, forging-machines have been in use having a general arrangement and mode of operation as follows:

About a common centre two pairs of hammers have been pivoted on helves or levers, which have at their rear ends, opposite to the ends bearing the hammer-heads, been operated by a cam, to cause each hammer of each pair to move away from its fellow, there being applied to some portion of each hammer, springs, so arranged as to act counter to the operation of the cam; and to cause each hammer of a pair to give simultaneously a blow toward the common centre, each hammer of each pair moving synchronously with respect to its fellow, whether moving toward or from its fellow, and each hammer-head serving as an anvil to receive and to react against the blow given by its fellow. In said arrangement there has been a provision for cutting off the forged portion of a rod or blank presented to the action of the hammers, without changing the centre of the rod from the position which it had while receiving the action of the hammers, the hammers being stopped from moving during the time the cutting-operation is performed.

This arrangement is faulty, inasmuch as the hammers break at some part of their helves, and do not give a drawing blow, such as is most efficient in forging.

My invention consists in an arrangement of opposite acting slides, to serve as hammers, by which I dispense with helves, and thus free the machine from liability to breakage, combined with an arrangement of the sliding hammers, such as shall cause them, when moving to give a blow, to traverse in a direction from the body of the rod or blank to be forged, toward the end or point thereof, thus giving what smiths term a drawing blow, which is effective in rapid drawing or elongating toward the point of the forging, whereas a square blow, or a blow in which the hammer does not in its movement tend either way from the centre of percussion, moves the particles of metal about equally in every direction from said centre, but a drawing blow, such as I have described, moves a majority of the particles toward the point or end of the forging; also, in moving the rod or blank after its end is forged, entirely clear of the hammers, by changing the general position of the rod, and thereby bringing it to the action of shears remote from the hammers, which in consequence do not have to be stopped in their movement. In the drawings, which illustrate an embodiment of my invention—

Figure 1 is a side elevation of my improved forging-machine, adapted to the production of horse-shoe nails and other small forgings.

Figure 2 is a plan of the same.

Figure 3 is an end view, and

Figure 4 is a sectional elevation, the section being taken in line *z z*, figs. 1 and 2.

*a* is the shaft, to which power is applied to work the machine, said shaft having one bearing in the upright, *b*, of the frame, and another bearing in the irregular piece *c*, in which piece are the slides or ways which guide the hammers *d* in their movements. On said shaft are fixed the double-throw edge-acting dishing-cam *e*, which operates alternately on each pair of the hammers, the eccentric, *f*, which operates the shears, to cut the forging from the rod or blank *g*, and the cam *h*, which shifts the blank and its bed *i*, so as to bring the forging to the position where it can be cut off by the shears clear from disturbance by the continued operation of the hammers.

The faces of the hammers *d* are so formed that they can meet on planes passing through the axis of shaft *a*, and dies may be formed in said faces suited to shape and form any article which is to be forged.

Inspection of the drawings will show that the hammers *d* are so guided in the piece *c* that their movements are not at right angles to planes intersecting the axis of the shaft *a*, the hammers moving in their descent away from the body of the blank *g* toward its point. Springs, *j*, are employed to force the hammers toward each other at the times when they are relieved from the operation of the cam.



The springs on the horizontal hammers are of equal force, but of less force than the lower spring, and of greater force than the top spring, and set-screws, such as are seen at *k*, may be employed to regulate the tension of the springs, so as to vary the force of the blows to be given, as may be desired.

The parts of cam *e*, which operate on the projections from the hammers *d*, to move them outward against springs *j*, are made dishing or inclined to the axis of *a*, instead of square thereunto, so as, in moving the hammers outward, always to keep the same amount of contact with the hammers in any position thereof, by which construction the amount of the projections from the hammers, on which the cam *e* operates, is reduced to a minimum.

The blank-bed *i* is connected to the post *l* by a kind of universal joint, composed of an upright and a horizontal pivot. The free end of said bed *i* is made as a tube, having an interior of a size and form adapted to the blank to be pushed through the tube to be forged, said free end being held in position by spring *m*, against the upper end of an inclined slot in the piece *n*.

The object of this arrangement of the bed *i* is to provide for movement of the forging and the blank away from the hammers, so as to present the forging over a stationary cutter, *o*, to be severed thereupon by the moving cutter *p*.

A rod, *q*, from the strap on the eccentric, *f*, works the rocker-arm *r* on the rocker-shaft *s*, there being at the other end of said shaft another rocker-arm, *t*, having in its vibrating end a stud, *u*. The movable cutter *p* is fixed on one end of an arm, *v*, which is pivoted to piece *n* at its other end, and a hook, *w*, depends from said arm *v*, which is kept out of the path of vibration of stud *u* by a spring, *x*, except at such times as the operator by movement of lever *y* moves the hook *w* into gear with stud *u*, movement of lever *y* being communicated to hook *w* by bent lever, seen in dotted lines in fig. 2. The shears are not required to operate except at such times as the forging is presented to the action of the cutters, which is accomplished as follows:

To a stand, *a'*, is pivoted a lever, *b'*, the upper end of which is provided with a guide, *c'*, on which a piece, *d'*, is fitted, so that it can be moved along against resistance of spring *f'* by pull on the rod *e'*, to which piece *d'* is fixed, the rod *e'* being bent, so that when the lever *y* is operated to cause hook *w* to engage with stud *u* to work the cutters, then the rod *e'* is pulled, and causes piece *d'* to move into the path of operation of the cam *h*, which, impinging on *d'*, causes vibration of lever *b'*, which, through link *g'*, lever *h'*, and link *i'*, draws down the bed *i*, and moves the forging where the cutters will sever it from the blank, *g*.

When the operator releases his hold upon the lever *y*, the spring *x* retracts the hook *w* as soon as the stud *u* moves upward, and the spring *m'* lifts the movable cutter, the spring *f'* draws the piece *d'* out of the path of operation of the cam *h*, and the spring *m* draws the blank-bed *i* into position, so that the operator can thrust the blank, *g*, through the tube of bed *i* between the hammer-faces, so as to receive their forging action. When the end of the blank, *g*, is sufficiently forged and shaped, then by pull on lever *y* the forged article is presented to the cutters, and the movable cutter severs the forging from the rod *g*, all as and by the means before described.

It is intended to have the hammers operate on hot iron, and the operator keeps several rods in a fire near by, so that as the heated end of the rod introduced to the action of the machine becomes cool, another hot rod from the fire is substituted for the one which has become cool.

The cams *h* and *e*, and the eccentric, *f*, are so shaped and fixed upon the shaft *a*, that the blank or forging on the end thereof, is made to move diagonally from between the hammer-jaws at a time when they are fully open, and so as to clear any two approaching jaws, and the forging being presented to the cutters, remains there till the forging is severed from the blank before the blank-bed assumes position in line with the axis of shaft *a*.

I claim the combination, for the purpose specified, of two or more pairs of sliding hammers, *d*, an independent spring, *j*, to work each hammer, inclined ways for each slide or hammer, and an inclined rotative cam, operative on all of the slides or hammers, all arranged and operating substantially as set forth.

Also, for moving the blank-bed from the hammers to the cutters, the combination of the cam *h*, the hand-worked slide *d'*, and the several levers and connections between said slide and the blank-bed, which cause the bed to be moved by the cam *h*, substantially as described.

Also, for causing the cutters to operate upon the forged nail, to sever it from the nail-rod when in position over the fixed cutter, the combination of the hand-lever which moves slide *d'* with the hooked rod *o*, pendent from the cutter-arm *v*, to throw the hook of said rod into gear with the vibrating-pin *u*, worked from a motor, *f*, on the main shaft, substantially as described.

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Witnesses:

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FRANCIS GOULD.