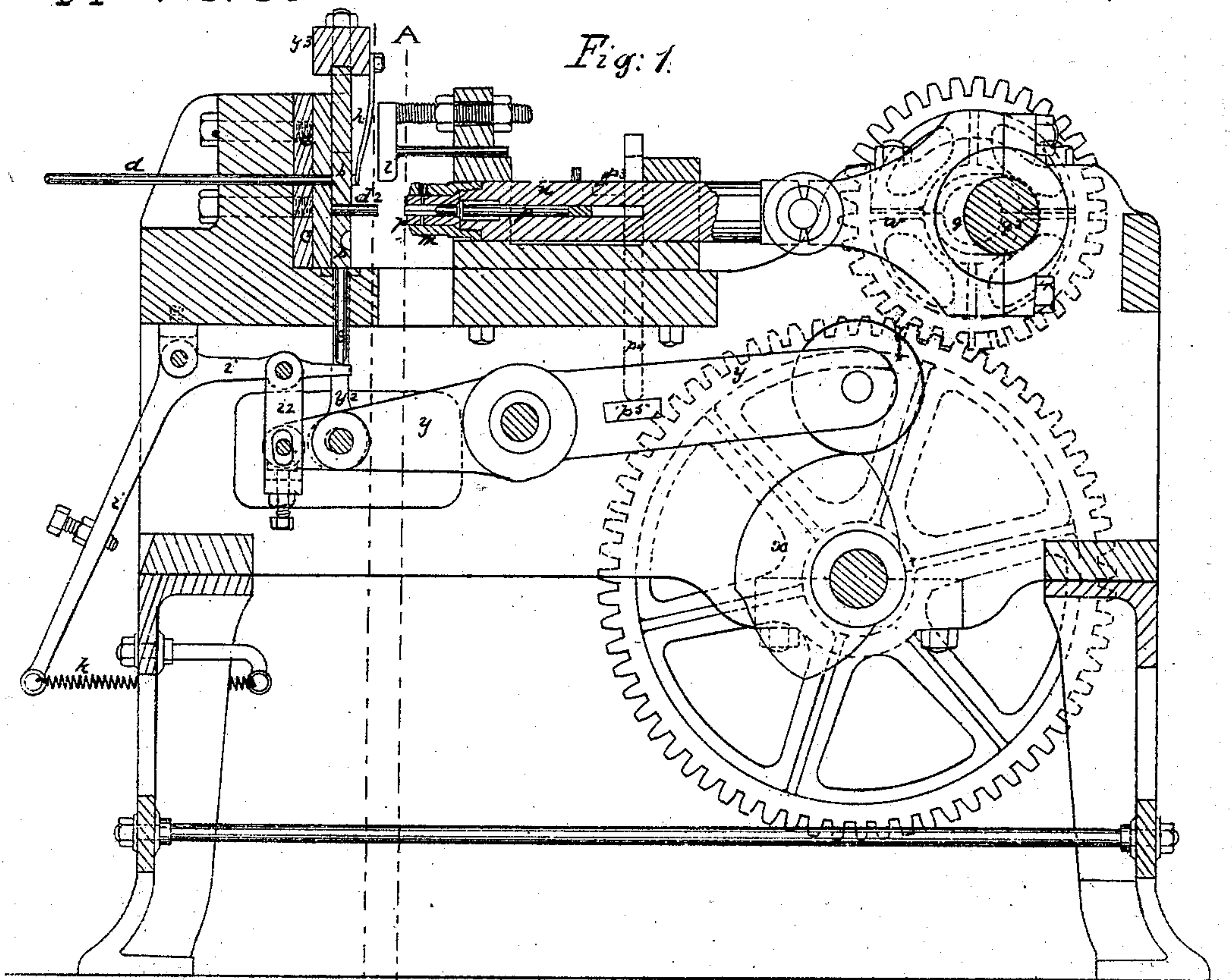


J. Wakefield.
Bolt & Rivet Machine.

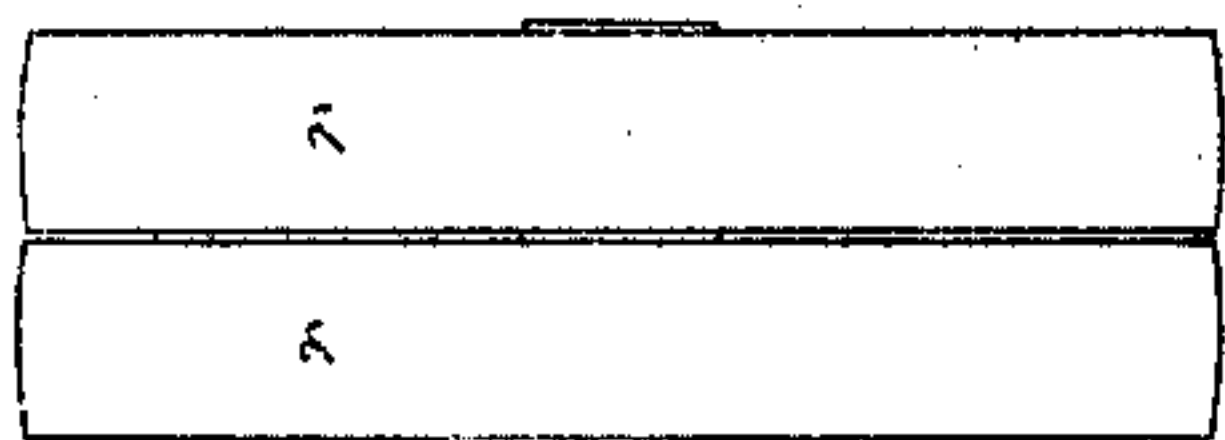
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Patented Dec. 10, 1867.

Fig. 1.



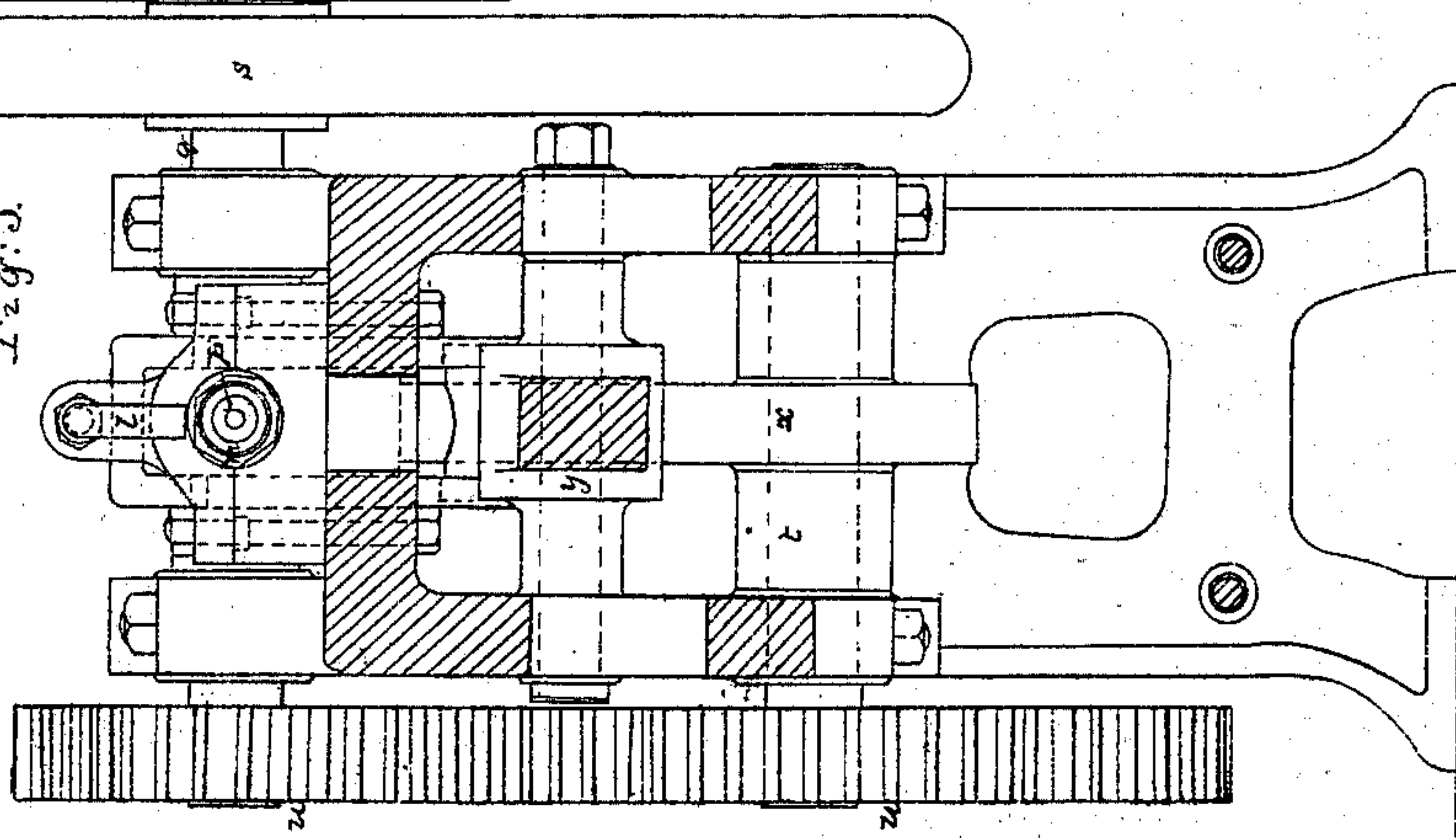
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Inventor

John Wakefield.

Fig. 3.



Witnesses

Richard Sherrett.

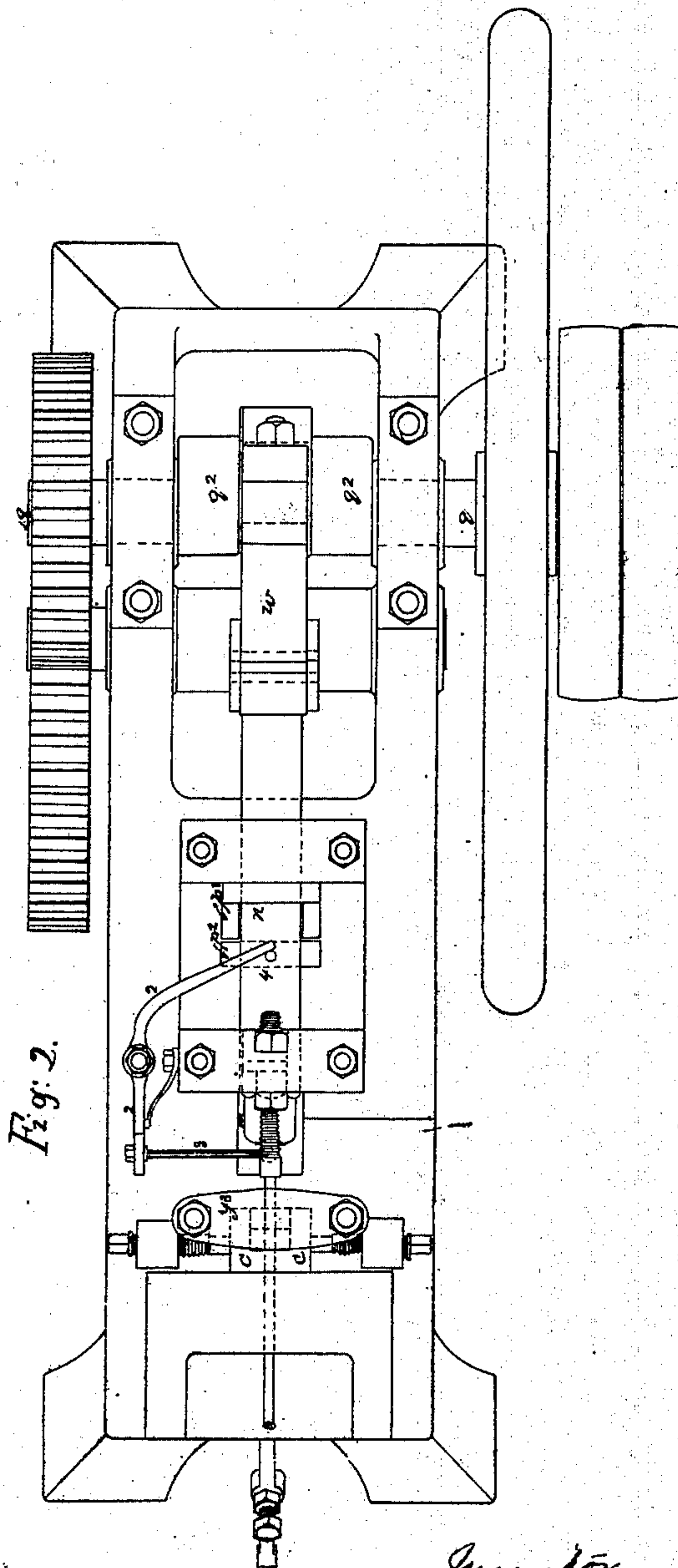
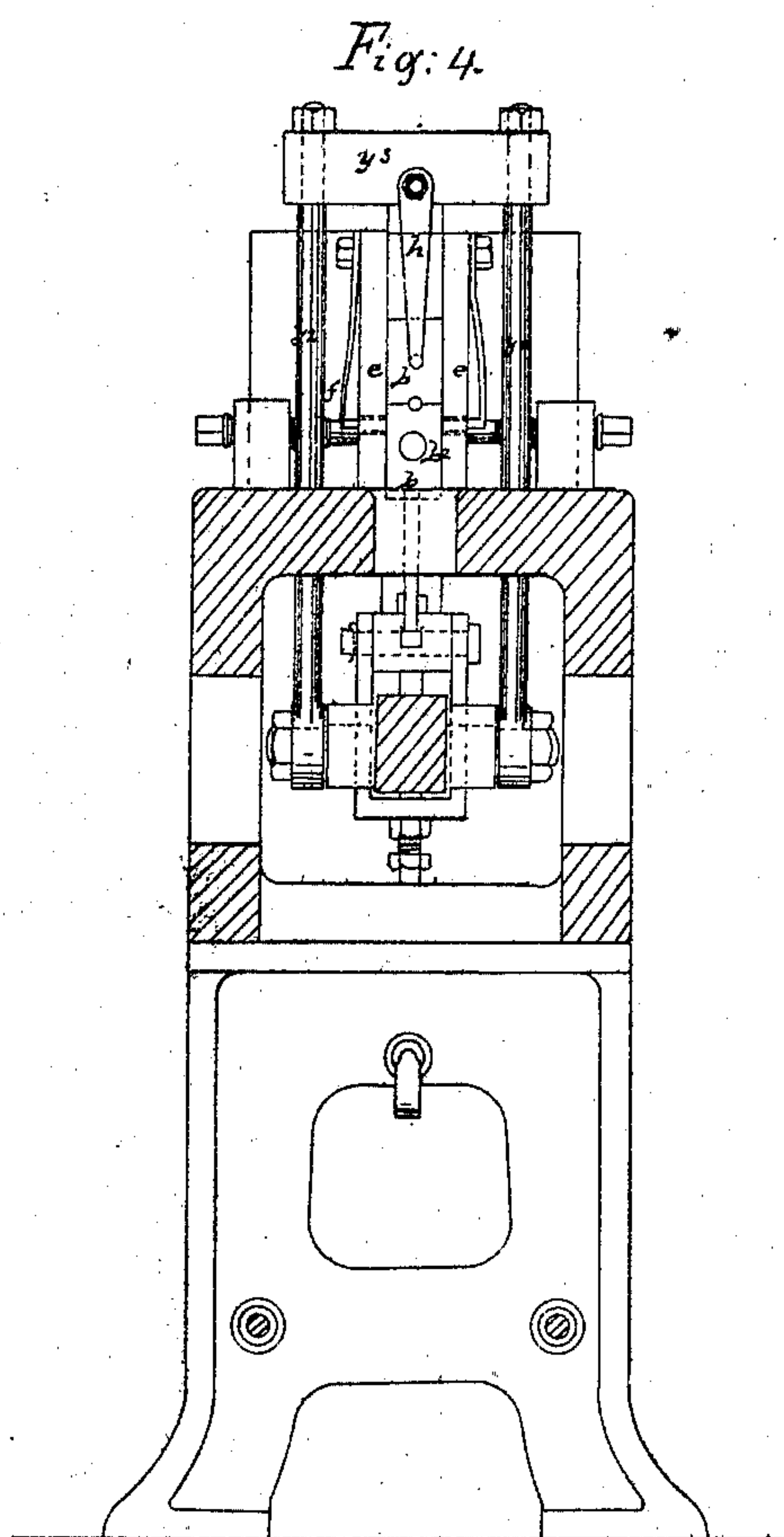
Henry Sherrett.

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Patented Dec. 10, 1867.



Witness

Richard Sherrett

Henry Sherrett

Inventor

John Wakefield

United States Patent Office.

JOHN WAKEFIELD, OF BIRMINGHAM, ENGLAND, ASSIGNOR TO ISAAC SMITH AND WILLIAM FOTHERGILL BARTHO.

Letters Patent No. 72,135, dated December 10, 1867; patented in England, September 14, 1865.

IMPROVED BOLT AND RIVET-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, JOHN WAKEFIELD, of Birmingham, in the county of Warwick, in the Kingdom of England, machinist, have invented new and useful Improvements in Machinery for the Manufacture of Rivets, Bolts, Screw-Blanks, and similar articles; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon; that is to say—

My invention consists of the arrangements or combinations of parts of the machinery hereinafter described for the manufacture of rivets, bolts, screw-blanks, and similar articles, by which said arrangements or combinations, great simplicity in the parts of the machine is secured, with efficiency of action. My invention is applicable to the manufacture of rivets, bolts, screw-blanks, and similar articles of iron, copper, or other metal, and either hot or cold.

The essential parts of the machine are thus constructed and worked: The rod to be made into rivets is fed into the machine by hand or by a feeder of the ordinary construction, the said rod being fed through a guide-plate into movable dies, the length of rod being regulated by a stop in front of the dies. The movable dies described have a rising and falling motion, and have three functions, that is, they cut off the length of rod fed into the machine, carry the cut-off rod in front of a horizontal punch or heading-die, and, finally, serve as the die in which the head of the rivet or bolt is formed.

As soon as the rod has been fed to the stop, the vertical dies descend, cutting off the length of rod against the face of the guide-plate, and carry the said cut-off length of rod in front of a hollow punch or die, having a horizontal motion; the interior of the said punch or die having a figure corresponding to that to be given to the shank of the rivet, the back end of the said hollow die being closed by a rod or stopper, situated in the axis of the bolt or plunger, carrying the said hollow die. On the advance of the said horizontal punch or die, that part of the length of rod in the vertical dies which is situated beyond the said vertical dies, is shaped by the said punch or die into the shank of the rivet or bolt. The shank of the rivet or bolt having been thus formed, the horizontal punch or die retires, carrying in its interior the partially made rivet or bolt, the said retiring motion removing the end of the rod which had been held in the vertical dies from the said dies, the said end or part being sufficient to make a head. The vertical dies now rise and bring a recess or concavity in the bottom vertical die of the figure of the head of the rivet to be made opposite the horizontal punch or die. The horizontal punch or die again advances and shapes or upsets that part of the rod external to it in the depression or concavity in the bottom vertical die, and forms a head. The shank held in the horizontal punch or die is thus headed and the rivet completed. The horizontal punch or die again retires, and the headed rivet is removed therefrom by a rod or tipper worked in the manner hereinafter explained. When the vertical dies are in the position last described, that is, in position to have the head of the rivet shaped in the bottom die, the opening in the said dies coincides with that in the guide-plate, and a fresh portion of the rod is fed through the said dies against the stop. On the retiring of the horizontal punch or die, after the formation of the head on the rivet, the vertical dies descend and cut off a fresh length of rod, and bring it in front of the horizontal punch or die, and the operations already described are repeated.

The rod or tipper for removing the finished rivet from the horizontal punch or die is constructed and worked as follows: The bolt or plunger, carrying the horizontal punch or die is hollow through the greater part of its length, and in the hollow of the said plunger, the rod or tipper works, the front end of the said rod or tipper closing the back end of the punch or die in which the shank of the rivet is made. The back of the rod or tipper carries a cross-bar, in which a forked slide, having a rising and falling motion, is capable of engaging. The said cross-bar works in longitudinal slots in the sides of the plunger. When the horizontal punch or die first retires, after having formed the shank of the rivet, the rod or tipper moves with the plunger, but when the said punch or die retires a second time, after the formation of the head of the rivet, the forked slide described descends, and engaging with the cross-bar of the rod or tipper, fixes the rod or tipper. The punch or die and plunger now move without the rod or tipper, and the rivet is ejected from the hollow punch or die, by coming against the end of the temporarily-fixed rod or tipper. On the advance of the horizontal punch

or die, to form a fresh rivet, the rod or tipper is liberated by the rising of the forked slide, and again moves with the said punch and the plunger in which it is situated.

The motion of the horizontal punch or die is effected by a crank on the principal shaft of the machine, and the motions of the vertical dies, and also the forked slide for working the tipper, are effected by a lever, moved by a cam on a shaft situated parallel to and worked from the principal shaft of the machine, the cam-shaft making one rotation to two rotations of the crank or principal shaft.

Having explained the nature of my invention, I will proceed to describe, with reference to the accompanying drawings, the manner in which the same is to be performed.

Figure 1 represents a longitudinal section of a rivet-machine, constructed according to my invention, and Figure 2 is a plan of the same.

Figure 3 is a transverse section of the machine on the line A A, fig. 1, looking towards the crank-shaft, and Figure 4 is a transverse section on the line X X, fig. 1, looking towards the feeding end of the machine.

The same letters of reference indicate the same parts in each figure of the drawings.

$b\ b$ are the movable dies for cutting off and carrying the cut-off rod, and shaping the head of the rivet. The said dies have a rising and falling motion against the guide-plate c , through which guide-plate the rod, d , to be made into rivets, is fed. The dies $b\ b$ slide in the frame e , (see fig. 4,) and are maintained therein by the ends of the springs $f\ f$, bearing against the edges of the dies, and the spring h , bearing upon the front of the said dies. The said dies $b\ b$ are pressed upwards and kept to their work by the cranked lever i , the short arm of which lever is maintained against the rod or spindle g , connected with the bottom die by the coiled spring k acting upon the longer arm of the said lever i , as represented in fig. 1. l is an adjustable stop in front of the dies, against which stop the rod d , fed through the plate c and dies b , bears. m is the horizontal punch or die for shaping the shank of the rivet, and holding it while being headed. The said punch or die m is hollow, and is made of a figure corresponding to that to be given to the shank of the rivet. The said hollow punch or die is carried by a bolt or plunger, n , sliding in guides on the bed of the machine.

In the axis of the die m and bolt or plunger n is a rod or stopper, p , which stopper, when the said die m is shaping the shank of the rivet, closes the back end of the said die. The said rod or stopper also constitutes the tipper for removing the finished rivet from the punch or die m , as hereinafter explained. q is the main shaft of the machine; $r\ r$ are the fast and loose pulleys, and s the fly-wheel, on the said shaft. Below the shaft q , and parallel therewith, is a second shaft, t , the said shafts q and t being geared together by the toothed wheels $u\ v$, the main shaft q making two revolutions to one revolution of the shaft t . The bolt or plunger n , carrying the punch or die m , is worked from a crank, q^2 , on the shaft q , the said crank being connected to the plunger by the connecting-rod w . The rising and falling motions of the vertical dies $b\ b$ are effected by the cam x on the shaft t , acting through the lever y , connecting-rods $y^2\ y^2$, and cross-pieces y^3 . The short arm of the lever i for pressing the dies b upwards, is connected by the link i^2 to the short arm of the lever y . The stopper or tipper p for removing the rivet from the punch or die m is capable of moving with the die and the plunger carrying it. The back end of the tipper carries a cross-bar, p^2 , working in a longitudinal slot made across the plunger n , (see plan, fig. 2.) Behind the said cross-bar p^2 is a forked slide, $p^3\ p^4$, the projecting parts, p^3 , being situated on either side of the plunger n . A rising and falling motion is given to the forked slide $p^3\ p^4$, by the lever y , the ends of the said slide resting on projections p^5 , on either side of the said lever.

When the forked slide $p^3\ p^4$ is in the position represented in fig. 1, the cross-bar p^2 of the rod or tipper p , moves with the die m and plunger n . When, however, by the descent of the long arm of the lever y , the said slide falls, the projecting parts, p^3 , engage behind the cross-bar p^2 , and fix it and the said tipper p on the punch or die m and plunger n , making their return motion after the formation of the head on the rivet, the said rivet comes against the temporarily fixed rod or tipper p , and is expelled from the punch or die m .

The action of the machine is as follows: The rod, d , to be made into rivets, being fed by hand or by a self-acting feeder, through the guide-plate c , and vertical dies b , against the stop l , the said vertical dies b descend, cutting off a length of rod against the face of the guide-plate c , and carrying the said cut-off rod in front of and in a line with the horizontal punch or die m . The cut-off length of rod brought in front of the horizontal punch or die m , is marked d^2 in fig. 1. On the advance of the ram n , the punch or die m shapes the length of rod d^2 , held in the dies b , into the shank of the rivet, the stopper p being pushed into the punch or die m , by the advance of the said punch or die upon the cut-off length of rod d^2 . The shank of the rivet having been thus formed, the said punch or die retires, carrying in its interior the partially-made rivet; the end of the partially-made rivet which had been held in the vertical dies b , being sufficient to make a head. The vertical dies b now rise and bring a recess at concavity b^2 , in the solid part of the bottom die of the figure of the head to be made opposite the horizontal punch or die m . The punch or die m advances a second time and shapes or upsets that part of the partially-made rivet external to it in the recess or concavity b^2 in the bottom die b , and forms a head.

The punch or die m again retires, and the finished rivet is expelled therefrom by the now temporarily-fixed rod or tipper p , the said rod or tipper being fixed by the engagement of the parts p^3 of forked slide, behind the cross-bar p^2 , in the manner hereinbefore explained. In order to insure the expulsion of the finished rivet from the punch or die m , I use a kicker-lever, marked 2, in fig. 2, a rod, 3, carried by the lever terminating near the side of the punch or die m . On the retiring of the die m , after the formation of the head, a pin or plug, 4, on the cam or plunger n , strikes against the outer arm of the lever 2, and causes the rod 3, at its opposite arm, to kick or strike the rivet as it leaves the punch or die m . During the formation of the head of the rivet by the second advance of the punch m , a fresh portion of the rod d is fed through the dies b to the stop l , and on the retiring of the punch m with the headed rivet, the said rod is cut off and carried down to the position represented in fig. 1 by the dies b , and the operations already described are repeated. When

heated rods are being made into rivets by the machine, I prefer to keep the dies *b b* and punch or die *m* cool by a stream of water passing through them.

Having now described the nature of my invention, and the manner in which the same is to be performed, I wish it to be understood that I do not limit myself to the precise details herein described, and illustrated in the accompanying drawings, as the same may be varied without departing from the nature of my invention. Thus the vertical dies may have a lateral motion to and fro, instead of an ascending and descending motion, and the punch *m* may be made to move vertically instead of horizontally. Other modifications may also be made, as, for instance, the machine may be made double ended or double sided, so as to produce more than one rivet at a time. This invention may also be employed for the manufacture of bolts, or blank-screws, or other similar articles, with heads, and all or any of these modifications may be carried out without departing from the nature of my invention. But

I claim as my invention of improvements in machinery for the manufacture of rivets, bolts, screw-blanks, and similar articles—

1. The arrangement, or combination, substantially as hereinbefore described, and illustrated in the accompanying drawings, of the vertical dies *b b*, for cutting off and carrying the cut-off length of rod, and for shaping the head of the rivet or bolt, with the horizontal punch or die *m* for shaping the shank of the rivet or bolt, and upsetting the end of the rivet or bolt into a head in the vertical dies.

2. The arrangement or combination of parts hereinbefore described, and illustrated in the accompanying drawings, for giving motion to the said vertical dies *b b*, and horizontal punch or die *m*.

3. The arrangement or combination of parts hereinbefore described, and illustrated in the accompanying drawings, for removing the finished rivet or bolt from the horizontal punch or die.

In testimony whereof, I have hereunto set my name in presence of two subscribing witnesses.

JOHN WAKEFIELD.

Witnesses:

RICHARD SKERRETT, 7 Cannon Street, Birmingham.

HENRY SKERRETT, 7 Cannon Street, Birmingham.