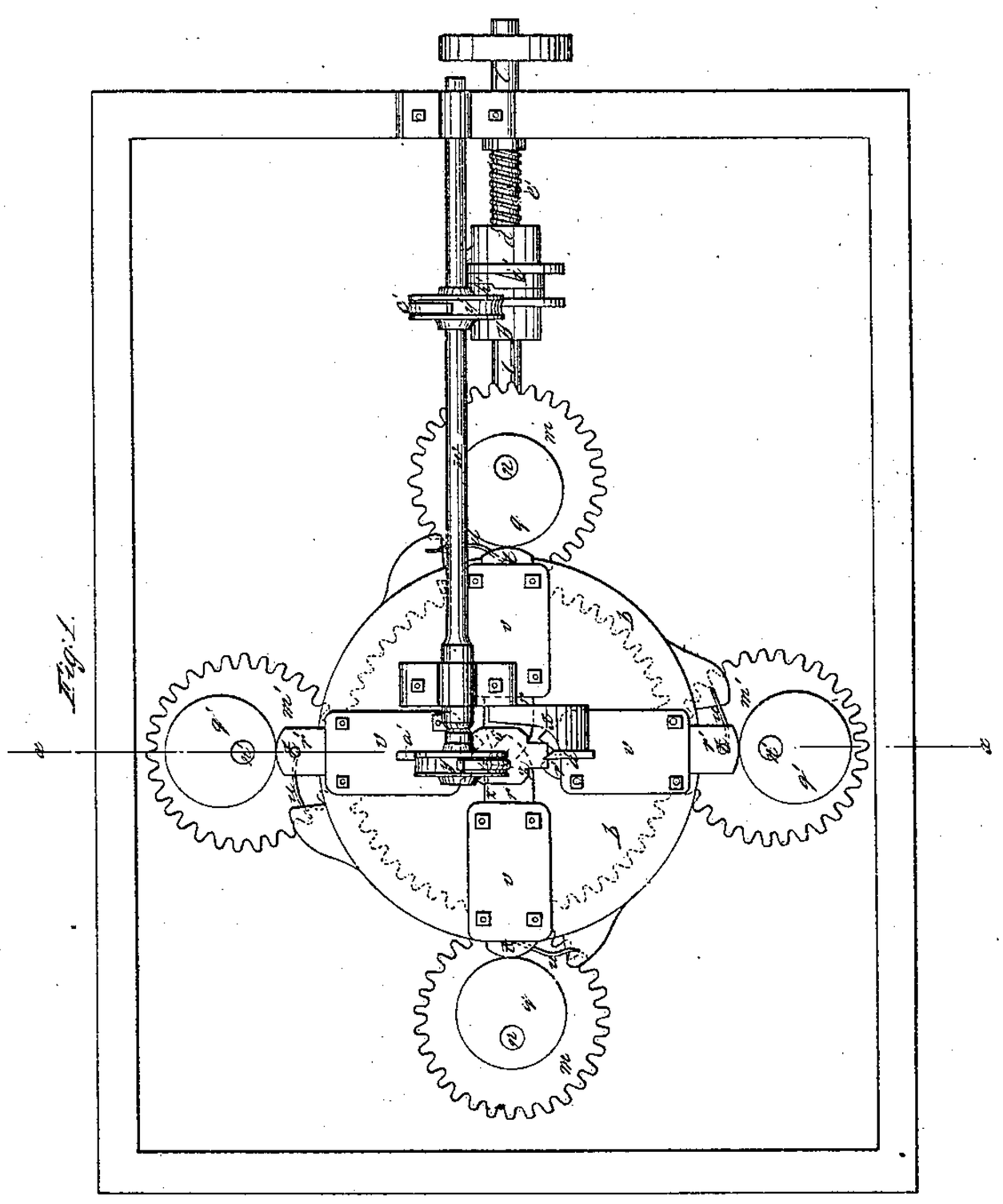
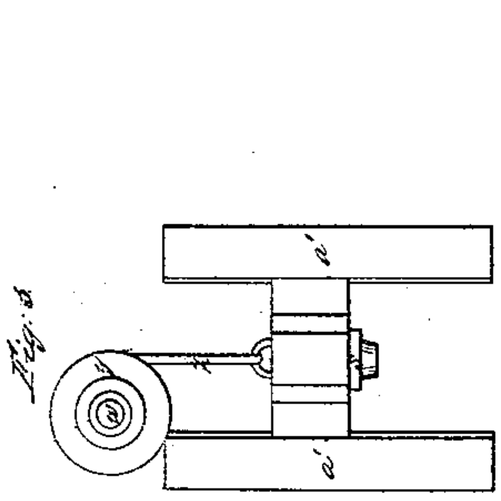
Sheet 1 - 2 Sheets.

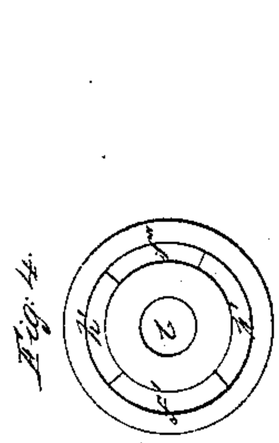
E. Kaylor,

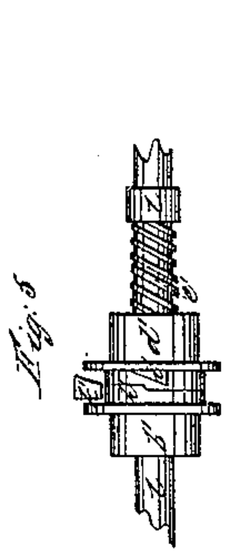
Bolt-Heading Machine,

No. 50,599. Patented Oct. 24, 1865.









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by his attorney
M. Bakewell

Sheet 2-2. Sheets.

E. Kaylor,

Bolt-Heading Machine,

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Fig. 1.

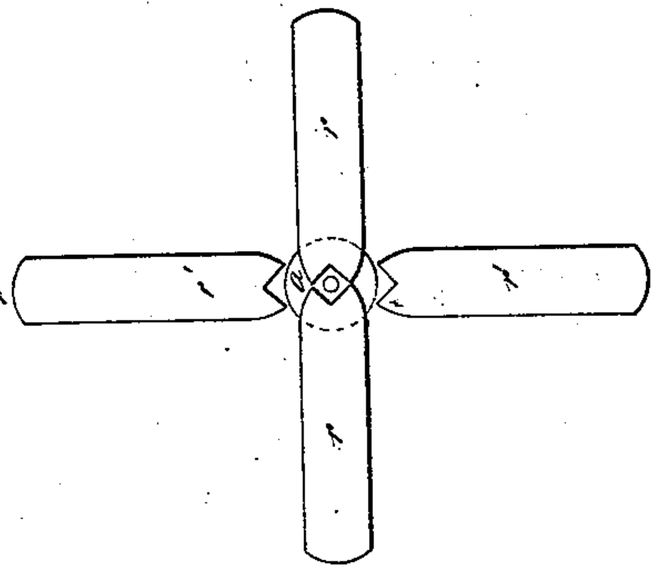
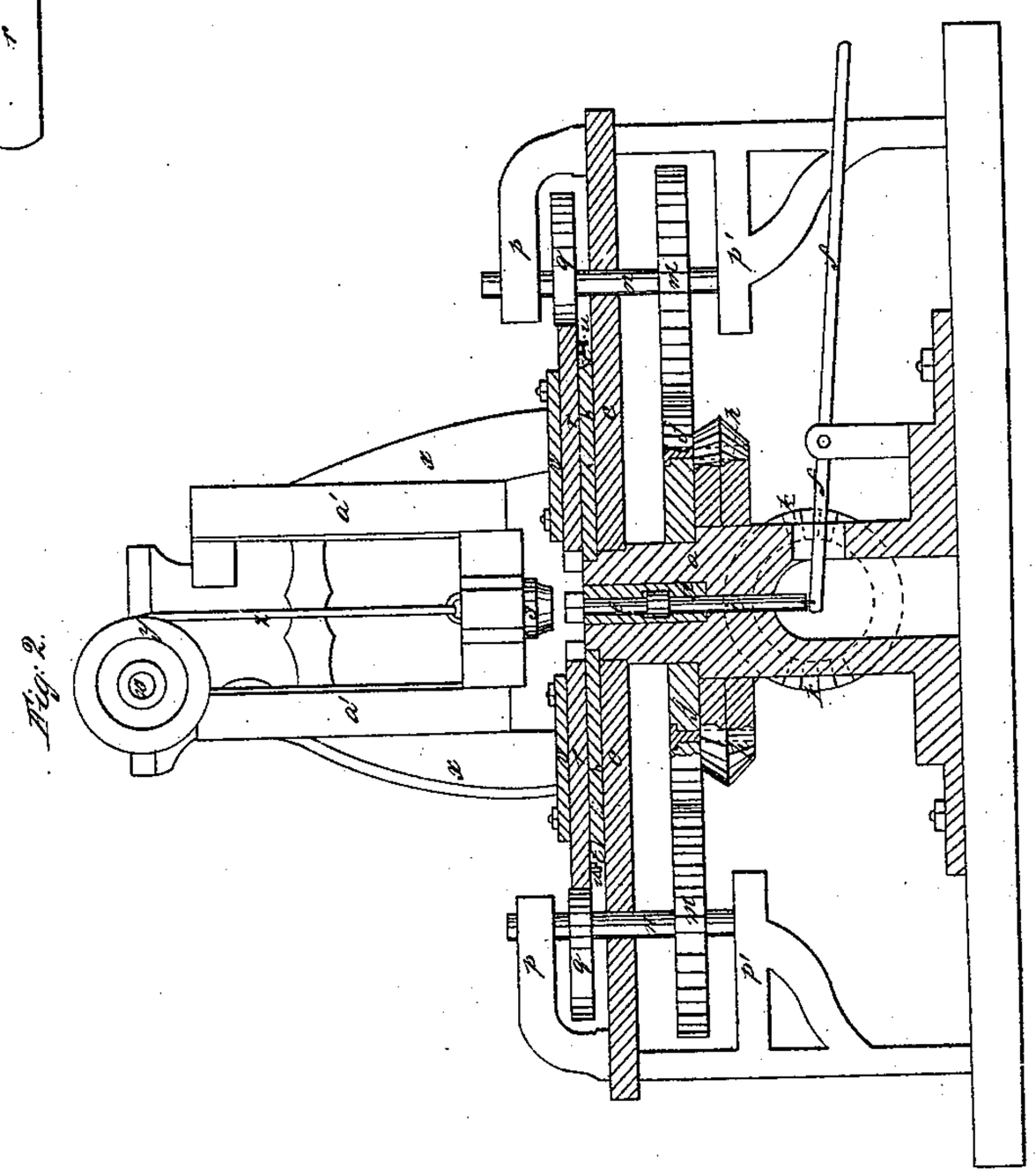


Fig. 2.



Witnesses:
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Allan C. Bakewell

Inventor:
Edward Kaylor
by his attorney
T. Bakewell

UNITED STATES PATENT OFFICE.

EDWARD KAYLOR, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN BOLT-HEADING MACHINES.

Specification forming part of Letters Patent No. **50,599**, dated October 24, 1865.

To all whom it may concern:

Be it known that I, EDWARD KAYLOR, of the city of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Bolt-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a top view of my machine, a part of the platform being removed so as to show the parts below it. Fig. 2 is a vertical section through my machine at the line *x x*, Fig. 1. Fig. 3 is a front view of the guides and drop-hammer. Fig. 4 is a view of the face of the crab of the clutch drawn to a larger scale. Fig. 5 is a top view of the self-opening clutch. Fig. 6 represents the relative position of the swages when one pair are closed on the head of the bolt and the other pair are withdrawn.

In the several figures like letters represent the same parts of the machine.

My machine is designed to form the head in square-headed bolts by means of the alternate action of four V-shaped swages, acting on the sides of the head, and the repeated blows of a drop-hammer on the top of the head of the bolt.

To enable others skilled in the art to make and use my machine, I will proceed to describe its construction and operation.

In the center of the machine is an upright post, *a*, around the top of which is placed a circular table, *b*, slightly raised above the platform *c*. In the center of the post *a* is a vertical cavity to receive a die, *d*, having a cylindrical bore, in which is placed the shank of the bolt *e* with a sufficient length of iron projecting above the top of the die to form the head. The lower part of the post is hollowed out, as seen in Fig. 2, and into its cavity enters the short end of a lever, *f*, to which is attached the lower end of the piston *i*, which is inserted through the post into the bore of the die *d*, the piston *i* being of such length that the point of the bolt *e* rests upon it.

Under the platform *c* is a horizontal mitered cog-wheel, *h*, resting upon which and attached to it is a large cog-wheel, *j*. These two wheels are supported by and revolve upon the post *a*. The horizontal mitered wheel *n* gears into a vertical mitered cog-wheel, *k*, (see Fig. 2,) which is attached to the horizontal shaft *l*, (seen in Fig. 1,) which is the driving-shaft of the machine, to which motion is communicated in any convenient manner.

Gearing into the central cog-wheel, *j*, are four cog-wheels, *m m m' m'*, of half the diameter of the larger wheel, so as to revolve twice for each revolution of the central cog-wheel, *j*. These smaller cog-wheels *m m'* are at equal distances apart, so that lines drawn through the axes of the opposite wheels would intersect each other at right angles in the center of the cavity of the die *d*. The shafts *n n'* of the cog-wheels *m* are vertical and extend above the platform *c*, and revolve in bearing in the brackets *p p'*. To each of the shafts *n* is attached a horizontal cam or eccentric-disk, *q q*, the under surface of which is on the same horizontal plane as the top of the die *d* and table *b*. On the surface of the table *b* rest four swages, *r r'*, each of which is V-shaped at its extremity, the V-face being a rectangle the sides of which are each equal in length to the square or side of the head to be formed on the bolt, so that when two opposite V-swages come together, as seen in Fig. 6, they form a square matrix around the cavity of the die *d*, by which the sides of the head of the bolt are to be shaped. Two of these swages, *r*, are set in the same horizontal line with their V-ends opposite to each other, and the other two, *r'*, are set at right angles to the others with their V-ends also opposite to each other. The outer end of each of the swages *r r'* rests against the edge of its eccentric-cam *q*, these cams being so set that when two opposite swages, *r r*, have closed around the cavity of the die *d*, the other pair, *r' r'*, is withdrawn, as shown in Fig. 6. Each of the swages *r r'* has a pin, *t*, near its outer extremity, against which a spring, *u*, presses to withdraw the swage when not pressed forward by its cam *q*. The swages are inclosed in boxes *v*, which serve to keep them in place on the table *b*.

Above the platform *c* is a horizontal shaft, *w*, supported on arches *x*, one of which is shown in Fig. 2, the shaft *w* carrying two pulleys, *y y'*, (seen in Fig. 1.) To the pulley *y*, at one end of the shaft *w*, is attached a rope or chain, *z*, which hangs down from one side of the pulley *y* exactly in the same vertical line as the axis of the bore of the die *d*. To the end of the

chain z is attached a drop-hammer, s, the end of which is cupped sufficiently to form the top of the square head of the bolt. The hammer-block s slides up and down in vertical ways a' a', attached to the arch x, which allow the hammer to drop freely when released. The pulley y' is placed on the shaft w, near to the rear end of the machine and over the clutch on the shaft l.

To the pulley y' is attached one end of a rope or chain, c', the other end of which is attached to the sleeve d' or loose part of the clutch, the other half or crab, b', of the clutch being keyed to the driving-shaft l. The chain c' hangs from its pulley y' on one side of the shaft w, and the hammer-chain z hangs from its pulley y on the other side of the shaft w, so that the unwinding of the chain from the pulley y' causes the shaft w and pulley y to revolve in such direction as to wind the chain z around its pulley y, and thus raise the drop-hammer s.

The pulley y' may be placed on the shaft w vertically over the crab b' of the clutch, which is fast to the shaft l, instead of over the sleeve d', so that the chain c' may tend to draw the loose sleeve d' toward the crab b' of the clutch, although this is not necessary, as a spiral spring, e', is placed around the shaft l, so as to bear against the loose sleeve d' and press it up toward the crab b'. The face of the crab b' of the clutch has two or more projections or teeth, h', of unequal size, and the face of the sleeve d' has corresponding depressions f', so that the teeth of the crab b' will only take into the depressions in the sleeve d' at one point in the revolution of the shaft l. The sleeve d' has a cam or wedge shaped projection, i', at one point in its circumference, which, as the shaft l revolves, when the clutch is closed, passes in contact with a post, k', so placed as that the projection i' cannot pass the post k' without pushing back the loose sleeve d', and thus throwing it out of gear with the crab b'. The effect of this arrangement is that as the shaft l revolves with the sleeve d' in gear with the crab b', the chain c' is wound around the sleeve d' and unwound from the pulley y', thus causing the pulley-shaft w to turn, and with it the pulley y, around which the hammer-chain z is wound until the hammer s is sufficiently raised. The cam-projection i' is set on the sleeve d' of the clutch in such a position that when the hammer is raised the projection i' passes the post k', suddenly releasing the sleeve d' from the crab b', when the hammer will immediately drop by its own weight, the chain c' winding off the sleeve d' onto the pulley y'. So soon as the shaft l completes its revolution the crab b' again engages the sleeve d', and the hammer is raised, as before. Thus at each revolution of the driving-shaft l the hammer is raised and allowed to drop.

By the gearing hereinbefore described the cams q q' are caused to revolve, once for every revolution of the driving-shaft l, so that both pairs of swages, r r and r' r', act upon the head of the bolt, first one pair, then the other pair, at each revolution and after every drop of the hammer. The gearing is also so adjusted that the hammer drops on the head of the bolt at the moment when one pair of swages is receding and the other advancing.

One of the important features of my machine is the mode in which the swage-cams are operated.

In the bolt-machines heretofore in use, in which two pairs of swages or dies are set at right angles to each other, so as to converge at the head of the bolt as a common center, great difficulty is experienced from the irregular action of the swages caused by some looseness or lost motion of the driving-wheel. This is owing to the fact that the cam-shafts by which the swages are operated are geared one into another, so as to operate as a train of gearing, and not independently, and the consequence is that the swages on one side are apt to have a somewhat longer throw than those on the other side, which will either strain or weaken the bolt at the neck or make a misshapen head. It is therefore very important that while the cams operate simultaneously they should be so independent of each other as that the stroke of each swage will be unaffected by the motion of its opposite swage or by any looseness of the driving-wheel. This practical difficulty I entirely overcome by giving to each cam-shaft n a separate and independent bearing in the machine and gearing the cog-wheel m of each of the cam-shafts n directly into the central gear-wheel, j, having its center of motion in the center of the machine or in the same vertical line as the bolt to be headed, so that while simultaneous action of the swage-cams is secured by gearing them to a common driving-wheel, yet as they are not geared into each other, nor directly connected together, all irregular pressure and strain is prevented, which would otherwise be caused if there were any lost motion or looseness of the central gear-wheel.

If it is desired to strike the head of the bolt when it is held and compressed between one pair of swages, it may be effected by so adjusting the gearing as that the hammer will strike the head of the bolt when each pair of swages is in the position shown in Fig. 6.

The advantage of using two pairs of V-shaped swages is that the four edges of the bolt-head are equally well shaped, as the swages meet at two corners on one stroke, and at the other two corners at the next stroke.

Having thus described my improvement in bolt-machines, what I claim as my invention, and desire to secure by Letters Patent, is—

1. The use of V-shaped swages for forming the head of bolts, in combination with cams for operating them, when so constructed and arranged as that each swage-cam shaft shall have a separate bearing in the frame of the machine, and shall be operated by a cog-wheel thereon gearing directly into a central driv-

ing-gear wheel instead of gearing into the cog-wheel on either of the other cam-shafts, substantially as and for the purposes hereinbefore described.

2. The combination of the crab b' and sleeve d' with the cam-projection i' and post k', with a spring, e', or other device for pressing the sleeve and crab together, for the purpose of a self-acting clutch.

3. The combination of the self-acting clutch constructed substantially as described, connected with the pulley y' by a rope or chain, and the pulley-shaft w, and pulley y, with its rope or chain, for the purpose of alternately raising and dropping the hammer in the manner hereinbefore set forth.

In testimony whereof I, the said EDWARD KAYLOR, have hereunto set my hand.

EDWARD KAYLOR.

Witnesses:

W. BAKEWELL,

THOS. OWSTON.