A. GERRARD.

RIVET DRILLING MACHINE.

APPLICATION FILED FEB. 4, 1910.

976,453.

Patented Nov. 22, 1910.

2 SHEETS—SHEET 1.

Fig. 1

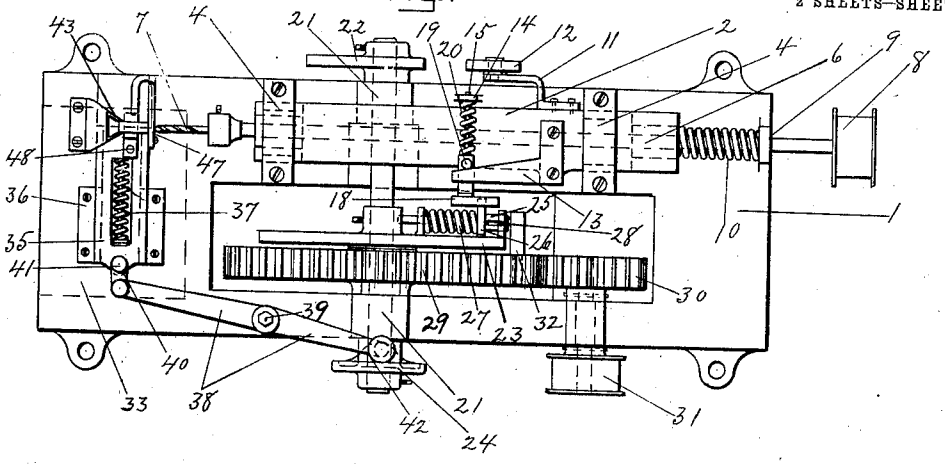

Fig. 2

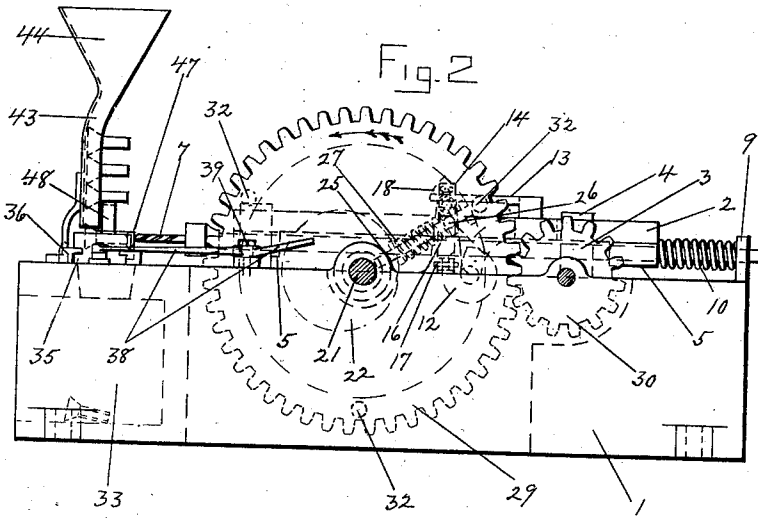

Fig. 3

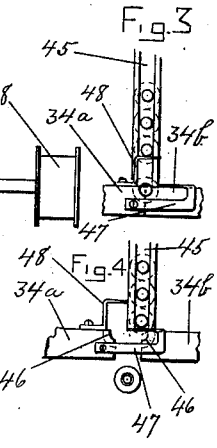

Fig. 4

WITNESSES

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2 SHEETS—SHEET 2.

Fig. 5

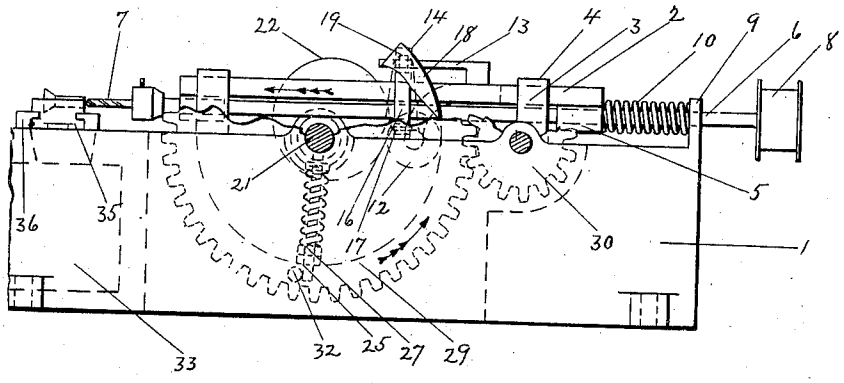


Fig. 6

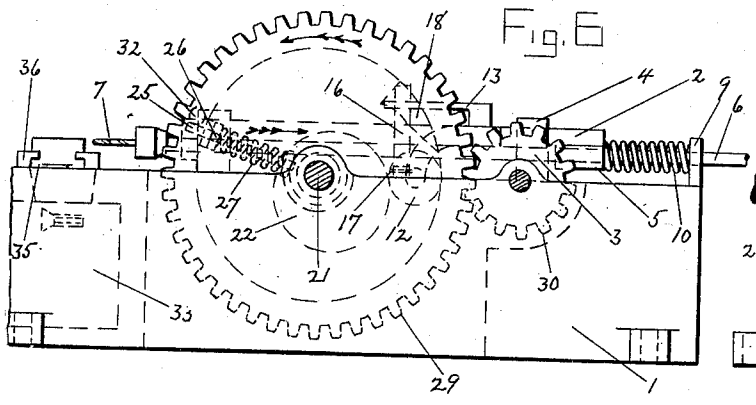


Fig. 7

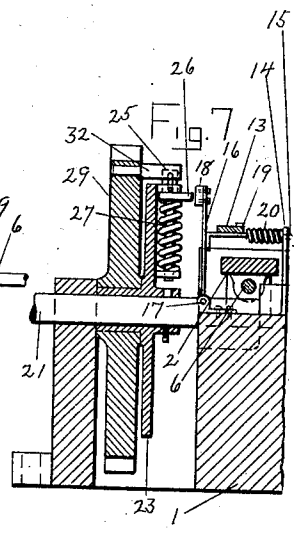
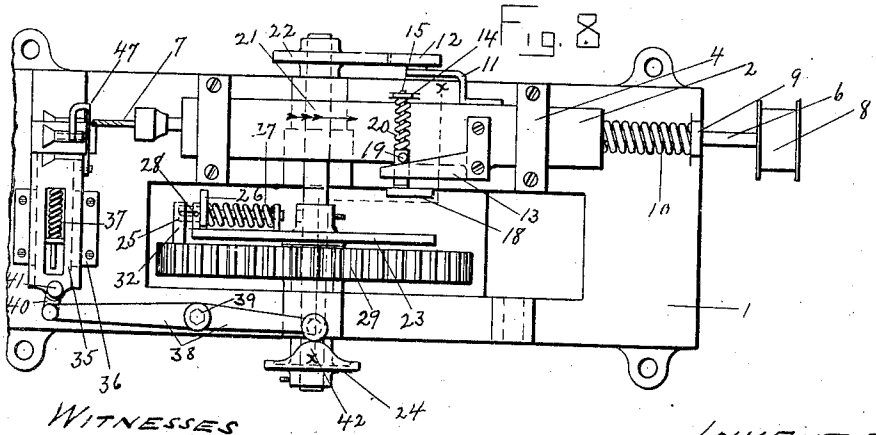


Fig. 8



WITNESSES

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RIVET-DRILLING MACHINE.

976,453. Specification of Letters Patent. **Patented Nov. 22, 1910.**

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To all whom it may concern:

Be it known that I, ADAM GERRARD, of Taunton, in the county of Bristol and Commonwealth of Massachusetts, have invented a new and useful Improvement in Rivet-Drilling Machines, of which the following, together with the drawings filed herewith, is a full, complete, and accurate description.

The object of my invention is to provide means in a machine of the kind specified for moving the drill alternately toward the rivet to be drilled and, when drilled, away from the said rivet in such manner that the drill, while drilling, shall be advanced toward the rivet slowly and under a motive power separate from that which moves the drill away from said rivet, and means whereby said motions automatically follow each other at desired intervals, with the least possible wear and tear of the parts of the machine.

Another object of my invention is to provide an automatic means for feeding rivets into a die in position for being drilled which shall be simple in operation and of few parts.

The construction and operation of my invention may be understood from the description following, reference being had to the accompanying drawings, in which—

Figure 1 represents a top view at the point of time when the drill is just beginning to advance to drill the rivet; Fig. 2 is a side elevation of the same position, parts being cut away; Fig. 3 is an elevation of parts of the rivet chute and die, looking from the position of the drill; when the die is closed; Fig. 4 is an elevation of the parts shown in Fig. 3, when the die is open; Fig. 5 is a side elevation of the machine, parts being omitted and cut away, to show the position of the same at the point of time when a rivet has just dropped into place to be drilled; Fig. 6 is a side elevation, parts being omitted, to show the position of the machine at the point of time when, the rivet having been drilled, the die is open, the rivet falling therethrough, and the drill is being moved back into position for drilling another rivet; Fig. 7 is a cross-sectional, enlarged view on the line *x*—*x* in Fig. 8; and Fig. 8 is a top plan view, parts being omitted, of the position shown in Fig. 6.

Reference being had to the drawings, 1 represents the base of the machine, over which is mounted a longitudinally slidable member 2 in grooved uprights 3. A strap 4, passing over the top of slide 2, connects the ends of uprights 3. Depending from the ends of the slide 2 are sleeves 5 in which is journaled drill spindle 6, having at its forward end drill 7 and at its rear end belt pulley 8. This drill spindle runs independently of the rest of the machine, and continuously. At the rear of base 1 is a stop 9 and footing thereagainst is a coil spring 10 having its other end footed against the rear end of slide 2 and tending to push said slide forward continuously, and thus hold the drill against the rivet to be drilled.

A bracket 11 is affixed to slide 2 having at its end a horizontal spindle whereon is mounted a roller 12, the purpose whereof will be explained later. Upon slide 2 is fastened cam 13. To base 1 is secured an upright post 14, having in its top a horizontal hole, transverse to the length of the slide 2, through which hole the end of a horizontal pin 15 may work back and forth. (See Fig. 7.) The other end of pin 15 is secured to an upright rod 16 which is pivotally connected with base 1 at 17 and carries, affixed to its top, a cam 18 (shown more clearly in Fig. 5.) An upright pin 19 projects from pin 15 and bears against the face of cam 13. A coil spring 10 footed against post 14 and pin 19, tends to push the upper end of rod 16, carrying with it cam 18, outwardly, while the pressure of cam 13 upon pin 19, as it is carried forward by slide 2, tends to pull the upper part of rod 16 inward.

In suitable bearings on base 1 is mounted shaft 21, which carries fixed upon it eccentric cam 22, disk 23, and cam 24. Upon disk 23 is mounted slide 25 which carries a horizontal pin 26 adapted to engage with cam 18 when said cam 18 is thrust outward by spring 20. Spring 27 is adapted to push slide 25 outward, away from shaft 21, pin 28 preventing excessive motion in that direction. Cam 18, on the other hand, will depress slide 25 against the push exerted by spring 27 if pin 26, carried along on disk 23, is engaged by cam 18.

Running free upon shaft 21, or as shown in Fig. 7, upon an extension of disk 23, is gear 29, driven by pinion 30, which is itself driven by a belt over pulley 31. Affixed in the inner rim of gear 29 is one or more horizontal pins 32, so placed as to strike the top of slide 25 when said slide is not in en-

gagement with cam 18, thereby locking disk 23 and its shaft 21 to gear 29 and causing said shaft 21 to revolve in unison with said gear. When, however, slide 25 is depressed by cam 18 pin 32 will pass over the top of said slide, gear 29 will run free on shaft 21, and shaft 21 will remain motionless.

At the forward end of the base is a chamber 33 having in its top wall a die for grasping and holding rivets composed of two parts, 34^a and 34^b, the latter being stationary and a part of said top wall while the former is formed on the end of a slide 35 working in holders 36 secured to the base 1. A compression spring 37 tends to push slide 35 toward the stationary part 34^b of the die, thus closing it, and lever 38, pivoted to the base 1 at 39, and to slide 35 through link 40 at 41, pushes slide 35 outward to open said die by means of the pressure exerted upon the end of lever 38 by the face of cam 24, when the elevation 42 in the rim of cam 24 comes opposite to the end of lever 38, and said end is pushed inward by said elevation, thereby opening the die.

Secured to the top of base 1 is a rivet chute 43, having a receptacle for rivets 44 at its top and a slot 45 (see Figs. 3 and 4) on the inside thereof, through which the stubs of the rivets protrude, the chute itself being a sort of channel for the heads. The inner edges of 34^a and 34^b are shaped to grasp a rivet and hold it firmly therein, as at 46, (Fig. 4).

Secured to 34^a is a bracket 47 which extends part way across the face of 34^b and returns upon itself in the form of a wire adapted to pass immediately above a rivet fixed in the die. Another bracket 48 is secured to 34^a and carries a wire which is adapted to pass immediately below a rivet resting upon a rivet which is supported by bracket 47. The length of the wires of brackets 47 and 48 is such that when the die is closed the wire of bracket 47 will not reach slot 45 and the wire of bracket 48 will extend across said slot; when 34^a shall have moved sufficiently to allow a rivet therein to drop into chamber 33, brackets 47 and 48 will have assumed the positions shown in Fig. 4, and when the die has closed sufficiently to allow the rivet supported by wire 47 to drop, the two parts of the die will have come close enough together to keep said rivet from falling into chamber 33, and wire 48 will have advanced far enough across slot 45 to prevent the rivet above from falling. When the die has fully closed, the position will be as shown in Fig. 3.

One complete cycle of operation of the machine, during which one rivet is drilled, is as follows:—Beginning with the position of parts shown in Figs. 1 and 2, the die is closed, holding a rivet in position for being drilled, slide 35 is held closed by the pressure of spring 37. At the same time, slide 25 being depressed by the engagement of pin 26 by cam 18, which has been pushed forward by spring 20 because slide 2, carrying with it cam 13, has just previously been pushed back to the farthest possible extent by eccentric cam 22 acting on roller 12, gear 29 is running free on shaft 21 which is motionless. Spring 10 begins to exert its force, and pushes the drill up against the rivet, and keeps on pushing, thus advancing slide 2 as the drill sinks into the rivet. As slide 2 advances, however, cam 13 gradually draws back slide 15, carrying with it cam 18, until, when the drill shall have gone the required depth in the rivet, cam 18 snaps off pin 26, slide 25 is snapped up by spring 27, and pin 32, revolving on gear 29, comes behind slide 25, locks disk 23 to said gear, and shaft 21 begins to revolve. As said shaft revolves, it carries with it eccentric cam 22 until, when it reaches the position shown in Fig. 6, it comes into contact with roller 12 and begins to push slide 2 back again. When slide 2 has been pushed back far enough to draw the drill out of the rivet, cam 24 has been carried around on shaft 21 far enough to allow the end of lever 38 to be pushed inward by elevation 42, thus opening die and allowing the rivet to drop into chamber 33. As shaft 21 continues to revolve, slide 2 is pushed fully back, and the end of lever 38 again contacts with the level rim of cam 24 and spring 37 closes the die, into which a new rivet has dropped, as explained above. When slide 2 has reached its farthest limit of backward motion, cam 13, carried with it, has allowed spring 20 to push cam 18 forward, so that when slide 25, carried by disk 23, comes to it, pin 26 is engaged, slide 25 is depressed, and gear 29 is unlocked from said disk and again runs free, allowing shaft 21 to remain motionless. One cycle has now been completed and the machine is in the position it was at the beginning.

Having now described my invention, what I claim to be new and wish to secure by Letters Patent, is,—

1. In a machine of the kind described, the combination of a base, a die therein, a revoluble and reciprocatory spindle in said base, means for advancing said spindle toward and independently driven mechanism for quick withdrawal of said spindle from said die, a clutch between said mechanism and its driving means, and mechanism operated by the reciprocatory motion of said slide for operating said clutch.

2. In a machine of the kind described, the combination of a revoluble and longitudinally movable drill spindle, a driving shaft, an intermittently revoluble shaft for propelling said spindle backward driven thereby, a clutch between said shafts for produc-

ing said intermittent motion, and mechanism operated by the longitudinally moving drill spindle for operating said clutch.

3. In a machine of the kind specified, the combination of a base, a die therein, a slide reciprocatory on said base, means for advancing said slide toward said die, a driving shaft, an intermittently revoluble shaft, a clutch therebetween, a slide transverse to said first-mentioned slide, a pin thereon, a cam on said first-mentioned slide engaging said pin, a spring holding said pin against said cam, and mechanism connected with said last-mentioned slide for operating said clutch.

4. In a machine of the kind described, the combination of a base, a die therein, a slide reciprocatory on said base, means for advancing said slide toward said die, a driving shaft, a pinion thereon, a revoluble shaft, a disk fastened thereto, a slide thereupon, a pin upon said slide, a spring pressing said slide outward, a spur gear enmeshing said pinion loose upon said revoluble shaft, a pin thereon adapted to engage said slide when pressed out, mechanism operated by said first-mentioned slide for automatically depressing said slide upon said disk.

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Witnesses:
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