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Improvement in Machines for Cutting off Bolts.

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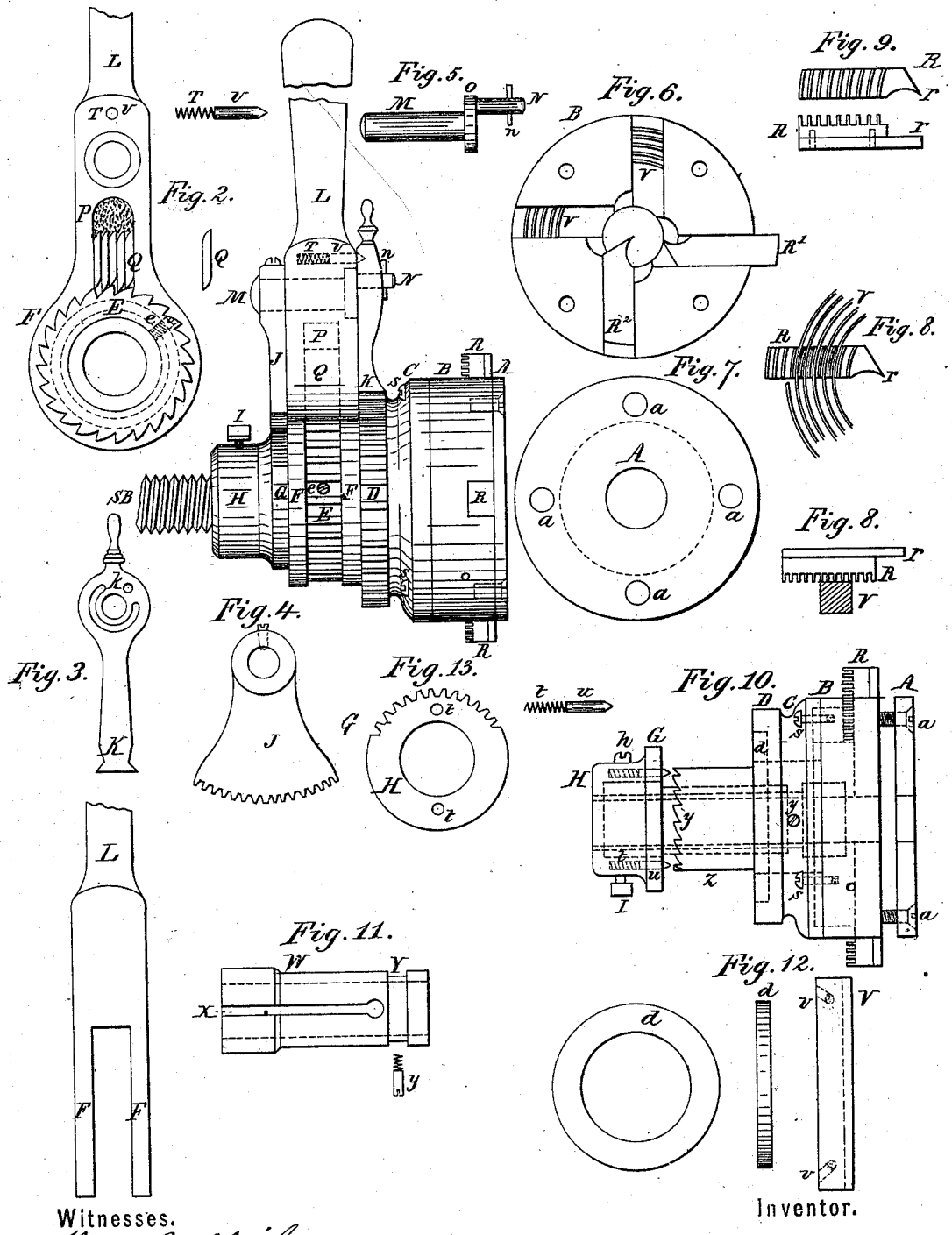

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IMPROVEMENT IN MACHINES FOR CUTTING OFF BOLTS.

Specification forming part of Letters Patent No. 123,124, dated January 30, 1872.

Specification describing certain Improvements, or rather a Machine, for Cutting off Stay-Bolts, or the like, invented by HENDERSON M. POWERS, of Lancaster, in the county of Lancaster and State of Pennsylvania.

The object of this invention is to provide a machine for cutting off stay-bolts at the desired point to allow for riveting, by means of a self-feeding cutting device, and in such a manner as to make a clean cut without jarring, or twisting, or enlarging the screw-hole, and effectually to protect the sharpest screw-thread from all injury or lateral enlargement—so difficult to avoid by the old process of cutting off the same, by the use of a hammer and chisel. To secure a tightly-fitting screw-connection through the water-space or other places is of the highest importance in steam-boilers, to avoid weak points, which riveting may hide, but not remedy, fully.

The accompanying drawing illustrates my invention, combined and in detail, which, with the explanation added, will enable any one skilled in the art to make and use the same.

Figure 1 is a side view, with the lever-handle L shown in part, and the external portions in place shown by the same letters detached.

Fig. 2 shows the rack-plates Q, and gum P in the socket of the handle L, and the annular ends F F slotted for the reception of the annular ratchet E.

Fig. 3 shows the reversible pawl K; Fig. 4, the quadrant-cogged feed-propeller J; Fig. 5, the shaft M, which supports the cogged quadrant J on one side, with a circular flange, O, for the eccentric portion N of the same for the reversible pawl K, to gain speed in its action on the cogged gear-wheel D, connected with the inner portion C of the head B, on the latter of which it has a free motion.

Fig. 6 shows the outer face of the head B, on removing the outer face or covering-plate A, (shown by Fig. 7.) This portion B of the head has four slots, in which the cutters *r*, with their screw-racks R, are fed in and out by the action of the lever L and gearing. Two of the cutters are removed to show the endless annular feed-screw V, into which the screw rack-teeth on R of the cutters fit and receive their motion. (Illustrated by Fig. 8.) Fig. 7 shows the outer face plate A of the head, with its screw-heads *a* and central opening to receive the bolt. The thickness of this plate A determines the portion of the bolt to be left to form the rivet. Fig. 9 shows the cutters with their screw-rack, in two views. The cutters *r* are secured by pins, and when worn out can be replaced by new ones, or repaired.

Fig. 10 is a plan view of the head, parts shown detached; the cylindrical main shaft Z, with its terminal toothed ratchet *z*. Around this portion Z the ratchet E and slotted annular ends F F of the handle or lever L are applied, the inner face of which fits against a loose washer, *d*, inserted flush in a recess made in the adjoining face of the cogged wheel D, attached to the portion C of the head to lessen friction. Fig. 12 shows an edge view of the washer *d* and annular feed-screw V, which latter has a regular thread cut on the outer face. (Difficult to illustrate properly.) This annular endless screw V sits in a groove made partly in the head portion *c*, and firmly connected with it by screws *s*. The screw-sockets *v*, in V, (Fig. 12,) have gum-elastic inserted into the ends, to produce a spring-like action on the same, and secure a more uniform or pliable action on the cutter-racks R. Fig. 11 shows the slotted sleeve W, which is fitted into the cylindrical main shaft Z, shown by the dotted lines in Fig. 10. A guiding-screw, *y*, enters through the portion *c* of the head, and extends into the flat groove Y on the sleeve W. The slots X on each side of the sleeve are intended as a spring-clamp against the stay-bolt, adjusted by a set-screw, I, entering through a stationary cap, H, shown in Figs. 1 and 10. The inner end is also shown by Fig. 13, which has an enlarged flange with cogged teeth on its upper portion, into which the teeth on the quadrant-cogged feed J fit and operates the pawls K. The holes *t* on the inner face of H have each a spiral-spring and rack-point, *w*, which come in contact with the rack-teeth *z*, on the end of the main shaft or cylinder Z of the head. The enlarged portion of the slotted sleeve W fits into this cap H, and its end comes in contact with an inner flange or shoulder of the cap H, shown by the dotted lines in Fig. 10.

Thus I have described the several parts and their relations to each other. A brief explanation will show the operation:

When the stay-bolt (S B, Fig. 1) is screwed

up to the desired point, whether through the water-space into the fire-box or otherwise, in order to cut the bolt it is only necessary to slip the machine over the bolt up to the boiler, the bolt S B entering through the opening in the head A through the sleeve W. This slotted sleeve is then clamped fast by the headed set-screw I in the cap H, and firmly held in position by the cap, and aids to protect the screw-thread—it being understood that the cutters *r* on their racks R are first worked out, as shown by the cutter R^1, in Fig. 6, as they (the four cutters) are propelled inwardly in regular order until they attain the position shown by R^2 in Fig. 10, at which point the bolt is separated completely, when the pawl K is reversed, operating the cogged feed-gear wheel D. By one or two motions of the lever, now in an opposite direction, by which the four cutters are again withdrawn from the center and the chips lodged in the side cells between, the cutter-points and end of the racks drop out, and the machine is ready to embrace another bolt to be cut off. The handled lever L may be of any desired length and strength. This, by means of the appliances of racks, and pawls, and side gear, as shown and described, is simply oscillated back and forward about a quarter revolution or less. The cap H being at rest with the sleeve W in the interior, and this being clamped against the bolt, forms the fulcrum on which the hollow main shaft Z turns with the combined head of the machine and motions of the handled lever L. Thus, the cap H, remaining stationary, (by means of the headed binding-screw I, and sleeve tightened on the fixed immovable bolt to be cut,) the quarter-cogged flange G on the cap H, imparts motion to the cogged quadrant J on the side of the lever L. This being affixed to the lever crank-pin M N gives motion to the pawl K on the opposite side of the lever L, which pawl being eccentric on the same shaft, and consequently longer, and the cogged wheel D larger or greater in diameter, an increase of motion is imparted to the portion C of the head, to which the endless annular screw V is attached, and consequently gains about a fourth of an inch on each quarter motion of the lever—it is this increase of motion that feeds the cutters *r* gradually toward the center. But, in reversing, the head A B remains stationary by the action of the points *u* on rack *z*, so as to draw out the cutters in one motion. The cutters have a curve-toothed rack, R, fitting into the thread of the endless annular screw at four points, at right angles to each other, operated simultaneously. To cause the pawl K to have a downward bite on the cogged gear, there is an inclined hole, *k*, Fig. 3, into which a pin, U, works, resting on a spiral spring, T, inserted in a hole shown in the lever L T U, Fig. 2, so that by the vibrating motion of the lever, the pawl is kept to its work. The annular ratchet E, secured by a binding-screw, *e*, between the slatted annular ends F F of the lever, is to prevent all loss of motion by means of a series of click-plates, Q, inserted into a socket in the end of the lever coming in contact with the rack-teeth, so that one or the other retains its hold at all points of motion—hence causing a regular continuous feed on the cutters without allowing any back motion while cutting. The socket in the lever for the click-plates Q has a piece of gum-elastic inserted in its upper end cut inward from above to give it more yielding and spring-power. These click-plates work against the under side of the gum stuffing, and keep them in contact with the ratchet-teeth E. The lower end of the lever L has a removable plate fitted over the socket and held by pins, so that it can be removed for having access to the gum P and click-plates Q. The ratchet-teeth *z* on the main cylinder Z of the head are also to prevent retrograde motion while reversing. The inner face of the flange G of the cap H, (Fig. 13,) shows two holes. These contain each a spiral spring, *t*, and a click-point, *u*, which act into the rack-teeth *z*, aforesaid. There is also a binding-screw, *p*, in the cap H. (Figs. 10 and 1.) By this combination every fraction of motion in the lever is utilized, and a uniform continuous feed is secured without any friction upon the clamped stay-bolt, in a manner that, while the feed is sufficiently fast, without strain upon any part of the machine a seven-eighths or inch bolt can be smoothly and speedily cut off with ease at a great saving of labor and time, and producing results that cannot otherwise be attained for keeping the screw-threads sharp and firmly fitted—not accomplished by any other means heretofore employed.

I am not aware that any machine has ever been made that performed the functions of this machine. I may mention that the space under the cutters and shorter racks retains all the chips, which drop out on withdrawing the bolt. The blanks on the inner end of the racks prevent their withdrawal so far as to admit access of chips to the annular screw V. Thus, while there is ample space for the chips, they cannot in anywise interfere with the action of the screw or cutters. There are also perforations for oiling the rack and screw-teeth, as well as at other desirable points. In short, after a full year's labor and experimenting, the machine is ready to be tested, and its action is its surest recommendation. Believing that the several combinations are new, therefore—

What I claim as my invention is—

1. The cogged-quadrant J on the cross-pin M, with its eccentric O N on the lever-handle L, in combination with the cap H, provided with a partially-cogged flange, G, substantially in the manner and for the purpose specified.

2. In combination with the said eccentric O N, I claim the pawl K, with its inclined pit *k*, for the action of the point U on the spiral spring T in the lever-handle L, in the manner and for the purpose mentioned.

3. The series of click-plates Q, with the elas-

tic stuffing P, in the socket of the lever L, in combination with the annular ratchet E, substantially arranged in the manner and for the purpose set forth.

4. The arrangement of the portion B of the head, with its hollow shaft Z, terminated by rack-teeth *z*, in combination with the click-points *u*, and spiral springs *t*, inserted into the perforations on the inner face of the flange G of the cap H, substantially in the manner shown, and for the purpose mentioned.

5. I claim the arrangement of the feed portion C, with its connections, provided with a cogged wheel D, anti-friction washer *d*, reversible pawl K, in combination with the lever L, for the purpose of increasing the speed of the cutters R *r*, operated substantially in the manner described.

6. The tool for cutting off bolts, constructed and arranged substantially as described.

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