(No Model.)

J. W. HARTLEY.

SCREW TAPPING MACHINE OR ATTACHMENT.

No. 513,363 Patented Jan. 23, 1894.

Fig. 1.

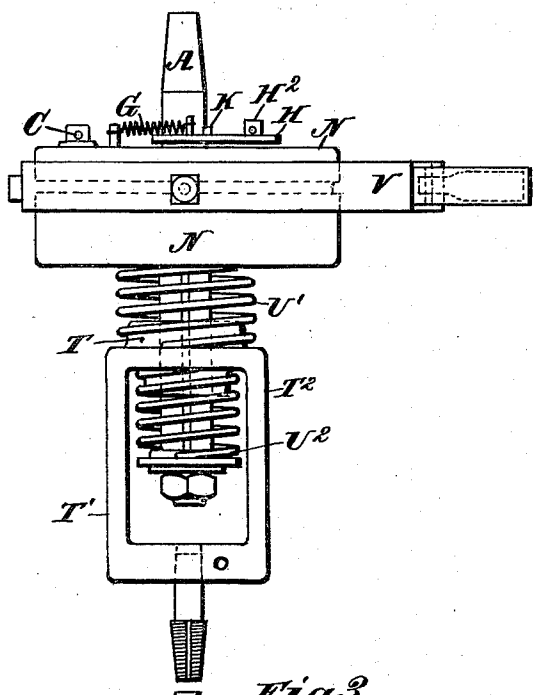


Fig. 2.

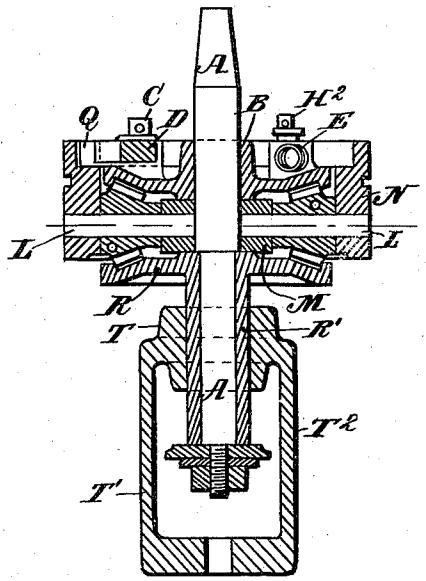


Fig. 3.

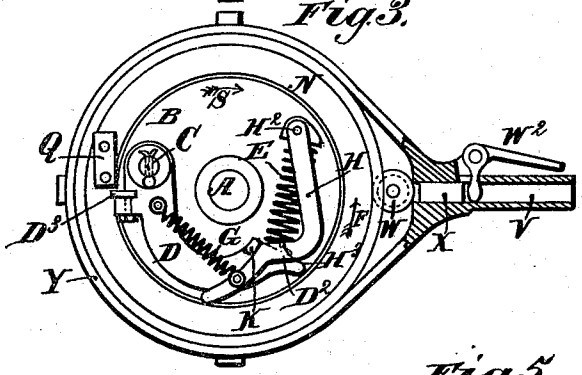


Fig. 4.

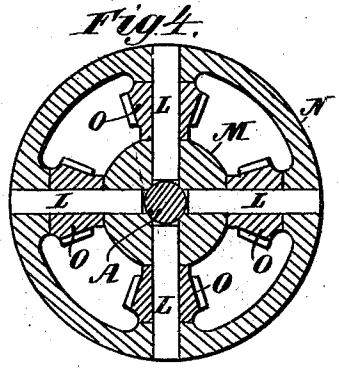
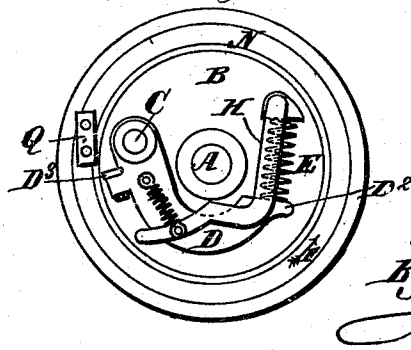


Fig. 5.



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JOHN WILLIAM HARTLEY, OF KILMARNOCK, SCOTLAND.

SCREW-TAPPING MACHINE OR ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 513,363, dated January 23, 1894.

Application filed June 1, 1892. Serial No. 435,226. (No model.) Patented in England December 16, 1890, No. 20,487, and in France November 18, 1891, No. 217,532.

To all whom it may concern:

Be it known that I, JOHN WILLIAM HARTLEY, a subject of the Queen of Great Britain, residing at Kilmarnock, in the county of Ayr, Scotland, have invented new and useful Improvements in Screw-Tapping Machines or Attachments, of which the following is a specification, and for which invention I have obtained patents in the following countries: Great Britain, No. 20,487, dated December 16, 1890, and France, No. 217,532, dated November 18, 1891.

My invention consists of an improved screw tapping machine and comprises an adaptation of an epicyclic train of wheels, and detent spring controlled levers, to enable the tap to be screwed home; automatically released; and reversed to unscrew when its work is done. The epicyclic gear consists of two bevel wheels, an upper and lower, which face each other, and are connected by intermediate bevel wheels gearing into both. The intermediate wheels are carried on a loose ring and boss; the upper bevel wheel is keyed firmly to a spindle fastened in the drill socket of an ordinary drilling machine; the lower bevel wheel runs loosely on the same spindle and is driven from the upper bevel when a lever held by a detent holds the ring carrying the intermediate wheels; when the tap is screwed home a catch is liberated, which connects between the upper bevel wheel and the loose ring carrying intermediate bevel wheels. The loose ring is thus disconnected and the upper bevel revolves, rotating the intermediate bevel wheels and their attachments more slowly, without rotating the tap. When these or the ring carrying them are arrested in their rotation by friction or otherwise, the lower bevel which carries the tap is reversed in its rotation and the tap is unscrewed. This enables a screw tapping and reversing arrangement to be applied to an ordinary drilling machine.

Referring to the accompanying drawings—Figure 1 is an elevation of my screw tapping gear ready for attachment to a drilling machine. Fig. 2 is a vertical section of Fig. 1. Fig. 3 is a plan showing detent lever, driving lever and intermediate wheel carrying or friction ring. Fig. 4 is a transverse section through the friction ring showing intermediate wheels and connections. Fig. 5 is a plan showing the levers in the position where the drilling machine spindle is disengaged from the tap.

Into the drill socket of an ordinary drilling machine I fix a vertical spindle A. Upon this spindle I attach an epicyclic train of wheels as follows:—The upper bevel wheel B I key securely on spindle A, and fix upon the upper surface of B a stud C, which forms the fulcrum of a stop lever D. The stop lever D in this instance operates in the same plane as the bevel wheel B. I construct this lever D in the form shown and provide at the outer end a projecting face D^3 of hardened steel of the form shown. The inner end D^2 of lever D rests against the main spiral spring E and thus its movement in the direction of the arrow F is prevented, unless when compressing spring E. The spiral spring G acting in tension, holds the lever D against the spiral E, thus retaining the spiral E in its position. When the end D^3 of the stop lever is moved in direction of arrow F, spiral spring E is compressed, and when the stop K (which is a raised projection from the lever D) passes the inclined face H^3 of the detent H, the spiral spring G draws the detent H forcibly against the stop K, not only holding the spring E in compression, but by means of a slight incline on the face of the detent H^3, the spring E is still further compressed, and the outer edge of stop lever D is withdrawn still farther clear of the stop Q. The position of the lever D and the detent H when the face D^3 of the lever D has been forced by the stop Q clear of it, and the detent H holds the projection K, is shown in Fig. 5. In this position the loose ring N is free to rotate at a different ratio from the upper bevel wheel B.

The train arms L of which I may have any suitable number, I insert into a bush M which revolves loosely on spindle A (Fig. 4); I carry the outer ends of arms L in a friction ring N, which connects them together and maintains them in their relative positions. The bevel wheels O upon the train arms run loooely by preference, the train arms being fixed. Upon

one or more of these bevels I fix a catch P which engages against the outer end of lever D.

Figs. 2 and 3 show the catch Q attached to the loose ring N, which ring carries the outer ends of the spindles upon which the intermediate wheels rotate. When contact takes place between the end of lever D^3 and the catch Q (Fig. 3) the train arms are arrested, and the bevels O cannot revolve, and consequently when bevel B is revolved in direction of arrow S, the whole train of wheels is carried round, all maintaining the same relative positions with regard to each other. The lower bevel R has a sleeve R′ attached, through which the spindle A passes, wheel and sleeve running loosely on spindle. On outside of sleeve R′ I have a bush or cylinder T sliding vertically upon feather keys, but revolving with sleeve R′. Arms T′ and T^2 pass downward and carry the tap T^3 (Fig. 1) as shown. Upon sleeve R′ I fix sometimes spirals U′ and U^2. I use U′ to force the tap downward into the hole. The spring U^2 is a lighter one, and is used merely to support the weight of the cylinder T and its attachments.

The operation is as follows:—I insert the tap in the hole to be tapped, and start the drilling machine in direction of arrow S. The outer end of lever D engages the catch Q (Fig. 3). The train is arrested, and the tap revolves in the same direction as the spindle A; when the tap reaches the bottom of the hole or meets with any other obstruction, beyond which it would be unsafe to force it, the extra resistance causes the catch Q to press heavily against the outer end D^3 of lever D, and compresses the spring E, until the detent H operates as shown in Fig. 5. The end of lever D^3 may now pass the catch Q without contact. The motion of the tap and lower bevel is now arrested, and the train arms and friction ring N revolve at a reduced speed. The operator now grasps the friction ring N, and arrests its motion, when immediately reverse motion is given to the lower bevel R, and the tap is withdrawn. The operator releases the detent H and the operation may be again repeated. For large taps I employ a lever V, with frictional pressure against the ring N; this I arrange as shown by a small roller W which I force against the ring N by lever W^2 and the rod X. The pressure of the hand of the attendant on lever W^2, forces roller W against ring N, and draws friction band Y against opposite side of ring N. I may arrange this friction in any other well known manner.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is—

1. In a screw tapping machine, the combination with a spindle, of a ring N having a stop Q, an epicyclic train of gearing, a pivoted stop lever D adapted to engage the stop on the ring, a detaining pawl H having a part against which the stop lever acts, a compressible spring E bearing against the stop lever and compressed by the movement of the latter in one direction, and a spring G acting on the detaining pawl and stop lever to hold the compressible spring in compression, substantially as described.

2. In a screw tapping machine, the combination with a spindle, of a ring N having a stop Q, a friction band Y having a lever provided with a friction device W to act against the said ring, a pivoted stop lever D adapted to engage the stop on the ring, a detaining pawl H having a part against which the stop lever acts, a compressible spring E bearing against the stop lever and compressed by the movement of the latter in one direction, and a spring G acting on the detaining pawl and stop lever to hold the spring in compression, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

JOHN WILLIAM HARTLEY. [L. S.]

Witnesses:
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