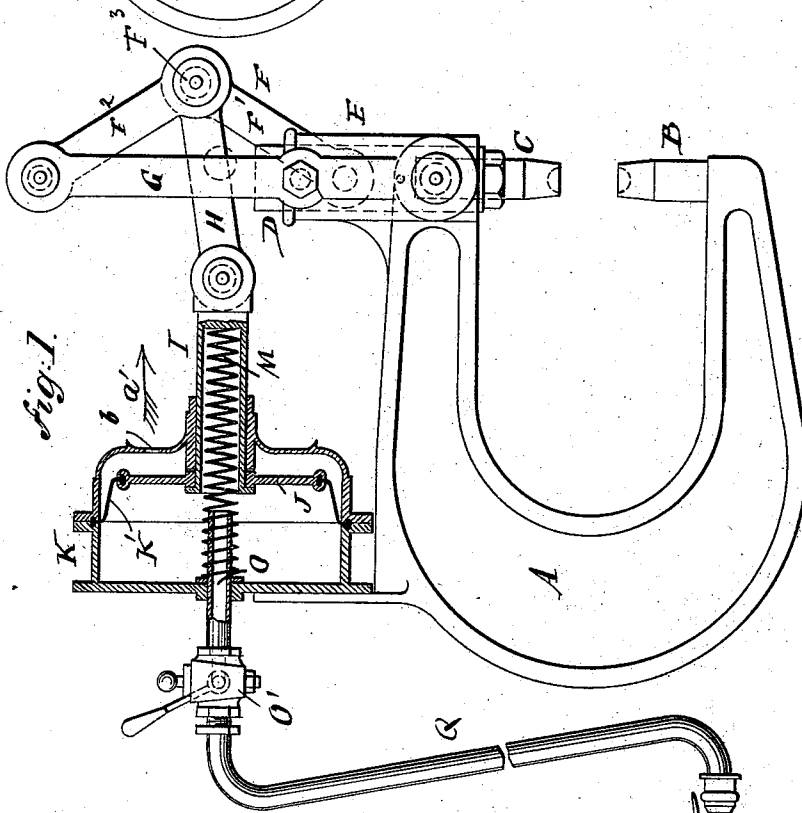
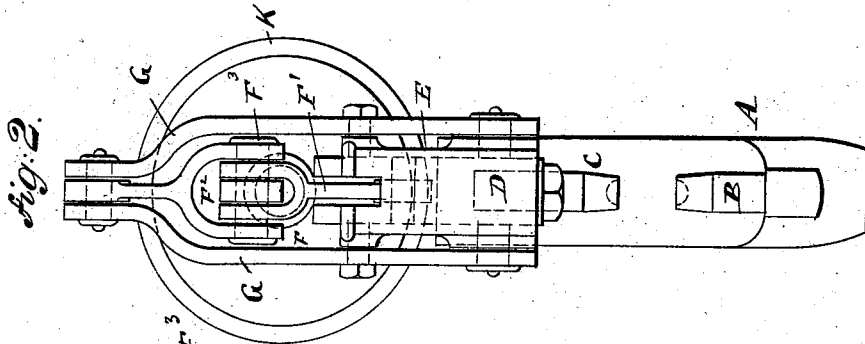


(No Model.)

L. P. LAWRENCE.  
TOOL OPERATING MECHANISM.

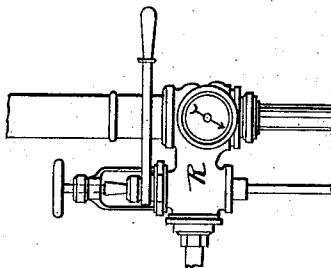
No. 377,858.

Patented Feb. 14, 1888.



WITNESSES:

*A. Schehl.*  
*Carl Kemp*



Inventor

*Louis P. Lawrence.*  
*by Joseph Raegen*  
ATTORNEYS

# UNITED STATES PATENT OFFICE.

LOUIS P. LAWRENCE, OF PASSAIC, NEW JERSEY, ASSIGNOR TO THE LAWRENCE RAILWAY BRAKE COMPANY.

## TOOL-OPERATING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 377,858, dated February 14, 1888.

Application filed March 7, 1887. Renewed January 14, 1888. Serial No. 260,749. (No model.)

*To all whom it may concern:*

Be it known that I, LOUIS P. LAWRENCE, of Passaic, in the county of Passaic, State of New Jersey, have invented certain new and useful Improvements in Tool-Operating Mechanism, of which the following is a specification.

The nature of my invention is the application of atmospheric pressure in contradistinction to pressure derived directly from steam, compressed air, or the like to mechanism for operating punches, &c.

The invention consists in the construction and combination of parts and details, as will be fully described and set forth hereinafter, and then pointed out in the claims.

In the accompanying drawings, Figure 1 is a side view of a riveting-machine provided with my improved vacuum mechanism, parts being broken out and others in section. Fig. 2 is an end view of the same.

Similar letters of reference indicate corresponding parts.

The U-shaped rigid frame A is of the usual construction—such as is used in hydraulic riveting-machines or punches—and on one arm of the said frame A a fixed die, B, for one head of the rivet is held, the other die, C, being held in a slide, D, mounted to reciprocate in a guide, E, projecting upward from the upper arm of the frame A. Said slide D is pivotally connected with the lower end of the arm F' of a toggle-lever, F, which arm F' is pivoted to the lower end of the upper arm, F<sup>2</sup>, of the toggle-lever F by the pivot F<sup>3</sup>, the upper arm, F<sup>2</sup>, of the toggle-lever being pivoted at its upper ends to two rigid standards, G, fastened to the upper end part of the frame A. A link or bar, H, is pivotally connected with the arms F' F<sup>2</sup> of the toggle-lever F, and the other end of said link is pivotally connected with a hollow piston-rod, I, of a piston, J, contained in a cylinder, K, of greater diameter, the rim of said piston J being connected with the said cylinder K by a flexiblering, K'. The piston-rod I passes through a suitable stuffing-box in one end of the cylinder K. A spiral spring, M, is contained in the hollow or tubular piston-rod I, one end of the spring resting against the outer closed end of the piston-rod and the other end resting against the opposite closed end of the cylinder. Said spring serves to

press the piston-rod in the direction of the arrow *a'*, Fig. 1.

The tube O projects into that end of the cylinder opposite the one in which the piston-rod I slides. Said tube also serves as a support and guide for the spring M. The tube O is provided with a three-way cock, O', and by means of the pipe Q, having any suitable coupling, the pipe O is connected with an ejector, R, which serves for creating a vacuum.

The operation is as follows: The parts being in the position shown in Fig. 1, the heated rivet, passed through the material which it is to unite, is placed upon the fixed bottom die, B, and a vacuum is created by means of the ejector R. The cock P is so adjusted as to establish communication between the pipes Q and O, whereby a vacuum is created in the cylinder, and the air entering into the cylinder through the aperture *b* forces the piston J in the inverse direction of the arrow *a'*, whereby the arms F<sup>2</sup> f' of the toggle-lever F are gradually brought in line and the upper die, C, is forced down with great force and forms the head on the rivet. Then the three-way cock is closed, so as to interrupt the communication between the pipes O and Q and permit air to pass through the pipe O into the cylinder, whereupon the spring M, which has been compressed, expands and forces the piston-rod in the direction of the arrow *a'*, whereby the pivot F<sup>3</sup> is moved in the like direction and the slide D and die C are raised. The movement of the die is very rapid and the pressure exerted by said die is very powerful.

It is evident that instead of using the machine for riveting it may be used for punching or for compressing material, or for any other purpose, the only changes necessary being that the dies are removed and replaced by other suitable implements. As the tube Q can be made flexible, the frame A and parts of the same can be moved about to any part of the shop and used for various purposes.

The mechanism is very light, no air-compressor or similar device is used, and there is no necessity of storing any quantity of compressed air, and comparatively little steam is used for creating a vacuum.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a frame or support, of a toggle-lever on the same, a vacuum-cylinder on the frame, a piston in said cylinder, which piston is connected with the toggle-lever, and a tool-holder connected with the toggle-lever, substantially as herein shown and described.

2. The combination, with a U-shaped frame or support, of a toggle-lever on the same, a vacuum-cylinder on the frame, and a piston in said cylinder, which piston is connected with the toggle-lever, substantially as herein shown and described.

3. The combination, with a U-shaped frame,

of a guide on the same, a slide in said guide, a toggle-lever connected with said slide, a vacuum-cylinder on the frame, and a piston in said cylinder, which piston is connected with the toggle-lever, substantially as herein shown and described.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

LOUIS P. LAWRENCE.

Witnesses:

OSCAR F. GUNZ,  
CARL KARP.