(No Model.) 2 Sheets—Sheet 1.

A. THOMSON.

RIVETING MACHINE.

No. 335,976. Patented Feb. 9, 1886.

Fig. 1.

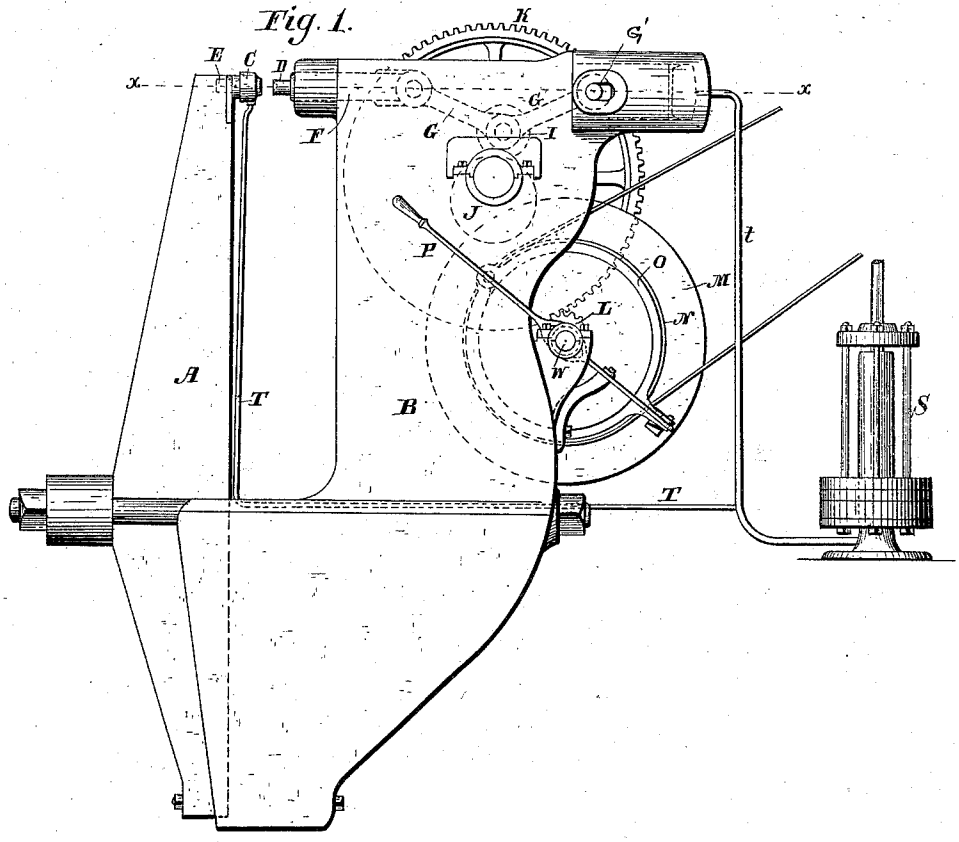
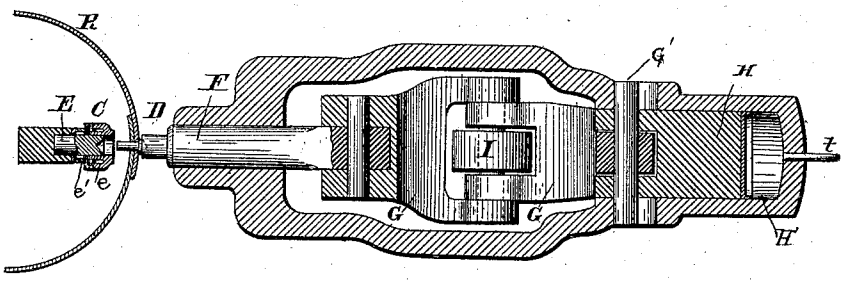


Fig. 2.



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Jos. L. Coombs

Inventor:
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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

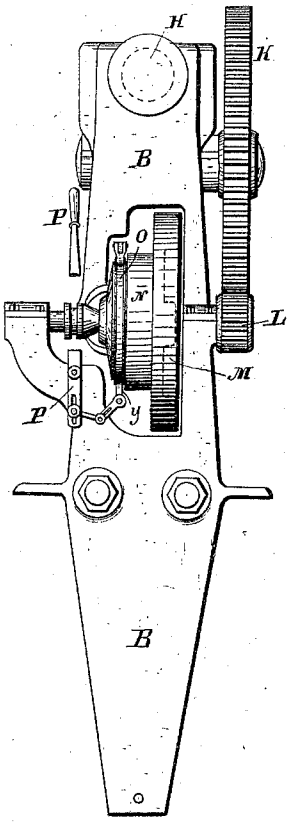
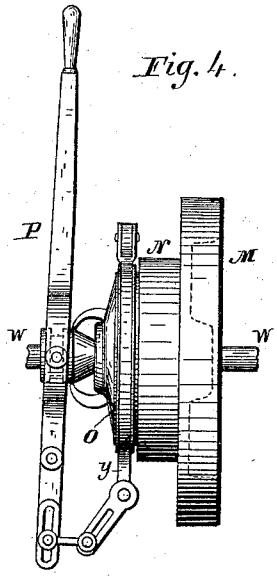


Fig. 4.



Witnesses:

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UNITED STATES PATENT OFFICE.

ALEXANDER THOMSON, OF FITCHBURG, MASSACHUSETTS.

RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 335,976, dated February 9, 1886.

Application filed March 29, 1883. Serial No. 89,953. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER THOMSON, a subject of the Queen of Great Britain, residing at Fitchburg, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Riveting-Machines; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

This invention relates more particularly to that class of riveting-machines wherein the plunger is driven by gearing, although applicable in certain particulars to other forms of riveting-machines, where it is desired to press and hold the plates together during the riveting process; and the said invention consists in certain novel arrangements and combinations of parts for effecting and regulating the pressure upon the plates and upon the rivet, and for holding the riveting-tool upon the rivet at the completion of the stroke, all as hereinafter more fully described, and set forth in the claims.

In the accompanying drawings, illustrating one application of my invention, Figure 1 is a side elevation; Fig. 2, a horizontal sectional view on the line *x x*, Fig. 1, of a power-press with my improvements adapted thereto. Fig. 3 is a rear elevation, and Fig. 4 a detail view, of the driving mechanism.

Similar letters of reference in the several figures indicate the same parts.

The letter B designates the main frame; A, the stake; G, the toggle; F, the plunger or ram carrying the riveting-die D, and connected at its rear end to one member of the toggle; E, the stationary die held in a socket in the stake A, and J the cam operating upon the roller I on the toggle-pin for raising and lowering the latter to reciprocate the plunger or ram F. These parts, together with suitable driving mechanism for rotating the cam J, and a support for the outer end of the rearwardly-projecting member of the toggle, constitute a well-known form of power riveting-machines, which I have selected for the purpose of showing the application of my present invention.

The means shown for pressing the plates and holding them firmly in position during the riveting process consist, essentially, of a sleeve or ring, C, surrounding the stationary die E, and provided with an annular groove or chamber, *e*, to receive the corresponding projection, *e'*, secured to the stake A. The sleeve or ring C is free to slide longitudinally of the die E upon the projection *e'*, constituting a piston working within the chamber *e*, and the latter is connected by a flexible joint or coupling to a pipe, I, communicating with the interior of the cylinder of an accumulator, S, containing a liquid, which latter is maintained under a constant pressure by means of weights applied to the piston or cylinder, as is well understood.

In the illustration given I have shown an accumulator of the usual type, consisting, essentially, of a cylinder within which the liquid is contained, and a piston, to which weights are applied, working in said cylinder. By means of the weights applied to the piston any desired degree of pressure may be placed upon the liquid.

The liquid, passing from the accumulator into the chamber *e*, operates to hold the sleeve or ring projected toward the movable die D with a force proportional to the area of the face of the piston *e'* and of the load upon the accumulator; hence this power can be varied at will by simply adding or renewing the weights.

The operation of this part of my invention is as follows: The plates to be united (shown at R, Fig. 2) are brought together, and the rivet is inserted and placed in line with the movable and stationary dies D and E, and in front of the sleeve C, which latter, by the pressure of the liquid in the chamber *e*, is held projected beyond the operating-face of the stationary die E. The driving mechanism having been started, the movable die D, as it is forced toward the stationary die E, makes contact with the head or outer end of the rivet, carrying it and the plates forward until the inner plate is brought in contact with and held firmly against the face of the sleeve C. If, now, the pressure exerted by the fluid in the chamber *e* upon the sleeve C were equal to or exceeded the power of the toggle and driving mechanism, the further movement of the plunger D would cease, or the plates or some

part of the machinery be ruptured; but by means of the accumulator the pressure developed in the chamber *e* has previously been adjusted relatively to the power and the nature of the work to be performed, so that the power operating upon the movable die shall be sufficiently in excess of that actuating the sleeve C to overcome the latter and force the sleeve back until the projecting end of the rivet is brought into contact with and upset against the inner plate by the stationary die E. The liquid in the chamber *e* is forced back into the accumulator as the sleeve C is retracted, so that the pressure upon the plates remains the same throughout the whole operation, and can be regulated or set to any desired degree. As is obvious, the sleeve C and its connections may be mounted upon and surround the movable die or plunger to co-operate with a fixed abutment on the stake.

The next feature of improvement relates to the means for regulating and maintaining the maximum pressure to be exerted by the movable die or plunger upon the rivet, which is effected in the following manner:

The rear end of the outer link or member of the toggle is sustained upon a pin, G′, mounted to slide horizontally in grooves or ways *g* formed in or upon the main frame B. This pin G′ is connected to the forward end of a piston, H, sliding in a cylinder, H′, in the main frame, said cylinder communicating, through pipe *t*, with the accumulator. The area of the piston H and pressure of the liquid on the accumulator are so proportioned relative to each other as that the force brought to bear upon the pin G′ shall represent the maximum pressure to be developed upon the rivet, and said pin is normally held at the extreme forward position or against the end of the slot or way nearest the toggle, thus forming a stationary bearing for the rear end of the link, and against which the pressure of the toggle and driving mechanism is developed. Should the resistance which the rivet opposes to the movement of the die D be greater than the pressure developed upon the pin G′, the excess of power will operate to force the piston H back against the constant pressure of the liquid in the accumulator, thereby permitting the toggle to be brought up into line without increasing or diminishing the pressure upon the rivet, but maintaining it at the maximum. The area of the piston H is considerably greater than that of the piston *e′*; hence both cylinders may be placed in communication with the same accumulator.

By elongating the slot in which the pin G′ rides, and increasing the throw of the toggle, the action of the dies upon the rivet may be prolonged after the latter has been brought into position and upset, the piston H yielding to the movement of the toggle, but at the same time maintaining the maximum pressure upon the rivet; but I preferably connect to the driving mechanism devices whereby the operator is enabled to stop and hold the toggle at any point in its throw, and thus retain the pressure upon the rivet. To accomplish this, I mount the driving-pulley N and fly-wheel M loosely upon the driving-shaft W, to which latter I secure a friction-clutch, O. Motion is communicated to the shaft carrying the cam J through a wheel, K, secured to said shaft, and a pinion, L, fastened to the driving-shaft W. The lever P, by which the friction-clutch is operated to connect the pulley N to the driving-shaft, is connected to a brake, Y, so that as the clutch is released from the driving-pulley the brake will be simultaneously applied to arrest the rotation of the driving-shaft. By this means, when the toggle is extended and the rivet seated and properly compressed, the operator can, by actuating the lever P, disconnect the pulley M from the driving-shaft, and at the same time apply the brakes, so as to hold the cam and toggle elevated, and rivet under pressure as long as desired.

Having thus described my invention, I claim as new—

1. In a power riveting-machine such as described, the combination, with the toggle for actuating the movable die and the weighted accumulator, of the piston attached to one member of the toggle and receiving the thrust of the latter, substantially as described.

2. In a riveting-machine, the combination of the friction-clutch O, brake Y, and lever P with pinions L, gear K, cam J, and toggle-joint G, substantially as described.

3. In a power riveting-machine such as described, the combination, with the riveting-dies and the toggle and driving mechanism for actuating one of said dies, of the holding-sleeve and the piston applied to one member of the toggle, said sleeve and piston being actuated by a liquid maintained under pressure in a weighted accumulator, substantially as described.

4. In a power riveting-machine such as described, the combination of the stationary die mounted in the stake, the chambered sleeve fitting over the annular piston surrounding said die, and the weighted accumulator containing a liquid maintained under pressure and communicating through a pipe with the chamber in said sleeve, with the opposing movable plunger or die and the power devices for actuating said plunger, substantially as described.

5. The combination, with the stationary die mounted in the stake, the chambered sleeve and piston working therein, and also supported upon the stake, and with the movable plunger, its toggle, and the driving mechanism applied to the toggle, of the piston connected to the toggle, the cylinder, and the weighted accumulator communicating with both the said cylinder and the chamber in the sleeve, substantially as and for the purpose set forth.

6. In a power riveting-machine such as described, the combination, with the riveting-

dies, the toggle applied to one of said dies, and the driving mechanism for actuating the toggle, of the piston connected to and supporting one member of the toggle, the cylinder in which said piston operates, the holding-sleeve, its piston and chamber, the accumulator communicating with said cylinder and chamber, and the pulley, clutch, and brake applied to the shaft of the driving mechanism, substantially as and for the purpose set forth.

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