

(No Model.)

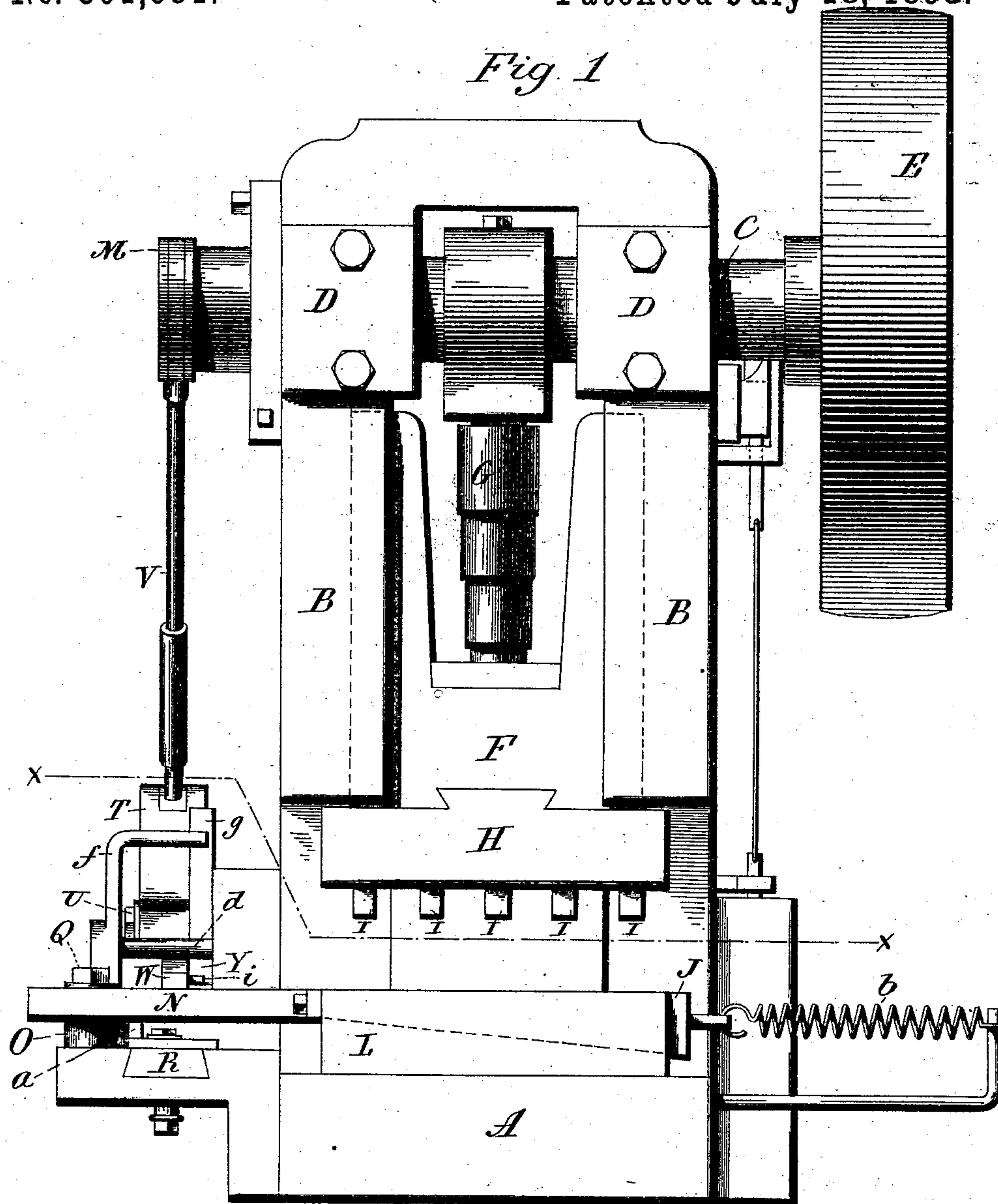
3 Sheets—Sheet 1

S. FRISBIE.  
RIVETING MACHINE.

No. 501,681.

Patented July 18, 1893.

*Fig. 1*



Witnesses  
J. H. Hummery  
William D. Kelby

Samuel Frisbie  
Inventor  
Gatty  
Earle Seymour

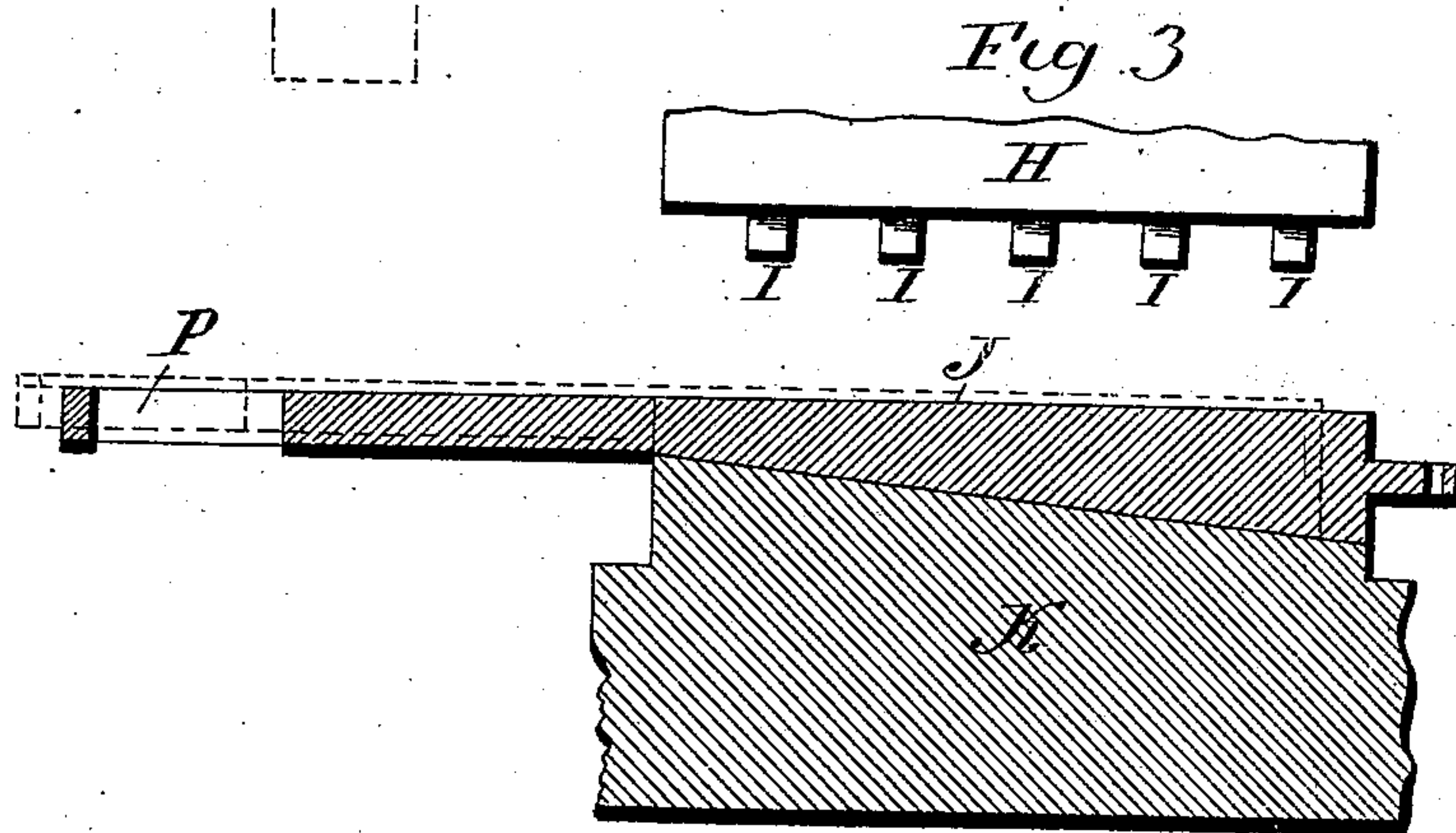
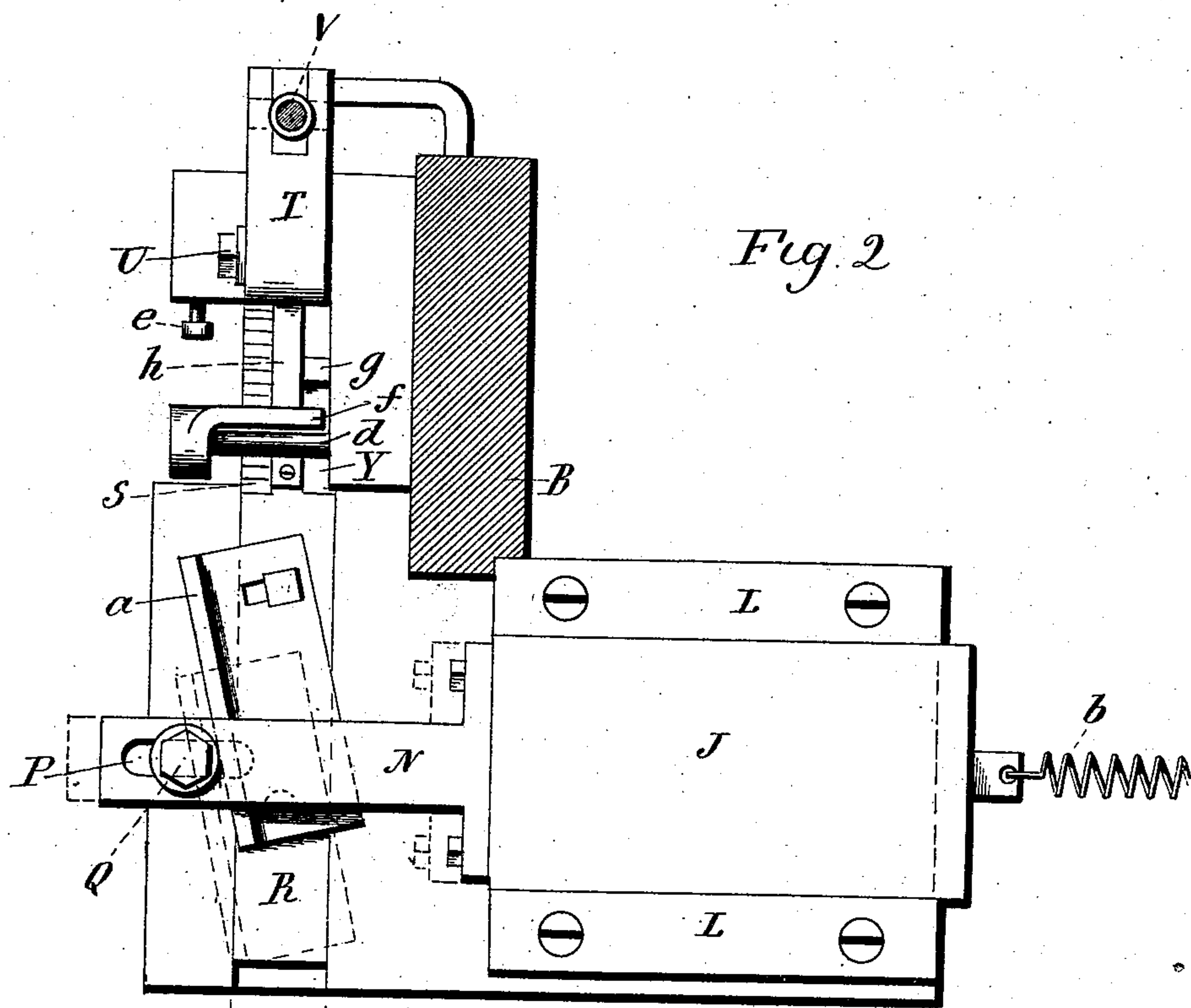
(No Model.)

3 Sheets—Sheet 2.

S. FRISBIE.  
RIVETING MACHINE.

No. 501,681.

Patented July 18, 1893.



Witnesses.

J. W. Hummery  
William D. Kellogg

Samuel Frisbie,  
Inventor.  
Gary  
Earle Heyman

(No Model.)

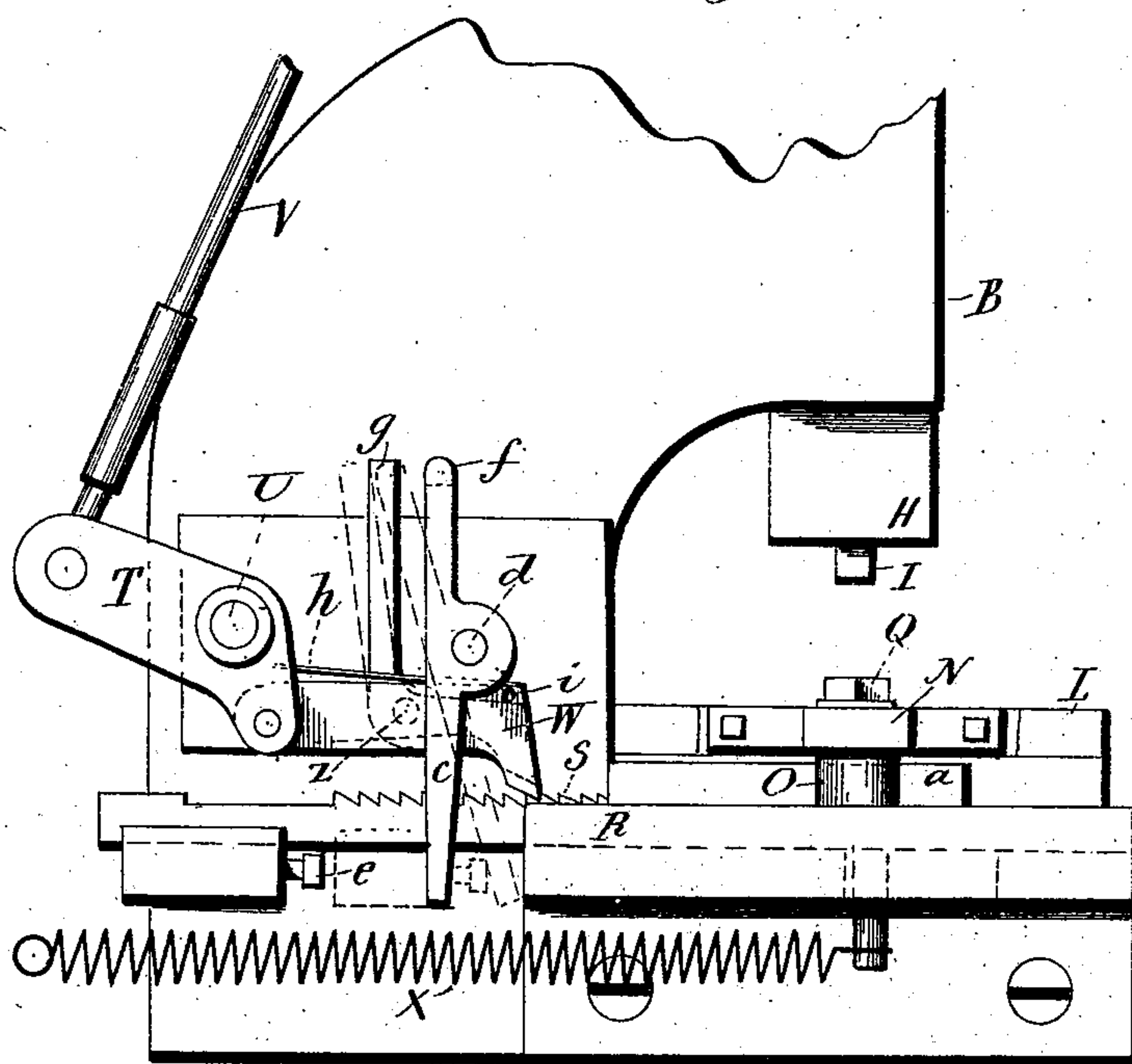
3 Sheets—Sheet 3.

**S. FRISBIE.**  
**RIVETING MACHINE.**

No. 501,681.

Patented July 18, 1893.

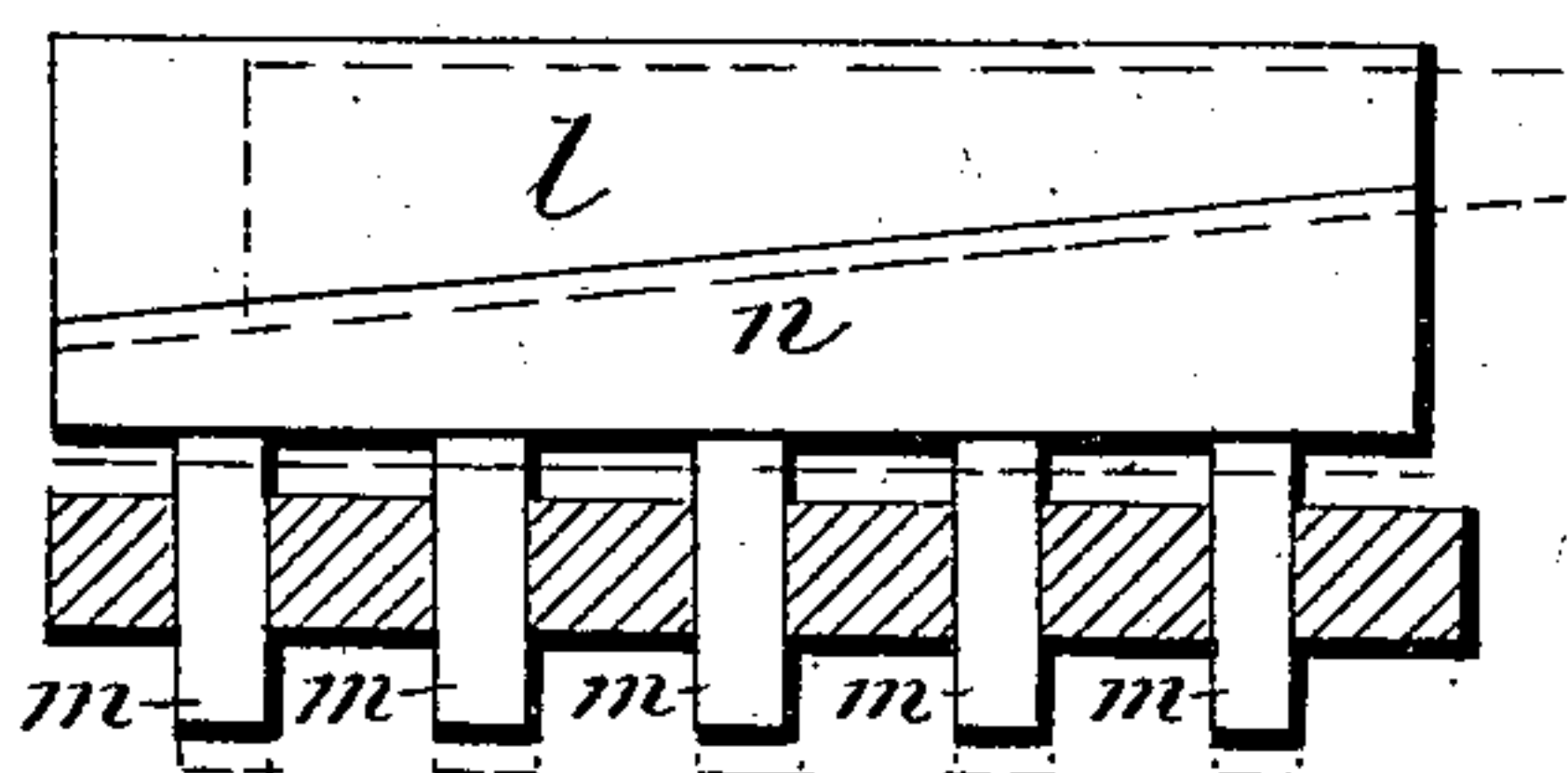
*Fig. 4*



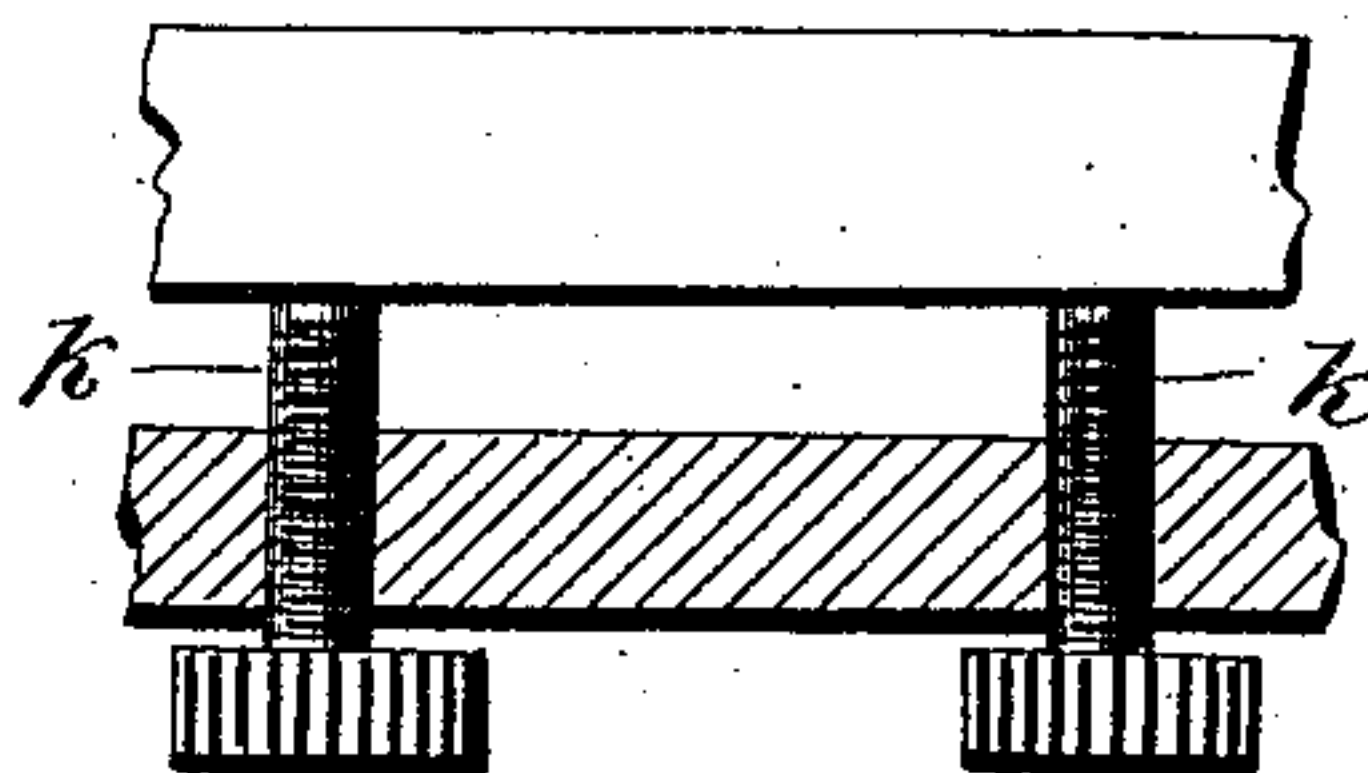
*Fig. 5*



*Fig. 7*



*Fig. 6*



Witnesses  
J. H. Shumway  
Lillian S. Kellogg

Samuel Frisbie  
Inventor  
Gatty Earle Heywood



# UNITED STATES PATENT OFFICE.

SAMUEL FRISBIE, OF UNIONVILLE, CONNECTICUT.

## RIVETING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 501,681, dated July 18, 1893.

Application filed September 29, 1892. Serial No. 447,235. (No model.)

*To all whom it may concern:*

Be it known that I, SAMUEL FRISBIE, of Unionville, in the county of Hartford and State of Connecticut, have invented a new Improvement in Riveting-Machines; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view of the machine complete; Fig. 2, a horizontal section cutting on line  $x-x$  of Fig. 1 looking down; Fig. 3, a longitudinal section through the anvil; Fig. 4, a side view of the machine, the upper portion broken away; Fig. 5, a front view of the pawl and dog to illustrate their connection; Figs. 6 and 7, modifications.

This invention relates to an improvement in riveting machines, having special reference to machines which are adapted to operate upon several rivets at the same time, the machine being designed for riveting that class of measuring-rules in which the edges are bound with metal. The body of the rule is usually of wood, ivory, or similar material, and strips of metal are laid upon the two edges and rivets inserted transversely through the body and strips of metal, then the rivets upset to secure the two strips of metal to the body. The rivets are pieces of wire, of a length greater than the distance between the two strips to be riveted, so that the wire projects from both sides to give sufficient length to upset upon the two surfaces. The wire is necessarily of small size, and unless the greatest care be exercised in riveting, the wire will bend within, and so as to split the body. In the manufacture of these rules the loss from such splitting is very great, and each rivet is operated upon singly and with greatest care, so as to make the loss from such splitting as light as possible.

The object of this invention is to construct a machine which will operate simultaneously upon all the rivets throughout the length of the piece of the rule to be riveted, and to produce the upsetting or riveting in such a manner as will avoid the bending of the wire within the body. If the blows upon the rivets be

very light, just sufficient to produce a slight upsetting of the metal, and these blows continued, the splitting will not occur. Taking advantage of this fact, the machine of this invention is adapted to produce such light blows, and by an automatic feed to bring the hammers and the anvil gradually toward each other, so that each successive blow will produce but a very limited amount of upsetting, the blows being continued in succession until the upsetting is complete. In such a machine as more fully hereinafter described and particularly recited in the claims the invention consists.

A, represents the base or bed of the machine, B B two uprights extending therefrom, and which carry a horizontal shaft C, in bearings D D, power being communicated to the shaft through a pulley E, in the usual manner for communicating power to power-presses, the machine in its general construction being similar to the common power-press.

F, represents the gate or slide, which is arranged between vertical guides on the uprights, and so as to slide up and down, being so moved by means of an eccentric on the shaft C, connected to the slide by a pitman G, in the usual manner for connecting the slide of a power-press, and so that each revolution of the shaft imparts a full reciprocating movement to the slide.

The usual clutch mechanism for connecting the power with the shaft, is employed, not necessary to be described.

In a head H, carried by the slide F, several hammers I, I, more or less in number according to the number of rivets required to be operated upon, are arranged, these hammers being adapted to strike the end of the wire rivets, and upset the end of the wire. Below the head H, the anvil J, is arranged; this anvil is in the form of a flat table, its surface parallel with the line of the faces of the several hammers I. The anvil rests upon a bed K, and is adapted to slide longitudinally thereon from right to left and return. It is supported between guides L L, see Fig. 2, and the under side of the anvil and the upper surface of the bed K, are inclined correspondingly, as seen in Fig. 3, and so that as the anvil J, is drawn from right to left, as indicated



in broken lines Fig. 3, a slight rise will be imparted to the anvil. The anvil is moved up this incline in a step by step or intermittent movement, and such movement is best produced from an eccentric M, on the driving-shaft. The anvil is constructed with an arm N, projecting longitudinally therefrom, and which carries upon its under side a stud or anti-friction roll O. The roll is held in the arm by means of a stud or axle extending through a vertical slot P, in the arm N, and secured by a nut Q, on the upper side, see Figs. 1 and 2, so that the roll or stud may be adjusted longitudinally in the arm. Below the arm is a transverse slide R, arranged between suitable guides, and so as to receive a backward and forward movement. This slide is provided upon its upper surface with a series of teeth S, see Fig. 4, and above the slide R, a bell-crank lever T, is hung, upon a stationary stud U, one arm of the lever being in connection with the eccentric M, through a rod V, and so that at each revolution of the shaft an oscillating movement will be imparted to the lever. The other arm of the lever carries a pawl W, the nose of which is adapted to engage the teeth S, of the slide R. The pawl receives a backward and forward movement through the lever T, and so that in its backward movement it will escape from one tooth of the slide R, and then in its advance movement, will engage that tooth and impart a corresponding advance movement to the slide R. The slide R, is provided with a spring X, which operates to return or draw the slide R, rearward, or free from the operation of the pawl. A dog Y, is hung upon a stationary pivot Z, which is adapted to engage the teeth of the slide R as the pawl advances the slide, and so as to hold the slide as it is advanced step by step under the action of the pawl W.

On the slide R, is a cam  $\alpha$ , which presents a straight surface to the stud or anti-friction roll O, on the arm N, of the anvil, the straight surface of the cam being oblique to the path of movement of the slide R, and so that as the slide R, is advanced step by step, the oblique surface of the cam  $\alpha$ , will operate upon the anvil and impart to it a corresponding step by step longitudinal movement. The anvil is provided with a spring  $b$ , opposed to the operation of the cam  $\alpha$ , and so that when the anvil is free from the operation of the cam  $\alpha$ , the spring will return the anvil to its normal position, and as seen in Fig. 2, the advance movement of the anvil being indicated in broken lines. After the advance of the anvil has been completed, and to permit the anvil and the slide R, to return under the action of their respective springs, the slide R, is relieved from engagement with the pawl W, and the dog Y, which relief is accomplished through a lever  $c$ , hung upon a stationary pivot  $d$ , in a plane parallel with the plane of the pawl. The lever  $c$ , extends down into the path of a stop or shoulder  $e$ , on the slide R, and so that as the slide in advancing com-

pletes its forward movement, the said stop will strike the lever  $c$ , and turn it forward. From the hub of the lever  $c$ , an arm  $f$ , extends upward, and from the dog Y, a similar arm  $g$ , extends upward, the dog being provided with a spring  $h$ , the tendency of which is to hold it down upon the teeth of the slide R. As the slide R, approaches its advance movement, the stop  $e$ , strikes the lever  $c$ , and turns it so as to bring the arm  $f$ , into engagement with the arm  $g$ , of the dog Y, which causes the dog Y, to rise from its engagement with the teeth of the slide R (as indicated in broken lines). From the pawl a stud  $i$ , projects over the dog Y, as seen in Fig. 5, and so that as the dog rises, it will engage the pawl and cause that to rise with it, so as to release the slide R, from engagement with both the dog and the pawl, and when so released, the spring X, will react and return the slide R, and as that slide R, so returns, the anvil J, will in like manner return under the action of its spring  $b$ . The hammers I I, correspond in number and position to the respective rivets in the body or part of the rule to be operated upon, and normally the anvil stands in its lowest position, which in this case would be at the extreme right, as represented in Fig. 3. The operator having prepared the part of the rule to be operated upon by placing the strips or bands thereon, and introducing the wires for the rivets through the bands and the body, sets the work so prepared upon the anvil, and so as to bring the wires or rivets directly below the hammers, the opposite ends of the rivets resting upon the anvil below. The machine is now set in motion, and the hammers rapidly reciprocating, come down upon the ends of the wire, producing but a slight force thereon, or not so great as to produce a bending effect upon the rivets. At each reciprocation of the hammers the anvil is advanced one step, as before described, and in such step its surface is brought slightly nearer the hammers, so that in the next descent of the hammers, they will again operate upon the wires to produce a slight upsetting, and this work will continue, successive blows being produced by the hammers, and the work gradually raised, and until the upsetting of the rivets is complete, and when this work has been completed, the pawl and dog are thrown out, as before described, and the anvil returns, the finished work is removed, and a new piece introduced, and so continuing. The reciprocation of the hammers may be continuous it being unnecessary to stop the machine when one piece is completed, and start it when the next is introduced, the automatic action of the mechanism to drop the anvil when the work is complete, avoids the necessity of disconnecting the power, but such disconnection may be made if desirable. If the work is continued, however, it is necessary that the next piece of work be introduced before the anvil commences its rise.

While preferring the inclined plane as the



means for raising the anvil, it will be evident that other means may be employed, as for illustration, the anvil may be arranged upon vertical screws, as seen in Fig. 6, *k k*, representing the screws, and intermittent rotation is imparted to the screws by any suitable mechanism so as to gradually raise the anvil, and then the screws returned after the work is complete to drop the anvil. This illustration will be sufficient to enable others to apply various devices to impart a step by step or intermittent rise to the anvil as the work progresses, the invention is therefore not to be understood as limited to any particular mechanism for imparting the vertical intermittent movement to the anvil, so as to cause it to gradually approach the hammers:

While preferring to raise the anvil as the means for gradually shortening the distance between the anvil and hammers, according to the extent of upsetting required, the anvil may be stationary, and the hammers forced down one step at each operation. This may be accomplished in various ways as for illustration, as seen in Fig. 7, in which *l*, represents the head, *m m* the several hammers. Longitudinally through the head is a slide *n*, against which the upper ends of the hammers rest, the opposite side of the slide inclined in like manner as that described for the anvil, and so that as the slide is drawn to one side, as represented in broken lines, it will correspondingly force the hammers toward the anvil, and this movement of the slide *n*, may be produced at each rise of the slide which carries the head, until the upsetting has been completed, as before described, then the slide *l*, will turn in like manner as does the anvil in the first illustration.

From the foregoing it will be understood that the invention is not to be limited to any particular mechanism for causing the hammers and anvil to gradually approach each other, it only being essential to the invention that there shall be a step by step advance of one toward the other, and this step by step or intermittent advance of the anvil toward the hammer, or vice versa, may be employed to advantage in single riveting machines where a positive movement is imparted to the hammer.

I am aware that it is not new to move the anvil of a riveting machine toward the hammer thereof by means of a wedge, and I do not therefore claim that construction broadly.

I claim—

1. In a riveting machine, the combination with one or more reciprocating hammers, and an anvil arranged in opposition thereto, of step-by-step mechanism for regularly and intermittently reducing the distance between the hammer or hammers and the anvil, the said mechanism being constructed and arranged to operate between the successive

blows of the hammer or hammers, substantially as set forth, and whereby the rivets are operated upon progressively, or little by little, instead of all at once.

2. In a riveting machine, the combination with one or more reciprocating hammers, and an anvil arranged in opposition thereto, of step-by-step mechanism for imparting a regular intermittent movement to the anvil toward the hammer or hammers, the said mechanism being constructed and arranged to operate between the successive blows of the hammer or hammers, substantially as described, and whereby the rivets are operated upon progressively or little by little, instead of all at once.

3. In a riveting machine, the combination with one or more reciprocating hammers, and an anvil arranged in opposition thereto and having its lower face longitudinally inclined, of a bed located below the anvil, and having a corresponding opposite inclination, and step-by-step mechanism for imparting a regular, intermittent movement to the anvil upon its bed to move it progressively toward the hammer or hammers, the said mechanism being constructed and arranged to operate between the successive blows of the hammer or hammers, substantially as set forth, and whereby the rivets are operated upon progressively or little by little, instead of all at once.

4. In a riveting machine, the combination of a reciprocating slide carrying one or more hammers corresponding in number to the rivets to be operated upon, an anvil below said hammers, and adapted to support the work, the anvil inclined upon its under side from one end toward the other, a bed below the anvil upon which the said inclined surface of the anvil rests, the anvil constructed with an arm projecting from one end, a slide arranged to move in a path at right angles to said arm, the said slide carrying a cam, and the arm carrying a stud against which said cam is adapted to operate, mechanism substantially such as described for imparting to said slide a step by step or intermittent movement, which movement will be communicated to the anvil by said cam, and cause the anvil to ride up the inclined surface on which it rests, mechanism substantially such as described to release the said anvil from the action of said slide, and a spring to return the anvil after such release, substantially as and for the purpose described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

SAMUEL FRISBIE.

Witnesses:

NELLIS E. DAY,  
W. E. GRAHAM.