(No Model.) 2 Sheets—Sheet 1.

G. A. N. ERMEL.

AUTOMATIC MACHINE FOR FORMING HEADS ON RIVETS, BOLTS, OR SCREW BLANKS.

No. 562,594. Patented June 23, 1896.

Fig. 1

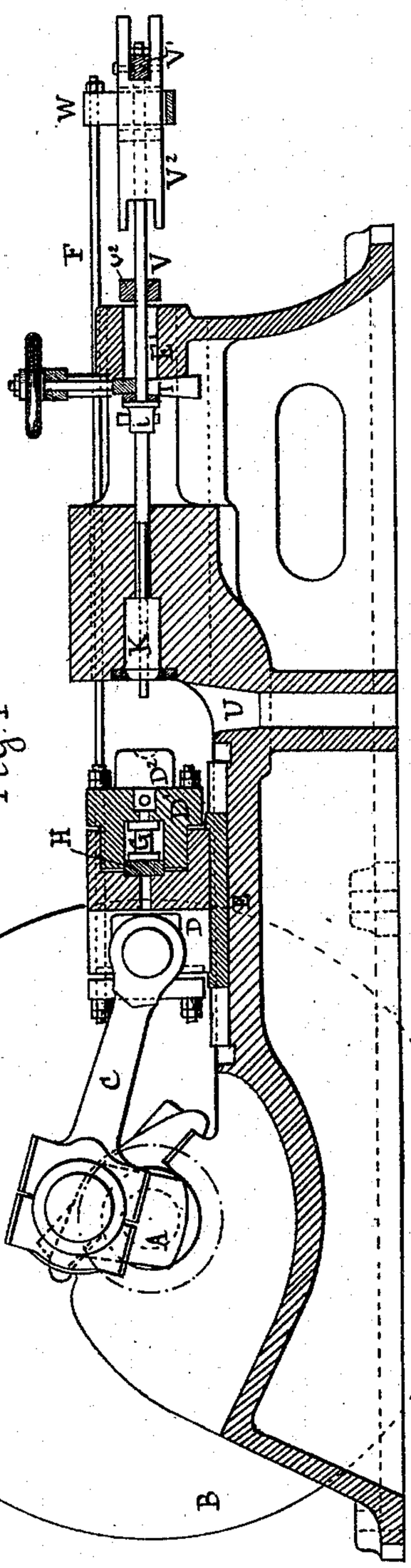
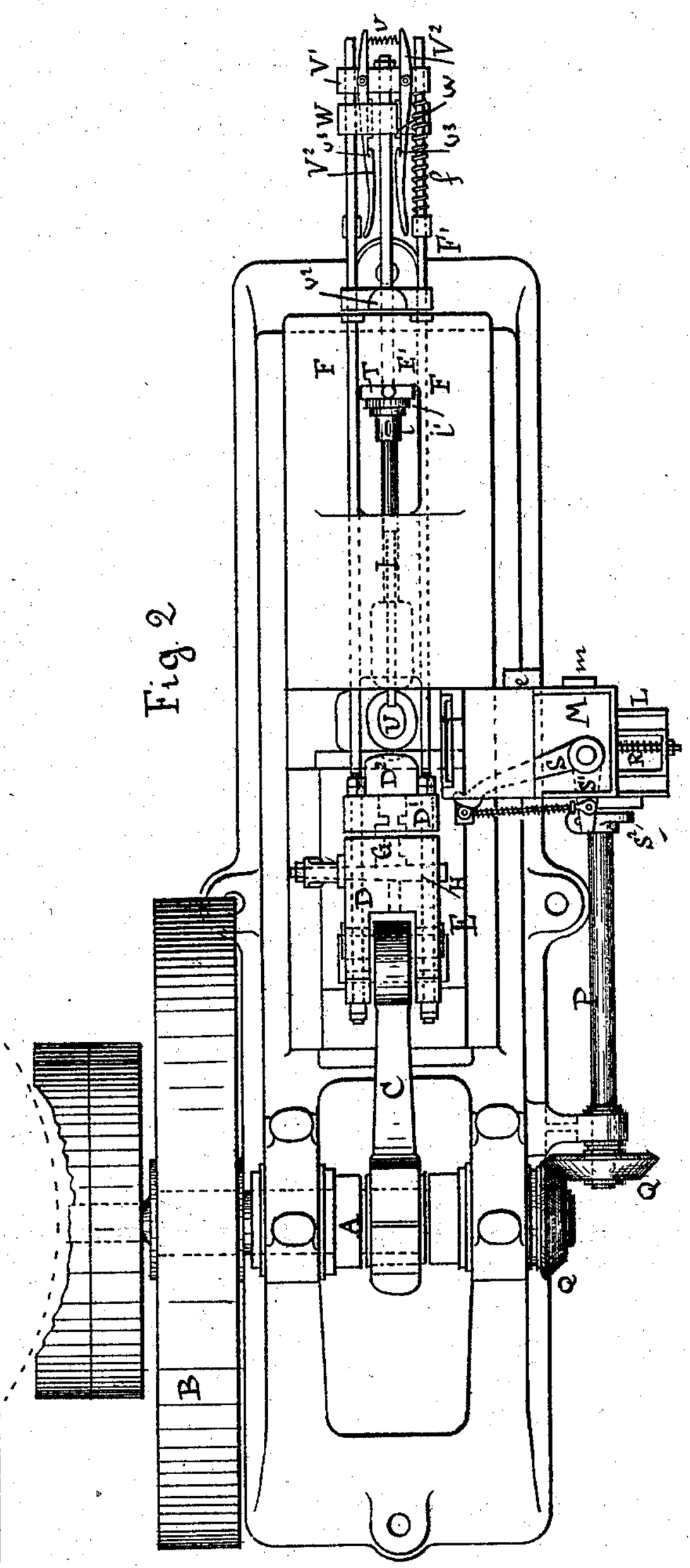


Fig. 2



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Inventor:
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Howson and Howson

(No Model.) 2 Sheets—Sheet 2.

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Fig. 4

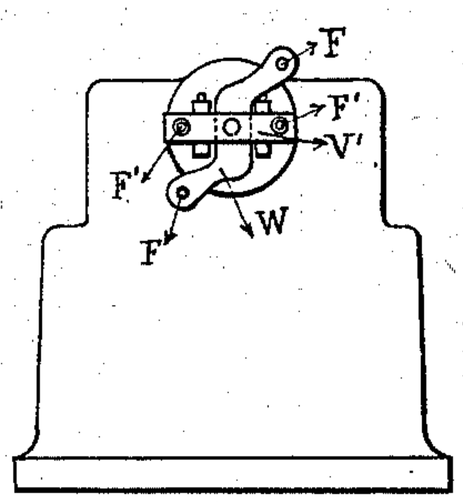


Fig. 3.

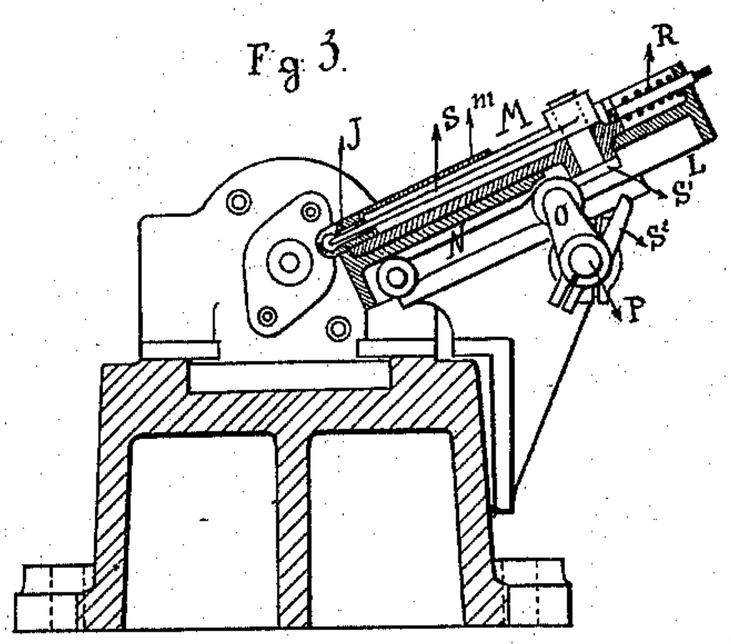
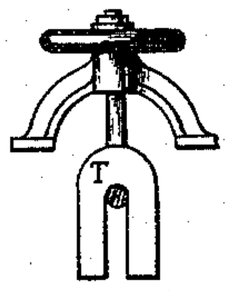


Fig. 5



Witnesses:
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Inventor:
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UNITED STATES PATENT OFFICE.

GEORGES ADOLPHE NORBERT ERMEL, OF BRUSSELS, BELGIUM.

AUTOMATIC MACHINE FOR FORMING HEADS ON RIVETS, BOLTS, OR SCREW-BLANKS.

SPECIFICATION forming part of Letters Patent No. 562,594, dated June 23, 1896.

Application filed November 19, 1895. Serial No. 569,460. (No model.) Patented in Belgium October 10, 1895, No. 117,832.

To all whom it may concern:

Be it known that I, GEORGES ADOLPHE NORBERT ERMEL, of No. 1 Rue Vautier, Brussels, in the Kingdom of Belgium, have invented a certain new and useful Automatic Machine for Forming Heads on Rivets, Bolts, or Screw-Blanks, (for which Letters Patent have been granted to me in Belgium, No. 117,832, dated October 10, 1895,) of which the following is a specification.

The machines at present in use for making rivets are controlled by hand, and the blanks intended to be formed into rivets, or otherwise, are introduced also into the matrix by hand. These facts limit the production and often cause accidents to the attendants.

In the machine which forms the subject of the present invention, the blanks are carried automatically to the matrix. The operation obviates possible accidents, and also increases the production under certain important and economical conditions, which will now be demonstrated.

In the accompanying drawings, Figure 1 is a longitudinal section of the machine. Fig. 2 is a plan view. Fig. 3 is a transverse section showing the blank-carriage. Figs. 4 and 5 show details which will be more particularly referred to.

The machine acts in a horizontal direction, and is continuous in its action. It is provided with a crank-shaft A, and on this shaft are mounted two fast and loose pulleys, and a fly-wheel B, of sufficient size to form, by its momentum, the head of the rivets or other pieces in course of manufacture. A connecting-rod C gives a reciprocating movement to a saddle or cross-head D, which slides in guides in a suitable frame E. The saddle is in two pieces, the front one D′ of which is detachable and carries a suitably-shaped die, the object of which is to give the form to the head of the rivet or bolt. The cross-head is arranged so as to permit of the easy insertion of a piece G, termed a "crushing-piece," which is intended to break away or crush up in case of abnormal shock or strain on the machine, leaving the other parts intact.

An adjustable wedge H serves to regulate exactly the position of the part D′, and consequently of the die D^2, so that it will strike or form the head of the rivet perfectly. This regulation is useful, especially when a die which has been repaired is being reused.

A steel matrix K, into which the blanks are introduced, is recessed into a block cast with the frame, and it is held therein by a retaining-plate. The matrix and retaining-plate are fixed flush with the face of the block to leave a clear space for the movement of the blank-carrier that will be now described. This carrier rests on a bracket-support fitted to the frame, and is inclined toward the axis of the machine. It is composed of two parts or slides L and M, sliding the one on the other. The lower portion L receives a reciprocatory movement from the connecting-rod N, coupled to a crank O, keyed on a secondary shaft P, which is actuated by gearing Q. The movement given to this part is constant, the upper part M sliding on the lower part, as above indicated. The two parts L and M are connected together by a spring R. The front portion of the upper slide, say toward the axis of the machine, is grooved or recessed to form a blank-carrier. In its traverse movement it receives from a supply-hopper or magazine a blank, which it carries forward to a point in line with the axis of the machine, that is to say, exactly in front of the matrix, where it is stopped for an instant. This stoppage, at the precise moment when the blank is facing the matrix, is determined by an abutment *m*, fixed adjustably on the slide M, coming in contact with a projection *e* of the frame.

The blank-carrier acts in the following manner: In its initial position its groove receives from the hopper placed above it a blank. It then advances toward the axis of the machine. As it moves forward, the abutment *m* strikes the fixed stop *e* of the frame precisely at the moment when the blank exactly faces the matrix, the upper slide M being arrested for a certain time, while the lower slide L continues its course, compressing the spring R. This stoppage of the upper slide affords sufficient time for the introduction of the blank into the matrix. The following is the mechanism which acts to this effect: The slide M has a pin perpendicular to its plane, forming the pivot of a bell-crank lever. The longer arm S of this lever terminates in the form of a hammer, which works

freely in the groove of the slide carrying the blank, and serves, when rocked on its pivot, to force the blank into the matrix. The rocking of the lever S is effected at the proper moment by a finger S^2, keyed on the secondary shaft P, coming in contact with the shorter arm S′. The lever and the finger are adjustable in their position in such a manner as to be presented the one to the other at any determined moment. When the finger S^2 has passed the arm S′, the carrier returns to its normal position. At the same time a spring returns the lever to its initial position, and the blank-carrier is also returned by its spring to receive another blank from the hopper. The groove J in the blank-carrier (the size of which is regulated according to the size of the rivet) is open at the top for nearly the whole of its length, and the end which comes flush with the matrix is so formed as to insure the easy introduction of the blank and to work without obstruction after the introduction of the blank. When once the blank is inserted in the matrix, it can be struck freely, and the carrier then returns to receive another blank from the hopper. After the head is formed the rivet is discharged from the matrix to make room for another blank. The discharging is effected by a pusher, which serves at the same time as a resistance to the blow which forms the head. This pusher is actuated immediately on the return of the saddle D after the completion of the head of the rivet. The rivet discharged from the machine falls at once through an opening U, formed in the frame, into a receptacle. The pusher is composed, first, of a rod I, which is introduced from the back into the matrix, and works therein. The diameter of this rod and the distance it penetrates into the matrix vary and are determined according to the size of the rivet it is desired to form. This rod is socketed into a rod V, fixed at its rear end to a cross-head V′, on which are pivoted two levers V^2, having their shorter arms kept apart by a spring *v*. The object of this spring is to maintain these levers in a position parallel to the tube V and in contact with a cross-piece W. This piece W is connected to the saddle D by two long bolts F, so that these rods work with the saddle D and maintain always the same distance.

The two levers V^2 are bent outward at their front ends, so that when they are advanced and strike against a curved or winding stop v^2 they will ride over this stop and be caused to open out, thus compressing the spring *v*. The cross-head V′ slides on the two rods F, which guide it and also carry springs *f* between the cross-head V′ and abutments F′, fixed on the rods. These springs are compressed by the movement of the cross-head V′ on the rods and serve to cause the rod I to rapidly return to its place, and, in fact, cause the whole of the pusher to return to its normal position after working.

The rod V is unchangeable in its dimensions, that is to say, it forms part of the body of the machine, while the rod I is changeable according to the dimensions of the rivet to be made.

The rod I enters the socket of the rod V to its full length, and is secured therein by a wedge. This rod I has not only the function of discharging the rivet from the matrix, but it has also to form the resistance to the blow of the head-forming tool D^2. To obtain this resistance, the rod V is furnished at its end with a socket *i*, in which a slot is formed to receive a cotter, by which the two are secured together. A horseshoe-shaped wedge-piece T, Fig. 5, which rests against a block E′, cast with the frame, is in contact with the socket *i*, and regulates exactly the distance of penetration of the rod I in the matrix, according to the length of the rivet. This piece T serves also as a stop to the return of the rod V and of the whole of the pusher. This piece T is adjustable vertically by means of a hand-screw, so as to fix the exact amount of return movement of the rods I and V, under the influence of the springs *f*. The horseshoe shape of this piece T allows for its being easily removed and replaced, and also for the free movement of the rod V through it, without either of these pieces interfering with the other.

The levers V^2 are formed with shoulders v^3, against which strike similar parts *w* on the cross-piece W. The shoulders are renewable.

The pusher acts as follows: As soon as the rivet is formed the cross-head returns, drawing with it the piece W by means of the bolts F. The shoulders *w* strike against the shoulders v^3, and thus draw forward the piece V′, the rod V, and the rod I, which latter enters the matrix and forces out the formed rivet. When the rods I and V are advanced the length of the rivet, that is to say, when the point of the rod I comes flush with the face of the matrix, the work is finished. At this moment, the levers V^2 come into contact with the rounded stop v^2, and they are rocked, so that the shoulders v^3 and *w* are separated. The piece V′, the levers V^2, the rods V and I are freed, and, under the influence of the springs *f*, are rapidly drawn back, in order to leave room for the insertion in the matrix of another blank. During the work of the die D^2 the piece W regains its position, to be ready to renew the discharging operation.

It is easy to understand from the above description the working of the machine in its different combined operations, that is to say, the carrying of the blank from the magazine to the matrix, the introduction of the blank in the matrix, the formation of the rivet-head, the forward movement of the pusher, the retreat of the same, the whole operation being automatic in such a manner that the manufacture is continuous.

En résumé, that which characterizes my invention is the rapid introduction of the blanks into the matrix, and the discharge, equally rapid, of the rivets, the whole being

effected automatically, so as to attain much more economically a much greater production than in the machines for making rivets actually in use at the present time.

I claim—

1. An automatic machine for making rivets, consisting of a reciprocating die or striker, an automatic feeding device for blanks, consisting of two slides, a secondary shaft and connections to impart a regular reciprocating motion to one of the slides, a stop to limit the movement of the other slide which carries the blank, a bell-crank lever actuated from the secondary shaft, the longer arm of the lever adapted to push the blank into the matrix, in combination with a pusher connected to and moving with the die or hammer-carrier to discharge the finished rivet from the die, and springs and a trigger mechanism to return the pusher to its normal position when the operation is finished, substantially as described.

2. In a machine for forming heads to rivets, the combination of a matrix and a reciprocating die or striker with an automatic feeding device for the blanks, the said device comprising a reciprocating carrier adapted to present a blank to the matrix and a hammer to force the blank into the matrix, substantially as set forth.

3. In a machine for making rivets, the combination of the reciprocating die or striker, with a pusher, mechanism to connect the pusher to the reciprocating die or striker during part of its return motion and springs and trigger mechanism to release the pusher and return it to its normal position, substantially as set forth.

4. In a machine for making rivets, the combination of a fixed matrix, a reciprocating die and a pusher to discharge the finished rivet, with a wedge to regulate the position of the die, and another wedge adapted to regulate the distance of the pusher in the matrix according to the length of the rivet, and to form a stop to limit the return of the pusher, substantially as set forth.

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

GEORGES ADOLPHE NORBERT ERMEL.

Witnesses:

GUSTAVE PIERRY,

GREGORY PHELAN.