(No Model.) 3 Sheets—Sheet 1.

W. MASON.

MACHINE FOR HEADING CARTRIDGE SHELLS.

No. 386,254. Patented July 17, 1888.

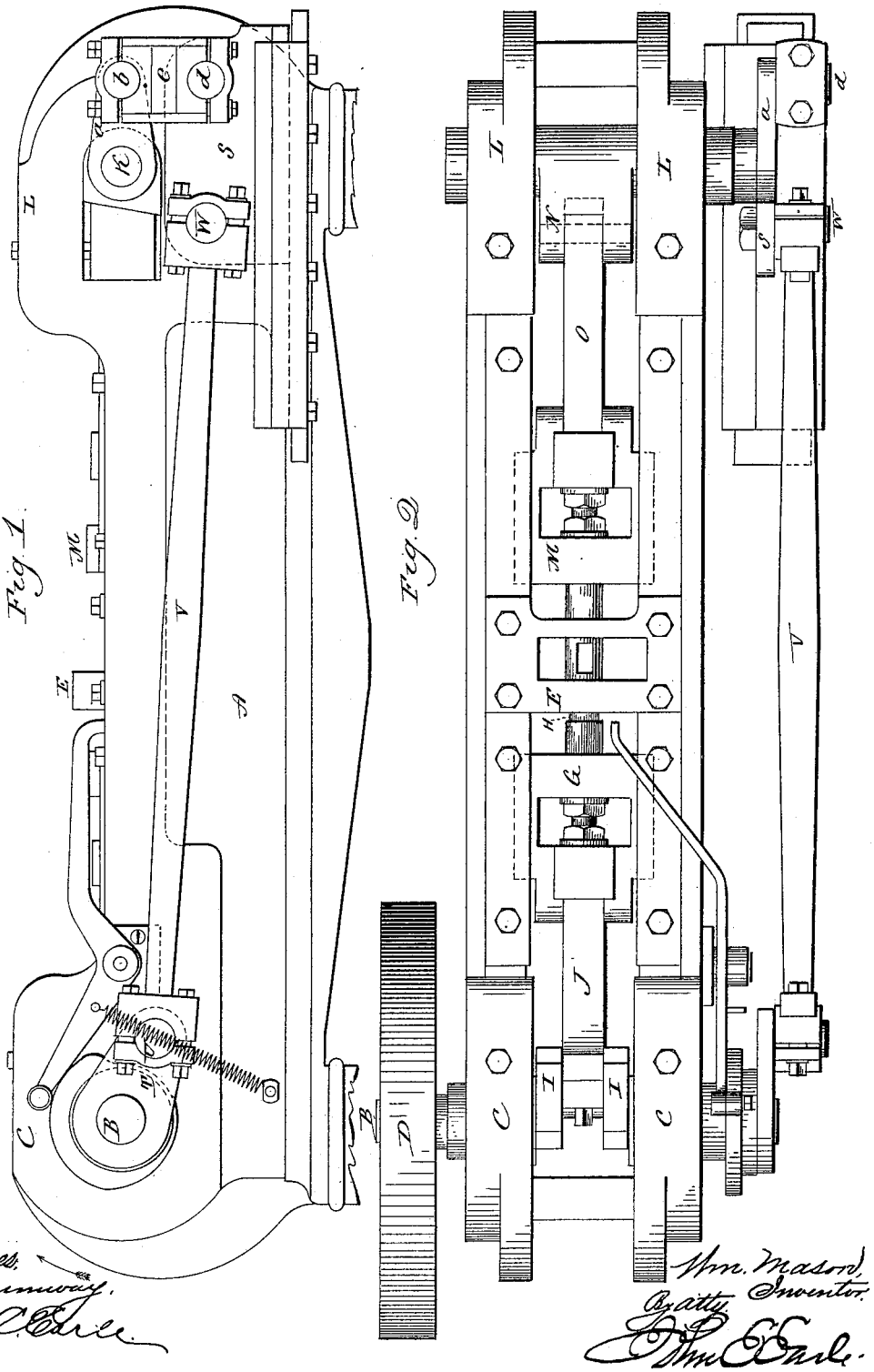

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Fig. 3.

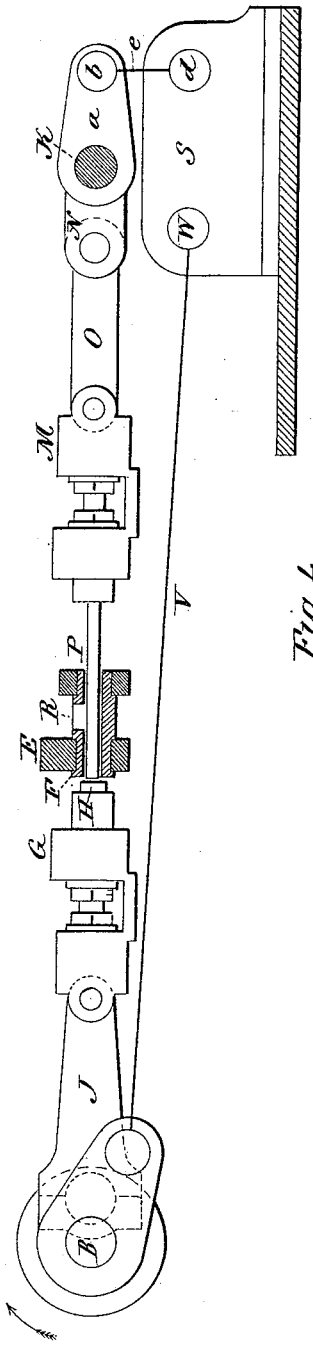

Fig. 4.

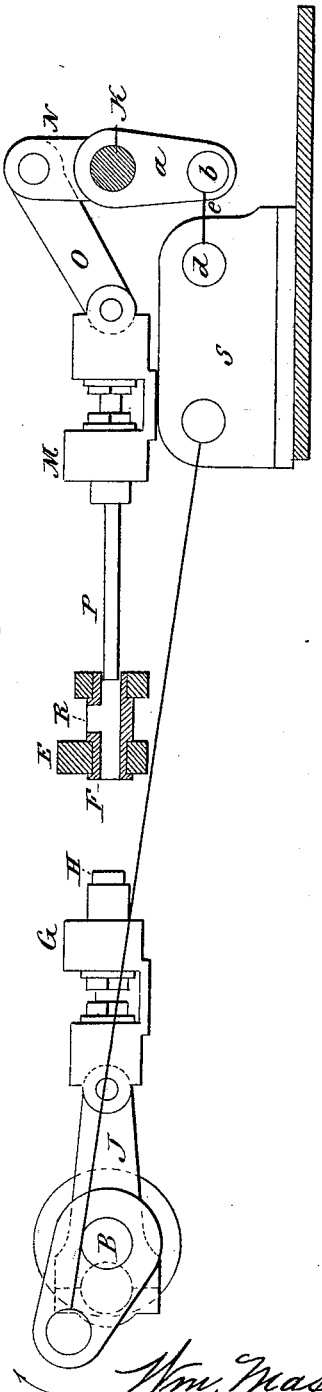

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Fig. 5

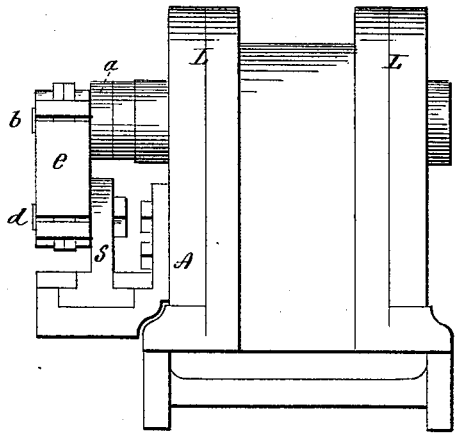


Fig. 6

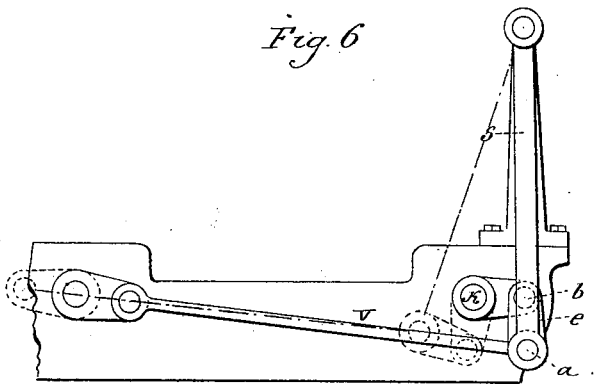
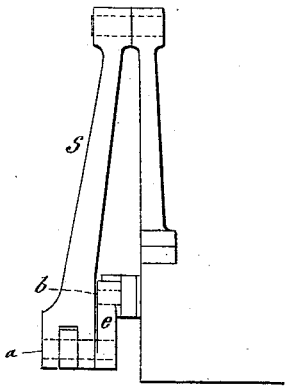


Fig. 7



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UNITED STATES PATENT OFFICE.

WILLIAM MASON, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE WINCHESTER REPEATING ARMS COMPANY, OF SAME PLACE.

MACHINE FOR HEADING CARTRIDGE-SHELLS.

SPECIFICATION forming part of Letters Patent No. 386,254, dated July 17, 1888.

Application filed May 28, 1888. Serial No. 275,275. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM MASON, of New Haven, in the county of New Haven and State of Connecticut, have invented new Improvements in Machines for Heading Cartridge-Shells; 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 side view, and Fig. 2 a top view, of the machine complete, illustrating the parts as in the position when the slides have both advanced as in just completing the heading operation; Fig. 3, a longitudinal section showing the parts in the same position as Figs. 1 and 2; Fig. 4, the same section showing the parts in the position when the punch-carrying slides have retreated to their extreme position; Fig. 5, a rear end view; Fig. 6, a side view; and Fig. 7, an end view illustrating a modification in the guide between the connecting-rod from the crank on the main shaft and the link through which the follower-punch slide is operated, on a reduced scale.

This invention relates to an improvement in machines for performing the work upon cartridge-shells commonly called "heading"—that is to say, a machine which, receiving the drawn blank for the cartridge-shell, upsets the closed end, so as to form an annular projecting flange around the closed end or head of the shell, and, if required, also forms the cap-seat for the primer. The upsetting of the closed end of the shell to form the head requires a great amount of power and brings upon the machine at the instant of heading a very great strain. The die in which the heading operation is performed is usually stationary and has an opening through it corresponding to the external diameter of the finished shell. The punch or follower enters the open end of the shell and serves as a support upon the inside of the shell against upsetting, and at the same time holds the shell with its closed end projecting from the die to give the requisite quantity of metal for the upsetting operation. The upsetting-punch moves in the opposite direction and in axial line with the follower or holding-punch, and comes against the closed end of the shell while it is held in the die, as before described. Under this operation it is necessary that the follower or holding-punch shall remain stationary during the instant the heading-punch is in operation.

My invention relates particularly to the mechanism for operating and holding the follower or punch which works within the die; and it consists in the mechanism between the slide carrying the said follower-punch and the driving-shaft at the other end of the machine, as more fully hereinafter described, and whereby the rotative movement of the driving-shaft for the heading-punch is converted into an intermittent reciprocating movement for the follower-slide at the opposite end of the machine, as more fully hereinafter described.

A represents the bed upon which the operative mechanism is arranged.

B represents the principal or driving shaft, which is supported in suitable bearings or pillow-blocks, C C, so as to receive a constant revolution through a pulley, D, on said shaft, or otherwise.

E represents the die-holder, which is supported on the bed and carries the die F, as seen in Fig. 3.

G is a slide arranged in suitable guides on the bed, and which carries the heading-punch H in the usual manner for this class of machines. To the slide G a reciprocating movement is imparted by means of a crank, I, on the shaft B through a pitman, J, in the usual manner for this class of cartridge-heading machines.

At the opposite end of the machine a shaft, K, is arranged in bearings L L, the axis of said shaft being parallel with the axis of the driving-shaft B. Between the shaft K and the stationary die-holder E a slide, M, is arranged, to which longitudinal back and forward movement is imparted by means of a crank, N, on the shaft K through a connecting-rod, O, as from the position in Fig. 4 to that in Fig. 3 and return.

To the shaft K an oscillating movement is imparted, as from the position in Fig. 3 to that in Fig. 4, to produce the longitudinal back and forward movement of the slide M which I have

described. The slide M carries a follower-punch, P, which is adapted to work through the die in the die-holder E. The follower-punch terminates at its end in a shape corresponding to the interior of the completed cartridge-shell, also usual in this class of machines, and the face of the punch H corresponds to the shape of the exterior or face of the head.

Into the die F is an opening, R, through which the drawn blanks may be introduced into the die with their closed end toward the heading-die H. One such blank being dropped into the die through the opening R, the follower-punch enters that blank and forces it through the die, so that its end projects beyond the face of the die to an extent sufficient for the heading operation. In that position the follower or holding-punch P then remains stationary until the heading-punch advances and upsets the closed end of the shell upon the follower and upon the face of the die as an anvil, and so as to produce the flange and give to the head the required shape. This done, the heading-punch retreats and the follower or holding-punch also retreats, a second blank is introduced to the die, and the follower-punch, advancing, forces the second blank against the open end of the first headed shell and drives that headed shell from the die, bringing the second blank into place of the first to be headed in its turn, and so continues its work.

To impart to the follower-punch the reciprocating movement which I have described and permit it to rest while the heading operation is performed, I arrange a slide, S, in suitable longitudinal guides on the bed of the machine and so that the path of movement of the said slide S is at right angles to the axis of the shaft K.

On the driving-shaft B a crank, T, is arranged, which revolves with the shaft, and from the crank-pin U of this crank T a connecting-rod, V, extends to a stud, W, on the said slide S, the pitman working on the said stud W as a pivot. The crank T, therefore, in its revolution will impart a full reciprocating movement to the slide S at each revolution of the said crank T.

On the shaft K a crank-arm, *a*, is made fast, provided with a crank-pin, *b*, and on the slide S is a stud, *d*, corresponding to the crank-pin *b*. The said crank-pin *b* and stud *d* are connected by a link, *e*. The position of the crank-pin *b* and the stud *d* are such that at the extreme advance movement of the slide M the said crank-pin *b* stands substantially over the stud *d* and so that at that time the link *e* stands in a vertical position at right angles to the path of movement of the said slide S, as indicated in Fig. 1, the line of the crank *a* at that time being in a longitudinal plane. The crank N of the shaft K, through which movement is imparted to the slide M, is in line with the said crank *a*, as seen in Fig. 3, so that any movement imparted to the crank *a* will be communicated to the crank N through the shaft K.

In Fig. 4 the position of the parts is represented as preparatory to receiving a blank—that is, in the extreme inactive or normal position. The crank T has then drawn the slide S toward the driving-shaft B to its extreme position. At this time the link *e* stands horizontal and has brought the crank *a* to a vertical position, as represented in said Fig. 4. As the revolution of the driving-shaft commences or continues from this point, as indicated by the arrow, the operation of the crank T is to force the slide S toward its other extreme, as seen in Fig. 3. This movement of the slide S is communicated to the crank *a* through the link *e;* but as the crank *a* must revolve about its axis, it follows that the stud *b*, carrying the one end of the link *e*, rises from the longitudinal path of the slide, and will so continue to rise until the link is brought into the vertical position indicated in Fig. 3 and the crank *a* has come to a horizontal position. During this operation the crank N has also been turned accordingly and has forced the slide M into its advanced position. When this advance movement of the slide is reached, the crank T is passing its dead-center, and the slide S is therefore substantially stationary. The extreme dead-point of the crank T is reached slightly before the extreme dead-point of the crank I is reached, so that as the crank T passes its dead-center it brings the crank I to its dead-center and the heading-punch H to its most advanced position. The movement of the slide as its crank passes the dead-center is very slight. At the same time the slide is passing this dead-center the link *e* and the crank *a* are both upon their dead-centers. Consequently there must be a very considerable movement of the slide S before any substantial movement will be produced upon the crank *a*. The slide M, with its holding-punch P, is brought to its dead-center, as I have described, before the heading-punch comes to its dead-center, and because of the link-connection *e*, which I have described, the holding-punch slide remains substantially stationary while the heading-punch is coming to its dead center. Therefore the holding-punch remains firm and substantially stationary during the actual heading operation; but the retreating movement of the slide M, as well as its advance, is more rapid than that of the slide G, which carries the heading-punch, as when the slide M reaches its extreme retreating movement its crank N, as well as the crank *a*, are on the quarter position or most rapidly-moving part of their stroke, so that the slight movement of the slide S, as its crank passes the dead-center, makes the corresponding movement of the slide M proportionately more rapid.

As the slide M rests at the dead-centers, it is in the strongest possible position of the machine and able to resist the heading operation.

From the fact that the movement of the slide M is produced by means of cranks it follows that the advance of the slide M, carrying the

holding-punch, is extremely easy. As its stopping and starting are produced on the dead-centers, no concussion or jar is produced in the heading operation, such as necessarily follows the operation of cams to produce the movement of the parts in the usual construction. Consequently the strain upon the machine, due to the shock in the usual construction, is avoided.

I have represented the device for connecting the link of the crank *a* with the connecting-rod from the crank of the main shaft as a longitudinal slide; but substantially the same result may be produced by making this intermediate device in the form of a swinging link, as represented in Figs. 6 and 7, in which S represents the intermediate part which corresponds to the slide S of the first illustration. This link is hung upon a pivot above the shaft K, and its lower end is jointed to the connecting-rod V and to the link *e*, as seen in Figs. 6 and 7. The reciprocating movement of the pivot which makes the connection between the link *e* and the connecting-rod V in this case is in a slightly-curved path, but is still substantially the reciprocating movement, so far as the pivot upon which the link *e* works is concerned. While therefore preferring the longitudinally-guided slide S as the pivot-connection between the link *e* and the connecting-rod V, I do not wish to be understood as limiting my invention to such a slide, it only being essential that there shall be a guide between the pivot of the link *e* and its connection with the connecting-rod V, so as to impart to the said connecting-point a substantially longitudinal reciprocating movement.

I illustrate the usual "knock-off" to facilitate the discharge of the headed shells and omit the cartridge-feed; but these parts constitute no material part of my invention, it being substantially the same as in the usual construction of cartridge-heading machines.

I claim—

1. In a machine for heading cartridge-shells, which consists of a stationary die, a slide on one side of the heading-die carrying a follower-punch, a slide on the opposite side carrying a heading-punch, and a driving-shaft, with a connection therefrom to said heading-punch slide to impart a reciprocating movement to said heading-punch slide, the combination therewith of a shaft, K, parallel with said driving-shaft, having a crank, N, with a connecting-rod therefrom to the said holding-punch slide, a second crank, *a*, on said shaft K, but in the opposite direction to the crank N, a crank, T, on the driving-shaft, a connecting-rod, V, hung by one end to said crank T on the driving-shaft, a link, *e*, hung by one end to said crank *a*, and a movable guide between the other end of said link *e* and the other end of said connecting rod V, and to which the corresponding ends of the said link *e* and the connecting-rod V are hung, substantially as described.

2. In a cartridge-shell-heading machine, consisting of a stationary die, a reciprocating slide carrying a heading-punch upon one side of said die, a reciprocating slide carrying the follower or holding punch upon the opposite side of the said die, and a driving-shaft with connection therefrom to the said heading-punch slide to impart reciprocating movement to said heading-punch slide, combined with a crank-shaft parallel with the driving-shaft, provided with a crank, N, and a connection therefrom to the follower-punch slide, the said shaft K also provided with a second crank, *a*, but in the opposite direction to the crank N, a slide, S, arranged in longitudinal bearings parallel with the path of movement of the said punch-carrying slides, the crank T on the driving-shaft, a connecting-rod, V, from said crank T to said slide S, and a link, *e*, hung by one end to said crank *a* and by the other end to said slide S, substantially as and for the purpose described.

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