

(No Model.)

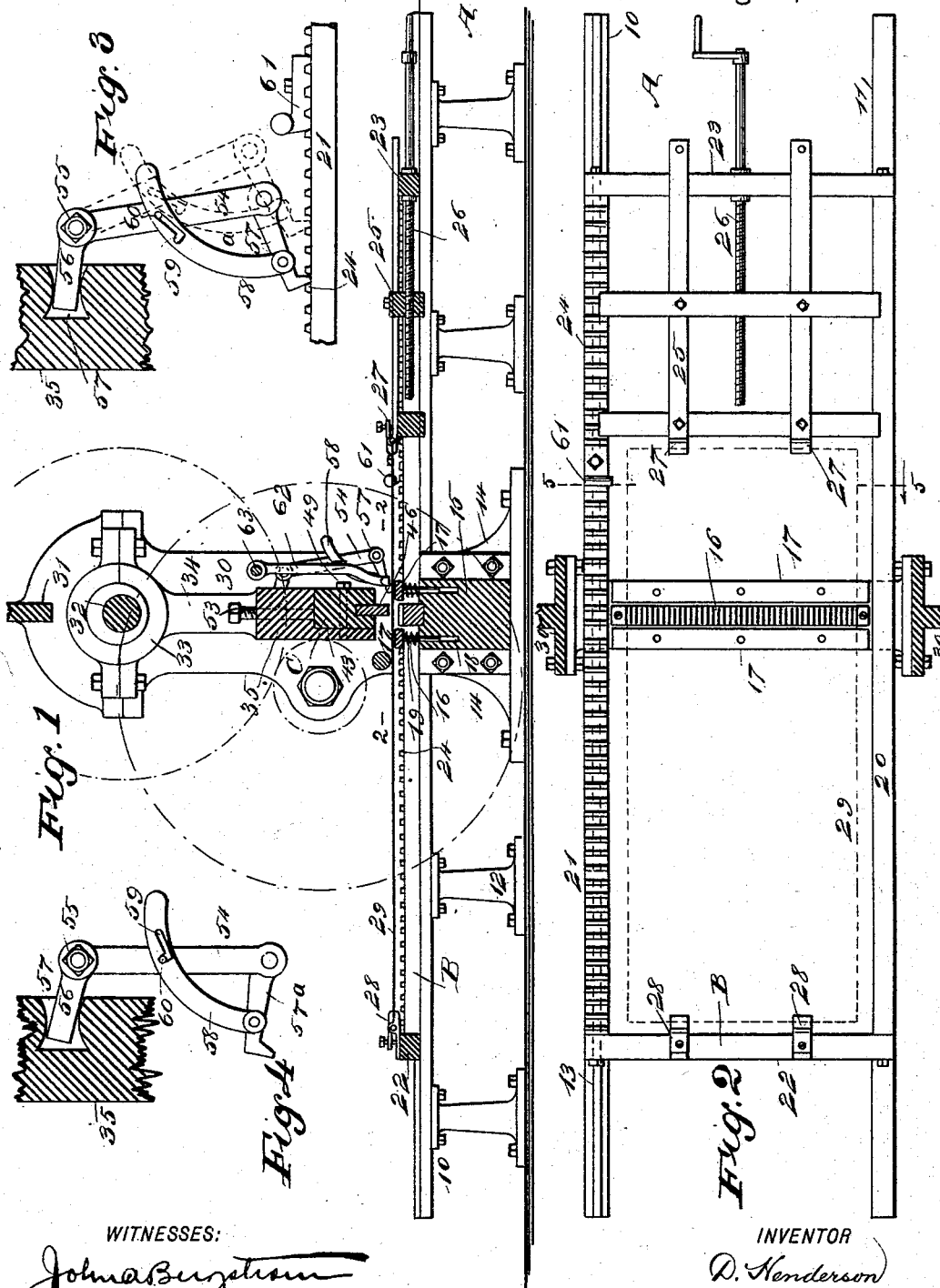
2 Sheets—Sheet 1.

D. HENDERSON.

MACHINE FOR PERFORATING SHEET METAL.

No. 524,203.

Patented Aug. 7, 1894.



WITNESSES:  
*John A. Burgeson*  
*to Sedgwick*

INVENTOR  
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ATTORNEYS.

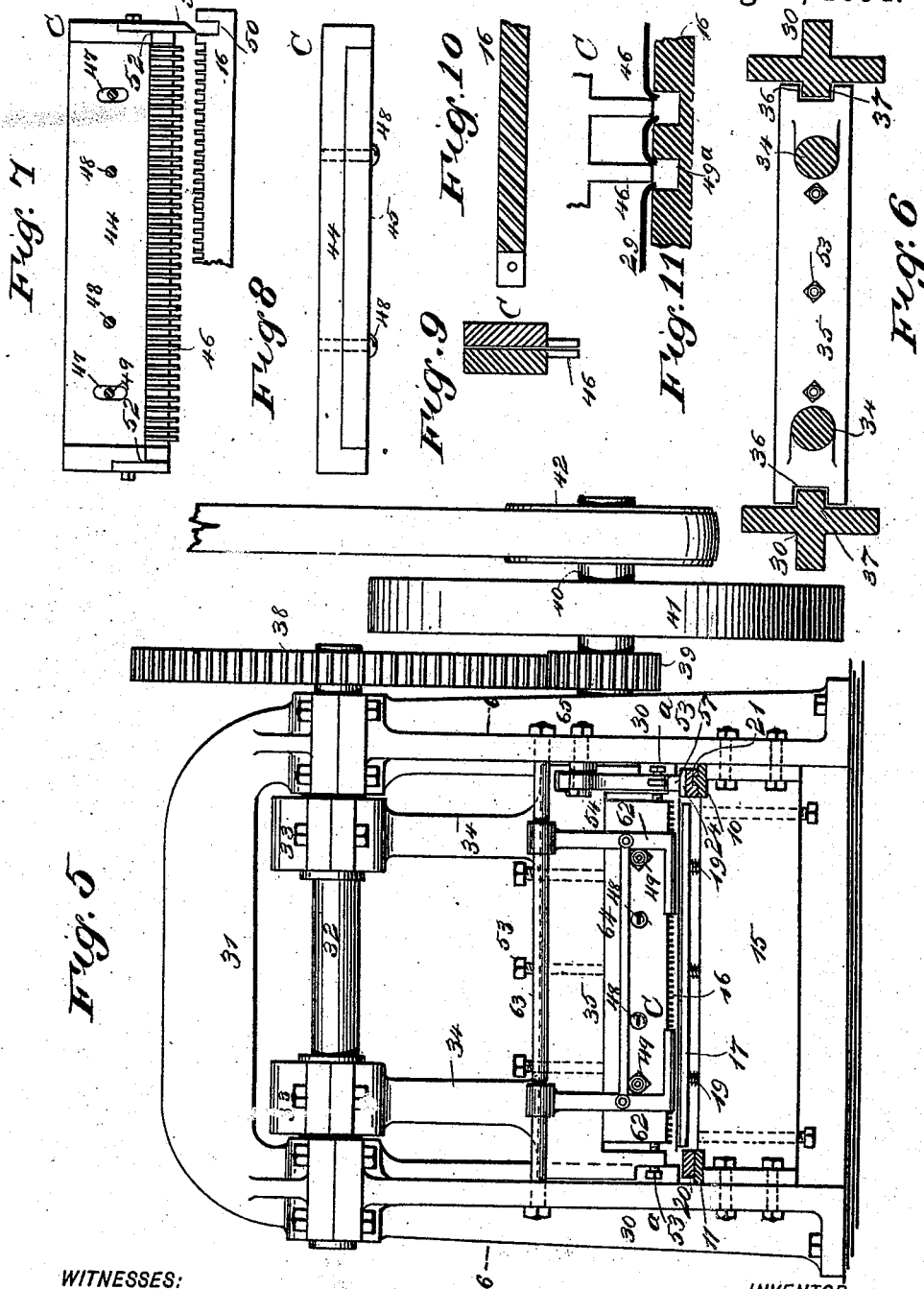
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2 Sheets—Sheet 2.

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WITNESSES:

John Bergstrom  
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# UNITED STATES PATENT OFFICE.

DAVID HENDERSON, OF CENTRAL CITY, COLORADO, ASSIGNOR TO HIMSELF,  
DANIEL J. MCKAY, AND JOHN C. JENKINS, OF SAME PLACE.

## MACHINE FOR PERFORATING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 524,203, dated August 7, 1894.

Application filed February 28, 1894. Serial No. 501,836. (No model.)

*To all whom it may concern:*

Be it known that I, DAVID HENDERSON, of Central City, in the county of Gilpin and State of Colorado, have invented a new and Improved Machine for Perforating Sheet Metal, of which the following is a full, clear, and exact description.

My invention relates to machines for perforating sheet metal, and has for its object to improve upon the construction of the machine for which Letters Patent were granted to I. C. Schuyler, No. 185,973, January 2, 1877.

Another object of this invention is to provide a machine capable of rapidly perforating sheet metal screens with slits or openings surrounded by a burr on one side of the sheet, and to construct the machine in a simple, durable and economic manner.

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

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar figures and letters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal central section through the machine. Fig. 2 is a plan view of the bed portion thereof, and a horizontal section through the central frame, the said section being taken on the line 2—2 of Fig. 1. Fig. 3 is a detail view of the dogs, illustrating their working position. Fig. 4 is a similar view, illustrating one of the dogs as held out of engagement with the part to be operated upon. Fig. 5 is a vertical transverse section, taken essentially on the line 5—5 of Fig. 2. Fig. 6 is a horizontal section taken practically on the line 6—6 of Fig. 5. Fig. 7 is a face view of one portion of the block adapted to carry the punches, illustrating a row of punches in position, said view likewise illustrating a portion of the die to receive the punches. Fig. 8 is a plan view of the punch block or head, illustrating the manner in which its parts are connected. Fig. 9 is a vertical section through the punch block or head, showing punches in position therein. Fig. 10 is a plan view of a slightly modified form of die; and Fig. 11 is a sectional view, illustrating the manner in which the metal sheet is punched.

The fixed bed A of the machine consists of two parallel side rails 10 and 11, the said rails being supported by pillars 12; and one of the side rails, the rail 10, for example, is provided with a longitudinal rib 13, and the two side rails are connected at their central portions by webs 14, the said webs having located between them a base block 15, and in the center of this base block the die 16 that is to be employed is located, the ends of the die being screwed fast to the block, as shown in Fig. 2.

At each side of the die a releasing bar 17, is located. Each releasing bar is provided with a series of pendent studs, which enter and slide in openings 18, made in the base block 15, as shown best in Fig. 1; and a spring 19 surrounds each stud, having bearings against the top of the base block and the upper surface of the releasing bar with which the stud is connected. These releasing bars are normally held at a slight elevation above the upper surface of the die.

A sliding bed B, is held to travel upon the fixed bed, the said sliding bed being supported mainly upon the side bars or rails 10 and 11 of the fixed bed; and the sliding bed may be said to consist of side rails 20 and 21, and end bars 22 and 23. The side bar 21, which travels upon the side rail or bar 10 of the fixed bed, is provided with teeth 24 upon its upper face, and with a groove in its under face receiving the rib 13 of the fixed bed. In this manner the sliding bed is guided in its movement upon the fixed one. The sliding bed at one of its ends is provided with a movable frame 25, and this frame is moved to and from the center of the sliding bed through the medium of an adjusting screw 26, held to turn freely in the end bar 23 of the sliding bed, and move in a nut secured to the under surface of the frame. The frame 25 at its inner end is provided with clamps 27, of any approved description, and similar clamps 28, are located upon the end bar 22 of the said sliding bed, as shown in Fig. 2; and the sheet of metal 29 to be operated upon is held at its ends between the two sets of clamps 27 and 28, as shown in Fig. 1, the metal being properly stretched by the manipulation of the frame 25, the frame being made adjustable also in order that its clamps may receive sheets of different lengths.

From the central portion of the fixed bed at each side, standards 30, are projected upward, said standards being connected at their upper ends by a cross bar 31. In the upper portion of the standards a shaft 32, is journaled, and the said shaft is provided with two eccentrics 33, located one near each end preferably, said eccentrics being connected with downwardly-extending bars 34, which may be integral with the eccentrics; and the bars are either attached to or are formed integral with a follower 35, said follower, as shown in Fig. 6, being provided with grooves 36 in its ends, receiving ribs 37 formed upon the inner faces of the standards 30. Thus upon the revolution of the shaft 32 the follower is raised and lowered.

The shaft 32 may be driven in any approved manner; in the drawings a gear 38, is shown as secured to one end of the shaft, which meshes with a pinion 39 upon a power shaft 40, the said shaft being provided with a driving wheel 41 and a driving pulley 42, and any approved means may be employed for throwing the power shaft in and out of gear with the driving shaft.

The follower is adapted to receive and carry the punches employed in puncturing the metal; and in order that the punches may be readily removed from the follower and replaced by others when desired, without in the least dismantling the machine or removing any of its parts, the follower is provided in one of its faces with a longitudinal recess 43, and this recess is adapted to receive what may be termed a punch block or head C. This punch block or head may be provided either with a slot its entire length to receive the punches, and clamps at each end, or the said punch block may be formed in two pieces, and provided with slots the size of the punches located at right angles or diagonally, the sections being secured together and held in place by suitable means, clamping the punches on their edges. For example, the punch block may be constructed as shown in Figs. 7, 8 and 9, in which the said punch block is made in two sections 44 and 45, one section being made U-shaped to receive the other, and the opposing faces of both sections at their lower edges are provided with longitudinal grooves, channels or slots, to receive the punches 46, as shown in Fig. 7, in which an inner face view of the section 44 of the punch block is shown with a row of punches in position therein; the corresponding face of the other section 45, is adapted to be provided in like manner with a second row of punches. Both of the sections of the punch block are provided with apertures 47, as is likewise shown in Fig. 7, and the sections of the block are secured together by means of bolts 48.

The block C, is held in the recess 43 of the follower by means of bolts 49, and in such manner that the block may have vertical movement for purposes of adjustment, and to that end the bolts 49 will be passed through

the elongated openings 47 in both sections of the block.

I desire it to be understood that the punches are preferably provided with chisel points and are placed in two rows, as shown in Fig. 9, and that the dies 16 are provided with recesses 49<sup>a</sup> corresponding to the punches, each recess being adapted to receive a punch. Furthermore the punches may be placed in any position; that is to say, they may be located transversely or diagonally with respect to the under face of the punch block, or they may be arranged in any way found necessary to produce the desired shape of slot or opening in the plate.

In Fig. 10 I have illustrated a die adapted to receive punches arranged diagonally in the block. In Fig. 7 I have also shown at one side of the die a deep channel 50, adapted to receive a slitting shear 51 secured by screws or otherwise to one end of the punch block; and in the same figure I have also illustrated clamps 52, one of which is integral with the slitting shear, said clamps being angular or L-shaped in formation, their vertical members being introduced into slots in the ends of the blocks, while their horizontal members extend inward in direction of the end punches. These clamps serve to prevent the end punches from moving when the sections of the block are separated. In Fig. 9 I have shown a section through the punch block, showing two rows of punches, but it will be understood that each row may be placed as far apart as in practice may be found desirable.

It is evident that without any trouble one set of punches may be removed from the machine and another set may be introduced.

In order to provide for the vertical adjustment of the punches, and to provide for the making of a coarse or a fine opening in the plate 29, adjusting screws 53, are located in the top of the follower, and are likewise entered into the punch block, and by manipulating the screws the block may be raised or lowered the distance required.

The movable or sliding bed B is given end movement through the medium of mechanism shown in Figs. 3 and 4. This mechanism consists of a link 54, which is pivoted at its upper end to a stud 55, located upon the inner face of one of the standards 30; and the said link is provided at its upper end with an arm 56, which is made to enter a recess 57 in the follower; therefore, the link 54 is of crank formation, and at the lower end of this link a dog 57<sup>a</sup>, is pivoted, adapted to engage with the teeth 24 upon the side bar 21 of the sliding bed. A segmental arm 58 is pivoted to the dog near the head of the latter, and the said arm is made to cross the link 54, the segmental arm being provided with an L-shaped slot 59, receiving a pin 60, carried by the link. When the dog is in working position the pin is at the upper end of the long or longitudinal portion of the slot

59, as shown in Fig. 3, and when so placed, at each upward movement of the follower the upper end of the link 54 of the feed device will be carried upward, and consequently the dog 57<sup>a</sup> will be carried in the direction that the sliding bed is to travel, and will carry the said bed forward the required distance. On the down stroke of the follower the dog 57<sup>a</sup> will be carried rearward, as shown in dotted lines in Fig. 3, and will take up the position required to produce another feed movement at the next upward stroke of the follower.

When the plate has been punched to a predetermined point, the dog will strike an offset 61, removably located upon the toothed bar 21 of the sliding bed, as shown in Fig. 3, and when such contact is made the dog will be carried upward to such a height that the pin 60 in the link of the feed device will enter the short or transverse section of the slot 59 in the segmental arm of that device, as shown in Fig. 4, and in this manner the dog will be held elevated and the bed may be moved as desired.

When the punches descend and travel through the plate, as shown in Fig. 11, the releasing bars 17 will be pressed downward against their springs 19; and in the event the plate should have a tendency to cling to the die the springs of the releasing bars will force the plate upward to its normal position the moment that the follower ascends, and in order that the plate shall not be drawn upward by the punches, or be forced upward to too great an extent by the releasing bars, guide arms 62, preferably of angular construction, are located over the plate in front of the follower, the horizontal members of the arms being located over the plate, and they extend inwardly in direction of each other as shown in Fig. 5. The vertical members of the arms are mounted to turn upon a shaft 63, extending from one standard 30 to the other, and the two arms are connected by a bar 64. When the machine is not in operation the guide arms may be thrown upward out of the way.

Adjusting screws 53<sup>a</sup>, are preferably placed in the sides of the follower, as shown in Fig. 5, for the purpose of adjusting the punch block longitudinally. The punches must be exactly in line with the center of the slots in the die.

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

1. In a metal punching machine the combination, with the stationary bed, the sliding bed having guided movement thereon and provided with a toothed surface, and the follower having reciprocating movement essentially perpendicular to the sliding bed, of a link fulcrumed upon a fixed support and having an operative connection with the follower at one end, while the other end of the

link has an operative connection with the toothed surface of the sliding bed to feed the latter forward, substantially as described.

2. In a metal punching machine, a punch block made in sections provided in their opposing faces with longitudinal grooves adapted to receive the punches, and clamps secured to the block and extending inwardly into the said grooves at each end thereof to engage with the end punches, substantially as described.

3. In a metal punching machine, a punch block made in sections provided in their opposing faces with longitudinal grooves adapted to receive the punches, and angular clamps whose vertical members are secured to the block, while their horizontal member extend inwardly into the said grooves to engage with the end punches, substantially as described.

4. In a metal punching machine, the combination, with a stationary bed, and a sliding bed having guided movement thereon and provided with teeth along one edge thereof, of supports projected upward at the sides of the sliding bed, a follower having sliding movement between the supports, a driving mechanism connected with the follower, substantially as shown and described, and a feed mechanism actuated from the follower, said mechanism consisting of a crank pivoted to a fixed support, one member whereof enters a recess in the follower, and a dog pivoted to the opposite member of the crank, adapted to engage with the toothed surface of the sliding bed, as and for the purpose specified.

5. In a metal punching machine, the combination, with a stationary bed, and a sliding bed having guided movement thereon and provided with teeth along one edge thereof, of standards projected upward at the sides of the sliding bed, a follower having sliding movement between the standards, a feed mechanism connected with the follower, substantially as shown and described, consisting of a crank arm pivoted to a fixed support, one member of which enters a recess in the follower, the other member being provided with a pivoted dog adapted for engagement with the toothed surface of the sliding bed, and a segmental arm pivoted to the dog and provided with an angular slot receiving a pin upon the crank arm, and a trip located upon the sliding bed and adapted for engagement with the dog, substantially as shown and described.

6. The combination, with the punch block, the die, and the releasing bars, of guide arms pivoted to the frame of the machine and provided with essentially horizontal members extending toward each other above the releasing bars, as and for the purpose set forth.

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Witnesses:

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HARRY H. LAKE.