(No Model.) 2 Sheets—Sheet 1.

F. N. HELFRICH.

PUNCHING AND SHEARING MACHINE.

No. 482,356. Patented Sept. 13, 1892.

Fig. 1.

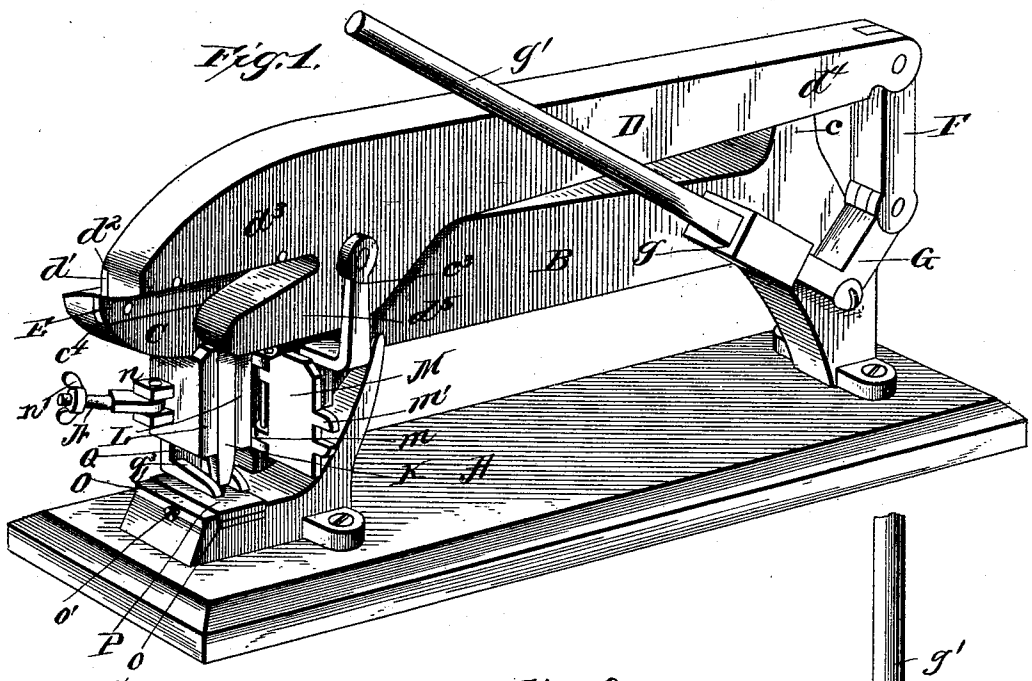
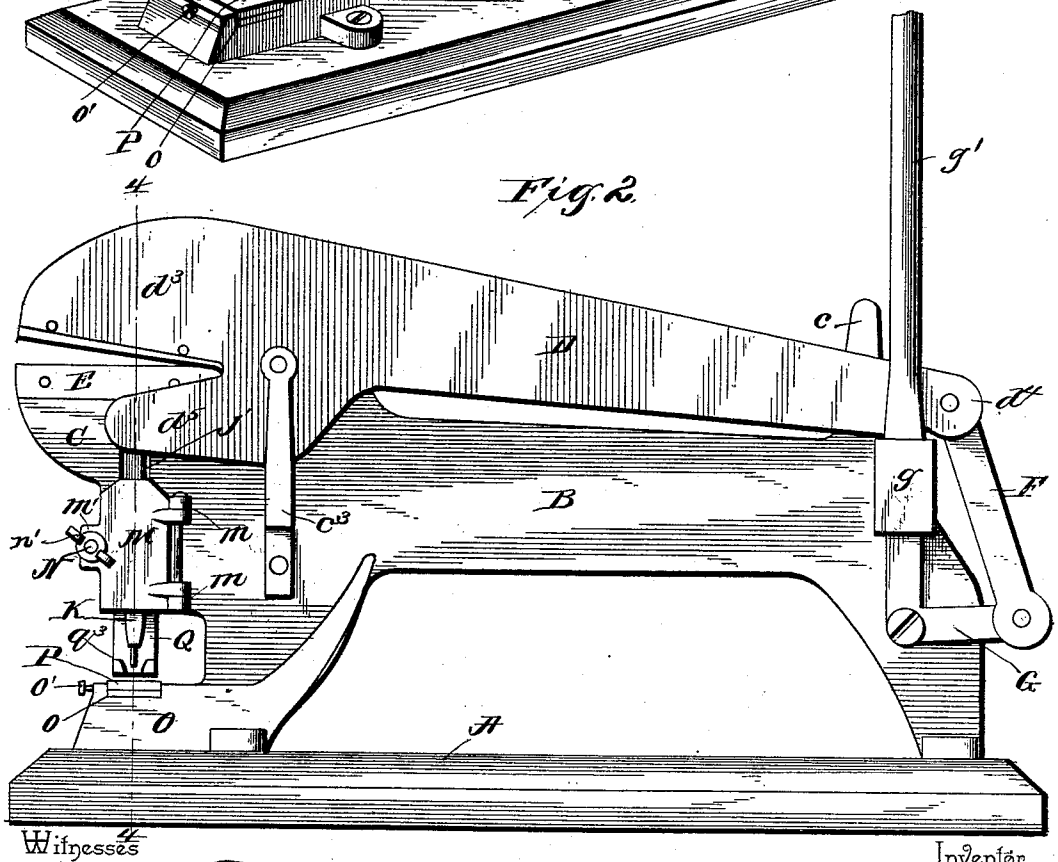


Fig. 2.



Witnesses

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(No Model.)

2 Sheets—Sheet 2.

F. N. HELFRICH.

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Fig. 3.

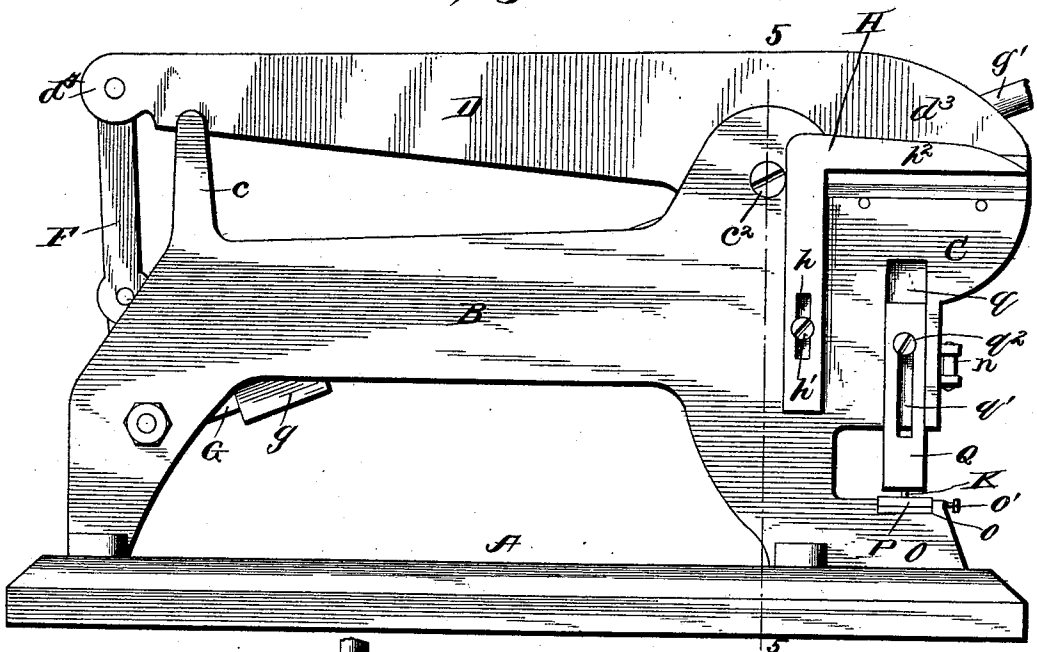


Fig. 4.

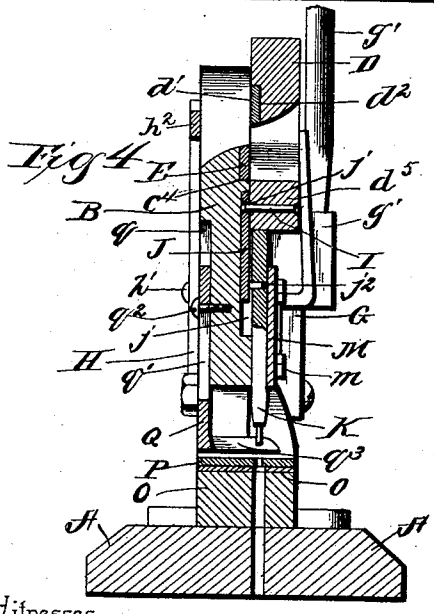


Fig. 5.

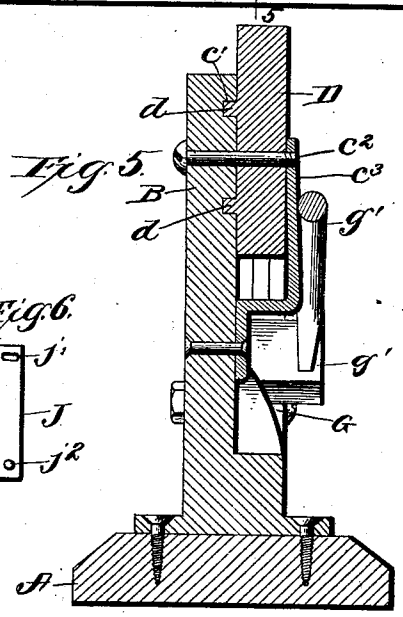
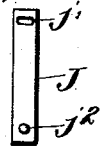


Fig. 6.



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK N. HELFRICH, OF HEBRON, NEBRASKA.

PUNCHING AND SHEARING MACHINE.

SPECIFICATION forming part of Letters Patent No. 482,356, dated September 13, 1892.

Application filed January 12, 1892. Serial No. 417,867. (No model.)

To all whom it may concern:

Be it known that I, FRANK N. HELFRICH, a citizen of the United States, residing at Hebron, in the county of Thayer and State of Nebraska, have invented a new and useful Punching and Shearing Machine, of which the following is a specification.

This invention relates to metal punching and shearing machines; and it has for its object to provide a machine combining shearing and punching devices operated by the same mechanism, and therefore simultaneously with each other.

It is the primary object of this invention to provide a machine of this character which shall be comparatively simple in construction, yet very efficient and convenient of manipulation in operation, and a machine which, while possessing these essentials, at the same time has a powerful leverage and is so constructed that the strain of the whole machine does not come upon any particular portion thereof.

With these and many other objects in view, which will be quite obvious to those skilled in the art, the invention consists in the novel construction, combination, and arrangement of parts hereinafter more fully described and claimed.

In the accompanying drawings, Figure 1 is a perspective view of a combined punching and shearing machine constructed in accordance with my invention. Fig. 2 is a front elevation of the same. Fig. 3 is a rear elevation thereof. Fig. 4 is a vertical sectional view on the line 4 4 of Fig. 2. Fig. 5 is a similar view on the line 5 5 of Fig. 3. Fig. 6 is a detail view of the punch-carrying plate or arm.

Referring to the accompanying drawings, A represents a suitable base or support, upon which is securely fastened the main stationary casting B, terminating at its forward end in a head C and provided at the other end with an upwardly-extending guide lug or projection *c*, that is designed to steady and guide the rear end of the pivoted shear D, pivoted to said stationary casting and forming the movable cutter of the shear. The said main casting B is further provided upon one side of the head thereof with a circular groove *c'*, that is designed to receive the projecting annular pivot ring or flange *d*, projecting from one side near the cutting end of the shear-blade or cutter D, and thus provides for a secure and strengthened pivotal connection between the pivoted shear D and the stationary casting carrying the stationary shear, and which also serves to relieve the strain of the machine from the main pivot-bolt c^2, passing through the head of the main casting and said pivoted shear. One end of the pivot-bolt c^2 is supported in the upper end of the angular brace-bracket c^3, engaging said bolt upon the outer face of the pivoted or lever shear, and, bending under said shear, is securely connected with the body of the main casting, thus holding said casting and movable shear firmly together.

The front upper edge of the head C is provided upon the side to which the pivoted shear is pivoted with a seat c^4, within which is secured the stationary shear or cutting-blade E, over which and in conjunction with which works the pivoted shear-blade *d'*, fastened in a corresponding square recess d^2, located in the bifurcated cutting end or head d^3 of the pivoted shear D. From the cutting end or head d^3 said pivoted shear D extends rearwardly the full length of the main casting B to form a lever portion d^4, working against the upwardly-extending steadying and guide lug *c*, projecting from the rear end of said casting. A swinging connecting and operating link F pivotally connects the extreme end of the portion d^4 of said pivoted shear with one arm of the bell-crank lever G, pivoted to the rear end of the main casting B, thus providing a toggle-joint leverage between the pivot of the bell-crank and the lever end of the pivoted shear. The free end of the bell-crank lever is provided with a socket *g*, that receives one end of the long operating-lever *g'*. It can be seen as the operating-lever *g'* is in its upwardly-extended position that the bell-crank arm and its connecting-link are at an angle to each other, and thus allow or cause the lever arm or portion d^4 of the pivoted shear to be drawn down and the blade thereof to be raised above the stationary blade upon the main casting. The metal to be cut can be easily placed between the cutting-blades and in the bifurcated end or head of the pivoted shear, and by pulling down the lever *g'* the toggle-levers, formed by the connection described,

throw the lever end of the pivoted shear up and cause the cutting-blade thereof to be carried down under great leverage upon the metal under the same and cause the metal to be readily and easily cut without material strain upon any part of the machine.

A holding-gage H is adjustably secured upon the face of the casting B opposite the pivoted shear and is provided with an adjusting-slot h, formed in the shank thereof and working over the set-screw h', by means of which the said gage may be regulated to adapt itself to the metal to be cut. The gage H is further provided with a right-angularly-disposed gage end h^2, which lies over the stationary blade-bed, and consequently over the metal placed thereon to be cut, and thus holds the same down while being cut.

As stated, the forward or cutting end of the shear D is bifurcated to receive the metal to be cut under the blade carried thereby upon the end above the bifurcation. The end d^5 of the pivoted shear below the cutting-blade d' works upon the face of the main casting B, beneath the stationary cutting-blade thereon, and is provided with an inwardly-projecting pin I, working in or engaging the upper slotted end of the punch-carrying plate J, seated and working within the vertical recess j, formed in the casting-head C, directly below the cutting-blade c^4 thereon.

The punch-carrying plate J is provided with a horizontal slot j' at its upper end, in order to allow the said plate to be readily reciprocated by the oscillations of the pivoted shear. The lower end of the plate J is further provided with a coupling-pin j^2, which engages a recess or perforation in one side of the reciprocating metal-punch K. The punch K is thus detachably connected to the reciprocating punch-carrying plate or arm and may be interchangeably used with other punches in various sizes, according to the nature of the work. The punch K, carried by the arm or plate J, fits snugly within the parallel guide and retaining lugs L, projecting from the head C on both sides of the vertical recess j therein, and thus, while accommodating and guiding the punch K, also guides the lower end of the punch-carrying plate or arm J, also working within the same. A hinged retaining and cap plate M is hinged at m to one of said guide-lugs L and is designed to closely fit over the top of both of said lugs, and therefore over the punch between the same. The said cap-plate M is provided with the securing-lugs m', between which the free end of a hinged securing or fastening bolt N takes. Said fastening-bolt N is pivoted at n to the front end of the head C and carries the clamping thumb-nut n', which when the bolt is thrown between the cap-lugs is designed to be tightened thereupon, and thus fasten the cap-plate over the lugs L and hold the reciprocating punch between the same therein.

The casting A is provided directly below the head C and the reciprocating punch with the die-bed O, which is itself provided with the die-seat o, which is designed to receive the form of die corresponding to the size or form of punch employed, and said dies are held within the seat o by means of the set-screw o', working through said bed and engaging the die P therein, and thus provides for a detachable fastening for the dies.

A punch-gage Q is adjustably seated in the vertical gage recess or seat q in the head C, directly opposite to the guide-lugs L thereon. The said punch-gage Q is provided with a vertical adjustment-slot q', which works over the set-screw q^2 in said recess q and allows for the vertical adjustment of the gage. The said gage is provided with a slotted gage end q^3, right-angularly disposed to the slotted portion of the same and lying directly over and parallel to the die-bed of the machine. The reciprocating punch works through said slotted gage end into its corresponding die and punches the metal as desired between the bottom of said gage end and said die. The said gage serves to securely hold the metal down upon the die-bed while the punch is withdrawn, so as to prevent the metal from being carried back with the punch. It is now apparent that simultaneously with the movement of the pivoted shear and by the same means actuating the said shear the punch of the machine is operated and performs its special function, in conjunction with the rest of the machine, as fully set forth.

The advantages and operation and construction of the herein-described punching and shearing machine are thought to be apparent without further description.

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

1. In a machine of the class described, the combination of the stationary shear-blade having a circular pivot-groove near one end and an upwardly-extending guide-lug near the opposite end, the movable shear member provided with a circular pivot ring or flange working and fitting snugly within said groove and with an extended lever portion, a pivot-bolt passing through said members at their point of pivot, an offstanding angle-bracket receiving one end of said pivot-bolt and secured to the stationary shear member, a bell-crank lever pivoted at its angle to said stationary member near one end, a toggle-forming link pivoted directly to the lever end of said movable shear member and to one arm of said bell-crank, and an operating-lever connected to the other arm of said bell-crank, substantially as set forth.

2. In a punching and shearing machine, the combination, with a stationary shear member provided with vertical parallel punch-guide lugs, of the movable shear member pivotally connected to said shear member, a reciprocating punch detachably connected with the pivoted shear member and moving between said guide-lugs, a swinging cap-plate adapted

to be swung against said guide-lugs to inclose the punch therein and away from the same to allow for the removal of the punch, and a clamping device arranged at one end of said stationary shear member and adapted to engage one edge of said cap-plate to hold the same closed, substantially as set forth.

3. In a punching and shearing machine, the combination of a stationary shear member provided with a vertical recess, parallel guide-lugs projecting beyond both sides of each recess and a die-bed located directly beneath the lower ends of said lugs, the pivoted shear member, a punch-carrying plate or arm loosely connected to one end of said pivoted shear member and working in said vertical recess and between said lugs, a reciprocating punch detachably connected to said plate or arm between said lugs, a hinged cap-plate inclosing the punch between said lugs, and operating mechanism, substantially as set forth.

4. In a punching and shearing machine, the combination of a stationary shear member provided with parallel guide-lugs and a die-bed located beneath the lower ends of the same, the pivoted shear member, a reciprocating punch detachably connected with one end of the pivoted member and working between said guide-lugs, a hinged cap-plate hinged to one of said lugs and provided with projecting securing-lugs at its free edge and inclosing the punch within said lugs, a hinged or swinging clamping-bolt pivoted at one end to said stationary member and adapted to be swung and clamped between the securing-lugs of said plate to hold the same closed, and operating mechanism, substantially as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

FRANK N. HELFRICH.

Witnesses:
JAS. DINSMORE,
W. E. GOODHUE.