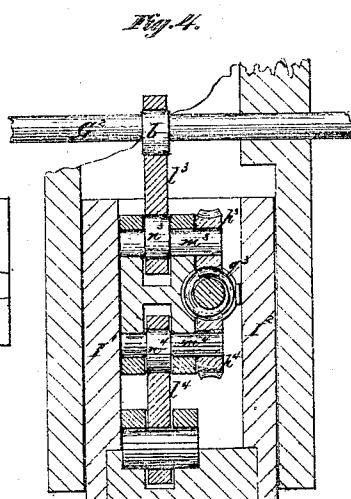
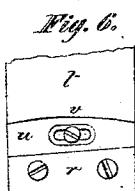
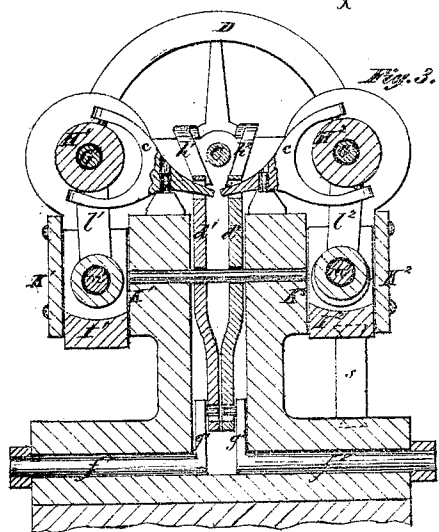
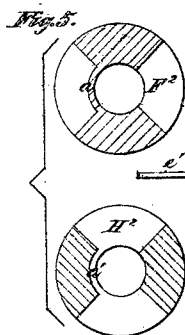
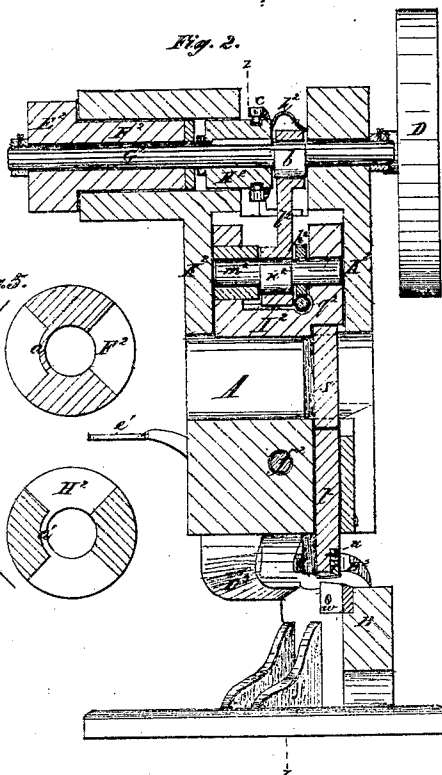
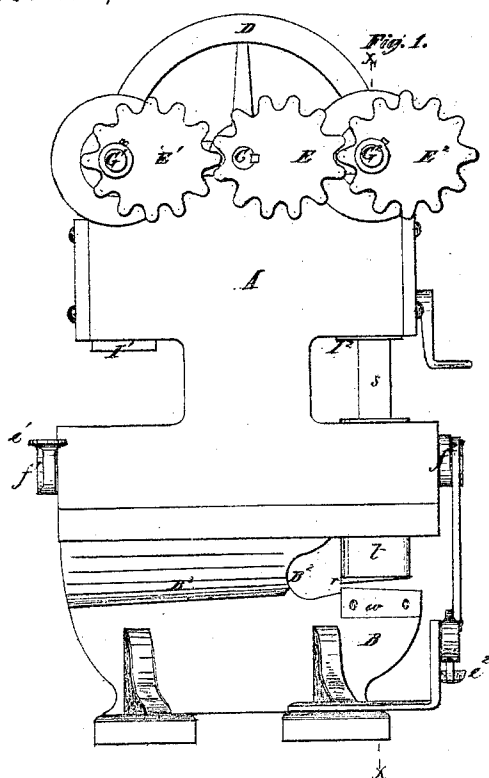


W. H. IVENS & W. E. BROOKE.

Improvement in Combined Punching and Shearing Machines.

No. 114,297.

Patented May 2, 1871.



Witnesses.

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UNITED STATES PATENT OFFICE.

WILLIAM H. IVENS AND WILLIAM E. BROOKE, OF TRENTON, NEW JERSEY.

IMPROVEMENT IN COMBINED PUNCHING AND SHEARING MACHINES.

Specification forming part of Letters Patent No. **114,297**, dated May 2, 1871.

To all whom it may concern:

Be it known that we, WILLIAM H. IVENS and WILLIAM E. BROOKE, both of Trenton, in Mercer county, and State of New Jersey, have invented certain new and useful Improvements in Combined Punching and Shearing Machines; and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawing through letters of reference marked thereon, forming part of this specification, and in which—

Figure 1 represents a rear elevation of a machine embracing our improvements; Fig. 2, a vertical transverse section taken on the line $x x$ on Fig. 1; Fig. 3, a vertical longitudinal section of the upper part of the same, taken on the line $z z$ on Fig. 2. Fig. 4 is a transverse section, showing a modification of the link-connection on the same line as in Fig. 2. Fig. 5 is a face view of the male and female clutch. Fig. 6 is a front view of the shear and its curvilinear adjusting key or wedge.

The same letters denote corresponding parts in the several figures.

Our present invention is an improvement upon that patented to us on the 24th of August, A. D. 1869, and numbered 94,117; and it consists in providing for the free rotation of the axles or driving-shafts within the eccentric gears, and a novel construction of clutch to insure their engagement when in position to dispense their greatest power on the resistance offered to the cutter or punch; also, in the means of adjustment of the cutter or punch head to adapt it for operating on various thicknesses of metal, and in a novel arrangement in one machine of upper or punching heads and dies and a lower shearing device. Furthermore, it embraces a novel means of adjusting the inclination of the upper or moving shear; also, a novel arrangement of foot-levers, links, springs, and clutch-yokes, so as to place the operation of each machine or part thereof under control of one person, and each part independent of the other.

Referring to the drawing, A represents the main frame of our machine, having punching or riveting heads at either side for operation alternately or separately, and beneath these is a peculiarly-formed shearing-table, B, which

will be more fully described hereinafter. C is the main driving-shaft, which receives its motion through a band or gear wheel, D, from any suitable motor. On one end of the shaft is an eccentric elliptic gear, E, which gears with a similar one, $E^1 E^2$, arranged on opposite sides of it. The two latter are connected with sleeves $F^1 F^2$, and rotate freely around the shafts $G^1 G^2$, and when it is desired to rotate said shafts or either of them the clutch H^1 or H^2 , or both, being in spline gear with their respective shafts, are slid into gear with the sleeve or sleeves. These clutches and sleeves, which are more clearly represented in Fig. 5, are of the ordinary form, with the exception that the one is formed with a web, a , extending from jaw to jaw on one side of the axis, and the other has the jaw cut away next to the axis on one side, as at a' , to receive the web a , which insures the engagement of the eccentric gear when in the proper relative position to that of the eccentric b on their axis, so as to obtain the greatest leverage of said gear during the cutting or punching action of the head.

The clutch-levers c are operated to keep the clutches in gear with the sleeves F^1 or F^2 by levers $d^1 d^2$, which are actuated by treadles $e^1 e^2$, through the rock-shafts $f^1 f^2$ and their cranks and wrists $g^1 g^2$. These treadles are arranged in such position that the operator can work them with his foot without disengaging either hand from the material to be operated on, and the clutches are disengaged by the action of the springs $h^1 h^2$ against the upper ends of the levers $d^1 d^2$, respectively, immediately on removing the foot from the treadle.

The heads $I^1 I^2$ are caused to reciprocate in vertical guides $K^1 K^2$ by the rotation of the shaft or shafts $G^1 G^2$, on which are eccentric formations b for operating said heads through the pitmen $l^1 l^2$, connected with said eccentrics b and links $l^3 l^4$, connected with shafts m^3 and m^4 , attached to the heads, on which latter shafts are also eccentrics n^3 and n^4 . Said shafts G^1 and G^2 and $m^3 m^4$ each carry a worm-wheel, p^3 and p^4 , between which is arranged a worm, g^3 , gearing with both of them, so that by the rotation of the latter double the scope of adjustment is afforded to the said heads or shears; or, with

the same amount of adjustment, one-half of the deflection of the links is avoided, thereby producing a more direct application of the power, and reducing the strain on the worm and liability of the latter to run back when under pressure.

The shearing-cutter *r* is connected with the head *I*² in a detachable manner by means of a link, *s*, fitted to said head and to the cutter-stem *t* by dovetails, or in any other suitable manner, so that by the removal or insertion of said link *s* the head may be used for punching purposes, or to communicate motion to the shearing-cutter *r*.

The cutter *r* is made adjustable on its stem *t* by means of a wedge, *u*, the upper or back edge of which is curved and rests against a correspondingly-curved bearing, *v*, so that by the adjustment of this wedge the angle of inclination of the cutter may be varied to suit the thickness of metal to be severed. This wedge may be fitted with a worm-gear or a simple slot and set-screw, as represented in Fig. 6, by which it may be adjusted to the desired angle.

w is the stationary cutter, against or in combination with which the cutter *r* operates to shear the plate, and is rigidly attached to the frame of the machine. This part of the frame of the machine is of peculiar formation, as represented in Figs. 1 and 2, being somewhat of an **S** shape, and gradually increasing in thickness as it extends beyond or away from the cutters, and by which a table, as at *B*², supports the overhanging weight of the sheet being cut, and the part severed is depressed and passes underneath the part *B*³, which entirely prevents the choking of the shears, no matter how thick the sheet of metal may be, if the shears are capable of cutting it.

What is here claimed as new, and desired to be secured by Letters Patent, is—

1. The combination and arrangement of the three elliptic gears *E* *E*¹ *E*², shafts *G*¹ *G*², clutches *H*¹ *H*², eccentrics *b*, links *l*, and heads *I*¹ *I*², substantially as set forth.

2. The clutch *F*², constructed with a web, *a*, on one part, and cavity *a'* on the other part, for operation, in combination with the eccentric elliptic gears *E*¹ or *E*², to insure the interlocking of the clutch with said gears when in position specified, for the purpose set forth.

3. The combination of the links *l*³ *l*⁴, eccentric-shafts *m*³ *m*⁴, worm-wheels *p*³ *p*⁴, and worm *q*³ with the head *I*¹, for adjusting the elevation of the latter, substantially as specified.

4. The frame *A* *B*, of the form and construction substantially as set forth.

5. Jointly with the frame *A* *B*, the head or heads *I*¹ *I*², lower shearing-jaws *t* *w*, and links *s*, for the purpose set forth.

6. The wedge *u*, made curvilinear on its upper edge, in combination with the cutter *r* and its plunger *t*, for varying the angle of said cutter, essentially as set forth.

7. The arrangement of the foot-levers *e*¹ or *e*², rock-shafts *f*¹ *f*², springs *h*¹ *h*², clutch-yokes *c*¹ *c*², and levers *d*¹ *d*² on either side of a double machine, so that the operation of the one side is rendered independent of the other, substantially as shown and described.

In testimony whereof we have hereunto subscribed our names this 8th day of September, 1870.

WM. H. IVENS.
WM. E. BROOKE.

Witnesses:

SYDNEY E. SMITH,
W. MORRIS SMITH.