

No. 804.109.

PATENTED NOV. 7, 1905.

P. EVANS.
PLATE SHEARING MACHINE.

APPLICATION FILED MAY 28, 1904.

4 SHEETS—SHEET 1.

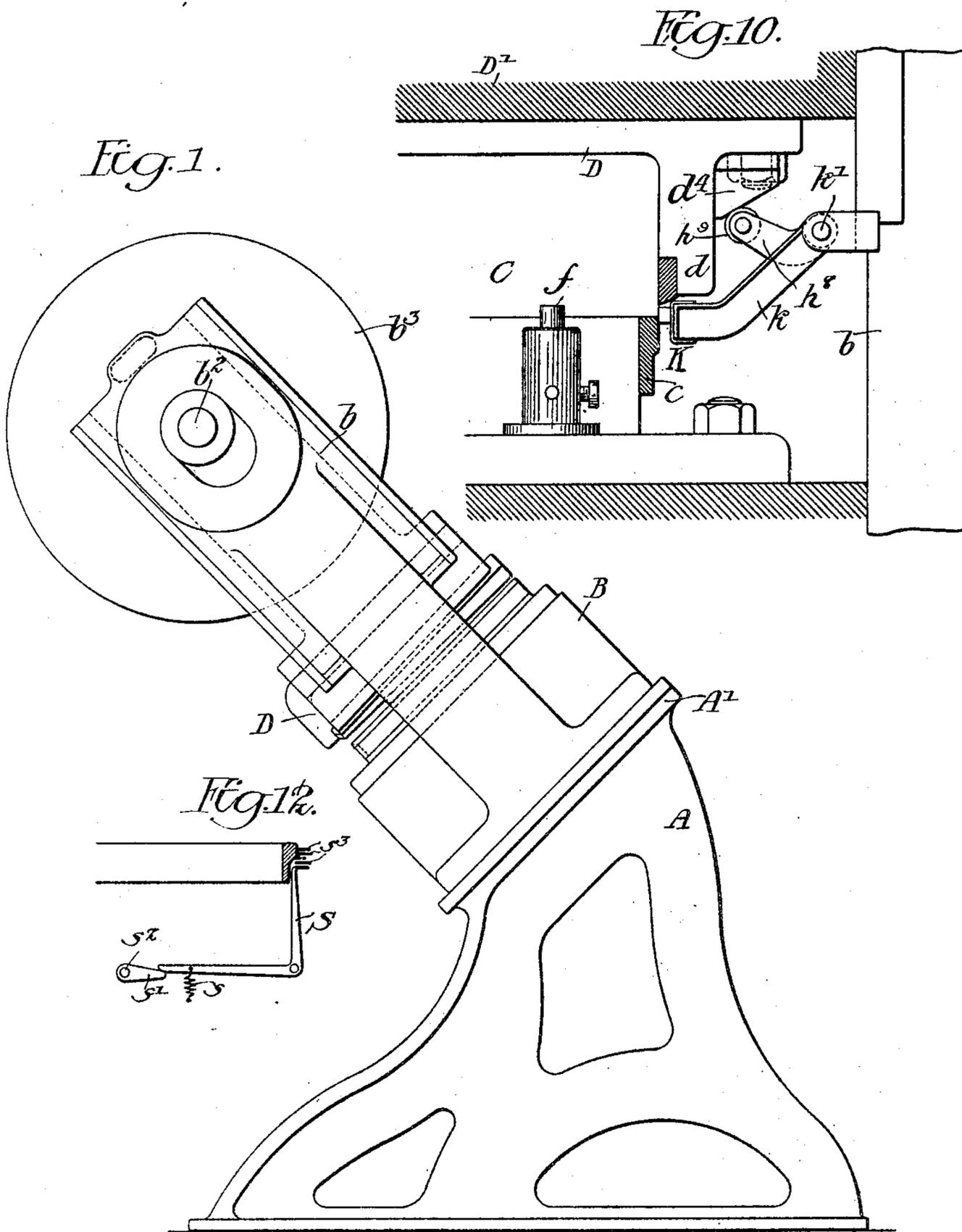
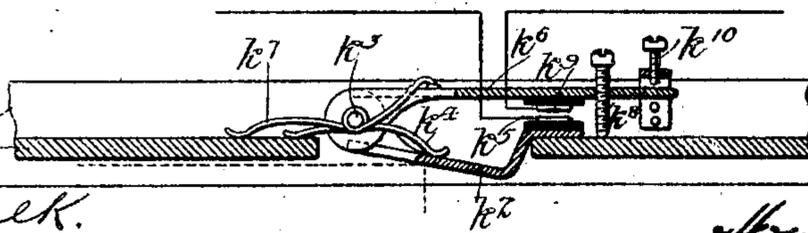


Fig. 11.



Witnesses:

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Louis H. Beck.

Inventor:

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Fig. 2.

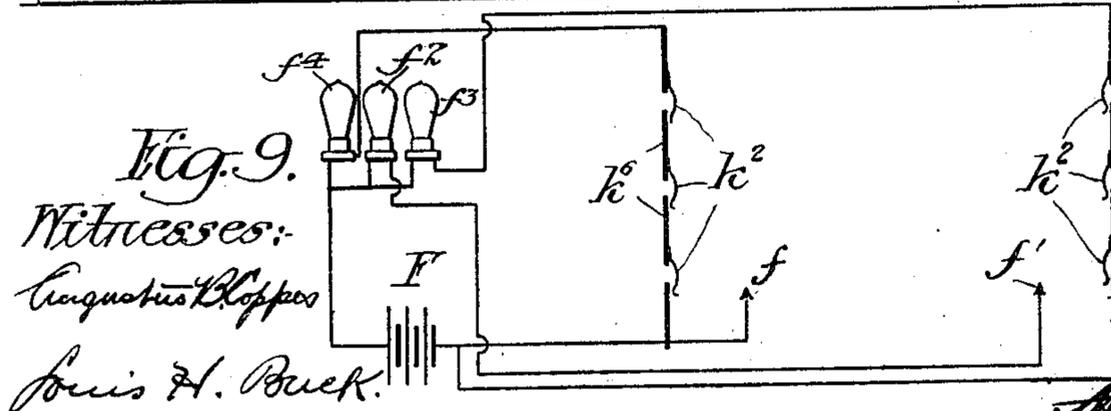
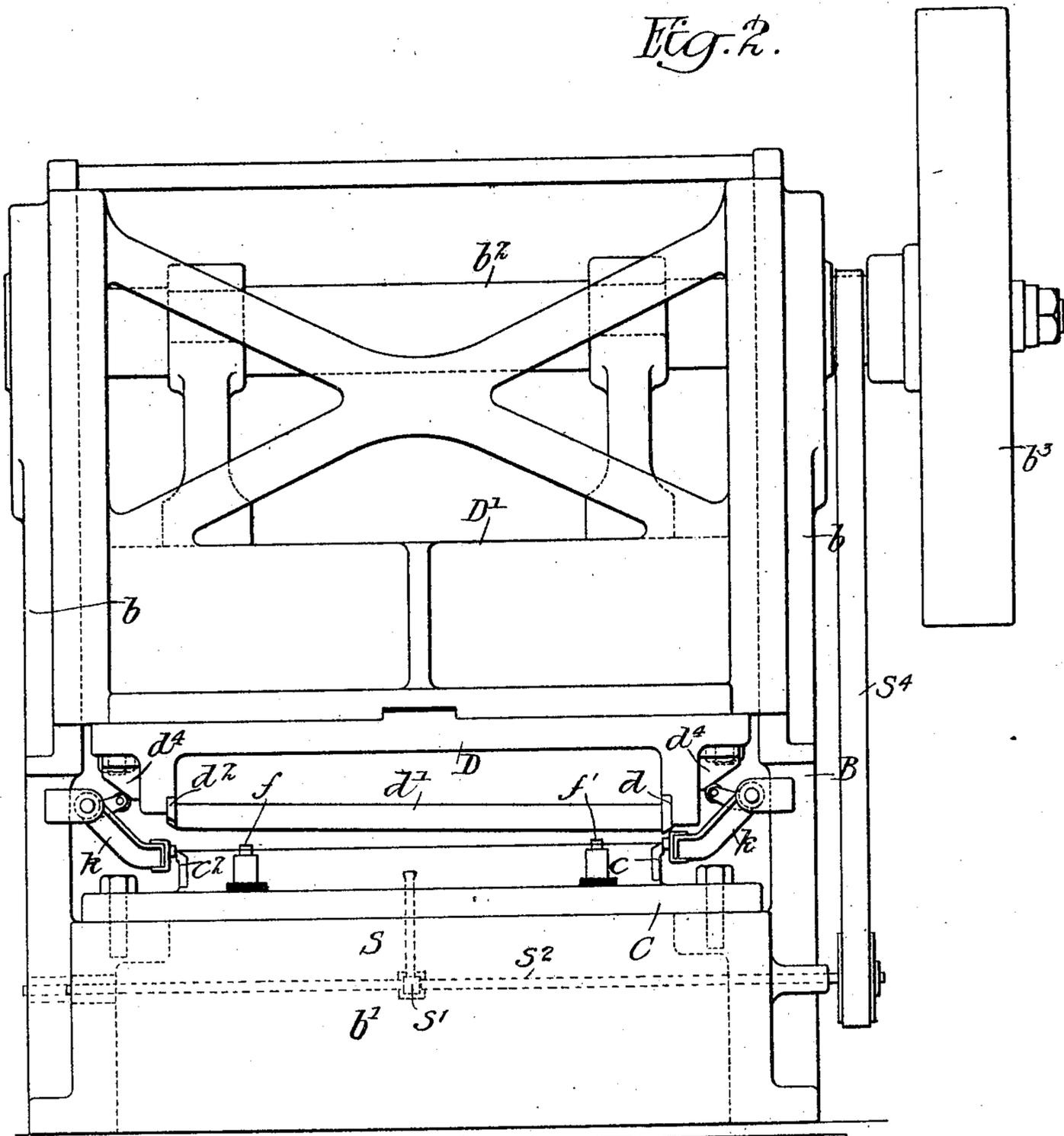


Fig. 9.
Witnesses:
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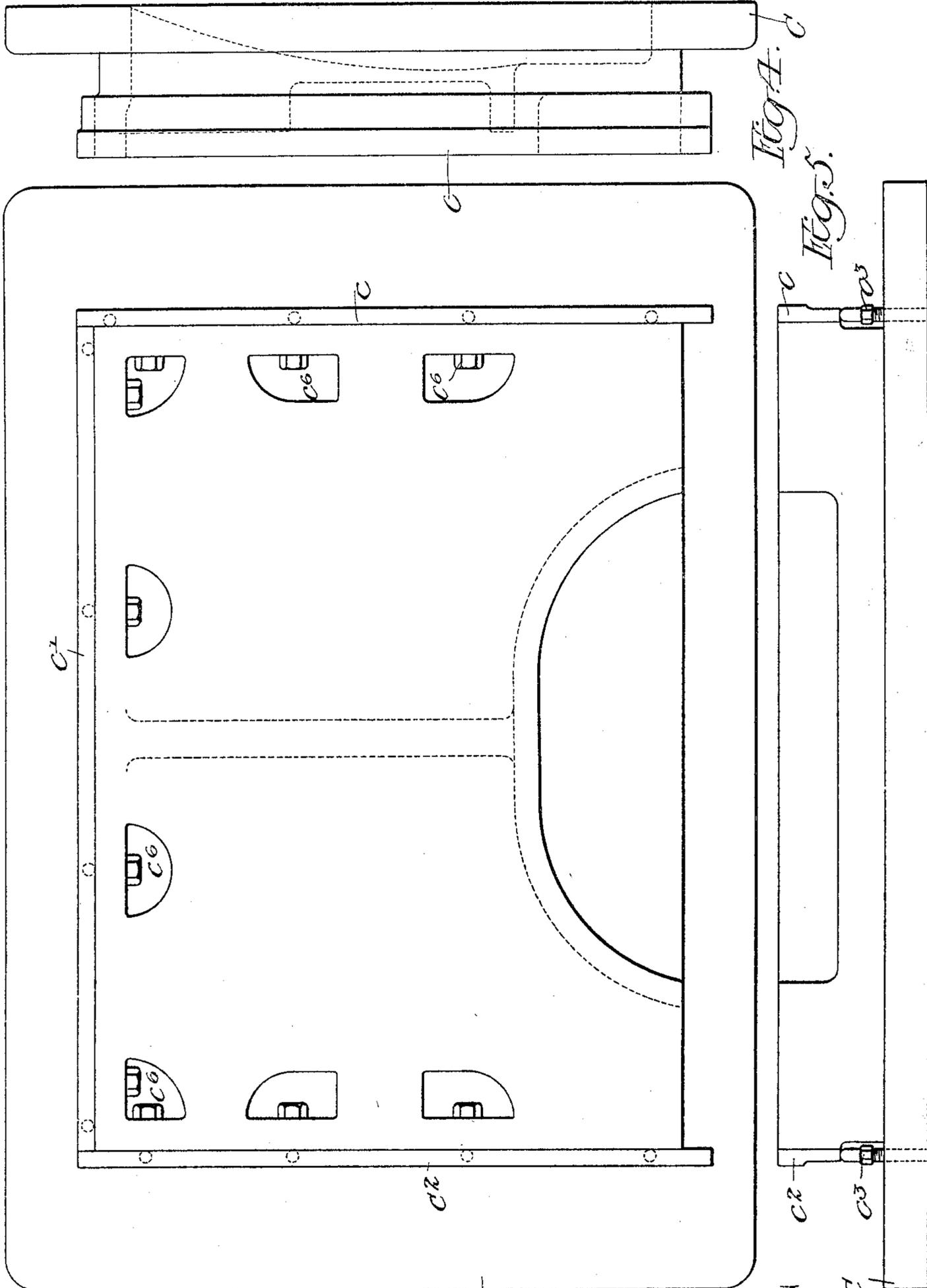
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4 SHEETS—SHEET 3.



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John H. Beck.

Fig. 5

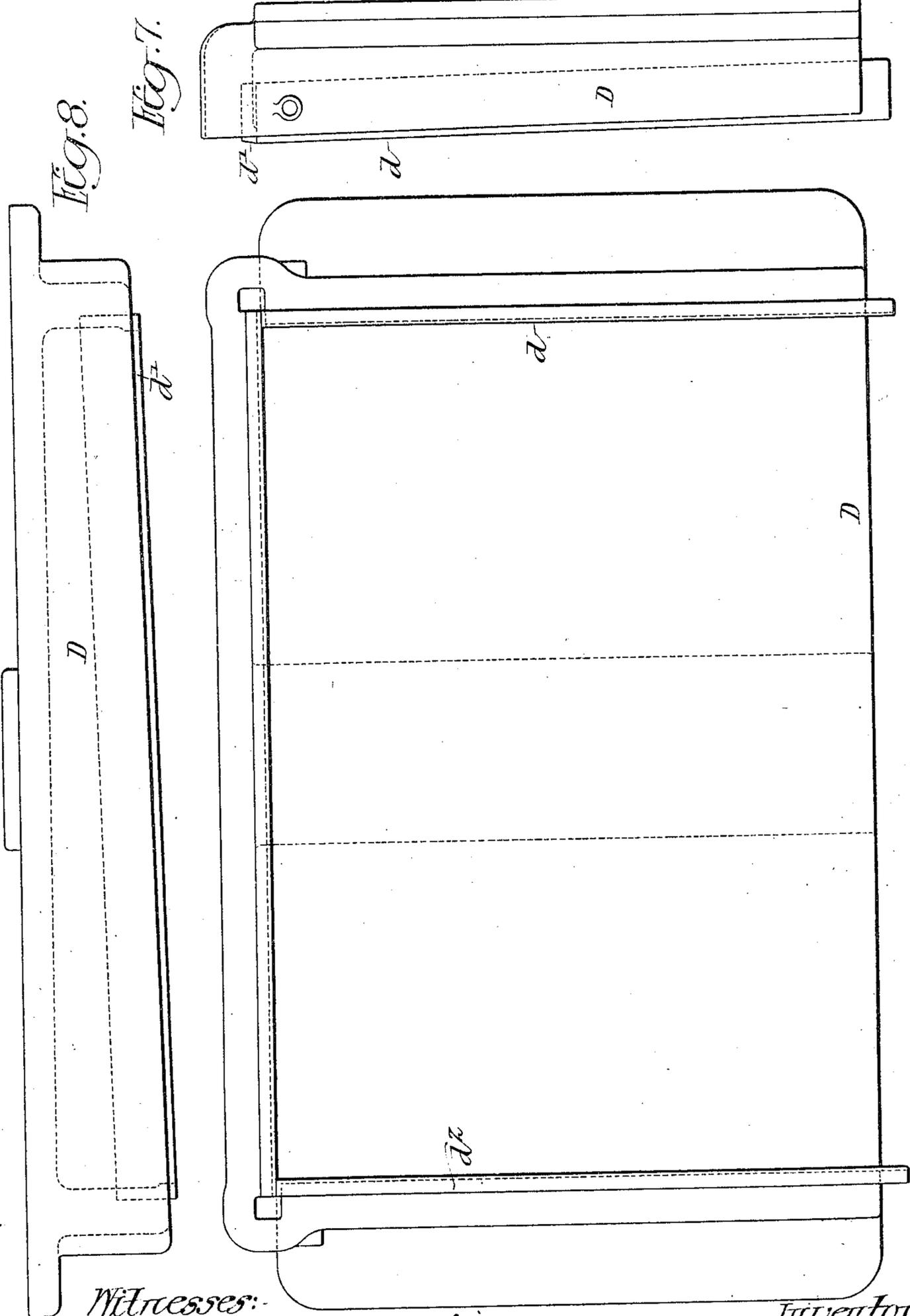
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4 SHEETS—SHEET 4.



Witnesses:
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Fig. 6.

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UNITED STATES PATENT OFFICE.

POWELL EVANS, OF PHILADELPHIA, PENNSYLVANIA.

PLATE-SHEARING MACHINE.

No. 804,109.

Specification of Letters Patent.

Patented Nov. 7, 1905.

Application filed May 28, 1904. Serial No. 210,319.

To all whom it may concern:

Be it known that I, POWELL EVANS, a citizen of the United States, residing in Philadelphia, Pennsylvania, have invented certain
5 Improvements in Plate-Shearing Machines, of which the following is a specification.

My invention relates to certain improvements in shearing-machines; and more particularly it consists of an improved mechanism
10 for resquaring sheet material.

The object of the invention is to provide a machine of the character above noted which shall perfectly square a plate or sheet at one operation and in less time, and consequently
15 at less cost than has hitherto been possible. To do this, I employ a resquaring-machine which operates upon all but one of the sides of a plate to be cut on each descent of the plunger or member carrying the knives having one side as a basic gage.

An additional object is to provide an attachment for a resquaring-machine which shall give visual indication as to whether or not portions of the plate project over the shearing edge on all sides to be cut.
25

These objects I attain in the manner hereinafter set forth, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved
30 machine, showing the preferred method of mounting it and the general position of the various parts. Fig. 2 is a front elevation of the upper portion of my improved machine. Fig. 3 is a plan view of the lower bolster of the machine. Figs. 4 and 5 are respectively
35 side and end elevations of said lower bolster. Fig. 6 is an inverted plan view of the upper bolster. Figs. 7 and 8 are respectively end and side elevations of said upper bolster. Fig.
40 9 is a diagram of the electrical connections of the apparatus comprising the indicating mechanism for my improved machine. Fig. 10 is an enlarged side elevation showing the detail construction of certain of the electrical mechanism. Fig. 11 is a side elevation of one of the electric switches; and Fig. 12 is an elevation, partly in section, showing that portion of my invention for removing the pieces cut from successive sheets of material.

50 In the machines of the general class to which my invention belongs it has hitherto been customary in order to resquare a tin plate and bring it to exact dimensions to cut but a single edge of said sheet at a time. For
55 this purpose a shearing-machine having a guiding edge and a single cutting-knife has

been employed, and in using this device the operator selects as a base the one of the four edges of the sheet which appears truest and guided by this edge cuts the opposite edge
60 parallel thereto. Then using either one of these two edges as a guide by other operations he successively cuts the remaining edges at right angles thereto, it being customary to employ gages to give exact dimensions. There
65 has also been employed a form of machine which cuts one contiguous end and side simultaneously; but the gage in this operation has been the gage from one of the sides cut as an edge and from a point on the other side cut as
70 a limit to that end. This obviously produces a sheet which is formed at right angles on two contiguous sides, but not to an exact size or in rectangular form when all four sides are considered. There has also been employed a
75 form of machine in which a plunger carries a die, so as to punch or cut all four sides of the sheet simultaneously; but such a machine when employed for cutting commercial sizes of sheet material has been found to be practically worthless, since there is no practical
80 method by which the wear of the cutting edges of the plunger can be taken up. In addition the waste of material necessarily involved has been excessive on account of the
85 fact that the die requires an ample margin of the sheet to project on all sides, so as to insure its cutting at every point. In my improved device I provide a series of knives or shears so arranged that when one edge of a plate to
90 be cut has been properly placed relatively to a guide the remaining three edges of said plate will be successively cut and that to exact dimensions and angles at corners or of exact predetermined shape by a single downward stroke of the plunger. The construction is such that the knives may be adjusted for wear without changing the dimensions of the sheet cut.

In the above drawings, A is the supporting-base of my improved machine, this consisting of a suitable standard or standards having at the upper portion an inclined surface upon which is supported the shearing-machine proper. This latter is therefore inclined to the vertical to any desired extent, so that the sheets operated upon when released by the machine fall away under the action of gravity into a suitably-placed receptacle.

Supported on the inclined portion A' of the
110 piece A is the main frame B of the machine, having side standards b suitably braced to-

gether and a bed b' , there being provided in said side members bearings for the driving-shaft b^2 , which, as is customary in machines of this class, is provided with a fly-wheel b^3 .

5 Said shaft is driven from a source of power through a pin-clutch operated by a treadle, which, as they are of the well-known forms, have been omitted from the drawings for the sake of clearness. The lower bolster C is
10 rigidly bolted to the bed b' , and, as shown in Figs. 3 to 5, inclusive, is provided at its two sides and rear with shearing edges or knives c , c' , and c^2 , respectively. These are fastened to the bolster-casting by the bolts c^6
15 and have screws c^3 whereby their vertical height may be adjusted. It will be noted that the two side shears c and c^2 extend beyond the ends of the rear shear c' , and it is of course to be understood that the external
20 periphery of the three-sided figure formed by the shears is necessarily of the exact dimensions or form to which the sheets are to be cut.

The plunger D' is so placed as to be movable in guides on the side member d and has
25 any desired cam-and-roller connection with the shaft b^2 , whereby when said shaft is rotated said plunger will be reciprocated in said guides. The upper bolster D is bolted to the
30 under face of said plunger, and, as shown in Figs. 6, 7, and 8, carries at its sides and rear three knives d , d' , and d^2 , which are placed to cooperate with knives c , c' , and c^2 of the lower bolster.

35 The knives d , d' , and d^2 on the upper bolster are preferably so adjusted that when the plunger is lowered the knife d will engage a properly-placed sheet of material near one of its front corners and cut it toward the rear of
40 the machine. When this knife has finished its cut, the knife d' cuts the sheet across the back edge, said cut being continued by the knife d^2 , which cuts from the rear to the front.

45 As shown in the drawings, all of the three knives have their cutting edges inclined to the horizontal and act as shears, cutting various portions along a given line successively and not simultaneously, as in the case of a
50 punch.

In order that means may be provided for indicating when a plate has been properly placed relative to the three shearing edges, so that a proper margin will be left project-
55 ing over each of them, I provide at the front of the machine a guide consisting of two pieces f and f' , serving as stops and defining the line with which one edge of a plate to be cut is made to correspond before the machine
60 is operated. These two pieces form the terminals of an electric circuit including a battery F or other source of current and an electric lamp f^2 .

In addition to the above there may be a plu-
65 rality of switches of the type shown in Fig.

11 placed adjacent to each of the lower side shearing edges and so arranged and constructed that they will be retained in a closed condition as long as they are held away from the
70 lower shear-blade—as, for example, by means of a sheet or plate projecting over or beyond said blade. My preferred construction of this part of the device consists of a bar K, supported parallel to each of the lower side shear-
75 blades c and c^2 by means of the arms k , fastened to a shaft k' , which in turn is carried in bearings projecting from the side members b of the machine. In the present instance each of the bars K is provided with three
80 openings in its face nearest the shear-blade, through each of which projects an angular metallic piece k^2 , pivotally supported upon a pin k^3 , carried by the bar K. A spring k^4 tends to keep the piece k^2 normally projecting
85 beyond the face of said bar K, and it is noted that the end of said piece farthest from the pin k^3 is provided with an insulated contact-piece k^5 . Said end resting upon the edge of the opening in the bar K limits the amount
90 of outward projection of the piece k^2 . A second piece k^6 is also pivotally supported by the pin k^3 and has a spring k^7 pressing it toward the piece k^2 . A screw k^8 , passing through said piece k^6 and bearing upon the bar K, prevents the contact-point k^9 from engaging the
95 contact-point k^5 , while a second screw k^{10} limits the motion of the piece k^6 in the opposite direction.

From the diagrammatic view shown in Fig. 9 it will be seen that the three switches, shown
100 as each consisting of a spring contact-piece k^2 and a fixed contact k^5 , are connected in series with each other and with one of the lamps f^3 and f^4 , which, as indicated, are connected in circuit with the battery F.
105

In adjusting the switches the screws k^8 are first turned so that the contact-points k^5 and k^9 are in engagement with each other, thus providing a closed circuit from the battery
110 through the switches and one of the lamps f^3 or f^4 . Said screw k^8 on each switch is then adjusted until the contact k^9 has been moved out of engagement with the contact k^5 to an extent just sufficient to break the circuit
115 through the switch and extinguish the lamp in circuit therewith. This operation is repeated for each switch independently of the others, it being of course understood that the other switches are temporarily retained
120 in a closed condition while the adjustment is being made.

In operation a plate to be squared is inserted between the upper and lower bolsters and its truest edge is brought against the two
125 pieces or stops f and f' . This completes the circuit between them and lights the lamp f^2 . If, for example, the sheet of material to be squared strikes the parts k^2 of all the switches, current will flow through the two lamps f^3 and f^4 , and indication will thus be given that
130

the plate is projecting far enough over the side shearing edges to which the switches are adjacent to permit a proper cut to be made. If, however, the plate should not be of sufficient size to so engage the movable parts h^2 of one or more of the switches adjacent to the shearing edges c , for example, then current will be prevented from flowing to the lamp f^3 , which will consequently not light up, thereby giving visual indication of the fact that the plate is not of sufficient length to project over this one of the side shearing edges. In such case by shifting the position of the plate it may be made to close all of the switches on both sides, thus lighting up both of the lamps f^3 and f^4 . Should it not be possible to do this, it will indicate that the plate is undersized and it may at once be discarded.

I preferably provide means by which the switches are automatically moved out of the way when the plunger and the upper knives descend, and for this purpose I fix an arm h^8 on each of the rods h' , making said arm to project, so as to be engaged by a portion d^2 of the upper bolster D as this latter descends to engage the plate. I preferably journal a roller h^9 on each arm h^8 and so fix this latter relatively to the arms h that as the plunger descends these, with the parts carried by them, are swung down and back, being retained in such position until the plunger again rises.

From the above it will be seen that a large proportion of the labor hitherto expended in trimming or resquaring plates or sheets will be saved by the use of my improved device, since not only is it possible to perform by one stroke of the plunger the work that is customarily done by three such strokes, but in addition means are provided for giving instant indication as to whether the plate is of proper dimensions to be used.

It will be understood that while I have illustrated electrical means for indicating the position of a plate in my improved machine it is to be noted that pneumatic, mechanical, or hydraulic devices are the equivalent thereof and are broadly included as possible means for ascertaining when a plate is so placed as to be properly cut.

In the practical operation of my improved machine I have found it advisable to provide some means for removing the E-shaped pieces sheared from the three sides of the plates operated upon, since these have a tendency to hold to the lower bolster and do not free themselves. For this purpose I employ a device such as is shown in Fig. 12, which consists of a bell-crank lever S, having an arm projecting into a recess formed in the shearing edge c' of the lower bolster. This lever is provided with a spring s , by which its arm, above mentioned, is normally retained within the recess of the blade, except when it is forced outwardly by means of a cam-

lever s' , which is carried on a shaft s^2 , making one revolution to each reciprocation of the plunger D'. As the successive strips of material (indicated at s^3) are sheared from the plates the knives d , d' , and d^2 force them downwardly until the lowermost comes opposite the end of the upwardly-projecting arm of the lever S. Since, however, this arm is forcibly moved outward once for each revolution of the plunger, one of the strips s^3 is engaged and pulled off of the bolster, so as to be thrown into a pile or receptacle where the accumulation of said strips will not interfere with the operation of the machine. If desired, the shaft s^2 may be driven from the main shaft b^2 of the machine by a belt s^4 and a pulley s^5 . After being sheared the finished plates are either removed by hand or are allowed to slide by gravity out of the machine, being collected in any desired manner.

I claim as my invention—

1. The combination of a frame, a bed thereon having more than two shearing edges, and a plunger carrying knives on a plurality of its sides, for coöperating with the shearing edges of the bed, the cutting edges of two of said knives on said plunger extending past the end of another intermediate of them and having their ends substantially flush with the cutting edge of said intermediate knife, substantially as described.

2. The combination of a frame, knives supported thereon along three sides of a substantially rectangular figure, the cutting edge of the knife on the intermediate side extending beyond the ends of those on the two other sides, and a plunger having three knives coöperating with those on the bed, the cutting edges of two of said knives on the plunger extending past the ends of the third and having their ends substantially flush with the cutting edge of said intermediate knife, substantially as described.

3. The combination of a bed having a shearing edge, a plunger also having a shearing edge, placed to coöperate with that on the bed, and visual means for automatically indicating when a piece of material to be cut projects beyond any of a number of points on said shearing edge, substantially as described.

4. The combination in a plate-shearing machine of a bed having a shearing edge, a plunger also having a shearing edge placed to coöperate with that of the bed, and electrical means independent of the controlling mechanism of the machine for automatically indicating when a piece of material projects beyond said edge, substantially as described.

5. The combination in a plate-shearing machine of a bed having a series of shearing edges arranged along the sides of a polygonal figure, a plunger also having shearing edges placed to coöperate with those on the bed, with means adjacent to said shearing

edges for visually indicating when a plate to be operated upon projects beyond the same, substantially as described.

6. The combination in a plate-shearing machine of a bed having a series of shearing edges arranged along the sides of a polygonal figure, a plunger also having shearing edges placed to cooperate with those on the bed, with electrical apparatus having means adjacent to said shearing edges for indicating when a plate to be operated upon projects beyond the same, substantially as described.

7. The combination in a plate-shearing machine of a bed having a shearing edge, a movable member also having a shearing edge, with a switch placed to be positively actuated by a sheet of material projecting beyond the shearing edge on the bed, and means independent of the operating mechanism of the machine in circuit with said switch for indicating when it has been actuated, substantially as described.

8. The combination in a plate-shearing machine of a bed having a shearing edge, a movable knife cooperating therewith, a series of switches placed adjacent to the shearing edge, with a generator and a lamp in circuit with said switches for giving indication when a piece of material to be cut projects beyond the shearing edge at any of a number of points, substantially as described.

9. The combination of a bed having a plurality of shearing edges and a guiding edge for a sheet of material to be operated upon, a plunger having knives cooperating with said shearing edges and electrical means for indicating when the sheet of material is in position against the guide, substantially as described.

10. The combination of a bed having a shearing edge and a guiding edge for material to be cut, a plunger having a shearing edge cooperating with that on the bed, a switch adjacent to the shearing edge, means for indicating whether said switch is open or shut and means for indicating when the sheet of material is in position against the guide, substantially as described.

11. The combination with a shearing-machine having a knife, a plunger having means for cooperating with said knife to cut a piece of material, a switch adjacent to the knife and means independent of the operating mechanism of the machine and connected to the switch for indicating when a sheet of material projects beyond the knife-edge and engages the switch, substantially as described.

12. The combination of a shearing-machine having a plurality of cutting edges arranged along the sides of a polygonal figure, stops placed to define one of the sides of said figure, a source of power and indicating means both in circuit with said stops, substantially as described.

13. The combination with a shearing-ma-

chine of a switch adjacent to the cutting edge placed so as to be operated by a piece of material projecting over said edge thereof, indicating means in circuit with the said switch and means for moving the switch out of operative position before the machine cuts a piece of material, substantially as described.

14. The combination with a shearing-machine of a switch having a supporting structure normally maintaining it adjacent to a cutting edge of the machine so that it will be operated by the material to be sheared, and mechanism placed to be acted upon by a portion of the movable part of the machine for moving said switch away from the cutting edge as the upper knife descends, with means for indicating whether said switch is open or closed, substantially as described.

15. The combination with a shearing-machine of a switch having a supporting structure normally maintaining it adjacent to a cutting edge of the machine so that it will be operated by the material to be sheared, and mechanism for moving said switch away from the cutting edge as the knife is operated, with means for indicating whether said switch is open or closed, substantially as described.

16. The combination in a shearing-machine of a framework including a bed having a shearing edge, a plunger having a portion cooperative with said shearing edge, a pivotally-supported arm on the frame, a switch carried thereby, and a second arm connected to the first and placed to be engaged by the plunger of the machine so as to move the switch away from the shearing edge when said plunger descends, substantially as described.

17. The combination with a shearing-machine of a bar extending adjacent to the shearing edge thereof, an arm attached to said bar, with a plurality of electric switches on the bar and means connected to said switches for indicating whether they are open or closed, substantially as described.

18. The combination in a shearing-machine having a plurality of shearing edges, of a plunger carrying knives cooperating with said shearing edges, bars supported adjacent to certain of the shearing edges, switches on the said bars placed to be operated by a sheet of material to be sheared, means for moving the bars away from the shearing edges when the plunger is operated and apparatus in circuit with the said switches to indicate whether they are open or closed, substantially as described.

19. The combination with a shearing-machine of a plurality of electric switches supported adjacent to a shearing edge of said machine so as to be operated by a sheet of material projecting over said edge, a current-generator and current-indicating means all connected in circuit with the switches, substantially as described.

20. The combination with a shearing-machine of a bar movably supported adjacent to

a shearing edge of said machine, electric switches carried by the bar and having portions projecting therefrom toward the shearing edge so that said switches will be operated
 5 by a piece of material projecting over said shearing edge, with indicating means and a current-generator in circuit with said switches, substantially as described.

21. The combination in a plate-shearing
 10 machine of means for cutting along a plurality of sides of a plate and automatically-acting means for positively removing from the machine the pieces cut off of said plate, substantially as described.

22. The combination in a machine having
 15 means for shearing a plate along more than two of its sides, of a pivoted lever in the path of the pieces cut from the plate and means for actuating said lever to cause it to automatic-
 20 ally remove said pieces from the machine, substantially as described.

23. The combination in a plate-shearing
 25 machine of a lower bolster having shearing edges along three of its sides, a plunger having knives cooperating with said other edges and an automatically-acting device for posi-

tively and successively removing the pieces sheared from successive plates, substantially as described.

24. The combination in a shearing-machine
 30 having means for shearing a plurality of edges of a plate, of a lever adjacent to one of the shearing edges of the machine and means for periodically moving said lever to cause it to engage and remove successively the pieces cut
 35 from the plates, substantially as described.

25. The combination in a shearing-machine
 having means for cutting the edges of a plate, of a lever having a portion movable in a line
 40 substantially at right angles to the line of motion of the pieces sheared from successive plates, and means for periodically actuating said lever to cause it to engage a cut-off piece and discharge the same from the machine,
 45 substantially as described.

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

POWELL EVANS.

Witnesses:

J. C. BIGGERSTAFF,
 WM. E. WATER.