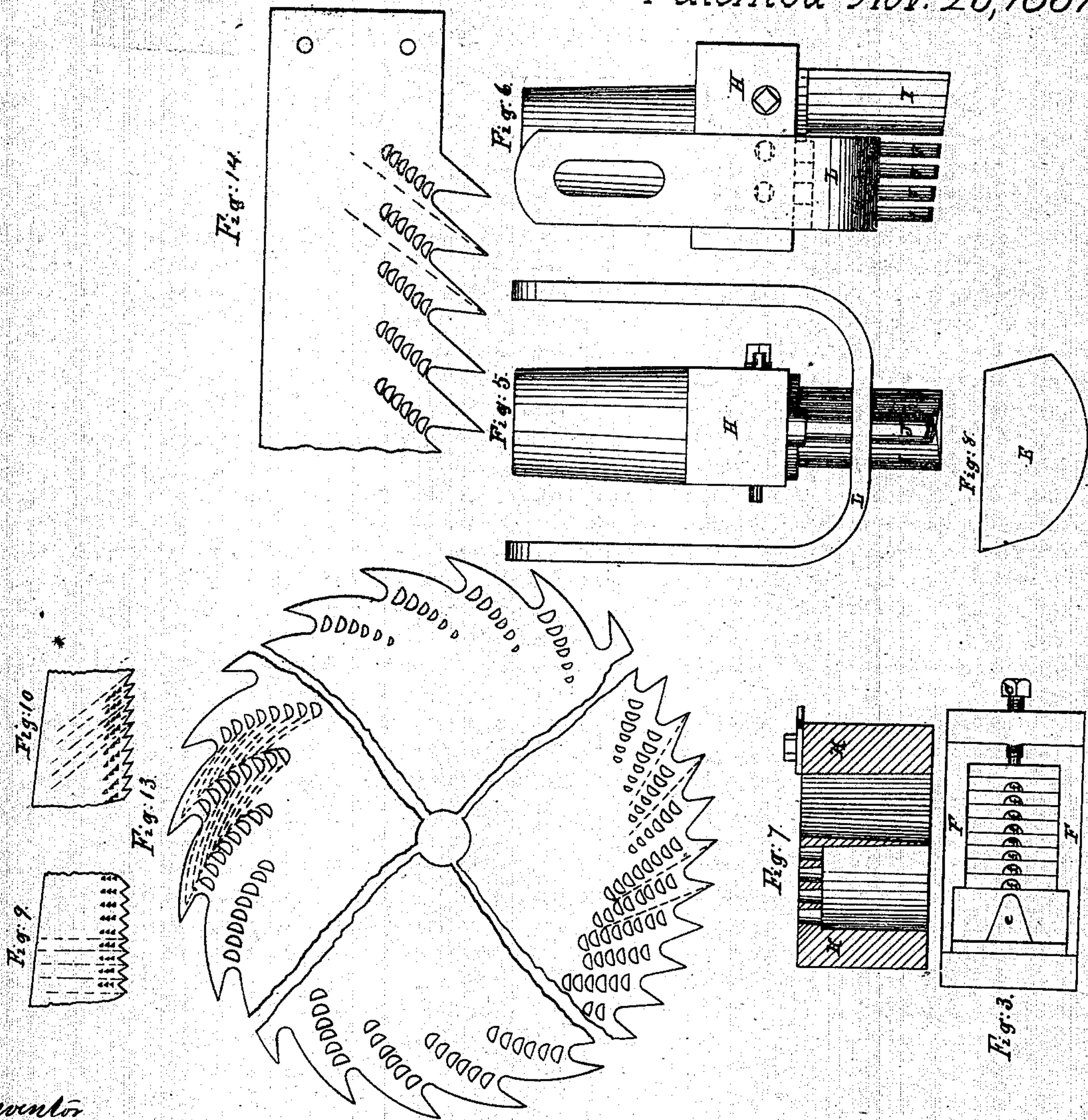


J. E. Emerson.

Punching Saw Teeth.

N^o 71473

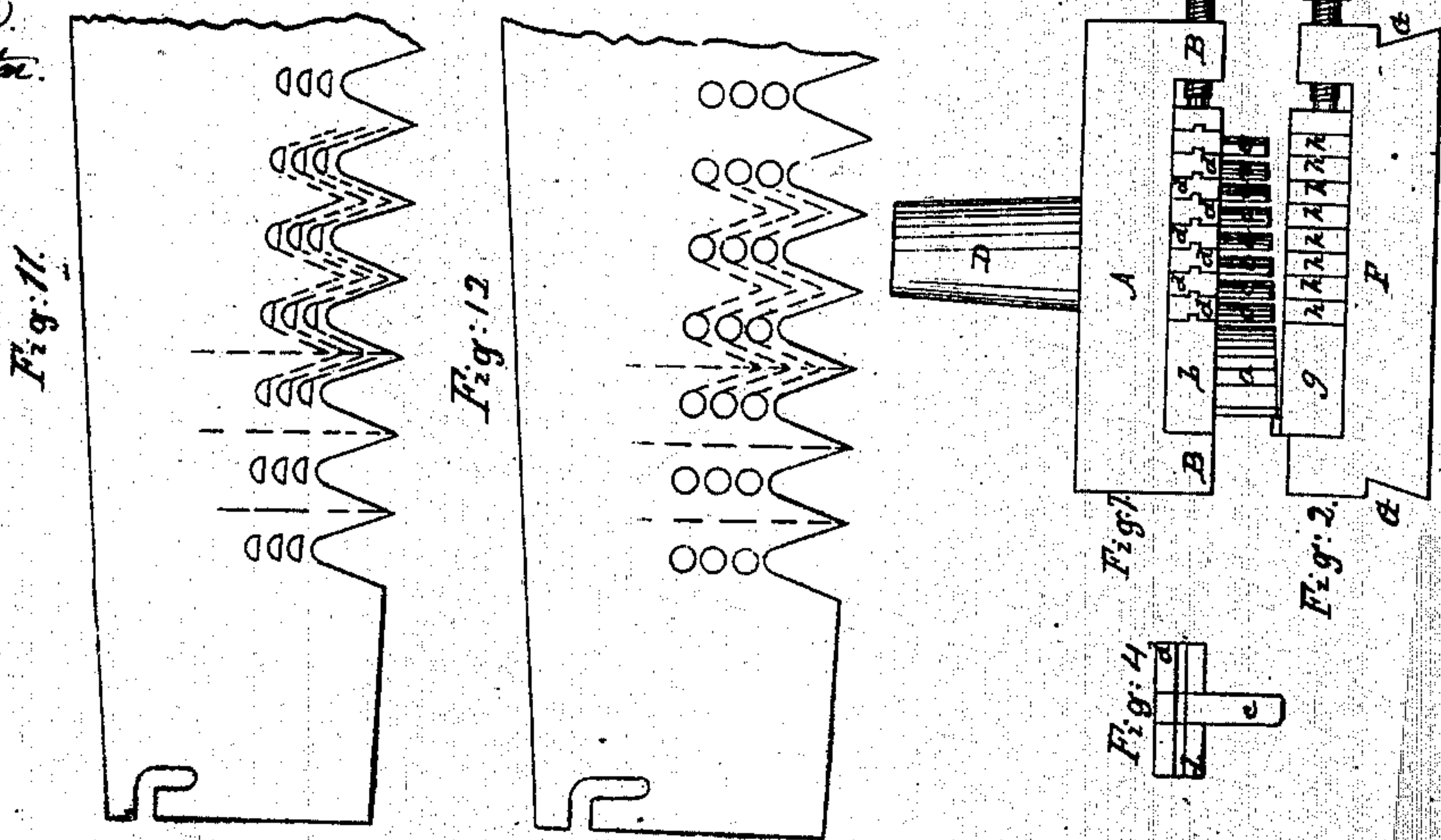
Patented Nov. 26, 1867.



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JAMES E. EMERSON, OF TRENTON, NEW JERSEY.

Letters Patent No. 71,473, dated November 26, 1867.

IMPROVED APPARATUS FOR PUNCHING SAW-TEETH.

The Schedule referred to in these Letters Patent and making part of the same.

TO ALL WHOM IT MAY CONCERN:

Be it known that I, JAMES E. EMERSON, of Trenton, in the county of Mercer, and State of New Jersey, have invented certain new and useful Improvements in Adjustable Punches and Dies for Punching Saws, and that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making a part of this specification, in which—

Figure 1 represents a side view of one of the punches, and

Figure 2 represents a side view of one of the dies.

Figure 3 represents a top plan of the die shown in fig. 2, and

Figure 4 represents a face view of one of the punches and the grooved plate that holds it, (an end view of which is seen in fig. 1,) removed from the punch-stock.

Figures 5 and 6 represent respectively an end and side view of another form of construction of punches, and

Figure 7 represents a section through a die formed for the punches, figs. 5 and 6, to work in.

Figure 8 represents a gauge by which the punches and dies may be set for straight or curved work either.

Figures 9, 10, 11, 12, 13, and 14 represent various shapes, forms, and inclinations of the teeth, and the holes or apertures at or in the line of the roots of the teeth, and which may be punched by my system of punches and dies.

Similar letters of reference, where they occur in the separate figures, denote corresponding parts in all the drawings.

My invention relates to a mode of constructing, arranging, adjusting, and holding punches and dies in their stocks, for the purpose of punching saws, as will be hereinafter described; and my invention consists in combinations of devices for the purposes set forth, as will be hereafter more fully set forth and claimed.

To enable others skilled in the art to make and use my invention, I will proceed to describe the same with reference to the drawings.

The punch-stock A, fig. 1, is made of metal, with flanges or projections, B, at its ends, between which there is a recess, for placing the punches, and in one of the flanges, jaws, or projections, are one or more set-screws, C, for holding the punches and their plates firmly in position, after they have been properly set in the recess. There is also a shank, D, on the punch-stock, by which it is set and held in the punching-machine.

The punch *a*, which cuts out the throat, or space between the saw-teeth, may be permanently attached to its plate, *b*, and be of such shape or form, and size, as it is desirable to make the throats or gullets in the saw. The punches *c c c*, &c., which are designed for cutting out a series of holes behind or above the throats or gullets of the saw, are made separate, and removable from their plates, *d d d*, &c., so that, when worn out or broken, others may be inserted in the same plates. The plate *b* of the punch *a* has a tongue formed upon that side of it which comes next to the other plates, *d*, as seen in fig. 1, and the plates *d* have a groove formed in one of their sides, and a tongue in or on its opposite side, so that when these plates and their punches are properly set in the punch-stock, and the set-screw or screws run up, they will be firmly and rigidly held in place by means of their tongues and grooves, or other similar interlocking devices.

The punches *c* I make out of sections of round, square, or angular steel wire, as follows: If the bottom of the throat or gullet of the saw-teeth, and the holes behind or above them, are to be round, as seen in fig. 12, then round wire, of the size of the holes to be punched, is used, the punches being cut off of such lengths as will allow them to be inclined from a horizontal plane, as seen in fig. 1, so that, in punching, they will come into action in their series capacity, and thus very much reduce the power required to force them through the saw-plate, and also prevent the plate from being unduly warped or bent; and if it be desired to diminish the sizes of these holes as they recede from the throat or tooth-space, the size of the round wire may be correspondingly reduced. If the holes are to be half round, angular, diamond, or of any other regular or irregular forms, as seen in the several drawings, then, with a fine saw, sections are cut from round, square, or angular steel wire, of such cross-section as will cut holes of the shapes required. The plates *d*, that are to receive these punches *c*, besides being tongued on one side, and grooved on the other side, have a vertical slot cut on one face, into which the punches fit, as seen in fig. 4; and these slots may be simple grooves or dove-tails, and the upper ends of the punches correspondingly formed to fit into them. The face of the punch is flush with the

face of the plate, so that, when the series of plates and punches is set in the stock, one plate shall hold or bear against the punch of the next adjacent plate, and thus throughout the series. By this construction of punches, one stock and one set of plates will serve for many sizes of punches, and will last for a very long period, whilst the punches may be renewed, as worn out, at a very trifling expense.

In hand, saw-mill, cross-cut, or other similarly-shaped saws, the holes punched out behind or above the throats may be at right angles, or inclined, to the edge of the saw, as seen in figs. 9, 10, 11, 12, and 14, but should be in the line of the wearing of the teeth of the saw, (which is always a defined line,) as they are designed to aid the user in gumming his saw, and serve as a gauge for so doing, besides their other advantages of preventing the saw from heating, or of fractures at the roots of the teeth, and admit of the use of one particularly-shaped file being used.

In circular saws, as seen in fig. 13, the holes may be punched in curved or in inclined straight lines, as the shape of the tooth or the purpose for which the saw is to be used may require, but always in defined lines, whether curved or straight. But as circular saws, by use, and refiling, and regumming, are gradually and regularly reduced in diameter, and as the diameter of a saw defines to a great extent the size of the teeth and throats formed in it, the holes, whilst preserving the general direction of the line of wear of the teeth, may gradually diminish in size, but maintain their general outline form, so that, as such saw wears away, it may have its teeth gradually reduced in size by the simple act of gumming, sharpening, and setting, the holes being the guide for the operator, he only having to cut away the bars between the holes.

The red and dotted lines in the figures, from 9 to 14 inclusive, show how the shapes of the teeth and throats are preserved until the last hole is reached, or the saw worn out.

All these forms, shapes, sizes, and curved or inclined lines of holes can be punched by my punches and dies, it being only necessary to use a gauge, such as is shown at E, fig. 8, or any other one, to set the punches and dies by, after they have been loosened in their stocks, by backing the set-screws. The curved or straight side of the gauge is placed against the punches, and they are all brought up against it, and then the screws are run up tight. The dies are similarly brought up to the same part of the gauge, and they are then made fast, so that the teeth are formed and the holes cut to conform thereto at one operation, and this, too, whether at right, angular, or curved lines, as may be desired. If punches and dies had to be specially made with their stocks or holders for cutting each form of tooth, and particular forms or lines of holes for such teeth, it would require innumerable punches and dies; but, by my mode of making them, the same stocks and plates may be used for various-sized and shaped punches and dies, and in curved or straight lines, as may be desired.

The dies are the counterpart or reverse of the punches. The die-stock F, fig. 2, is substantially the same as that for the punches, with the exception of the shank. This die-stock bears the relation of an anvil to the punch-stock, and remains stationary, and, for the purpose of being readily removed and replaced on its bed, may have dove-tailed ends, G, so as to slide and fit into a dove-tailed groove or recess in the bed. The die *e* receives the punch *a*, and the dies *f* receive the punches *c*. These dies are formed in separate plates, *g* and *h*, so that they can be adjusted or changed to suit the punches in the punch-stock, or the shape, form, size, or direction of the holes, or of the saw-teeth or their throats.

Figs. 5 and 6 represent an end and side view of a punch-stock and punches, in which H is the punch-stock, I the punch for cutting out the throats and forming the teeth of the saw, and J the punches for punching the holes behind or above the roots of the teeth; and K, fig. 7, represents the die used with such a punch. L, figs. 5 and 6, is a stripper for holding or preventing the saw-plate from rising with or adhering to the punches. The punch and die, in this case, can only be used for limited sizes and forms of teeth, gullets, and holes. They can be removed, changed, or replaced, but each punch has its separate set-screw to hold it, and when the punch is made up, it is either straight, or may be made to hold the punches in a defined curved line, but cannot be changed, as in the case of the construction shown in figs. 1, 2, and 3. The punches in figs. 5 and 6 are inclined, and the tooth formed and holes punched at one operation, and, in this particular, are like those in figs. 1, 2, 3; but the die K, fig. 7, is cut out of a solid piece, and can only be used with a special punch, of which it is the counterpart or reverse. Gauges are used in connection with these punches and dies, for properly placing the plate, so that the throats of the teeth, as well as the holes, shall be uniformly spaced and punched.

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

1. The combination of a series of punches with a series of dies, each in its own stock, when so made and arranged that it will punch out the throat of a saw-tooth, and a hole, or a series of holes, behind or above said throat, and in a line corresponding to the wear of the saw-teeth, and at one operation, substantially as described.
2. I also claim the so arranging of the series of punches and the series of dies in their stocks as that they may be set to punch the throats of saw-teeth, and the series of holes behind or above them, in straight, inclined, or curved lines, as may be desired, substantially as described.
3. I also claim making the punches of separate pieces of steel, and fitting them to recesses or grooves in their respective plates, substantially in the manner described, so that, when set up in the stock, one plate shall hold the punch of the next adjacent plate, throughout the series, substantially as described.

Witnesses:

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