

(No Model.)

J. A. COLEMAN & A. E. TENNEY.
TRIMMING DIE.

No. 507,260.

Patented Oct. 24, 1893.

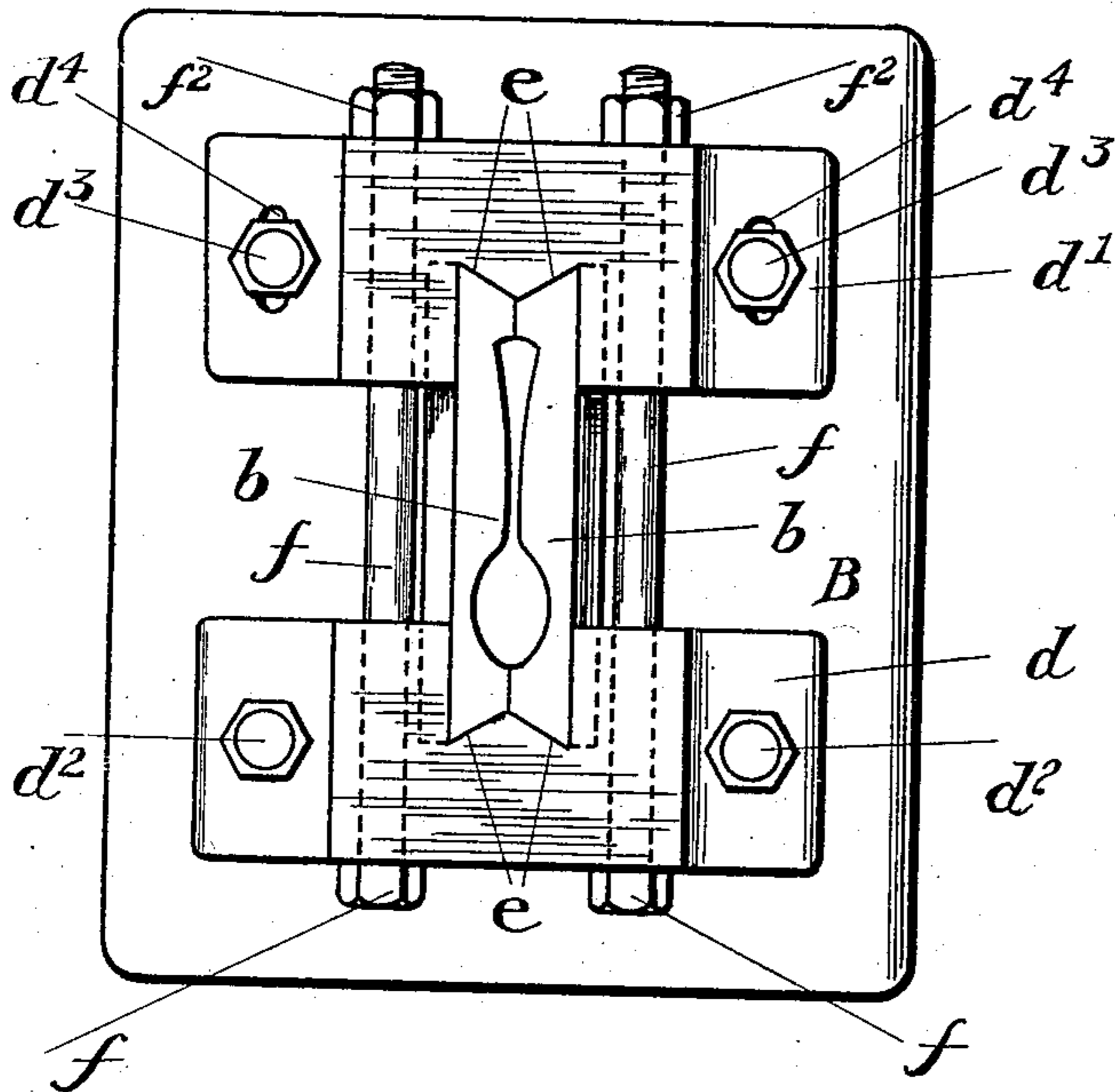


FIG. 1.

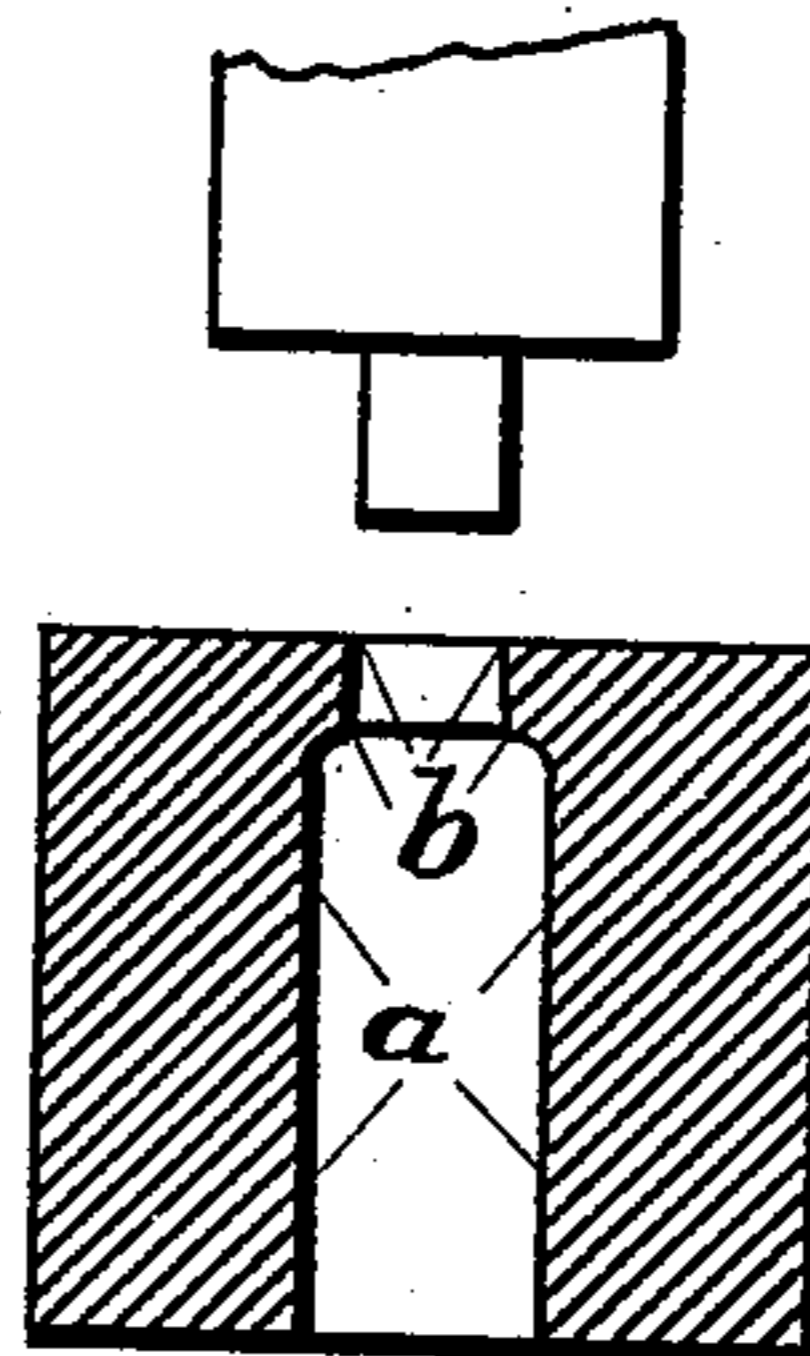


FIG. 3.

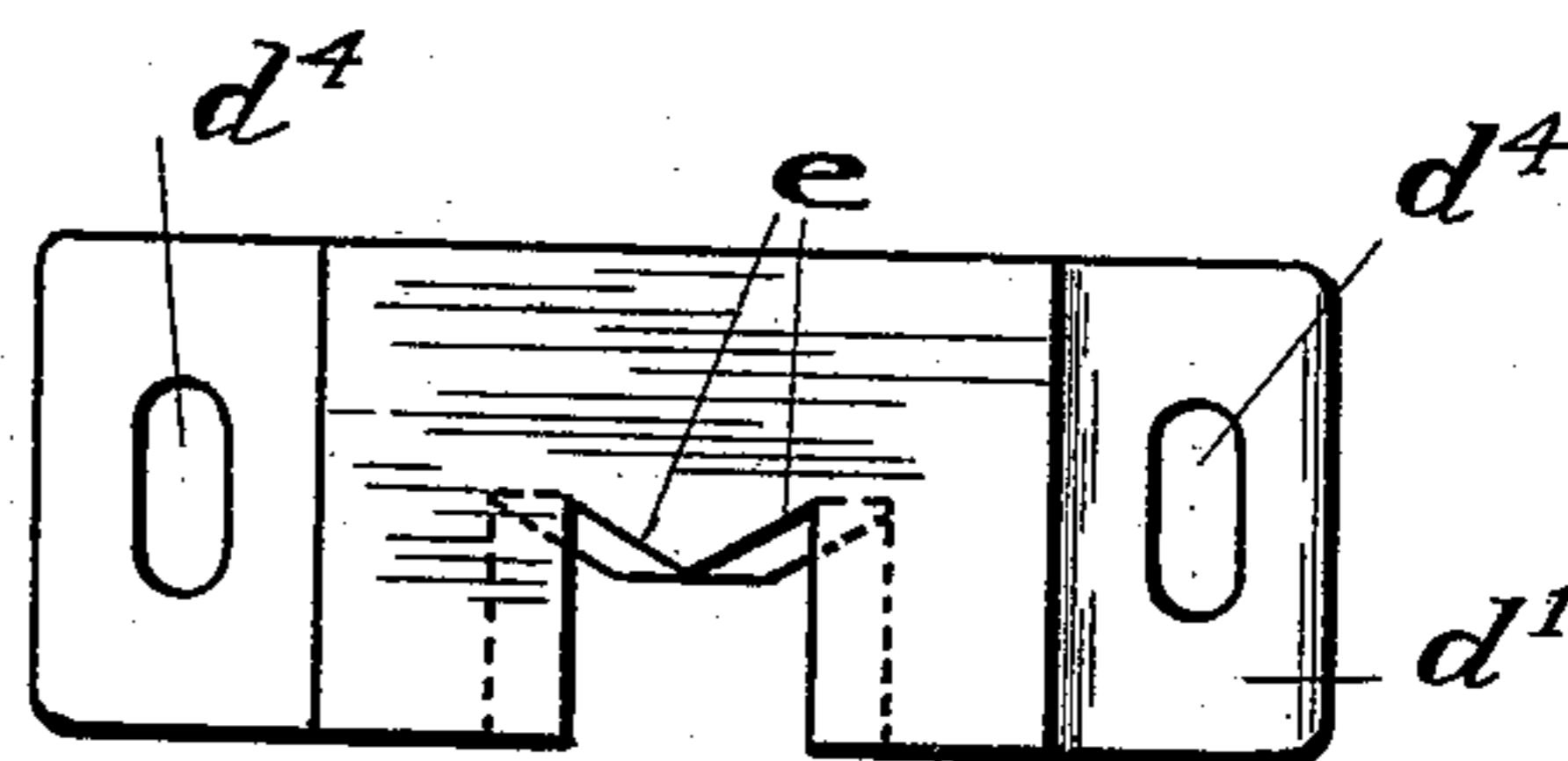


Fig. 4.

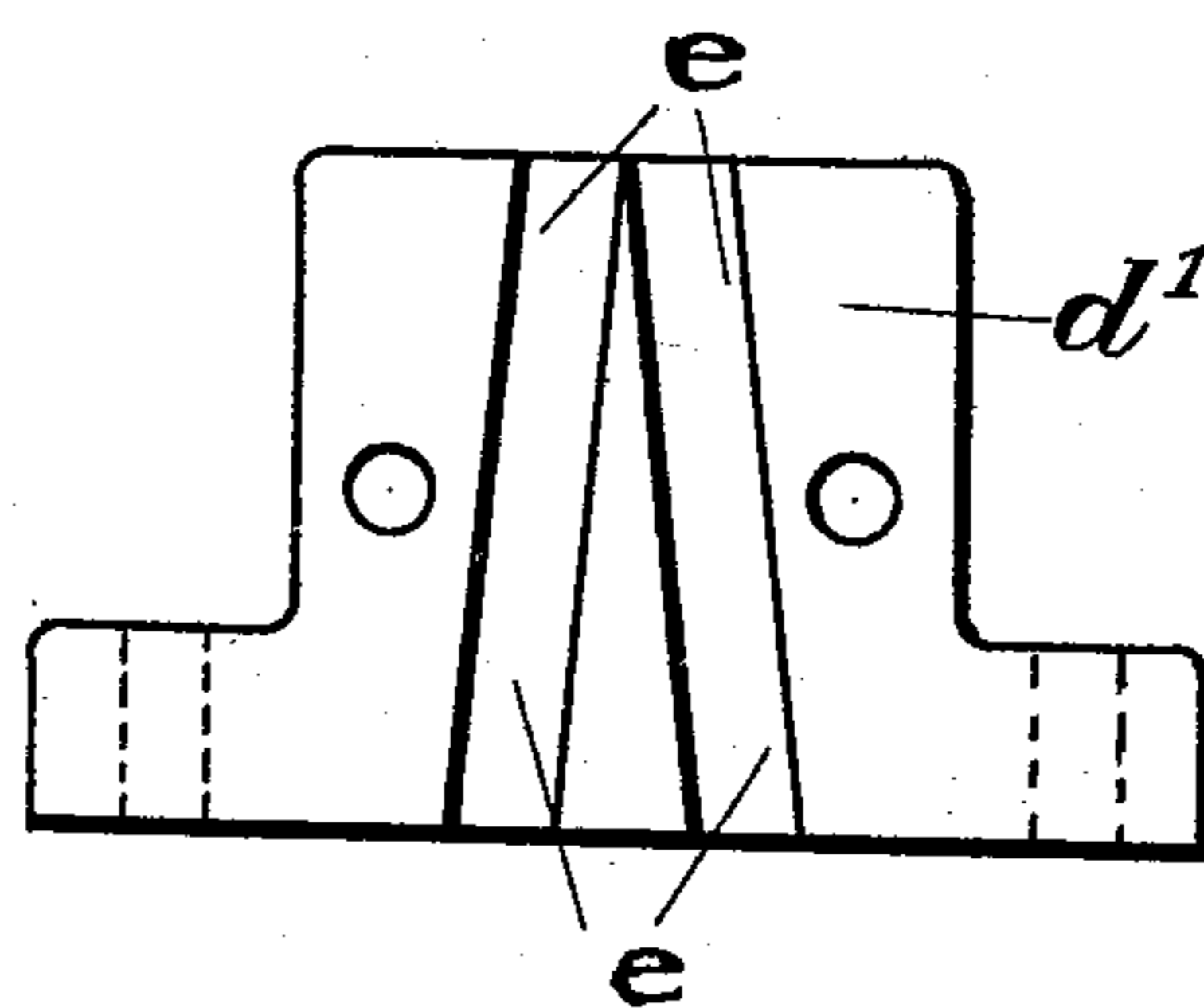


FIG. 5.

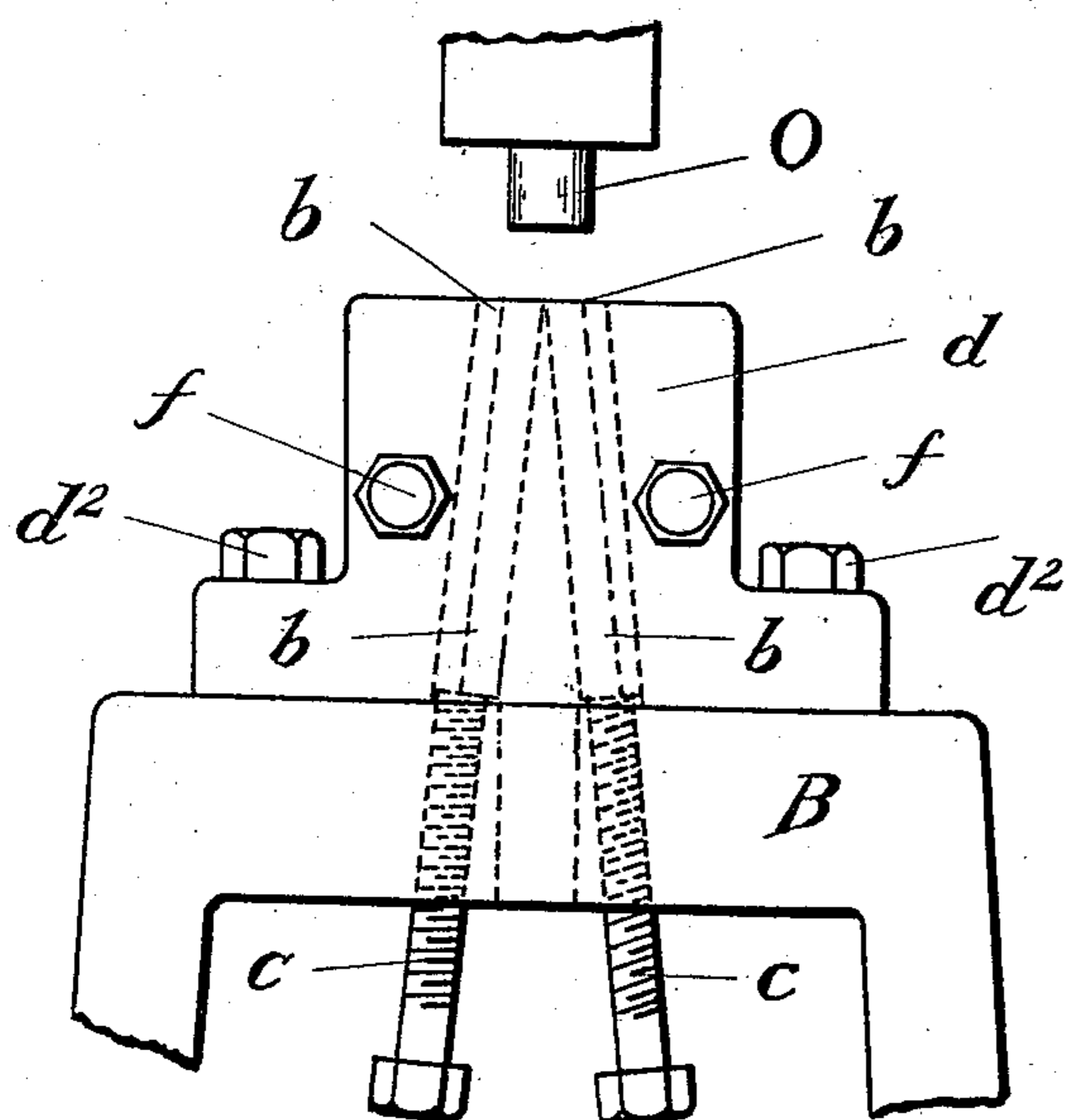


FIG. 2.

WITNESSES.

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TRIMMING-DIE.

SPECIFICATION forming part of Letters Patent No. 507,260, dated October 24, 1893.

Application filed December 17, 1892. Serial No. 455,530. (No model.)

To all whom it may concern:

Be it known that we, JOHN A. COLEMAN and ALFRED E. TENNEY, of the city of Providence, in the county of Providence and State of Rhode Island, have invented a new and useful Improvement in Dies commonly known as Punching and Trimming Dies, of which the following is a specification.

Our improvement relates to dies commonly used in punching machines and it consists in certain new and improved constructions and combinations of the several parts thereof substantially as hereinafter described and claimed.

In the drawings Figure 1 is a top plan view of our improved die with its clamps or holders resting upon the bed of the punching machine. Fig. 2 is a vertical end elevation of the die holders or clamps resting upon the bed of the punching machine. Fig. 3 is a vertical central section of an ordinary die such as is in common use. Fig. 4 is a top plan view of a die-holder showing inclined grooves for die-segments. Fig. 5 is a vertical end elevation of a die-holder showing inclined grooves for die-segments.

Heretofore any desired pattern in a die has been expensively cut, drilled or broached through a solid piece of steel, if the die was made in one piece, or else milled or otherwise worked out if the die was made in two pieces. Whether the die was solid or made in halves, it was always necessary to undercut it just below its cutting portion (see Fig. 3 *a*) so as to enlarge the hole and thus afford a "clearance" in order that the punched article might easily drop through the die after it was punched.

To do good punching the punch and female die must be closely fitted to each other at the top or cutting portion of the die, so that the cutting edges of the punch and die may produce the best cutting effect, just as the edges of shears must pass closely by each other to cut well. As soon as any considerable wear takes place the punching or shearing quality of the die and punch is spoiled, as the punch becomes smaller and the die becomes larger, and an enlarged punch is necessary to be fitted to the enlarged opening in the die; but where absolute accuracy of the article

punched is essential, both punch and die must be thrown aside when they have worn apart and new ones substituted.

Whenever the cutting edge of the die becomes dull the face of the die must be ground off at a right angle to the die's axis, and if the die be accidentally gapped or nicked in the cutting part the amount ground off to produce a new edge is serious, and often ruins the die. This in any event hastens the early destruction of the die as the cutting portion is only a small proportion of an ordinary die. (See Fig. 3—*b*.) A die one inch thick for example may have only three sixteenths of an inch of available material at the cut; when this is used up the rest of the metal must be thrown aside. It is obvious that such dies are short lived, and that great expense is entailed for renewals from the above causes.

The object of our invention is to overcome these difficulties by providing a die which may be sharpened without affecting its original accuracy and dimensions, and which will outlast many fold such dies as have heretofore been employed. This is accomplished by making the die in two parts several inches in length, in each of which such a configuration is cut or formed that when it is mounted in the position hereinafter described, and the tops of both parts of the die are ground to form the cutting edges, each part of the die will form one half or side of the desired pattern of the article to be cut out by the die. These two parts which when put together possess the complete pattern of the die, are set with their cutting ends inclined to or lying against each other, and their opposite ends inclined away from each other. (See Figs. 1 and 2 *b. b*.) They are securely held by suitable clamps *d. d'* in this inclined position to form a female die, with the angle of inclination of their two halves sufficient to form a clearance for the article punched.

The clamps or die-blocks are arranged with suitable means for retaining the segments of the die in their proper converging relations (in the present instance having inclined bevel grooves *e, e, e, e*, Fig. 1) and means for firmly holding the die in place, by clamping screws *f, f*, Figs. 1 and 2, and these clamps or die-blocks are provided with means for

being securely fastened to the punching machine bed.

The lower ends of the composite die may rest upon the bed of the machine, which enables them to resist the thrust of the punch in the act of punching, or upon thin pieces of metal laid on the bed, but we prefer the following adjustment for light work:

The bed of the machine B, Figs. 1 and 2, is arranged with screws, see Fig. 2 c, c, the ends of which thrust against the lower ends of the inclined halves of the die for a purpose to be explained hereinafter. The upper or cutting ends of the inclined die-segments and the punch are accurately fitted to each other. As the lower ends of the halves of the die straddle apart, while the top or cutting ends are close together it is obvious that a punched article will drop through a constantly widening space of its own configuration without obstruction. The geometry of the die thus constructed reveals that the configuration to be cut in the parts to produce a given shaped article must be different from the configuration which would be cut in an ordinary die to make the same article.

It is obvious that in the old fashioned dies where the opposite sides are mounted parallel with each other the configuration cut in them must be substantially like the configuration of the article to be cut; but in our new dies where parallelism of the die-segments is abandoned, and inclination to the axial center is substituted, a different configuration must be cut in them to produce the same formed article from that which would be cut in dies of the old fashioned parallel principle. This is obvious if the geometry of the structure is considered. When the die-segments are inclined their upper or cutting ends must be ground off in a plane at an angle to their axial centers, in order that the metal to be cut may rest fairly upon the die.

It is obvious that if the die-segments were cut to the exact configuration, for instance of a blank for a tablespoon, when held parallel with each other, the configuration would be changed and all wrong when they were spread apart at the lower ends, while the cutting ends were held together. The different parts of the pattern would be farther removed from the axial center, when the ends are ground off, in the measure that the parallelism of the die-segments was departed from. Consequently dies upon this new principle require a different configuration from that which must exist in dies on the old parallel principle, to produce the same form of article, when the new ones are set inclined to each other as described.

When the die has become dull, injured, or sufficiently worn at the cutting point to affect the accuracy of its dimensions or the quality of its work, the die-segments simply have their cutting ends faced off anew in a grinding machine.

The screws, Fig. 2 c, c already referred to

in the bed of the machine, are turned to adjust the die-segments in their respective inclines in the clamps or die-blocks, until the cutting faces on the ends of the die-segments match and lie in the proper plane occupied by them for doing the work. By this convergence together at the same point, there results the same accuracy at the cutting point as at first. As often as worn again, the die-segments are ground again, and the screws again adjust them to compensate for the portion ground off, by thrusting the die-segments up the inclines until their cutting faces are again in convergence in the correct and original plane, and so on until the long die-segments are used up.

In order to provide for the different adjustments necessary with our new form of dies, we arrange them in the following manner: On the bed-plate B, we mount the die-holders d, d' , and secure them to the bed-plate by means of screw-bolts d^2, d^3 . Each of these die-holders d, d' , is provided with the inclined grooves e, e , so formed in their vertical sides as to receive the beveled ends of the dies b, b , and hold them in the proper position to each other when the die-holders are secured to the bed. The die-holder d' , is formed with oblong holes d^4, d^4 , through which the screw bolts d^3 , pass which allow it to be adjusted nearer to or farther from the die-holder d . Through both die-holders the bolts f, f , pass provided on their ends with the nuts f^2, f^2 , which are arranged to clamp the die-holders upon the dies b, b , when the latter are properly adjusted with relation to the holders and to each other. The adjusting screws c, c , are provided with threads which engage with corresponding ones in the bed B, and sustain the dies b, b , upon their upper sides while their heads project below the bed far enough for them to be turned by means of a wrench to adjust the dies to their proper cutting position. The die-holders are first attached to the bed, the screw-bolts d^2, d^2 , being set up solidly, and the screw bolts d^3, d^3 , being set up so as to allow of a movement of the die-holder d' , to and from the die-holder d . The screw-bolts f, f , are then passed through the die-holders, the dies b, b , are slipped into their grooves and adjusted to the proper height by the screws c, c . The nuts f^2, f^2 , are then set up on the bolts f, f , clamping the dies in position in the holders, and the screw bolts d^3, d^3 , are then set up solidly bringing the lower ends of the dies to a firm bearing upon the upper ends of the adjusting screws c, c . The cutting-punch O is then used to punch out the articles desired from the metal laid on top of the cutting-dies and the divergence of the opposite faces of the latter allows the article to drop through freely as it is punched.

It will be observed that the two dies b, b , are merely parts of a single cutting-die which forms the article, although for convenience of description they have been described sepa-

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rately above. They might be used as a single die without bringing their cutting edges quite together, where they are contiguous, for cutting some kinds of articles, the inclination toward each other being given to them as above described, by using a sheet of metal of the exact width corresponding to the length of the article to be punched, and holding it accurately upon the top of the die so as not to form a fin at the ends of the punched article, where the adjacent faces of the dies, *b, b*, would not quite join each other; but this construction and operation of the dies would obviously be the same substantially as when their adjacent faces are made to join.

Having described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. The described cutting-die having an upper face to sustain the material to be cut, and formed of two segments converging toward each other and meeting at their cutting face: each of said parts being formed so that at the cutting face they conjointly produce the article to be punched by them and form a clearance for it to drop through, and each of them being mounted with a vertical adjustment in combination with the corresponding cutting punch, substantially as described.

2. The combination of the converging die-segments having an upper face to sustain the material to be cut, and forming a clearance

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between them for it to pass through, the die-holders *d, d'*, provided with grooves to receive the die-segments and hold them in their converging position, the clamping bolts *f, f*, and holding mechanism arranged to support one of the die-holders adjustably upon the bed of the machine, substantially as described.

3. The combination of the converging die-segments having an upper face to sustain the material to be cut, and forming a clearance between them for it to pass through, the die-holders *d, d'*, provided with grooves to receive the die-segments and hold them in their converging position, the clamping bolts *f, f*, the adjusting screws *c, c*, and holding mechanism arranged to support one of the die-holders adjustably upon the bed of the machine, substantially as described.

4. The combination of the converging die-segments having an upper face to sustain the material to be cut, and forming a clearance between them for it to pass through, the die-holders, *d, d'*, each formed of a single piece of metal provided with a groove to receive the opposite die-segments *b, b*, and hold them in their converging position with relation to each other, said die-holders being secured to the bed of the machine, substantially as described.

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Witnesses:

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