

(No Model.)

F. H. HATHORN.
DIE FOR ROLLED FORGINGS.

No. 603,637.

Patented May 10, 1898.

Fig. 1.

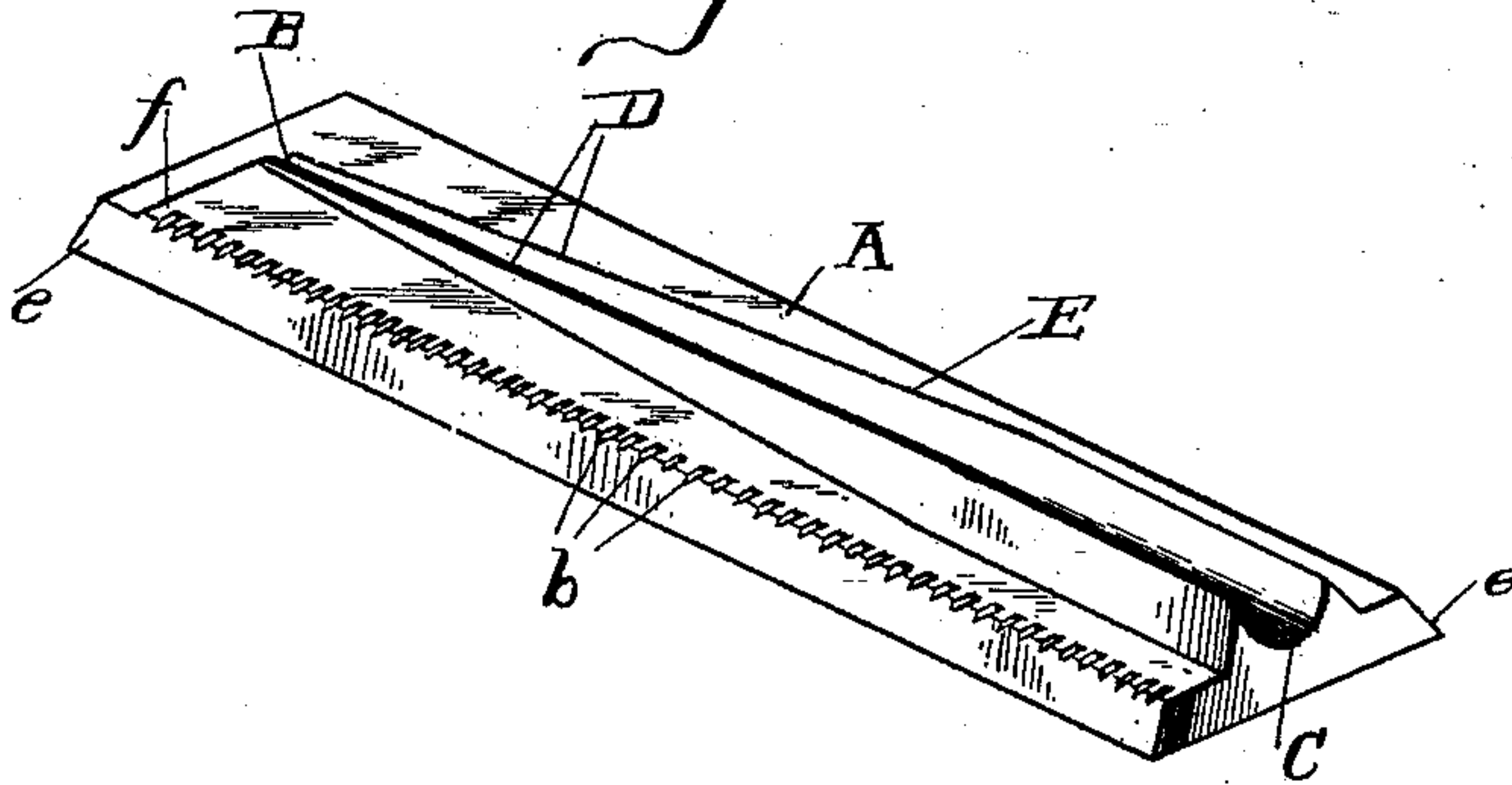
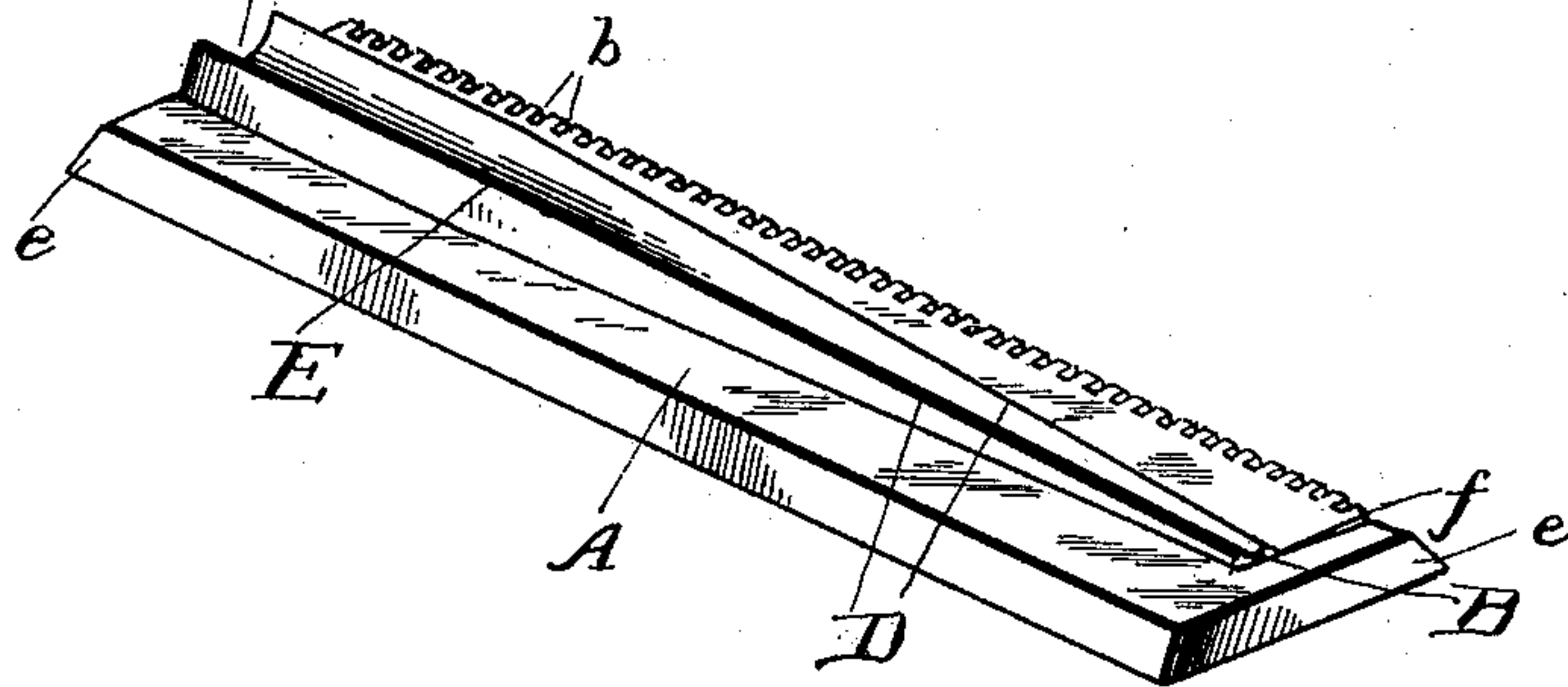


Fig. 2.



Witnesses
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DIE FOR ROLLED FORGINGS.

SPECIFICATION forming part of Letters Patent No. 603,637, dated May 10, 1898.

Application filed February 13, 1897. Serial No. 623,245. (No model.)

To all whom it may concern:

Be it known that I, FRED HERBERT HATHORN, a citizen of the United States, residing in the city of Brewer, in the county of Penobscot and State of Maine, have invented new and useful Improvements in Dies for Rolled Forgings; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in dies for making rolled forgings; and it consists of the construction hereinafter set forth, whereby a better and more perfect forging is produced with less waste of stock from a smaller-sized bar and the life of the die increased to a considerable degree.

Throughout the description reference is made to the accompanying drawings, forming part of this application, in which—

Figure 1 shows a cabinet projection of my improved die as constructed. Fig. 2 is also a cabinet projection of my improved die complete, showing a view from the opposite end from that shown in Fig. 1.

Similar letters of reference refer to correspondingly like parts throughout the two figures.

In the production of rolled forgings the dies are placed facing each other in opposite directions in the forging-machine and are made to pass by each other in a longitudinal direction, the bar from which the forgings are made being inserted between the dies before their forward ends meet, and the cutting edges of the latter cut and form the article complete in one motion and separate the same from the bar. When forgings are made from steel bars, it is necessary to heat the latter before inserting between the dies, and in order to form perfect ends to the forgings it is essential that the cutting edges of the dies enter the bar a short distance from said end and cut off a short piece that is called a "waste." Furthermore, the bar should be rotated at the same speed the dies are traveling to produce sound, smooth, and perfect forgings. In order to obtain the largest number of forgings from a certain amount of stock, it is quite essential that the waste pieces between

each forging should be of the smallest possible area and the construction or form of the dies should be such as to produce the largest practicable forging from the smallest-sized bar, and it is to meet these requirements that I have invented this new form and construction of dies shown and hereinafter to be described.

For purposes of explanation only I have shown in the drawings and will now describe a forging-die containing my improvements of the form used for forging steel balls, and it is not my intention to limit myself exclusively to ball-dies, for the same principle involving my invention can be used on dies of other forms for forging articles of various shapes to work equally as well and with the same advantages herein set forth and described.

Referring to the drawings, A represents the base of my improved die, which for rolled forgings is rectangular in shape, with parallel sides *e e*, beveled to increase the width at the back to facilitate locking the same within a forging-machine. Upon the front surface, which is the face of the base A, rise in a longitudinal direction the cutting edges and forming-surfaces D E of the die, commencing a short distance from the forward terminus of the base and extending to its opposite end. These cutting and forming edges in a ball-die consist of two ridges D D, rising each side of a median line, between which is planed a semicircular groove C, extending their entire length. In other dies for forging articles of different design the grooves that form the shape of the article are planed between these ridges.

The ridges D D, commencing a short distance from the forward end of the base A, protrude very slightly from the surface at their commencement and increase in depth and thickness as they continue in diverging lines toward the opposite end of the base until the point marked E is reached (which in a ball-die is where the groove between the ridges forms a semicircle) and then continue to the end of the die in parallel lines. The outside surfaces of the ridges D D are beveled to their junction with the base A. Consequently the metal forming them increases in thickness in the same ratio that they increase

in height, which lengthens their durability and prevents their edges from expanding and getting out of shape by continued use in hot metal in making forgings.

5 By this construction thus far described it can be readily understood that in forging articles from a round bar the rod first comes in contact with the two ridges at the forward end B of the dies, which cut into the metal and
10 immediately commence to form and spread each side of these incisions as the die continues until the bar reaches the parallel edges E E of the dies, which in passing through the metal cut off and sever the complete forging
15 from the bar and small waste piece at the end. By having the ridges D D of the dies cut into the metal at the start they form a forging the full diameter of the bar from which the forging is made instead of cutting from a line or
20 crease that reduces the diameter of the bar at the place the dies start into the bar when dies are used that have their cutting edges continued to a point; and a further advantage of my construction as thus far described is that
25 the bar from which a forging is made when struck by the blunt end of two ridges on opposite sides of the bar, making four points or ridges entering the bar at the same time, will have a greater tendency to cause that bar to
30 rotate and produce a larger number of perfect forgings than the dies would that have their cutting edges meet at points which enter the bar at only two places, with the liability of twisting the rod in the operator's hand
35 instead of starting square and rotating the same from the commencement of the forging. To further insure perfect and even rotation of the bar while the forging is being made, I cut notches or indents *b b* upon the surface
40 of the base A at the edge nearest the operator when the dies are placed in the forging-machine, which is the edge of the base A on the bar side of the die. For some forgings it is preferable to have the surface of the base A
45 on this side of the cutting and forming portions of the die slightly raised or higher than the opposite side, or what will answer the same purpose in some form of dies is to have the forward end of the base of the die cut
50 away slightly across its upper surface in front of the notches *b* at this end of the ridges D. By using indents instead of corrugations or saw-teeth surfaces to help rotate the bar while the forging is being made no indentations,
55 cuts, or scratches are made in the bar. Consequently the latter does not have to be forged down to a smaller size in order to roll out the indentations that would not close up in a ball-forging. Furthermore, by having indenta-
60 tions in the base of the dies and away from the cutting and forming surfaces of the same

what projections or spurs that are raised upon the bar from which the forgings are made in consequence thereof will be rolled down by the smooth surface between the indentations
65 and the cutting and forming surfaces of the dies when the next forging is made and a perfectly smooth rod at all times enters between the cutting edges of the dies.

As heated metal expands, the end of a rod
70 that is placed between the dies is in consequence larger in diameter than the colder portion in the operator's hands. Therefore it is not necessary to have the space between the face of the bases A A of my improved dies
75 when set in the forging-machine greater than the diameter of the cold rod, as the enlargement of the latter in heating is sufficient expansion to produce the spurs upon its surface in consequence of the indentations on the dies
80 when inserted between them for the purpose of rotating the bar without twisting to produce a perfect forging.

Having thus described my invention, what I claim, and desire to secure by Letters Pat-
85 ent of the United States, is—

1. In a device of the character described, a die consisting of a base-plate, cutting edges formed on the base-plate and diverging slightly and increasing in height, then extend-
90 ing horizontally and parallel to the end of the base, said cutting edges inclosing a groove gradually increasing in depth from the beginning to the end of the diverging edges, a raised surface formed at one side of the ridge
95 having indentations and forming at the reduced end a plane surface between the ends of the indentations and raised portion, said plane surface tapering with the diverging wall, as and for the purpose described. 100

2. In a device of the character described, a base having cutting edges, serrations formed along the side of the base, and a smooth surface between the cutting edges and the serrations of equal height with the serrations, for
105 the purpose described.

3. In a device of the character described, a base having the initial cutting edges starting separately a short distance back of the forward end of the base, serrations on the side
110 of the base and a smooth surface of equal height with the serrations between said serrations and the cutting edges, as and for the purpose described.

In testimony that I claim the foregoing as
115 my invention I hereunto subscribe my name this 11th day of February, 1897.

FRED HERBERT HATHORN.

Witnesses:

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LUCIEN C. EVERETT.