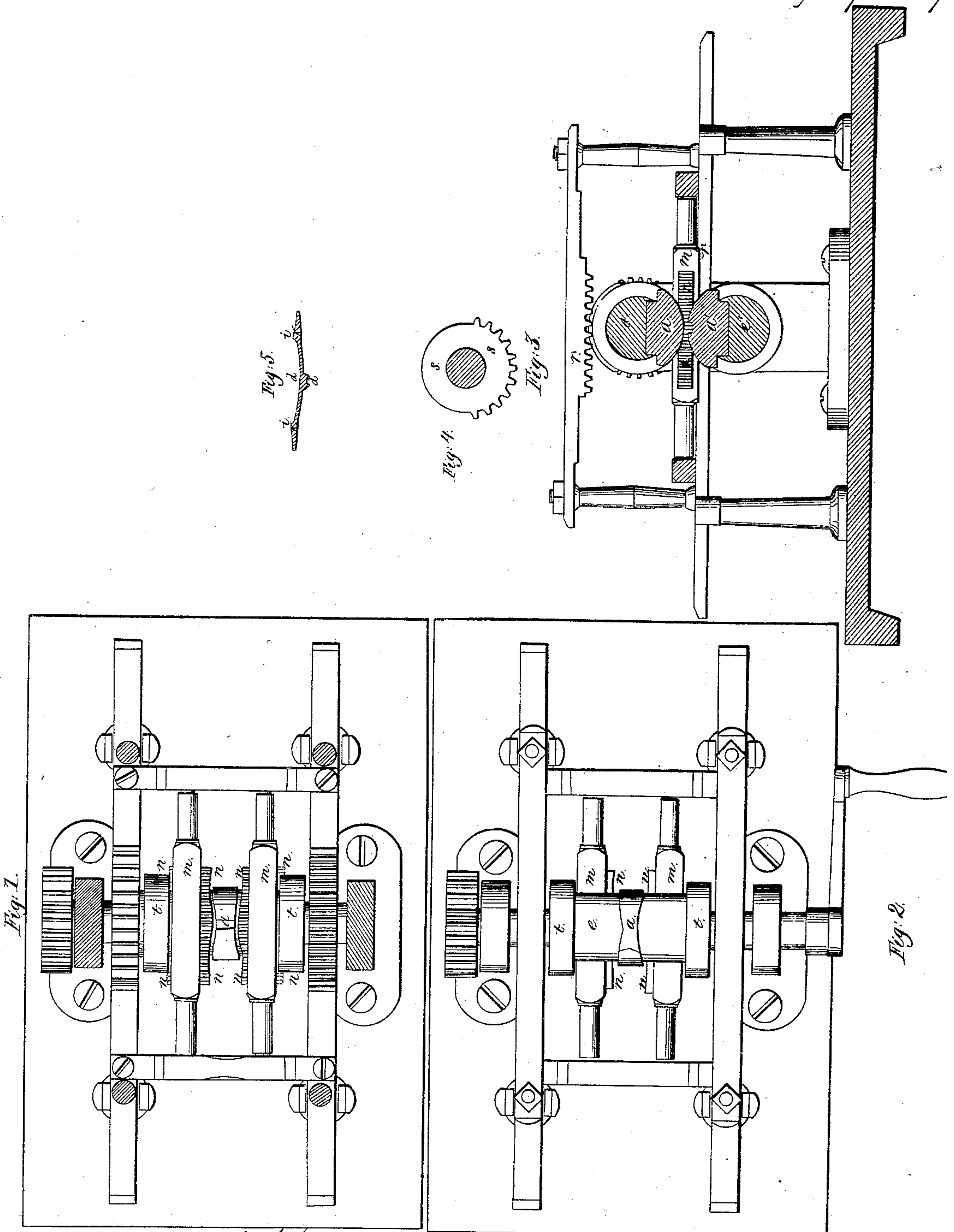


# I. Dodge, Making Axles,

N<sup>o</sup> 24,842.

Patented July 19, 1854



Witnesses: *C. A. Waldron*  
*D. Blake*

Inventor  
*Levi Dodge*



# UNITED STATES PATENT OFFICE.

LEVI DODGE, OF WATERFORD, NEW YORK, ASSIGNOR TO HIMSELF AND DODGE & BLAKE,  
OF SAME PLACE.

## DIE FOR SHAPING ARTICLES IN METAL.

Specification of Letters Patent No. 24,842, dated July 19, 1859.

*To all whom it may concern:*

Be it known that I, LEVI DODGE, of Waterford, in the county of Saratoga and State of New York, have invented an Improvement in the Forming of Articles of Metal by Means of Dies, and that the following is a full, clear, and exact description of the principle or character which distinguishes it from all other things before known and of the usual manner of making, modifying, and using the same, reference being had to the accompanying drawing, of which—

Figure 1 is a plan of the machine exhibiting the arrangement of the dies; Fig. 2, a top view of the machine; Fig. 3, a vertical longitudinal section through the middle of the machine; Fig. 4, a view of one of the half gears; Fig. 5, a longitudinal section of a piece of iron formed by the dies in the manufacture of axes.

My invention consists in forming articles of iron or other metal by means of dies operating on several or all sides of the article at once in the manner hereinafter set forth.

For the sake of illustrating the character of my invention I will proceed to describe its application to the forming of axes.

In the ordinary manufacture of axes, a bar of iron is first passed between swaging dies  $a, a'$ , fixed to revolving shafts  $e, e'$ , and is brought into the shape shown in the longitudinal section Fig. 5, and this piece is then hammered, folded, and welded so that the thickened part  $d$ , forms the head of the ax, the space between  $d$ , and  $i$ , forms the eye of the ax and the two thick portions  $k$  when welded together form the bit of the ax to which the steel edge is to be welded. After the bar comes from the dies it is forged by the trip hammer into the required shape, it being found impracticable by any known means to form or operate upon more than two sides by means of dies. A great saving would be made if the edges of the bar could be shaped by dies so as to give the whole of the required shape to the bar at one operation, previous to the folding of the bar. To accomplish this, I prepare two side frames  $m, m$ , into which are inserted dies  $n$  of various lengths, movable easily back and forth. The lengths of these dies vary according to the shape to be given to the "ax

poll" or other article to be formed, so that if the outer ends of the dies be beveled, their inner ends would present the configuration of the edges of the finished article or a pattern of the same. The frames  $m m$  are supported on a carriage and so geared with the shafts  $e, e'$ , as to move in conjunction with the revolving dies  $a, a'$ , by the well known contrivance of a double rack  $r r$ , and half or interrupted gears  $s, s$ .

Upon the shafts  $e, e'$ , are strong flanges  $t, t$ , against the shoulders of which the back ends of the dies pass, as the frames move between these shoulders thus keeping the movable dies up to their work as the bar of iron or metal passes between them. These dies are so arranged as to come into action immediately at the point or line of greatest pressure upon the metal by the dies  $a, a'$ , as so little in advance of that line that for all practical purposes their action is considered as simultaneous and according to the projection of the movable dies will be the lateral impression upon the metal and this impression is retained by the continual pressure of the dies as far as necessary so that all sides of the ax are operated upon at once, we may say, and any required configuration given to it by the operation of the movable dies in conjunction with the dies  $a, a'$ .

The dies are here shown as having a reciprocating motion illustrating an operation only upon a short piece of metal, but it is obvious that they may be arranged so as to repeat the operation by continuous motion upon a long piece or bar of metal for forming these and various kinds of articles and it is not necessary to the result or their operation that these dies should be operated by the flanges  $t, t$ , as various well known mechanical means may be substituted therefor, without changing their operation. It is obvious also that a succession of movable dies may not be necessary to the successful application of this principle of operation and that single movable dies of appropriate shapes may in some cases be sufficient for the purpose, preserving the essential characteristic of the invention viz: the mode of operating by dies on several or all sides of the piece of metal at once, so as to complete the forms of variously shaped articles by simultaneous die pressure on several or all

sides thereby dispensing with after forging or other means of working into shape.

What I claim as my improvement is—

The forming of articles of iron or other  
5 metal where such articles are to be shaped by a simultaneous action or pressure of dies on several or all sides, is the employment of

the movable dies *e* operating substantially upon the principles herein set forth.

LEVI DODGE.

Witnesses:

DAVID BLAKE,  
JAMES DODGE.