C. LANZ.

Dies for Forging Eyes on the Ends of Rods.

No. 228,907. Patented June 15, 1880.

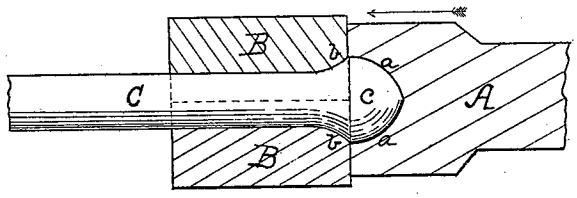

Fig 2.

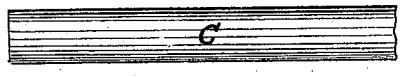

Fig 1

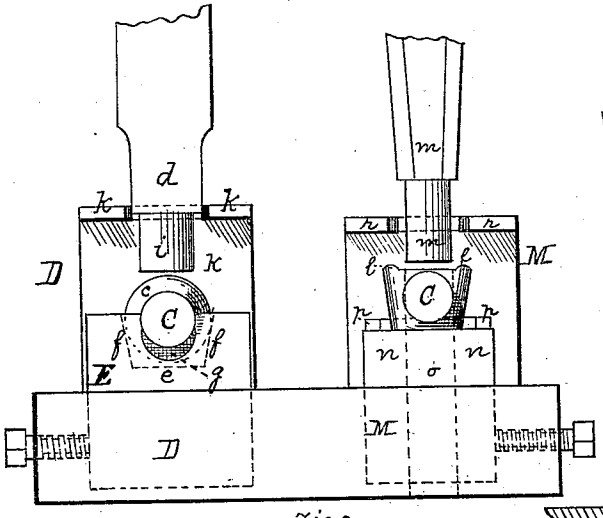

Fig 3

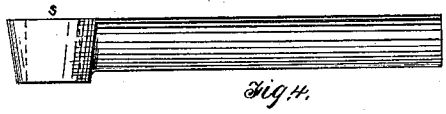

Fig 4.

Fig 5.

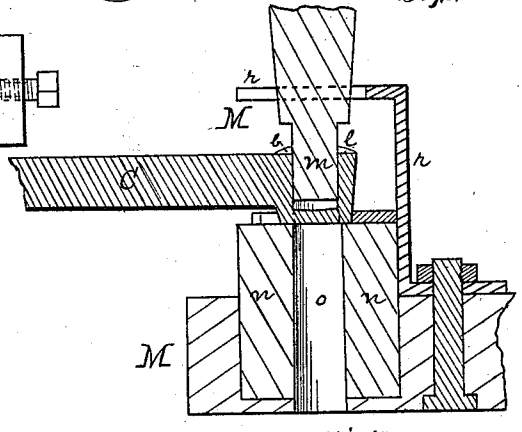

Fig 7.

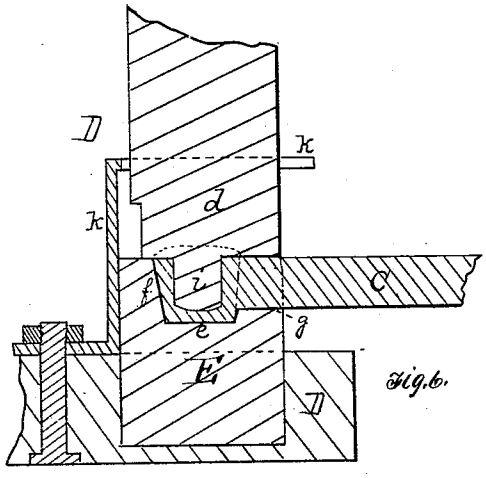

Fig 6.

Witnesses:

S. G. Kay,

John Lippincott.

Inventor:

Charles Lanz,

by James S. Kay,

Attorney.

UNITED STATES PATENT OFFICE.

CHARLES LANZ, OF PITTSBURG, PENNSYLVANIA.

DIE FOR FORGING EYES ON THE ENDS OF RODS.

SPECIFICATION forming part of Letters Patent No. 228,907, dated June 15, 1880.

Application filed December 22, 1879.

To all whom it may concern:

Be it known that I, CHARLES LANZ, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Dies for Forging Eyes on the Ends of Rods; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a view of the rod on which the eye is to be formed. Fig. 2 is a longitudinal vertical section of the upsetting-dies, showing the upset rod therein in full lines. Fig. 3 is a face view of the dies for pressing and punching the eye. Fig. 4 is a side view of the finished blank. Fig. 5 is a top view of the finished eye-half of a hinge ready for use. Figs. 6 and 7 are longitudinal sections of the dies for pressing and punching the eye.

Like letters of reference indicate like parts in each.

My invention relates to dies for the manufacture of eyes on the ends of wrought-metal rods for different purposes, its principal object being the manufacture of the eye-halves of hook-and-eye hinges, in which it is essential that the sides of the perforation be perpendicular to form a bearing-surface on the hook for its whole length and prevent the wabbling of the hinge. These eyes have been formed by upsetting the ends of a metal rod and forging the eye on the upset end by means of dies, the form of half the ring or eye being sunk in both the lower and upper die, and a projection formed in the center of the cavity of each die to forge the perforation half-way through the blank. As these dies could have no means of stripping the eye thus forged from the projections in the dies, the projections were necessarily beveled to free themselves from the blank, and thus left a fin in the center of the eye and formed the sides of the perforation beveled or tapered, the eye thus formed being liable to wabble on the hook, and therefore unsuited for use in hinges.

Eyes with perpendicular perforations have also been formed by forging a solid head on the end of the rod and punching the eye through the head, the metal punched out being thrown aside as waste, causing the loss of a large amount of metal.

The object of my invention is to improve the construction of the dies used for forming these eyes, by means of which the metal of the perforation is pressed into the body of the eye, and a solid neat eye, the inner sides of which are perpendicular and free from fin-marks, is formed.

It consists, first, in combining, with a stationary die in which is formed a flat-based matrix of the same internal shape and depth as the external shape and thickness of the eye, a reciprocating plunger having a flat base and a perpendicular projection of less length than the depth of the matrix, by means of which plunger the heated metal is spread so as to conform to the shape of the matrix and the eye or perforation is pressed nearly through the blank; and, second, in forming the plunger above referred to of less width than the matrix, so that the pressed blank will extend on either side of the plunger, and combining therewith a stationary stripper which catches on the protruding edges of the blank when the plunger is raised, and strips the blank from the projection on the plunger.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

In the drawings herein referred to, A is a heading-die, and B B are the holding-dies, of an upsetting-machine, said dies being operated in the same manner as is usual in bolt-making machinery.

C is the rod on which the eye is to be formed. It is a round rod or bar of wrought-iron or other suitable metal of the proper size.

The ends of the dies B B near the heading-die are beveled out, as shown at *b*, and the heading-die A is provided with the concave recess *a*, in which concavity and beveled portions the end of the rod C is upset, forming a knob-like head or projection, *c*, on the end thereof. After the upsetting of the rod it is taken to my improved pressing-dies D. These dies are formed in two parts—the pressing-die or plunger *d* and stationary die E, in which is formed the matrix *e*, the matrix having the same internal form as the external shape to be imparted to the eye. The matrix shown is circular in shape, and its sides *f* are beveled or tapered, so as to permit the blank to free itself therefrom. The base of the matrix is flat, to

impart a like flat or even surface to the base of the blank, and a recess, *g*, is formed in front, in which the rod fits when the head is subjected to the operation of the dies. The plunger or pressing-die *d* is provided with the circular perpendicular projection *i*, which is of the same diameter as the eye to be formed, but of less length, and the under surface of the plunger is flat to impart a like smooth or flat surface to the top of the eye. The plunger moves in suitable guides above the matrix, a reciprocating motion being imparted thereto by any suitable means, the projection *i* thereof moving in the same axis as the matrix. The plunger is of less width than the matrix, which extends out a short distance on either side of the plunger. Attached to the base of the die is the stripper *k*, the arms of which extend on each side of the plunger at a suitable distance above the matrix *e*.

After the blank or rod C is upset, as before described, the upset head or end *c* is placed in the matrix *e*, the rod extending out through the recess *g* of the matrix. The plunger *d*, in its descent, presses the upset end down and out, so as to fill the matrix and form a smooth level surface on the top of the eye, so far as the under surface of the plunger extends, at the same time forcing the projection *i* into the metal and forming the eye nearly through. Any surplus of metal is pressed up on either side of the plunger, as at *l l*. As the projection *i* is perpendicular, so as to form the eye of the blank perpendicular, the heated metal shrinks on the projection, and when the plunger ascends the blank is lifted out of the matrix *e* and carried up with it until the protruding edges *l l*, extending beyond the plunger, come in contact with arms of the stripper, which extend on either side of the plunger, and catch on the edges *l l*, and strip the blank from the projection, thereby freeing it from the plunger.

The eye of the blank thus formed is punched entirely through by means of the punching-dies M, composed of the vertically-reciprocating punch *m* and the stationary die *n*, through which is formed the cylindrical hole *o*, the punch *m* working through this hole. On the stationary die *n* is a guide, *p*, to direct and retain the blank in proper position for punching. The punch *m* works between the arms of the stripper *r*, which strips the blank therefrom after it is punched.

The solid eye is formed on the end of the rod in the following manner: The bar or rod is first brought to a proper heat and then fed to the upsetting-dies, the dies B B grasping the rod while the end is upset by the die A, forming the knob-like head *c* thereon. It is then fed to the pressing-dies D, the head *c* resting in the matrix *e*, as shown in Fig. 3, and the rod extending through the recess *g*. Upon the descent of the plunger the upset end or head *c* is spread or pressed out until it fills and conforms to the shape of the matrix, and by means of the projection *i* the eye is formed part way through, as shown in Fig. 6, any surplus of metal *l* being pressed up on either side of the plunger. Upon the ascent of the plunger the blank thus formed is freed therefrom by the stripper *k*. It is then placed on the stationary die *n*, being retained in proper position by the guide *p*, and upon the descent of the reciprocating punch *m* the eye *s* is punched entirely through, the burr in the bottom of the blank falling through the hole *o* of the die *n*. Upon the ascent of the punch the blank is freed therefrom by the stripper *r*, as above described. The surplus of metal on the top of the eye may then be removed in any convenient way, and if the rod is to be formed into an eye-hinge the screw-thread is cut on the rod, as shown in Fig. 5.

By my improved dies I am enabled to form a neat blank having a perpendicular eye or perforation, without fin-marks formed through the same, the blank being formed at one heat, and the metal of the perforation being forced into the body of the blank. The blank thus formed is specially suited as the eye-half of a hook-and-eye hinge, as it has a perpendicular perforation and a flat base, the perforation and base forming perfect bearing-surfaces for the hook.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The stationary die E, in which are formed the flat-based matrix *e*, of the same internal shape and depth as the external shape and thickness of the eye to be formed, and the recess *g*, in combination with the flat-based plunger *d*, having the perpendicular projection *i*, substantially as and for the purposes set forth.

2. In combination with the stationary die E, having the flat-based matrix *e* and recess *g*, the flat-based plunger *d*, of less width than the matrix, having the perpendicular projection *i* and the stationary stripper *k*, the arms of which extend on either side of the plunger, substantially as and for the purposes set forth.

In testimony whereof I, the said CHARLES LANZ, have hereunto set my hand.

CHARLES LANZ.

Witnesses:
I. R. HARBISON,
JAMES I. KAY.