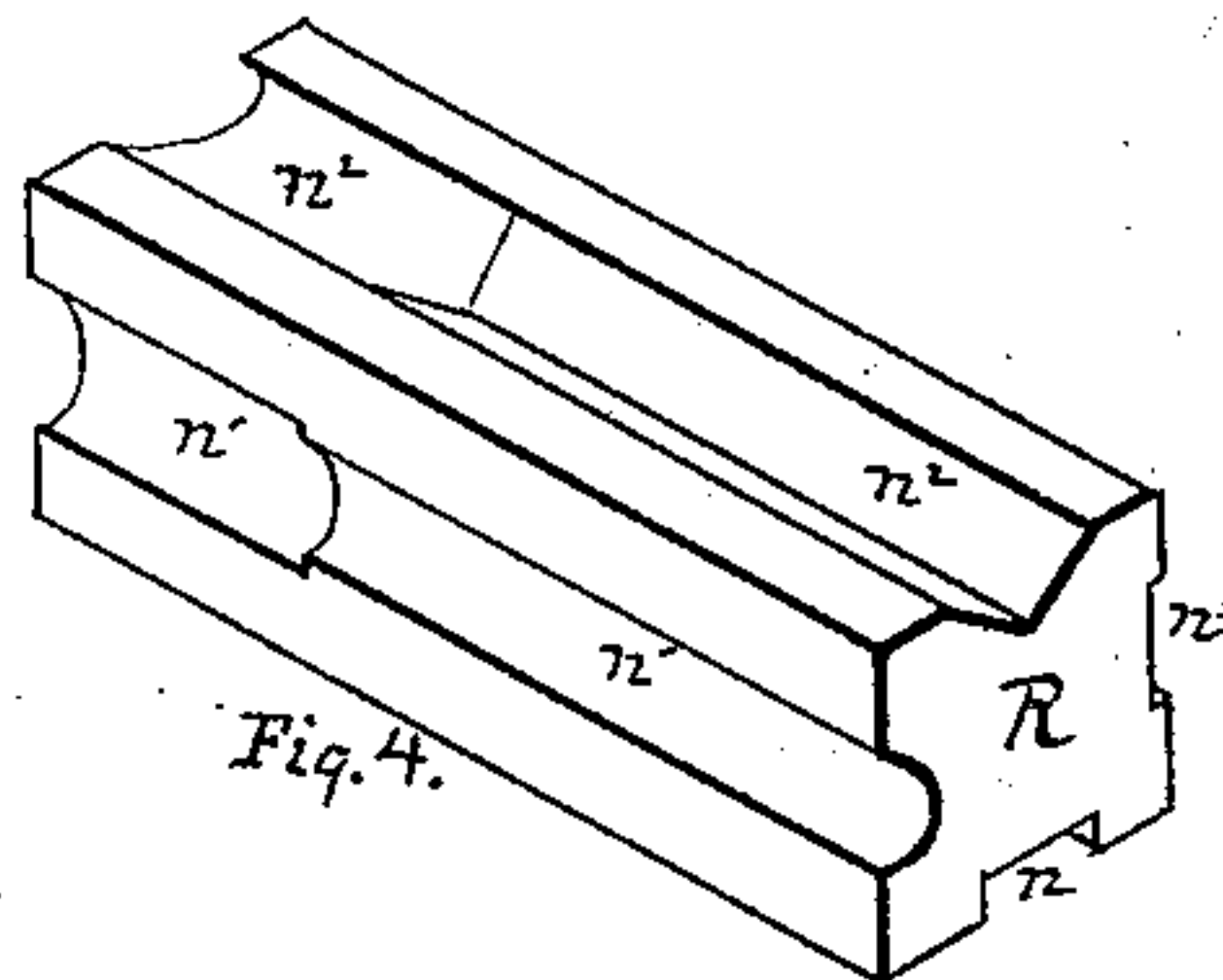
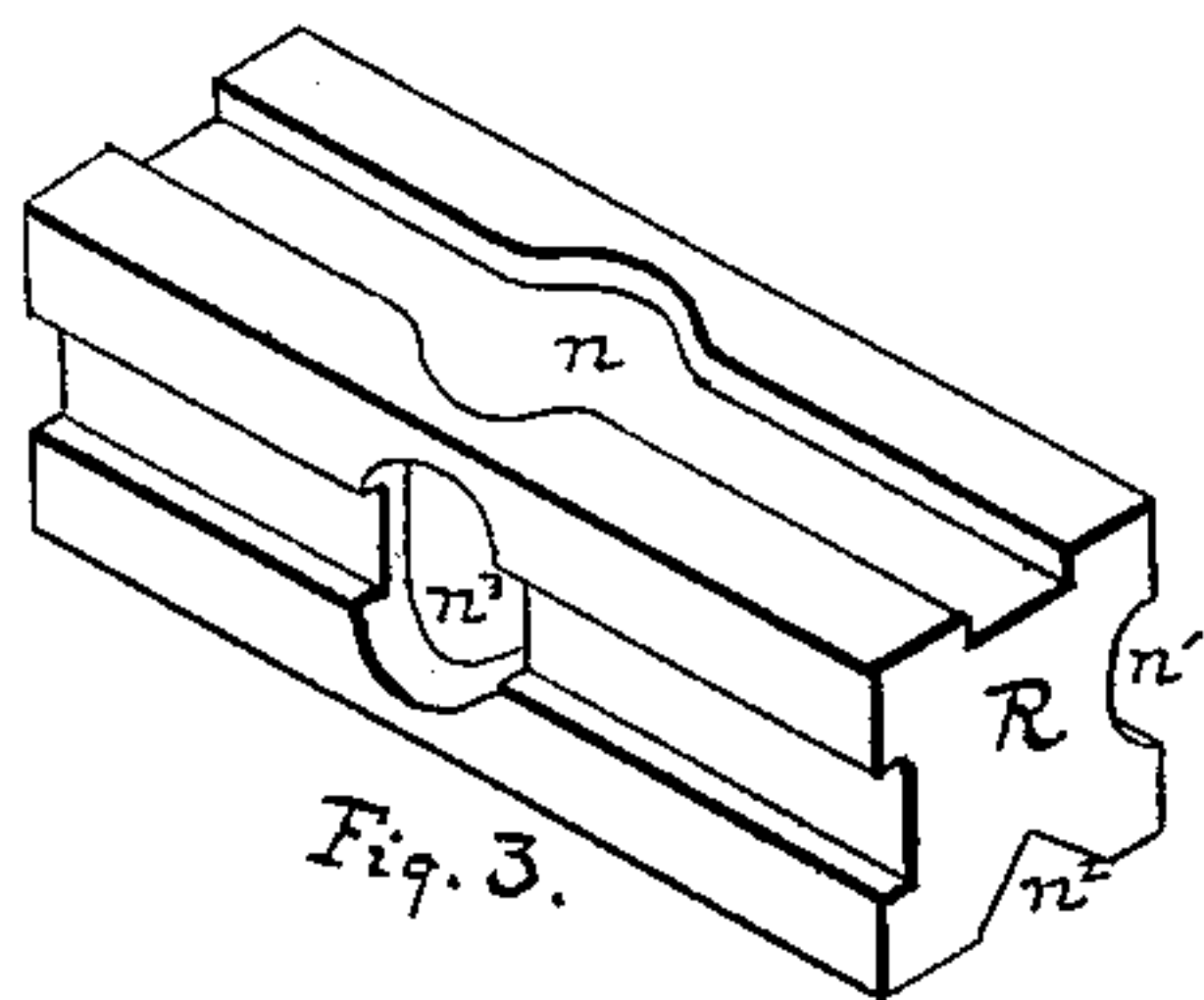
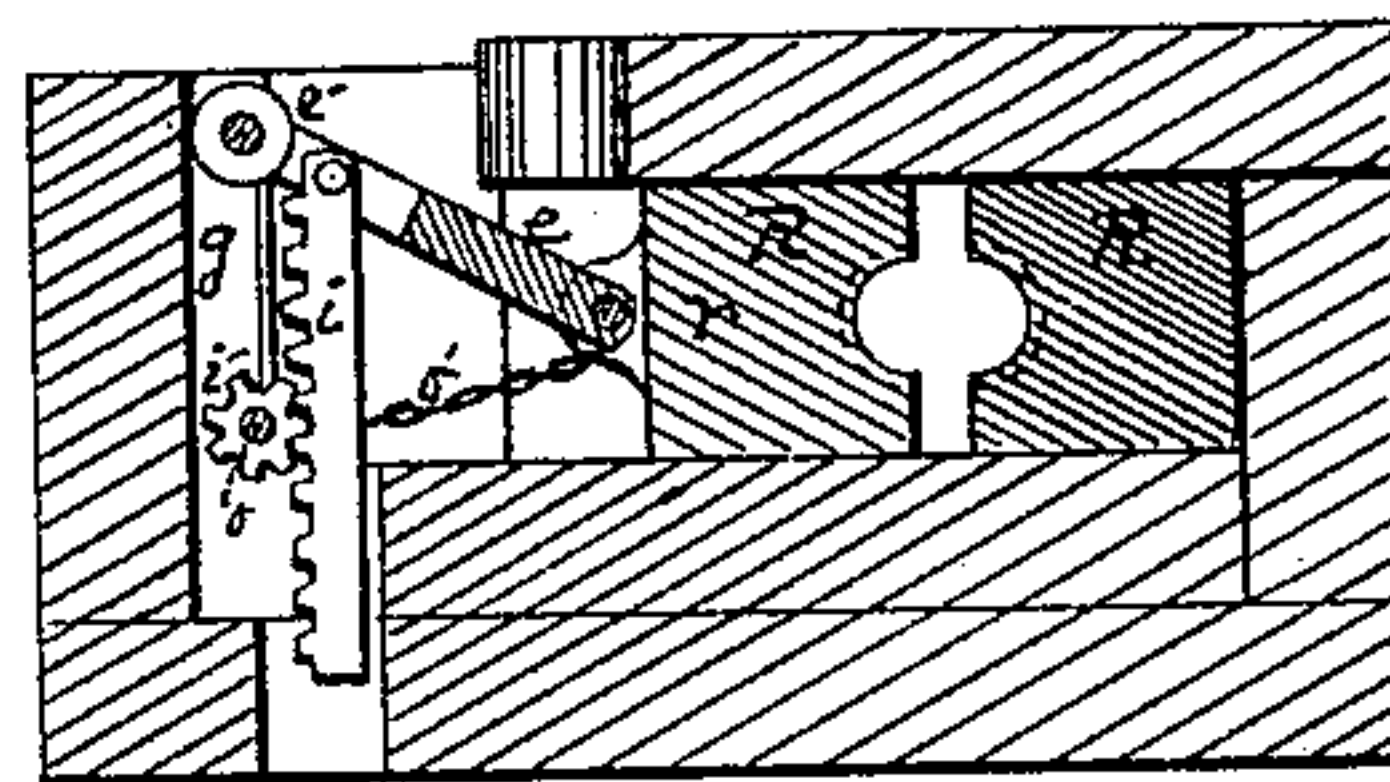
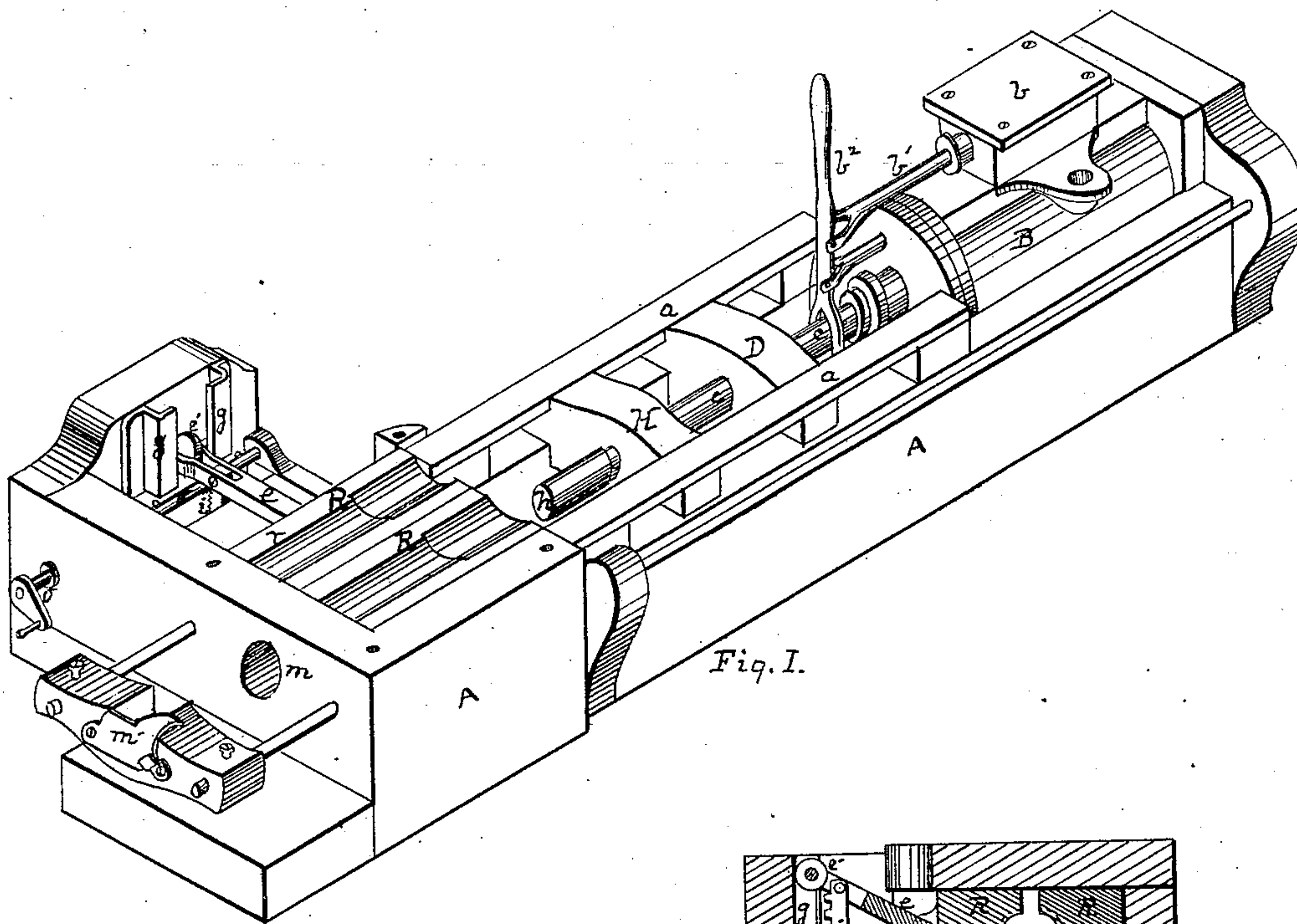


E. KAYLOR.

## Machine for Upsetting Metallic Bars and Rods.

No. 164,459.

Patented June 15, 1875.



WITNESSES \_\_\_\_\_

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# UNITED STATES PATENT OFFICE.

EDWARD KAYLOR, OF PITTSBURG, PENNSYLVANIA.

## IMPROVEMENT IN MACHINES FOR UPSETTING METALLIC BARS AND RODS.

Specification forming part of Letters Patent No. **164,459**, dated June 15, 1875; application filed February 17, 1873.

*To all whom it may concern:*

Be it known that I, EDWARD KAYLOR, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Upsetting-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawing making a part of this specification, in which—

Figure 1 is a perspective view of my improved machine. Fig. 2 is a vertical cross-section through the gripping dies, and illustrating the devices by which they are opened and closed; and Figs. 3 and 4 are perspective views of the reversible dies.

Like letters of reference indicate like parts in each.

The operation of upsetting a head on the end of a rod of iron of comparatively small area in cross-section has long been known and practiced. Of late years a demand has arisen, particularly in connection with heavy iron for bridges and other large superstructures, for a machine which was capable of acting on the mass or body of the iron at a distance from the end, not for the sake of upsetting a part which, by means of the flat face so upset, should, like a bolt-head, by a direct bearing, resist a tensile strain, but for the sake of enlarging or swelling the body of the iron, so that such enlarged body, after being reduced in sectional area by the punching of an eye therein or the cutting of a screw-thread thereon, should still have an amount of material in cross-section at its weakest point equal or nearly equal to that of the part or body not upset. In this art of upsetting any desired length or part of the body of the bar or rod, either from the end along back or through a portion of the length remote from the end, hydraulic pressure has been applied; but it has been found too slow in its action, and it also failed to give the quick, strong, percussive stroke which is most effective. The plunger has also been operated by a knuckle-joint and wedge; but this device will not in all cases act with the rapidity desired. The maximum of motion at any one stroke is the length of the stroke of the plunger. I have found that by operating

the ram or plunger directly by the piston of a steam-cylinder I can secure the quick, strong blow desired, and have at the first stroke a possibility of motion sufficient to do the work at a single blow.

My invention relates only to machines employed in the art referred to; and consists in combining a pair of reversible gripping-dies with a suitable plunger, said plunger working in guides arranged in line with the dies, and operated by the direct thrust of a steam-piston, whereby rods, bars, and similar long articles may be held and presented to the action of the plunger, so as to be upset or swelled in the length or body of the article and at varying points, as desired.

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

The frame-work A, of any suitable construction, is arranged horizontally, or nearly so. At one end is a steam-cylinder, B, such as is ordinarily used in steam-hammers, with the usual accompaniments of steam-chest *b*, valve, valve-stem *b*<sup>1</sup>, and reversing-arm *b*<sup>2</sup>. The piston-stem *c* carries a block, D, which is guided by the guide-rails *a* and frame A, and acts as a ram to the plunger *h*, which, in turn, is attached to and guided by the sliding block H. The piston-stem and plunger are arranged in line with the cavity of the gripping-dies R R. These dies, as illustrated in Figs. 3 and 4, are made reversible. The cavities *n* are for upsetting a broad part at a little distance from the end in a flat bar, the grooves *n*<sup>1</sup> for upsetting a round on the end of a round, the grooves *n*<sup>2</sup> for upsetting a round on the end of a square, and the grooves *n*<sup>3</sup> for upsetting a broad and thick part at a little distance from the end of a flat.

In the operation of the machine, the dies being open, a rod or bar is inserted through the hole *m*, and held by any suitable clamp or stop device, *m*'. The dies are closed, steam is turned on, and the piston, acting through the plunger *h*, upsets the rod or bar in the usual manner. Should the resistance be too great for the work to be done by a single blow, another is given almost instantaneously, and so on till the upsetting is done. The su-



periority of this machine arises partly from the fact that it acts as rapidly as machinery can be moved by steam, and also from the fact that the piston has a possible length of stroke sufficient to do the work by one motion. In order to open and close the dies R R rapidly, I make one, *r*, movable laterally, Figs. 1 and 2, and attach it by a hinge-joint to an arm, *e*, which arm, at its opposite end, is attached to a roller-shaft, *e'*, which latter plays up and down in the guides *g*. At or near the rear end of the arm *e* I attach a toothed rack, *i*, and make it engage a pinion, *i'*, on the crank-shaft *o*. From this crank-shaft a chain, *o'*, extends to the die *r*. By turning the crank-shaft *o* one way, the arm *e* is raised, the chain *o'* wound up, and the die *r* is drawn back. By turning it the other way, the chain *o'* is unwound, and the arm *e* is brought down, so as to force the die *r* over against the other die and hold it in position while the upsetting is being done. The arm *e*, with its connections, practically amounts to a toggle-joint, and I thus secure the advantages of that device in closing the dies and keeping them closed; and by the chain *o'* I am enabled to apply a force in a horizontal line to withdraw the die.

I am aware that a machine which forges

bolt-heads in an unjointed or solid-sided recess or die-box, by the blow imparted by the piston of a steam-engine, is not new; but in the art of upsetting iron, as distinguished from bolt-making, such a machine would be inoperative for practical use. Dies are required to form the matrix or mold, which can be taken apart in order to remove the upset bar.

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

1. The reversible dies R R, supported in a suitable frame, in combination with plunger *h*, arranged in line with said dies, supported in guides, and operated by the direct thrust of a steam-piston, substantially as specified.

2. In combination with the movable die of a pair of gripping dies, a toggle-arm, *e*, and chain *o'*, and suitable devices for raising and lowering the former, and winding and unwinding the latter, substantially as set forth.

3. The reversible dies R R, having the cavities  $n\ n^1\ n^2\ n^3$ , substantially as and for the purpose specified.

In testimony whereof I, the said EDWARD KAYLOR, have hereunto set my hand.

EDWARD KAYLOR.

Witnesses:

A. S. NICHOLSON,  
G. H. CHRISTY.