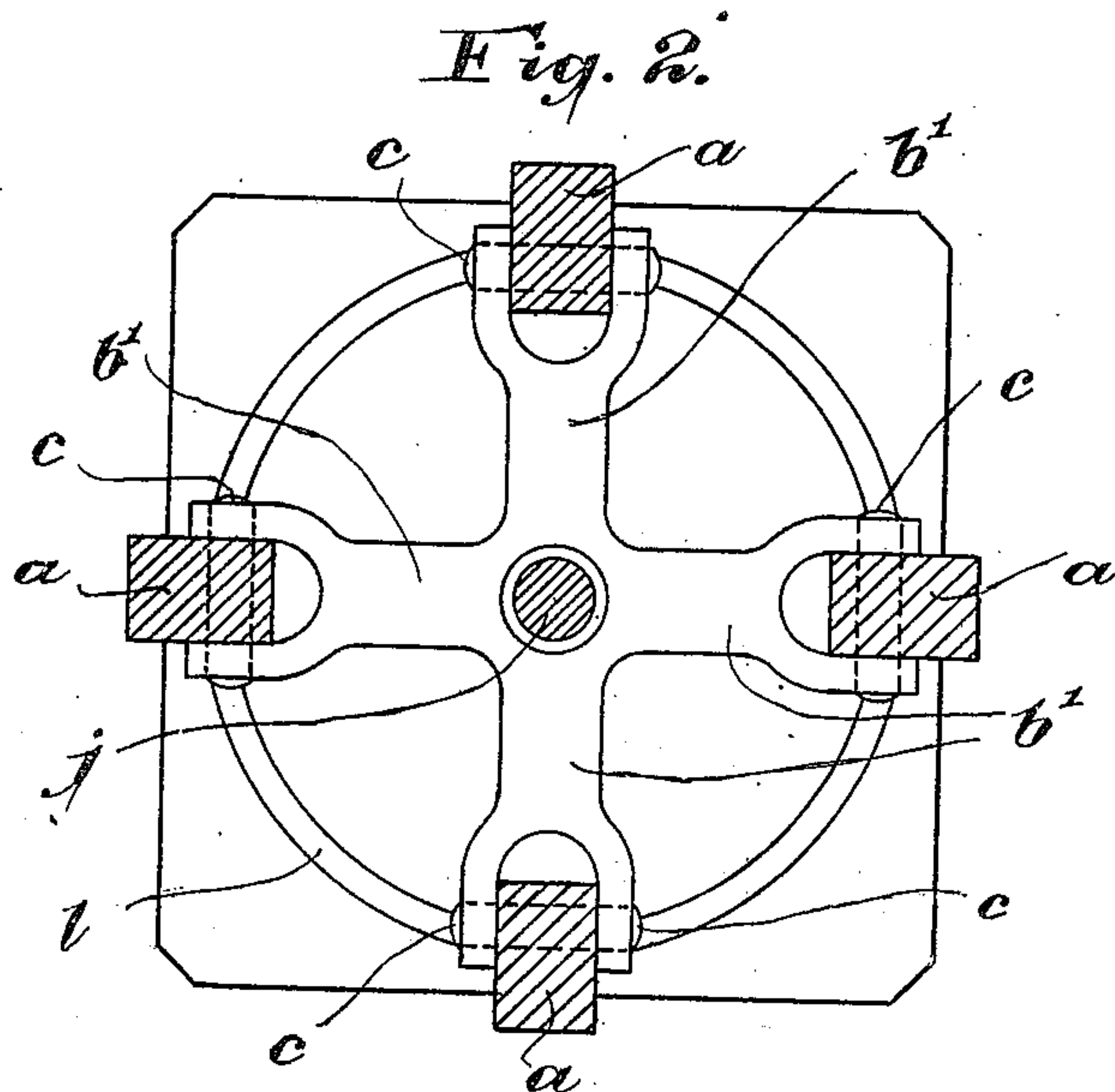
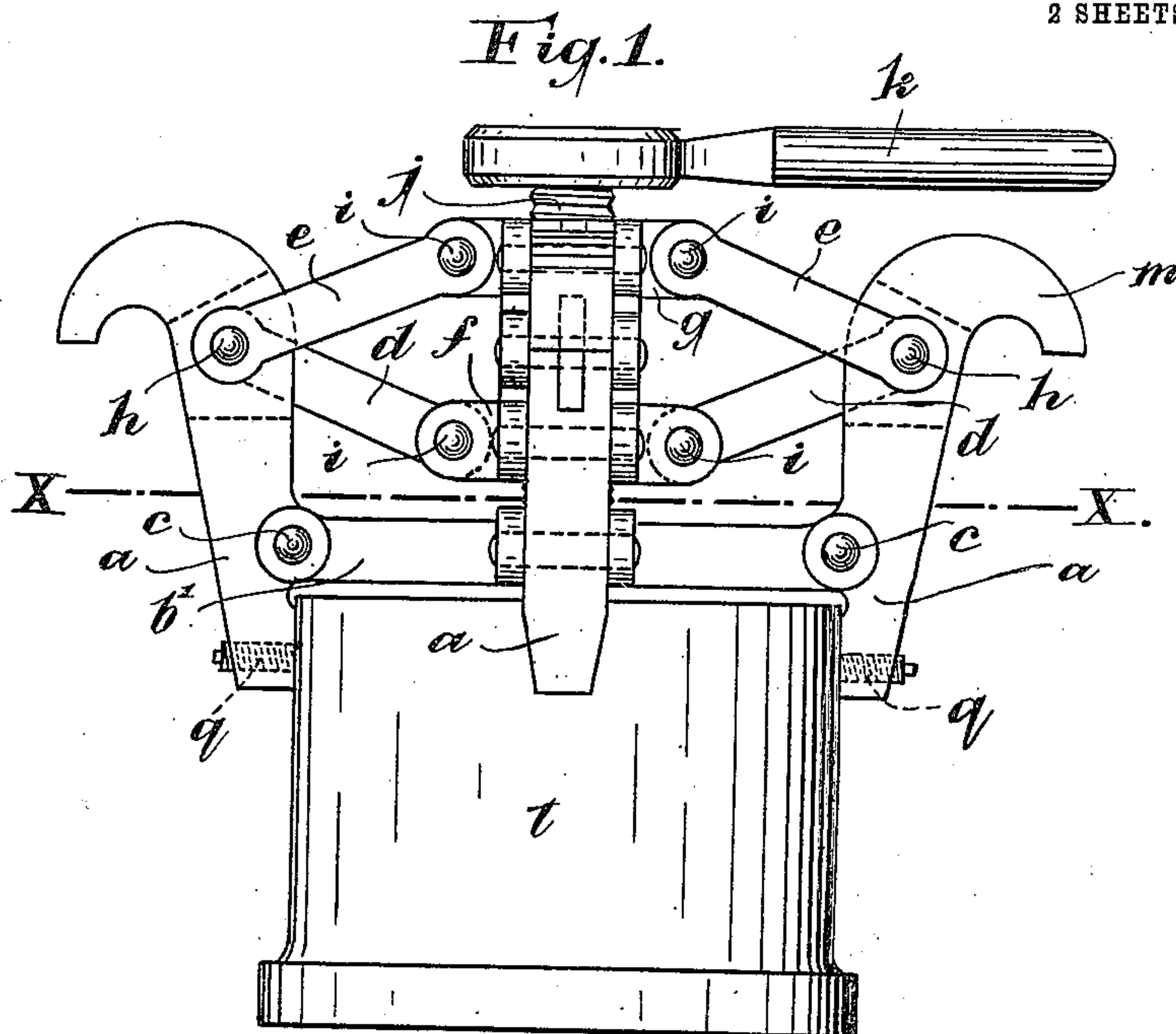


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 APPLICATION FILED JAN. 12, 1910.

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Patented May 30, 1911.

2 SHEETS—SHEET 1.



Witnesses:  
 P. F. Nagle.  
 L. Couville.

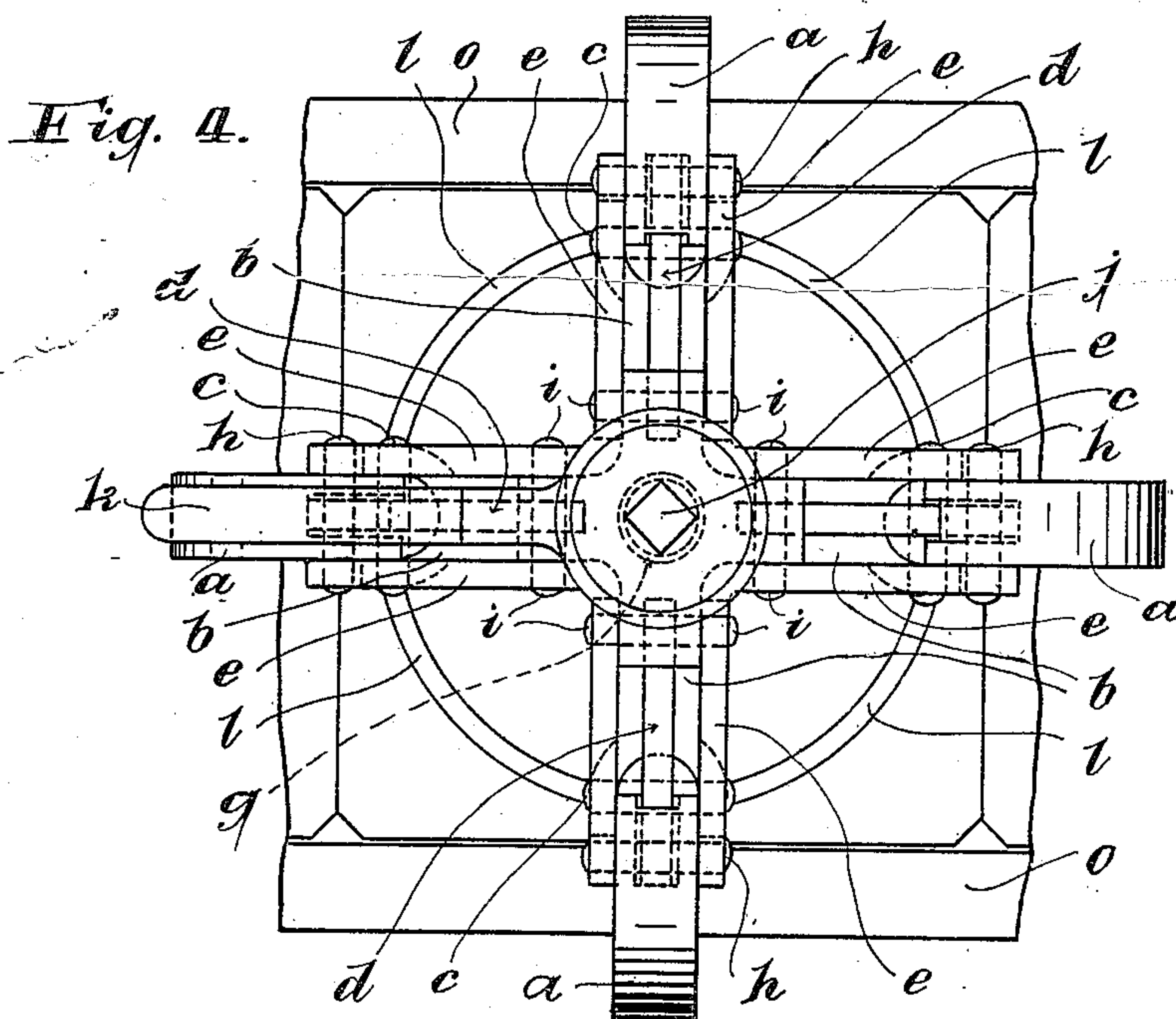
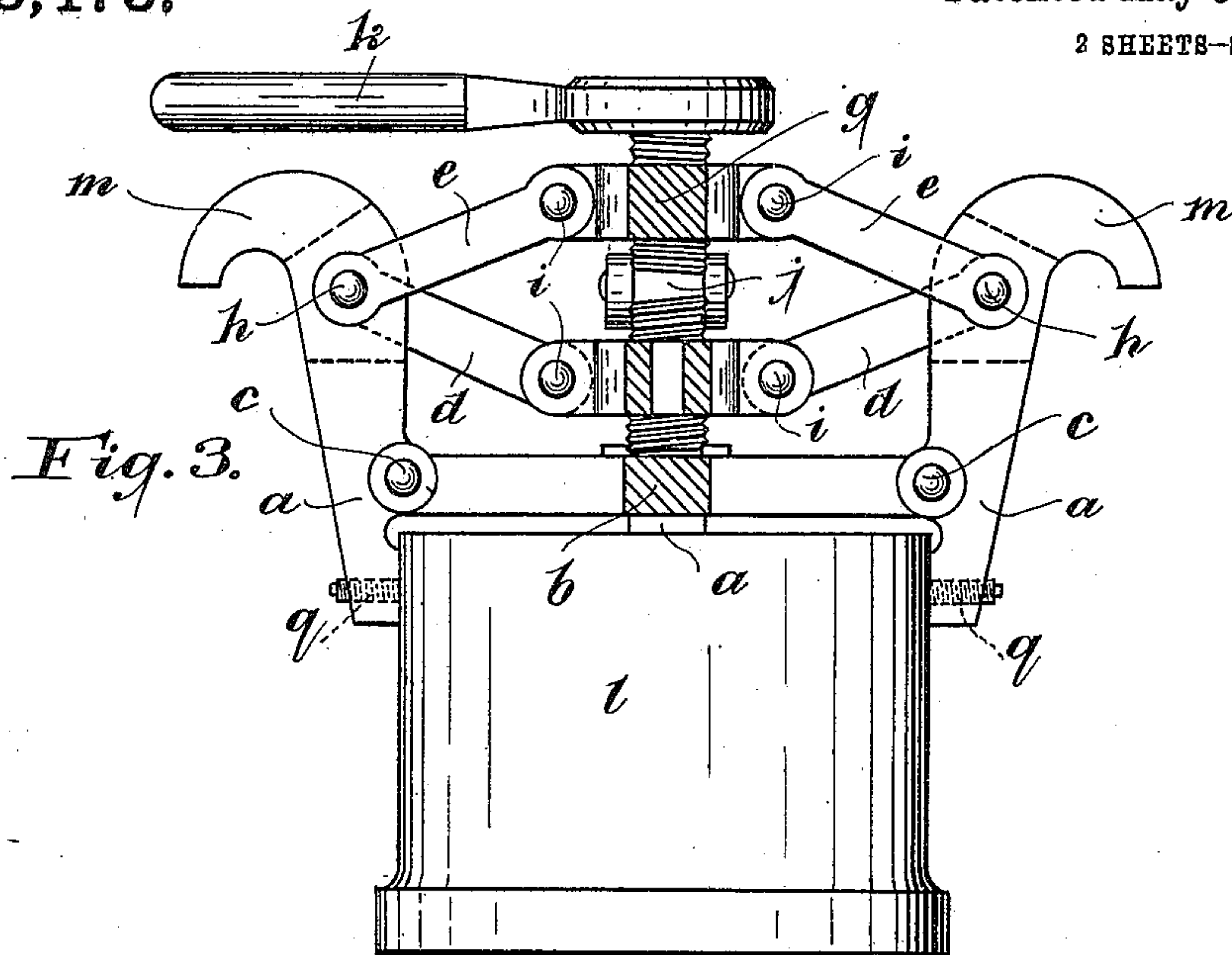
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Witnesses:  
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# UNITED STATES PATENT OFFICE.

FREDERICK THOMAS, OF LONDON, ENGLAND.

APPARATUS FOR REMOVING DIES, HEADS, AND THE LIKE FROM STAMP-BATTERIES  
FOR CRUSHING OR MILLING ORES.

993,473.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed January 12, 1910. Serial No. 537,674.

*To all whom it may concern:*

Be it known that I, FREDERICK THOMAS, a subject of the King of Great Britain, residing at London, England, have invented certain new and useful Improvements in Apparatus for Removing Dies, Heads, and the Like from Stamp-Batteries for Crushing or Milling Ores, of which the following is a specification.

At present considerable difficulty is experienced in removing the dies from the mortar boxes of stamp batteries for milling ores. It is usual to dig out, by means of any available instrument, the die from the mortar box with the result that considerable time and labor is expended in so doing.

Under my invention I provide a simple and effective form of vise which is adapted to grip the die which can then be readily lifted out of the mortar box and, if desired, replaced therein by the aid of the said vise. The vise is also adapted for placing or removing the shoes or heads of the stamps of the battery. The vise, which is of simple construction, has three or more jaws adapted to grip the die or shoe these jaws being preferably hooked at their upper ends so that the vise, along with the die or shoe gripped thereby, may be readily lifted and removed or otherwise handled by a simple lever, chain, pulley block, or other means.

In order that my invention may be clearly understood I have appended explanatory drawings which show, by way of example, one form of the vise having four jaws.

Figure 1 is an elevation of a battery die *l* held by the vise. Fig. 2 is a sectional plan of the vise, taken on the line X, X, Fig. 1. Fig. 3 is an elevation, with the front jaws and toggles broken away. Fig. 4 is a plan of the vise, die, and part of the mortar box *o*.

Similar letters of reference are employed to indicate corresponding parts throughout the views.

The vise shown on the drawings comprises four jaws *a*, connected near their lower ends, by a double connecting piece *b* made in the form of a cross with the forked ends of which the jaws *a* are jointed by means of pins *c*. The upper ends of the jaws *a* are connected together by toggle levers *d*, *e*, and right and left-handed nuts *f*, *g*, the said toggles *d*, *e*, being connected by pins *h* to the jaws *a* and connected to the nuts *f* and *g* by

pins *i*. It will be seen that there are double toggles *e*, one at each side of each jaw *a*, with single toggles *d* intermediate of the toggles *e*, the jaws being each recessed (see dotted lines) for the reception of the toggles *d*. The nuts *f* and *g* and toggles *d*, *e*, are adapted to be moved by a right and left-handed screw *j* operated by a key or spanner *k* or other convenient means. When the screw *j* is turned in one direction the toggles cause the upper ends of the jaws to open out so that the lower ends may grip the die or shoe and, then, by turning the screw in the opposite direction, the upper ends of the jaws can be drawn inward and the lower ends thereof be caused to release the die, or shoe, as the case may be. When the die is gripped by the vise the latter along with the die can be withdrawn from the mortar box *o* by means of a lever, chains, hooks, or the like engaging the hooked upper ends *m* of the jaws *a*, or certain of them. By this means the arduous and cumbersome task of digging out the die and removing by boring and wedging (with various forms of pinch bars and solely by hand) is avoided, and the dies can be easily and expeditiously handled.

Of course, although I have referred specially to the action of the apparatus for removing battery dies it is obvious that stamp shoes or heads can be removed or handled in the same way after being driven from the head or stem as the case may be.

The vises are of necessity made in various sizes to suit the standard sizes of battery dies heads and shoes in use and may have renewable and adjustable gripping faces, such as, for instance, a hardened hollow set screw or such like *q*, fitted in each jaw.

Having now fully described my invention what I claim and desire to secure by Letters Patent is:—

1. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a plurality of jaws, a connecting piece made in the form of a cross with ends pivotally connected to the jaws, double toggles pivotally connecting the upper ends of the jaws, a screw threaded nut pivotally connected to the double toggles, a right and left hand screw-threaded rod, single toggles intermediate of the double toggles and pivotally connected to the jaws, a screw



threaded nut pivotally connected to said single toggles and means for rotating the screw threaded rod.

2. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a plurality of jaws, a double connecting piece made in the form of a cross with forked ends pivotally connected to the jaws, double toggles pivotally connecting the upper ends of the jaws, a screw threaded nut pivotally connected to the double toggles, a right and left hand screw-threaded rod, single toggles intermediate of the double toggles and pivotally connected to the jaws, a screw threaded nut pivotally connected to said single toggles and means for rotating the screw threaded rod.

3. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a plurality of jaws having hooks at their upper ends, a double connecting piece made in the form of a cross with forked ends pivotally connected to the jaws, double toggles pivotally connecting the upper ends of the jaws, a screw threaded nut pivotally connected to the double toggles, a right and left hand screw-threaded rod, single toggles intermediate of the double toggles and pivotally connected to the jaws, a screw threaded nut pivotally connected to said single toggles and means for rotating the screw-threaded rod.

4. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a plurality of jaws having adjustable gripping faces, a double connecting piece made in the form of a cross with forked ends pivotally connected to the jaws, double toggles pivotally connecting the upper ends of the jaws, a screw-threaded nut pivotally connected to the double toggles, a right and left hand screw-threaded rod, single toggles intermediate of the double toggles and pivotally connected to the jaws, a

screw-threaded nut pivotally connected to said single toggles, and means for rotating the screw-threaded rod.

5. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a plurality of jaws, a hardened hollow set screw fitted in each jaw and forming an adjustable gripping face therefor, a double connecting piece made in the form of a cross with forked ends pivotally connected to the jaws, double toggles pivotally connecting the upper ends of the jaws, a screw-threaded nut pivotally connected to the double toggles, a right and left hand screw-threaded rod, single toggles intermediate of the double toggles and pivotally connected to the jaws, a screw-threaded nut pivotally connected to said single toggles and means for rotating the screw-threaded rod.

6. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a cruciform connecting piece, four jaws pivoted to said cruciform connecting piece each jaw being of tapered shape with its upper end curved outwardly and screw means for simultaneously opening or closing the jaws.

7. A vise adapted to grip the dies, heads, shoes and the like of stamp batteries for crushing or milling ores, comprising, in combination, a cruciform connecting piece, a right and left hand screwed spindle working in said piece, two nuts on the said spindle arranged one above the other, four gripping jaws pivotally connected at their lower ends to the connecting piece, double links pivotally connecting the upper nut to the jaws and single links pivotally connecting the lower nut to the jaws.

In testimony whereof I affix my signature in presence of two witnesses.

FREDERICK THOMAS.

Witnesses:

G. W. H. GEM,  
JAMES FULLWOOD.