

No. 840,578.

M. M. MORRISON.
FORGING MACHINE.
APPLICATION FILED OCT. 22, 1902.

PATENTED JAN. 8, 1907.

3 SHEETS—SHEET 1.

Fig. 2.

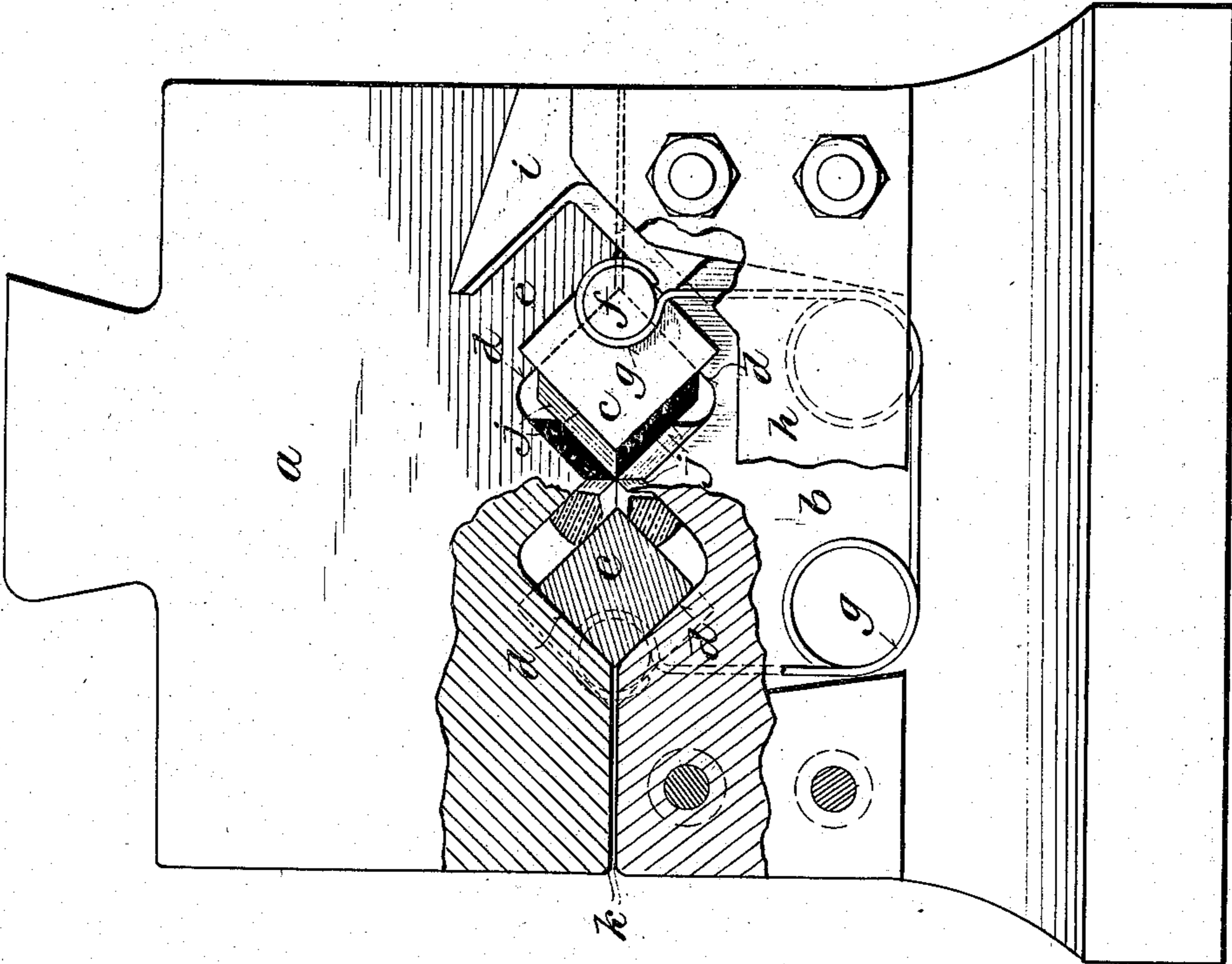
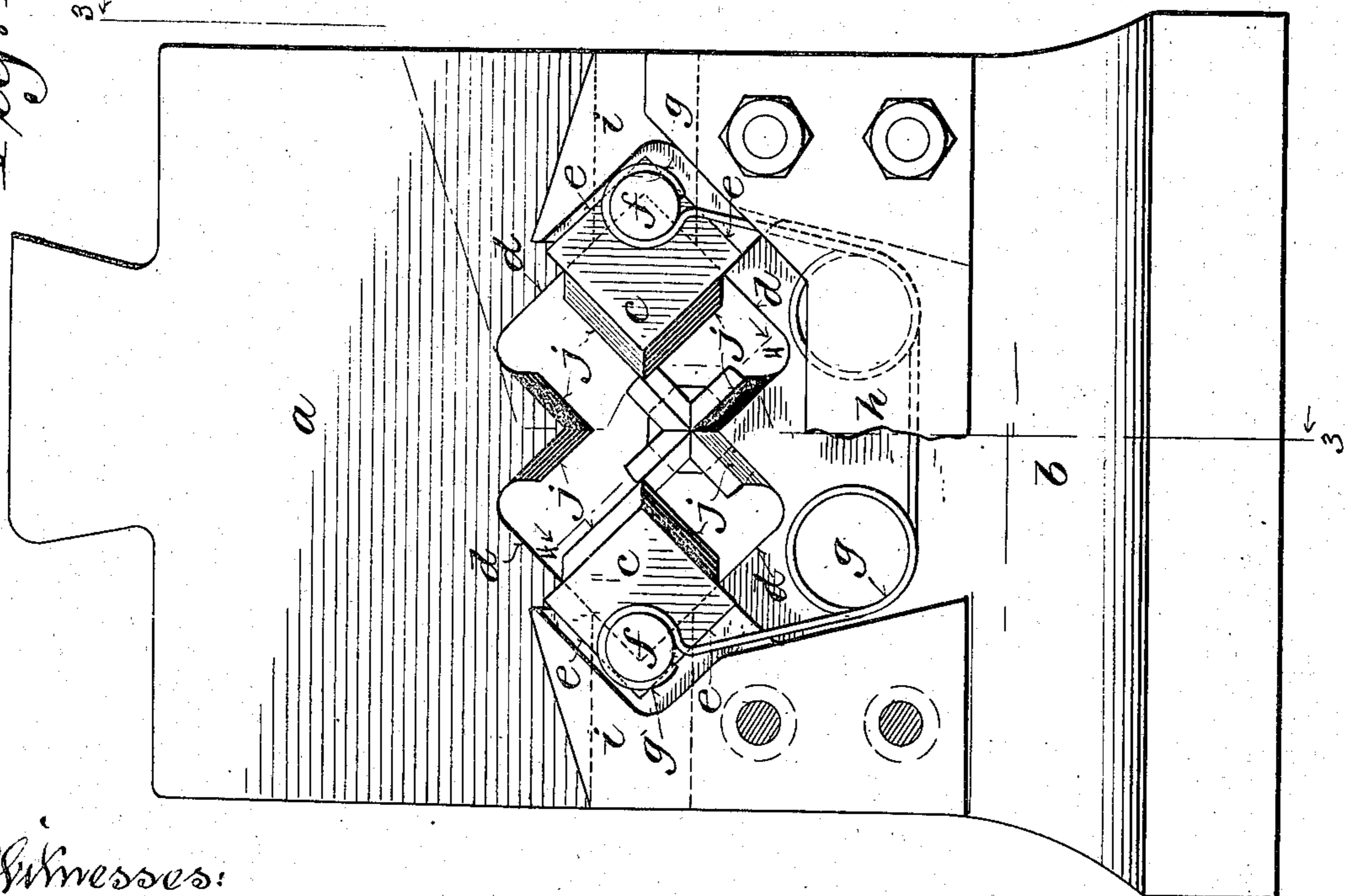


Fig. 1.



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3 SHEETS—SHEET 2.

Fig. 4.

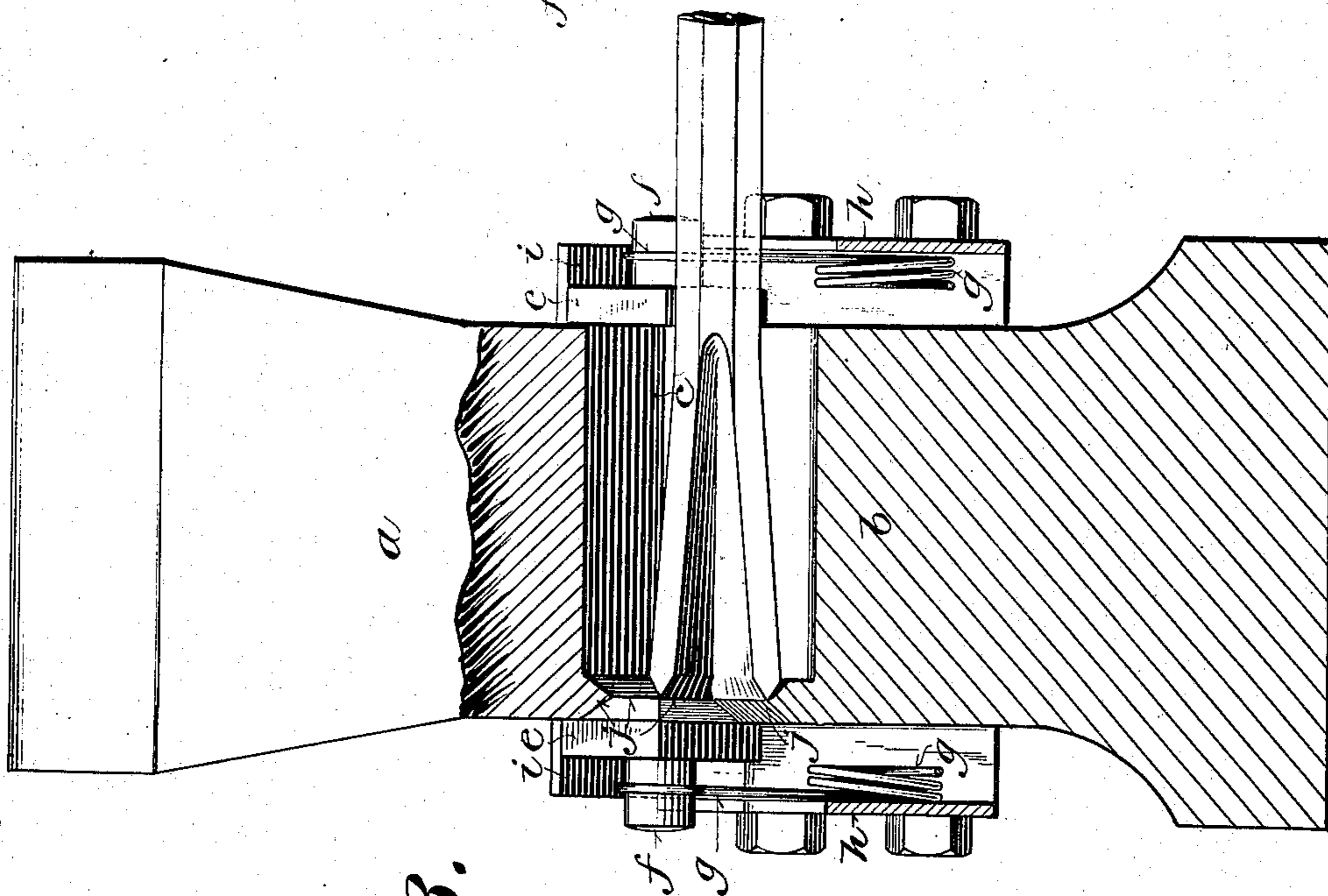
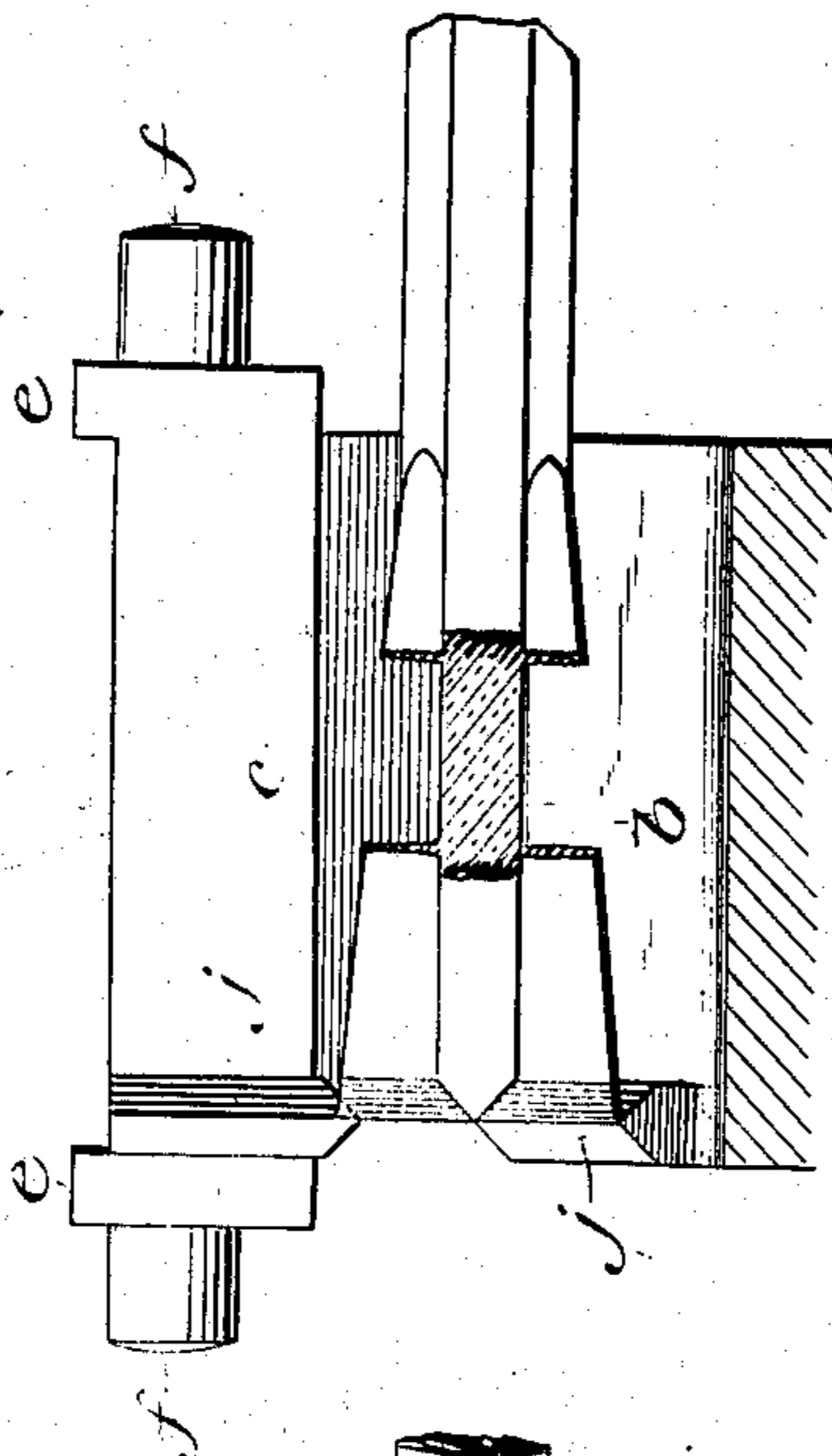


Fig. 3.

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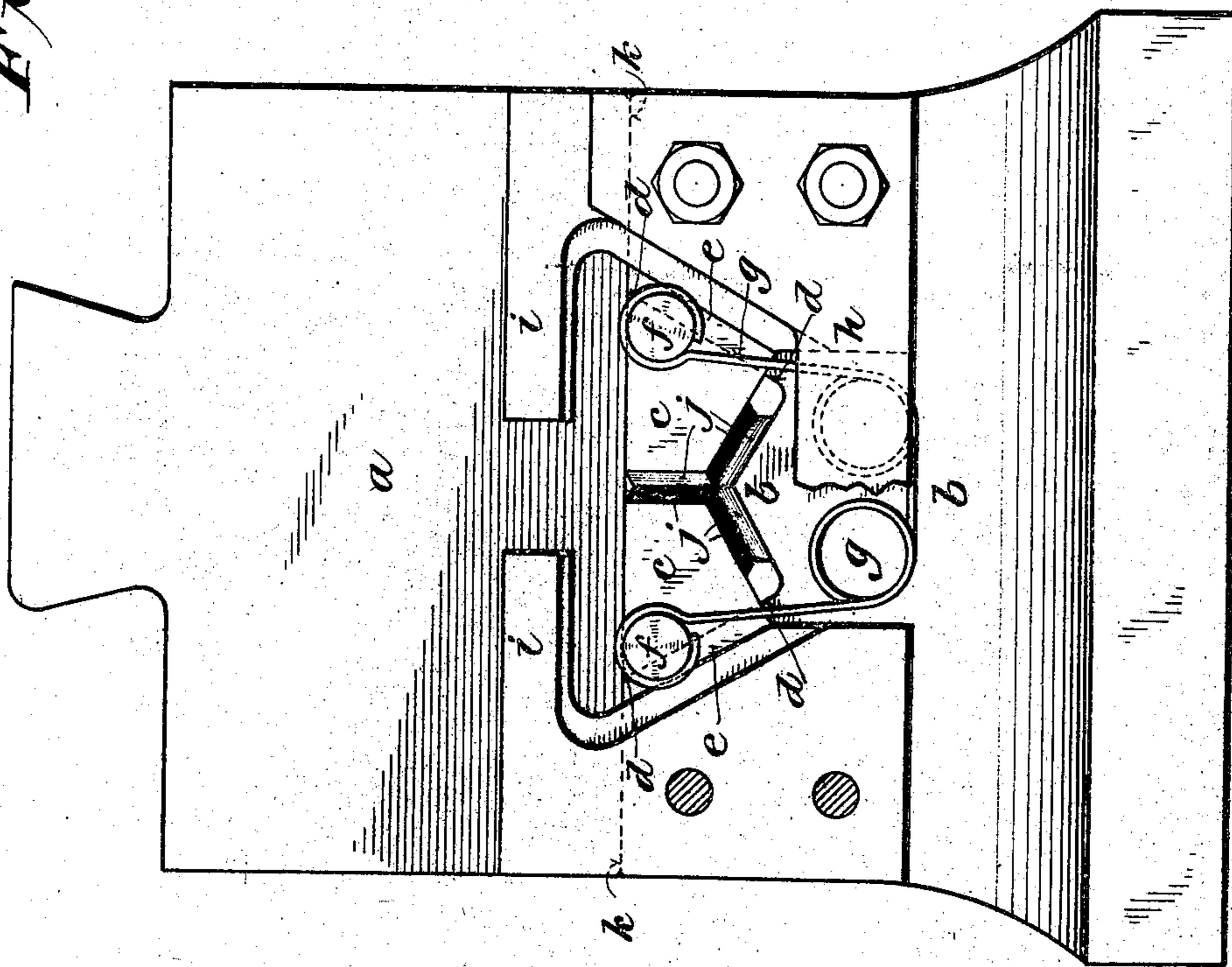
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3 SHEETS—SHEET 3.

Fig. 5.



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UNITED STATES PATENT OFFICE.

MACKINTOSH MACKAY MORRISON, OF CALUMET, MICHIGAN.

FORGING-MACHINE.

No. 840,578.

Specification of Letters Patent.

Patented Jan. 8, 1907.

Application filed October 22, 1902. Serial No. 128,207.

To all whom it may concern:

Be it known that I, MACKINTOSH MACKAY MORRISON, a citizen of the United States, residing at Calumet, in the county of Houghton and State of Michigan, have invented certain new and useful Improvements in Forging-Machines, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

The main object of this invention is to facilitate forging or shaping rock-drills, stone-jack pinion-shafts, or other articles having projections or depressions on two or more sides.

It consists in certain novel features of construction and in the arrangement and combinations of parts hereinafter particularly described and claimed.

In the accompanying drawings like letters designate the same parts in the several figures.

Figure 1 is a rear elevation, certain parts being broken away, of a forging-machine embodying my invention; the dies being open or separated. Fig. 2 is a similar view of the machine, showing the dies closed or brought together. Fig. 3 is a section on the line 3 3, Fig. 1. Fig. 4 is a section and elevation on the line 4 4, Fig. 1; and Fig. 5 is a view similar to Fig. 1 of a modified form of the machine, showing the dies closed.

For the purpose of illustration a machine designed particularly for forming the fluted portion and cutting edges of rock-drills is shown; but the invention is equally applicable by such modifications as will be apparent to those skilled in the art to machines for shaping various tools and articles of different forms for different purposes.

The machine is intended to be used in a drop-hammer, steam-hammer, or other machine having a reciprocating piston or plunger for operating the movable dies.

Referring to the drawings, *a* and *b* are the main dies, one of which is movable toward and from the other. The movable die *a* may be attached to the hammer-head, plunger, or piston, or may be detached and arranged to receive the blow or thrust of the hammer-head, plunger, or piston of a drop or steam hammer or other machine. The stationary or anvil die *b* is mounted on a fixed support in the proper relation to the movable die and the hammer-head, piston, or plunger by which it is actuated.

c c are auxiliary dies arranged between the main dies *a* and *b*, preferably on the fixed die, and movable transversely to the direction of movement of the die *a*. In the present case the working faces of the several dies are alike, but their form is determined by the form it is desired to give to the forging. In this case both the main dies *a* and *b* are formed on opposite sides of their working faces with inclined guiding-faces *d d*, which converge from the ends of the die-blocks toward the working faces, and the auxiliary dies *c c* are formed with corresponding inclined faces which are presented to the inclined guiding-faces on the other dies, the main-die guiding-faces being longer than the corresponding faces of the auxiliary dies so that the opposing meeting faces of the main dies may constitute stop-faces to limit the approach of the working faces of said dies; but in certain cases—as, for example, in a machine for making tri-form drills or drills having three vanes or blades—the inclined guiding-faces on the die *a* and the opposing inclined faces on the auxiliary dies *c c* may be dispensed with, the die *a* being made with a plain face opposed to corresponding faces on the auxiliary dies, as shown in Fig. 5.

The dies *c c* are formed at their ends on one or both sides, opposite their working faces, with lateral projections or flanges *e*, which overhang opposite sides of one or both of the main dies, and thus prevent longitudinal displacement of the auxiliary dies and permit the faces of main dies to strike one another, insuring uniformity of thickness of the forgings. These laterally-movable auxiliary dies *c c* are preferably assembled with and carried by the fixed die *b*. They are formed at the ends back of their centers with studs *f*, with which the ends of retracting-springs *g* are connected. These springs may be conveniently made of U shape from round wire and formed, as shown, with circular coils to render them more flexible or elastic. They are retained in place by guards or keepers *h*, bolted over them to the sides of die *b*. The dies *c* are limited in their outward movement and are held when they are released by the withdrawal of the main die *a* in proper working relation to said die by recessed stops *i*, which are bolted, with the guards or keepers *h*, to the sides of die *b*, out of the path of die *a*.

For cutting off the ends of the fluted parts of rock-drills the opposing dies are provided

at their rear ends with transverse angular projections or cutters *j*.

The machine herein shown and described operates as follows: A heated rod or blank being inserted in the opening between the dies when they are separated, as shown in Fig. 1, the die *a* is forced by the stroke of a hammer or thrust of a piston or plunger toward the die *b*. As it approaches the die *b* its inclined guiding-faces *d* engage the opposing faces of the dies *c* and cause them to approach each other on the inclined guiding-faces *d* of the fixed die *b* equally and simultaneously with the approach of the die *a* toward the die *b*. As the dies are self-centering and approach each other simultaneously, they operate equally on the several sides of the blank, producing a symmetrical forging. This may be accomplished by a single stroke or thrust of the hammer-head, piston, or plunger if sufficient force is applied thereto, or, if necessary or desired, the blows or thrusts may be repeated. The thickness of the forging between opposing faces of the dies is determined by the meeting faces *k* of the main dies, and the diameter or width of the forging is determined by the size of the blank from which it is made. When the hammer-head, piston, or plunger is withdrawn and the movable die *a* released, the springs *g* immediately retract the laterally-movable auxiliary dies *c* against the recessed stops *i*, leaving the forging free to be shifted in or removed from the machine as desired and preventing injury to the dies by continued contact with and absorption of heat from the forging. The life of the dies is thus materially extended.

For some kinds of forging—such, for example, as stone-jack pinion-shafts—the angular projections or cutters *j* are dispensed with.

Various changes in details of construction and arrangement of parts may be made within the principle and intended scope of the invention in adapting machines to produce forgings of different shapes.

I claim—

1. In a forging-machine the combination of opposing main dies one of which is movable toward and from the other and one of which has an inclined guiding-face, an auxiliary die having an inclined face opposed to the guiding-face on one of the main dies, which latter guiding-face is adapted to force the auxiliary die laterally toward the working faces of the main dies when they are brought together, said auxiliary die having at one end a flange bearing against the side of the main die, and means tending to retract the auxiliary die, substantially as described.

2. In a forging-machine the combination of main dies, one of which is movable toward and from the other and one of which has a forming-face and guiding-faces inclined to the line of movement of the movable main

die, and auxiliary dies having inclined faces opposed to the inclined faces on the main die and adapted to force the auxiliary dies simultaneously toward the working face of the other dies when they are brought together, the main-die guiding-faces being longer than the corresponding faces of the auxiliary dies, and the main dies having opposing stop-faces which determine the approach of the working faces when the dies are brought together, substantially as described.

3. In a forging-machine the combination of main fixed and movable dies having forming-faces and inclined guiding-faces, laterally-movable auxiliary dies having inclined faces adapted to bear against the opposing guiding-faces of the main dies and to simultaneously force the auxiliary dies toward each other as the main dies are brought together, substantially as described.

4. In a forging-machine the combination of two main dies one of which is movable toward and from the other, having forming-faces and inclined guiding-faces which diverge in each die toward the opposing die, and laterally-movable auxiliary dies having inclined faces which correspond with and are adapted to bear against the opposing guiding-faces of the main dies and to simultaneously force the auxiliary dies toward each other as the main dies are brought together, substantially as described.

5. In a forging-machine the combination of opposing main dies, one of which is movable toward and from the other and one of which has an inclined guiding-face, an intermediate laterally-movable auxiliary die having an inclined face opposed to the guiding-face on one of the main dies and guiding-flanges overhanging said main die at the ends and holding said auxiliary die against longitudinal displacement, and stops on the sides of said main die for limiting the outward movement of the auxiliary die, and permitting the faces of the main dies to strike each other without injury to the auxiliary die, substantially as described.

6. In a forging-machine the combination of main dies one of which is movable toward and from the other, and one of which has inclined guiding-faces, intermediate laterally-movable auxiliary dies having inclined faces presented to the guiding-faces on one of the main dies, stops on the sides of said main die for limiting the outward movement of the auxiliary dies, and means tending to separate the auxiliary dies and permitting the faces of the main dies to strike each other, substantially as described.

7. In a forging-machine the combination of main dies one of which is movable toward and from the other and one of which has an inclined guiding-face, and an intermediate laterally-movable auxiliary die having an inclined face presented to the guiding-face on the

main die, said dies having transverse cutting-off projections at one end of the working faces of the dies, substantially as described.

5 8. In a forging-machine the combination of main dies, one of which is movable toward and from the other and one of which has inclined guiding-faces, intermediate laterally-movable auxiliary dies having inclined faces presented to the inclined guiding-faces on the
10 main die, retracting-springs connecting the auxiliary dies at their ends, and guards or keepers attached to one of the main dies over said springs and retaining them in place, substantially as described.

15 9. In a forging-machine the combination of main dies one of which is movable toward and from the other and one of which has recessed stops and guiding-faces diverging to-

ward said stops from the longitudinal axis of said dies, laterally-movable auxiliary dies 20 having inclined faces presented to the inclined guiding-faces on the main die, and a retracting-spring tending to withdraw said auxiliary dies against said stops and permitting the faces of the main dies to strike each 25 other, thereby limiting the forward motion of the movable main die and insuring uniformity of thickness in the forgings without injury to the working faces of the dies, substantially as described. 30

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

MACKINTOSH MACKAY MORRISON.

Witnesses:

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