

No. 689,411.

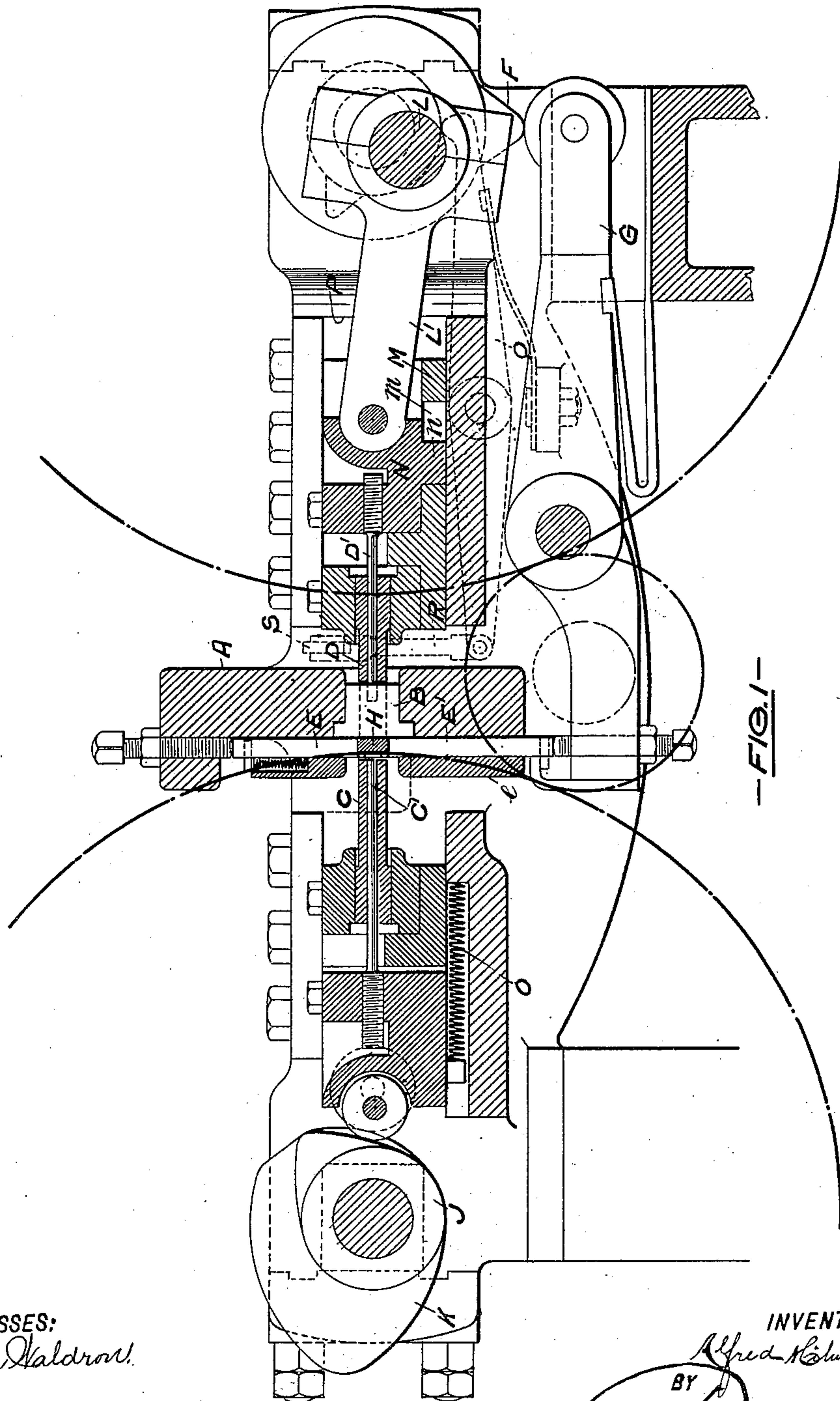
Patented Dec. 24, 1901.

A. M. REYNOLDS.
MACHINE FOR FORGING NUTS, &c.

(Application filed May 7, 1901.)

(No Model.)

3 Sheets—Sheet 1.



—FIG. 1—

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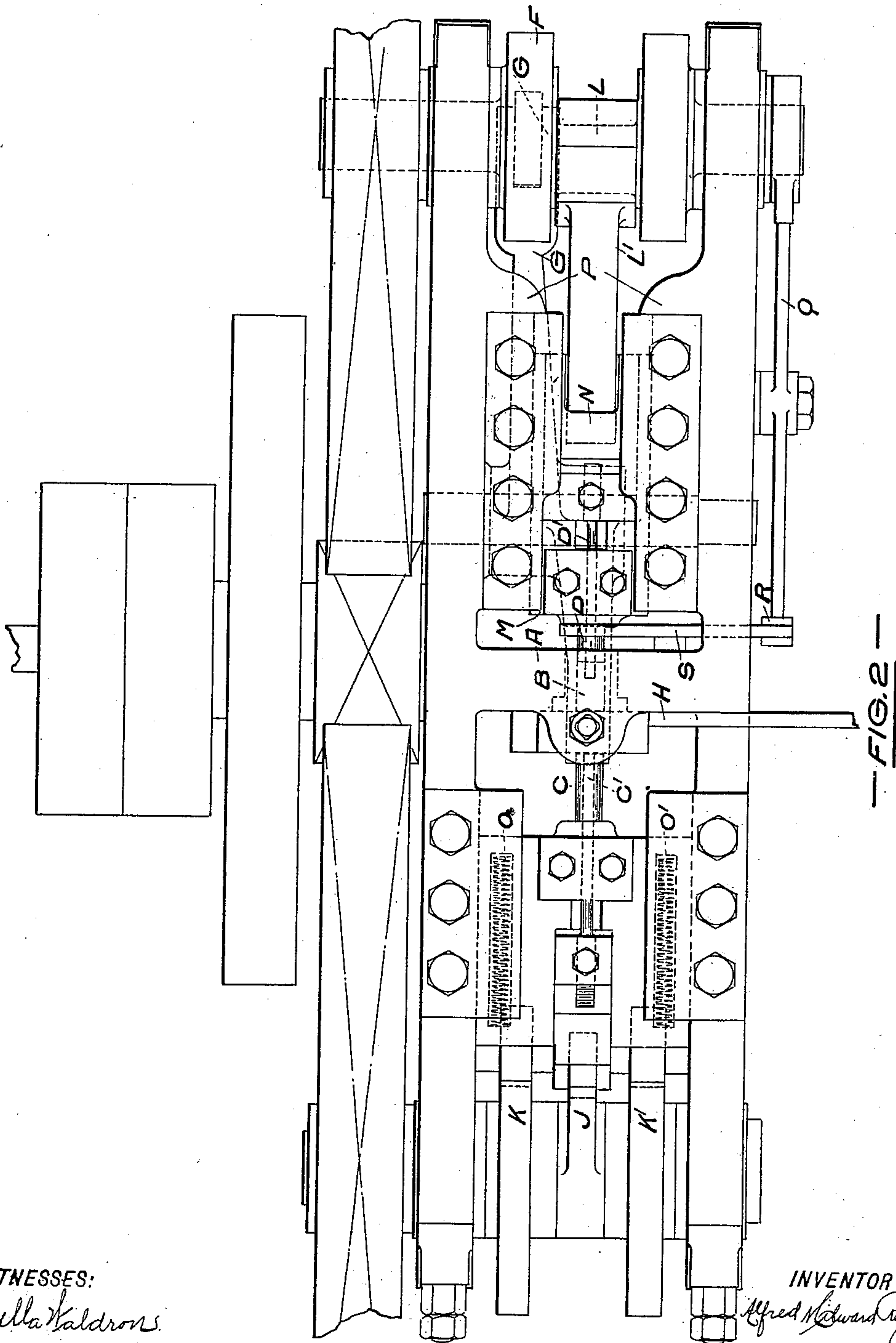
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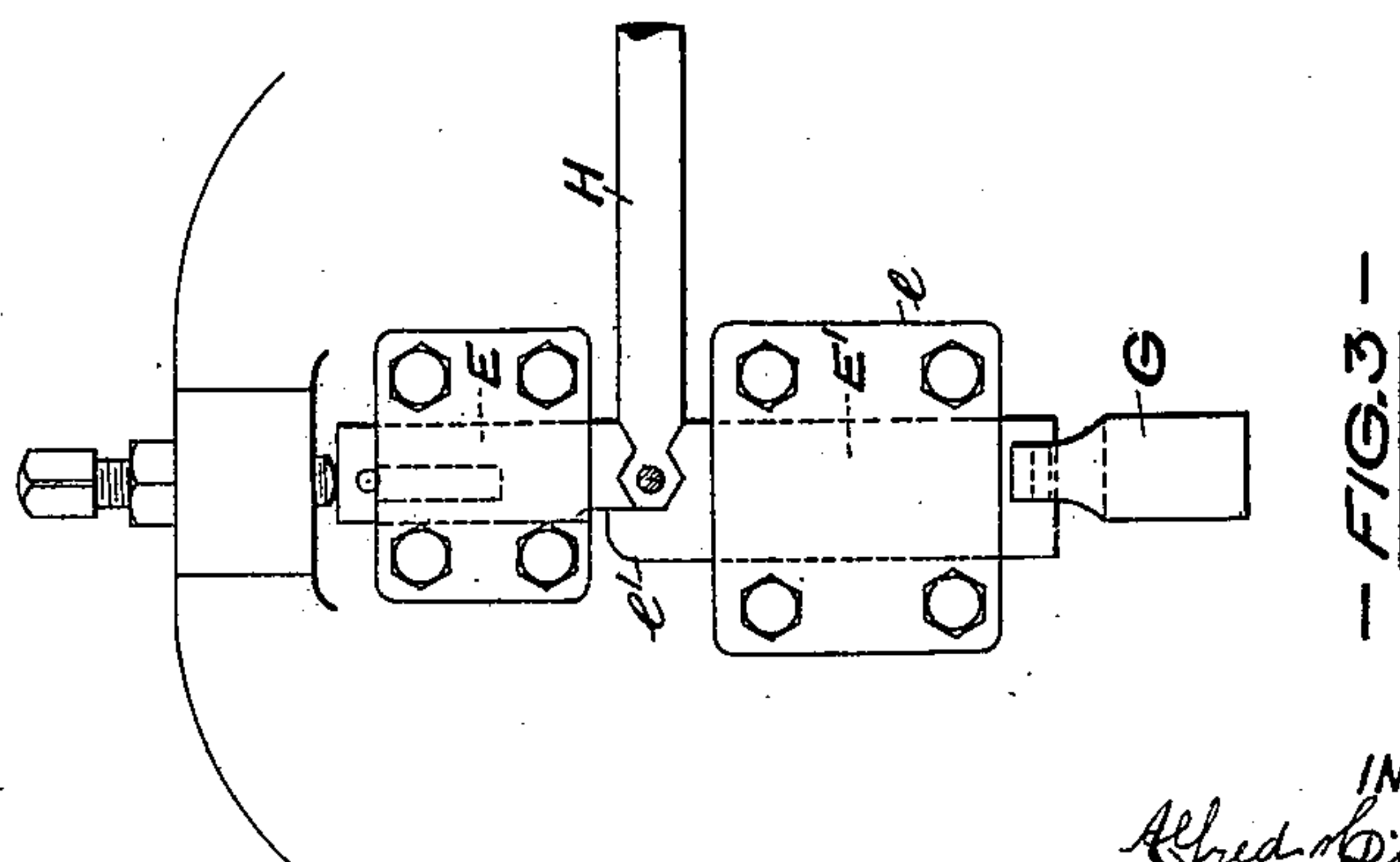
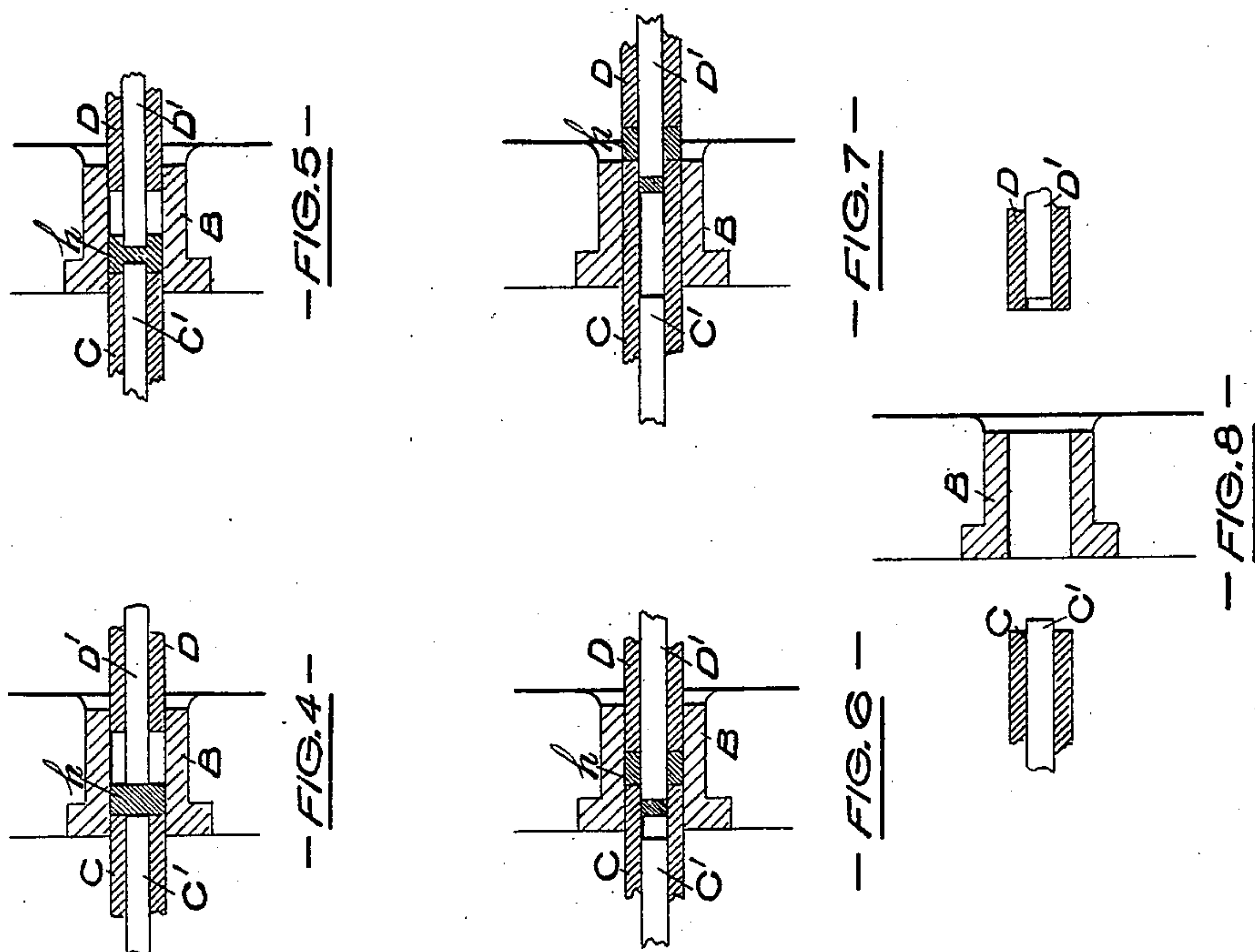
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ALFRED MILWARD REYNOLDS, OF BIRMINGHAM, ENGLAND.

MACHINE FOR FORGING NUTS, &c.

SPECIFICATION forming part of Letters Patent No. 689,411, dated December 24, 1901.

Application filed May 7, 1901. Serial No. 59,132. (No model.)

To all whom it may concern:

Be it known that I, ALFRED MILWARD REYNOLDS, a subject of the King of Great Britain and Ireland, and a resident of Newtown Row, in the city of Birmingham, England, have invented certain new and useful Improvements Relating to Machines for Forging Nuts and Similar Articles, (for which I have filed an application in Great Britain, No. 8,158, bearing date April 20, 1901,) of which the following is a specification.

This invention consists of improvements relating to machines for forging nuts and similar articles, my object being to render such machines more certain and uniform in action and to improve the quality, while effecting an economy in the cost of the work produced therewith.

In order that my invention may be more readily understood, I append hereunto three sheets of explanatory drawings to be hereinafter referred to.

Figure 1 is a sectional side elevation of a nut-forging machine as constructed in accordance with my invention. Fig. 2 is a plan of the machine. Fig. 3 is a front elevation of the first forming-dies, while Figs. 4 to 8, inclusive, are views, to a larger scale, of the piercing and pressing tools, illustrating different stages in the manufacture of a nut by my improved machine.

The same reference-letters in the different views represent the same parts.

My machine as illustrated has a horizontal frame or bed, on each end of which is mounted a shaft, the said end shafts being both driven by suitable gearing from the one central or first-motion shaft in the ordinary manner.

Within the bridge-piece or bolster A, stretching from side to side of the machine-frame, I arrange a die B in alinement with the punches C C' and snap-tool and punch D D', respectively, and on the face of the said bridge-piece I mount the indenting or shaping tools E and E', which are disposed perpendicularly to the axis of the die B and the punches C C', snap-tool D, and punch D', but with the center of their working surfaces in alinement with the said axis. The tools E and E' are shown separately at Fig. 3 of the drawings. The upper tool E is fixed adjustably on the face of the bridge-piece A, while the lower

tool E' is arranged to move vertically within a suitable guide e under the action of a revolving cam F, operating on the lever G. The adjacent portions of the tools E E', I form to the configuration of the nuts required to be made, so that when the bar of metal H is inserted between them the pressure imposed upon it by the vertical movement of the lower tool E' causes it to assume the said configuration. The end of the metal bar H thus partially shaped is not, however, at this stage completely severed from the main portion of the bar. The extent of the impression made by the tools is shown at Fig. 3. The projection e' on the lower tool E' serves as a stop to uniformly limit the amount of the metal bar H fed into the machine at each operation, the working face of the projection e' being level with the corresponding face of the die B.

For the purpose of severing the partially-formed nut from the bar and piercing, compressing, and ejecting the finished nut I dispose in front and behind the die B the punches C C', snap-tool D, and punch D', hereinbefore referred to, and cause them to be operated in a longitudinal direction by the cams, as J, K, and K', and the crank L. The punches C C' are arranged concentrically, but are supported and carried independently and are operated by the cams J and K and K', respectively. The snap-tool D and punch D' are similarly arranged and are also supported and carried separately; but the motion of the snap-tool D (attached to the outer slide M) is effected during the movement of the slide N, to which the punch D' is attached and which obtains its motion from the crank L through the connecting-rod L'. The snap-tool D and punch D' are therefore operated by the same crank, though the punch D' has a greater motion than the tool D. The return of the punches C C' is effected by the springs O and O', while the return of the snap-tool D is effected during the return of the punch D' in the manner to be hereinafter described.

The complete action of my improved mechanism is as follows: One end of the heated bar of metal H is inserted between the indenting or shaping tools E E' up to the stop e', formed on the lower tool E', which is then closed on the bar. The punch C under the

action of the cams K K' then severs the piece of metal between the tools E E' from the bar H by forcing it into the die B, Fig. 4. At this point the punch D' has been so far advanced
 5 by the crank L as to be in contact with the blank *h*, and the continued motion of both punches C' and D' effectually compresses the metal in the center of the blank and causes it to flow to or assume the shape shown at
 10 Fig. 5. The punch C' is now free to retire before the advance of the punch D', but the punch C continues its forward movement. The nut is thus pierced and when brought into contact with the tool D is compressed or
 15 consolidated, as indicated at Fig. 6, in order to insure its perfect formation by the die B. From the position shown at Fig. 6 the snap-tool D and punch D' commence to recede before the punch C, and the latter continues its
 20 forward movement until the nut is ejected, as shown at Fig. 7. During the subsequent return movement of the punch C the thin bur or wad of metal which has been forced out of the nut is removed by the inner punch C',
 25 which at the starting position projects slightly from the face of the outer punch C, as at Fig. 8; but during the return of the punch D' the nut *h* still remains on its front extremity, and the contact of the nut with the snap-tool D
 30 is sufficient to return the said snap-tool until its motion is arrested by the abutment of its slide against the stops P on the machine-frame. The continued retreat of the punch D' causes its withdrawal from the nut, and
 35 on such withdrawal the nut falls into a receptacle placed to receive the finished articles. Should the nut, however, adhere to the face of the snap D after the withdrawal of the punch, the "knock-off" device (which is com-
 40 prised by a cam-operated lever Q, the link R, and knock-off lever S) removes the said nut and leaves the snap and punch in readiness for the next operation.

The projection *n* on slide N, working in slot
 45 *m* in slide M, is for the purpose of returning

the said slide M to its rear or starting position when there is no work in the machine.

For the manufacture of nuts or similar articles of a shape other than hexagonal the same cycle of operations is used in conjunction with dies, punches, and snaps shaped to the necessary configuration. 50

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In machines for forging nuts and the like, the combination of a die, punches and a snap-tool arranged in alinement with each other, means for operating said parts and a pair of indenting or shaping tools arranged 60 to shape the blank, but not to sever the said blank from the bar, the severing being done by one of the punches, and a stop projection on one of the indenting-tools located beyond the position of the blank to afford a bearing 65 for the extreme end of the bar, said stop projection being at one of the lateral edges of the shaping-tool, the opposite edges of said tools being free from projections for the feeding in of the bar in a direction transversely 70 to the axial line of the nut to be formed, substantially as described.

2. In combination, a pair of indenting-tools, one of which has a laterally-arranged stop, inner and outer punches, the outer punch being arranged to sever the blank from the bar, a die into which the said outer punch forces the severed blank and subsequently ejects it through the back of the die and a punch and snap-tool operating on the other side of the 80 blank with means for operating said indenting-tool and the punches and snap-tool, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ALFRED MILWARD REYNOLDS.

Witnesses:

EDWARD MARKS,
 HERBERT BOWKETT.