(No Model.) 2 Sheets—Sheet 1.

J. A. HAMER.

FORGING MACHINE.

No. 403,586. Patented May 21, 1889.

FIG. 1.

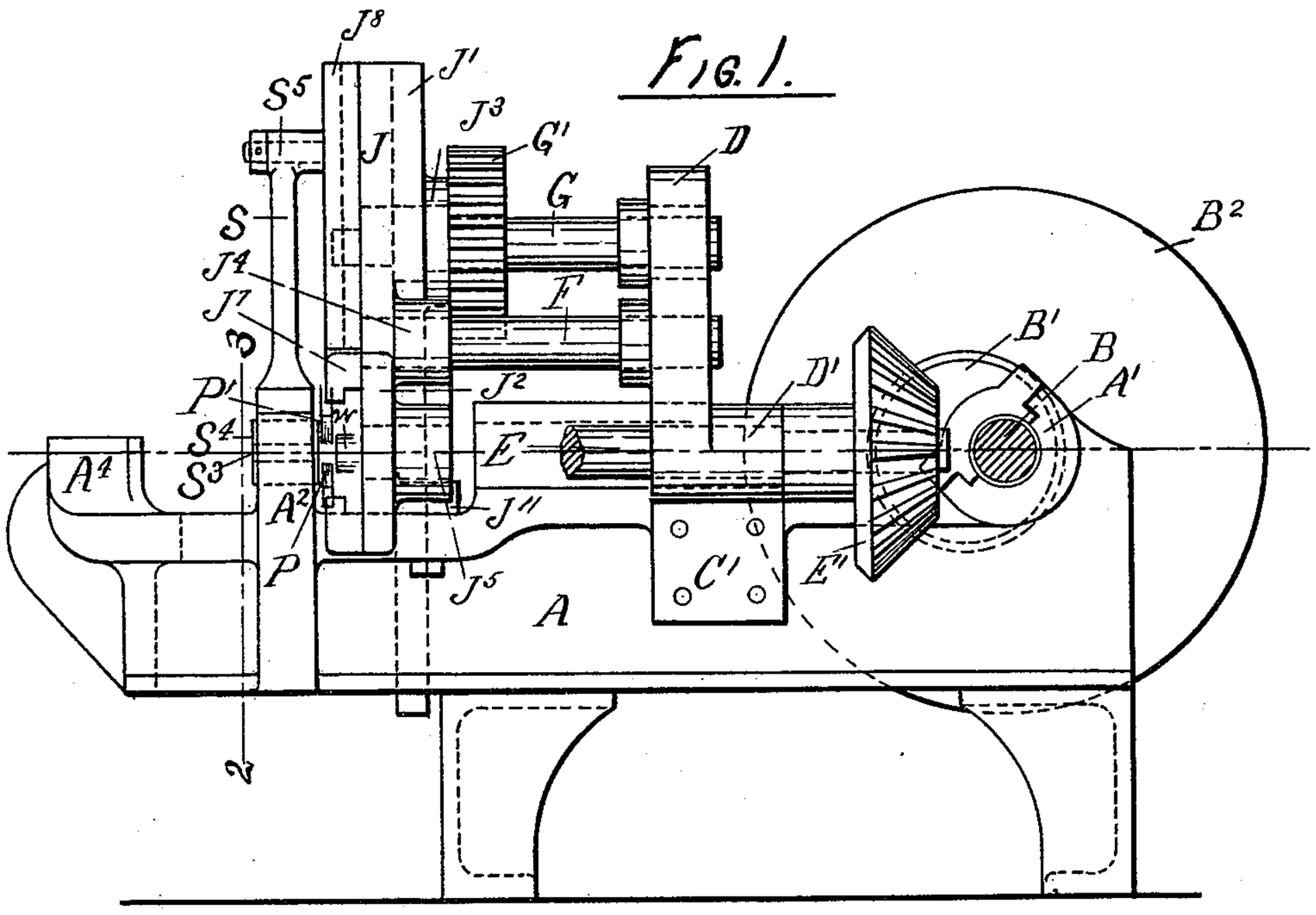
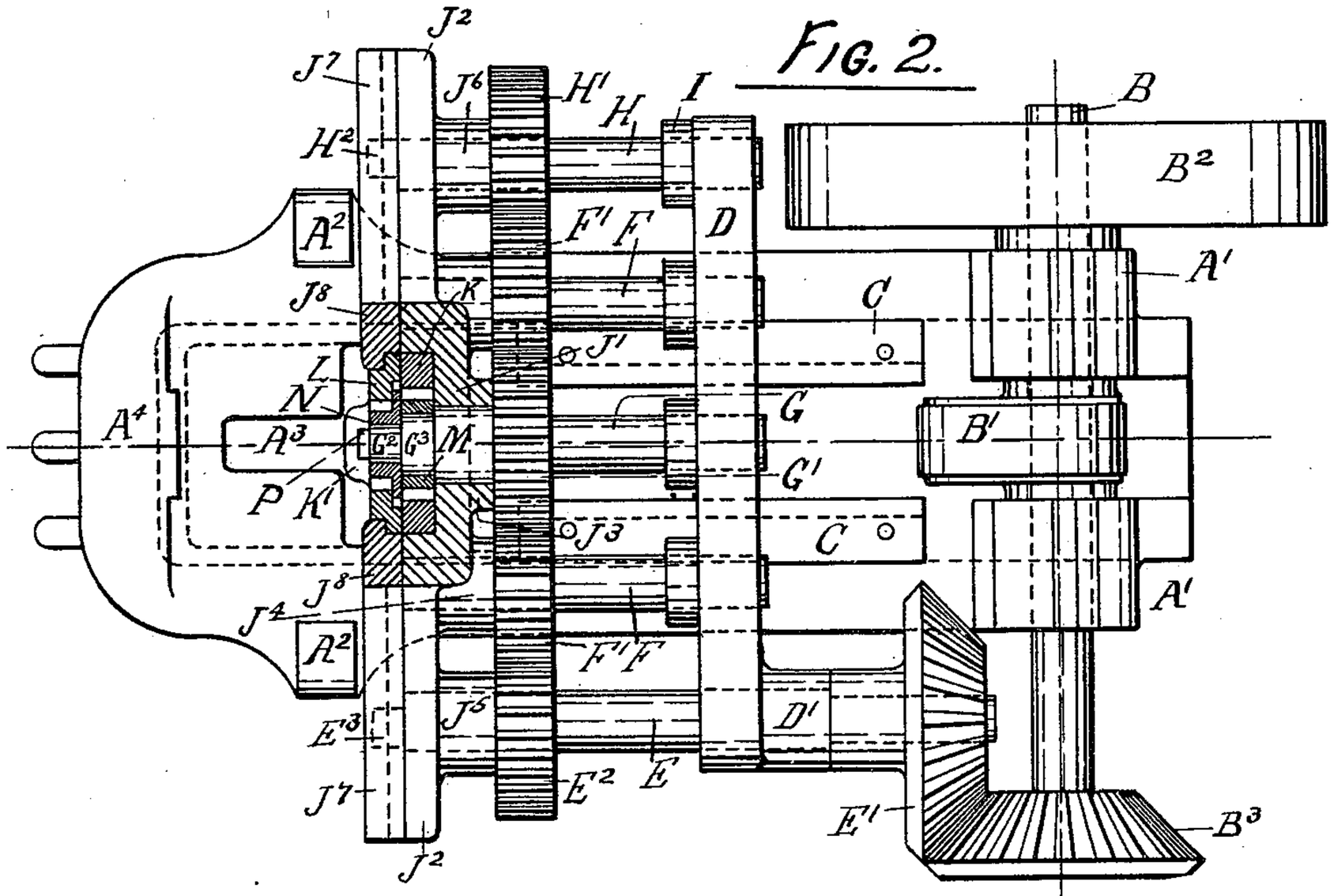


FIG. 2.



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(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

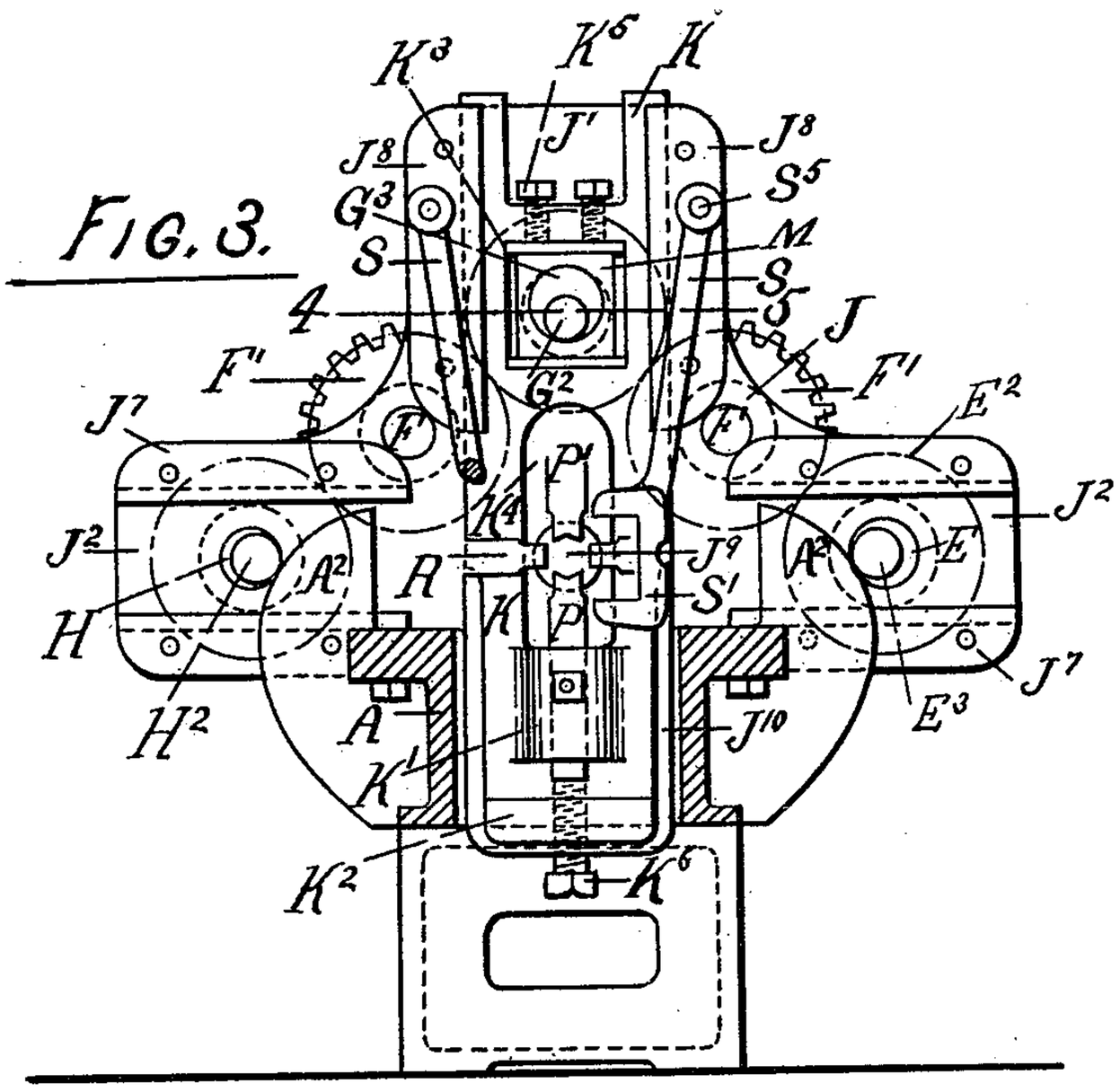
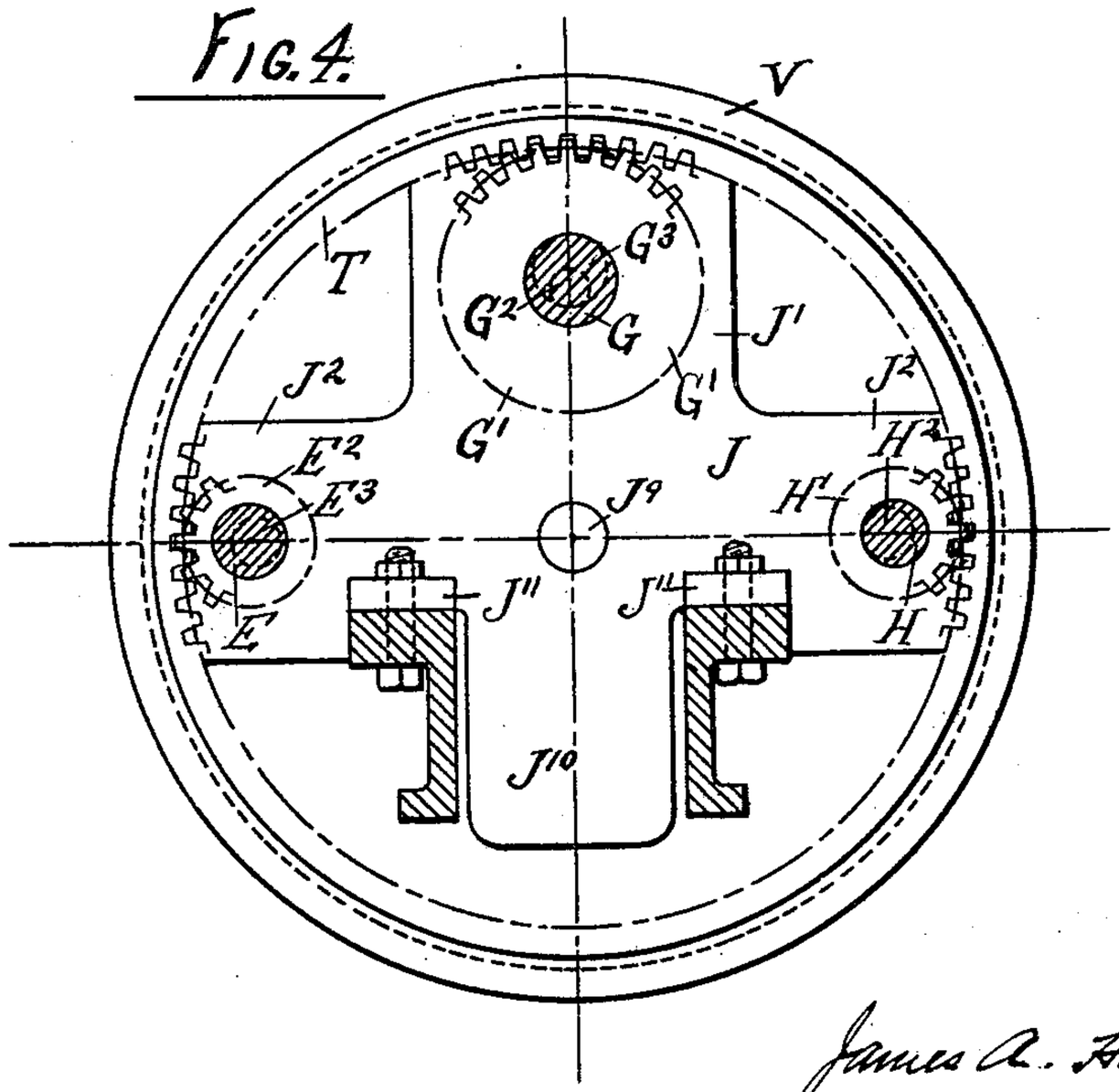


FIG. 4.



WITNESSES
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UNITED STATES PATENT OFFICE.

JAMES A. HAMER, OF READING, PENNSYLVANIA.

FORGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 403,586, dated May 21, 1889.

Application filed November 13, 1888. Serial No. 290,723. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. HAMER, a citizen of the United States, residing at Reading, in the county of Berks and State of Pennsylvania, have invented certain new and useful Improvements in Forging-Machines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

The invention relates more particularly to forging-machines adapted to form the heads of bolts. The principal object is to provide an effective machine the wearing parts of which will not be exposed to the scales from the heated metal, and all the parts of which will be readily accessible for cleaning, adjustment, or repair. This object is attained mainly by the novel arrangement and manner of operating the hammers which converge to the central forging-point of the machine. The horizontal upsetting-hammer is attached to a cross-head and operated by an eccentric on the main shaft in the ordinary manner; but the four radial hammers employed are operated by three parallel horizontal counter-shafts which are rotated simultaneously by the main shaft, with which they are connected by gearing. The ends of these counter-shafts, which are provided with eccentrics, extend through a vertical frame, the center of which is the forging-point, and engage hammer-plates or cross-heads working in guides on said frame, to which plates the eccentrics impart a radial movement. Only three counter-shafts are used, the top and bottom hammers being both operated by a single counter-shaft above the center, the end of which shaft is provided with two eccentrics. One of these eccentrics engages the top hammer-plate and the other the bottom hammer-plate, the latter working in guides above the forging-point and being slotted where it passes this point, the bottom hammer being secured to its lower end. The construction is more fully described below.

Figure 1 is a side elevation of the complete machine. Fig. 2 is a plan view of the same through line 4 5 of Fig. 3. Fig. 3 is a cross-section through line 1 2 of Fig. 1, looking toward the main shaft. Fig. 4 shows an equivalent means of connecting the several shafts which operate the radial hammers.

The main shaft B of the machine rests in bearings A′ at one end of the bed-plate A. Power is conveyed to it through the wheel B^2, and an eccentric, B′, secured centrally to the shaft, gives a reciprocating motion to a hammer, W, the head only of which is shown in the drawings, Fig. 1. The cross-head to which it is secured and which is connected to the eccentric B′ is not shown, as any convenient form may be used. This cross-head, with its hammer, moves in guides C on the top of the bed-plate. A bevel-wheel, B^3, on the main shaft gears with a wheel, E′, on a shaft, E, at right angles to the main shaft. The shaft E is supported in the bearing D′ of the cross-yoke D, which is bolted through the pads C′ to the bed-plate, and also in a bearing, J^5, on a side arm, J^2, of a vertical frame, J, which is bolted to the bed-plate. A top shaft, G, and an opposite side shaft, H, are similarly supported in the yoke D and frame J, and motion is conveyed to them by means of the gear-wheels E^2, G′, and H′ through the idlers F′ on intermediate shafts, F.

Similar eccentric ends, E^3 and H^2, are formed on the shafts E and H, respectively, and the top shaft, G, is formed with two eccentric bearings, G^2 and G^3, the centers of which are on opposite sides of the center of the shaft, as shown.

The star-shaped vertical frame J has the bearings J^3, J^4, J^5, and J^6 for the several shafts G, F, E, and H on its rear face toward the main shaft; but the front face has secured to its side arms, J^2, binder-plates J^7, which serve as guides for hammer-plates to which the side hammers, R, are secured. Similar binders, J^8, are bolted to the upper arm, J′, which latter is recessed, so as to bring the face of the hammer-plate K, to which the lower hammer, P, is secured, flush with the front face of the side arms, J^2. The plate K has a square opening, K^3, near the upper end, in which a bearing, M, bored to fit the larger eccentric, G^3, of the top shaft, G, has a side movement to suit the

throw of the eccentric, and is slightly adjustable vertically by means of set-screws K^5. The lower end of the plate extends below the side arms through the bed-plate, and the hammer P is shown as secured to it by passing through a lug, K′, and is adjustably backed by a set-screw, K^6, in a lower lug, K^2. A slot, K^4, in the center of the plate enables it to clear the horizontal hammer W, which passes through the central opening, J^9, in the frame. The hammer-plate L, to which the upper hammer, P′, is secured, is shown in section in Fig. 2, but is not seen in the other views, the means of connecting it, as well as the side hammer-plates, which are not shown at all, to the eccentric, from which they derive their motion, as also of securing the hammer to the plates, being substantially equivalent to those described for the plate K. The bearing N fits the smaller eccentric, G^2, and has a similar side movement to the bearing M, and both plates are held in place and guided by the binders J^8.

Die-arms S are pivoted at S^5 to the front face of the frame J, and dies S^4, (shown in Fig. 1,) suited to the body of the bolt to be formed, are secured in the jaw ends S′. These dies may be pressed together, when desired, by means in common use, and therefore not shown, the strain being brought upon the side brackets, A^2. These dies serve their usual purpose of holding the blank from which the bolt is formed firmly and centrally while the metal is upset against them, the end strain upon the blank and upon the dies S^4 being taken by the anvil-block A^4 on the end of the frame, the space between the latter and the dies being occupied by suitable loose blocks, and set-screws through the anvil-block A^4 being employed, as usual, to accommodate different lengths of bolts.

In operating my machine the side hammers, R R, top and bottom hammers, P′ and P, and the horizontal upsetting-hammer W are operated simultaneously, as desired, the movement of the radial hammers being taken direct from the main shaft, as described, instead of from the cross-head of the horizontal hammer.

The wearing parts of the machine are all kept above the central forging-point, thus preventing the great wear ordinarily occasioned by scale and dirt, and the general arrangement of the machine is superior both for operating and keeping in repair, and the construction is simple and economical.

I do not confine my invention closely to the construction described and illustrated, as equivalent means of effecting substantially the same results may be readily devised. In Fig. 4, for instance, is illustrated an equivalent means of connecting the parallel eccentric shafts E, G, and H, the several wheels E^2, G′, and H′ gearing with the large internally-toothed wheel T, which turns on the vertical frame J; or an endless chain and sprocket-wheels may be employed for the same purpose. Similar equivalents in other parts of the machine it will not be necessary to specify; but

What is claimed is as follows:

1. In a forging-machine, the shaft G, provided with two eccentrics having their centers on opposite sides of the shaft-center, said eccentrics being connected with separate hammers which are guided radially upon a frame, substantially as set forth.

2. In a forging-machine, the parallel shafts E, G, and H, connected substantially as described, and provided with eccentrics connected with separate hammers which are guided radially upon a frame, two of said hammers being reciprocated in opposite directions by one of said shafts, substantially as set forth.

3. In a forging-machine, the combination of the horizontal bed-plate provided with anvil-block A^4, and the vertical frame secured thereto, a main shaft, B, with eccentric B′, connected with a horizontal hammer, W, and engaging shafts E, G, and H, with eccentric ends connected with radial hammers R R, P, and P′, and dies S^4, all arranged and operated substantially as set forth.

4. In a forging-machine having radial hammers guided in a vertical frame, substantially as described, the bottom hammer, P, secured to a sliding slotted plate, K, reciprocated in guides above the central forging-point, substantially as and for the purpose set forth.

5. In a forging-machine, the combination of the bed-plate A, main shaft B, parallel shafts E, G, and H, with eccentric ends, yoke D, vertical frame J, radial hammers R R, P, and P′, horizontal hammer W, and swinging dies, all arranged and operated substantially as set forth.

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

JAMES A. HAMER.

Witnesses:
W. G. STEWART,
ROBERT L. KEITH.