(No Model.) 4 Sheets—Sheet 1.

H. HAMMOND.

FORGING MACHINE.

No. 322,930. Patented July 28, 1885.

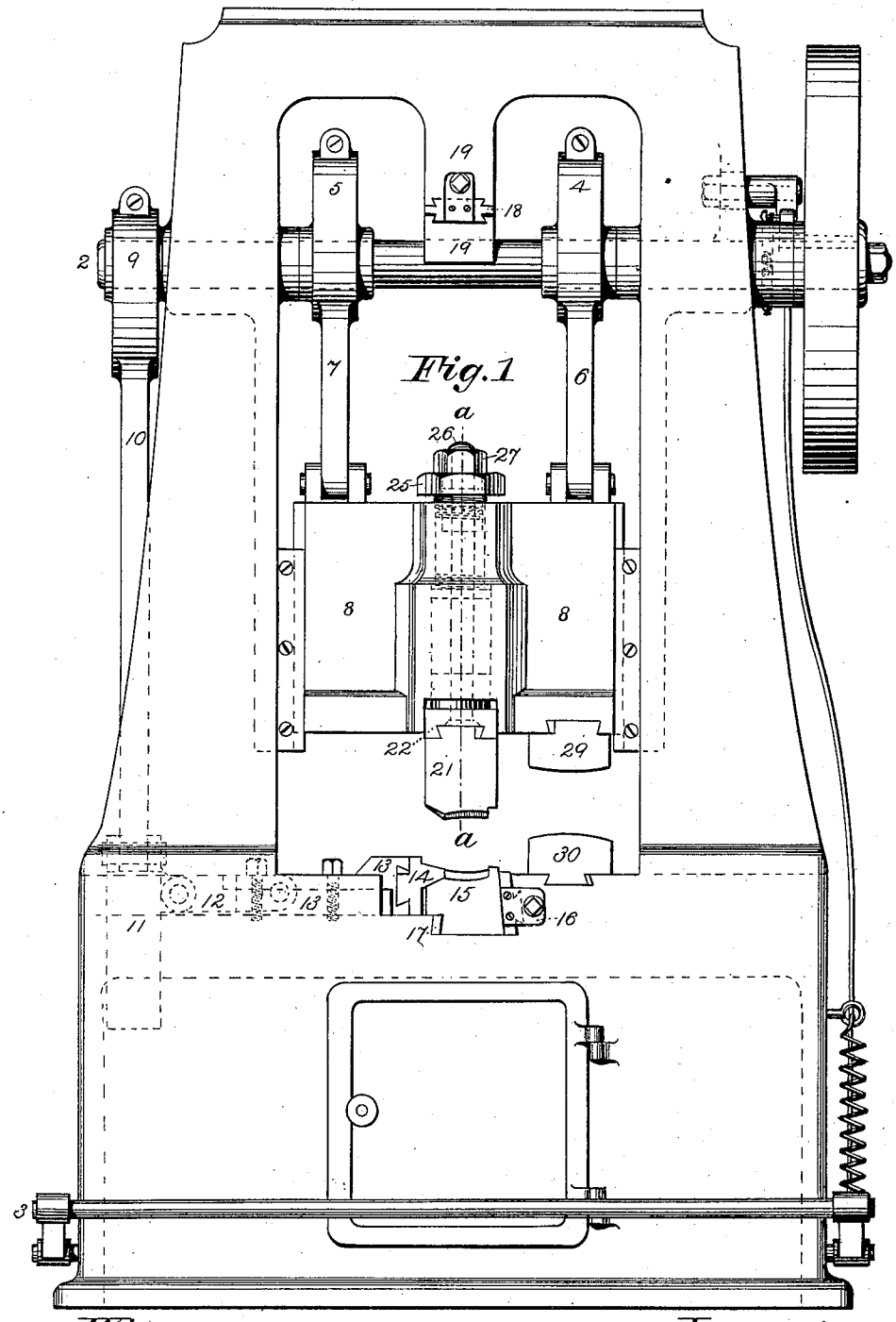


Fig. 1

Witnesses:

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Wm Henry Brocklesby

Inventor:

Henry Hammond

by Albert G. Walker, his Attorney

N. PETERS, Photo-Lithographer, Washington, D. C.

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4 Sheets—Sheet 2.

H. HAMMOND.

FORGING MACHINE.

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Fig. 3

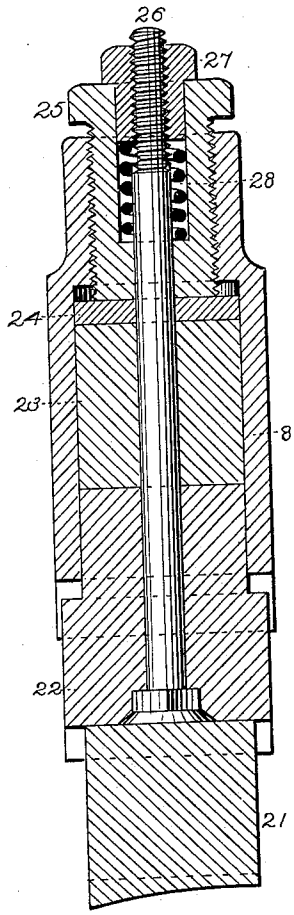


Fig. 4

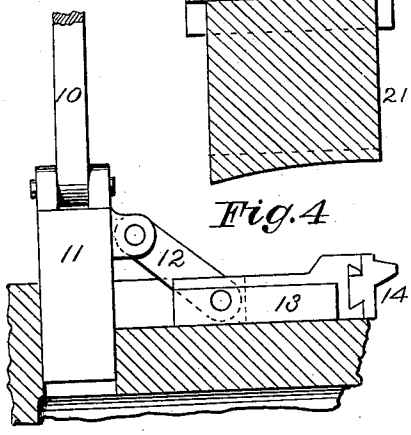
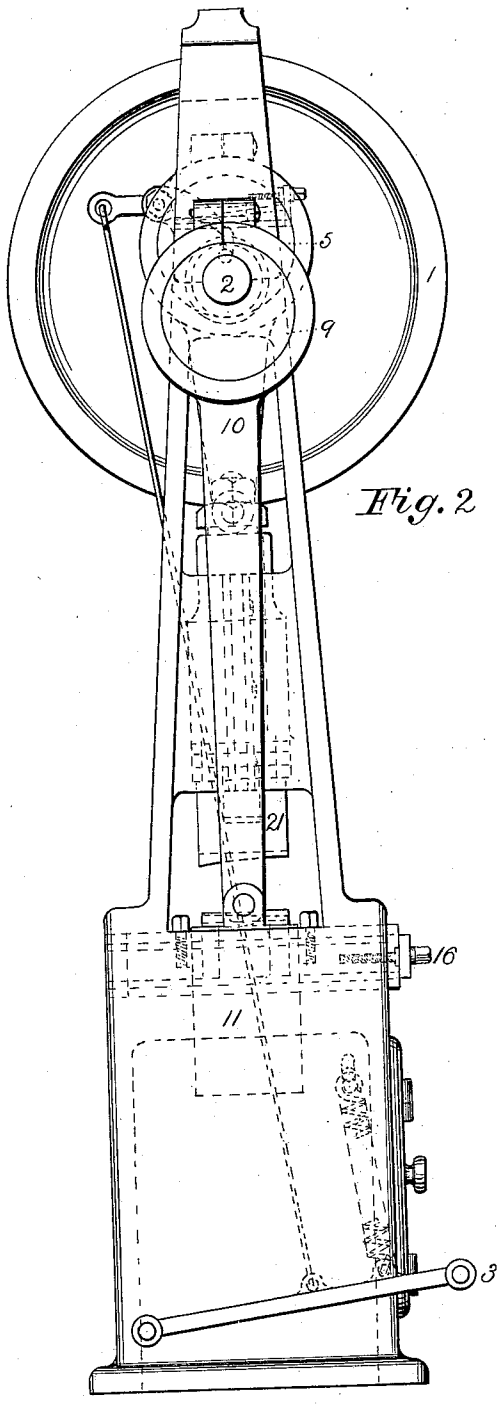


Fig. 2



Witnesses:

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(No Model.) 4 Sheets—Sheet 3.

H. HAMMOND.

FORGING MACHINE.

No. 322,930. Patented July 28, 1885.

Fig. 5

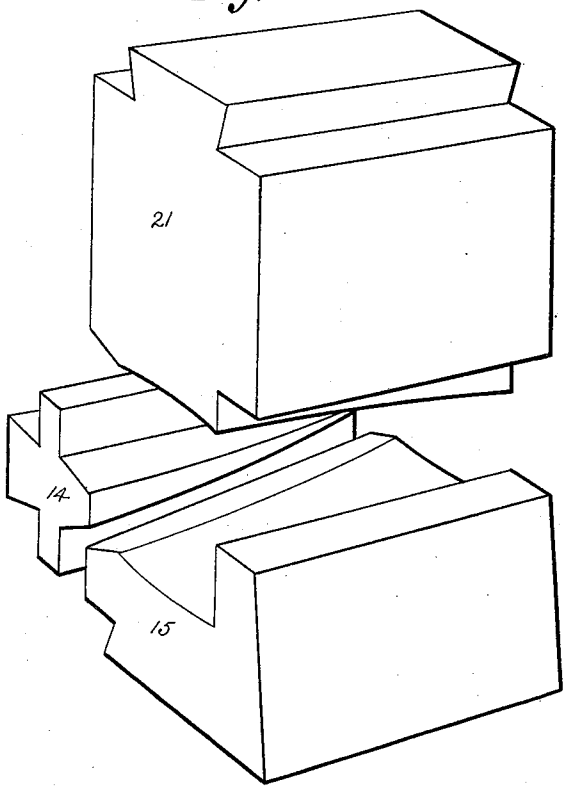


Fig. 7



Fig. 8

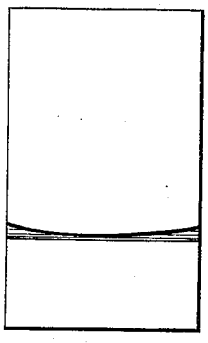


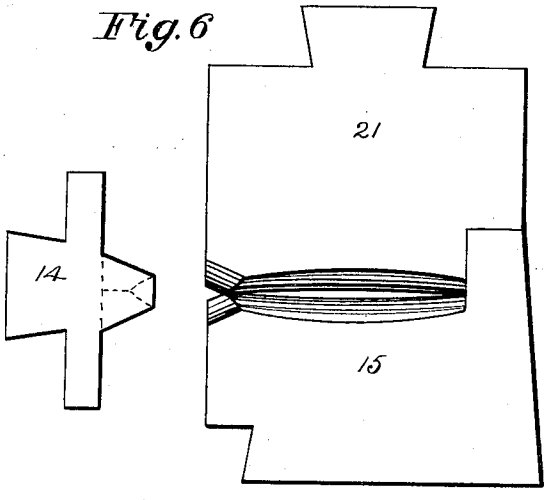
Fig. 9



Fig. 10



Fig. 6



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(No Model.) 4 Sheets—Sheet 4.

H. HAMMOND.

FORGING MACHINE.

No. 322,930. Patented July 28, 1885.

Fig. 11

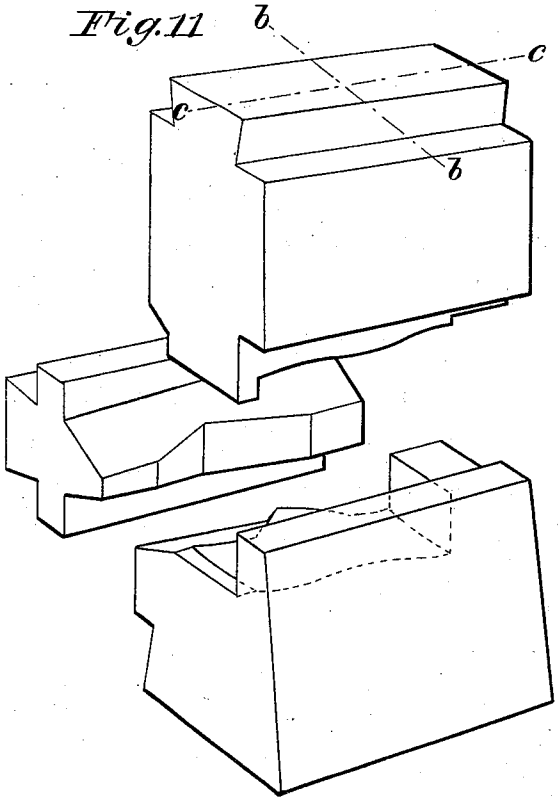


Fig. 14



Fig. 15

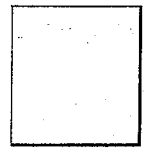


Fig. 16



Fig. 17

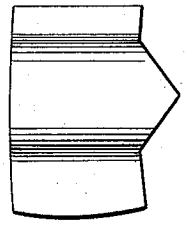


Fig. 13

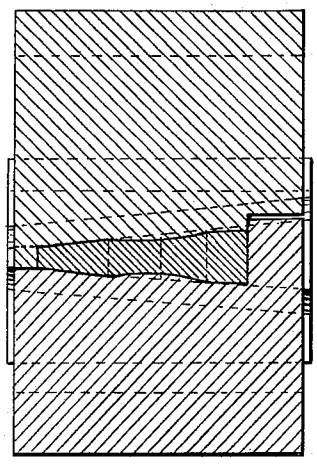
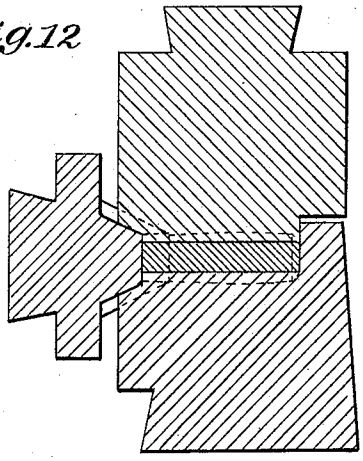


Fig. 12



Witnesses:

Frank H. Pinpont

John Henry Brocklesby.

Inventor:

Henry Hammond

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N. PETERS. Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HENRY HAMMOND, OF NEW HAVEN, CONNECTICUT.

FORGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 322,930, dated July 28, 1885.

Application filed December 26, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY HAMMOND, of New Haven, Connecticut, have invented a new and useful Forging-Machine, suitable to the manufacture of axes and other analogous articles, of which the following description and claims constitute the specification, and which is illustrated by the accompanying four sheets of drawings.

This machine is adapted to forge articles of malleable metal into the desired forms by means of successive blows delivered by one die having an elastic bed against another die having a solid bed, and by means of a third die operating with positive pressure substantially at right angles with the other two.

Figure 1 of the drawings is a front view of the machine. Fig. 2 is a side view of the same. Fig. 3 is a vertical central cross-section of the elastic bedded die on the line *a a* of Fig. 1. Fig. 4 is a side view of the slides 11 and 13, as connected by the link 12. Fig. 5 is a perspective view of a set of three dies used in the machine to forge the ax-poll blank and ax-bit of Figs. 7 and 8 into the ax-blank of Figs. 9 and 10. Fig. 6 is a front view of the dies of Fig. 5 when the upper die is delivering its blow upon the lower die and the side die is at the outer limit of its stroke. Figs. 7 and 8, respectively, are edge and side views of an ax-poll blank, with its edge split for the reception of the ax-bit, and with the ax-bit placed therein preparatory to welding and forging the poll and the bit together. Figs. 9 and 10 are edge and side views, respectively, of the blank and bit of Figs. 7 and 8, after they have been welded and forged by the dies of Figs. 5 and 6 in the machine shown in Figs. 1 and 2. Fig. 11 is a perspective view of a set of three dies which may be used in the machine in the place of those of Figs. 5 and 6, and which are adapted to forge the rectangular block of Figs. 14 and 15 into the concave ax-poll blank of Figs. 16 and 17. Fig. 12 is a vertical cross-section of the set of dies of Fig. 11, on the line *b b* of that figure, while Fig. 13 is a vertical longitudinal section of those dies on the line *c c* of Fig. 11. Figs. 14 and 15 are edge and side views, respectively, of a rectangular block of metal suitable to be pressed by the dies of Fig. 11 into the form of the concave ax-poll blank of Figs. 16 and 17, which latter are edge and side views, respectively, of a concave ax-poll blank suitable for use in making a specimen of the so-called "Kentucky" axes.

The wheel 1 turns the shaft 2 or runs loosely upon it, according as the treadle is depressed or raised. The devices by means of which the treadle controls the shaft are fully shown and described in another application of mine for Letters Patent of the United States for a new and useful forging-machine, which application is of even date with this. They are also indicated in the drawings of this application; but they are not described nor claimed in this specification. The eccentrics 4 and 5, through the rods 6 and 7, work the gate or pitman 8, while the eccentric 9, through the rod 10, works the upright slide 11, the link 12, and the horizontal slide 13, which slide carries upon its working end the side die, 14. The lower die, 15, is adjustable by means of an adjusting device, 16, on one of its sides and a suitable thickness of metal inserted in the recess 17 on the other of its sides, which adjusting device is fully illustrated, described, and claimed in my said other application for letters patent. Another form of that adjusting device is also used at 18 in this machine, as a means of lengthening or shortening the upper support, 19, of the shaft 2. The upper die, 21, is held by a dovetailed joint in the die-holder 22, the upper cylindrical part of which is adapted to reciprocate within narrow limits in an upright cylindrical bore in the gate or pitman 8. Above the die-holder and in that bore is the rubber spring 23, and above the rubber spring is the disk 24, and above the disk is the hollow adjusting-bolt 25, the periphery of which has a screw-thread working with a corresponding thread in the upper end of the bore. The bolt 26 extends through a vertical central bore in the die-holder 22, rubber spring 23, disk 24, and bolt 25, and is supported by the nut 27, into the bore of which it is tapped, and which has an annular shoulder resting upon the top of the bolt 25. The head of the bolt 26 supports the die-holder 22, and above it the rubber spring 23 and the disk 24. The spiral spring 28 encircles the bolt 26 in an annular chamber in the bolt 25 and below the

nut 27. The upper convex forging-die, 29, is also fixed to the gate or pitman 8 as to a die-holder, and it is adapted to deliver blows upon the lower convex forging-die, 30, which is fixed to the bed of the machine.

The mode of operation of this machine is as follows: The ax-poll blank and ax-bit blank of Figs. 7 and 8 being held by the operative upon the lower die, 15, he depresses the treadle and thus starts the machine. The revolution of the shaft 2 first causes the upper die to deliver its blow, and, as the upper die rises, the same revolution causes the side die, 14, to apply its pressure to the blanks against the resistance of the shoulder of the bottom die. The blow and the pressure are thus alternately applied at every revolution of the shaft until their work is completed.

When the dies of Figs. 11, 12, and 13 are used, the upper die and the side die operate simultaneously, and may complete their work at a single revolution of the shaft, unless the forming of the ears or other projections of the article being forged renders several revolutions necessary or desirable.

The operation of the dies 29 and 30 is independent of that of the other dies, and is sufficiently obvious without description here.

The rubber spring 23 acts as a cushion between the die-holder 22 and the disk 24, and thus makes the blow of the upper die an elastic one.

The spiral spring 28 acts as a cushion between the bolt 25 and the nut 27, and thus breaks the fall of the nut upon the bolt when the upper die is raised from the forging by the upward movement of the gate, and is forced downward in the bore of the gate by the rubber spring.

The tension of the rubber spring, and also that of the spiral spring, may be adjusted by raising or lowering the nut 27 upon the screw-thread of the bolt 26. The rubber spring may be replaced by a piece of metal of similar form, and the die-holder 22 may then be made rigid by screwing the nut 27 hard down upon the bolt 25, and thus the upper die may be made to deliver rigid blows instead of elastic ones. Whether the upper die is thus furnished with a rigid bed or is provided with an elastic one, as before described, its vertical position relatively to the gate is adjustable by raising or lowering the bolt 25 in the bore in which it is tapped.

I claim as my invention—

1. The combination of the die-holder 22, the rubber spring 23, the bolt 26, and the nut 27, so arranged relatively to the gate 8 as that the die-holder will meet a gradually-increasing resistance when pressed upward, all substantially as described.

2. The combination of the die-holder 22, the rubber spring 23, the bolt 25, the bolt 26, and the nut 27, so arranged relatively to the gate 8 as that the die-holder will meet a gradually-increasing resistance when pressed upward, and as that said resistance may be adjusted to different degrees, and as that said combination may be adjusted to different elevations within the bore of the gate, all substantially as described.

3. The combination of the die-holder 22, the hollow bolt 25, the long bolt 26, and the nut 27 with the gate 8, so arranged as that the die-holder may be adjusted to different elevations within the gate, all substantially as described.

HENRY HAMMOND.

Witnesses:

ALBERT H. WALKER,

FRANK H. PIERPONT.