Dec. 31, 1929. H. BIRMINGHAM 1,741,811

DROP FORGING HAMMER

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Fig. 1.

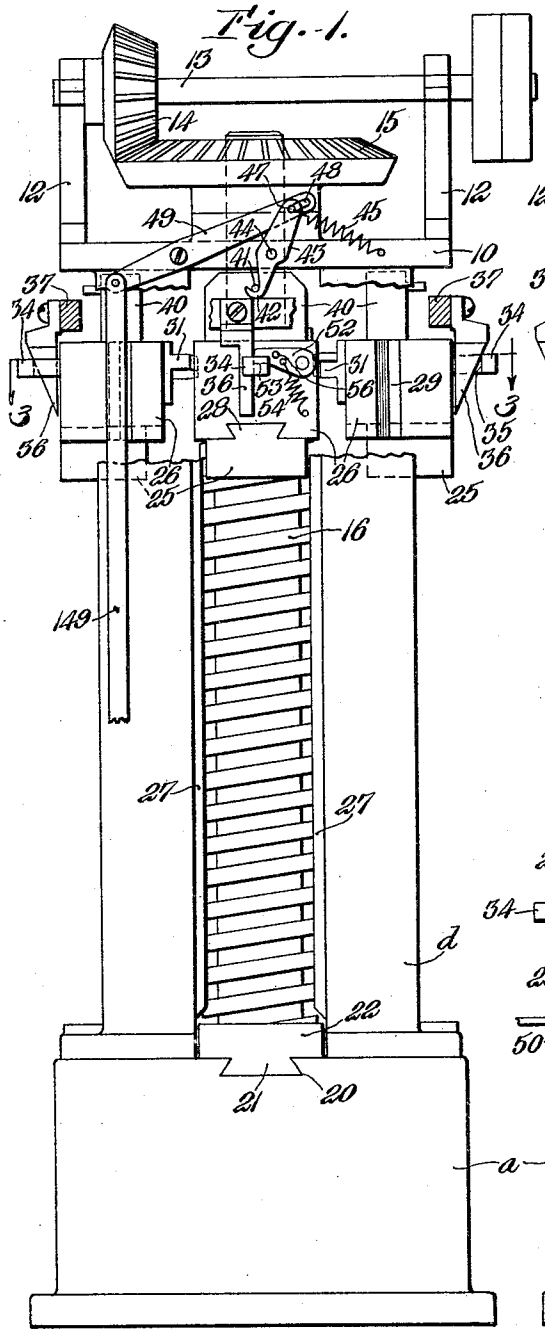
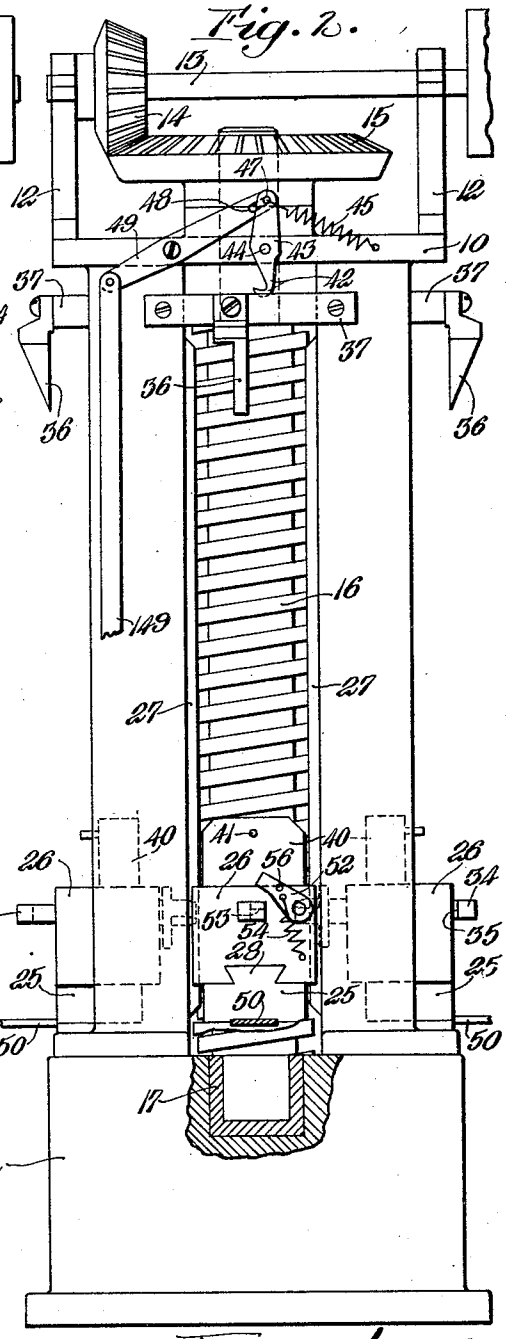


Fig. 2.



Inventor:
Henry Birmingham
By Jas. H. Churchill
Atty.

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Fig. 3.

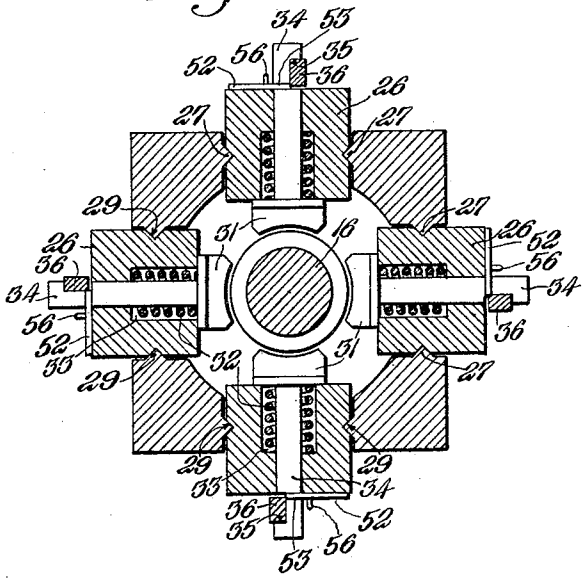
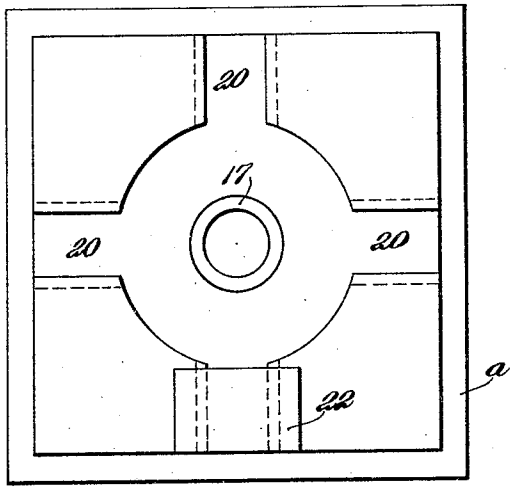


Fig. 4.



Inventor:
Henry Birmingham
By Jas. H. Schmehill
atty.

Patented Dec. 31, 1929

1,741,811

UNITED STATES PATENT OFFICE

HENRY BIRMINGHAM, OF ASHLAND, MASSACHUSETTS; WILFRED J. BIRMINGHAM ADMINISTRATOR OF SAID HENRY BIRMINGHAM, DECEASED

DROP-FORGING HAMMER

Application filed June 3, 1926. Serial No. 113,573.

This invention relates to a drop-forging hammer and is herein shown as embodied in a hammer having a plurality of movable and stationary dies with which a plurality of pieces of work may be forged into the same or different shapes at each operation of the hammer.

The invention has for its object to provide a hammer of the character described, with which metal articles may be shaped or forged in a minimum time, at a minimum cost, and with a minimum of labor.

To this end, the hammer is provided with a stationary base or anvil block upon which are supported a plurality of dies which will be hereinafter referred to as the lower or stationary dies with which co-operate a plurality of movable dies which are elevated by means of a rotatable screw or threaded shaft, which has co-operating with it clutch members, one for each movable die, and provision is made for manually controlling the engagement of the clutch members with said screw-shaft for automatically disengaging the clutch members from the screw-shaft when the movable dies are at the limit of their upward movement; for holding the movable dies in their elevated position; and for releasing them at the will of the operator and permitting them to drop by gravity and substantially in an instant to act on the work resting on the lower dies.

Provision is also made for holding the clutch member or members out of engagement with the screw-shaft while the movable dies are descending.

These and other features of this invention will be pointed out in the claims at the end of this specification.

Fig. 1 is an elevation of a drop-forging hammer embodying this invention, the movable dies being shown in their elevated position;

Fig. 2, a similar view showing the movable dies in their lowered position;

Fig. 3, a cross section on the line 3—3, Fig. 1, showing the clutch members disengaged from the screw-shaft, and

Fig. 4, a plan view of the anvil shown in Fig. 1, with one of the lower dies in place thereon.

Referring to the drawings, *a* represents a base or anvil block, preferably rectangular in shape, and upon which are erected uprights *d* which support at their upper end a top plate 10 having uprights 12 in which is mounted a driving shaft 13, provided with a beveled pinion 14, which meshes with and drives a beveled gear 15 fast on a screw-shaft 16 which has its lower end stepped in a bushing 17 in the base *a* (see Fig. 2).

In the present instance, the base *a* is provided in its upper surface with four guideways 20 located substantially 90° apart (see Fig. 4) for the reception of dovetailed keys or lugs 21 on the underside of four die blocks 22 which rest solidly on the base *a* and are provided in their upper sides with the desired or proper dies for the shaping of the article to be hammered. The die blocks 22 are removable from the base but when placed thereon as represented in Fig. 1, are practically stationary.

The die blocks 22 may be designated the lower dies and have co-operating with them upper die blocks 25 dovetailed into the lower surface of hammer blocks 26 located between adjacent uprights *d*, each hammer block having removably secured to it by the dovetailed key or rib 28 an upper die block 25, which is aligned with the lower die block 22 with which it co-operates.

Each hammer block 26 slides up and down on guides or ribs 27 attached to the uprights *d*, and is provided on opposite sides with guideways 29 into which the ribs or guides 27 extend.

Each hammer block 26 carries a clutch member 31 which is suitably shaped to engage the screw or threaded shaft 16, and is designed to be forced by a spring 32 between the screw-threads when it is desired to raise the hammer block from its lowered position shown on Fig. 2 into its elevated position shown in Fig. 1.

The spring 32 is located in a socket 33 in the hammer block 26 and surrounds a stem or rod 34 attached to the clutch member 31

and extended through a suitable opening in the hammer block to the outside thereof.

The clutch member 31 is designed to be automatically disengaged from the screw-shaft 16 when the hammer block has reached the limit of its upward movement. To this end, the stem 34 of the clutch member 31 is provided on one side with an elongated slot or notch 35, with which co-operates a wedge-shaped member 36 secured to a supporting member 37 fastened to the uprights *d* in any suitable manner.

The stem 34 is made of suitable length to leave a sufficient length of the slot or notch 35 projecting beyond the hammer block when the clutch member 31 is engaged with the screw-shaft, so that as the hammer block approaches the end of its upward travel, the end of the wedge member 36 will enter the notch or slot 35 in the stem 34 and on further upward movement of the hammer block will gradually move the stem 34 outwardly and disengage the clutch member 31 from the screw-shaft 16 at or about the time the hammer block has reached the end of its upward movement.

Provision is made for retaining the hammer block in its elevated position with the clutch member disengaged from the screw-shaft 16. To this end, the hammer block 26 is provided with an upright projection 40 having a pin 41 which is designed to be engaged by a hook 42 on the lower end of a lever 43 which is pivoted at 44 to the stationary plate or member 10 and has its upper end connected with a spring 45 which acts to normally position the lever 43 so that its hooked end is in the path of the pin 41 and will be engaged therewith after the manner shown in Fig. 1. The lever 43 acts as a means for holding the hammer block in its elevated position until released therefrom by the operator.

In the present instance, the holding lever 43 is shown as connected at its upper end by a pin and slot connection 47—48 with a lever 49 pivoted to the stationary plate or member 10 and having its lower end connected by a link 149 with a foot treadle, not shown, so that, when the foot treadle is depressed by the operator, the holding lever 43 will be turned into substantially the position shown in Fig. 2, so as to release the hammer block 26 and allow the latter to drop and cause its die to strike the work 50 resting on the lower die 22 and thereby impart to the work the shape of the dies.

Provision is made for locking or holding the clutch member 31 in its disengaged position, and to this end, the hammer block has pivoted to its outer end a lever 52 which is arranged to extend over the stem 34 of the clutch member and to be entered into a slot 53 in the upper surface of the said stem, by a spring 54 when the stem has been moved outwardly by the wedge member 36 sufficiently to disengage the clutch member 31 from the screw-shaft 16.

In Fig. 1, the locking lever 52 for the clutch member 31 is shown as entered into the slot 53 and in Fig. 2, it is shown as elevated from said slot, which is effected by the operator, when he desires to clutch the hammer block to the screw-shaft.

The lever 52 may be provided with a pin 56 which serves as a handle for the operator, and when the locking lever 52 is raised by the operator, the clutch member 31 is immediately engaged with the screw-shaft 16 by the spring 32 and as soon as the spring 32 has moved the clutch into engagement with the screw-shaft, the operator releases the handle 56 which allows the spring 54 to lower the locking lever 52 into engagement with the unslotted end of the stem 34, upon which it rides or bears, until the stem 34 has been moved outwardly by the wedge member 36 so as to bring the slot 53 into alignment with the lever 52 which is entered therein by its spring 54 and serves to lock or hold the clutch member 31 in its disengaged position represented in Fig. 3.

In the present instance, the drop-forging hammer is shown as provided with a plurality of co-operating sets of dies arranged substantially 90° apart, and these dies may be shaped so as to perform a plurality of different operations on the work, or the dies may be shaped so that the sets may perform the same operation.

In the present instance, the holding lever and its releasing mechanism for only one hammer block is shown to avoid confusion in the drawing, but it will be understood that each hammer block 26 has co-operating with it a holding lever 43 and a releasing lever 49 therefor, so that each individual hammer block may be operated independently of the others or they may be simultaneously operated.

The operation of the hammer may be readily understood from the foregoing description.

While it is preferred to provide the hammer with a plurality of individually controlled upper die blocks, which are moved upwardly by a screw-shaft; disconnected therefrom and allowed to drop by gravity, it is not desired to limit the invention to this particular embodiment of the invention.

What is claimed is:—

1. In a drop-forging hammer, in combination, a base provided with a lower die, a screw-shaft erected upon said base, an upper die provided on its inner surface with a socket, a spring in said socket, a clutch member having a stem extended through said socket and through said upper die and acted upon by said spring to couple the upper die with said screw-shaft, a stationary wedge

member located in the path of movement of said stem to be engaged with the stem on the upward movement of the upper die and effect longitudinal movement of said stem against the action of said spring to disengage the clutch member from said screw-shaft, a holding lever carried by said upper die and co-operating with said stem to engage and hold the latter against movement by its spring after it has been moved by said wedge member, a pin carried by said upper die, a holding lever normally in position to be engaged by said pin when the upper die reaches the end of its upward movement, and a spring to hold said lever in position to be engaged by said pin.

2. In a drop-forging hammer, in combination, a base provided with a lower die, a screw-shaft erected upon said base, an upper die provided on its inner surface with a socket, a spring in said socket, a clutch member having a stem extended through said socket and through said upper die and acted upon by said spring to couple the upper die with said screw-shaft, a stationary wedge member located in the path of movement of said stem to be engaged with the stem on the upward movement of the upper die and effect longitudinal movement of said stem against the action of said spring to disengage the clutch member from said screw-shaft, and a holding lever carried by said upper die and co-operating with said stem to engage and hold the latter against movement by its spring after it has been moved by said wedge member.

3. In a drop-forging hammer, in combination, a lower die, an upper die movable toward and from said lower die, a rotatable screw-shaft, a clutch member carried by said upper die and provided with a stem extended to the outside of the upper die and provided with an elongated slot, a spring to force said clutch member into engagement with said screw-shaft, a wedge member located in the path of movement of the stem co-operating with said elongated slot to enter the same and act on said stem to disengage said clutch member from said screw-shaft and permit the upper die to drop toward said lower die, and means co-operating with said stem to hold the clutch member disengaged from the screw-shaft while it is dropping.

4. In a drop-forging hammer, in combination, a lower die, an upper die movable toward and from said lower die, a rotatable screw-shaft, a clutch member carried by said upper die and provided with a stem, a spring to force said clutch member into engagement with said screw-shaft, and a wedge member located in the path of movement of said stem to be engaged with the stem on the upward movement of the upper die and effect longitudinal movement of said stem against the action of said spring to disengage the clutch member from said screw-shaft, and means co-operating with said stem to hold the clutch member disengaged from said screw-shaft.

5. In a drop-forging hammer, in combination, a lower die, an upper die movable toward and from said lower die, a rotatable screw-shaft, means for rotating it continuously in a direction to elevate the movable die, a clutch member carried by the upper die for coupling the latter with the screw-shaft having a stem projecting beyond the upper die, a spring to force the clutch member into engagement with said screw-shaft, and a wedge member co-operating with the stem of the clutch member to be engaged by said stem and effect longitudinal movement of the stem and disengagement of the clutch member from the screw-shaft independently of the latter.

In testimony whereof, I have signed my name to this specification.

HENRY BIRMINGHAM.