

May 10, 1932.

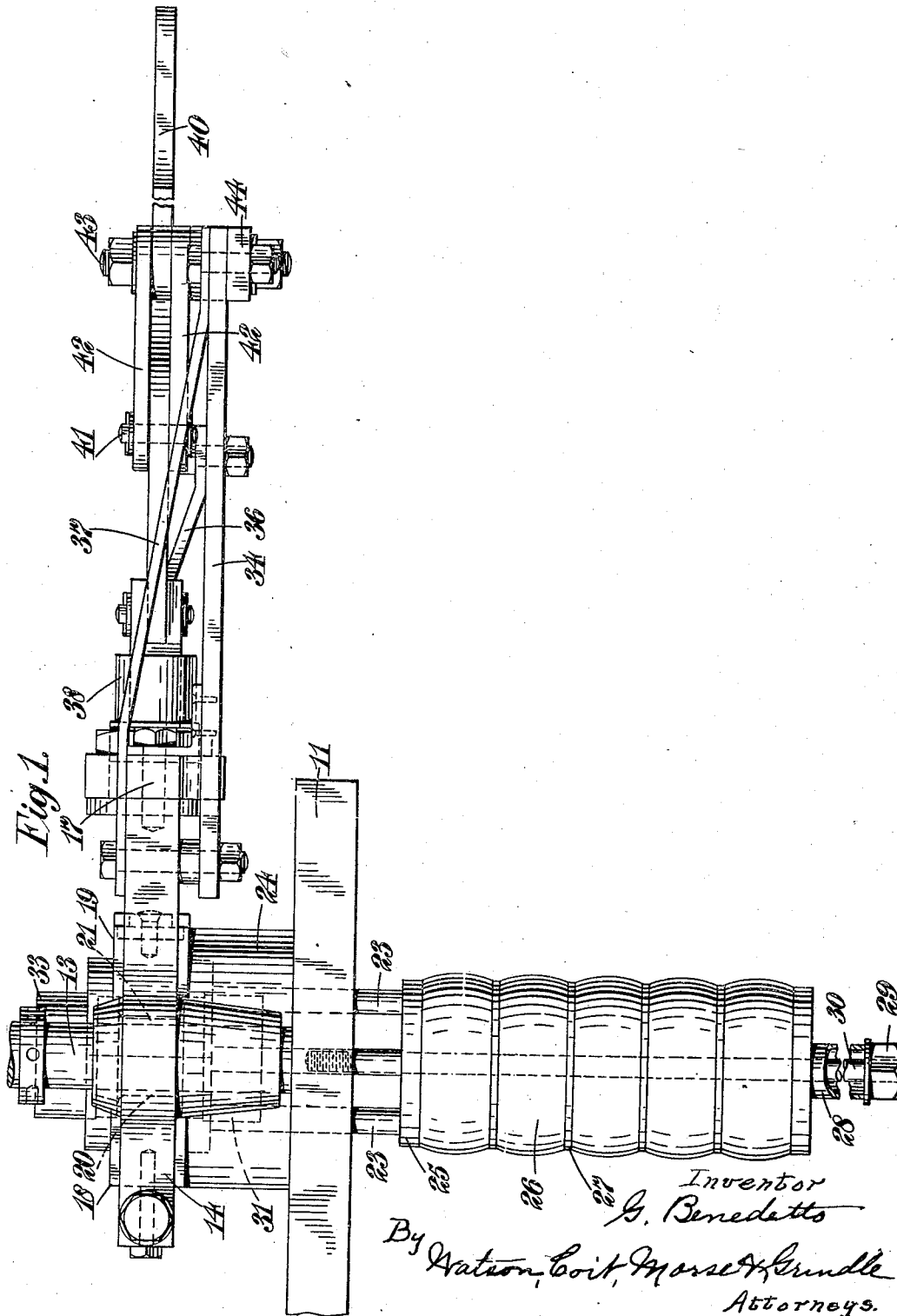
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**1,857,708**

FORGING

Filed Aug. 4, 1931

3 Sheets-Sheet 1



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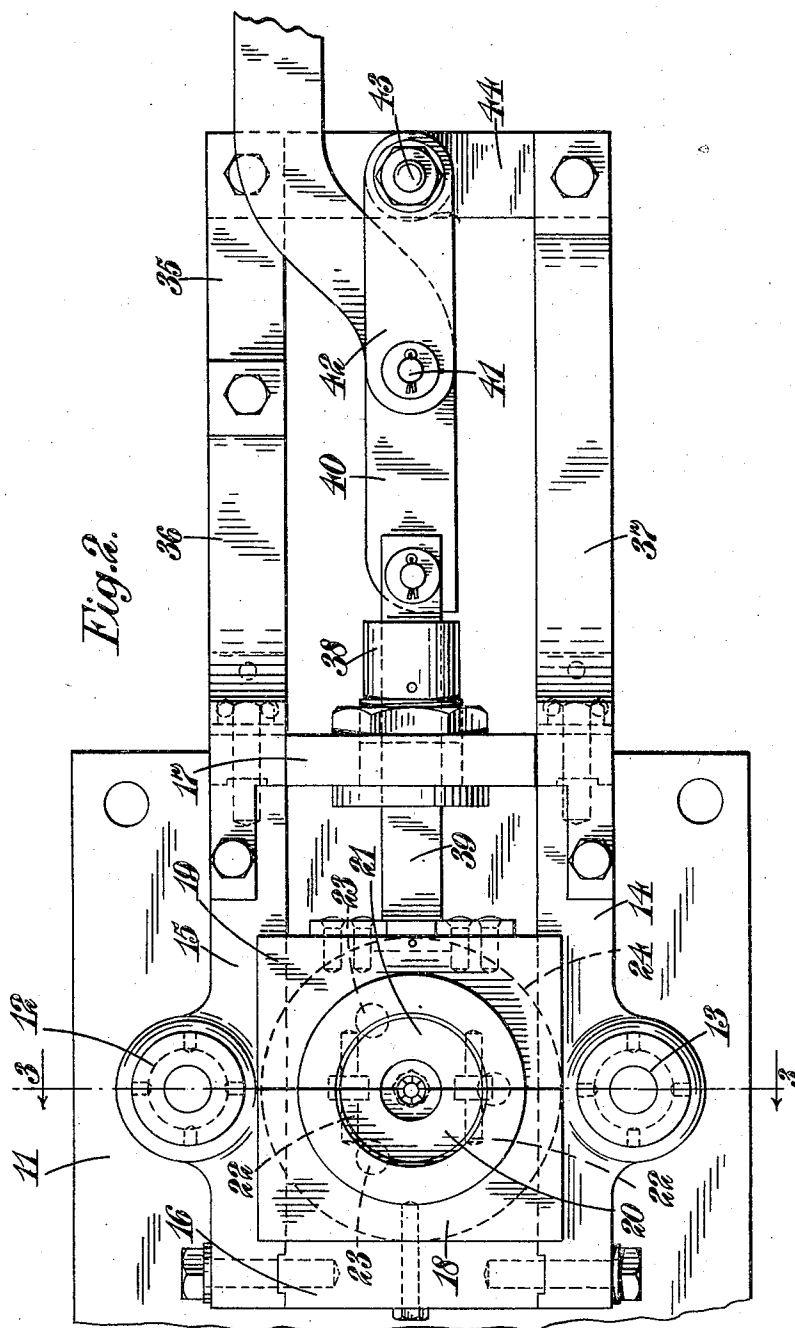
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## UNITED STATES PATENT OFFICE

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## FORGING

Application filed August 4, 1931, Serial No. 555,123, and in Great Britain June 10, 1930.

This invention comprises improvements in or relating to forging and has for its object to provide means whereby enlargements may be upset and shaped upon blanks at a plurality of positions along the length of the blank with a minimum of time and expenditure of heat energy. The employment of electric forging and upsetting machines is well known and in prior United States patent application Serial No. 481,334 there is described a machine in which blanks may be upset electrically so as to provide a plurality of enlargements at different points of their length, particularly at the ends, and the present invention contemplates the employment of forging operations such as are described in the aforesaid patent application.

According to the present invention a die for forming two upset end portions of a forging simultaneously comprises in combination die blocks for engaging the two ends of the forging, a holder to locate the forging between the die blocks, yielding means for supporting the holder with a forging therein between the die blocks to permit the forging (with its holder) to be forced against one die block by pressure of the other die block. By this means it is possible to form, or perfect, a head or enlargement on the work by the contact thereof with the movable die block at one end and the other die block at the other end simultaneously. The heads thus formed may be given suitable shapes by appropriately forming the die blocks as desired.

Preferably the holder takes the form of a work-holding vice provided with die-recesses for the purpose of shaping the exterior of the forging when the die blocks are brought into contact therewith.

The die may be formed as an attachment for a forging press, with the movable die block secured to the movable head of the press.

The invention includes a method of forging double-headed members consisting in taking a blank of a section similar to that desired for the body portion of the finished forging, upsetting heads thereon in an electric upsetting machine at both ends thereof and thereafter introducing the blank into a forging

die as above described and bringing both ends of the forging to shape at the same time.

Preferably, the heads are upset by the upsetting apparatus on both ends of the blanks simultaneously, the work being preferably transferred from the upsetting apparatus to the forging die while still hot so that intermediate heating is rendered unnecessary.

The invention further relates to various constructional features of the apparatus and details of the method, both of which will now be described with reference to a specific embodiment of the apparatus taken by way of example only.

The apparatus to be described is suitable for use in a forging press of ordinary construction as an attachment thereto, but it will be understood that a special forging machine having the characteristics described could be employed if desired.

In the accompanying drawings which illustrate said specific embodiment of the invention—

Figure 1 is a side elevation of a die.

Figure 2 is a plan of the same, and

Figures 3 and 4 are vertical sections upon the line 3—3 of Figure 2, showing the die in two operative positions.

A base plate 11 is provided for the attachment, adapted to be secured upon the die-holding plate of a forging press.

Upon the plate are two upstanding guide pillars 12, 13 and upon the guide pillars there is slidably mounted a rectangular steel vice-frame which consists of side members 14, 15 united by cross members 16, 17. The vice-frame rests upon a resilient rubber support as hereinafter described, and this permits it to yield under superimposed pressure.

Two vice jaws 18, 19 are provided in the frame 14, 15. The jaw 18 is shown fixed at one end of the frame while the jaw 19 is slidable relatively thereto. The vice jaws 18, 19 carry removable die sections or gripping members 20, 21 which are recessed to conform with the exterior of the forging to be produced and are secured in the jaws by means of fixing screws 22. The underside of the jaws 18, 19 rests upon three sliding pins 23 which pass through a die block 24 below

the vice and through the base plate 11 into engagement with the yieldingly supported presser plate 25.

The presser plate 25 is supported upon a stack of rubber blocks 26, interspaced by washers 27 and carried at their bottom end upon a supporting tube 28 which is held up by a nut 29 on a central rod 30 which passes upwardly through the tube 28 and the rubber blocks 26. The central supporting rod is screwed to the underside of the base plate 11. By means of the nut 29 the force exerted upwardly upon the pins 23 may be adjusted. It will be understood that this force is adequate to lift the vice-frame with the forging secured therein and the operating means for the vice jaw 21, against the action of gravity and hold it in the uplifted position spaced from the underlying die block 24. The parts are shown in this position in Figure 4 of the drawings.

The die block 24 is formed with a removable central die 31 which is shaped to correspond with the form of the finished forging desired. It is secured to the base block 11 by means of bolts 32.

Above the vice is a movable die block 33 which is intended to be shaped to conform with the other end of the desired forging (see Figure 3). The upper movable die block 33 is intended to be mounted in the movable head or ram of a forging press.

At one end of the vice-frame there is mounted a projecting framework which is bolted to the side members 14, 15 and consists of lower parallel bars 34, 35 and upper bars 36, 37 which serve to triangulate the construction and stiffen the support of the parallel bars 34, 35.

In the cross member 17 there is secured a bush 38 in which slides a ram 39 secured to the movable vice jaw 19. The ram 39, between the frame members 34, 35 is pivoted to a bent toggle lever 40, prolonged to form an operating arm the whole of which is not shown in the drawings. The toggle lever 40 is pivoted at 41 to a pair of parallel links 42 and the links 42 are pivoted at 43 to a cross member 44 carried by the frame members 34, 35.

It will be seen that the links 42 complete the toggle, or they may be regarded as the equivalent of a crank. It would be possible to substitute for the toggle a crank or an eccentric, which is the equivalent of a crank bearing upon the end of the ram 39 for the purpose of advancing the vice jaw without the intermediary of a toggle lever such as 40.

In operation of the method of forging according to the present invention a blank which may be destined to be formed, say, into a hub for a bicycle wheel, is taken of a diameter equal to the central or body portion of the desired forging. A sufficiency of metal is upset electrically at each end thereof simultaneously in a machine constructed as de-

scribed in the aforesaid United States patent application Serial No. 481,334.

The piece with its ends still glowing red is rapidly taken and placed between the jaws 20, 21 of the vice which are brought together by operation of the lever 40 and grip the part between them.

Thereafter the movable forging head which carries the die 33 is brought down and depresses the part, together with the vice 14, against the resilient pressure of the rubber blocks 26 until the part engages the lower die 24. Further movement of the dies towards one another causes the hot metal to be forced into the shape provided between the vice jaws and the dies. If the initial upsetting has been conducted in such a manner as to provide the appropriate amount of metal the result is a true forging executed without waste in a single heat.

Upon release of the pressure of the upper die by raising the plunger of the press, the rubber blocks 26 raise the vice jaws 18, 19 into the position shown in Figure 4, and upon opening the vice jaws by operation of the lever 40 the finished piece can readily be removed from the machine.

It will be observed that the ejecting pressure of the rubber blocks can readily be varied by operation of the nut 29.

I claim:—

1. A die for forming two upset end portions of a forging simultaneously, comprising in combination, a pair of die blocks relatively movable in a predetermined path toward each other for engaging the two ends of the forging, a forging holder to position the forging between the die blocks, a supporting member, pillars disposed on opposite sides of said die blocks and extending parallel to the path of relative movement thereof, said pillars being carried by said supporting member, a pair of sleeve elements, each element being mounted for sliding movement on one of said pillars, parallel guides carried by said sleeve elements and engaging said holder to support the latter for movement in a plane transverse to the path of relative movement of said pillars, and means yielding in the path of relative movement of said die blocks for normally supporting the holder with a forging therein between the die blocks, whereby the forging may be forced against one die block by pressure of the other die block.

2. A die for forming two upset end portions of a forging simultaneously, comprising in combination, a pair of die blocks relatively movable in a predetermined path toward each other for engaging the two ends of the forging, a forging holder to position the forging between the die blocks, said holder having relatively movable portions for gripping the forging therebetween, a supporting member, pillars disposed on

opposite sides of said die blocks and extending parallel to the path of relative movement thereof, said pillars being carried by said supporting member, a sleeve element mounted for sliding movement on each pillar, parallel guides carried by said sleeve elements and engaging the portions of said holder to support the latter for relative movement in a plane transverse to the path of relative movement of said pillars, and means yielding in the path of relative movement of said die blocks for normally supporting the holder with a forging therein between the die blocks, whereby the forging may be forced against one die block by pressure of the other die block.

In testimony whereof I affix my signature.  
GIUSEPPE BENEDETTO.