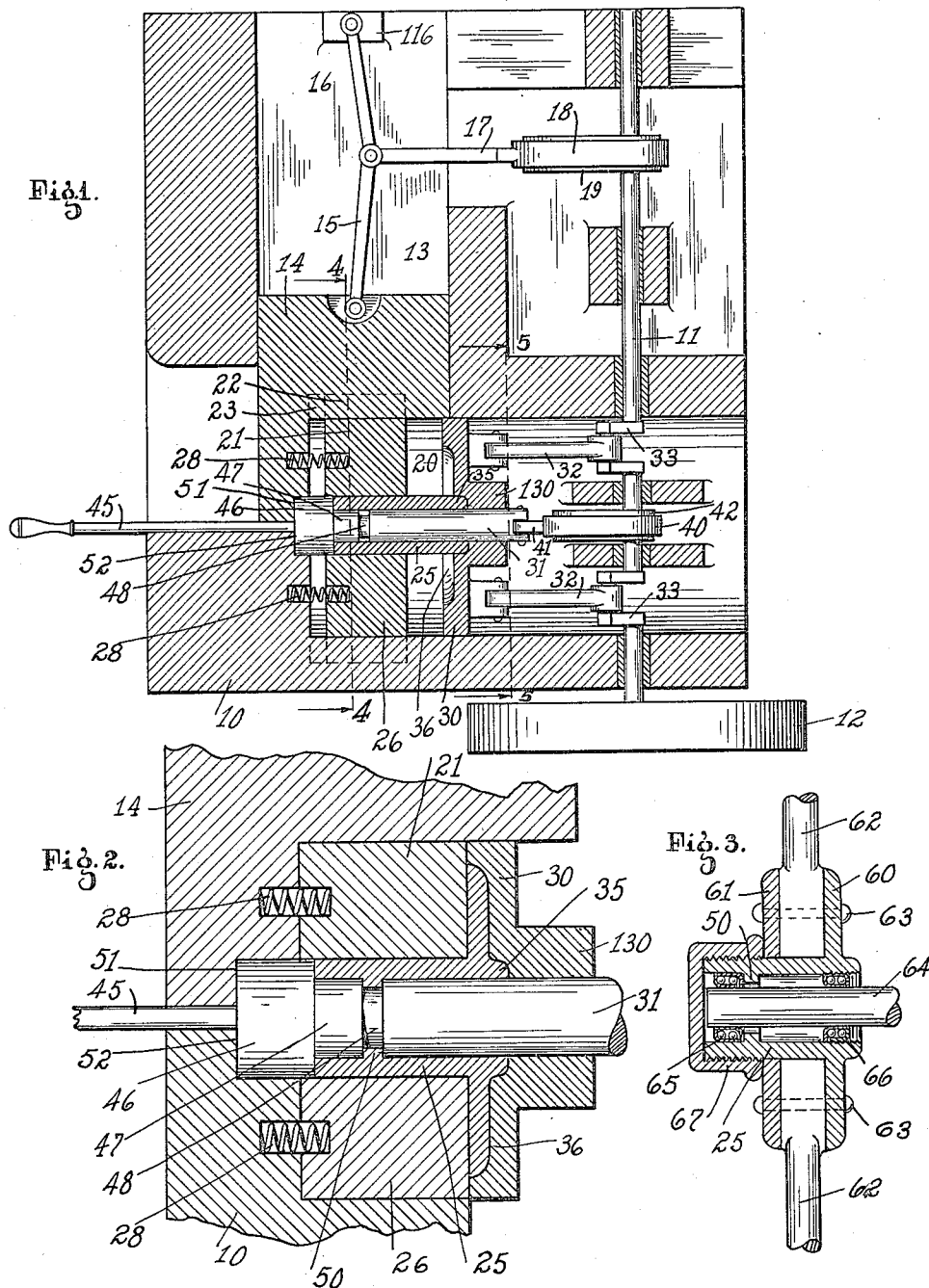


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F. P. BATES.
FORGING MACHINE.
APPLICATION FILED JULY 28, 1913.

Patented Aug. 31, 1915.
2 SHEETS—SHEET 1.



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Fig. 4.

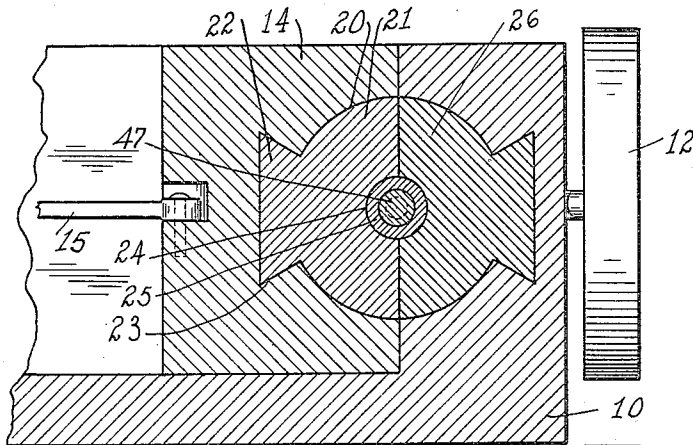


Fig. 5.

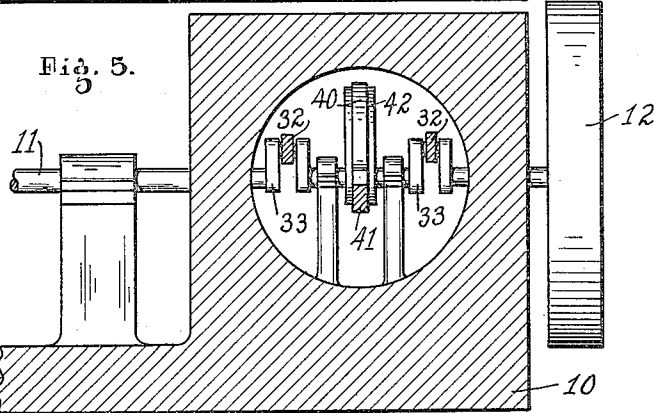
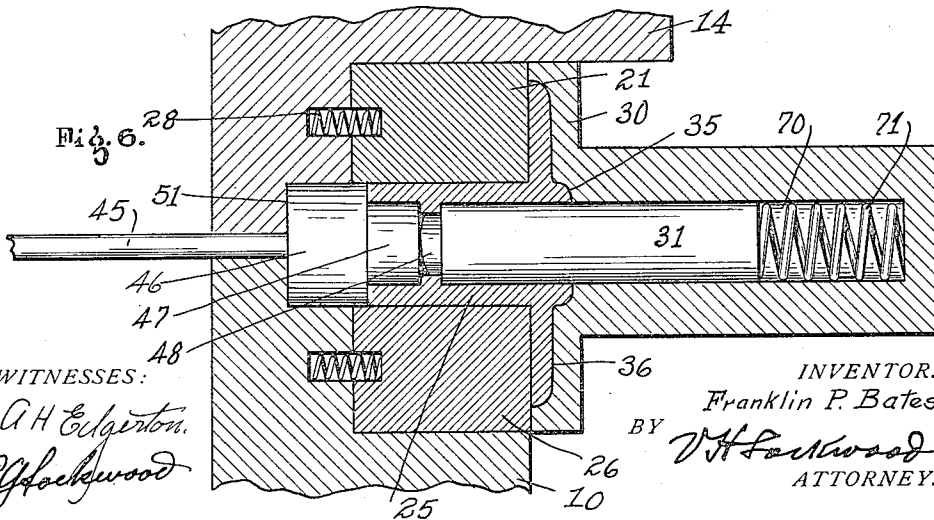


Fig. 6.



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UNITED STATES PATENT OFFICE.

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FORGING-MACHINE.

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Specification of Letters Patent.

Patented Aug. 31, 1915.

Application filed July 28, 1913. Serial No. 781,557.

To all whom it may concern:

Be it known that I, FRANKLIN P. BATES, a citizen of the United States, and a resident of Indianapolis, county of Marion, and State of Indiana, have invented a certain new and useful Forging-Machine; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which like letters refer to like parts.

The object of this invention is to provide a machine for forming vehicle hubs out of metal tubes. The invention has been made with particular reference to the rapid and economical construction of hubs for automobiles.

The chief feature of the invention consists in the means for upsetting a straight metal tube so as to form an external spoke flange some distance from both ends of the hub, and an internal annular rim or flange which holds the bearing box in place. Such internal and external flanges are required in most automobile hubs now in use and means is herein provided for forming the same from a straight tube and forming the same, preferably, in one operation of the machine, the two flanges being simultaneously formed. External spoke flanges have been formed at the end of the hub, but so far as known, there has never been any machine provided for forming such external spoke flange at a point away from the end of the tube or hub and also for forming said internal flange. Automobile manufacturers require said flange formed substantially at the point herein shown and away from the end of the hub.

In carrying out said invention, a metal tube is cut in proper lengths and one length of tube is heated and held in place in the machine by suitable external die members or formers, and one end of the tube contains and is held by a substantially stationary die member, and a plunger die enters the other end of the tube, said two internal die members being formed so as to leave a space for the internal flange of the hub while being formed, and a movable die member acts against the end of the tube and upsets it and forms the internal spoke flange some distance from the end of the tube.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings, Figure 1 is a horizontal section through the machine just before the movement of the movable die member. Fig. 2 is a portion of what is shown in Fig. 1 on a larger scale with the parts after operation of the movable die member, showing the hub in completed form. Fig. 3 is a section through a portion of an automobile wheel for illustrating the use of said hub. Fig. 4 is a section on a line 4-4 of Fig. 1. Fig. 5 is a section on the line 5-5 of Fig. 1. Fig. 6 is a section substantially the same as Fig. 2, but showing a modified form.

The machine is provided with a main frame 10 having a horizontally disposed shaft 11 with a wheel 12 which serves both as the drive wheel and fly wheel, although that is immaterial. There is a transverse guideway 13 carrying a sliding block 14 which is operated by the toggle links 15 and 16, one being pivoted to said block 14 and one to a stationary part 16 and the two links being pivoted to the end of a rod 17 extending from a strap 18 surrounding a cam 19 secured on shaft 11. Therefore, during each revolution of the shaft 11, the block 14 is moved back and forth. Said block 14 is provided with a semi-circular recess 20 in one side to receive the die member 21 which has a dovetailed flange 22 which operates in a correspondingly formed guideway 23, as indicated in Fig. 4. On one side, said die member 21 has a semi-circular recess 24 to receive the metal tube 25 from which the hub is to be formed. Opposite said die member 21 there is a corresponding die member 26 of the same shape and size and mounted in the same manner in a fixed portion of the machine. It has a recess corresponding to the recess 24 so that said two die members 21 and 26 hold between them said tube 25 and since the die member 26 is relatively fixed, the other die member is moved up clamping the tube 25 between said die members through the action of the toggle 15. Each die member 21 and 26 is cushioned by a spring 28, the ends of which are embedded in said die members and the parts in which they are mounted respectively, as shown in Fig. 1. Said springs 28 normally hold the die members 21 and 26 outward somewhat.

The movable die member 30 is a plate with a thickened or reinforced portion 30 through the center of which the plunger die member 31 operates. Said movable die

member 30 is moved toward the die members 21 and 26 by connecting rods 32 mounted on cranks 33 on the shaft 11 so that both connecting rods 32 will be simultaneously operated to force the die member 31 toward the die members 21 and 26. The surfaces of the die members 21 and 26 which are adjacent the die member 30 are flat. A portion of the surface of the die member 30 adjacent said other die members is likewise flat, but it has a relatively deep recess 35 immediately surrounding the opening for the plunger 31, said recess being of such size as to admit the end of the tube 25. There is an additional recess 36 and circular in form in the base of said die member 30 surrounding said recess 35, but not so deep. Said last mentioned recess 36 is to form the spoke flange.

The plunger 31 which extends through the die member 30 is actuated by a strap 40 which is connected with the plunger by a rod 41 and which surrounds a cam 42 secured on the shaft 11 between the cranks 33.

After the tube section 25 has been heated by some proper means, not shown here, it is picked up by a die member secured to a handle 45. Said die member referred to consists of an enlarged portion 46 secured immediately to the handle 45 and of a diameter substantially the same as the external diameter of the tube 25, and of a reduced portion 47 which is the same diameter substantially as the internal diameter of the tube 25, and a still further reduced portion 48 which has a diameter equal to the internal diameter of the internal flange 50 of the hub, and the reduced portion 48 of said die member has a length equal to the width of said flange 50. After the tube 25 is picked up by said die member and handle, it is inserted upon the end of the plunger 31 when in retracted position, not shown, and at the same time it is put in place in the recess in the die member 26 for said tube and the portion 46 of the die member on the handle 45 is placed in a recess 52 in the frame of the machine and then the further operation of the machine moves the sliding block 14 and die member 21 up toward the tube 25 and said block 14 has a recess 51 corresponding to recess 52 for partially surrounding the portion 46 of the die member on the handle 45. In this way the die member on the handle 45 is held in fixed position and is clamped and likewise the tube 25, which is to be treated, is clamped securely between the die members 21 and 26. After the tube has been thus clamped by the parts referred to, the further rotation of the shaft 11 will cause the plunger 31 to penetrate the tube 25 until it comes against the part 47 of the die member on the handle 45. Thereafter the parts 47 and 48 of the die member on the handle 45 remain momentarily station-

ary in the tube so as to maintain the internal form of the tube in its original diameter excepting at the flange 50.

In the next place the further rotation of the shaft 11 will force the movable die member 30 toward the die members 21 and 26 and after driving them, in spite of their springs 28, against the solid walls of the block 14 and of the frame of the machine, respectively, it will upset the tube and form a spoke flange 60 by cooperating with the die members 21 and 26. It will also force the middle of the tube into the space around the part 48 of the die member on the handle 45 and form the internal flange 50. Then the parts will be in the position shown in Fig. 2, and the hub 25 will be completed.

As shown in Fig. 3, said hub 25 has an integral spoke flange 60 and also a ring 61 which surrounds the hub, and spokes 62 are secured between said parts 60 and 61 by bolts 63. The axle 64 extends through the hub and is carried by two roller bearings 65 and 66. The roller bearing 65 is driven into the hub against the flange 50 and the purpose of said flange is to hold said roller bearing 65 in place. The other roller bearing 66 is threaded into the hub or may be otherwise supported, and a cap 67 is secured to the outer end of the hub.

In the modified form shown in Fig. 6, the cam 42 is omitted and consequently the strap 40 and rod 41, and the plunger 31 does not extend entirely through the movable die member 30, but only partially therethrough, extending into a hole 70 against a spring 71 embedded in said hole. The only difference resulting from this modified form is that the plunger 31 is not actuated until and excepting by the movable die member 30 and when it moves up, it carries with it the plunger 31 until said plunger 31 engages the part 48 of the die member on the handle 45. Then said plunger 31 stops, but the movable die member 30 continues to move and the spring 71 is compressed.

The invention is:

1. A machine for forging articles from metal tubes including a frame, means for externally holding the tube in position in said frame to be treated, means insertible in said tube having a reduced portion, and an external die member movable endwise against the tube for forcing the metal of the tube around a reduced portion of the means within the tube for forming an internal flange in the tube.

2. A machine for forging articles from metal tubes including a frame, means for externally holding the tube in position in said frame to be treated, two cylindrical die members insertible in the respective ends of said tube until they abut against each other, one of said die members being in fixed position on the frame and there being a reduced

end portion on one of said internal die members, a movable die member surrounding said internal die member, and means for forcing said latter die member endwise against the tube for forming an internal flange in said tube.

3. A machine for forging articles from metal tubes including a frame, means for externally holding the tube in position in said frame to be treated, a die member insertible in one end of said tube and adapted to be held in fixed position, a plunger adapted to enter the other end of said tube, one of said internal members having a reduced portion on the end thereof, a die member movable endwise against the end of the tube for forcing the metal thereof around the reduced portion of the member within the tube for forming an internal flange, and means for actuating said plunger first and thereafter said movable die member.

4. A machine for forging articles from

metal tubes including a frame, means for externally holding the tube in position in said frame to be treated, a handle having on the end thereof a die member consisting of an enlarged portion adapted to be seated fixedly in the frame, a second portion adapted to be inserted in said tube and of the same diameter as the internal diameter of the tube, a still further reduced portion within the tube, a plunger insertible in the other end of the tube of the same diameter as the internal diameter of the tube, an external die member movable toward and against the end of the tube, and means for operating first said plunger and then said movable die member.

In witness whereof, I have hereunto affixed my signature in the presence of the witnesses herein named.

FRANKLIN P. BATES.

Witnesses:

O. M. McLAUGHLIN,
J. H. WELLS.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."