Nov. 21, 1933. H. H. HAGER 1,935,742

APPARATUS FOR FORGING VALVES

Filed July 30, 1930 3 Sheets-Sheet 1

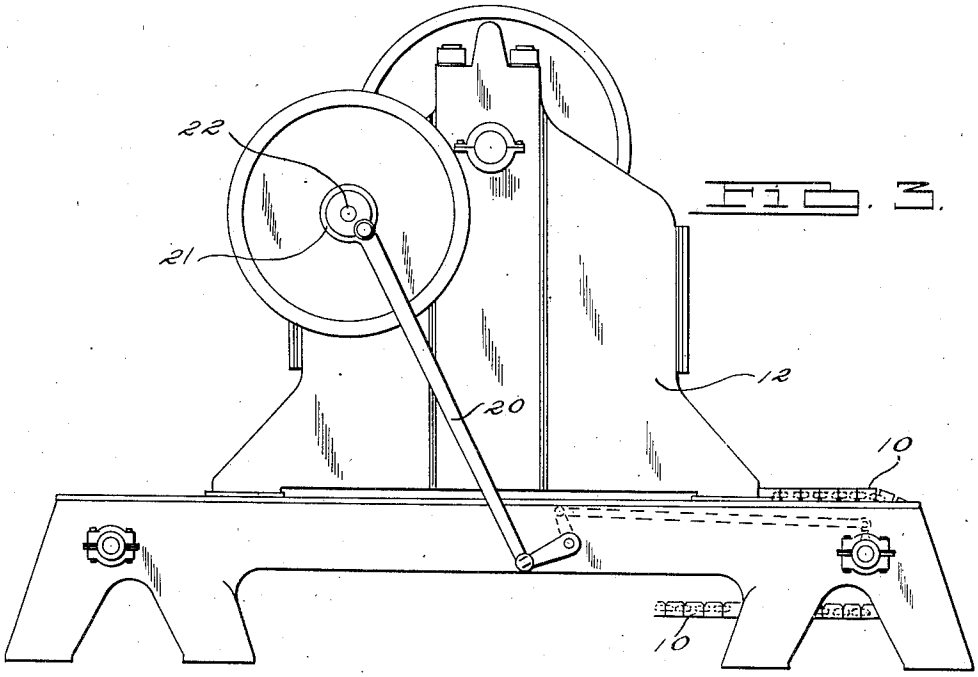


Fig. 3.

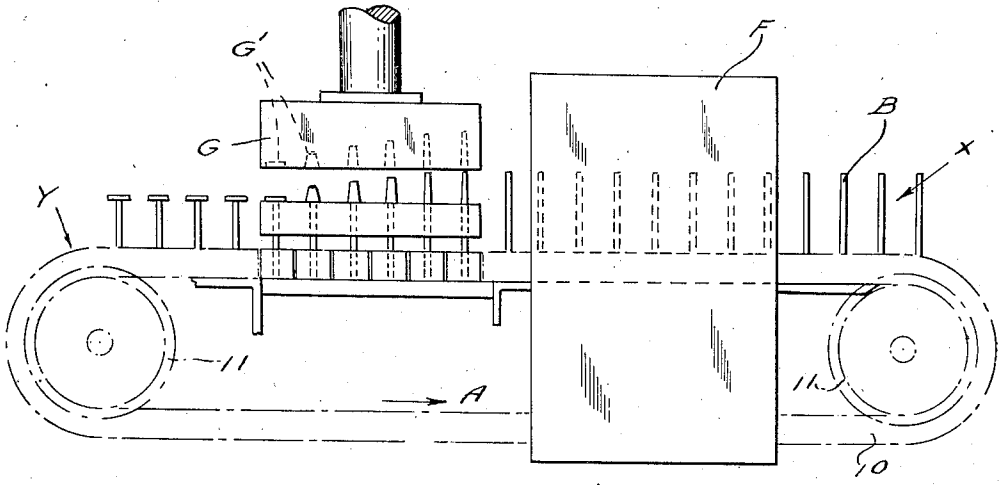


Fig. 1.

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APPARATUS FOR FORGING VALVES

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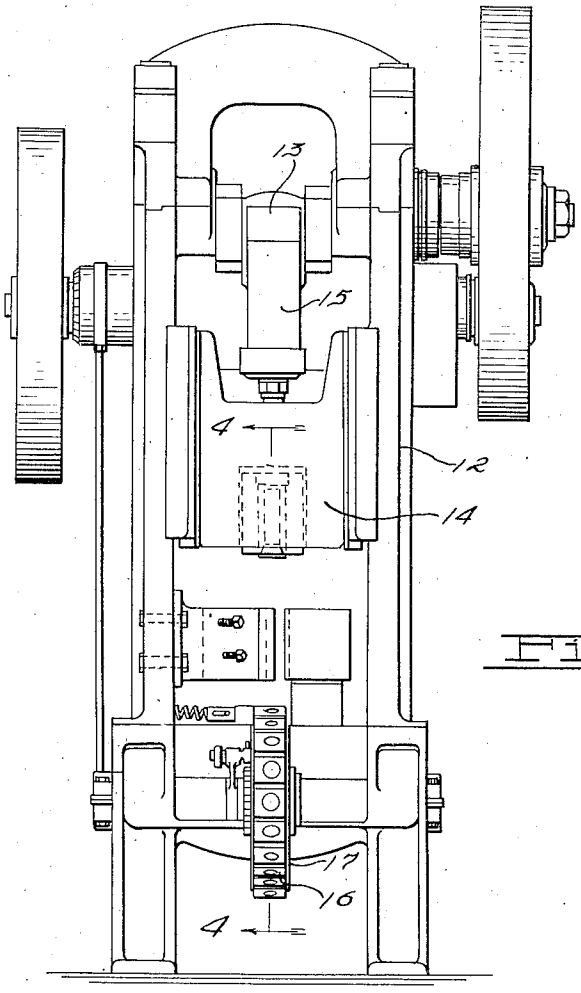


Fig. 2.

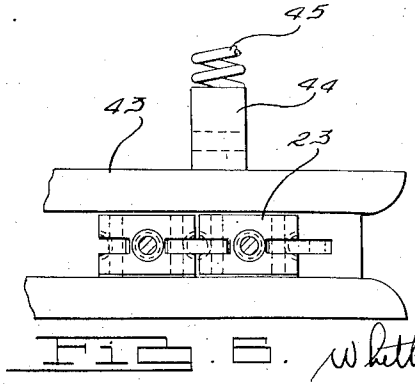


Fig. 6.

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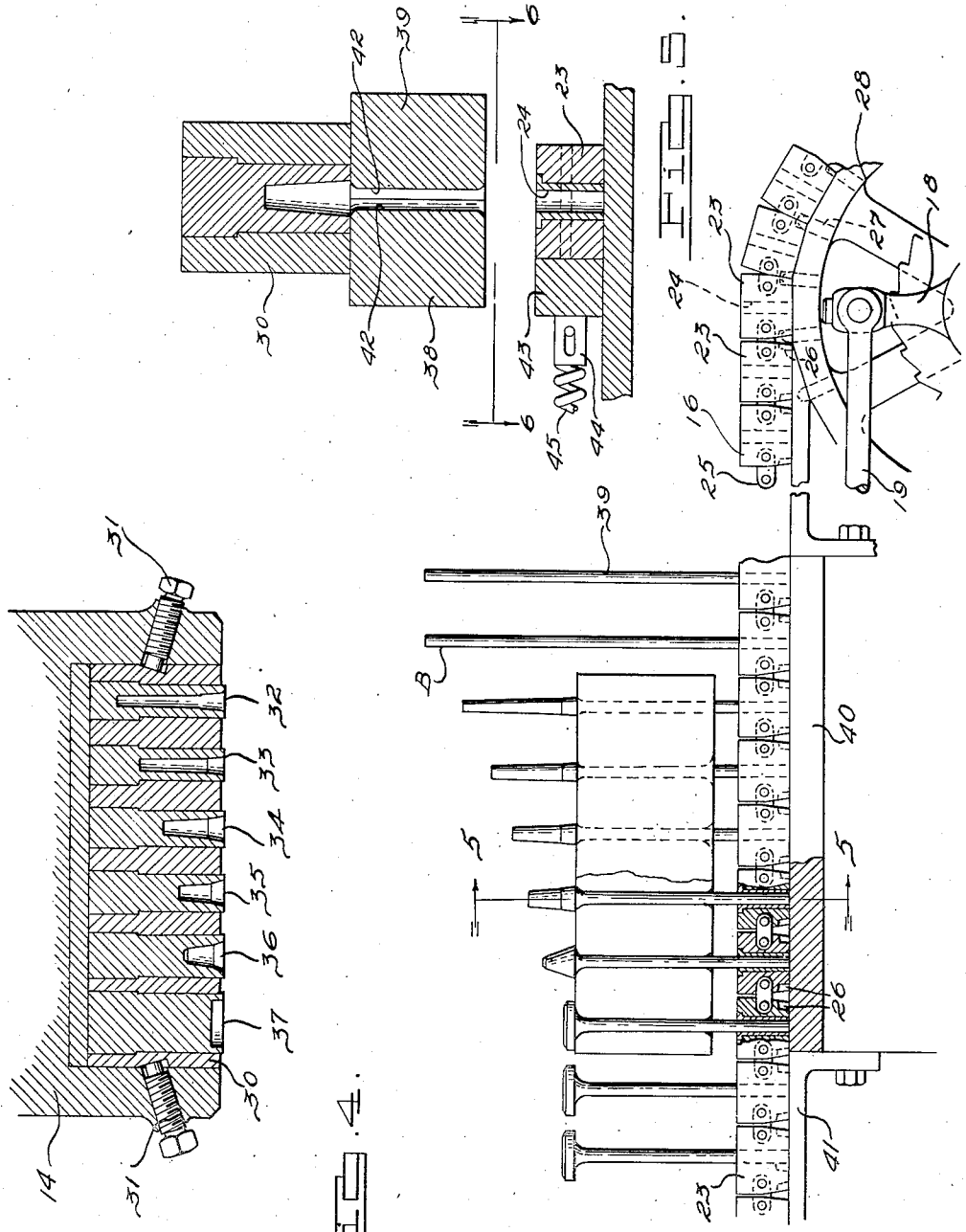


FIG. 4.

FIG. 5.

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APPARATUS FOR FORGING VALVES

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Application July 30, 1930. Serial No. 471,777

4 Claims. (Cl. 78—13)

This invention relates to the method of and apparatus for forging valves and has as its objects to provide a method and apparatus whereby valves of, for instance, the poppet valve type, may be continuously produced. More specifically the invention contemplates a method and means whereby the stock or blanks which consist of rods having approximately the diameter of the required valve stem, are introduced into a furnace or other heating chamber and brought to the proper temperature and are then conveyed or fed by a step-by-step movement past a plurality of forging or upsetting dies, each blank being successively operated on by said dies to shape the metal at one end thereof to form a valve head.

In accordance with this invention the upsetting or shaping dies are arranged in a group or gang, the number of shaping dies corresponding to the number of operations required to produce the valve head, the dies on each pass simultaneously operating on a number of blanks corresponding to the number of upsetting operations required whereby one complete valve is produced on each pass of the forming or upsetting dies.

Other objects and advantages of this invention will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings wherein,

Figure 1 is a view illustrating diagrammatically in side elevation an apparatus by means of which my improved method will be carried into execution;

Figure 2 is an end elevational view of a forging machine constructed in accordance with this invention;

Figure 3 is a side elevation of the structure illustrated in Figure 2;

Figure 4 is an enlarged vertical longitudinal sectional view taken substantially on the plane indicated by line 4—4 in Figure 2;

Figure 5 is a vertical sectional view taken transversely of Figure 4 through one of the upsetting dies, and

Figure 6 is a fragmentary horizontal sectional view taken substantially on the plane indicated by line 6—6 in Figure 5.

Referring now particularly to Figure 1, my improved method of continuously forging valves will be described. Inasmuch as the particular instrumentalities used form no important part of the method, these instrumentalities have been illustrated in Figure 1 only diagrammatically. In this figure it will be noted that there is illustated an endless conveyer 10 passing around sprocket wheels or pulleys 11. This endless conveyer is adapted to receive and support in upright position a plurality of spaced blanks B and the endless conveyer is adapted to be driven in the direction of arrow A with an intermittent or step-by-step movement.

The stock or blanks B may be placed upon the conveyer 10 at the point X and inasmuch as the conveyer is moving in the direction of the arrow A, the stock or blanks will be conducted into and through a furnace F during which time they will be brought to the proper temperature. Obviously, if desired, the furnace F can be so constructed as to maintain the conveyer cool or relatively cool while heating only the upper ends of the blanks B.

As the blanks B emerge from the furnace they are presented to a forging or upsetting apparatus G consisting of a plurality of heading punches or upsetting dies G', the number corresponding to the number of operations necessary to produce the valve shaped head on the end of each blank rod B. Obviously, at each pass or operation of the forging apparatus, one operation is formed upon the blank so that when the apparatus is in operation, one complete valve is produced at each pass or operation of the forging or upsetting apparatus. The completed valves can be removed from the endless conveyer at the point Y.

Referring now more particularly to Figures 2 to 6 inclusive and in Figures 2 and 3, it will be noted that there is illustrated a continuous forging machine which can be employed alone, the blanks being heated in any suitable manner and placed on the conveyer, or may be associated with the furnace illustrated in Figure 1. Mounted upon the frame 12 of this machine is a crank shaft 13 which operates the movable or upper head 14 of the forging apparatus through a pitman rod 15. This upper die member 14 is in the form of a punch holder for holding a plurality of heading punches, yet to be referred to in detail.

The reference character 16 indicates an endless conveyer which passes over sprocket wheels 17 arranged at opposite ends of the frame of the machine, one of the sprocket wheels being driven intermittently with a step-by-step movement by means of an indexing mechanism 18 operated by a rod 19 actuated by a lever 20 which is reciprocated by means of a cam 21 on driven shaft 22.

By reference to Figures 4, 5 and 6 it will be noted that the endless conveyer 16 comprises a plurality of conveyer blocks 23 each provided with an aperture or socket 24 adapted to receive the lower end of the rod-like blank. These conveyer blocks are pivotally connected by links 25, the lower faces of each block being provided with a semi-circular recess 26 whereby a pair of adjacent recesses of adjacent conveyer blocks together form sockets engaged by peripherally arranged pins 27 on the indexing wheel 28 whereby the conveyer is driven. It will be obvious, however, that other desired or preferred forms of conveyer may be employed.

By reference to Figures 4 and 5 it will be noted that the movable head 14 of the forging apparatus is recessed to receive a heading punch holder 30 which is preferably removably secured

in place by set-screws 31. This punch holder is provided with a plurality of recesses for receiving a plurality of heading punches 32, 33, 34, 35, 36 and 37 adapted and shaped to successively operate upon the upper end of the blank B to produce the poppet valve shaped head thereon. Obviously, the number or character of these dies may be altered as the shape and nature of the valve being produced dictates. On the downward movement of the upper head 14 the heading punches descend down against a pair of gripper dies 38 and 39 which are adapted to grip the stem of the valve. These gripper dies are shown in closed position in Figure 5 with the punch dies at the end of the downward stroke.

The upper flight of the conveyer 16 as it passes under the forging apparatus is supported upon a bed plate 40 which also forms a support or abutment for the lower end of each of the blanks during the forging operations. On either side of the forging apparatus the upper flight of the conveyer is supported on frame member 41.

One of the gripper dies, for instance the gripper die 39, is arranged for lateral movement away from the other or stationary gripper die 38 during each indexing movement of the conveyer, so as to release the stem of the valve blank to permit the blank to be positioned under the next heading punch. It will be understood that the adjacent faces of the gripper dies 38 and 39 are provided with a plurality of semi-circular recesses 42 which together form cylindrical recesses for gripping the shank portion of the valve blank. When the movable gripper die 39 moves away fom the stationary gripper die 38, the conveyer 16 must be displaced laterally to move the shank of the valve blank out of the semi-circular recesses 42 of the stationary gripper die and for this purpose I provide a movable conveyer guide 43 normally urged in one direction by means of a releasing block 44 acted on by a spring 45. Thus, when the movable gripper die 39 moves laterally away from the stationary gripper die 38, the releasing block 44 will move the conveyer guide 43 laterally whereby the shanks of the blanks B will clear the semi-circular recess 42 so that they may be moved longitudinally of the machine under the next heading punch. The movable gripper die 39 may be operated in timed relation with the remainder of the machine in any preferred or desired manner as, for instance, by a toggle linkage (not shown).

In practice the blanks B are inserted in the sockets 24 of the conveyer and are fed by a step-by-step movement under the forging apparatus. Upon each downward movement of the head 14 the heading punches simultaneously act upon a corresponding number of blanks and as seen from the drawings, the end of the blank is shaped by these successive operations to produce the valve head. Obviously, after the machine has been operating, one complete valve is produced at each operation or pass of the forging apparatus.

The gripping dies engage and support the shanks of the valve blanks and as previously mentioned, these gripper dies are separated during each indexing movement of the conveyer to permit the blanks to be fed through the machine as will be apparent.

The removable heading punch holder permits the removal of worn or damaged die members or the substitution of die members of other shapes when desired.

Obvious modifications in the specific construction herein illustrated may suggest themselves to those skilled in this art and to this end reservation is made to make such changes as may come within the purview of the accompanying claims.

What I claim as my invention is:

1. In an apparatus for forging poppet valves, a die member having a plurality of progressively different heading punches, a heating chamber arranged in close proximity to said die member, a traveling linear member adapted to pass through said heating chamber for simultaneously presenting a plurality of heated blanks to said heading punches, means for actuating said member with a step-by-step movement to present each blank successively to the next subsequent heading punch, and means operable during the interval of rest of said member for gripping the blanks in timed relation to the heading operations.

2. In an apparatus for continuously forging valves, a movable die member having a plurality of shaping dies arranged to perform successively different heading operations, a heating chamber arranged in juxtaposition to said movable die, a traveling linear member adapted to pass through said heating chamber and operable upon each pass of the die member to present thereto a plurality of heated blanks corresponding to the number of shaping dies and operable between each pass to transfer each blank to the next subsequent shaping die, gripping members arranged upon opposite sides of the path of travel of the member, and means for automatically actuating said gripping dies to grip the blanks in timed relation to each pass of the die member and to release the blanks subsequent to the heading operation by the shaping dies.

3. In an apparatus for forging poppet valves, a die member having a plurality of progressively different heading punches, a heating chamber arranged adjacent said movable die, a traveling linear member adapted to pass through said heating chamber for simultaneously presenting a plurality of heated blanks to said heading punches, means for actuating the linear member with a step-by-step movement to present each blank successively to the heading punch, gripping dies arranged upon opposite sides of the path of travel of the blanks, and means automatically operable during the interval of rest of the linear member to grip said blanks in timed relation to the operation of the heading punches and to release said blanks prior to continued movement of the linear member.

4. In an apparatus for continuously forging valves, a movable die member having a plurality of progressively different heading punches, a traveling linear member having a plurality of sockets to receive and support valve blanks in an upstanding position and to simultaneously present a plurality of said valve blanks beneath said die member, a pair of cooperating gripping dies arranged upon opposite sides of the path of travel of said linear member and adapted to clamp the valve blanks intermediate the ends thereof beneath said movable die member during each pass thereof, the distance between said gripping dies and movable die member being such that upon actuation of said die member to its lowermost position the same will abut the gripping dies to fashion the portion of the blanks projecting thereabove.

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