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R. JARDINE

1,826,549

PROCESS OF MAKING COMPOSITE VALVES

Original Filed July 9, 1924

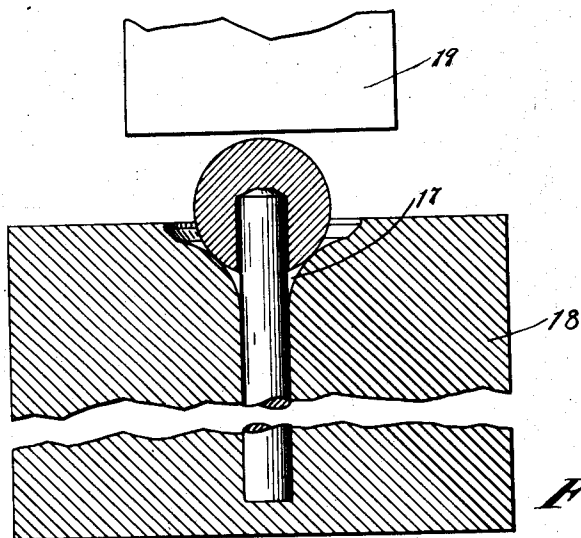


Fig. 2.

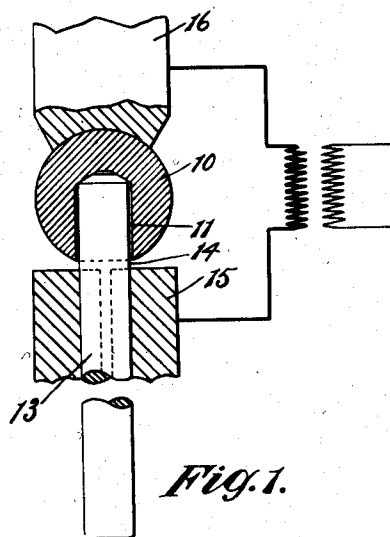


Fig. 1.

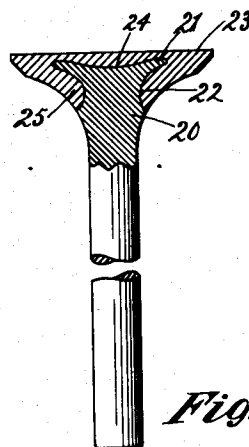


Fig. 3.

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UNITED STATES PATENT OFFICE

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PROCESS OF MAKING COMPOSITE VALVES

Application filed July 9, 1924, Serial No. 725,024. Renewed February 29, 1928.

This invention relates to poppet valves of the envelope type in which the stem and the seating portion of the head are made of different pieces mechanically connected, and has for its principal object to permit those pieces to be homogeneously united with ease and economy.

Further objects and advantages of the invention will become apparent as the disclosure proceeds and the description is read in connection with the accompanying drawings illustrating a selected embodiment of the invention, and in which

Fig. 1 is a sectional view illustrating the stem and head blanks assembled preparatory to welding, or otherwise homogeneously uniting them;

Fig. 2 is a similar sectional view illustrating the blanks seated in a lower die preparatory to forging; and

Fig. 3 is a similar sectional view illustrating the valve represented by the two blanks after forging.

The head blank 10 may be a spherical ball of metal having the characteristics desired in the head or the seating portion of the head of the valve, and having a pocket 11 extending diametrically into the blank somewhat beyond the center. When the pocket is made by a drill the bottom 12 thereof will correspond to the shape of the drill point.

The stem blank 13 may be a suitable length of rod having the characteristics desired in the stem of the valve and its lower end may be finished. The diameter of the stem rod should be less than the diameter of the pocket 11 to afford clearance 14 between the rod and the walls of the pocket.

According to the preferred procedure the blanks 10 and 13 are assembled in the relation illustrated in Fig. 1, electrodes 15 and 16 are applied, a current of very low voltage and very high amperage is turned on, the bottom of the pocket and the end of the stem blank are separated a few thousandths and then pressed together.

When the separation is made an arc as large as the stem blank is formed and fuses the metal at the bottom of the pocket and the end of the stem, and under the subsequent

pressure a perfect weld is effected. On account of the low voltage the small clearance 14 will prevent an arc between the walls of the pocket and the stem blank and at the same time there will be insufficient air in the thin annulus represented by the clearance to permit any appreciable oxidation of the metal.

The united blanks are then heated and forged by inserting them into a cavity 17 in a die 18 and exerting pressure on them with an upper die 19. Under this treatment the stem blank is provided with the enlargements 20 and 21 connected by the waist-shaped portion 22 and the head blank is formed into an envelope or jacket 23 covering the top of the stem blank as indicated at 24 and gripping the waist-shaped portion as indicated at 25.

The interlocking relation between the metal of the stem blank and the metal of the head blank makes a strong and serviceable connection, and the head blank metal forms a protecting envelope for the upper portion of the stem blank metal, shielding it from the most severe service. The welding of the end of the stem blank to the bottom of the pocket results in a homogeneous union between the top portion 24 of the envelope and the top end of the stem blank metal which not only contributes to the strength of the connection but facilitates the conduction of heat from the stem to the seating portion of the valve head which is in contact with the cooled cylinder casting.

The blanks should not be heated separately before the welding operation because the supply of air usually present under those conditions would permit the formation of scale on the walls of the pocket and the end of the stem blank, which would not only eliminate the necessary clearance, but would form a defective streak in the finished valve.

The homogenous union of the two blanks may be effected by other processes of welding or by brazing or by inserting between the end of the stem and the bottom of the pocket what may be called an iron cement which, upon fusion, will unite the head and the stem.

However, electric welding is the preferred

means of making this union, and when the voltage is very low the clearance 14 required is very small. For example, with a $\frac{3}{8}$ " valve stem the pocket need only be $\frac{1}{2}$ " in diameter.

5 The spherical form of head blank is preferred because it lends itself to quantity production with remarkably uniform size, which is important when the forging is to be done in the manner described.

10 Various modifications may be made within the scope of the invention, and while the foregoing disclosure includes specific description and illustration, it is not intended that anything therein should unnecessarily limit the claims or require an interpretation of them
15 that would permit the substance of the invention to be appropriated without infringement.

I claim as my invention:

20 1. The process of making composite valves which includes inserting one end of a rod into a pocket in a block, homogeneously uniting the end of the rod to the end wall of the pocket and hot forging the block and rod to form a valve head.

25 2. The process of making composite valves which includes inserting one end of a rod into a pocket in a block, said pocket being of sufficient dimensions to afford clearance around said rod, welding the end of the rod to the
30 end wall of the pocket and hot forging the block and rod to form a valve head.

35 3. The process of making composite valves which includes inserting one end of a rod into a pocket in a block, welding the end surface of the rod to the end wall of the pocket and radially expanding the rod and block simultaneously to form an enlargement on the rod and a flange on the block extending under said enlargement in intimate
40 contact therewith.

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CERTIFICATE OF CORRECTION.

Patent No. 1,826,549.

Granted October 6, 1931, to

ROBERT JARDINE.

It is hereby certified that the above numbered patent was erroneously issued to "Rich Tool Company, of Chicago, Illinois, a corporation of Illinois", whereas said patent should have been issued to Rich Tool Company, of Portland, Maine, a corporation of Maine, as assignee by mesne assignments of the entire interest in said invention, as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 16th day of February, A. D. 1932.

(Seal)

M. J. Moore,
Acting Commissioner of Patents.