March 10, 1931. A. H. LEIPERT 1,795,433

METHOD OF FORMING AND SECURING VALVE SEATS IN POSITION

Filed Jan. 31, 1928

Fig. 1

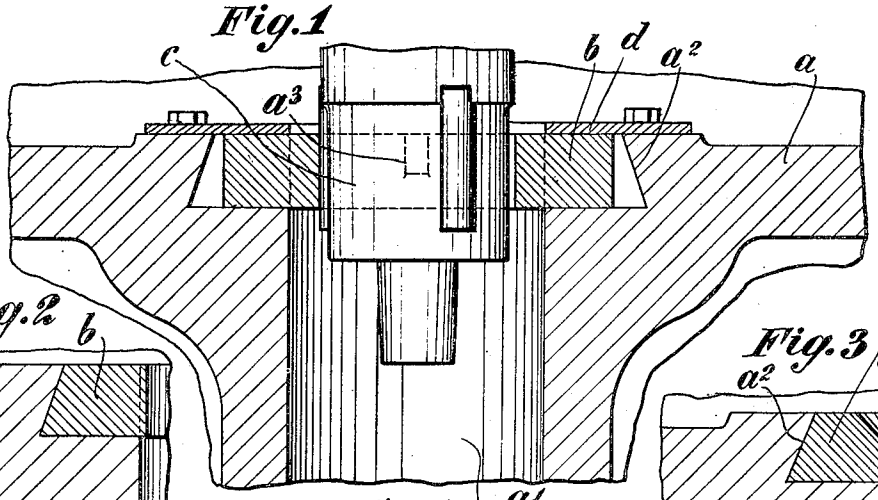


Fig. 2

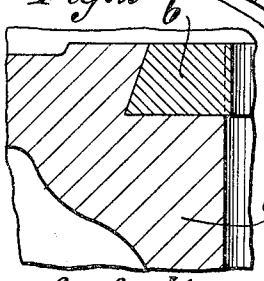


Fig. 3

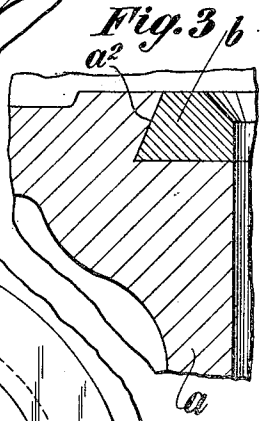


Fig. 4

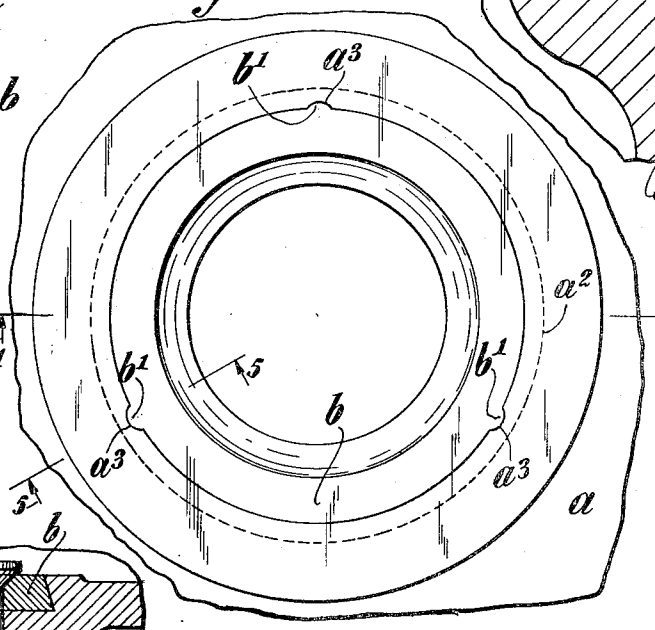


Fig. 5

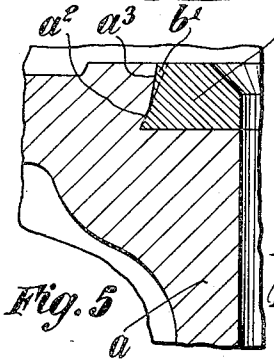
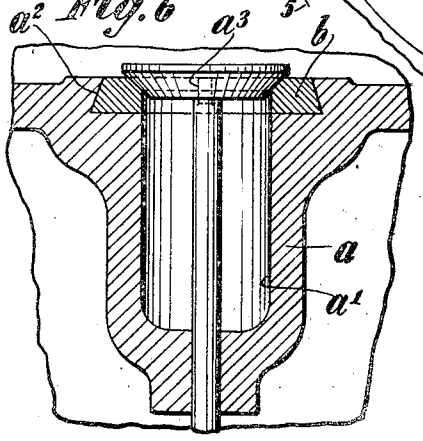


Fig. 6



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UNITED STATES PATENT OFFICE

AUGUST H. LEIPERT, OF NEW YORK, N. Y., ASSIGNOR TO INTERNATIONAL MOTOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

METHOD OF FORMING AND SECURING VALVE SEATS IN POSITION

Application filed January 31, 1928. Serial No. 250,941.

In an endeavor to carry off the heat from the valves of internal-combustion engines more rapidly, it has been proposed to form the valve seat of a material having greater heat conductivity than the engine casting. To do this, the valve seat has been formed in several ways, for example, cast either with or after the casting of the main cylinder blocks, or fastened into place after the casting and machining operations have been completed.

The present invention resides in providing an improved method of constructing a valve seat to be formed in situ after the cylinder block has been cast, and consists in expanding and rolling the material forming the valve seat into place. It is also contemplated to form the contacting portions of the valve seat of greater density than the portion remote from the valve and adjacent the cylinder casting, whereby the life of the seat will be increased and the heat from the valve carried off more rapidly. The operation of forming the seat in this manner, by the application of pressure, also results in what is essentially a homogeneous union of the metal thereof with the metal of the casting, thereby further insuring the most favorable condition for heat conduction.

Further objects and advantages of the invention will appear as the description proceeds and reference will now be had to the accompanying drawings, wherein:

Figure 1 is a view in section taken on line 1—1 of Figure 4, but showing the valve seat before being rolled into position;

Figure 2 is a segmental view on the same section line as Figure 1, but showing the valve seat rolled into position so that it engages the underhooking edge of the casting;

Figure 3 is a view similar to Figure 2, showing the valve after it has been rolled into the proper form;

Figure 4 is a plan view showing the valve seat after it has been rolled and formed;

Figure 5 is a segmental view in section taken on line 5—5 of Figure 4; and

Figure 6 is a view in section, similar to Figure 1, but showing the valve engaging the finished valve seat.

Referring particularly to the above-described figures, a designates the cylinder casting of an engine provided with a valve hole a'. The retaining wall of the cylinder is undercut as at a^2 to provide a groove into which the material of the valve seat is rolled. This undercut portion forms a shoulder which prevents the valve seat from being removed and receives the latter when it is installed in the following manner.

The valve seat b, which may be of annular form, is placed as shown in Figure 1. A suitable expander c of well-known construction is placed within the valve seat and the latter is rolled, shaped, worked, forged or swaged, and thus expanded into the undercut portion a^2 of the cylinder wall a. During this rolling operation, the material of the valve seat becomes denser. That portion of the seat adjacent the valve will be of relatively greater density than the portion of the seat adjacent the underhooking edge. This is true also in the next step of rolling the taper in the valve seat after it has been forced into the position shown in Figure 2. Figure 3 illustrates the valve seat with the tapering seat formed therein. By forming the seat adjacent the taper with a very compressed and close-grained structure, its life is greatly increased as well as its ability to carry off the heat rapidly.

In order that the seat may be prevented from turning, serrations or recesses are formed in the cavity receiving the seat, and in the rolling of the seat into position, the material of the seat will be forced into the recesses to serve as a key to prevent the turning thereof. This is illustrated in Figures 4 and 5, wherein recesses a^3 are formed in the casting a and receive the rolled portions b' of the seat when it is rolled into position. Of course, the particular form of staking or means for securing the seat against rotation, is immaterial since any well-known provision of this character may be utilized.

The metal constituting the valve seat may be of any composition capable of being expanded or rolled and transferring heat better than cast metal. A copper aluminum bronze alloy, being homogeneous and not

flaking, has been found to be satisfactory metal for these valve seats. The particular means formed on the cylinder casting for retaining the valve seat in position is immaterial, since shoulders and projections of many forms may be substituted for the underhooked groove to receive and engage the expanded seat material.

In practice it has been found that the metal of the seat, in being rolled, tends to be turned back at the upper edge and to be pulled away from the rim of the horizontal portion of the groove. To reduce this action an expander is used having rollers, the outer surfaces of which always lie in planes parallel to the axis of the expander. In fact it is sometimes necessary to secure a plate *d* to the block to confine the metal of the seat in its proper position and cause it to engage the horizontal portion of the groove intimately.

The method described herein has been found to be very practical and affords a means of securing the valve seat in position effectively and in the same operation with the formation thereof.

Although the invention has been described with specific reference to the accompanying drawings, no limitation as to structure or means of applying the seat is to be placed upon it, save as defined in the appended claims.

I claim as my invention:—

1. The method of forming and securing a valve seat in position in a cylinder casting, comprising forming a groove in the casting, forming recesses in the wall of the groove, placing the metal from which the seat is formed within the groove, and expanding the metal into the grooves and recesses.

2. The method of forming and securing a valve seat in position in a cylinder casting, comprising forming a groove in the casting, placing the metal from which the seat is formed within the groove, rolling the metal into position, the portion of the seat to be engaged by the valve being worked to greater density than the remote portion.

This specification signed this 28th day of January, A. D. 1928.

AUGUST H. LEIPERT.