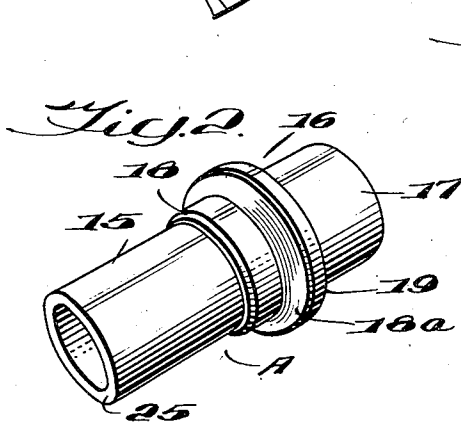
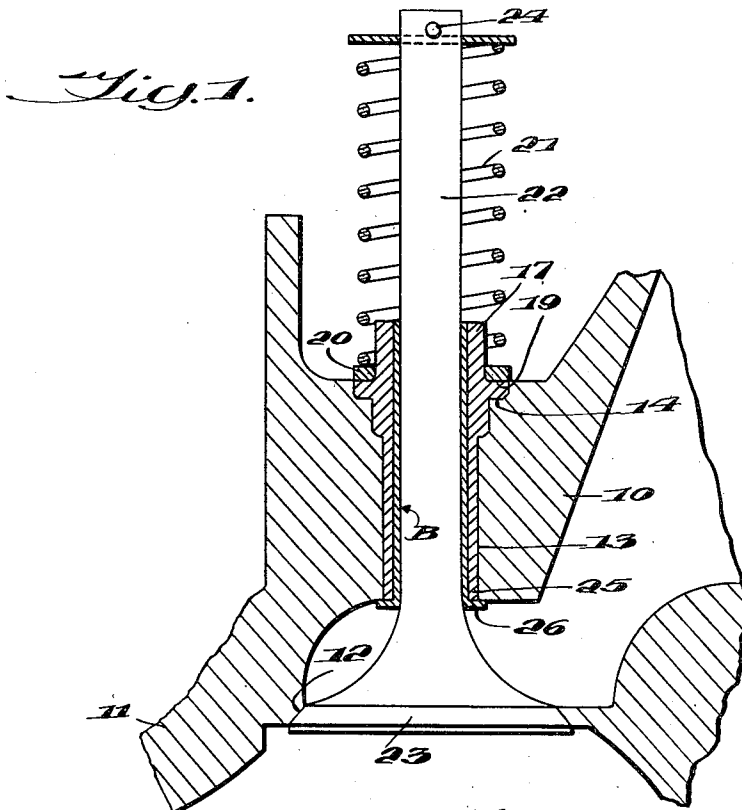


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A. C. KIMBERLY
METHOD, SYSTEM AND DEVICE FOR REBUILDING
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INVENTOR

ARTHUR C. KIMBERLY,

BY

Herbert M. Birch
ATTORNEY

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METHOD, SYSTEM AND DEVICE FOR REBUILDING INTERNAL COMBUSTION ENGINES

Arthur C. Kimberly, Cochran, Ga.

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The present invention relates to a method, system and device for rebuilding internal combustion engines and particularly the valve guide boss of the intake or exhaust valve.

Usually an internal combustion engine in the head of each cylinder is formed a boss bored through to provide an opening for a valve guide for the stem or shank of the intake or exhaust valve. During use the valve guide bore becomes worn causing the engine to use excessive oil and operate inefficiently because of loss of power. To overcome this an oversize valve guide is installed. This is done by boring out the boss that accommodates the guide, thus providing the proper fit. However after this operation is repeated much of the boss stock has been removed and the cylinder is discarded due to the loss of boss stock in the inside diameter. The present invention provides a simple, inexpensive and positive manner of replacing the lost boss stock in the inside diameter position.

After each such reaming operation the valve boss bore becomes progressively oversize to a point where it is no longer considered sound engineering to use the over size valve guide to take up the loss of valve boss metal lost through reaming.

An object of the present invention is to provide a novel method of rebuilding motors with worn valve bosses.

Another object is to provide a novel insert for a rebored valve boss, whereby the valve bosses of the motor are reconditioned to the equivalent of their original condition.

Another object is to fill the valve boss bore being reconditioned with a ferrule and sleeve combination formed of the same metal as that of the cylinder valve boss previously removed by reaming or the like whereby, through a simple process to wit: heating the valve boss to a temperature of 400° to 500° Fahrenheit and then quickly inserting the combination sleeve-type ferrule, the temperature of which has been reduced by direct application of Dry Ice. When the valve boss expands due to the heat and the combination sleeve-type ferrule is contracted by Dry Ice, the fit is a "pinch fit" from .002 to .005. By using this method the combination sleeve-type ferrule is shrink fitted into the boss and becomes a part of same.

Still another object is to provide means for reconditioning the valve bosses of engine cylinders for use with standard sizes of valve guides, and by repeating the reaming process used for installing oversize valve guides, several oversize guides may be installed as needed, without replacing the combination sleeve-type ferrule. After the maximum is reached in the installation of oversize valve guides in a cylinder equipped with the combination sleeve-type ferrule, the next oversize combination sleeve-type ferrule may be installed, provided the cylinder is otherwise serviceable.

Yet another object is to provide a novel method of counterboring a valve boss and locking the same with a standard valve guide, whereby a specially formed recon-

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ditioning ferrule and elongated sleeve is retained in the bore of the valve boss.

With these and other objects in view, the invention consists in the method of reboring, counterboring and assembling and in the arrangement and combination of parts hereinafter described and particularly defined in the appended claims, it being expressly understood that there is no intent to limit this invention to the present details of construction.

In the drawing, like parts throughout the views are given like numerals and thereby identified in the following detailed description; wherein:

Figure 1 is a vertical cross section view taken through a portion of a reconditioned cylinder and an exhaust valve boss, showing the present invention novel device locked in place by a coacting valve sleeve and spring seat washer with a valve therein in elevation;

Fig. 2 is a side elevational view of the novel ferrule or sleeve combination per se;

Fig. 3 is a side elevational view of another embodiment of the present invention for use with a bronze flange type valve guide for other type engines, instead of a cast iron guide, wherein the collar extension is eliminated.

Referring in detail to the drawing and with particular reference to Figure 1, numeral 10 is a valve boss of a cylinder 11 with a valve seat 12, which may be for an intake or an exhaust valve. The valve boss 10 is formed with a bore 13, which is counterbored to form a flange seat 14. When the valve boss has been rebored and counterbored it is ready to receive the novel unitary ferrule and sleeve combination A of the present invention shown in Figure 2.

The novel ferrule and sleeve combination is a unitary or one piece structure comprising an elongated sleeve 15, a ferrule-like part 16 and a tubular collar 17. The part 16 consists of a flange having a pair of annular seating surfaces 18 and 18^a for fitting in the counterbore of the boss 10 and an upper flange annular surface or land 19. The surface 19 is in adjacent contact with a spring seat washer 20. This washer encircles the collar 17 and is in adjacent contact with the end of a coiled valve spring 21, which spring encircles the collar 17 and the stem 22 of a valve 23. When the washer 20 is in place in land 19 and the valve is suitably locked by its usual operating keyway 24, the ferrule-portion is locked in its seat, that is, in the valve boss counterbore 14.

The sleeve 15 of the unit A extends throughout the bore of the boss bore 13 with its rim 25 flush with the dome of the cylinder 11. When in this flush position the unit A is further locked in the bore by the insertion through the continuous bore of the sleeve and collar of a standard valve guide B having a flange 26.

The valve guide B by virtue of the flange 26 overlaps the rim 25 of the unit A and a part of the cylinder dome to provide a seal between the valve guide and the sleeve 15 above the valve head.

Normally the engine cylinder 11 and its valve boss when new will contain only the valve guide B, but after continued use the valve guide becomes worn and motor efficiency impaired so the cylinder must be discarded. However, by the present novel method the valve boss 10 is rebored, counterbored to a double seat seal and then reconditioned by the insertion of the novel unit A into the bore with a new standard valve guide. Obviously, by this new method of reconditioning and assembly of parts the cylinder 11 becomes as good as new.

In Figure 3 is another form of the unit A marked A'. This form is used with a different form of valve guide, namely a bronze guide, which does not require the extended collar 17 of form one.

The installation of the combination sleeve-type ferrule

is accomplished in the same manner and at the same time as the overhaul work is done on the cylinder with usually only two (2) additional operations. One additional operation is the reaming of the boss to accommodate the sleeve of the combination sleeve-type ferrule and the other operation is one additional heating of the cylinder boss as described above. One heating is employed in the usual installation of the valve guide.

Without further description, it is believed that the two embodiments and their advantages are described and illustrated so as to clearly be understood; and it is to be expressly understood that other arrangements and formations of the parts or combinations thereof which may now occur to others are to be considered within the scope of this invention. To determine the scope of this invention, reference should be had to the appended claims.

What is claimed is:

1. In a system of assembly a valve boss with an elongated bore and a counterbore top, a filler unit in said boss bore of a material identical to that of the said boss, said unit comprising a sleeve extending throughout the bore having a rim flush with an end of the boss, a flange adjacent the end opposite to the rim, said flange forming sealing surface when seated in the counterbore of the valve boss bore and a valve guide sleeve in said unit sleeve formed with an exhaust sealing flange overlapping said flush rim and the end of the valve boss.

2. A filler insert for the bore of a reamed out valve boss comprising an elongated sleeve having a unit content of the metal equal to the unit content of the metal reamed from the walls of the said boss bore, the bore of said sleeve being equal to the bore of said boss prior to the reaming thereof, and an annular flange formed exteriorly around the said sleeve for supporting an end of a valve spring and valve guide means in the sleeve bore flanged to lap over the lower end of the sleeve and the valve boss bore.

3. A filler insert for the bore of a reamed out valve boss comprising an elongated sleeve having a unit content of the metal equal to the unit content of the metal reamed from the walls of the said boss bore, the bore of said sleeve being equal to the bore of said boss prior to the reaming thereof, an annular flange formed exteriorly around the said sleeve for supporting an end of a valve spring and forming a sealing surface, said sleeve having an annular collar with a bore continuous with the bore of said sleeve, said collar extending upward from the said flange, and an annular seating surface below said flange adapted to cooperate with the undersurface of said flange to provide a dual seal around the upper part of the valve boss bore.

4. In a cylinder, an exhaust valve assembly for a reconditioned valve boss bore in said cylinder, including a valve and a filler combination, said valve boss bore having a multiple counterbored portion to form surfaces,

said filler combination comprising a ferrule having a shrink fit connection between the outer circumference thereof and the inner wall of said valve boss bore, said ferrule comprising a tubular sleeve having a straight end and a multi-flanged end, spaced apart sealing surfaces formed by said flanges in sealing engagement with said counterbore surfaces and a valve guide sleeve secured within said ferrule, said guide sleeve being formed with an annular outturned flange overlapping the straight end of the ferrule and the rim surface of the cylinder around the valve boss, said top of the cylinder being formed with a well for an oil pool around and below the upstanding end of the flanged end of the ferrule, said valve being mounted for reciprocation in said valve guide sleeve.

5. In a cylinder, an exhaust valve assembly for a reconditioned valve boss bore in said cylinder, including a valve and a filler combination, said valve boss bore having a multiple counterbored portion to form surfaces, said filler combination comprising a ferrule having a shrink fit connection between the outer circumference thereof and the inner wall of said valve boss bore, said ferrule comprising a tubular sleeve having a straight end and a multi-flanged end, spaced apart sealing surfaces formed by said flanges in sealing engagement with said counterbore surfaces and a valve guide sleeve secured within said ferrule, said guide sleeve being formed with an annular outturned flange overlapping the straight end of the ferrule and the rim surface of the cylinder around the valve boss.

6. A ferrule for exhaust valve bores rebored with counterbore portions comprising a sleeve having a plurality of axially spaced flanges formed around the circumference thereof adjacent one end of the sleeve inter-fitting in the counterbore portions to form seals, said sleeve having a centrally smooth interior bore and an exteriorly smooth exterior circumference at the opposite end thereof, and a liner sleeve with a flanged end in said smooth interior bore of said ferrule, said flanged end of said liner sleeve overlapping the edge of said ferrule sleeve adjacent the exteriorly smooth opposite end thereof, to thereby form another seal in addition to said first-mentioned seals.

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