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VALVE GRINDER

2,576,333

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2 SHEETS—SHEET 1

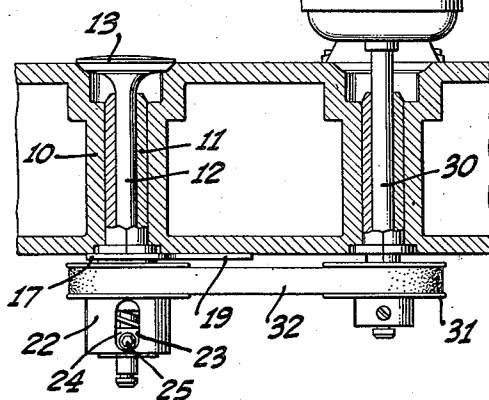
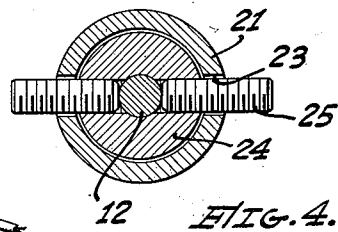
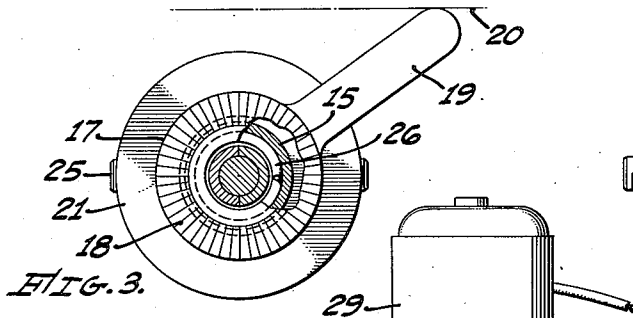
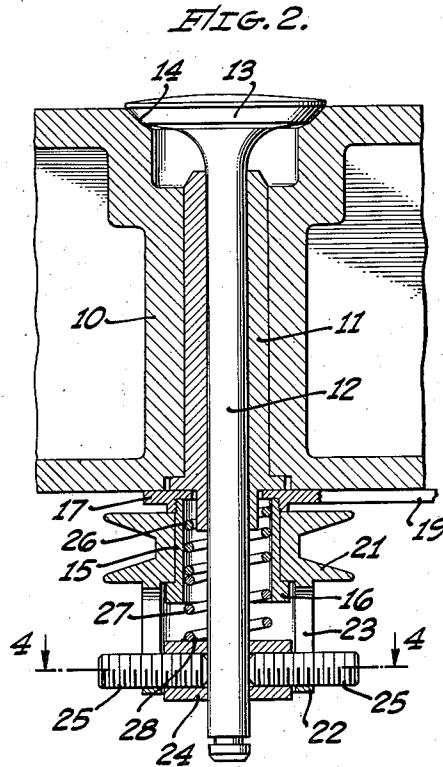
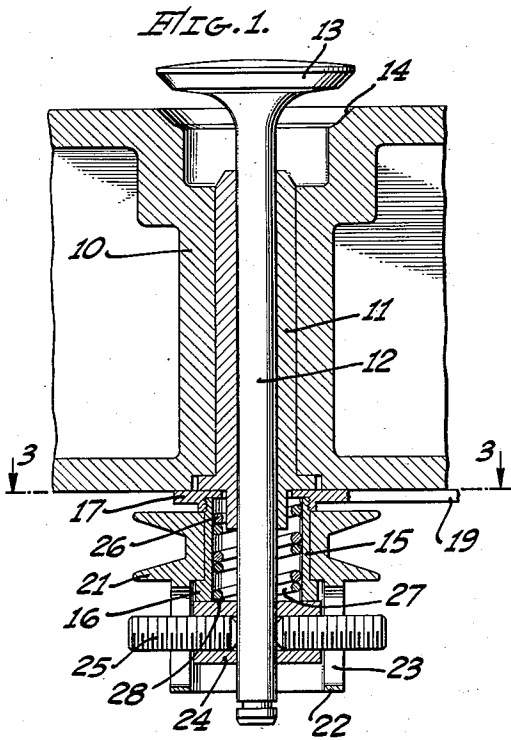


FIG. 5.

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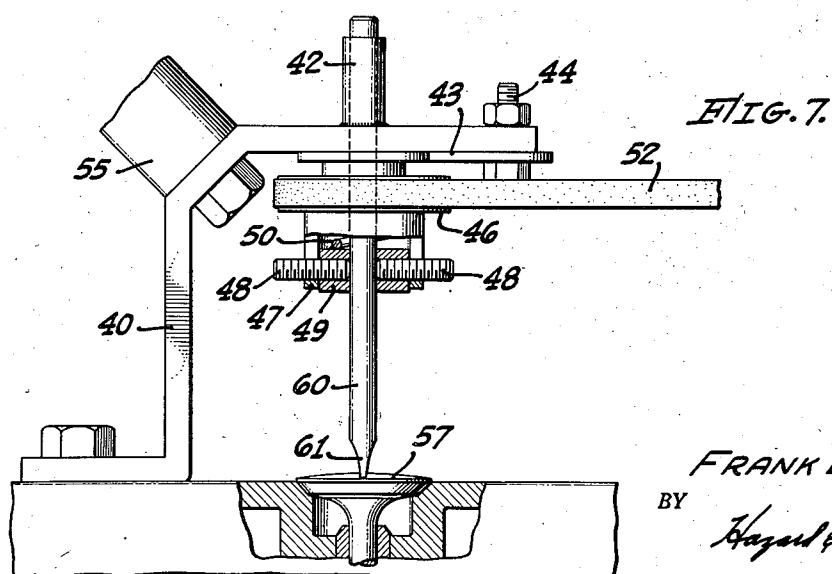
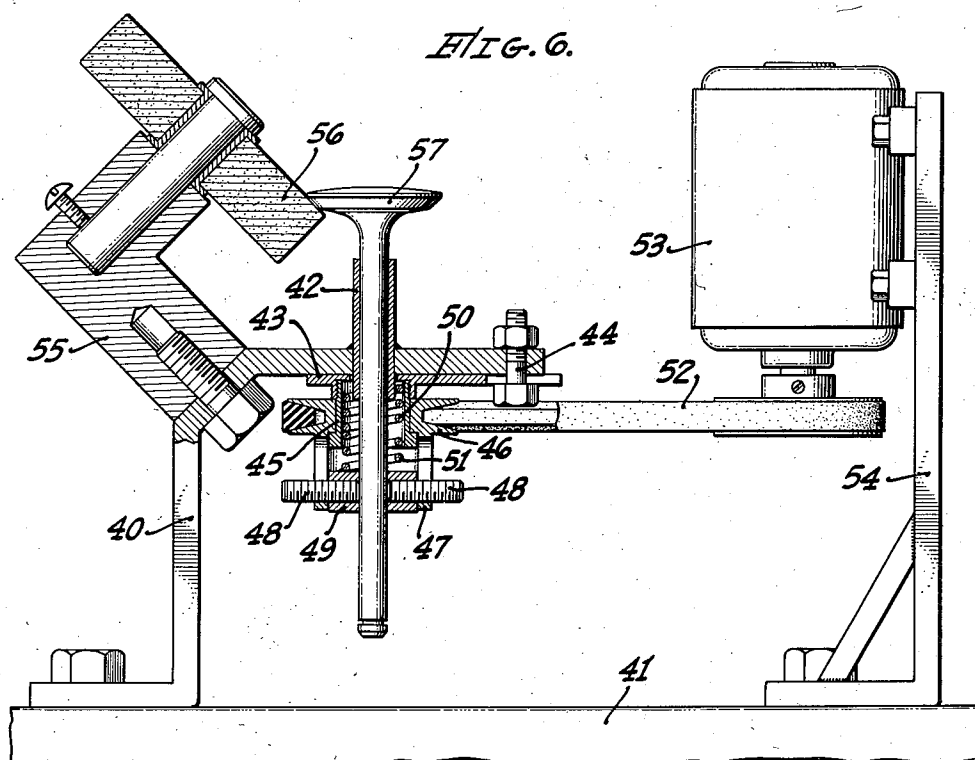
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2 SHEETS--SHEET 2



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## UNITED STATES PATENT OFFICE

2,576,333

## VALVE GRINDER

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3 Claims. (Cl. 51—29)

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This invention relates to improvements in valve grinders of the type that are employed to grind the seating surfaces of a poppet valve and its valve seat, such as those employed on internal combustion engines.

A primary object of the invention is to provide an improved valve grinder which can be easily and quickly applied to a valve stem and which has a rotary clamping means that can be clamped upon a valve stem and then rotated to rotate the valve with relation to its seat. Associated with the clamp is a novel, simple, and durable expansible and contractible means so arranged that when the clamping means is rotated in one direction the expansible and contractible means will be expanded so as to cause the valve stem to urge its head against the valve seat in the course of grinding the valve. However, on rotating the clamping means in the opposite direction the expansible and contractible means will be contracted enabling the head of the valve to be lifted from its seat for purposes of inspection of the ground surfaces or for the application of additional valve grinding compound.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a vertical section through a valve seat of an internal combustion engine illustrating the valve thereof as having the valve grinder embodying the present invention applied thereto and showing the valve as having been lifted from its seat for purposes of inspection or the application of valve grinding compound;

Fig. 2 is a similar view but illustrating the position assumed by the various parts in the course of grinding the valve;

Fig. 3 is a horizontal section taken substantially upon the line 3—3 upon Fig. 1 in the direction indicated;

Fig. 4 is a horizontal section taken substantially upon the line 4—4 upon Fig. 2 in the direction indicated;

Fig. 5 is a view illustrating the manner in which the improved valve grinder can be advantageously used;

Fig. 6 is a view in side elevation, parts being shown in vertical section illustrating an alternative form of construction; and

Fig. 7 is a view illustrating another manner in which the alternative form of construction may be used.

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Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, 10 indicates the manifold of an internal combustion engine within which there is a valve guide 11 for the valve stem 12 of a valve, the head of which is indicated at 13. The head of the valve is adapted to seat upon a valve seat 14. The particular formation of the manifold, the valve guide 11, and the arrangement of the ports leading to or from the opening surrounded by the valve seat 14 will vary considerably with different types of internal combustion engines, and consequently, these features have not been illustrated in detail.

15 The valve grinder embodying the present invention consists of a spring housing made up of a cylinder 15 having an external shoulder 16. On the upper end of the cylinder 15 there is screwed or otherwise applied a cap 17 which may have its upper surface knurled or roughened as indicated at 18, or which may have a laterally extending arm 19 which may engage the side of the cylinder block of the engine as indicated by dotted lines at 20. The knurling at 18 and the arm 19 may both be used on the same construction if desired and the primary purpose of the knurling and the arm 19 is merely to hold the spring housing made up of the cylinder 16 and the cap 17 against rotation. On the exterior of the spring housing there is rotatably disposed a pulley 21, this pulley being rotatable between the shoulder 16 and the cap 17. This pulley has a cylindrical extension 22 in which slots 23 are formed. A disc 24 is disposed within the extension 22 and has threaded apertures therein to receive set screws 25 which are screwed into the apertures through the slots 23. The set screws 25 are adapted to be tightened into clamping engagement on the valve stem 12 and as the set screws extend through the slots 23 they provide an axially slidable but nonrotatable connection between the disc 24 and the pulley 21.

Within the spring housing there are two axially aligned compression springs 26 and 27. These compression springs have open convolutions. The lower end of the lower compression spring 27 is anchored, such as by brazing at 28 to the top of the disc 24 and in a similar manner, the upper end of the compression spring 26 is anchored to the cap 17. If the pulley 21 is rotated relatively to the spring housing in one direction the spring 27 which is anchored to the disc 24 will unscrew out of the spring 26 into the position shown in Fig. 2. After the spring 27 has completely screwed out of the spring 25, con-

tinued rotation of the disc 24 by means of the pulley 21 will merely cause the adjacent ends of the springs 26 and 27 to snap or pass over each other. However, the two springs being completely out of each other and in axial alignment will assume their maximum overall expanded or extended position. Consequently, the disc 24 will be urged into its lowermost position limited by the set screws 25 engaging the bottoms of the slots 23 and in this position the valve stem 12 will be urged downwardly thereby so as to cause the head 13 to press against the seat 14 while the valve is being rotated.

On the other hand, if the pulley 21 is reversely rotated, this will cause the disc 24 to be turned in the opposite direction from that previously mentioned and cause the spring 27 to screw into the spring 26, thus shortening the overall length of the two springs. When the parts assume this condition illustrated in Fig. 1, wherein it will be observed that the disc 24 has been lifted into engagement with the bottom of the spring housing, the valve will be bodily lifted from its seat 14 to permit of inspection of the seating surfaces and the application of additional valve grinding compound. In this manner it will be appreciated that when the pulley 21 is rotated in one direction the springs will screw out of each other and assume a maximum overall length wherein they are effective to urge the valve against its seat while it is being rotated. Continued rotation after the springs have mutually unscrewed does not involve a continued expansion or extension of the overall dimension of the two springs inasmuch as their ends merely slide and snap over each other. However, when it is desired to inspect the seating surfaces or to apply additional valve grinding compounding it is merely necessary to reversely rotate the pulley 21 which will cause the two springs to screw one within the other and thus shorten their overall dimensions enabling the valve to be lifted from its seat.

Any means may be employed for rotating the pulley 21 and to this end I have illustrated in Fig. 5 the application of an electric motor 29 which has a shaft 30 that can be inserted through the valve guide of an adjoining valve. A pulley 31 may be applied to the lower end of this shaft and a belt 32 trained over the pulleys 31 and 21. This motor may be used to drive the pulley 21 in the normal or valve grinding direction which, as above explained, will involve the pressing of the valve head against its seat while it is being rotated. Whenever it is desired to inspect or apply valve grinding compound, the motor 29 may be stopped and the pulley 21 reversely rotated a few revolutions by hand. Other means may be employed for rotating the pulley 21 if desired.

In Figs. 6 and 7 an alternative form of construction is disclosed consisting of a suitable bracket or arm 40 that may be bolted or otherwise secured to a support 41. On this arm or bracket there is welded or otherwise secured a valve guide 42, and a holder 43 is bolted to the arm such as by a bolt 44. This holder has threaded thereto or otherwise secured thereto a sleeve or housing 45 which provides shoulders between which a pulley 46 is rotatable. This pulley has an extended hub 47 which is slotted to receive set screws 48 that are threaded into a disc 49 that is axially slidable within the hub. A helical spring 50 has its upper ends fastened within the housing 45 and has open convolutions. This spring is in axial alignment with a similar spring 51 that is anchored or otherwise secured to the

disc 49. The pulley 46 is adapted to be driven by a belt 52 driven off of a motor 53 which may be mounted on a bracket 54 that is secured to the support 41. On the arm or bracket 40 there is a support 55 for an abrasive wheel 56 which is rotatable thereon about an axis that is inclined to the axis of the stem of the valve 57.

This form of construction may be very advantageously employed where it is desired to entirely re-face the seating surface of the valve 57. When the valve is in the position shown in Fig. 6, on rotating the pulley 46 in the proper direction the spring 51 will unscrew from the spring 50 thus, in effect, lengthening the overall length of the two springs and forcing the disc 49 downwardly until the set screws 48 are limited by the bottoms of the vertical slots in the hub 47. This causes the head of the valve 57 to press yieldably against the side of the abrasive wheel 56 while the valve is being rotated by the pulley 46. The abrasive wheel 56 may rotate on its support and the arrangement is such that a smooth bevel will be quickly ground on the setting surface of the valve 57, thus re-facing the valve as desired. Reverse rotation of the pulley 46 will, of course, cause the spring 51 to screw into the screw 50 and result in a lifting of the valve 57 from its engagement with the grinding wheel 56 whenever this is desired. When the valve has been thus re-faced it is desirable to grind its seat complementary to the seating surface of the valve head. To this end the valve 57 is inserted in its valve guide on the engine, as shown in Fig. 7, and the arm 40 may be bolted on top of the cylinder block. A stem 60 having a screw driver end 61 or equivalent means for engaging the valve head of valve 57 is inserted through the valve guide 42 and secured in position by tightening the set screws 48. On driving the pulley 46 in one direction the stem 60 is forced downwardly into engagement with the valve 57 and causes it to press firmly against its seat while being rotated. By reversely rotating the pulley 46 the stem 60 will be elevated and the valve 57 may be lifted for purposes of inspection of the seat or the application of additional valve grinding compound.

From the above described construction it will be appreciated that the improved valve grinder is very simply and durably constructed and will produce the desired operation of pressing the head of the valve against its seat while it is being rotated relatively thereto and which upon a few reverse revolutions of the pulley 21 will enable the valve to be lifted from its seat to inspect the seating surfaces or apply additional abrasive.

Various changes may be made in the details of construction without departing from the spirit and scope of the invention as defined by the appended claims.

I claim:

1. A valve grinder comprising means providing a spring housing adapted to be applied to a valve stem adjacent an engine manifold, means for holding the spring housing against rotation on a supporting structure, a pulley rotatable on the spring housing, clamping means applicable to a valve stem having an axially movable but non-rotatable connection with the pulley, a pair of aligned helical compression springs in the spring housing having open convolutions and capable of screwing into or out of each other, one spring having its remote end anchored in the spring housing and the other spring having its remote end anchored on the clamping means

whereby when the pulley is rotated in one direction the springs will unscrew from each other and be cooperatively effective to urge the valve stem to seat its head and upon rotation of the pulley in the opposite direction the springs will screw into each other enabling the valve head to be lifted from its seat and means to rotate the pulley alternately in opposite directions.

2. A valve grinder comprising a spring housing, a pulley rotatable on the spring housing, said pulley having a cylindrical extension, a disc within the extension, said disc having apertures therein and being applicable to a valve stem, set screws in the apertures and extending through slots in the extension to hold the disc against rotation relatively to the pulley but enabling the disc to slide axially with relation to the pulley, and opposed helical compression springs having open convolutions disposed in the spring housing, one spring having one end thereof anchored to the disc and the other spring having one end thereof anchored to the spring housing whereby when the pulley is rotated in one direction the springs will mutually unscrew from each other to urge the disc into a position wherein the head of the valve will be urged against its seat and when the pulley is rotated in the opposite direction the springs may screw into each other to enable the head of the valve to be lifted from its seat, and means for stationarily mounting the spring housing on a supporting structure and means to rotate the pulley alternately in opposite directions.

3. A valve grinder comprising clamping means adapted to be clampingly applied to a valve stem,

a spring housing also applicable to the valve stem, means for holding the spring housing stationary, a pulley rotatable on the spring housing having a slidable but non-rotatable connection with the clamping means whereby the clamping means and valve stem may be rotated by the pulley and the clamping means and valve stem may move axially relatively to the pulley, and two helical compression springs within the housing having open convolutions and capable of screwing one into the other, one spring having one end secured to the spring housing and the other spring having one end secured to the clamping means whereby when the pulley is rotated in one direction the springs will screw one into the other causing the clamping means to shift the valve axially in one direction, and when the pulley is rotated in the opposite direction the springs will unscrew from each other causing the clamping means and valve to shift axially in the opposite direction and to be resiliently urged in that direction while the valve stem is being rotated by the pulley and means to rotate the pulley alternately in opposite directions.

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