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J. C. PEWTHER

VALVE GRINDER

Filed Aug. 7, 1922

Fig. 1.

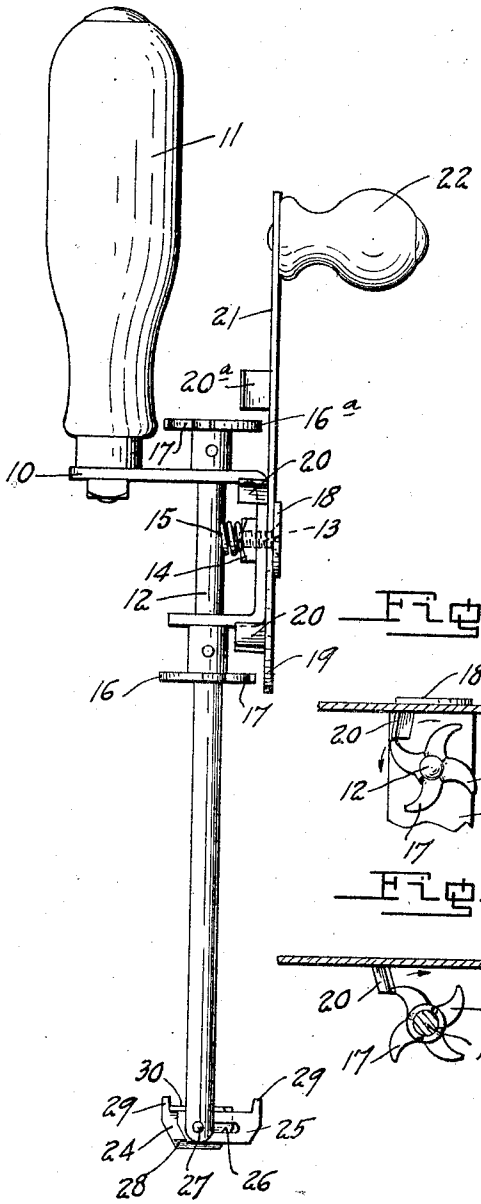


Fig. 2.

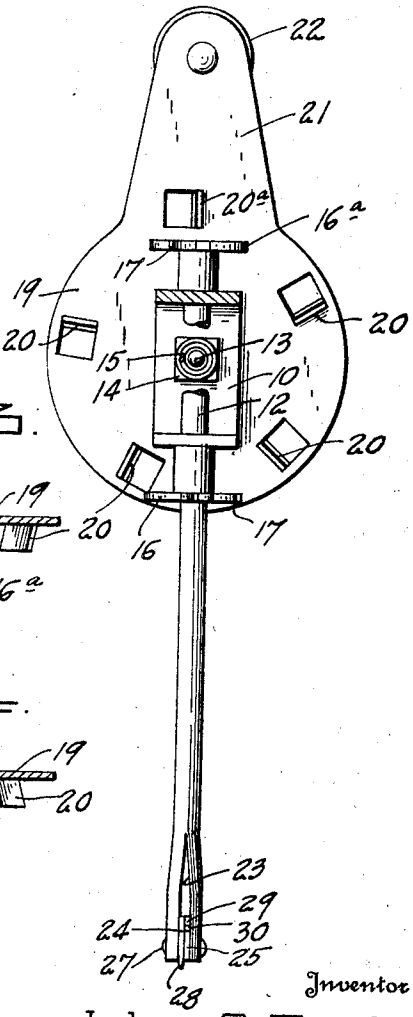


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

JUDSON C. PEWTHER, OF DENVER, COLORADO.

VALVE GRINDER.

Application filed August 7, 1922. Serial No. 580,238.

To all whom it may concern:

Be it known that I, JUDSON C. PEWTHER, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Valve Grinders, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to devices for grinding the valves of internal combustion engines or other apparatus of like character, and particularly to devices of this sort engageable with the valve to cause an oscillation of the valve against its seat.

One of the objects of the present invention is to provide a valve grinder of this character which shall be extremely simple, which may be readily connected to the valve, and which will cause the valve to oscillate upon its seat and at the same time secure a progressive movement of the valve in one direction so that the valve will constantly move around upon the seat and thus a uniform grinding action be secured.

A further object is to provide very simple means to this end which will automatically cause an oscillatory movement of the shaft for a number of oscillations and then move the shaft for a certain angular distance before a second set of oscillations are started.

A still further object is to provide valve engaging means which are suited either to those valves having a nick whereby they may be rotated or those valves having spanner holes in which spanners may be located, and in this connection to provide a valve engaging member mounted upon the stem of the valve grinder which is adjustable to valves having their spanner holes spaced apart different distances.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a side elevation of a valve grinder constructed in accordance with my invention;

Figure 2 is a front elevation with the handle 11 omitted and part of the body 10 in section;

Figure 3 is a fragmentary top plan view showing the manner in which the star wheel 16ª engages the teeth 20;

Figure 4 is a horizontal section showing the manner in which the star wheel 16 engages the teeth 20.

Referring to these drawings, 10 designates an approximately U-shaped piece of steel which constitutes the frame of the valve grinder and which has one leg longer than the other, a handle 11 being attached to this relatively long arm or leg of the frame strip. The frame strip is provided with two oppositely disposed aligned bearings for the shaft 12 and the strip is perforated directly opposite the shaft for the passage of a pivot bolt 13 carrying a nut 14. A coiled spring 15 bears at one end against the shaft and at the other end bears against this nut.

Mounted upon the shaft 12 and bearing against the arms of the U-shaped frame are star wheels 16 and 16ª comprising collars which are pinned or otherwise attached to the shaft so as to oscillate therewith and which carry a plurality of outwardly projecting teeth 17. These teeth, as illustrated, are formed integral with the collar and preferably these teeth are not radial to the axis of the shaft but extend outward and forward in a curve so that the side faces of the teeth are curved. Thus two opposite teeth of this star wheel formed by the collar 16 and its teeth will have a sinusoidal curvature, as clearly shown in Figure 3.

Mounted upon the pivot screw 13 and held in place by a washer 18 disposed inward of the head of this screw is a disk 19 having inwardly projecting teeth 20 adapted to strike against and have engagement with the teeth 17 of the star wheel 16. I have shown each star wheel 16 as formed with four teeth, though I do not wish to be limited to this, and I have shown the disk 19 as formed with an integral, radially extending portion 21 having a crank handle 22 and the disk as carrying five teeth 20 and 20ª to coact with the upper and lower star wheels. Four of these teeth 20 are disposed so as to strike the teeth 17 of both star wheels as the disk 19 is rotated, but one tooth 20ª is disposed outward of the circle upon which the teeth 20 are set so that this tooth will escape

the teeth of the gear wheel 16ª but will strike the teeth of the gear wheel 16 (see Figure 1).

The extension 21 constitutes a crank arm whereby the disk may be rotated, and as this disk 19 is rotated toward the left in Figure 2, the teeth 20 will alternately strike the teeth on the star wheel 16ª and the teeth on the star wheel 16, the tooth 20ª skipping the teeth of the star wheel 16ª but engaging the teeth of the wheel 16. This alternate striking of the teeth on the upper and lower star wheels is secured by there being an odd number of teeth on disk 19. As the disk 19 is rotated, therefore, a tooth 20 will strike a tooth on the wheel 16ª and rotate the shaft in one direction until the tooth 20 has engaged teeth 17. A tooth 20 will then engage a tooth on gear wheel 16 and rotate the shaft in the opposite direction and the shaft will thus be oscillated intermittently in opposite directions until the disk 19 is rotated to a position where the tooth 20ª is opposite the gear wheel 16ª. The tooth 20ª, however, being off-set with relation to the tooth 20 passes over or misses the gear wheel 16ª so that instead of rotating the shaft in the opposite direction the shaft is left in its position and the gear wheel 16 is again struck by one of the teeth 20 so that the shaft at this point is given two movements in the same direction. Each time, therefore, that the disk 19 makes a complete revolution the shaft is given a one step movement of advancement.

The particular reason for curving the teeth 17, as illustrated in Figure 3, and inclining the teeth 20 as illustrated in Figure 4 is to cause the teeth 20 and the teeth 17 to so work together as to eliminate the sudden start which would otherwise take place at each reversal of the direction of the valve grinding shaft. This arrangement gives the greatest power at the beginning of each motion or step instead of at the completion, which is a great advantage in the practical operation of the device. The spring 15 bears against the main shaft and thus acts as a brake preventing back lash, making the shaft run steadily, and preventing any other motion than the motion desired.

In all valve grinding devices it is necessary to provide the grinding shaft with means for engaging the valve. The valve is ordinarily provided with a diametrically extending notch into which a screw driver or like implement may be inserted, or with a pair of apertures for the insertion of a spanner wrench. The distance between these apertures varies in different valves, and in order to fit my valve grinder to either a valve having a nick or a valve having spanner openings, I split the end of the shaft 12, as at 23, and pivotally mount within this split portion of the shaft the two plates 24 and 25. The plate 25 is longitudinally slotted, as at 26. The plate 24 is simply pivoted upon the rivet 27 which extends through the slot 26. The plate 24 is wider than the plate 25 and one edge 28 of this plate is thinned down so as to have an edge somewhat like a screw driver. Each of these plates 24 and 25 is provided at one end with an outwardly projecting stud or tooth 29. The plate 24 has a ledge or flange 30 against which the plate 25 rests so that both these plates 24 and 25 may be rotated together but the slot 26 permits the plate 25 to be shifted independently of the plate 24.

When it is desired to use the device for grinding a valve having a nick, the screw driver edge 28 is used, the plates 24 and 25 being turned around for this purpose so as to expose this screw driver edge. If, however, the valve has spanner apertures, then the plates 24 and 25 are turned so that the lugs 29 project and it is obvious that these plates 24 and 25 may be relatively shifted so as to increase or decrease the distance between these lugs 29, thus suiting this valve engaging member to the particular detailed construction of the valve designed to be operated on.

The operation of the device will be obvious from what has gone before. The stem or shaft is engaged by means of the plates 24 and 25 with the valve. The operator then presses down on the handle 11 and rotates the disk 19. The rotation of the disk 19 causes four oscillations of the shaft and of the valve and a fifth movement of advancement. In other words, the valve is four times oscillated back and forth and once moved forward. This causes a more or less constant change of the valve upon its seat so that no one portion of the valve will operate for any length of time upon the same portion of the seat, but the valve will be constantly shifting upon the seat while it is being oscillated. Thus the change occurs at every complete turn of the crank and always in the same direction so that the operation does not take place upon the same portion of the valve seat until the valve has made a complete turn, thus grinding equally in all positions. This is absolutely necessary in a practical valve grinding device, for should a valve be slightly warped the warp would be ground out with my device, while unless there was some provision for a step by step advance as well as oscillation, the grinding operation would in all probability transfer some of the warp to the valve seat and this would cause the valve to seat imperfectly.

With regard to the blade whereby the valve grinder is adapted to valves of the spanner or slot type, it may be said that most valve grinders have three or four detachable spanner tips of varying widths, and as

these detachable tips are loose and interchangeable they are readily lost. My improved tip consisting of the plates 24 and 25 is permanently attached to the shaft and cannot become lost, while at the same time fitting the device for use with any ordinary type of valve.

While I have illustrated certain details of construction and arrangement of parts which I have found to be particularly effective, I do not wish to be limited thereto, as it is obvious that many changes might be made in these details without departing in any way from the spirit of the invention as embodied in the accompanying claims.

I claim:—

1. A valve grinding device comprising a support having a handle, a shaft oscillatably mounted in the support and extending parallel to the handle, a rotatable member mounted upon the support and having a crank handle, a pair of star wheels mounted upon the shaft on each side of the rotative axis of said member, the rotatable member having inwardly projecting teeth adapted to engage the teeth of the star wheel and the teeth of the star wheels being set in alternate relation to each other, the teeth of the star wheel being curved reversely to the direction of movement of the star wheel and the teeth of the rotatable member being inclined in the direction of rotation.

2. A valve grinder of the character described comprising a supporting member having a handle and formed to provide two arms, a shaft oscillatably mounted in said arms, a disk rotatably mounted on the supporting member and having its axis of rotation at right angles to the shaft and disposed between said arms, a spring bearing against the shaft and acting as a brake, and star wheels mounted upon the shaft from the center of rotation of said rotatable member, the rotatable member having inwardly projecting teeth, certain of the teeth being adapted to engage both of the star wheels to thereby cause an oscillation of the shaft in opposite directions and another tooth being adapted to engage only one of said star wheels but to escape the other star wheel.

In testimony whereof I hereunto affix my signature.

JUDSON C. PEWTHER.