April 26, 1932. E. O. STARKIN 1,856,002

COMBINED VALVE AND VALVE SEAT CUTTER

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Fig. 1.

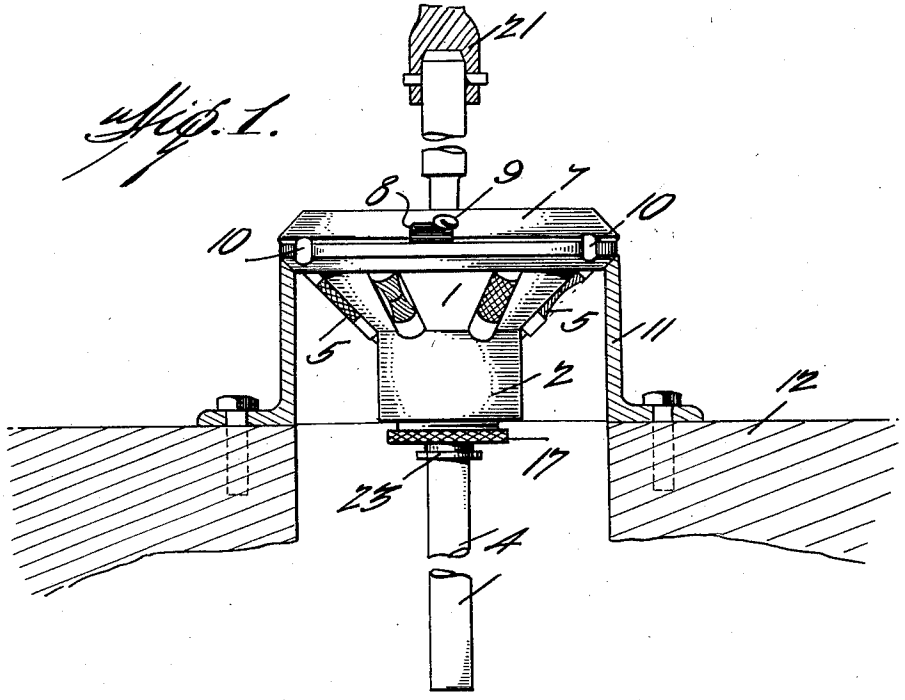


Fig. 3.

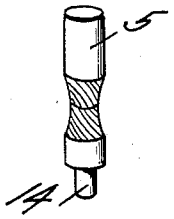


Fig. 2.

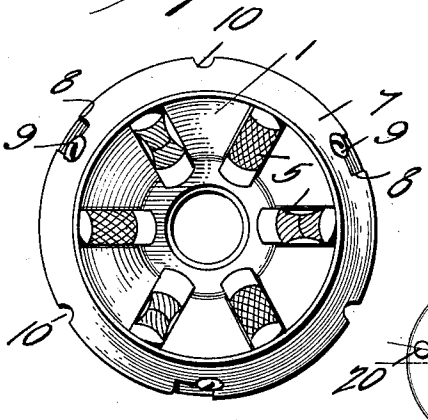


Fig. 4.

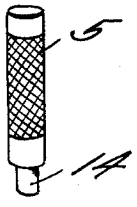


Fig. 11.

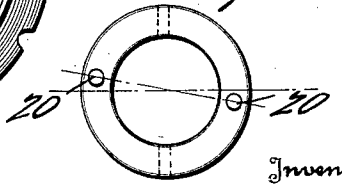


Fig. 9.

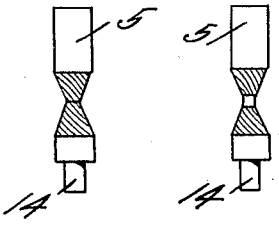


Fig. 10.

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COMBINED VALVE AND VALVE SEAT CUTTER

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Fig. 5.

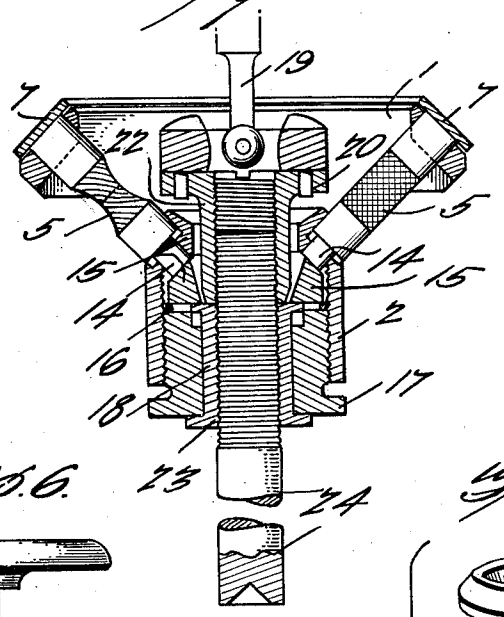


Fig. 6.

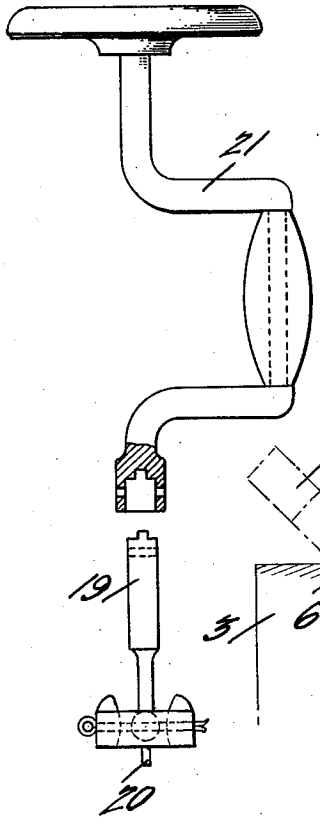


Fig. 7.

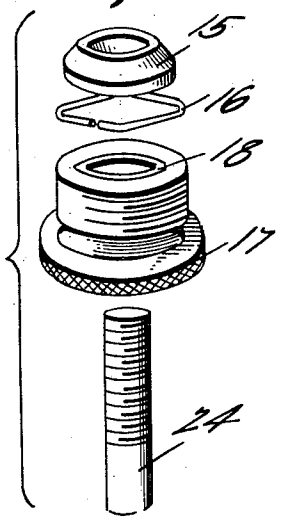


Fig. 8.

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UNITED STATES PATENT OFFICE

EMIL O. STARKIN, OF METUCHEN, NEW JERSEY

COMBINED VALVE AND VALVE SEAT CUTTER

Application filed May 31, 1930. Serial No. 458,338.

This invention relates to improvements in valve and valve seat cutters, and more particularly to a device which will cut both the valve and its seat at one operation.

An object of the invention is to provide an improved valve and valve seat cutter, which will be so constructed and arranged that by utilizing interchangeable cutter or filing elements, the same may be used for radius cutting or angle cutting.

Another object of the invention is to provide an improved valve and valve seat cutter which will be so constructed and arranged that a plurality of angles may be cut at the same operation, as for example when cutting a valve seat, two fifteen degree angles and a forty five degree angle may be simultaneously ground by merely placing the proper cutting elements within the device, prior to the actual grinding operation.

A further object of the invention is to provide an improved valve and valve seat cutter which will be provided with means for positively and definitely speeding up or retarding the cutting operation as desired depending upon the character of work being done.

A still further object of the invention is to provide an improved valve and valve seat cutter which will be highly efficient in operation and which will be quite inexpensive to manufacture.

Other objects will appear as the description proceeds.

In the accompanying drawings which form a part of my application,

Figure 1 is a side elevation of my improved device used in a stand upon a bench when used only as a valve cutter;

Figure 2 is a plan view of my improved valve and valve seat cutter;

Figure 3 is a perspective view of a radius cutting roll as used in my device;

Figure 4 is a perspective view of a plain cutting roll as used in my device;

Figure 5 is a vertical sectional view taken through the cutting device when used as a valve seat grinder;

Figure 6 is an elevation of a hand brace and universal connection used to operate the cutting device;

Figure 7 is a group perspective of the several parts received within the body portion of the cutter used for tensioning the cutting rolls;

Figure 8 is a sectional view through the tension screw showing an interchangeable bushing within the same for positively supporting a valve stem;

Figure 9 is an elevation of a multi-angular cutting roll,

Figure 10 is an elevation of a modified form of multi-angular cutting roll, and

Figure 11 is a plan view of my universal head connection.

Like characters of reference are used throughout the following specifications and the accompanying drawings to designate corresponding parts.

In carrying out my invention, I provide a substantially cone-shaped body 1 having a depending hollow shank portion 2, which is adapted to enter the valve passage in the engine cylinder 3, when the valve 4 is removed.

The body 1 is provided with a plurality of radially extending slots or passages, in which the interchangeable cutting rolls 5 are adapted to be received. It will be clearly seen from the drawings that the thickness of the body 1 is less than the diameter of the rolls 5, and therefore the rolls will extend beyond the inner and outer surfaces of the body to provide an effective cutting surface to cut the valve 4 and valve seat 6, respectively.

A cover cap or ring 7 is adapted to be removably secured to the top of the body 1, and is provided with a plurality of bayonet slots 8 adapted to cooperate with the screws 9 carried by the said body 1. The ring 7 serves to prevent the cutting rolls 5 from sliding out of the body, and being notched at points 10, provides for the positive reception of the body within a cylindrical supporting standard 11 mounted upon a bench 12, where it is desired to cut only a valve separately from the valve seat.

A plurality of openings are formed about the hollow shank portion 2, to receive the reduced ends 14 of the cutting rolls 5. When

a valve 4 is to be cut separately, the following elements are received within the depending shank portion 2, namely, a bearing collar 15 which is ring-shaped and is adapted to be forced up against the depending ends of the rolls 5, after which a spring 16 is inserted within the shank. A tension screw 17 is externally threaded and is formed with a central opening and annular seat adapted to interchangeably receive different sizes of bushings or guides 18 for varying sizes of valve stems. The tension screw with its proper size of guide is then screwed into the lower end of the shank 2. It will be apparent that when the screw 17 is tightened, a corresponding pressure is brought to bear upon the bearing collar or ring 15 to tension the movement of the cutting rolls 5, as desired. Thus the rolls 5 may be made to rotate slowly or rapidly depending upon the character of the work being done.

A universal connection link 19 having depending pins 20 adapted to be received within corresponding openings in the valve head is provided, and is adapted to be received within a hand brace 21, so that the valve may be rotated back and forth to effect the cutting thereof.

When the valve seat is to be cut or filed, a somewhat different set of elements will be received within the shank 2 of the body 1. Assuming the proper cutting rolls 5 are in position within the body 1, the spindle lock nut 22 is placed from the top of the body to extend downwardly into the shank 2 and is adapted to extend flush with the lower surface of the bearing ring 15, after which the tension screw 17 with its interchangeable spindle bushing 23 carried thereby, will be screwed into the lower end of the shank. The spindle bushing 23 is internally threaded to receive the threaded upper end of the spindle 24, which also threads into the internally threaded spindle lock nut 22, thereby holding the spindle and the body 1 in a substantially rigid assembly, ready to be placed within the valve passage of the engine cylinder for cutting the valve seat. Openings will be made in the upper surface of the lock nut 22 so that the depending lugs or pins 20 on the universal connection link 19 may be received therein, and the cutting body rotated back and forth, as hereinbefore described.

In Figures 3, 4, 9 and 10 of the drawings, I have illustrated four distinct types of cutting rolls 5, which may be used in any desired manner in my valve and valve seat cutter. Figure 3 of the drawings illustrates a radius cutting roll which is used to enlarge the opening being cut, while the cutting roll illustrated in Figure 4 designates the roll used for cutting a forty-five degree angle. The rolls illustrated in Figures 9 and 10 are used when it is desired to cut two separate fifteen degree angles at the same operation. Any or all of the rolls 5 may be formed with reduced opposite ends, and one end be encased in a cap member to snugly fit within the openings in the upper periphery of the body 1, it being understood that it is necessary to have the lower ends of the several rolls reduced to positively prevent the same from dropping out from the body.

Many minor changes in detail of construction may be resorted to without departure from the spirit of the invention.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A valve and valve seat tool including a plurality of rotary cutting rolls, a bearing ring engageable with the outer ends of said rolls, tensioning means for applying frictional resistance to the rotation of the rolls, said bearing ring cooperating with said tensioning means to prevent endwise movement of the rolls and means for moving the tensioning means towards and away from the rolls.

2. A valve and valve seat tool including a plurality of rotary cutting rolls interchangeably carried by said tool, a bearing ring engageable with the outer ends of said rolls, and a cooperating spring seated bearing ring engageable with the inner ends of said rolls to prevent endwise movement of the same.

3. The subject matter as claimed in claim 2, and a tension screw engageable with the spring seated bearing ring for applying the desired varying degrees of frictional resistance to the rolls.

4. A valve and valve seat tool including a body, a plurality of interchangeable cutting rolls carried thereby, said rolls having a portion of their surfaces extending beyond the inside and outside of said body to dress a valve and valve seat respectively at one operation, a bearing ring engageable with the outer ends of said rolls, tensioning means for applying frictional resistance to the rotation of the rolls, said bearing ring cooperating with said tensioning means to prevent endwise movement of the rolls and means for moving the tensioning means towards and away from the rolls.

5. The subject matter as claimed in claim 4, and an interchangeable valve stem guide carried by said tensioning means.

6. The subject matter as claimed in claim 4, and an interchangeable spindle bushing carried by said tensioning means, a pilot positively supported by said spindle bushing and extending into said body, and a spindle lock nut positively attached to the upper end of said pilot.

7. A valve and valve seat tool having a plurality of rotary cutting rolls having surfaces adapted to grind a plurality of different angles at one operation, a bearing ring en-

gageable with the outer ends of said rolls, tensioning means for applying frictional resistance to the rotation of the rolls, said bearing ring cooperating with said tensioning means to prevent endwise movement of the rolls and means for moving the tensioning means towards and away from the rolls.

8. The subject matter as claimed in claim 7, said bearing ring being detachably secured to said tool to permit the interchange of the desired type of cutting rolls.

In testimony whereof I affix my signature.

EMIL O. STARKIN.