Sept. 11, 1934. O. R. SCHOENROCK 1,973,227

METHOD FOR MAKING VALVE SPRING RETAINER LOCKS

Filed March 23, 1931

FIG. 2

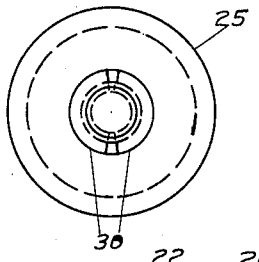


FIG. 4



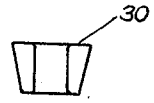
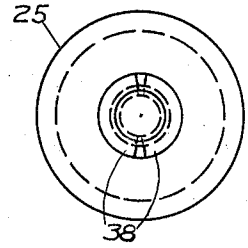


FIG. 3

FIG. 6



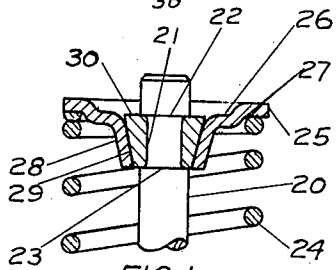


FIG. 1



FIG. 8

FIG. 5.

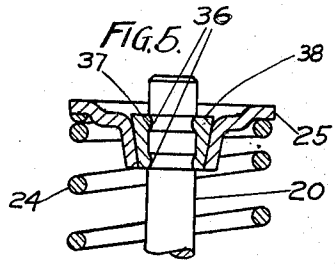


FIG. 10.

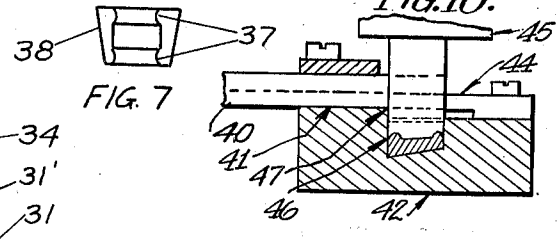


FIG. 7

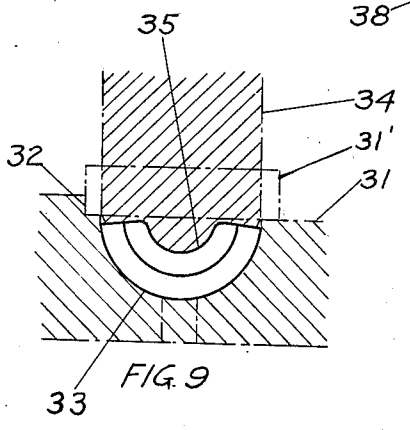


FIG. 9

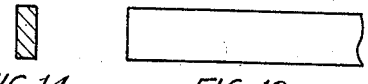


FIG. 14.

FIG. 13.



FIG. 12.

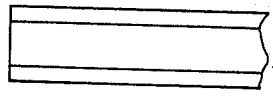


FIG. 11.

INVENTOR.
OTTO R. SCHOENROCK,
BY John P. Smith.
ATTORNEYS.

Patented Sept. 11, 1934 1,973,227

UNITED STATES PATENT OFFICE

1,973,227

METHOD FOR MAKING VALVE SPRING RETAINER LOCKS

Otto R. Schoenrock, Chicago, Ill.

Application March 23, 1931, Serial No. 524,448

9 Claims. (Cl. 29—148)

The present invention is directed generally to a novel and improved construction of spring retainer lock which is used in connection with internal combustion engines for locking the retainer ring or disc to the valve stem after the valve spring has been properly located in its position surrounding the valve stem.

Up to the present time the method which has been heretofore employed for making these substantially semi-circular valve spring retainer locks, has consisted of feeding round bars into screw machines where they are cut off and turned down to form substantially complete circular washers of a proper cross-section after which they are again handled and split or cut into halves or semi-circular form. After this operation is completed, it is again necessary to handle them in order to file or otherwise remove the burs occasioned by the splitting or sawing of the circular form into a semi-circular form. All of these operations entail a considerable expenditure of time and labor with the result that the cost of these retainer locks runs into considerable money especially when it is considered that two of each of these semi-circular locks are used on each valve stem and that two such valve stems are used to each cylinder in connection with the intake and exhaust valves of the engine. This means that when there are six cylinders to an engine, twenty-four of such semi-circular valve spring retainer locks are used.

It is therefore, one of the primary objects of the present invention to not only overcome these objections to the expensive method of making these valve spring retainer locks, but to also provide a completely finished retainer lock in one operation.

These and other objects are accomplished by providing a construction of a novel form of valve spring retainer lock and a novel and improved method of making the same, by means of which sections or bars of proper cross section are rolled or drawn and are suitably cut in proper lengths either simultaneously or subsequent to the upsetting or forming of the lock in suitable dies in the manner hereinafter described.

Referring to the drawing:

Fig. 1 is a vertical cross sectional view of a fragmentary portion of a conventional form of valve mechanism, showing the manner in which my improved form of retaining lock is securely locked and seated in the spring retainer or washer and in position in the recess formed in the valve stem for retaining the spring in position thereon;

Fig. 2 is a top plan view of the same;

Fig. 3 is a side elevational view of the semi-circular retainer lock;

Fig. 4 is a top plan view of the same;

Fig. 5 is a vertical cross sectional view of a valve stem and its associated parts, showing a modified form of the retainer lock mounted therein;

Fig. 6 is a top plan view of the same;

Fig. 7 is a detail side elevational view of the modified form of retainer lock;

Fig. 8 is a top plan view of the lock shown in Fig. 7;

Fig. 9 is a diagrammatic view of the dies which are employed for bending and upsetting the rectangular blank into semi-circular form;

Fig. 10 is a side elevational view partly in cross section of a similar blank cutting and lock forming or upsetting die, showing the semi-circular bar being formed into valve locks.

Fig. 11 is a top plan view of a semi-circular bar and is the preferred form from which the valve locks are made.

Fig. 12 is a cross sectional view of the same.

Fig. 13 is a top plan view of another form of non-circular bar from which the valve lock may be made, and

Fig. 14 is a cross sectional view of the same.

In order to illustrate my invention, I have shown the same in connection with the conventional form of valve stem and its associated parts such as are used for the intake and exhaust valve of internal combustion engines, which comprises the usual valve stem, only a fragmentary portion of which is indicated by the reference character 20, which in turn is provided adjacent its upper end with a peripheral recess 21 forming an upper shoulder 22 and a lower shoulder 23. Surrounding the valve stem 20 is the usual valve spring 24 which has its lower ends suitably seated on the cylinder block and its upper end engaging a spring retainer or washer generally indicated by the reference character 25. This spring retainer 25 is provided with a depressed circular shoulder as shown at 26 which lies inwardly and adjacent to a normally flat peripheral portion of the spring retainer 25 so as to form in effect a curved recess as shown at 27 for forming a seat for the upper coil of the spring 24. The central portion of the spring retainer 25 is provided with a conically shaped and downwardly extending portion 28 so as to form in effect a conical seat as shown at 29 for my improved form of semi-circular and conically shaped locking members 30. In this connection it will be noted that the beveled side of the locking member 30 engages the conical surface or seat 29 of the retainer 25 and the inner curved surface of the locking member 30 is seated in the circular recess 21 of the valve stem 20. In this connection it will be noted that the spring retainer 25 is securely locked to the upper end of the valve stem 20 by depressing the retainer 25 against the action of the spring 24 and inserting the semi-circular retainer locks 30 into the seat 29 so that the upper shoulder of the lock 30 engages the shoulder 22 formed by the peripheral

recess 21 in the valve stem 20 as clearly shown in Fig. 1 of the drawing.

My improved method for making these valve spring retaining locks consists of having rolled or drawn bars of non-circular cross section which includes semi-circular cross section and irregular cross section strips or bars of metal such as is shown in Figs. 11 to 14 inclusive, with the fibers thereof running in longitudinal direction of the bar. It is obvious from the above that the rolled or drawn bar may be of any non-circular cross section such as semi-circular or any symmetrical or irregular cross section.

My preferred method of making valve lock includes the use of the non-circular bar of the semi-circular cross section as shown in Figs. 11 and 12 of the drawing. This bar if preferably made slightly less than a perfect semi-circle in order that the two finished semi-circular and conically shaped valve locks will properly seat themselves in the recesses surrounding the valve stem and the seat in the valve spring retainer 25.

The semi-circular strip or bar 40 is fed through a semi-circular aperture 41 in the female die member 42 beneath a guide plate 43. The bar 40 is moved forwardly until its forward edge strikes a stop 44, after which the reciprocating male die member 45 moves downwardly. On a portion of the initial movement downwardly, the cutting edge 46 of the male die member 45 cooperates with the sharp edge 47 of the female die member to sever the blank from the bar. The remaining stroke of the reciprocating die member 45 is utilized in upsetting the blank so as to form the completely finished semi-circular valve lock in either the forms shown in Figs. 3 and 4 or Figs. 7 and 8. In other words the male die member 45 may be provided with recesses so that the ribs 37 may be formed on the inner curved surface of the valve locks.

When a bar of the cross section shown in Figs. 13 and 14 is used, it is cut into blanks of proper length so as to be slightly less than a complete semi-circle when formed so as to insure a perfect seating of the circular part in the complementary conically shaped seat formed in the spring retainer and to properly engage the recess formed in the valve stem. These blanks, which are subsequently formed or upset into the semi-circular locking members, are positioned on a female die member 31 as indicated by the dotted line position 31' in Fig. 9 of the drawing, against a shoulder 32 of the die member 31. The female die member is provided with a conically shaped recess as shown at 33 which corresponds in size and dimension to the conical seat 29 formed in the retainer 25. Cooperating with the female die member 31 is a reciprocable male die member 34 which has its lower end provided with a semi-cylindrical nose 35 corresponding in size with the reduced diameter of the valve stem 20. When the die member 34 is actuated by any conventional form of driving mechanism to depress the locking blank into semi-circular form, it will be noted that any burs resulting from the cutting of the blanks will be curved in conformity with the surved surfaces of the dies so as not to interfere or obstruct a perfect seating of the locking members in their proper positions both in the retainer and in the recess formed in the upper end of the valve stem.

Obviously, these methods of manufacturing these valve spring retainer locks reduce to a minimum the cost of manufacture and secures an accuracy in dimensions which is essential to the proper aligning of the valve stem and its associated parts, so necessary to the production and manufacture of efficient internal combustion engines.

It will be readily seen that by making retainer locks from a bar having a semi-circular cross section, as shown in Figs. 10, 11 and 12, I have provided a simple and efficient method for making valve locks in which the blanks will be simultaneously severed and upset so as to form a semi-circular and conically shaped retainer lock of the construction shown in Figs 3 and 4 or with slight changes in the dies, the lock may be made in the form shown in Figs. 7 and 8.

While in the above specification I have described one preferred form and a modification of the form of lock which my invention may assume in practice, it will of course, be understood that other forms of modification may be made not only in the section of the lock, but also in the method, without departing from my invention as expressed in the following claims:

What I claim is my invention and desire to secure by Letters Patent is:

1. The herein described method of making a valve spring retainer lock consisting of successively severing and forming conically shaped semi-circular locks from longitudinal bars by a single operation.

2. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar of semi-circular cross-section and upsetting said blank into semi-circular conical form.

3. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar of semi-circular cross-section and subsequently upsetting said blanks to substantially conical and semi-circular form.

4. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar and subsequently upsetting said blanks to substantially semi-circular form.

5. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar of non-circular cross-section, and subsequentlly upsetting said blanks to substantially semi-circular form.

6. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar of non-circular cross-section, and subsequentlly upsetting said blanks to substantially conical and semi-circular form.

7. The herein described method of making valve spring retainer locks consisting of cutting blanks from a rolled bar of non-circular cross section, and subsequently upsetting the blanks in a semi-circle.

8. The herein described method of making a valve spring retainer lock consisting of severing blanks from a longitudinal bar of non-circular cross-section and upsetting said blanks into semi-circular and conical form having an internal protruding bead.

9. The herein described method of making a valve spring retainer lock consisting of successively severing and upsetting blanks from a longitudinal bar into conically and semi-circular form by a single operation.

OTTO R. SCHOENROCK.