W. E. COAKLEY.

METHOD OF FORMING VALVE SEATS.

APPLICATION FILED MAY 1, 1920.

1,390,022. Patented Sept. 6, 1921.

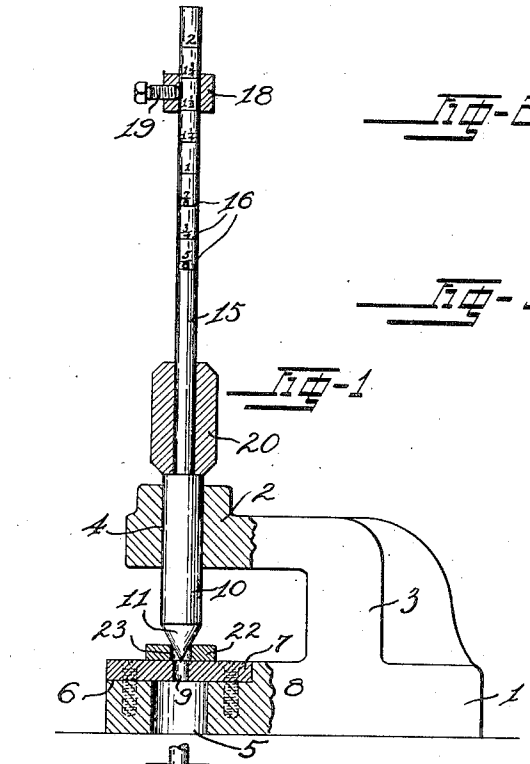


Fig-1

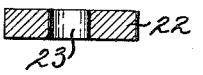


Fig-2

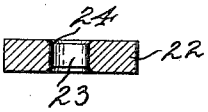


Fig-3

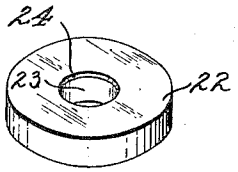


Fig-4

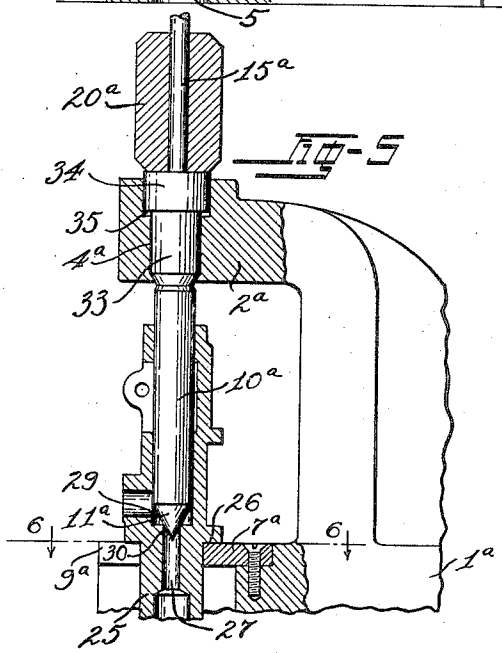


Fig-5

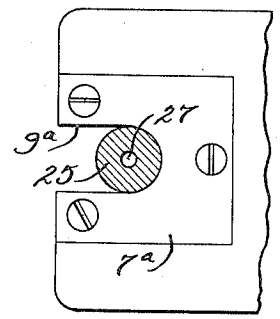


Fig-6

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UNITED STATES PATENT OFFICE.

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METHOD OF FORMING VALVE-SEATS.

1,390,022. Specification of Letters Patent. Patented Sept. 6, 1921.

Original application filed December 7, 1917, Serial No. 206,093. Divided and this application filed May 1, 1920. Serial No. 378,150.

To all whom it may concern:

Be it known that I, WILLIAM E. COAKLEY, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Methods of Forming Valve-Seats, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

My present invention relates to a novel method of forming valve seats, this being a division of my former application Serial No. 206,093, filed December 7, 1917, which covers the apparatus for carrying out the method.

Valve seats of the nature wherewith my invention is concerned were previously made by grinding or cutting away the metal and this necessitated the use of a lathe, requiring great care in "setting up" the work—an operation incident to the use of machines of this class. Furthermore, equal care had to be exercised in grinding or cutting the seat to see that it was smooth and of the proper depth and degree of taper. Such practice, involving so much labor and skill, obviously made the production of valve seats slow and expensive.

Objects of the invention are to provide a method whereby valve seats may be rapidly and economically produced by unskilled workmen; and which is particularly convenient of practice.

To these ends my invention consists in producing valve seats by swaging the material surrounding an aperture in the member that is to have the valve seat thus, preferably by a single blow, to impart the desired size and shape to the seat, the swaging operation further having the effect of compressing and consequently hardening the material in the immediate region of the seat, thereby enhancing its wearing qualities. Furthermore, by this method, the surface of the seat may be made as smooth as the working surface of the swage itself (within the limitations of the quality of material wherein the seat is formed), and the swage of course may be given a highly finished working surface.

In the accompanying drawing, wherein I have illustrated apparatus for carrying out my improved method, Figure 1 is a side elevation of the apparatus or machine; Fig. 2 is a sectional detail of a "blank" member wherein valve seats are adapted to be formed in accordance with my method; Fig. 3 is a similar view of the member after the valve seats have been formed therein; Fig. 4 is a perspective view of the same; Fig. 5 shows a machine through which my method may be employed for forming valve seats inside valve casings; and Fig. 6 is a section on the line 6—6 of Fig. 5.

The form of machine shown in Fig. 1 comprises a base 1 and a head 2, the latter being supported a suitable distance above the base by a neck 3. The head overhangs the front portion of the base and has a bore 4 in vertical alinement with a hole 5 of the base. A depression 6 is formed in the top of the base at the front, and in it is fastened a hardened plate 7 as by screws 8, the plate having an aperture 9 that opens into the hole 5. A swage 10 is guided within the bore 4, and its lower end 11 is shown as conical and as possessing the same degree of taper as that to be given the valve seat.

A guide 15, consisting of a rod, rises from and is carried by the swage 10, and this rod is graduated as indicated at 16 whereby the location of an adjustable collar 18 may be determined as hereinafter explained. The collar is held to the rod by a set screw 19. A weight 20 is slidable freely upon the rod 15 between the upper end of the swage and the collar 18.

In the use of the foregoing apparatus, the operator grasps the rod 15 and lifts the swage 10 high enough to permit a member or element 22, wherein the valve seat is to be formed, to be placed upon the plate 7 with its aperture 23 approximately in register with the opening 9 of the plate 7. He then lowers the swage so that its tapered end may enter the aperture of the member and accurately center or position it with respect to the swage. Leaving the swage in this position, the operator elevates the weight 20 until it attains the height of the collar 18, when he allows it to drop and impose a blow upon the upper end of the swage 10 with the result that the seat is formed within the upper end of the aperture of the member 22, the seat being indicated, in Figs. 3 and 4, at 24. He then elevates the swage as before, inverts the member 22,

lowers the swage into contact with the member, and then elevates and drops the weight to form a valve seat at the opposite end of the aperture.

There is a rather important relation existing between the heft of the weight—plus that of the swage, rod and collar—and the height to which the weight is elevated before it is released, which determines the power of the blow that is imparted to the element or member 22, and this relation may be altered through the adjustment of the collar 18 to vary the power of the blow according to the size of valve seat that is to be formed. It is clear that a valve seat of comparatively small diameter would require a lighter blow than one of considerably greater diameter, for in the latter instance there would be much more metal to displace than in the former. The graduations 16 upon the rod 15 indicate the positions which the collar 18 should occupy when the machine is adjusted to operate upon members having (in the present instance) external diameters indicated by the respective graduations.

It may be explained that the elements or members 22 constitute reversible valve seats that are now in quite extensive use. However my method may be used in producing valve seats in the interiors of valve casings by modifying the machine as illustrated in Fig. 5. Here a plate 7^a is set within the base 1^a and is provided with a notch 9^a into which a piece of work 25 may be inserted, the work, in the present case, consisting of a casing having a flange 26 which rests upon the portion of the plate 7^a surrounding the notch 9^a. The casing is further provided with bores 27 and 28 of different diameters between which a shoulder 29 is formed, it being designed to have a valve seat 30 formed within the end of the bore 27 adjacent the shoulder 29.

10^a is a swage that is adapted to be dropped into the bore 28 of the piece of work before the latter is placed in the machine, the lower conical end 11^a of the swage projecting into the bore 27. As the flange 26 is slid in upon the plate 7^a, the upper end of the swage engages the inclined edge portion of the lower end of a hammer 33 that is guided within the bore 4^a of the head 2^a, elevating the hammer slightly and supporting it with its enlarged upper end 34 off a shoulder 35 that is formed by the enlargement of the upper end of the bore 4^a. A guide 15^a is carried by the hammer 35 and a weight 20^a is reciprocable thereon so that by raising the weight as in the former case and allowing it to drop, it will impart a blow, through the hammer 33, to the swage 10^a of sufficient power to produce the valve seat 30.

Having thus described my invention, what I claim is:

1. The method of producing valve seats in apertured members which consists in swaging the material surrounding the aperture to form the seat.

2. The method of producing valve seats in apertured members which consists in placing within the aperture a swage having a seat forming portion identical in form with the seat engaging portion of the valve wherewith the seat is designed for use, and imparting a blow to the swage.

In testimony whereof, I hereunto affix my signature.

WILLIAM E. COAKLEY.