

(No Model.)

J. POWELL.

PROCESS OF HARDENING SEATS AND VALVES.

No. 481,332.

Patented Aug. 23, 1892.

Fig. 1.

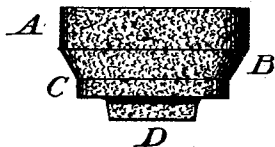


Fig. 3.

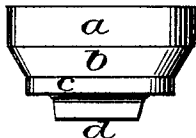


Fig. 4.

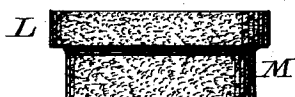
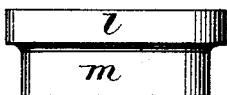


Fig. 6.



Attest:
George E. Cruise,
Harry E. Rohrer.

Fig. 2.

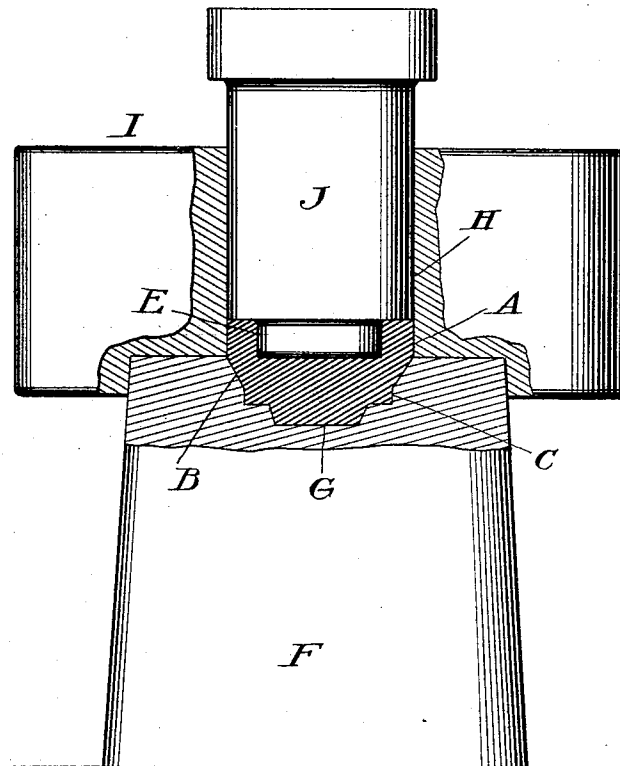
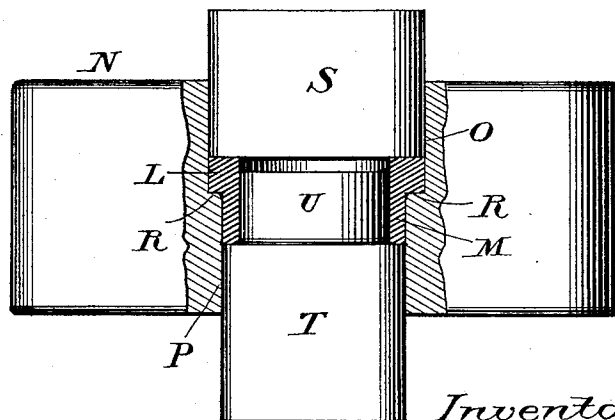


Fig. 5.



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UNITED STATES PATENT OFFICE.

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PROCESS OF HARDENING SEATS AND VALVES.

SPECIFICATION forming part of Letters Patent No. 481,332, dated August 23, 1892.

Application filed October 13, 1888. Serial No. 288,041. (No model.)

To all whom it may concern:

Be it known that I, JAMES POWELL, a citizen of the United States of America, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a certain new and useful Process of Hardening Seats and Valves, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention comprises a novel method or process of finishing those valves and detachable valve-seats which are applied to cocks and other similar devices for controlling the flow of steam, gas, water, &c.

Valve-disks and seats as heretofore made are cast of a suitable composition or alloy, more or less hard, and then finished in a lathe in the ordinary way, which mode of construction is objectionable from the fact that it is impossible to produce valve disks or seats free from imperfections, as it is well known that old castings as they come from the mold are more or less porous or crystalline in structure. This defect causes such valve disks or seats to wear very unevenly under the influence of steam, water, or other fluids. Efforts have been made to remedy this difficulty by adding larger proportions of the hardening metals to the alloy, thus increasing the cost and labor of finishing; but it has been found impossible to entirely overcome the formation of minute pores in the casting by such hardening. By my improved process it is unnecessary to increase the hardness of the common alloys, such as brass or bronze, of which such valve disks or seats are usually composed, nor is it important that such castings shall be free from small blow-holes or minute pores, as my said process forces the metal into a compact homogeneous mass perfectly solid and free from cavities, having a smooth-finished surface, without any additional labor, while their hardness is so greatly increased that they will wear many times longer than valves or seats made in the ordinary way, thus increasing their efficiency and economy in a marked degree. These valves and seats are first made of any metal or composition of metals which is sufficiently hard for the purpose, and are cast to approximately the proper size and shape, after which the blanks are placed in appropriate dies or swage-blocks and

subjected to the percussive action of a hammer, plunger, or equivalent appliance. The result of this operation is to harden or condense the outer skin of the cast blanks and at the same time to render them sufficiently smooth for use without any special finishing, as hereinafter more fully described.

In the annexed drawings, Figure 1 is a side elevation of a rough valve-blank. Fig. 2 is an axial section showing said blank in the act of being hardened or condensed. Fig. 3 is a side elevation of the finished valve. Fig. 4 is a side elevation of a rough valve-seat blank. Fig. 5 is an axial section showing said blank in the act of being hardened or condensed. Fig. 6 is a side elevation of the finished valve-seat.

To illustrate my method of hardening a valve, I have selected a blank consisting of a cylindrical body A, conical bearing B, guide C, flange or rib D, and a cavity E, the latter being seen only in Fig. 2. This blank is a rough casting of practically the same size and shape as the valve and is composed of any hard metal or composition of metals capable of standing more or less hammering.

F represents a swage-block having in its upper end a die G, adapted to receive the principal portion of the blank, the remaining portion of the same being inclosed by the cylindrical chamber H of a ring I, the latter being applied to said block in the manner shown.

J is a punch adapted to traverse the chamber H and having at its lower end a short cylindrical shank K, that enters the valve-cavity E. The rough casting is placed within the die G of the swage-block F and the ring I is applied to the latter, after which act the punch J is inserted in the chamber H, so as to cause the shank H of said punch to enter the cavity E of the valve. One or more blows are now delivered upon the head of the punch either by means of a hammer or the plunger of a drop-press, as this part of the process is immaterial, provided the casting is so forced into the die as to harden or condense the metal to the required degree. After the first or second or any subsequent blows upon the punch the casting can be taken out of the swage-block and then annealed and rehammered as often as may be necessary. The

number of blows given to the casting and the extent to which it is annealed will vary with the metal or metals of which the valve is made or the peculiar use to which it is to be put. Therefore specific instructions for carrying out this part of the process cannot be given; but the finished valve will have the appearance seen in Fig. 3, where *a*, *b*, *c*, and *d* represent the smooth, hardened, or condensed surface of the valve. The process of hardening or condensing the valve-seat is the same in principle as the operation just described; but the dies, &c., are modified to suit the different shape of the casting, which latter may be formed as seen in Fig. 4. Here the valve-seat blank is shown as being composed of two members L and M, the upper of which L is somewhat shorter and slightly larger in diameter than the lower member, which lower member is usually screw-threaded externally to engage with the diaphragm of the shell or casting.

N is a swage-block having a pair of communicating chambers O P of unequal diameters, said chambers being joined by an annular ledge or shoulder R.

S is a punch adapted to traverse the upper chamber O, and T is a counter-punch that enters the lower chamber P.

U is a short cylindrical spindle projecting from the counter-punch T and fitting within the bore of the valve-seat. This rough casting L M is first inserted in the chamber O of the swage-block N, and the punch S is driven into said chamber for the purpose of forcing the blank down until it rests upon the annular ledge or shoulder R, as seen in Fig. 5.

The counter-punch T is then inserted in the other chamber P, so as to cause the shank U to enter the bore of the blank, and said punch is then set upon an anvil or the bed-plate of a drop-press. The punch S is then operated on in the same manner as the punch J, the blank being hammered as often as desired, and also annealed, if necessary, the blank being disengaged from the swage-block by driving the punch T up through the same. When thus detached the finished valve-seat will present a light, hardened, or condensed surface, as indicated at *l m* in Fig. 6.

From the above description it is apparent that the valve and valve-seat are finished by the same process—that is to say—the rough blanks are first confined in suitable dies and then hardened or condensed so as to present a smooth finished appearance by the percussive action of punches or plungers.

I claim as my invention—

The process, substantially as described, of imparting a smooth, hardened, and condensed surface to cast blanks for valves and valve-seats, which process consists in confining said blanks within suitable dies and then subjecting the blanks to the percussive action of punches or their equivalents, whereby said castings are hardened, condensed, and finished without further manipulation, as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

JAMES POWELL.

Witnesses:

JAMES H. LAYMAN,
SAML. S. CARPENTER.