A. WHEELER.

Apparatus for Tempering Steel.

No. 6,615. Patented July 31, 1849.

Fig. 1.

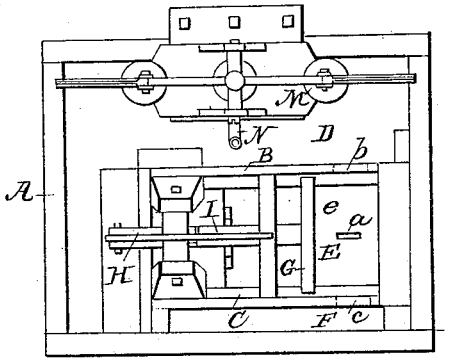


Fig. 2.

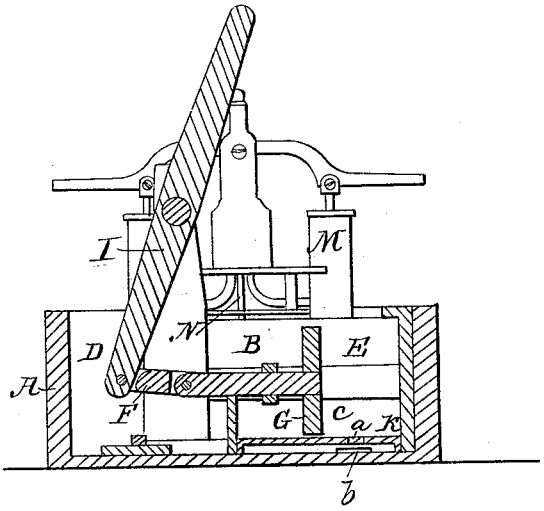


Fig. 3.

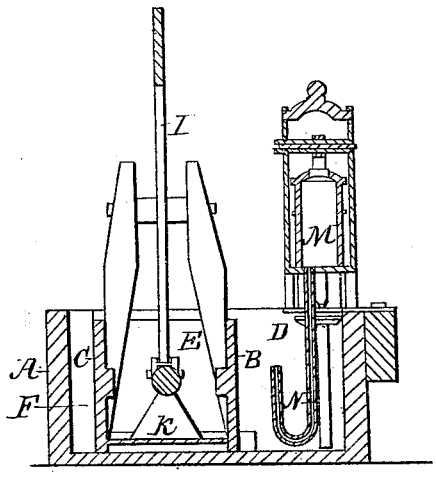
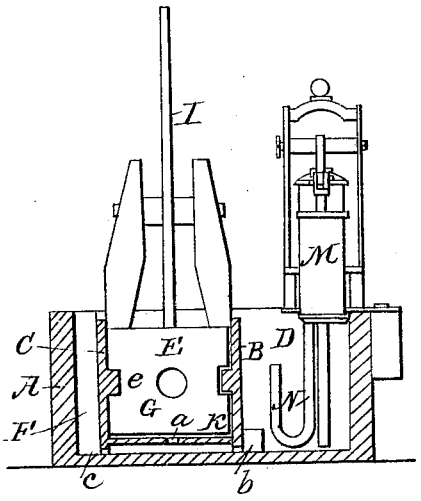


Fig. 4.



UNITED STATES PATENT OFFICE.

ASA WHEELER, OF WARWICK, MASSACHUSETTS.

PROCESS OF HARDENING METALS.

Specification of Letters Patent No. 6,615, dated July 31, 1849.

To all whom it may concern:

Be it known that I, ASA WHEELER, of Warwick, in the county of Franklin and State of Massachusetts, have invented a new and useful Process of Hardening Steel or Articles Made Thereof; and I do hereby declare that the same is fully described and the apparatus to be employed represented in the following specification and accompanying drawings, letters, figures, and references thereof.

Of the said drawings Figure 1, denotes a top view of a hardening cistern, and the contrivance or contrivances appended thereto for producing water currents therein, as will be hereinafter described. Fig. 2, is a vertical and longitudinal section thereof, taken through the horizontal piston, and representing a side view or elevation of the forcing pump apparatus disposed at or near one side of the cistern. Fig. 3, is a vertical central and transverse section of the said cistern etc. Fig. 4, is a vertical and transverse section of the main piston, trough and its induction passages.

In hardening tools or articles of steel, or those composed of steel united to iron or some other material, much difficulty is often experienced particularly when the hardening is attempted to be performed by simply dipping the article, when in a heated state, into water. The steam, gas or volatile products, which escape from the hot metal, operate to press the water away from the surface or part to be hardened. Much of the heat abstracted from the article by the surrounding water remains in such close proximity thereof as to materially retard the process of hardening. I have discovered that by immersing the article or part thereof to be hardened (when in a heated state) below the surface of water and then causing one or more currents or streams of water, and particularly those made to emanate and rise upward from the lower part of a vessel containing the said water, to impinge against the faces or surfaces to be hardened the hardening process is very much improved.

In order to harden a hammer I cause a rapid current of water to pass through a body of water in a tub or cistern. This I do by means of a force pump or any other equivalent. While the water is so in motion I dip the heated article in it, and in such manner that the water may be made to entirely surround it, and the current to impinge directly against the part to be hardened. To operate to the best advantage, the current should have an upward motion, that is to say should flow in a vertical or nearly vertical direction. As the tendency of the abstracted heat as well as that of the steam and gas, generated is to rise directly upward the vertical current materially aids in removing the same from the surface to be hardened, and in so doing allows the surrounding fresh or cold water to close in or against the article thereby aiding in the rapid extraction of heat therefrom.

To harden an ax or edge tool I usually make use of two or more currents which I cause at the same time, to impinge against opposite sides of the part to be hardened while said article is immersed in water. These currents may be produced in various ways. One which I consider a very good one is as follows: I take a trough or vessel of sufficient size, and insert in it two parallel vertical partitions so as to divide it into two compartments. In the central compartment I place a gate or piston, which I cause by a suitable mechanism to move from near one end of the compartment to the opposite end thereof. In front of the said piston, and through the lower part of each partition and near the lower part thereof, I make an orifice or hole of sufficient size for the current of water to flow through. Through each partition, and at or near its opposite end, I also make one or more holes. Now when the vessel is filled with water if we draw the piston or gate quickly through its compartment, and from the front end of the said compartment toward its rear end, currents of water will be caused to rush from the two outer compartments, through the two front apertures (which should be made directly opposite to or in line with each other) and will meet together and rise upward through the body of water. This being done we place the ax to be hardened and while heated, in the water and below its surface and at the junction of the two currents so that one of the said currents shall strike it on one side, while the other shall impinge against its other side, the ax or that part of it to be hardened being at the same time entirely surrounded with water.

A somewhat similar mode of producing a single upward current for the purpose of

hardening hammers or single faced tools, is as follows: I take a trough or vessel A, Fig. 1, of sufficient size, and insert in it, two parallel vertical partitions B, C, and so as to divide the trough into three compartments, D, E, F. In the central compartment E, I place a gate board or piston G, and apply to it a connecting rod H, and hand lever I, or other suitable mechanism by which a reciprocating rectilinear and horizontal motion may be given it. Downward in the floor K of the middle compartment E, (the said floor being elevated somewhat above that of the vessel A,) and in front of the piston I make an opening *a*, and two passages *b*, *c*, leading in opposite directions therefrom and opening respectively into the compartments D, F, as seen in Fig. 4. The upper edges of the partitions as well as that of the piston are calculated to be arranged at some distance below the level of the top edges of the vessel A, so that when the vessel is full or nearly full of water, the water shall stand somewhat above the level of the top of the piston. By working or moving the piston in the right direction a current of water may be made to pass through the channels *b*, *c*, and flow upward through the opening *a*, and into the water within the space or chamber *e*, in front of the piston. The hammer or face to be hardened may be inserted in the water in the space *e*, and so as to allow the upward current of water, made to pass through the said waters, to impinge against it.

When it is desirable to harden very quickly or to indurate a steel face or piece of steel to a very great degree, a common force pump M, may be employed to take the water from the vessel A, and throw it upward through a bent pipe N, and into the body of water in the vessel, so as to produce a jet which after rising out of the water, will fall back into the same. The article to be hardened may be inserted in the body of the water and in contact with the said jet, or current passing through the said body.

I do not claim hardening steel or iron by immersing it in whole or in part in a current of water, nor do I claim suspending the article to be hardened in air and causing a jet of water to impinge against it, as these methods are known; but

What I do claim is—

Hardening steel or iron by immersing it below the surface of and in water and then causing one or more jets to play through the body of the water and against the metal or part thereof to be hardened.

ASA WHEELER.

Witnesses:
JOSEPH STEVENS,
HANNAH STEVENS.