Jan. 23, 1945. H. E. SPIETH 2,367,898

FLAME HARDENING HEAD

Original Filed Nov. 4, 1940

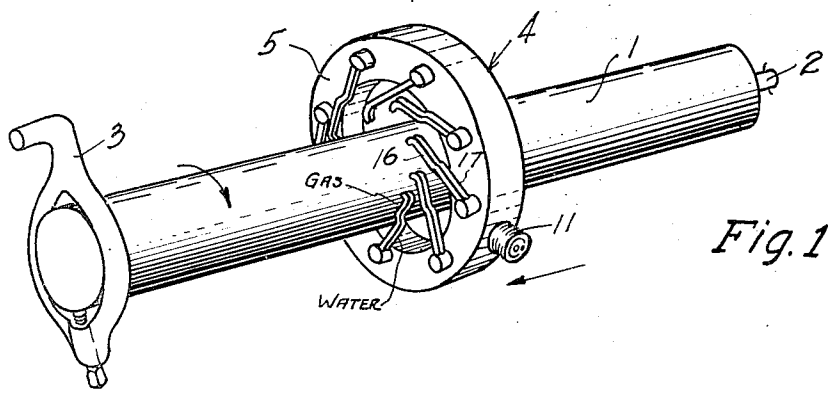


Fig. 1

Fig. 2

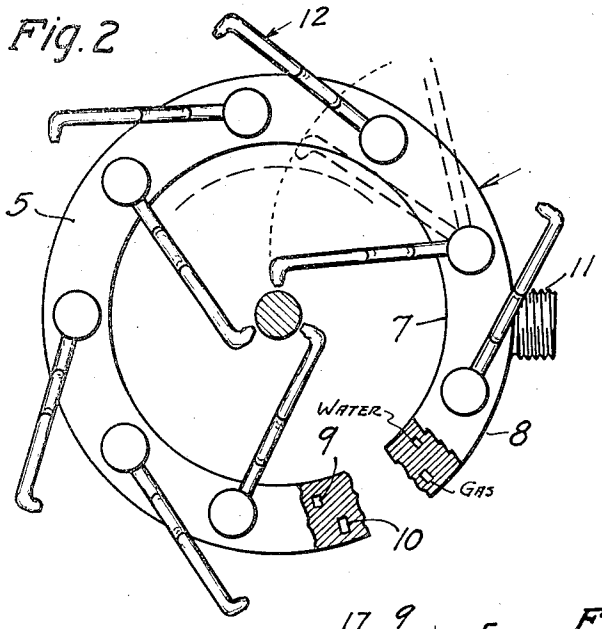
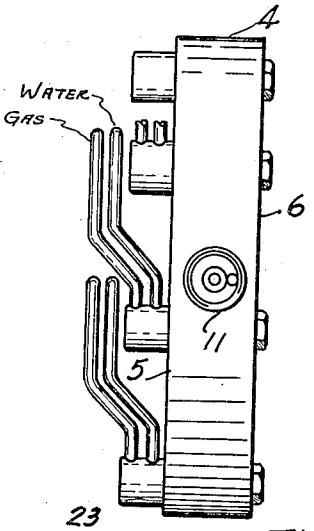


Fig 3



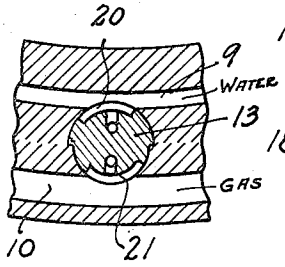


Fig. 5

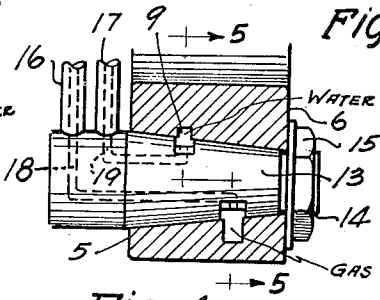


Fig. 4

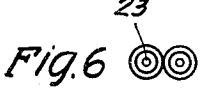


Fig. 6

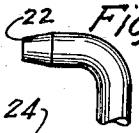


Fig. 7

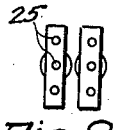


Fig. 8

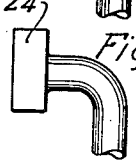


Fig. 9

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2,367,898

FLAME HARDENING HEAD

Harry E. Spieth, Portland, Oreg.

Substituted for abandoned application Serial No. 364,115, November 4, 1940. This application May 23, 1944, Serial No. 536,977

2 Claims. (Cl. 266—4)

This invention relates to improvements in flame-hardening apparatus, and this application is a substitute for my application, Serial No. 364,115, filed November 4, 1940.

The principal object of the invention is the provision of a hardening and quenching head readily adaptable to any type of metal handling machinery and operable and adjustable throughout a wide operative range.

The invention comprises a head in the form of a ring formed internally with water and gas ducts in communication with swingably mounted and adjustable water and gas jets which are readily adjustable with respect to the work being dealt with. The water and gas ducts are in open communication through a single inlet with sources of supply of water and gas.

These and other objects will appear as my invention is more fully hereinafter described in the following specification, illustrated in the accompanying drawings, and finally pointed out in the appended claims.

In the drawing:

Figure 1 is a perspective view of a shaft mounted for rotation in a lathe or other machine and showing my invention in operative position with respect thereto.

Figure 2 is a side elevation of the hardening and quenching head with a fragment broken away for convenience of illustration.

Figure 3 is an edgewise view of Figure 2.

Figure 4 is an enlarged sectional view through the hardening and quenching head illustrating the manner in which the jets are swingably mounted with respect to the head and adapted to be brought into and out of communication with the water and gas ducts.

Figure 5 is a sectional view taken on the line 5—5 of Figure 4.

Figure 6 is an enlarged detail view of the water and gas jets.

Figure 7 is a side elevation of Figure 6.

Figure 8 is a detail front elevation of a modified form of water and gas jets.

Figure 9 is a side elevation of Figure 8.

Referring now more particularly to the drawing:

In Figure 1 reference numeral 1 indicates pieces of work being dealt with which in this instance is a shaft centered as at 2 at one of its ends in a lathe and engaged with the lathe at its opposite end by means of a dog 3 in the usual manner and adapted to rotate in the direction of the arrow applied to the shaft. The hardening and quenching head is generally indicated at 4 and consists of a ring having two flat sides 5 and 6 and flat inner and outer peripheries 7 and 8 respectively. The interior of the ring is formed with two concentric water and gas ducts 9 and 10 respectively which are in open communication with a threaded nipple 11 adapted for connection with a feed pipe to supply water and gas to the ducts 9 and 10.

A plurality of nozzles generally indicated at 12 are swingably mounted to the ring 4 and are preferably equally spaced with respect to each other. Each nozzle is swingably mounted to the ring by means of a tapered shaft 13 threaded at one of its ends as at 14 to receive a locking nut 15. The opposite end of the shaft 13 extends outwardly from the side wall of the ring and is suitably apertured to receive a pair of hollow tubes 16 and 17. The tube 16 by means of a duct 18 formed in the shaft 13 is adapted for open communication with the gas duct 10. Similarly the tube 17 by means of duct 19 is adapted for communication with the water duct 9. The shaft is relieved as at 20 and 21 at diametrically opposed points to provide sufficient space to insure a free flow of gas or water from the ducts in the ring to the ducts 18 and 19. The tapered portion of the shaft 13 serves as a valve with respect to the ducts 9 and 10 so that the flow of water and gas into the ducts 18 and 19 may be controlled by rotation of the shaft with respect to the ring 4. For example, when the tubes or nozzles 16 and 17 are swung inwardly to the work being dealt with the ducts 18 and 19 are in communication with the ducts 9 and 10 and the water and gas is flowing freely through the nozzles, but when the nozzles are swung outwardly with respect to the ring 4 as shown in Figure 2 the flow of water and gas is cut off by the tapered portion of the shaft 13.

In Figures 6 and 7, I have illustrated one form of nozzle which comprises a tip 22 having a single orifice 23. In Figures 8 and 9, I illustrate a modified form of nozzle which consists of a tip 24 formed with a plurality of orifices 25.

In hardening metal with my invention the depth of hardness is governed by the amount of heat put into the object being hardened and is controlled by the amount of oxygen or acetylene supplied to the nozzle or nozzles, and by adjusting the speed at which the flame jets travel. The degree of hardness obtained depends on the rate of quenching which is governed by the type of quenching medium—water, compressed air, etc.—and by the volume of such quenching used. A simple trial easily determines the correct setting for torch speed, gas flow, and

rate of quenching, to secure the degree of hardness and depth of penetration desired.

The object being hardened rotates in the direction of the curved arrow in Figure 1, while the hardening head moves horizontally from one end of the work to the other. The adjustable mounting of the nozzles with respect to the ring renders the device capable of applying various amounts of flame or water to the object to be hardened. A maximum amount, of course, may be applied when all of the nozzles are swung inwardly toward the object to be hardened and each of the nozzles may be located in any of their adjusted positions by advancing the nut 15 on the threaded end 14 of the shaft 13.

While I have shown a particular form of embodiment of my invention I am aware that many minor changes therein will readily suggest themselves to others skilled in the art without departing from the spirit and scope of the invention. Having thus described the invention, what I claim as new and desire to protect by Letters Patent is:

1. Flame hardening apparatus comprising a ring member having water and gas ducts formed internally therein, means for connecting said ducts with sources of supply, a plurality of water and gas nozzles arranged in pairs and each pair being attached to a valve body rotatably mounted in the ring and adapted to control communication between the ducts and nozzles, and means for locking each of said valve bodies in various positions.

2. Flame hardening apparatus comprising, a ring member having water and gas ducts formed internally therein, means for supplying said ducts with gas and quenching fluid, respectively, a plurality of valve-rotors mounted in said ring member and formed with gas and fluid ducts adapted to be moved into and out of communication with the respective ducts of said ring member, and pairs of gas and fluid nozzles connected to said valve-rotors and communicating with the respective ducts thereof, the ends of said nozzles being adjustable through arcs intersecting at the ring center.

HARRY E. SPIETH.