Oct. 23, 1945. W. P. SHAKS 2,387,414

QUENCHING DEVICE

Filed March 30, 1943

FIG. 1

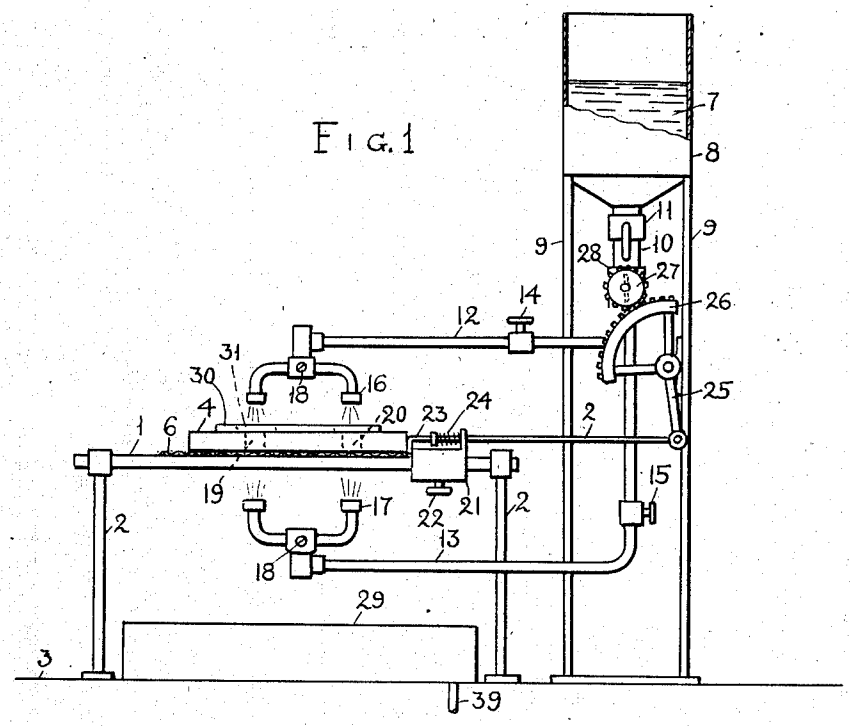



FIG. 2

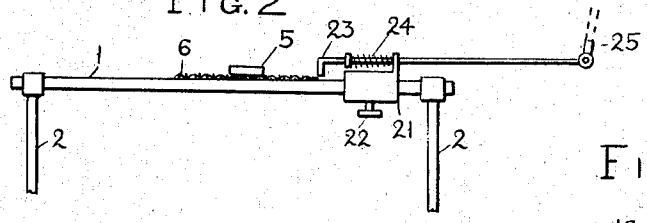



FIG. 4

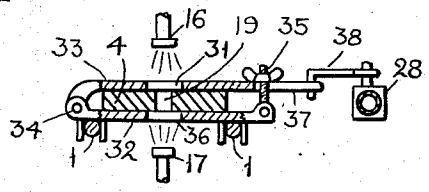



FIG. 3

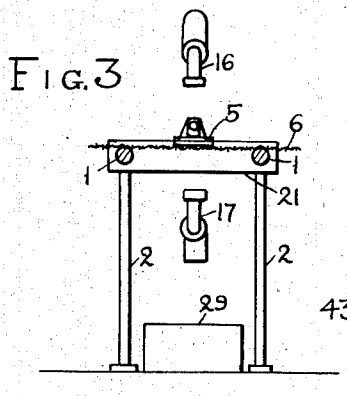
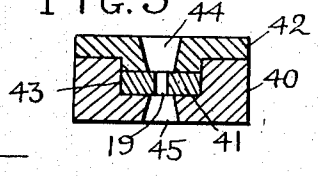



FIG. 5




WILLIAM P. SHAKS
INVENTOR

BY John P. McKenna
ATTORNEY

Patented Oct. 23, 1945

2,387,414

# UNITED STATES PATENT OFFICE

2,387,414

## QUENCHING DEVICE

William P. Shaks, Woodside, N. Y.

Application March 30, 1943, Serial No. 481,171

3 Claims. (Cl. 266—6)

My invention relates to quenching devices and has particular reference to devices or apparatus for quenching of heated steel objects for their hardening.

The object of my invention is to provide an apparatus for rapid quenching of heated steel objects simultaneously from two sides in order to avoid any warping which otherwise may take place.

When hardening flat objects such as flat discs, gears, discs, etc., by ordinary methods, it is difficult to avoid warping of such objects because one side or one end of the object usually becomes immersed or otherwise subjected to the action of a quenching liquid ahead of the other side or end. It is also often necessary to harden a limited area of the object, as, for instance, in blanking dies where the cutting edge around the hole must be very hard while the rest of the die should preferably remain relatively soft to avoid cracking of the die in service. For such purposes I provide an apparatus in which a heated object is placed on a supporting fixture and is simultaneously subjected to an adjusted spray or stream of a quenching liquid from the upper and lower sides thereby preventing warping of the object. The spray is so localized that only the cutting edges are hardened.

Another object of my invention is to provide means for individually adjusting the rate of flow of the liquid at the top and at the bottom of the object.

Still another object of my invention is to provide means automatically to open spray when the object is placed in a correct position on a supporting fixture.

My invention is more fully described in the accompanying specification and drawing in which—

Fig. 1 is an elevational view of my device showing an object to be quenched in an operative position;

Fig. 2 is a fractional view of the same showing the device in an inoperative position with the object removed;

Fig. 3 is an end view of the device;

Fig. 4 is a detail view of a quenching fixture;

Fig. 5 is a sectional view of a modified quenching fixture.

My quenching device consists of a supporting fixture formed of two parallel bars or rods 1 supported at the ends on posts or legs 2 extending to the floor 3 of a room in which the device is located. The bars are used for supporting an object 4 to be quenched. For very small objects 5 a wire screen 6, Fig. 3, may be placed on the rods 1.

Quenching liquid 7, such as water, oil or a salt solution, is held in a tank or other suitable container 8 supported on legs 9. A pipe 10 extends from the bottom of the tank with a valve 11 for stopping and starting the flow of the liquid. The pipe is branched out below the valve into pipes 12 and 13, the pipe 12 extending above the supporting bars and the pipe 13 extending below them. These pipes have valves 14 and 15 for regulating the relative amount of flow to the work 4. Removable spraying nozzles 16, 17, are attached to the ends of the pipes as by screws 18. Various types of nozzles may be used in connection with the pipes 12 and 13 such as, for instance, double nozzles as shown for simultaneously delivering sprays, localized against two holes 19, 20 in the work 4. The cutting edges only of the holes are therefore hardened, leaving the rest of the die relatively soft.

My device can be used to advantage in quantity production where a large number of similar articles must be quenched in an exactly similar manner. To facilitate and to expedite the quenching operation, an attachment is provided for automatically positioning the work in a right place in relation to the nozzles and simultaneously automatically opening the sprays. This attachment consists of a stopping block 21, slidably fitted on the bars 1 and clamped in a desired place by a screw 22. A finger 23 slides in the block and is normally held in an extended or inoperative position as shown in Fig. 2 by a retrieving spring 24. The other end of the finger is connected by a link 25 with a gear sector 26, operating a pinion 27 on the handle of a second valve 28. The valve is therefore automatically opened by the pressure of the work against the finger 23 when the work is placed against the stop 21.

A plate 30 may be placed on top of the die with holes 31 for the quenching fluid. These holes are larger than the holes 19, the margin determining the width of the hardened zone around the holes.

A special fixture 32 may be employed for quantity quenching, the fixture having a top plate 33, hinged at 34 and having a clamping screw 35. The fluid is sprayed through holes 31, 36, larger than the hole 19 in the die or similar article 4. A lug 37 on the fixture turns a handle 38 on the valve 28 and opens the latter for spraying. Removal of the fixture automatically closes the valve.

The quenching liquid flows from the work into

a pan 29 underneath and is drained through a pipe 39.

A modified fixture as shown in Fig. 5, consisting of a receptacle 40 with a recess for a die 41, and a cover 42 with a projection 43 fitted into the recess, holes 44, 45 direct streams of water on the edges of an opening 19 in the die.

It is understood that my quenching devices may be further modified without departing from the spirit of the invention, as set forth in the appended claims.

I claim as my invention:

1. A quenching device comprising means to support a piece of work at an elevation; a protective plate adapted to be placed on top of the work and having an opening for admitting a quenching fluid to a limited spot on the work; means to direct the fluid against the exposed portion of the work through the opening; and means to control the flow of the fluid by the position of the work with the plate on the supporting means.

2. A quenching device comprising protective plates for the upper and lower sides of a piece of work; means to clamp the plates against the work, the plates having openings registering with spots on the work which must be hardened; means to direct the flow of a fluid against the work through the openings from the top and from the bottom; and means to control the admittance of the fluid to the work by the position of the clamping means on the supporting means.

3. A quenching device comprising a table; a removable enclosure for a work with openings for the portions of the work to be quenched; means to support the enclosure with the work in an operative position; a tank for a quenching liquid supported at an elevation above the work; a valve at the bottom of the tank for stopping and starting flow of the liquid; an upper pipe extending from the valve above the work; a lower pipe extending from the valve below the work; removable nozzles at the ends of the pipes for directing the liquid into desired points on the work simultaneously from the top and from the bottom; a block adjustably mounted on the table; a finger slidably supported on the block adapted to be moved when the enclosure with the work is placed against the block; means to open the valve when the finger is moved by the enclosure; and yieldable means to return the finger into its original position when the work is removed from the table.

WILLIAM P. SHAKS.