

May 17, 1938.

C. S. SWANSON

2,118,018

WATER COOLED DIE FOR FORMING DISK WHEELS

Filed July 18, 1936

Fig. 1.

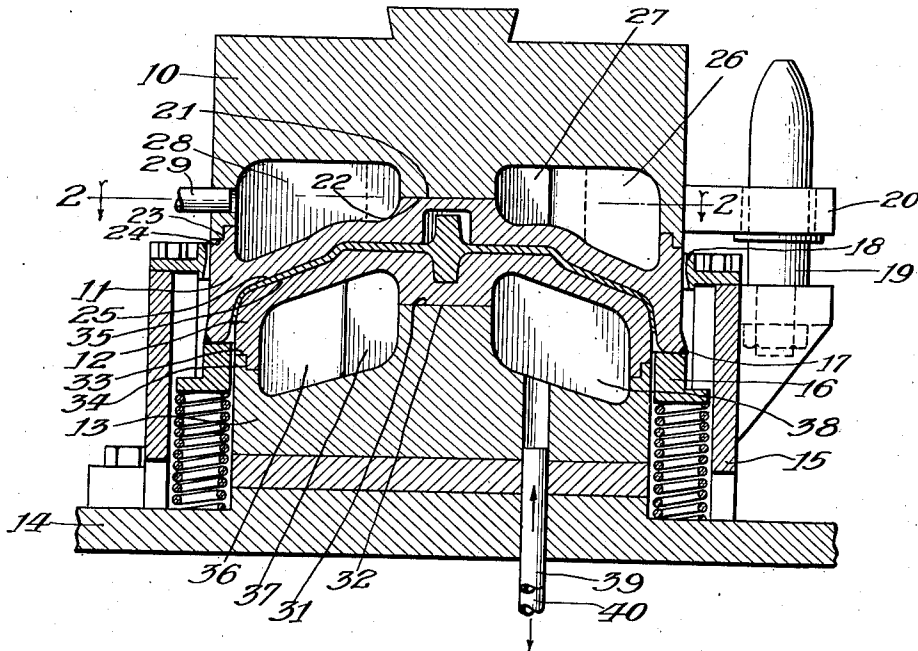
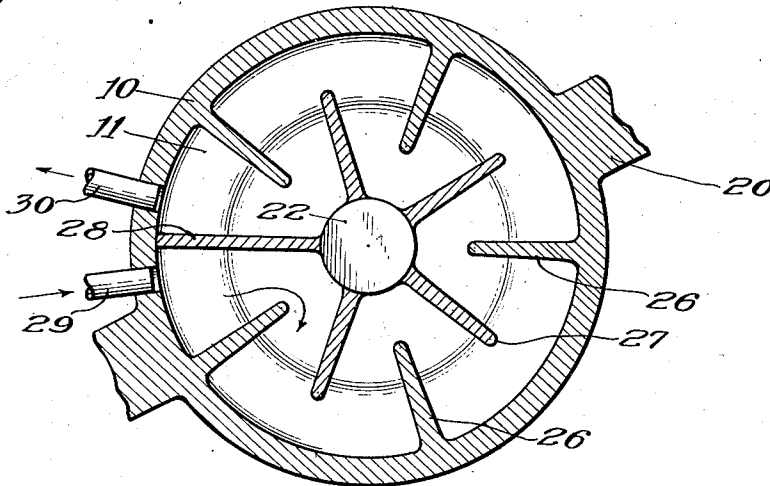


Fig. 2.



Inventor:
Clarence S. Swanson,
By: Bertha L. MacGregor
Attorney.

UNITED STATES PATENT OFFICE

2,118,018

WATER COOLED DIE FOR FORMING DISK
WHEELS

Clarence S. Swanson, Chicago, Ill., assignor to
Standard Forgings Corporation, Chicago, Ill.,
a corporation of Delaware

Application July 18, 1936, Serial No. 91,319

4 Claims. (Cl. 78—80)

This invention relates to dies for forming forgings, and particularly to water cooled dies. The dies herein shown and described are adapted for forming disk wheels, but the invention is not limited to the specific form illustrated.

The main object of the invention is to provide means for cooling the forming dies so that the cooled dies will cause the forging being formed to cool rapidly and act as a quench on the forging. The fast cooling serves as a quenching process from the finish forging temperature of approximately 1650 degrees Fahrenheit, rapidly cooling the forging below the critical range to approximately 1200 degrees Fahrenheit and fixing the normal grain size in the steel finish forged at the 1650 degree temperature. In consequence of this cooling, high strength in the steel forging is attained without increasing hardness.

A further object of the invention is to provide water cooled dies efficient for their intended purpose, in which circulation of water is efficient and uniform, and which may be constructed and assembled economically.

The forming dies herein shown, exclusive of the water cooling features, are the subject of my co-pending application, Serial No. 78,860.

In the drawing:

Fig. 1 is a vertical sectional view of a pair of forming dies embodying my invention.

Fig. 2 is a horizontal sectional view, in the plane of the line 2—2 of Fig. 1.

In that embodiment of my invention shown in the drawing, the upper die comprises two members, 10 and 11, and the lower die two parts, 12 and 13. The upper die is mounted in a reciprocable support (not shown) and the lower die rests on a fixed support 14.

Certain features of construction herein shown, such as the housing 15, spring supported drawing ring 16, trimming edges 17 and 18, guiding means 19, 20, and the special contour of the faces of the dies, are the subject of my aforementioned co-pending application and need not be herein described in detail because the present invention is not dependent upon them.

The upper part 10 of the upper die has a central boss 21 which has a flat surface adapted to bear on the complemental central boss 22 of the lower part 11 of said die. The part 10 has a peripheral offset edge 23 which is complemental to the edge 24 of the part 11. Between the contacting centers 21, 22, and peripheral edges 23, 24, the die members 10 and 11 are recessed to form an annular chamber through which water circulates for cooling the face 25 of the upper die.

The part 11 is so recessed that the floor of the chamber preferably follows the contour of the faces 25, leaving a water cooled shell between the forming surfaces of the die and the chamber.

Within the chamber formed between the parts 10 and 11 of the upper die are a plurality of radially disposed baffles, the baffles 26 being preferably integral with the die part 10 and the baffles 27 with the part 11. A partition wall 28 extends radially across the chamber between the water inlet 29 and outlet 30 in the side of the die part 10. The baffles 26 and 27 are alternately arranged and extend vertically between the die parts 10 and 11 so that the water circulates in a zig-zag course, as clearly shown in Fig. 2. The presence of the baffles 26 causes the water to flow toward the center 21—22, and the baffles 27 direct the water in an outward radial direction, whereby the shell above the forming surface 25 is efficiently cooled. The disposition of the baffles and partition wall on the respective die parts 10 and 11 permits said parts to be constructed and assembled in a convenient manner.

The lower die members 12 and 13 are also provided with central bosses 31, 32, which correspond with the upper die bosses 21, 22, heretofore described. Peripheral edges 33, 34 are similar to the meeting edges 23, 24. The die members 12 and 13 are also recessed to form an annular chamber beneath the forming surface 35, leaving a water cooled shell between said surface and the chamber.

Baffles 36 extend inwardly from the die member 13 and baffles 37 extend radially from the center of the die member 12. A partition wall 38 extends across the chamber between the inlet 39 and outlet 40. The water circulates in the lower die in a zig-zag course as heretofore described in connection with the upper die.

Changes may be made in details of construction without departing from the scope of my invention and I do not intend to be limited to the exact form shown and described, except as set forth in the appended claims.

I claim:—

1. Apparatus for forming disk wheels, comprising a reciprocable die and a stationary die, the lower surface of the reciprocable die constituting a forming face adapted to cooperate with the upper surface of the stationary die, an annular chamber in the reciprocable die above the major part of the disk wheel forming face and spaced from the said face by a relatively thin shell which extends between the center and the periphery of the die for a distance substantially

equal to the radial extent of the disk-forming face, and means for circulating water through said chamber.

2. Apparatus for forming disk wheels, comprising a reciprocable die and a stationary die, the lower surface of the reciprocable die constituting a forming face adapted to cooperate with the upper surface of the stationary die, an annular chamber in the reciprocable die above the major part of the disk-wheel forming face and spaced from the said face by a relatively thin shell which extends between the center and the periphery of the die for a distance substantially equal to the radial extent of the disk-forming face, vertical baffle partitions extending radially into the chamber from the center of the die and between the shell and upper wall of said chamber, similar baffles extending radially into the chamber from the peripheral wall of the die, and means for circulating water through said chamber.

3. Apparatus for forming disk wheels, comprising a reciprocable die and a stationary die, the lower surface of the reciprocable die constituting a forming face adapted to cooperate with the upper surface of the stationary die, said reciprocable die comprising upper and lower members contacting each other at their center horizontal surfaces and peripheral edges providing there-

between an annular chamber extending laterally for substantially the radial extent of the disk-forming face, said chamber being spaced from said forming face by a relatively thin shell which is coextensive with said face between the center and the periphery of the die, and means for circulating water through said chamber.

4. Apparatus for forming disk wheels, comprising a reciprocable die and a stationary die, the lower surface of the reciprocable die constituting a forming face adapted to cooperate with the upper surface of the stationary die, said reciprocable die comprising upper and lower members contacting each other at their center horizontal surfaces and peripheral edges providing therebetween an annular chamber extending laterally for substantially the radial extent of the disk-forming face, said chamber being spaced from said forming face by a relatively thin shell which is coextensive with said face between the center and the periphery of the die, vertical baffle partitions extending radially into the chamber from the center of the die and between the shell and upper wall of said chamber, similar baffles extending radially into the chamber from the peripheral wall of the die, and means for circulating water through said chamber.

CLARENCE S. SWANSON.