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COOLING MEANS FOR GRINDING MILL DISKS

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Fig. 1.

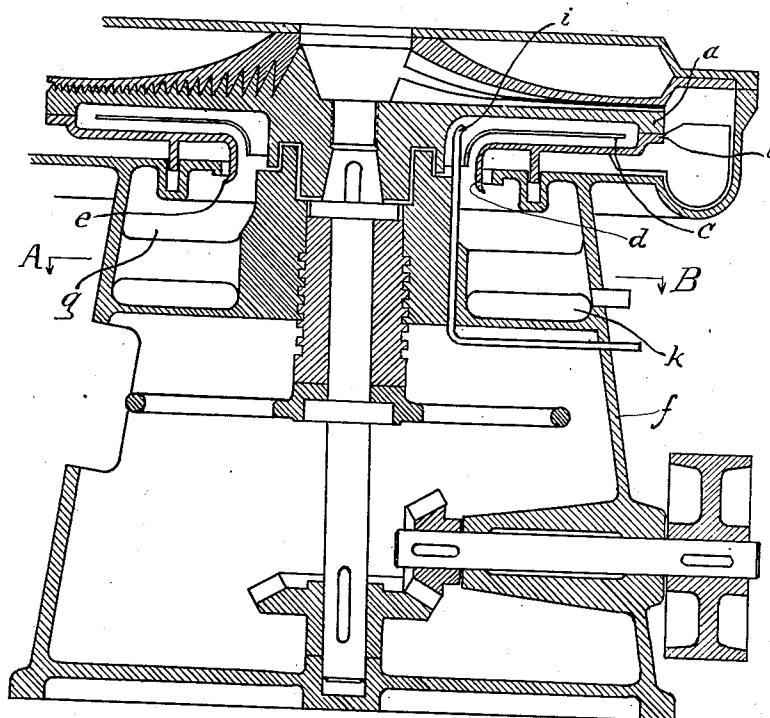
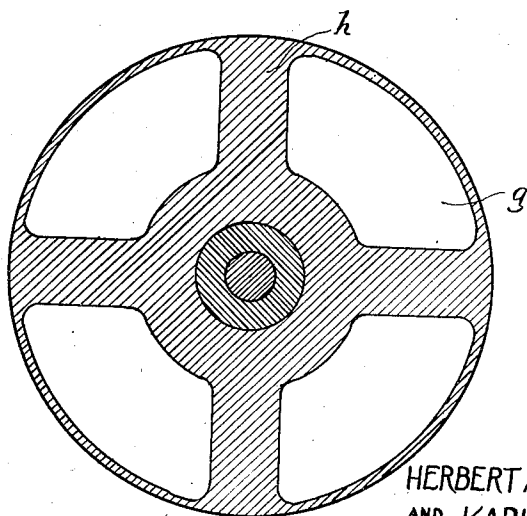


Fig. 2.



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COOLING MEANS FOR GRINDING MILL
DISKSHerbert Alfred Merges and Karl Behnsen,
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In Germany and Great Britain October 5, 1937

1 Claim. (Cl. 83-7)

The invention relates to an arrangement for the external cooling of rotating members, so-called working disks such as grinding wheels, buffing wheels, centrifuges, crushing wheels and the like, an object of the invention being to make possible to provide adequate cooling to the extent desired of the whole of the working surface of such rotating members, while at the same time saving the expense of special packing material for the cooling space which is in rotating movement with the working disk to be cooled.

The external cooling arrangement according to the invention consists essentially of a concave ring having a section corresponding to that of the working disk to be cooled and attached to the outer rim thereof and fitting, for example, around the drive shaft; further of a second concave ring of a smaller external and internal diameter, located inside and concentrically with the outer concave ring and spaced apart from it and from the underside of the working disk to be cooled, the outer concave ring being extended in the centre to form a collar which widens gradually in the outward direction and extends into an annular chamber in the stationary part of the machine in question. This annular chamber serves the purpose of collecting the cooling medium, for example water. It is preferably provided with radially arranged ribs, spokes or the like, for the purpose of arresting the swirling movement imparted to the cooling water by the rotation of the working disk and of the concave cooling rings.

The cooling members can also be in the form of a suitably shaped hollow revolving disk. The internal concave ring can be either stationary or rotatable.

In feeding the cooling medium into the space between the cooling surface and the internal concave ring the fluid ring thus formed has a greater width than the fluid ring formed when the cooling fluid passes into the lower space between the external and internal concave rings owing to centrifugal force. The fluid supply thus always endeavours to produce a balancing of the two fluid rings and therefore constantly to draw fluid away from the cooling space proper, so that when the rate of feed of cooling medium to the cooling space proper is suitably adjusted the cooling surface is uniformly wetted and no dead fluid spaces are formed.

The external cooling according to the invention furthermore ensures safe packing of the rotating part with relation to the stationary part without necessitating special packing material,

thus ensuring greater safety in working and a reduction in energy consumption.

Now it has been found that especially at high rotational speeds the cooling water flowing from the chamber between the internal and external concave rings, into the annular chamber which surrounds the mouths of the concave rings, is caused to swirl owing to the rotating motion of the concave ring; especially is this the case where the concave ring has a central bell-mouth, the rim of which is curled back to form a splash ring, both bell-mouth and curled rim often extending into the water which collects in the annular chamber and cause said water to rise up the walls of the collecting space, whilst no, or hardly any, waste water drains off through the outlet at the bottom of the annular chamber. This leads to particular inconveniences especially where the cooling medium is a brine solution or the like, which necessitates special surface protection in the cooling and draining spaces, and where damage may be caused to the machine or parts thereof on the cooling medium coming into contact with them at points where this is not desirable.

It was found that these drawbacks can be eliminated in a simple way by providing means in the waste water collecting chamber, which are suitable for preventing the swirling of the waste water in said chamber due to the movement of the rotatable parts.

Foremost among such means are webs distributed in the manner of wheel spokes in the upper part of the annular chamber as well as projections located on the outer annular walls of the collecting space, which counteract the uniform swirling flow of the water. However, such inserted members are preferably to be avoided in the lower part of the annular chamber, in order that the water can here re-establish its rotating motion thus ensuring quick drainage through the aperture provided near or in the bottom of the collecting chamber.

The accompanying drawing illustrates by way of example an embodiment of the present invention. Figure 1 shows a longitudinal vertical section of a toothed disk grinding mill, the lower grinding disk of which is to be cooled. Fig. 2 is a sectional view taken on the line A-B of Fig. 1, and shows radially distributed spoke-like stays *h* in the annular chamber *g* for preventing rotary movement of the water draining off. According to the invention the grinding disk *a* is provided with a concave disc *b* and between the grinding disk and the concave disk there is a

further concave disk *c* of a smaller diameter than *b*. The two concave disks, one within the other, surround with their central mouths the bearing housing of the lower grinding disk. The concave disk *b* extends in the centre to a bell-mouthed flange *d* the rim of which forms the splash ring *e*. This bell-mouth extends into the annular chamber provided in the stationary housing *f*. Below the bellmouth, spoke-like members *h* are provided radially and at a certain distance from one another in the annular chamber *g*, whereas the lower part of the annular chamber constitutes an unobstructed annular hollow space. The operation is as follows:

The cooling water injected through the nozzle *i* into the hollow space between the disk *c* and the toothed disk *a* flows toward the periphery and as described above is then forced down through the space left free at the external periphery into the space between the two concave disks *c* and *b*, being finally precipitated at *e* into the annular chamber *g*. At higher peripheral velocities when the supply of cooling medium is greater there is the possibility of the annular chamber being quickly filled with fluid, so that the circular motion of the bell-mouth *d* of the concave disk which will then extend into the cooling medium will be imparted to said cooling medium and will prevent the latter from draining off at the bottom of the annular chamber at *k*.

It has been found that at high rotational speeds and even if the collecting chamber *g* is only partly filled the rotary motion of the film of fluid centrifuged against the housing walls is sufficient to cause a swirling of the waste water which in turn causes incomplete drainage and thereby an undesirable choking of the annular chamber. Surprisingly enough it was found that spokes or other members inserted in the annular chamber for the purpose of breaking up the uniform rotational motion, did not cause a swirling which would prevent a uniform draining away of the cooling medium or the like, and this is of particular importance where the cooling medium which is in circulation is to be fed back to the nozzle at *i*.

The device of the type described is also suitable for air cooling, as it induces a constant renewal of the cooling medium whilst preventing the formation of dead spaces, more so as the pressure required for feeding fresh cooling medium to the working part to be cooled is independent of the peripheral velocity of the latter; in the same way the device can also be utilised for feeding heating media, for example when working with viscous masses, where heat will reduce their tendency to set.

The device according to the invention can furthermore be provided with members for increasing the superficial area so as to increase the cooling or heating effect, such as ribs or the like, located for example on the surface of the grinding or crushing disk to be cooled. Moreover wings or the like can be provided on the stationary part of the machine, extending into the outer annular space so as to accelerate the drainage of the cooling medium.

What we claim and desire to secure by Letters Patent of the United States is:

An arrangement for externally cooling working disks, comprising a funnel-shaped member extending at the centre into a collar which gradually widens outwardly attached to the underside of the surface to be cooled, an outwardly directed beading on the edge of said collar, a smaller funnel positioned between said first-mentioned funnel and the underside of the surface to be cooled, nozzles projecting into the annular space formed between the underside of the surface to be cooled and the smaller funnel, through which nozzles heat absorbing medium is adapted to be injected into said annular space in an adjustable quantity, a collecting chamber for receiving the used heat absorbing medium disposed so that the collar of the first-mentioned funnel projects thereinto, and radially arranged members in said collecting chamber for preventing swirling of the heat absorbing medium caused by the rotation of the working disk.

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