

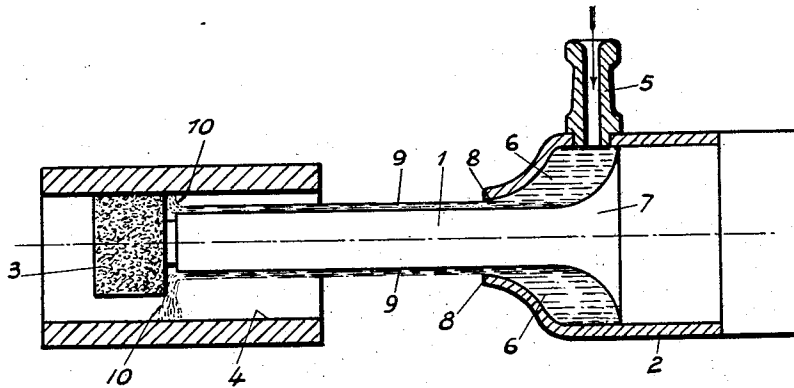
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GRINDING AND THE LIKE MACHINES

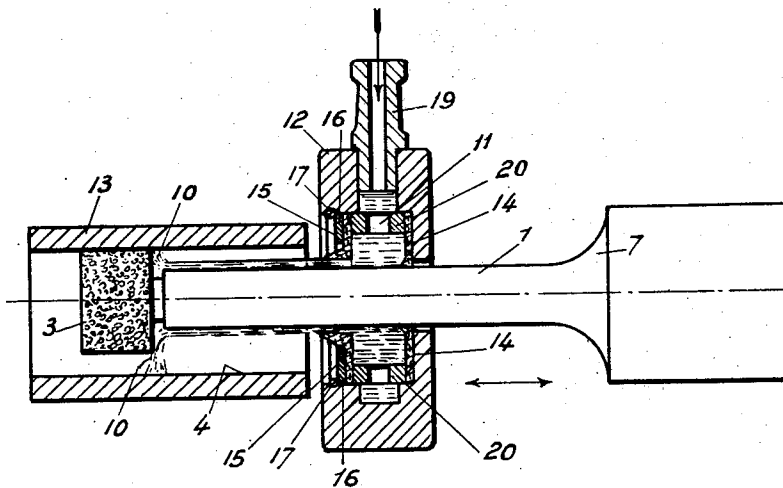
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.Fig. 1.



.Fig. 2.



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[Signature]
by *[Signature]*

UNITED STATES PATENT OFFICE

2,489,437

GRINDING AND THE LIKE MACHINES

Victor Henri Charles Sandoz, Saint-Nicolas
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2 Claims. CL. 51—267)

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My invention has for its object machines for grinding previously bored holes and in particular holes of very small diameter. It is a known fact that such operations are generally executed through grinding by means of grinding spindles moving at very high speeds of rotations of the order of 60,000 R. P. M. and more.

Among the principal problems laid open by the execution of such grinding machines operating at a very high speed, there should be considered the problem of cooling in a permanent manner the bearings of the spindle carrying the grinding wheel and the grinding wheel itself, together with that of the watering of the grinding wheel and of the wall of the hole during operation. Now these problems are intricate through the fact that the spindle carrying the grinding wheel in such machines is overhung with reference to the frame through a comparatively considerable length.

In order to provide under such conditions for the progression of the water or the like cooling fluid from the frame of the machine up to the parts to be considered, various contrivances have been resorted to heretofore; these contrivances are more or less complicated due to the fact that they require the execution of annular chambers, of tubular sleeves, of flutings, grooves or slots, whether longitudinal or helical, of bores, etc. which require a delicate machining by reason of the small transversal cross-section of such type of apparatuses, the presence of such recesses being furthermore obviously detrimental to the rigidity and resistance of the machine. Moreover the channels and recesses may be obstructed by various material such as scale suspended inside the fluid required for cooling purposes. At other points the grooves may be deformed by reason of the wear produced by the continuous passage of the cooling liquid.

My invention removes the above drawbacks, not only by providing for the efficient cooling of the bearings of the spindle and for the watering of the grinding wheel and of the work undergoing the grinding operation, but also by doing away entirely with any complicated machining or mounting for achieving the essential objects set forth.

My invention resides in a device for watering and cooling spindles for inner grinding operations which arrangement is characterized by the fact that between the admission of the cooling and watering liquid to the machine frame on one hand and the grinding wheel and the grinding zone on the other hand, said liquid instead of

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being guided in channels as in the prior arrangements flows freely over and along the spindle carrier or the like device holding or containing the spindle and its associated parts. In practice, the liquid fed under pressure to an intermediary collector or water container in the frame passes out of same through an annular nozzle surrounding the rear end of the spindle carrier, after which it flows over the latter up to the grinding wheel while forming round the spindle carrier a cooling hydraulic sheath which is permanently renewed and the speed output of which may be adjusted by modifying the pressure at which the liquid is fed.

In the apparatuses used heretofore it was necessary to provide ducts of suitable shape and one or more tubes for bringing the cooling liquid to the grinding wheel. It will be easily understood that my invention shows the advantage of allowing the reinforcement, with a same diameter for the bulk of the arrangement, i. e. with a same diameter or fluid jet, either of the grinding wheel carrier or of the spindle or of both, as there is no solid material such as steel, bronze or the like round the liquid jets.

As a modification, if the grinding wheel carrier or the spindle is not reinforced, my invention has the advantage of allowing the grinding of inner chambers with a grinding spindle carrier the diameter of which is smaller than that of the spindles carriers used heretofore, which allows grinding parts which could not be ground with any previously known machine.

Accompanying drawings show diagrammatically in axial cross section two forms of execution of my invention.

In said drawings, I have shown at 1 the outer wall of the spindle carrier or equivalent member, at 2 the frame carrying said spindle carrier, at 3 the grinding wheel and at 4 the bore to be ground. The inner parts of the spindle carrier have not been illustrated as the particular structure of the grinding machine is of no interest for the application of my invention.

In Fig. 1, a connection 5 screwed transversally into the frame 2 is connected with a supply of water under pressure which has not been illustrated so as to feed a ring-shaped chamber 6 surrounding the base 7 of the spindle carrier 1, while its front part ends under the form of a circular edge 8 forming an outlet nozzle of reduced width surrounding the body of the spindle carrier. The liquid forced out of the ring-shaped chamber through said nozzle streams over said body of the spindle carrier and forms round it a moving cool-

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ing sheet 9 leading to the grinding wheel 3 which is also cooled thereby after which it waters in a continuous manner at 10 the wall of the bore 4 during the grinding operation.

The examples illustrated in Fig. 2 relate to bores of a considerable length which is such that the flow of water may not reach the grinding wheel and the work being ground.

The water chamber designated in Fig. 2 by the reference number 22 is then provided separate from the frame and is formed inside a cooling block 12 rigid with the member to be ground 13 inasmuch as it moves only, in unison with the latter, with a longitudinal reciprocatory movement with reference to the system including the spindle carrier 1 and the grinding wheel 3.

An annular packing 14, of leather or the like material, plays the part of a stuffing box and provides for the water-tightness of the rear part of the container or chamber 11 while allowing its longitudinal movement over the spindle carrier; at the same time the front end of the container is bounded by a second packing 15 bearing against a washer 16 held in place by an elastic ring 17. This packing 15 is provided with a collar 18 forming a nozzle forcing out of the chamber the water fed thereto under pressure through the connection 19. A stay or intermediate member 20 provided with peripheral holes is arranged between the two packings 14 and 15.

My invention is not only applicable to inner grinding but may be used also for the cooling of tools executing other mechanical operations.

What I claim is:

1. In combination in a high speed grinding machine, a rotatable shaft; a grinding wheel secured to said rotatable shaft at one end thereof; a non-rotatable container surrounding a portion of said shaft; a fluid conduit connected

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with said non-rotatable container for admitting cooling fluid under pressure into the same; an opening arranged at that end of said container which is nearer to said grinding wheel and being slightly larger than said shaft passing there-through so as to form a substantially annular slot around said shaft adjacent to the surface thereof; and closing means forming part of said non-rotatable container and arranged between the same and said rotatable shaft at the other end of said non-rotatable container.

2. In combination in a high speed grinding machine, a rotatable shaft; a grinding wheel secured to said rotatable shaft at the front end thereof; a non-rotatable fluid container surrounding a portion of said shaft; an opening at the front end of said non-rotatable container being slightly larger than the cross section of said shaft so as to enable ejection of cooling fluid from said container along the surface of said shaft towards said grinding wheel; and closing means at the rear end of said non-rotatable container arranged between the same and said rotatable shaft.

VICTOR HENRI CHARLES SANDOZ.

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