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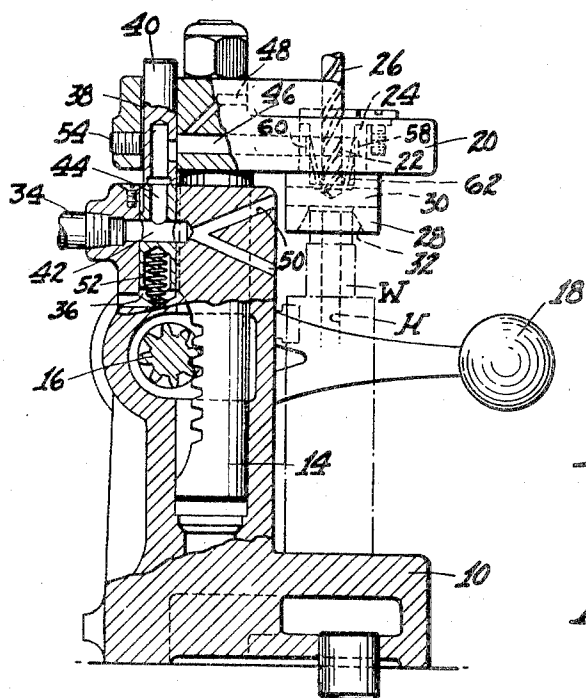
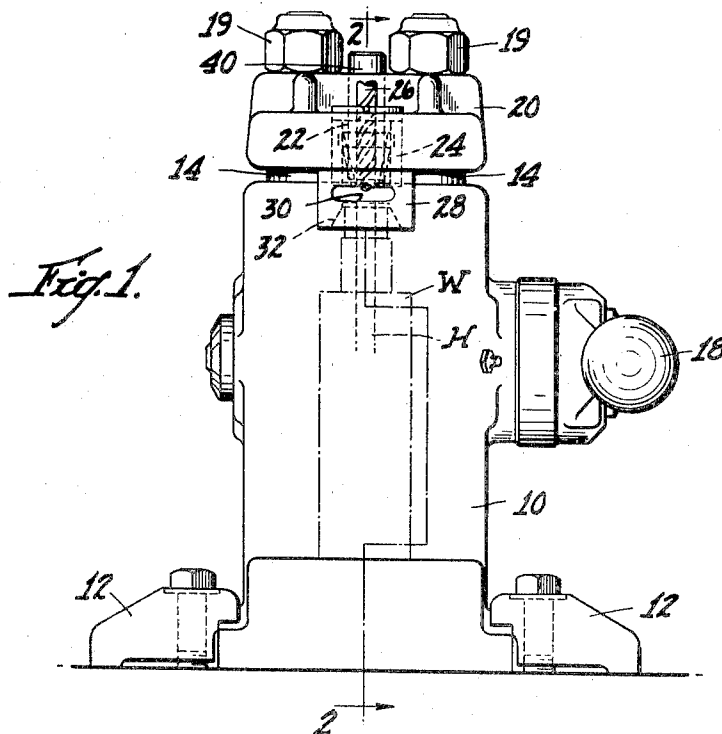
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2,491,635

COOLANT DEVICE FOR TOOLS

Filed May 9, 1947

3 Sheets-Sheet 1



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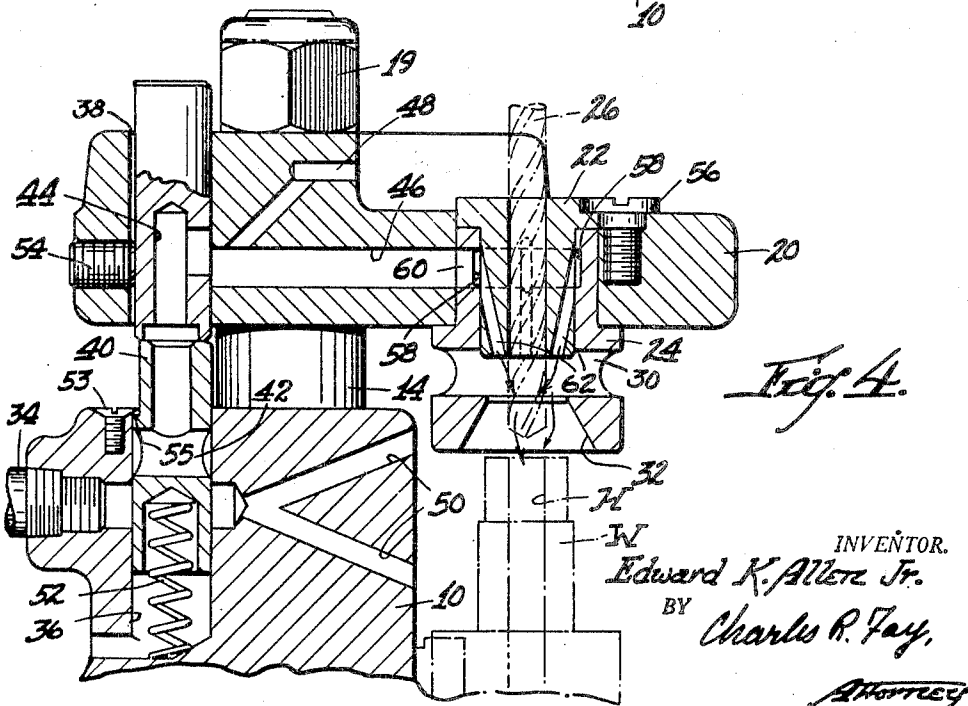
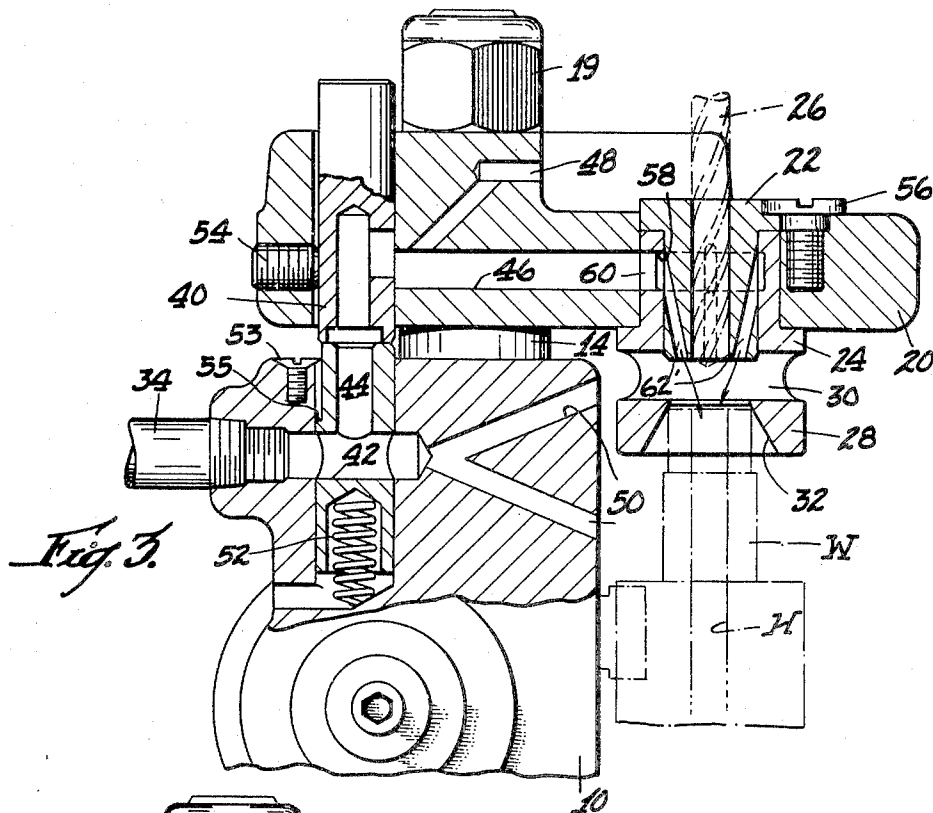
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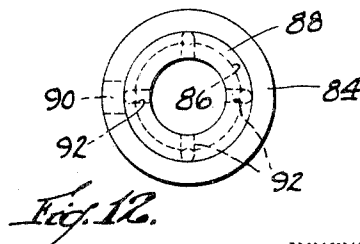
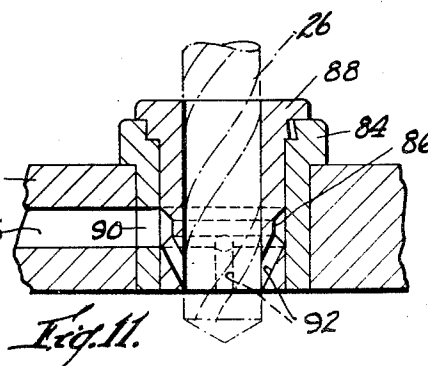
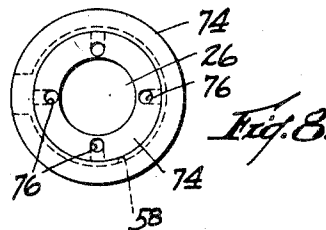
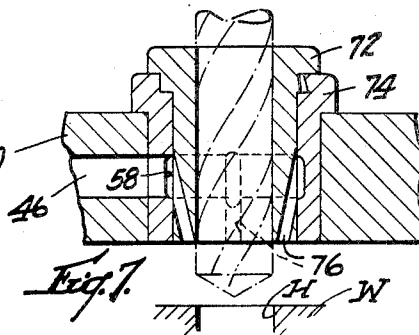
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COOLANT DEVICE FOR TOOLS

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3 Sheets-Sheet 3



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COOLANT DEVICE FOR TOOLS

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1 Claim. (Cl. 77—55)

1

This invention relates to coolant devices for directing lubricants and coolants to tools and also to the work the tool is operating upon.

The principal object of the invention is to provide a device of the class described comprising a new and improved tool bushing which may be made in standard sizes for replacement and interchangeability, said bushing including means for providing correct placement of the coolant relative to the tool and to the work, and also into the groove, hole, etc., that is being machined, so as to flush out and break chips to prevent interference with the tool, and at the same time eliminating bulky and interfering coolant pipes and also to generally improve lubrication and coolant devices for various types of tools, thus reducing tool wear and increasing cutting efficiency.

Further objects of the invention include the provision of new and improved tool bushings and liners which incorporate therein coolant passages formed in the bushings and liners in such a manner that the bushings can be located in the liners without regard to rotative positioning thereof and to at all times receive the coolant supply uniformly without the necessity of piping to achieve the desired result; and the provision of a novel guide bushing for tools in which bushing there are provided passages for directing coolants and lubricants to the tool in a direction in general the same as the direction of the tool feed, so that the tool is maintained clean and free from chips; and the coolant, at the same time, is directed to the hole which is being machined out by the tool so as to flush the same and clean out and break the chips.

A still further object of the invention includes the provision of a coolant supply system in a jig incorporating a work clamping head which is movable with respect to a base, the clamping head providing means for the detachable reception of liners and bushings, and there being aligned holes in the movable head and the base for receiving a valve which automatically cuts off the coolant flow when the clamping head is raised to remove and insert work pieces and to open the coolant supply to the bushing upon closing the clamping head without attention on the part of the operator.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings in which

Fig. 1 is a view in front elevation of a device embodying the present invention;

Fig. 2 is a section on line 2—2 of Fig. 1;

2

Fig. 3 is an enlarged section similar to Fig. 2 showing the clamping head closed and the coolant valve open;

Fig. 4 is a view similar to Fig. 3 but showing the clamping head open and the coolant supply closed;

Fig. 5 is a section through a modified bushing and liner arrangement;

Fig. 6 is a bottom plan view thereof;

Fig. 7 is a section through a still further modified bushing and liner arrangement;

Fig. 8 is a bottom plan view thereof;

Fig. 9 is a section of another modification of the bushing;

Fig. 10 is a bottom plan view thereof;

Fig. 11 is a section through a further modification; and

Fig. 12 is a bottom plan view thereof.

In order to efficiently cool and lubricate cutting tools it has been necessary in the prior art to provide cumbersome and bulky pipes to direct the coolant fluids to the places desired and it is often a difficult matter to design such piping so that it will not interfere with the operation of the machine. The present case is directed to a new and improved coolant and lubrication system for cutting tools which obviates the use of pipes and also improves the cooling and lubrication thereof.

As shown in Figs. 1 and 2, there is provided a jig base 10 which may be secured to a machine bed in any way convenient, or as illustrated, by clamps 12. The jig base 10 in the particular illustration of the present invention herein disclosed, rises vertically, and is provided with a pair of upright racks 14 which are operated together vertically by means of a gear 16 in turn operated by a handle 18 located at the side of the jig. The racks are secured by nuts 19 at their tops to a clamping head 20 in which is provided a tool guiding bushing 22 in turn located in a liner 24 in a hole in the clamping head, and as is well known in the art the bushing and the liner also are replaceable and interchangeable for different sizes and types of tools. In the present case there is shown a drill 26 which is guided in its vertical movement by the bushing but it is to be understood that any tool may be used as is convenient or desired.

The work W is clamped between the base 10 and the clamping head 20 and positioned by means of a depending clamp element 28 which in the illustration in Figs. 1 to 4, inclusive, is integral with the liner 24; however, as shown in Figs. 5 to 12, inclusive, this particular member need not be integral with the liner but may be applied in any way desired. The clamping element 28 is

3

provided with a through hole 30 for cooling and lubricating purposes and it is also provided with a conical surface 32 to aid in centering the work, surfaces 32 intersecting hole 30 for flow of coolant to the work.

The base 10 is provided with a coolant inlet 34 which leads into a vertical hole 36. In the present case this hole is shown as being in the nature of a vertically arranged hollow or bore aligned with a similar hole 38 in the head 20. A valve 40 is arranged in these holes to extend into each of them and this valve is provided with an opening 42 communicating with a passage 44 therein, passage 44 in turn communicating with a passage 46 in the head 20 so that coolant fluids flow through the valve, and into passage 46 to the tool as will be hereinafter described. However, passage 46 is provided with a lateral passage at 48 which allows coolants to be directed to the tool 26 at the top surface of the clamping head 20 and the passage 42 is lined up with a pair of angular diverging passages 50 in the base 10. One passage 50 directs fluids to the hole 30 in the clamping element 28 and the other directs fluids to the work W.

A spring 52 tends to push the valve 40 upwardly but the latter may be secured in adjustable relation to the clamping head 20 by a set screw 54. It will be clear that as the clamping head is raised to release the work piece W by means of the rack and gear, the valve will be raised therewith and once the passage 42 passes out of alignment with the inlet 34, the valve is closed and coolant no longer may pass to any point in the jig; on the other hand, as the clamping head is brought down the valve 40 is brought down with it, opening the valve to its widest extent in the drawings as shown in Figs. 2 and 3. To prevent escape of valve 40 from hole 36 there is provided a screw or the like having a head 53 to overlie and contact a shoulder 55 on the valve.

Passage 46 leads directly to the hole in the head 20 in which is located the liner 24 and the bushing 22. The bushing 22 may be locked by means of a screw 56 or it may be locked by well known eccentric means as is indicated in Figs. 5 to 12. Any other means may be used if desired. In the showing of Figs. 3 and 4 the liner is provided with an interior annular groove 58 into which the coolant from passage 46 flows. The liner is also provided with a radial hole 60 by which the coolant is admitted to the groove 58 from passage 46. The bushing 22 is provided with a plurality of inclined converging passages 62, there being as many of these passages as is desired, but usually there will be four of them. These passages lead from the annular groove 50 down to the bottom of the bushing and it will be seen that the coolant will be directed in the same general direction as the tool feed as the latter is brought down to work on the work piece W. This arrangement clearly maintains the tool clear of chips as well as cooling and lubricating it, as the coolant will flow in the flutes of the tool whether it is a drill or milling cutter or other tool and, at the same time, the coolant will pass down onto the work and into the hole H being formed in the work piece, flushing the hole out and keeping it clean of chips upon each withdrawal of the tool 26. It is also to be noted that in the usual operation of the tool 26 it will be withdrawn several times while the head is still clamped so that the direction of the coolant will be directly into the hole H, when the tool is up, see Fig. 3. It is also to be particularly noted

4

that the radial position of bushing 22 with respect to the liner 24 is of no importance because the inlet ends of passages 62 will always correspond with the annular groove 58 regardless of the rotative position of the bushing, so that the bushing which is the usual part to be replaced and interchanged need not be carefully set in any particular rotational angular position.

Figs. 5 to 12, inclusive, illustrate modifications of the liner and bushing above described. In Figs. 5 and 6 the head is indicated at 20 and the coolant passage therein at 46. In this case the liner 64 sets down on top of the head 22 and it is not provided with the clamping element 28. However, means is provided as shown at 66 for securing a bushing 68 thereto and in this case coolant passages 70 are generally the same as above described but the exit ends thereof are located on the interior surface of the bushing and not at the end thereof as in Figs. 3 and 4. In this case, therefore, the coolant flows the same as before through the liner but impinges on the tool directly within the bushing.

In Figs. 7 and 8 the bushing 72 and liner 74 are generally the same as in Fig. 5 but in this case there are shown passages 76 in the bushing which passages have their outward ends in the end surface of the bushing 72 rather than at the interior surface thereof as in Fig. 5.

In Figs. 9 and 10 the bushing 78 and liner 80 are generally the same as before but in this case the passages 82 are merely milled grooves in the exterior surfaces of the bushing 78 and in this case the effect is generally similar to that of the bushing shown in Fig. 7.

In Figs. 11 and 12, there is no annular groove in the liner 84 but instead there is an exterior annular groove 86 in the bushing 88 so that the only opening in the side wall of the liner is the inlet hole 90 aligned with passage 46. It is to be noted that the passages 92 in this modification may be the same as any of those described above.

It will be seen that this invention provides automatic cutting off of the coolant and lubricating fluids when the work clamp is opened and automatic starting of the coolant flow upon the closing of the clamp; and in addition the present invention provides tool liners and bushings which may be made standard, releasable, and interchangeable, as is the practice at the present time, but with the additional advantage of optimum placement of coolant as respects both the tool and the hole being machined in the work, and in the absence of interfering and bulky pipes. The bushings of the present invention can be located in the liners without regard to rotational positioning; and the coolant supply will act as a chip breaker as well as chip remover during the operation of the tool. Also, this invention provides a uniform supply of coolant so as to reduce tool wear and increase the cutting speed and general efficiency of the machine.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed otherwise than as set forth in the claim, but what I claim is:

In a machine tool comprising a head having a lubricant carrying passage, a tool guiding and lubricating device on said head comprising a tool guiding bushing member and a liner member receiving said bushing member, said liner member having an annular groove on its inner surface and a radial hole communicating with said lubricant carrying passage in said head for admitting

5

lubricant to said annular groove, said bushing member having passages around its periphery communicating with said annular groove in the liner member, and said bushing passages extending in converging relation toward the end of the bushing member for ejecting lubricant directly onto a tool in said bushing member at various points around the periphery of said tool.

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10

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