March 8, 1938. C. H. KASCH 2,110,441

GRINDING MACHINE

Filed Oct. 10, 1934 2 Sheets-Sheet 1

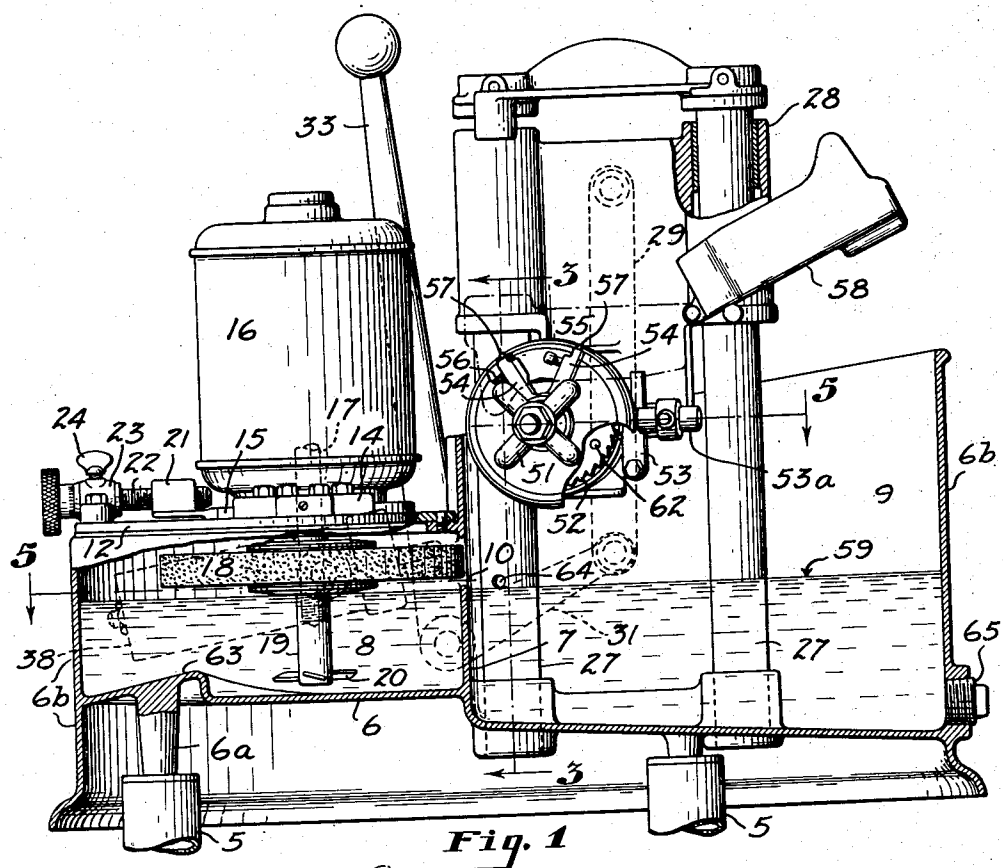


Fig. 1

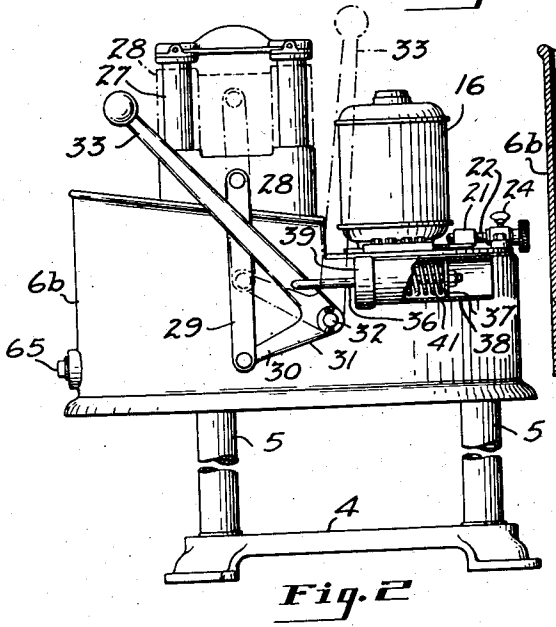


Fig. 2

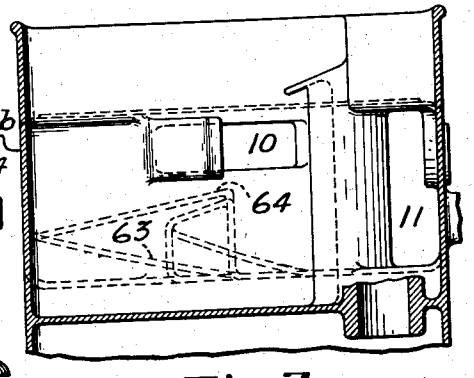


Fig. 3

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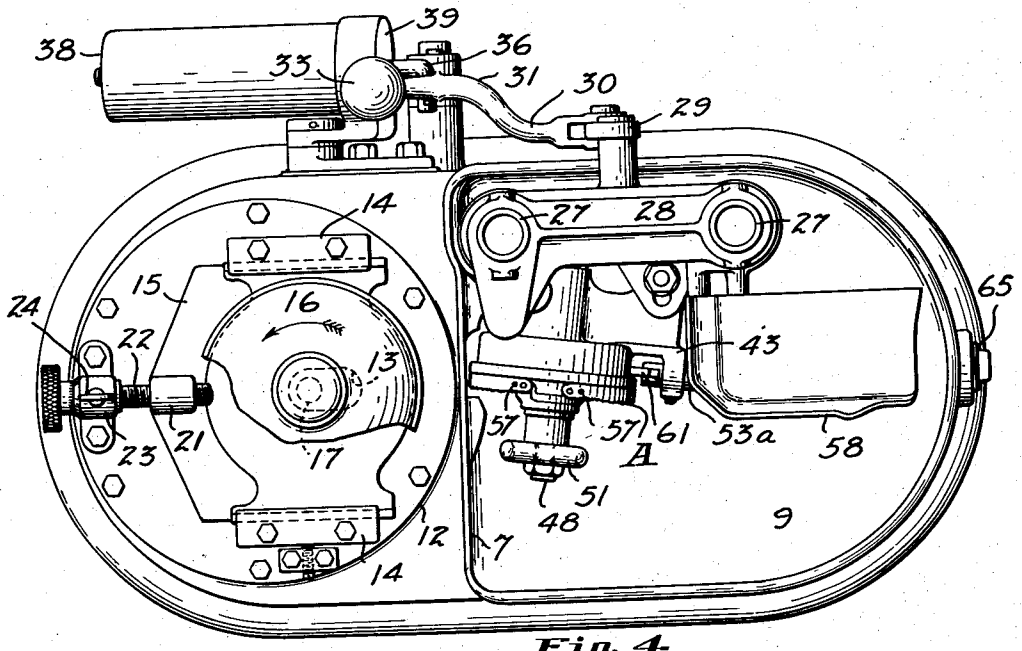


Fig. 4

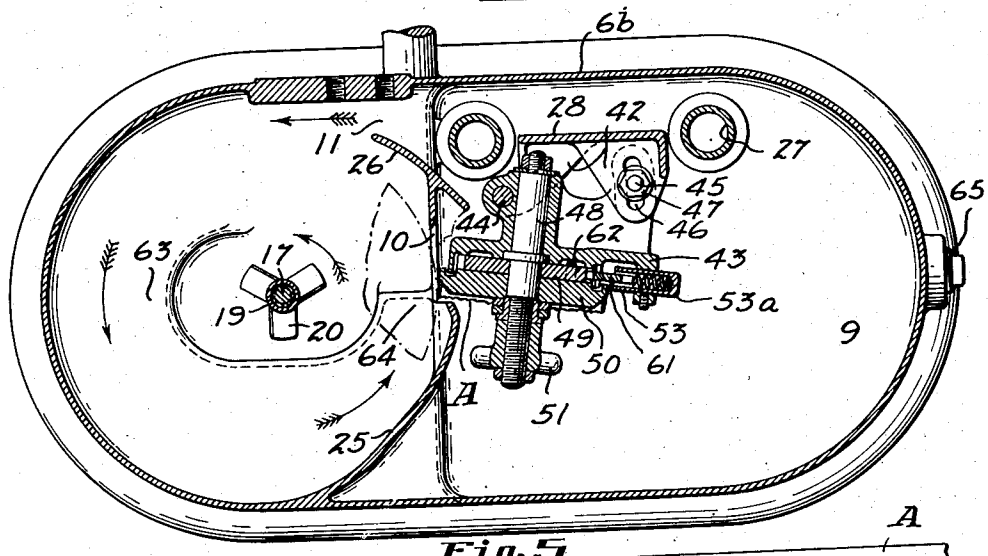


Fig. 5


Fig. 6

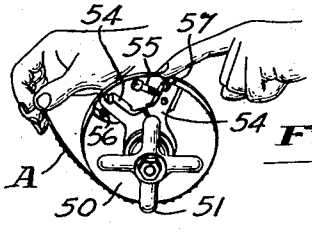


Fig. 7

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# UNITED STATES PATENT OFFICE

2,110,441

## GRINDING MACHINE

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Application October 10, 1934, Serial No. 747,665

10 Claims. (Cl. 51—267)

This invention relates to grinding machines, and more particularly to machines for sharpening cutter blades of the scalloped type.

One of the objects of the present invention is to provide an improved grinding machine for sharpening scalloped type cutter blades by means of which a prefectly ground cutting edge can be obtained.

Another object is to provide a grinding machine which is semi-automatic in nature and which is of such character that scalloped cutter blades can be quickly and easily sharpened.

Another object is to provide a grinding machine for sharpening cutter blades in which the blade is held without distortion between the points thereof.

A further object is to provide a grinding machine for sharpening scalloped cutter blades in which the coolant is forced against the blade and grinding wheel directly at the point of grinding contact, so as to keep the cutting edge being ground cool and from losing its temper.

With the above and other objects in view the present invention consists in certain features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawings and then claimed.

In the drawings:

Fig. 1 is a vertical, longitudinal section taken through the grinding machine, showing the position of the grinding wheel and showing the work holding member;

Fig. 2 is a reduced side elevation of the opposite side of the grinding machine showing the mechanism for actuating the work holding carriage and showing the carriage in its lowermost position;

Fig. 3 is a section taken approximately on the line 3—3 of Fig. 1, showing the openings in the partition which provides the machine base with a grinding wheel compartment and a work compartment;

Fig. 4 is a plan view of the grinding machine shown in Fig. 1, the splash guard being swung to its open position to show the work holding means;

Fig. 5 is a section taken approximately on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary side elevation of a cutter blade which is of the general character to be sharpened on the machine of the present invention; and

Fig. 7 is a diagrammatic perspective view showing the method of mounting the cutter blade on the work support.

Referring to the accompanying drawings, in which like numerals refer to like parts throughout the several views, the apparatus is particularly adaptable for use in sharpening cutter blades of the general character illustrated in Fig. 6, wherein the blade A is formed along one edge with a series of scallops 1 to form points 2, and which scallops are beveled at 3 at each side between the points 2 to provide a sharp cutting edge.

The machine is preferably supported on a suitable support 4 having upstanding portions 5 which engage leg portions 6a that depend from the machine base 6. The base 6, as shown in Figs. 4 and 5, is oval in shape and provided with an upstanding peripheral wall 6b which is divided by a transversely extending partition 7 into a grinding wheel compartment 8 and a work compartment 9, the partition 7 having a central opening 10 therein substantially midway between its upper and lower edge through which the grinding wheel may extend, as will be later described.

The partition 7 also is provided adjacent one of the side walls, with an opening 11 for the passage of a coolant between the two compartments.

Mounted over the grinding wheel compartment 8 is a plate-like member 12 having an aperture 13 therein. This member 12 carries spaced parallel guideways 14 which slidably support a motor slide plate 15. An electric motor 16 is bolted to the slide plate 15, and has its shaft 17 extending through the plate 15 and through the aperture 13. The grinding wheel 18 is secured to the shaft 17 below the plate-like member 12 and in alignment with the opening 10 in the partition 7, the wheel being held on the motor shaft 17 by means of a nut 19 which extends nearly to the bottom of the compartment 8 and which is provided with an impeller 20.

The slide plate 15 is formed with an internally threaded portion 21 which receives a threaded adjusting screw 22, the screw being rotatably mounted and held against axial movement in a journal 23 which is secured to the plate-like member 12. A thumb screw 24 is provided in the journal to hold the screw 22 against inadvertent rotation when the motor and grinding wheel support is in its adjusted position. By rotating the adjusting screw 22 the grinding wheel 18 is moved into and out of the opening 10, as the case may be, so as to remove the proper amount of metal from the cutter blade to be sharpened.

The partition 7 is provided with an arcuate leading portion 25 extending from the one side

wall of the base, as shown in Fig. 3, to the opening 10, which portion 25 is arranged in the region of the grinding wheel 18 and preferably of greater width than the grinding wheel. The partition 7 is also provided with a trailing arcuate portion 26 similarly arranged, but at both sides of the partition 7 and extending to the side opening 11.

The work to be ground is carried in the work compartment 9 by a mechanism which includes a pair of fixed spaced guides 27 extending upwardly from the base 6 within the peripheral wall, and provided with a carriage 28 which is slidably mounted thereon for vertical reciprocation.

The carriage reciprocating mechanism comprises a link 29 pivoted at one end to the carriage 28, and at the other end to one arm 30 of a bell crank lever 31 which is pivoted on a pin 32 secured to one of the base side walls, the other arm 33 serving as an actuating lever and being provided with a plunger rod 36 having a cap 37 at its free end. The cap 37 is mounted in a spring case 38 which is pivotally supported on the side wall by means of a bracket 39. Surrounding the rod 36 is a compression spring 41 which is disposed between the cap 37 and the bracket 39 and which serves to hold the carriage 28 in the uppermost position indicated in Fig. 1 or Fig. 2.

Extending laterally from the carriage 28 is a pair of lugs 42 on which a bracket housing 43 is mounted, the housing having a pivot pin 44 journalled in the lug 42 which is adjacent the partition 7, and a bolt 45 extending through an elongated opening 46 in the other lug, whereby to permit a swinging movement of the housing to adjust the work for obtaining the proper bevel, a nut 47 being provided to lock the housing in any adjusted position.

Rotatably mounted within the housing 43 at right angles to the carriage and to the grinding wheel shaft, is a shaft 48 which carries a ratchet wheel 49, a circular work holder 50 and a ratchet knob 51. The ratchet wheel 49 is provided with a series of circumferentially arranged ratchet teeth 52 which are engageable by a spring pressed member 53 carried within a tubular portion 53a secured to the housing 43.

The work holder is provided with a pair of adjacently disposed brackets 54 rotatably mounted on the shaft 48, one of which is provided with an adjusting screw 55 and the other of which is urged toward the screw held arm by a compression spring 56. Both brackets 54 are provided with projecting pins 57 which, when a cutter blade to be ground is mounted on the work holder 50, extend through openings 60 in the ends of the cutter blade.

Also pivotally mounted on the carriage 28 is a suitable splash guard 58 to be extended over the ratchet wheel 49 and work holder 50 when the machine is in operation, to prevent the coolant from being thrown from the machine.

The compartments 8 and 9 receive and hold the coolant, the level of which, indicated by numeral 59, is maintained substantially at the lower edge of the opening 10 immediately below the lower side face of the grinding wheel, the opening 11 in the partition 7 serving to place the coolant in the two chambers into communication.

When it is desired to grind or sharpen a scalloped blade such as indicated in Fig. 6, the carriage 28 is raised to its uppermost position, as indicated in Fig. 1, by actuating the lever 33 and the splash guard 58 is raised to the position shown in Fig. 1 to expose the work holder. The cutter blade is then mounted on the work holder by bending the blade into a downward loop, as shown in Fig. 7, and fitting around the circular work holder 50, at which time the opening in the end of the blade is hooked over the pin 57 of the screw held locating bracket 54, the blade being tightly held to keep the same from slipping off the pin in this locating bracket. Then the other bracket 54 is depressed until the free end of the cutter blade can be hooked over the pin 57 in this last mentioned bracket, after which the pressure is removed so that the spring tension provided by the spring 56 will tend to move this last mentioned bracket towards the other bracket and hold the cutter blade on the work holder. The cutter blade is then pressed against a slight shoulder 61 formed on the work holder 50 to insure perfect backing of the blade and accurate alignment of the cutting points.

The grinding wheel 18 is next moved through the opening 10 by rotating the adjusting screw 22 so that as the carriage 28 is moved downwardly the grinding wheel will partly contact the cutter blade for resharpening. Also, the proper bevel should be determined and this may be accomplished by adjusting the housing 43 by pivoting the same upon the carriage 28.

Before commencing to resharpen the first scallop on the cutter blade, the ratchet pawl 53 is held out of engagement with the ratchet wheel 49 and the index knob 51 is turned backwards until it strikes the stop pin 62 which controls the movement in that direction. The ratchet pawl is then released and the electric motor started in operation.

With the cutter blade mounted on the work holder and the grinding wheel adjusted for sharpening the blade, the lever 33 is pulled to the left by the operator as viewed in Fig. 2, which moves the carriage downwardly causing one scallop of the cutter blade, point to point, to move across the face of the grinding wheel. The lever is then reversed and the blade again passes over the face of the grinding wheel in the upward direction, thereby insuring a complete and perfect scallop on the knife blade in which the same is sharpened from cutting point to cutting point.

At the end of the upward stroke the index knob 51 is then turned in a counter-clockwise direction, as viewed in Fig. 1, one notch or tooth, and the next scallop, point to point, of the cutting edge is accurately set and positioned for sharpening, and the process is then repeated until the entire blade length has been ground on one side. At the point where the cutter blade passes over the grinding wheel for the last scallop, the work holder automatically stops and comes to rest by reason of the stop provided on the work holder itself.

After the blade is sharpened on one side the carriage 28 is moved to its uppermost position and the cutter blade is removed and reversed end for end, to position the opposite sides of the scallops for sharpening, and the process is then again repeated.

It will be noted in Figs. 1, 3, and 5 that the peripheral portion of the bottom of the grinding wheel chamber 8 is formed with a shelf 63 which gradually increases in height from the farthest side of the chamber, as viewed in Fig. 5, and its point of maximum height, as shown by the numeral 64 in Fig. 3, is immediately below the

bottom edge of the opening 10. The shelf 63 also inclines upwardly and inwardly from the wall of the grinding wheel chamber 8. This shelf, together with the arcuate portion 25, is provided so that as the coolant is agitated and given a circulatory motion by the propeller 20 it will travel in the direction of the arrow indicated in Fig. 5 in a rising circular path and be directed against the grinding wheel which by reason of centrifugal force, directs or throws the coolant through opening 10 into contact with the cutter blade being ground, substantially at the region of contact of the grinding wheel therewith. The coolant then drops into the work chamber where the minute particles of metal will settle to the bottom of the chamber 9, the clean coolant being allowed to circulate by reason of the opening 11 back into the grinding wheel chamber 8.

It is to be noted that this action or circulation of the coolant actually forces the grinding solution against the cutter blade at the point of contact between the cutter blade and grinding wheel.

In order to insure that the level 59 of the coolant will not be above the lower edge of the opening 10, an opening 64 is provided in the tubular guide 27 adjacent the partition 7, whereby the coolant may drain through this opening 64 and discharge through the tubular guide 27 through the bottom of the machine.

A suitable drain opening, closed by a plug 65, is also provided for the work chamber 9 to provide for the draining of the coolant from the chambers 8 and 9.

Although a single embodiment of the invention has been herein shown and described, it will be understood that numerous details of the construction shown may be altered or omitted without departing from the spirit of this invention as defined in the following claims.

What I claim is:

1. In a grinding machine, a grinding wheel chamber, a work chamber, a partition separating said chambers and having an opening therein intermediate its top and bottom edges, said chambers being in communication with each other and arranged to contain a coolant, a grinding wheel horizontally disposed within said first mentioned chamber and having a portion of its grinding surface projecting through said opening into said work chamber, a work support in said work chamber, means for rotating said wheel, means within said grinding wheel chamber for imparting circulatory motion to the coolant within said grinding wheel chamber, and means within said grinding wheel chamber for directing the coolant into contact with said wheel where it is thrown by centrifugal force through said opening into said work chamber and against the work carried by said support at the region of grinding contact of said wheel therewith, said last mentioned means including a shelf rising gradually upwardly from the bottom of said griding wheel chamber and extending in a circular path and terminating below said wheel at the region of the bottom of said opening.

2. In a grinding machine, a grinding wheel chamber, a work chamber, a partition separating said chambers and having an opening therein intermediate its top and bottom edges, said chambers being in communication with each other and arranged to contain a coolant, a grinding wheel horizontally disposed within said first mentioned chamber and having a portion of its grinding surface projecting through said opening into said work chamber, a work support in said work chamber, means for rotating said wheel, an impeller in said grinding wheel chamber driven by said grinding wheel, for imparting circulatory motion to the coolant, and means within said grinding wheel chamber for directing the coolant against said wheel where it is thrown by centrifugal form through said opening into said work chamber and against the work carried by said support at the region of grinding contact of said wheel therewith.

3. In a grinding machine, a grinding wheel chamber, a work chamber, a partition separating said chambers and having an opening therein intermediate its top and bottom edges, said chambers being in communication with each other and arranged to contain a coolant, a grinding wheel horizontally disposed within said first mentioned chamber and having a portion of its grinding surface projecting through said opening into said work chamber, a work support in said work chamber, means for rotating said wheel, means within said grinding wheel chamber for imparting circulatory motion to the coolant within said grinding wheel chamber, and means within said grinding wheel chamber for directing the coolant against said wheel and through said opening into said work chamber and against the work carried by said support at the region of grinding contact of said wheel therewith, the level of coolant being below the lower side face of said grinding wheel and below the bottom of said opening.

4. In a grinding machine, a grinding wheel chamber, a work chamber, a partition separating said chambers and having an opening therein intermediate its top and bottom edges, said chambers being in communication with each other and arranged to contain a coolant, a grinding wheel horizontally disposed within said first mentioned chamber and having a portion of its grinding surface projecting through said opening into said work chamber, a work support in said work chamber, means for rotating said wheel, means within said grinding wheel chamber for imparting circulatory motion to the coolant within said grinding wheel chamber, and means within said grinding wheel chamber for directing the coolant against said wheel and through said opening into said work chamber and against the work carried by said support at the region of grinding contact of said wheel therewith, the level of coolant being below the lower side face of said grinding wheel and below the bottom of said opening, one of said chambers having an overflow opening disposed to prevent the rise of level of the coolant above the bottom of said first mentioned opening.

5. In a grinding machine, a chamber arranged to contain a coolant and having a vertically arranged partition to provide a grinding wheel compartment and a work compartment, said partition having an aperture therein, a cover over said grinding wheel compartment and provided with an opening, a plate slidably mounted on said cover, an electric motor mounted on said plate and having a shaft projecting through said opening into said grinding wheel compartment, a grinding wheel secured to said shaft in alignment with said aperture, and means for moving said plate relative to said aperture whereby to adjustably move said grinding wheel through said aperture.

6. In a grinding machine a grinding wheel chamber for holding a coolant, a grinding wheel within said chamber positioned above the normal level of said coolant, a stationary obstruction in

said chamber, and means driven through the grinding wheel axis for imparting a whirling motion to the coolant, said obstruction positioned in the path of flow of the whirling coolant to cause a portion of the whirling coolant to pass above the obstruction, rise above the normal level of the coolant and be directed against the grinding wheel.

7. In a grinding machine a grinding wheel chamber for holding a coolant, a grinding wheel within said chamber positioned above the normal level of said coolant, means driven through the grinding wheel axis for imparting a whirling motion to the coolant, and a stationary obstruction positioned in the path of flow of the whirling coolant and in the form of an inclined portion in said chamber above which the coolant is caused to pass by reason of said whirling motion, whereby the whirling coolant is caused to rise above its normal level and is directed to contact with the grinding wheel and be carried to the object being ground.

8. In a grinding machine a grinding wheel chamber for holding a coolant, a grinding wheel within said chamber positioned above the normal level of said coolant, means for imparting a whirling motion to the coolant, and a stationary obstruction positioned in the path of the whirling coolant and in the form of an inclined portion in said chamber gradually rising from the bottom of and adjacent the wall of said chamber and terminating below the grinding wheel, whereby the whirling coolant is caused to rise above its normal level and is directed above the obstruction to contact with the grinding wheel and be carried to the object being ground.

9. In a grinding machine a grinding chamber for holding a coolant, a grinding wheel within said chamber having a vertical axis of rotation and positioned above the normal level of said coolant, means for imparting a whirling motion to the coolant, and a stationary obstruction positioned in the path of the whirling coolant and in the form of an inclined portion in said chamber gradually rising from the bottom of and adjacent the wall of said chamber and terminating below the grinding wheel, above which the coolant is caused to pass by reason of said whirling motion, whereby the whirling coolant is caused to rise above the normal level of the coolant and is directed to contact with the grinding wheel and be carried to the object being ground.

10. In a grinding machine a grinding wheel chamber for holding a coolant, a grinding wheel within said chamber positioned above the normal level of said coolant, means for imparting a whirling motion to the coolant, and a stationary coolant diverting member in the chamber positioned in the path of a portion of the whirling coolant, said diverting member being in the form of an inclined member in said chamber above which the coolant is caused to pass by reason of said whirling motion and arranged to divert said portion of the whirling coolant to cause the coolant to rise above its normal level and be directed against the grinding wheel.

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