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H. L. BLOOD

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GUARD ARRANGEMENT FOR MACHINE TOOLS

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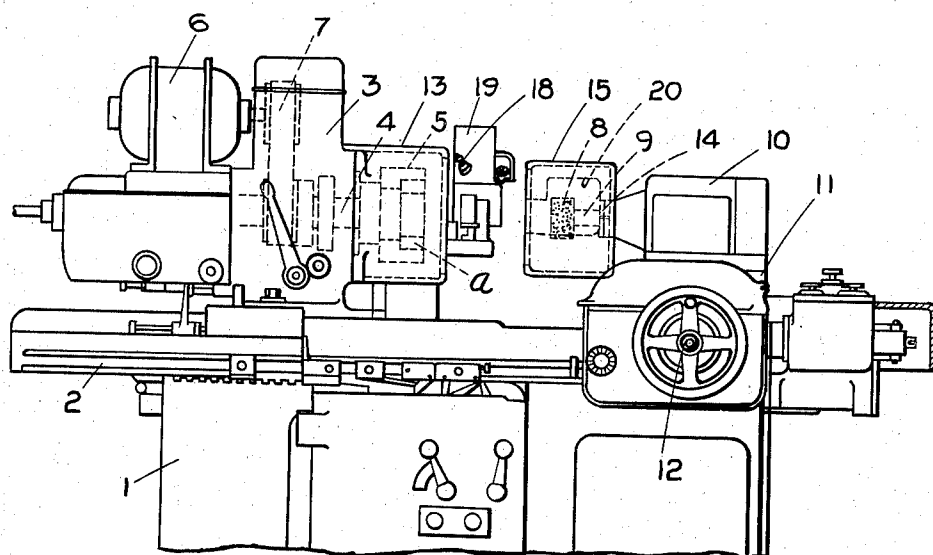


FIG. 1.

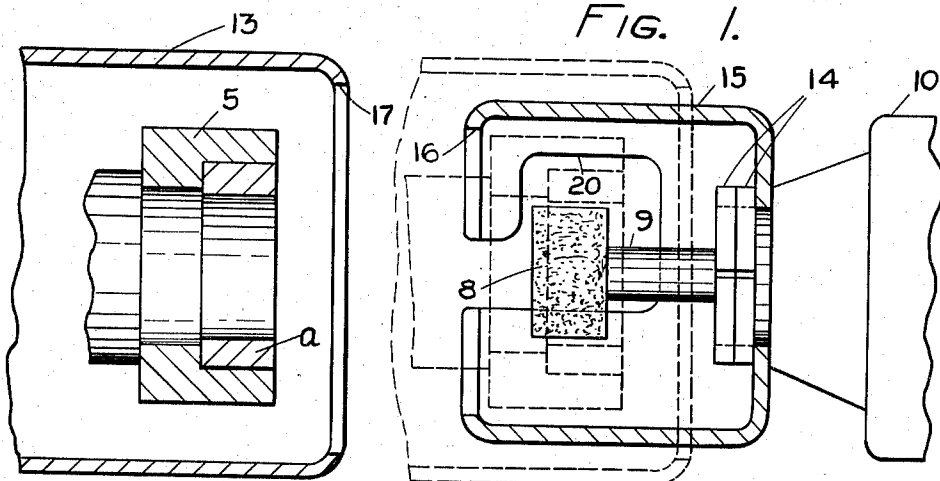


FIG. 2.

Inventor:
Harold L. Blood
By Mes. W. Kennedy
Attorney

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GUARD ARRANGEMENT FOR MACHINE TOOLS

Harold L. Blood, Worcester, Mass., assignor to
The Heald Machine Company, Worcester,
Mass., a corporation of Massachusetts

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7 Claims. (Cl. 51—272)

The present invention relates to a guard arrangement for machine tools, and more especially for internal grinding machines.

Objects of the invention are to safe-guard the machine operator at all times not only from the dangers of grinding wheel breakage, but also from accidental contact with either the rotating grinding wheel or the rotating work-holder; and also during the grinding operation, to effectively intercept and confine the splash of coolant fluid, which, laden with abrasive particles, is thrown off at high velocity by the rapidly rotating wheel or workpiece.

Other and further objects and advantages of the invention will more fully appear from the following detailed description thereof, taken in connection with the accompanying drawing in which

Fig. 1 is a front elevational view of an internal grinding machine, provided with the guard arrangement of my invention, and

Fig. 2 is a fragmentary large scale sectional view of the guard devices shown in Fig. 1.

Like reference characters refer to like parts in the different figures.

Referring to Fig. 1, the internal grinding machine there shown comprises a base 1, having longitudinal ways, not shown, whereon is supported, for reciprocatory movement, a table 2. Mounted on said table is a workhead 3 wherein is journaled a shaft or spindle 4 whose inner end carries any suitable work holder or chuck 5 for the work *a* whose bore is to be ground. Any suitable means such as an electric motor 6 and a driving belt 7 may be employed to drive the spindle 4 thus to obtain rotation of the workpiece *a*, while its bore is being ground.

Such grinding is effected by a grinding wheel 8, carried on the end of a rotary spindle 9 which is suitably journaled in a wheelhead 10 and driven at high speed. The wheelhead is mounted on a bridge 11 which is supported by the machine base 1. Said bridge spans the table 2 and its ways, thus permitting the necessary back and forth movements of the table by which to obtain the grinding wheel's disposal within the workpiece bore, the usual relative reciprocatory traverse between wheel and work during the grinding operation, and the subsequent separation of same, to the position illustrated by Fig. 1, for the removal of the ground workpiece and the chucking of an unground workpiece. The table motions to effect this cycle of operations may be imparted by mechanism such as that shown and described in the Blood Patent No. 2,011,705 dated

August 20, 1935, and it will further be understood that a progressive radial or cross feed between the grinding wheel and the surface of the workpiece bore, while said parts are in grinding position, is imparted, as by means of a feed screw 12, Fig. 1, by which the wheelhead 10 is shifted at right angles to the axis of the wheel spindle 9.

In the above and similar internal grinding machine organizations it has been common practice to provide the workhead with an open-ended guard, somewhat as shown in the drawings at 13, said guard substantially surrounding the rotating chuck 5 and serving as a partial shield against the operator's accidental contact with the moving parts as well as to intercept some of the coolant thrown off during the grinding operation. But heretofore, much of this coolant has splashed out through the front of such a guard, which must be left open for the grinding wheel's entrance to and exit from the workpiece bore.

It has also been the practice, in internal grinding machines to provide the rotating wheel, when in its withdrawn or non-grinding position, with a guard, substantially as shown and described in Heald et al., Pat. #1,250,168; but the necessity of periodically swinging such a guard to inoperative position, to permit the relative approach movements of wheels and work, exposes the operator at such times to the dangers of wheel breakage, as well as to accidental contact with the unguarded wheel.

My invention does away with all these short comings of the prior guard arrangements. According to my invention the wheelhead 10 has secured thereto, as by means of nuts 14, 14 a fixed guard or shield 15, encircling the wheel 8, and having a front opening 16 of sufficient diameter to permit free passage therethrough of the chuck 5. In similar fashion, the front opening 17 of the work guard 13 is of sufficient diameter to pass freely over the outside surface of the wheel guard 15, the latter substantially filling and closing said opening 17 when the table movement has disposed the work *a* in the operative or grinding position, as indicated by the broken lines in Fig. 2. In this position the wheel guard 15 surrounds the chuck and is in turn surrounded by the work guard 13, the telescoping relation of the two guards serving very effectively to intercept and confine the splash of the abrasive-laden coolant. Not only is the operator protected during the grinding operation from such splash, but he is at all times protected from the dangers of grinding wheel breakage and from

any accidental contact with either the rotating wheel or the rotating work.

It is customary, in such grinding machines to periodically subject the grinding wheel, when separated from the work, to a dressing and truing operation, as by traversing its cutting surface with a diamond point 18, mounted in a suitable pivoted holder 19 on the table 2. At appropriate intervals said holder 19 which normally occupies the inoperative position shown in Fig. 1, is swung downwardly, to project the diamond point through a suitable opening 20 of the wheel guard 15, so to engage and traverse the wheel surface substantially in the horizontal plane of the wheel's axis, after which the holder is rocked back to inoperative position, to leave the way clear for the usual cycle of table movements to proceed.

In my improved guard arrangement as above described, the opening 17 of work guard 13 needs to be only very slightly larger than the wheel guard 15, a clearance of a few thousands of an inch being sufficient to permit such radial or cross feed of the wheelhead 10 as is ordinarily produced by the feed screw 12. A similar slight clearance suffices between the workholder 5 and the opening 16 of wheel guard 15.

I claim:

1. In a machine tool, a rotary work holder, a rotary tool, means for shifting said parts substantially axially, to alternately place said tool in operative position relative to the work in said holder and to separate said tool from said work, and an encircling guard for said tool, adapted in said operative position to encircle said work holder.

2. In a machine tool, a rotary work holder, a rotary tool, means for shifting said parts substantially axially, to alternately place said tool in operative position relative to the work in said holder and to separate said tool from said work, and guards encircling respectively said work holder and said tool, said guards in said operative position being in telescopic relation.

3. In a machine tool, a rotary work holder, a rotary tool, means for shifting said parts substantially axially, to alternately place said tool

in operative position relative to the work in said holder and to separate said tool from said work, a guard encircling said work holder in spaced relation thereto, and a second guard encircling said tool in spaced relation thereto, said second guard, in said operative position occupying the space between said first guard and the work holder, and said work holder in said operative position occupying the space between said second guard and said tool.

4. In a machine tool, a rotary work holder, a rotary tool, means for shifting said parts substantially axially, to alternately place said tool in operative position relative to the work in said holder and to separate said tool from said work, and guard means for said work holder and tool respectively, said guard means cooperating in said operative position to totally enclose said work holder and said tool.

5. In a machine tool, a rotary work holder, a rotary tool, means for shifting said parts substantially axially, to alternately place said tool in operative position relative to the work in said holder and to separate said tool from said work, and a guard encircling said tool and spaced therefrom, the space between said guard and said tool in the latter's operative position being occupied by said work holder.

6. In an internal grinding machine, a rotary work holder and a rotary grinding wheel, said parts being relatively shiftable in substantially axial directions to engage and disengage said wheel with the work in said holder, a guard device for each of said parts in spaced relation thereto, one of said guard devices being receivable in the other guard device when the parts are shifted to operatively engage said wheel with said work.

7. In an internal grinding machine, a rotary work holder and a rotary grinding wheel, said parts being relatively shiftable in substantially axial directions to engage and disengage said wheel with the work in said holder, a guard for said wheel encircling the latter at all times, and a dressing device engageable periodically with said wheel through an opening in said guard.

HAROLD L. BLOOD.