Feb. 3, 1942. H. T. BRADNER 2,271,677

FLUID CIRCULATING SYSTEM

Filed Nov. 18, 1937

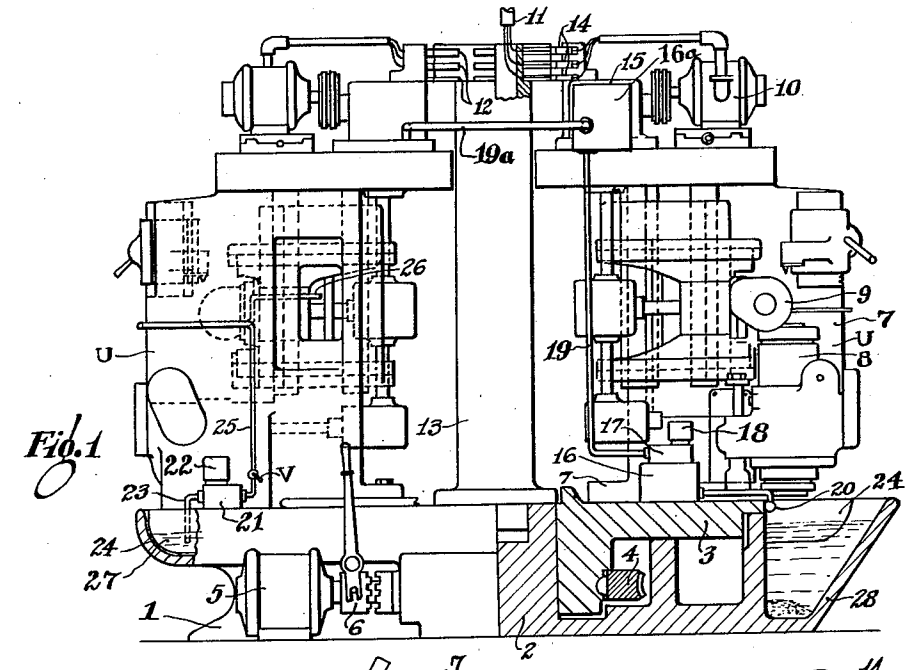


Fig. 1

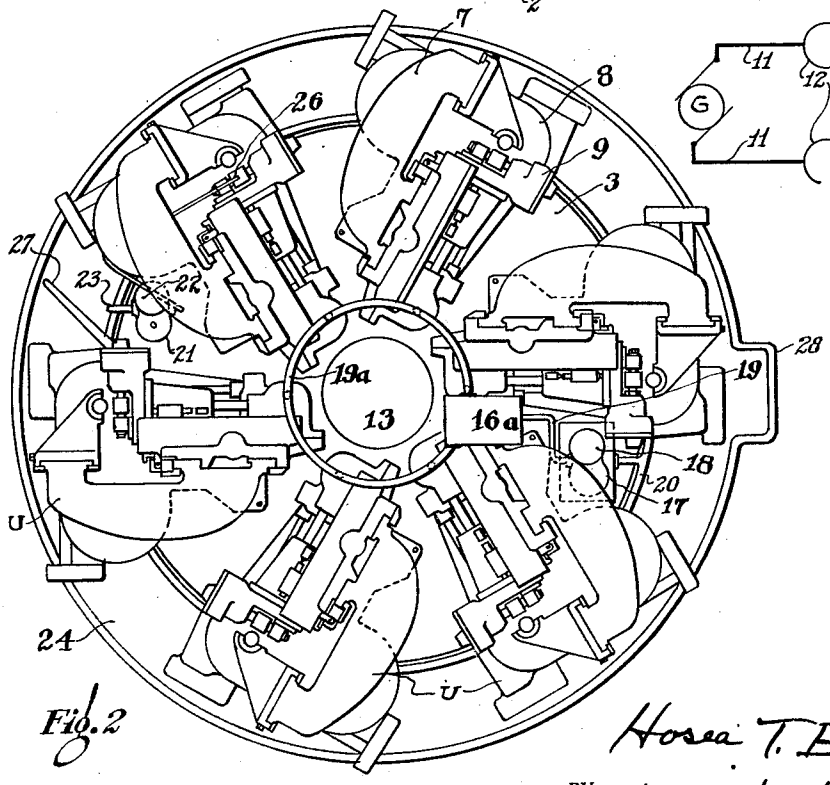


Fig. 2

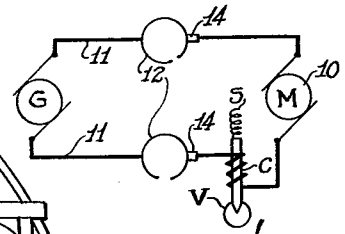


Fig. 3

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FLUID CIRCULATING SYSTEM

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8 Claims. (Cl. 90—4)

This invention relates to machine tools and the like, and particularly to liquid circulating systems therefor.

It is an object of my invention to provide an improved means for circulating lubricating liquids to machine tools and like devices.

Another object is to provide an improved means for circulating the cooling and lubricating liquids commonly used in cutting metal and similar operations.

Another object is to provide an improved means which will circulate both lubricant and coolant and lubricant mixtures and prevent either from impairing the efficiency of the other.

Another object is to provide an improved liquid circulating means which will be simple in construction.

Another object is to provide an improved liquid circulating means which will be efficient in operation.

Another object is to provide an improved liquid circulating means which will occupy relatively little space.

Another object is to provide an improved liquid circulating means in which leakage of liquids will be prevented.

Another object is to provide an improved liquid circulating means which may effectively be used with multi-unit machines.

Other objects will hereinafter appear.

The invention will be better understood from the description of one practical embodiment thereof, illustrated in the accompanying drawing, in which:

Figure 1 is a side elevational view, partly in section, of a machine tool type known as a rotary hobbing machine in which the invention is embodied;

Figure 2 is a plan view of the machine of Figure 1; and

Figure 3 is a diagrammatic representation of the valve actuating mechanism included in the apparatus of the preceding two figures.

The machine illustrated is in general of a type shown in Patent Number 2,075,489 issued March 30, 1937, to the Lees-Bradner Company, as assignee of Charles H. Schurr and Homer C. Warner.

It consists of a stationary base 1, provided with a central pivot 2, about which may be rotated a turntable or unit support 3. This turntable has keyed to it a worm wheel 4 driven by a worm actuated by an electric motor 5 through a clutch 6, to carry the units mounted upon the table past an operator at a stationary loading and unloading station.

Mounted upon the turntable are a plurality of machine units, shown in the drawing as six in number and indicated generally by the letter U. Each unit comprises a frame 7 supporting the work and cutter heads 8 and 9, respectively, which are connected by suitable gearing, the gearing of each unit being driven by its individual motor 10.

Each motor 10 is supplied with electric current coming from a generator (not shown) through conduits 11, and also through suitable circuit making and breaking means, illustrated somewhat diagrammatically as a plurality of broken or interrupted conducting rings 12 carried on the top of a central column 13 fixed in position upon the pivot 2 of the base. Upon these rings bear brushes 14 carried upon insulated supports upon the brackets 15 of the respective machine units.

The parts so far described have all been generally indicated and described in the above mentioned Letters Patent, and are included only as illustrative of one environment in which the invention may be advantageously used.

Mounted upon the turntable 3 is a tank 16 containing lubricating oil or the like, this tank being provided with a pump 17 driven by an electric motor 18, the motor receiving power from the brushes 14 in the same manner as the motor 10, but preferably having two sets of brushes so that it will not be stopped when either set is passing over the break in the conductor ring 12.

From the pump, a pipe or conduit 19 leads to a tank 16a at the top of machine from which the liquid flows to the various units U through a manifold-like conduit 19a, this lubricant being returned at the bottom of each unit to a circular pipe 20 adjacent the turntable 3, by which the lubricant is returned to the tank 16.

Thus, it will be seen that the lubricant is retained in a closed system and precluded from mixing with the coolant fluid. Of course, the tank 16 permits settling of any solid particles which may be returned to the tank with the lubricating liquid, and, if desired, the tank may have suitable straining or filtering means to eliminate such material.

Also, mounted upon the turntable 3 is a pump 21, likewise driven by an electric motor 22, and receiving its power from the conductor rings 12 in the same manner as motor 18.

The intake of this pump depends into the annular space 24 about the periphery of the base, and from this space draws coolant-lubricant mixture to be supplied to the cutters and work.

Pipes 25 conduct the coolant liquid to nozzles 26 through which it is discharged upon the cutters and work of the several units. From this point the liquid may run back upon the turntable and into the trough 24.

A deflector blade or sweep 27 is fixed to the turntable immediately in advance of the intake 23 to sweep chips and other solid particles out of the way of the intake.

At one or more points about the base the trough 24 is enlarged to form one or more sumps 28 into which chips and other solid material particles may drop, and from which they may be readily removed by the operator.

Both pumps run continuously during the operation of the machine. With the regard to the lubricating liquid supplied by pump 16, circulation is permitted continuously to each unit.

However, when it is desired that an operator remove a completed piece of work and insert a new work piece, the flow of the coolant from the nozzle 26 impedes such operation, and each pipe 25 is therefore provided with control valve indicated generally at V.

This valve is diagrammatically illustrated in Figure 3 as controlled in accordance with the operation of motor 10 of the unit with which it is associated. In this figure the valve is shown as arranged to be closed by a spring S and opened by the passage of current through a magnetic coil C, this being connected in series with the motor 10 of its unit.

It will be apparent that when current to this motor is discontinued by its brushes 14 reaching the break in conducting rings 12, the coil C will cease to function and the spring will close the valve. However, as soon as brushes 14 have passed over the gap in the rings and current is again supplied to the motor, the valve will be opened and coolant liquid supplied to the nozzle 26 of the particular unit as it passes around the machine to again reach its loading and unloading position.

While I have described the illustrated embodiment of my invention in some particularity, obviously many others will readily occur to those skilled in this art, and I do not, therefore, limit myself to the precise details shown and described, but claim as my invention all embodiments, variations, and modifications thereof coming within the scope of the appended claims.

I claim:

1. In a machine tool comprising a stationary base, a rotatable support mounted thereon, and a machine unit carried by said support, the base being formed to include an annular trough, a pump carried by said rotatable support and having an intake depending into said trough, means for driving said pump, a sweep carried by said support and depending into said trough in advance of said intake, and a conduit from said pump to said machine unit.

2. In a machine tool comprising a stationary base, a rotatable support mounted thereon, and a machine unit carried by said support, the base being formed to include an annular trough, a pump carried by said rotatable support and having an intake depending into said trough, means for driving said pump, a sweep carried by said support and depending into said trough in advance of said intake, and a conduit from said pump to said machine unit, said trough being enlarged to provide a solid material receiving and settling sump.

3. In a rotary machine tool having a stationary base, a rotating support carried thereby and a machine unit carried by the support, stationary liquid receiving means in said base, a pump carried by the rotating support, a conduit from said pump to said unit, a motor connected to drive said pump, the pump having an intake fixed with respect thereto and extending into the liquid receiving means in the base, a valve interposed in the conduit from the pump to the unit, and controlling means for said valve actuated by the movement of the support upon the base.

4. In a machine tool having a stationary base and a machine unit movably carried thereby, a stationary liquid receiving means in the base, a pump movably carried with the machine unit, a conduit from said pump to said unit, a motor connected to drive said pump, and an intake from said pump carried thereby and extending into said liquid receiving means in the base, said intake being movable within said liquid receiving means as the machine unit is moved upon the base, and control means controlling the supply of liquid through said conduit operated in accordance with the movement of the machine unit relative the base.

5. In a machine tool having a stationary base and a machine unit movably carried thereby, a stationary liquid receiving means in the base, a pump movably carried with the machine unit, a conduit from said pump to said unit, a motor connected to drive said pump, and an intake from said pump carried thereby and extending into said liquid receiving means in the base, said intake being movable within said liquid receiving means as the machine unit is moved upon the base, and solid material moving means associated and movable with the intake of said pump.

6. In a rotary machine tool having a stationary base, a rotating support carried thereby and a machine unit carried by the support, a stationary circular liquid receiving trough in said base concentric with the axis of said rotating support, a pump carried by the rotating support, a conduit from said pump to said machine unit, an intake fixed with respect to the pump and extending into the circular trough, and driving means connected to said pump, the trough having a deepened portion to provide a solid material receiving and settling sump.

7. In a rotary machine tool having a stationary base, a rotating support carried thereby, and a machine unit carried by the support, a stationary circular trough in said base concentric with the axis of said rotating support, a pump carried by the rotating support, a conduit from said pump to said unit, an intake fixed with respect to the pump and depending into said trough, driving means connected to drive said pump, control means controlling the supply of liquid to said unit, and operating means connected to said control means actuated by the unit.

8. In a rotary machine tool having a stationary base, a rotating support carried thereby, and a machine unit carried by the support, a stationary circular trough in said base concentric with the axis of said rotating support, a pump carried by the rotating support, a conduit from said pump to said unit, an intake fixed with respect to the pump and depending into said trough, driving means connected to drive said pump, a valve controlling the supply of liquid to said unit, and operating means connected to said valve and actuated by the unit.

HOSEA T. BRADNER.