Feb. 5, 1924. 1,482,855

R. L. MORGAN

MECHANISM FOR SUPPLYING LIQUID TO GRINDING MACHINES

Filed Feb. 3, 1921 2 Sheets-Sheet 1

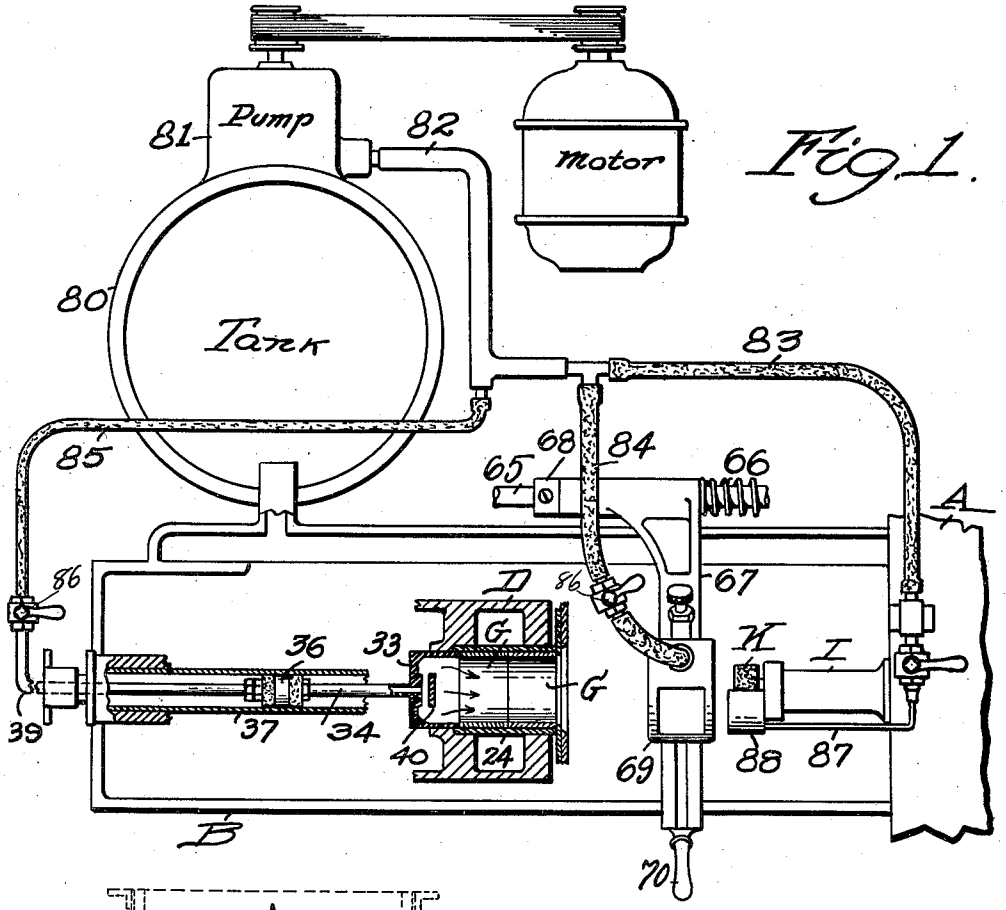


Fig. 1.

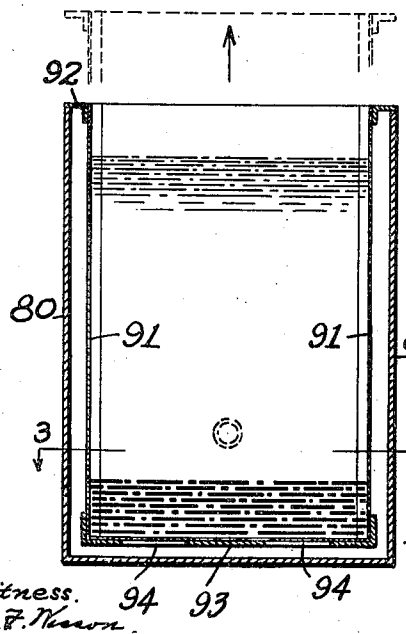


Fig. 2.

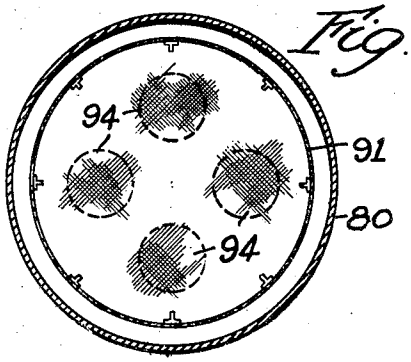


Fig. 3.

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Filed Feb. 3, 1921 2 Sheets-Sheet 2

Fig. 4.

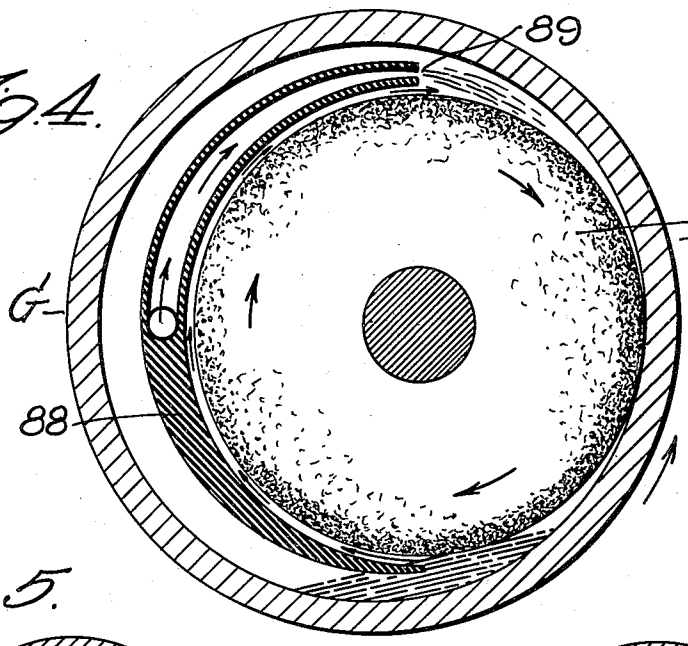


Fig. 5.

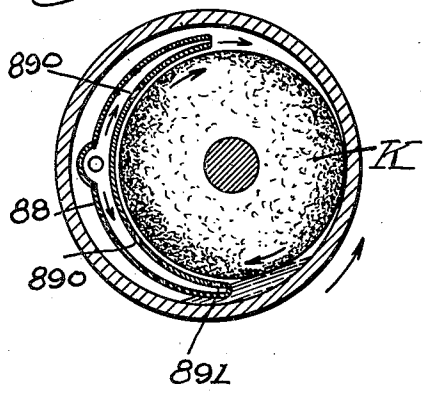


Fig. 6.

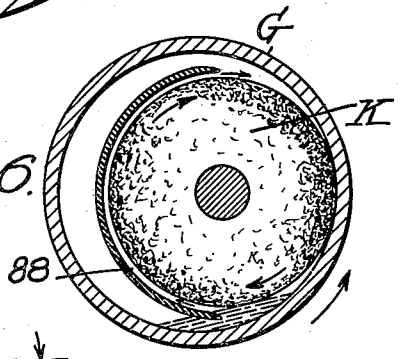
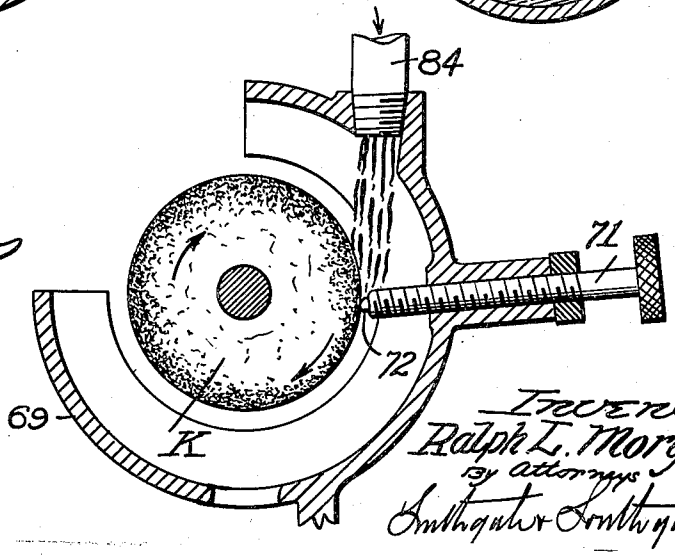


Fig. 7.



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UNITED STATES PATENT OFFICE.

RALPH L. MORGAN, OF WORCESTER, MASSACHUSETTS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO GREENFIELD TAP AND DIE CORPORATION, OF GREENFIELD, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MECHANISM FOR SUPPLYING LIQUID TO GRINDING MACHINES.

Application filed February 3, 1921. Serial No. 442,260.

To all whom it may concern:

Be it known that I, RALPH L. MORGAN, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Mechanism for Supplying Liquid to Grinding Machines, of which the following is a specification.

The object of this invention is to provide an improved mechanism for supplying liquid to grinding machines for practicing what is known as "wet grinding".

The invention has been particularly devised for use in connection with the internal grinding machine shown in an application for patent filed by me November 20, 1920, Serial No. 425,475, fluid pressure operating mechanism for reciprocating members; in an application for patent filed by me on even date herewith, Serial No. 442,259, workholders; and in an application for patent filed on even date herewith by Myles Morgan, Serial No. 442,258, grinding machines.

The invention consists in particular of a novel way of applying the liquid to the grinding wheel to increase the speed and accuracy of the grinding operation, and to prevent the particles detached from the wheel and work from filling up the wheel and the invention also involves improved means by which the grinding liquid can be applied to the wheel truing device and also an improved settling tank for containing the grinding liquid.

Referring to the drawings and in detail;

Fig. 1 is a plan view partly in section of said grinding machine and connections showing how my invention may be applied thereto;

Fig. 2 is a central sectional elevation of the tank in which the liquid is contained;

Fig. 3 is a plan view thereof;

Fig. 4 is an enlarged cross sectional view showing the way the liquid is applied to the grinding wheel;

Figs. 5 and 6 are similar views on a smaller scale, illustrating modifications, and

Fig. 7 is a cross sectional view through the means for truing up the grinding wheel.

Referring to the drawings and in detail A designates the frame or base, fitted to slide on which is the work-table B which carries a suitable spindle D in which the bushings G—G to be ground are carried, suitable work-retaining means being provided on the end or face of the spindle.

I designates the block in which the spindle of the grinding wheel K is journalled.

A work-holding bushing 24 is fitted in the spindle D, and fitted in the same is a pusher 33 which is moved axially by a pipe or hollow piston-rod 34 carrying a piston 36 fitted in a cylinder 37. A flexible hose 39 is connected to said pipe 34. A baffle plate 40 is arranged in said pusher 33.

A shaft 65 is secured at the rear of the frame, fitted on which is a spring 66 engaging an arm 67 hung on said shaft and held against an adjustable collar 68. The arm 67 carries a yoke 69 and the same can be clamped over in operative position by clamp screw 70. A screw 71 is threaded in said yoke 69 and the same carries a diamond-point 72 for truing up the wheel. These parts are arranged as shown in said prior applications and the detail operation of these parts need not be herein described.

My improved mechanism for supplying liquid is arranged as follows:—

A tank 80 is arranged adjacent to the machine, and the frame A is provided with suitable drain passages and a spout, so that after the liquid is supplied to the various parts of the machine it will drain back into the tank. A pump 81 is arranged to take liquid from said tank, which pump may be driven by a suitable motor.

82 designates the outlet pipe from the pump, which outlet pipe has a branch 83 extending to the bearing head I for the grinding wheel, a branch pipe 84 extending to the arm 67 employed for truing the wheel, and a branch pipe 85 extending to the pipe or piston rod 34. Valves 86 may be provided to control the supply of liquid through these branch pipes. The branch pipe 83 connects by an extension pipe 87 to a semi-cylindrical hollow wheel guard 88, which is arranged around the wheel K and which has an outlet 89 at its end as shown in Fig. 4. This guard is made of such size and shape that it can occupy a fixed relation with the wheel and so that both wheel and guard can be moved inside of the work. This guard also protects or shields the wheel so that

is cannot be hit by the operator and so that the operator cannot be cut thereby.

By the mechanism before described, a peculiar and improved action of the grinding liquid upon the grinding wheel will be obtained. The grinding liquid passes through the hollow piston rod 34, and in through the pusher 33, being deflected by the baffle plate 40 so as to flow in a thin stream out through the inside of the work G which is to be ground internally. This will provide a small layer or running stream of the liquid at the bottom of the work as shown in Fig. 4 which will stand at an incline due to the rotation of the work and which will practically form a seal between the work and the bottom of the wheel guard 88 and grinding wheel.

The grinding wheel K rotating rapidly in the direction indicated by the arrows, will act as a pump and will pick up this liquid and will carry the same around inside the guard. By this operation hot sparks of molten metal or particles coming from the wheel and the work at their points of contact will be immersed in the grinding liquid, and will be carried up around between the wheel and the guard, and will thus be cooled and solidified. When these loose particles reach the top of the wheel or as they come out from between the wheel and the guard, the liquid issuing from the end of the guard will wash them along down on the wheel. I have found that the particles being solidified in this way before they again come between the wheel and the work will not fill or load up the wheel. This action will keep on taking place until all of the particles are carried out of the inside of the work G to be ground by the stream of liquid following outwardly through the bottom of the work. Thus any particles which are carried around will be cooled before they again come around to the point of contact between the wheel and the work, and they ultimately will be washed out by the flow received from the pipe 34. I have found in practice that this way of supplying a grinding liquid allows the work to be much more rapidly and accurately ground.

I may provide the guard 88 with additional holes 890 to help the cooling of the particles between the wheel and the guard if desired, and the lower end of the guard may be provided with an outlet 891 if desired to assist in feeding the stream which is flowing through the bottom of the work, as shown in Fig. 5.

In some instances, the guard 88 may be made solid without having the grinding liquid supplied thereto, as shown in Fig. 6, the entire action being obtained by the grinding wheel working as a pump and carrying the liquid supplied through the pusher around between the same and the guard. The arrangement shown in Fig. 4 however, is the preferred one, as I am at present advised.

When the wheel is to be trued up, the grinding liquid is allowed to flow through the branch pipe 84 as illustrated in Fig. 7, thus washing down the flying particles through an escape opening provided through the bottom of the yoke 69.

The settling tank 80 is provided with an upright screen 91 which has a supporting rim 92 at its upper end, and which fits loosely in the tank so that an annular space will be left between said tank and the screen, the outlet being connected to this annular space. The screen is provided near its lower end with a bottom 93 having outlets 94. As the liquid comes back from the machine it is filled with particles of the grinding wheel, and the particles which have been ground off of the work, and also may contain some oil from the machine. As the liquid drains into the settling tank the heavier particles will drop to the bottom thereof and the lighter particles will float on the top as indicated in Fig. 2. Thus, a zone of relatively clear liquid will be formed between these two layers and this zone of liquid will drain through the vertical screen into the annular space between the same and the upright walls of the tank. This will allow the tank to be used for a long time before it has to be cleaned, and finally when it has to be cleaned all that is necessary is to remove the cylindrical screen and dump the same.

The details and arrangements herein shown may be greatly varied by a skilled mechanic without departing from the scope thereof.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent is:—

1. In an internal grinding machine, means for supplying liquid to the bottom of the work, a grinding wheel, and a partial cylindrical guard surrounding the wheel and arranged so that the wheel will act to carry the liquid around between the same and the guard.

2. In an internal grinding machine, means for supplying a current of liquid axially through the bottom of the work to be ground, a grinding wheel, and a semi-cylindrical guard surrounding the wheel and arranged so that said wheel will carry said liquid around between the same and said guard.

3. In an internal grinding machine, means for supplying a current of liquid axially through the bottom of the work to be ground, a grinding wheel, and a partial cylindrical guard surrounding the wheel and arranged so that said guard and wheel can be moved inside the work and so that the wheel will act to carry the liquid around between the same and the guard.

4. In an internal grinding machine, means for supplying a current of liquid axially through the bottom of the work to be ground, a grinding wheel, a partial cylindrical guard surrounding the wheel and arranged so that the wheel will act to carry the liquid around between the same and the guard, and additional means for supplying liquid to said guard.

5. In an internal grinding machine, a grinding wheel, a partial hollow cylindrical guard surrounding the wheel and having an outlet, and means for supplying liquid to said guard, the guard and wheel being arranged so that the same can be moved inside of the work.

6. In an internal grinding machine, means for supplying liquid to the work, a grinding wheel, and a partial cylindrical hollow guard having an outlet surrounding the wheel and arranged so that the wheel will act to carry the liquid around between the same and the guard, and means for supplying liquid to the guard.

7. In an internal grinding machine, means for supplying a current of liquid axially through the work to be ground, a grinding wheel, and a hollow semi-cylindrical guard surrounding the wheel, and having a plurality of outlets, and means for supplying liquid to said guard.

8. A settling tank for grinding machines comprising a tank, an upright screen loosely fitted therein and provided with a bottom, and an outlet connected to the space between said tank and said screen.

In testimony whereof I have hereunto affixed my signature.

RALPH L. MORGAN.