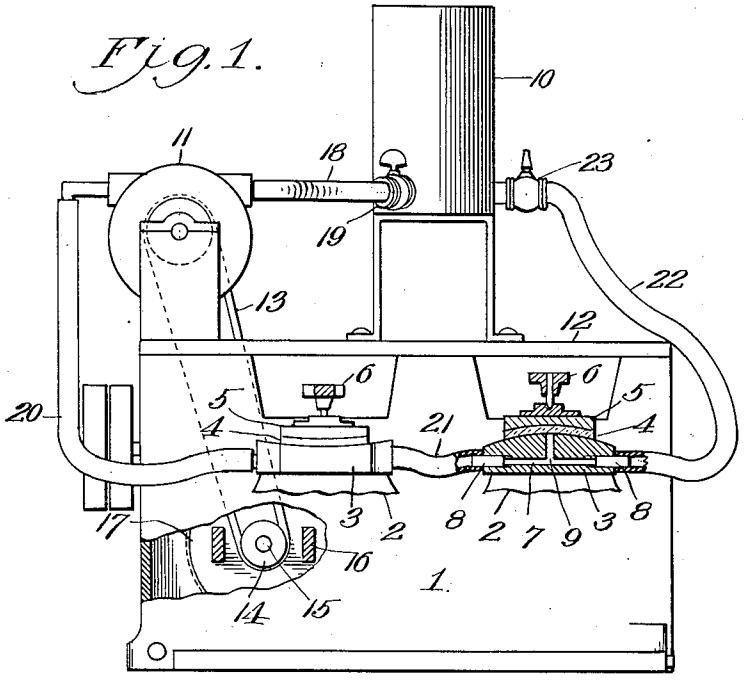
Oct. 29, 1935. I. N. CASSITY 2,019,171

AUTOMATIC FEED FOR LENS GRINDING AND POLISHING COMPOUNDS

Filed Oct. 24, 1934 2 Sheets-Sheet 1

Fig. 1.



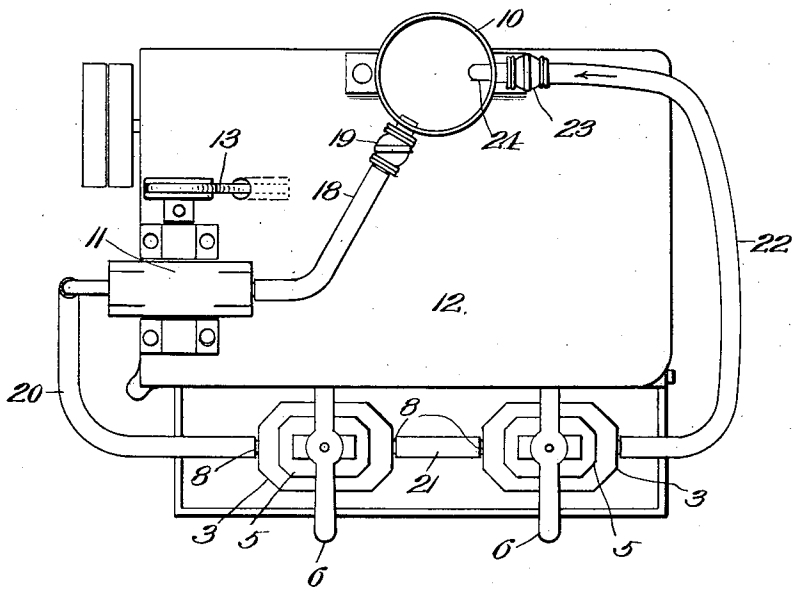


Fig. 2.

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Fig. 3.

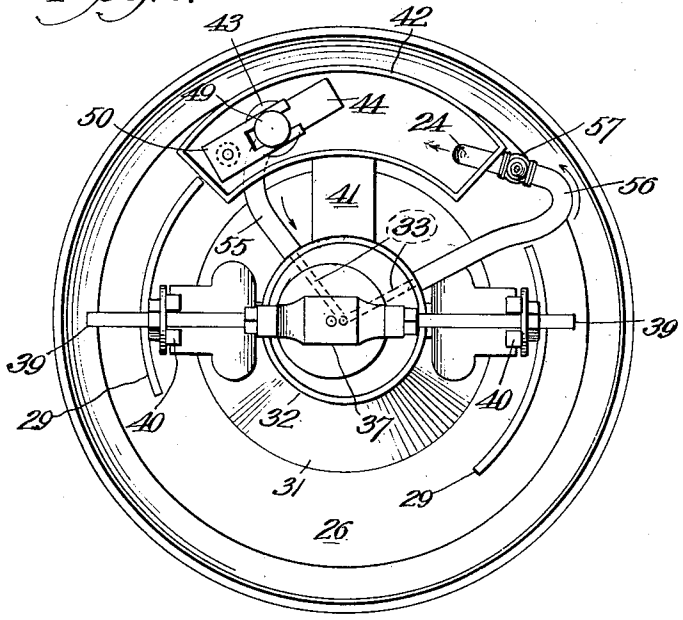


Fig. 5.

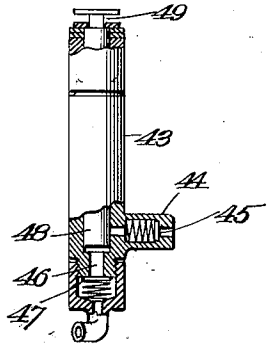


Fig. 6.

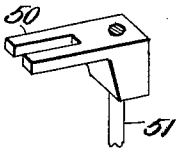


Fig. 4.

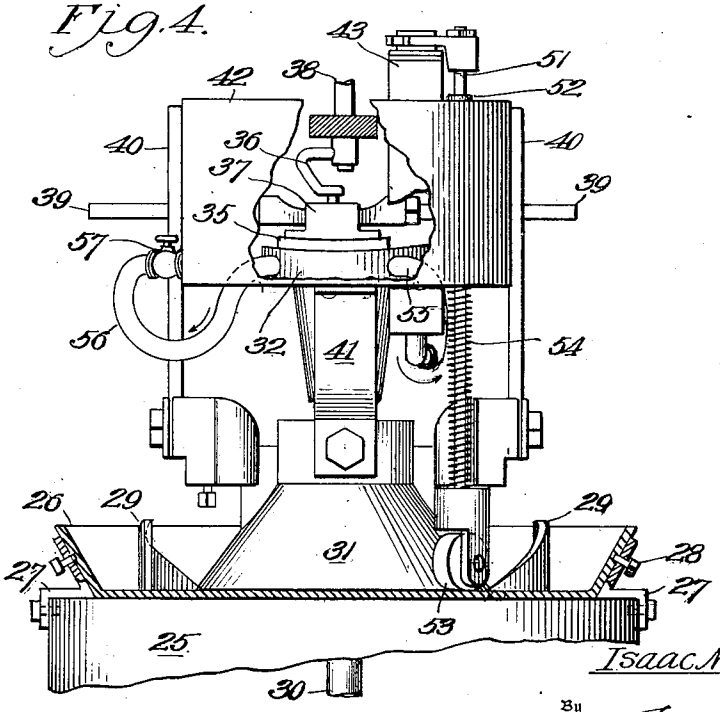
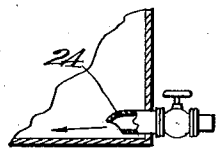


Fig. 7.



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UNITED STATES PATENT OFFICE

2,019,171

AUTOMATIC FEED FOR LENS GRINDING AND POLISHING COMPOUNDS

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7 Claims. (Cl. 51—263)

This invention relates to lens grinding or polishing machines and more particularly to automatic means for supplying such machines with a suitable liquid grinding compound, usually a water carrier containing emery or rouge in suspension. Compounds of the character indicated must be maintained in fairly constant agitation to prevent the settling of the emery or rouge. Also in the feeding of rouge, in particular, it is desirable that although sufficient rouge shall be fed to maintain a constant film between the polishing block and the lap on which the lens is being worked, an excess flow results in a waste of material. Heretofore, various means have been provided for the automatic feeding of polishing or grinding compounds to machines used for spherical lenses, usually by feeding the compound in great excess over what is actually needed, and efforts have been made to feed the compound by automatic means to machines operating on cylindrical lenses, but as far as I am aware no means has been provided for the automatic feeding of the compound in an efficient and economical manner.

The present invention, therefore, has for its primary object the provision of automatic means for the feeding of polishing or grinding compound for both spherical and cylindrical lens grinding machines, in such a manner that the rate of flow and hence volume of the feed is always under the control of the operator of the machine, and the compound is prevented from settling through a constant or an intermittent circulation of the fluid from a container to the point of service and back to the container.

A further object of the invention is to provide apparatus for the feeding of polishing or grinding compound under pressure, to overcome the tendency of the compound to settle and to clog the tubes or conduits and feed openings, means being provided for controlling said pressure to regulate the volume of delivery on the face of the lap on which the lens is being worked.

With the general objects named, in view, and others as will hereinafter appear, the invention consists in certain novel and useful features of construction and organization of parts as hereinafter described and claimed; and in order that it may be fully understood, reference is to be had to the accompanying drawings, in which:—

Figure 1 is a fragmental front view of a cylinder grinding or polishing machine of common and well known type, equipped with one embodiment of the automatic feed of the invention which provides for a constant flow of grinding or polishing compound from and back to the container.

Figure 2 is a top plan view of the construction shown in Figure 1.

Figure 3 is a top plan view of a different type of common and well known cylinder grinding or polishing machine equipped with a slightly different embodiment of the automatic feed of the invention, in which there is an intermittent flow of compound from and back to the container.

Figure 4 is a rear elevation of the construction shown in Figure 3, but also showing a portion of the upper driving arbor for rotation of the block; the compound container and pump being broken away to expose the lens block and lap.

Figure 5 is a fragmental vertical section through the type of pump shown in Figures 3 and 4.

Figure 6 is a perspective view of the driving head of the pump shown in Figure 5.

Figure 7 is a fragmental section through the container to show the return flow nozzle whose jet maintains the liquid in agitation.

In Figures 1 and 2 of the drawings, 1 is a casing or housing provided with a pair of forwardly projecting tables or supports 2, on which non-rotatable laps 3 are removably secured. The laps provide polishing or grinding surfaces over which lenses 4, removably secured to lens blocks 5, are adapted to be rubbed by means of movement imparted to the blocks by operating mechanism 6. In the polishing or grinding operation, it is essential that a film of compound, such as emery or rouge, shall be maintained between the face of the lens and the face of the lap. To provide a supply of compound in an economical manner, each lap is formed with a through passageway 7, each of said passageways having extensions 8 for connection to rubber or other suitable tubes or conduits hereinafter mentioned. The passageway through the lap may be in a straight line, as shown, or may be formed with two branches arranged at an angle to each other, if desired. Connected to said through passageway and having a discharge opening through the operating face of the lap is a branch passageway or feeding opening 9, or a plurality of such feed openings may be made if found desirable, and, by preference, said feed openings are so located on the face of the lap, that the lens being worked is always in position to entirely or partially obstruct said opening or openings.

In order to maintain a constant supply of rouge or emery to the face of the lap, the following mechanism may be provided: To provide a

self-contained unit, the liquid supply container and pump may be assembled directly on the grinding or polishing machine, although they may be entirely independent thereof. In the form of apparatus illustrated, the liquid container 10 and a rotary pump 11 are individually mounted on the top 12 of the casing 1, it being understood that the character of the container and its size and shape and the character of the pump which may be rotary, reciprocatory, or otherwise, are subjected to no limitations, except that the container should be large enough to supply grinding compound for a reasonably long period of continuous operation of the machine, and the pump must be capable of creating the maximum pressure in the feed lines which may be required in the lens grinding operation, as will hereinafter more particularly appear. In the present embodiment of the invention, the pump 11 is driven by means of a belt 13, extending through openings in the top 12 of the container 1 and encircling a pulley 14 placed on the shaft 15 and rigidly connected to the yoke 16 of the worm gear 17. The operating mechanism of the grinding or polishing machine is not further detailed as it forms no part of the present invention. It is, of course, to be understood that the pump may be driven in any other suitable manner as by a separate motor or prime mover.

The container 10 is provided with a by-pass conduit or tube leading from and returning to the container, as follows: An outlet tube or conduit 18, controlled by a pet cock or valve 19 extends to the intake of the pump 11, and from the outlet of said pump, a conduit or tube 20 is connected to one of the tubes 8 of the lap passageway 7 in one of the laps 3. If both laps are in service on the machine, the other tube 8 of the first lap is connected by a short flexible conduit or tube 21 to the proximate tube 8 of the second lap 3, and the remaining tube 8 of said second lap is connected by a tube 22 back to the liquid container 10. The tube 22 is also controlled by a valve or pet cock 23. When the two valves are open and the machine is in operation, it is apparent that the liquid in the container is pumped through the laps, and that a certain amount of said liquid will be forced out through the feed opening 9 onto the faces of the laps to constantly supply grinding or polishing compound thereto.

To maintain the liquid in agitation within the container to avoid settling of the emery or rouge, and to avoid the necessity of using a special agitator, it has been found desirable to have the return conduit or tube 22 terminate within the container in a nozzle 24, (Figure 7), which discharges downwardly against the bottom of the container. The jet from the nozzle maintains the entire body of liquid in constant agitation and circulation.

The volume of liquid discharged onto the operating surface of the lap 3 may be controlled by manipulation of the valve 23. An increase or decrease in the resistance imposed to the return of liquid to the container, results in increasing or diminishing the pressure within the conduit to increase or diminish the quantity of liquid discharged through opening 9 onto the face of the lap under the lens being worked. It will be found, in practice, that the liquid flow may be most efficiently controlled by regulation of said valve 23. Although, in the present embodiment of the invention, the ordinary pet cock is shown it is to be understood that a needle valve or any other suitable valve may be employed for the purpose mentioned. When the machine is not in service the two valves may be closed to prevent leakage of liquid if there is a tendency to leak at the joints in the tubing. The valves will also be closed when the tubing or pump are disconnected for cleaning or the like.

In Figures 3, 4, 5 and 6, a different type of grinding and polishing machine is illustrated, where there is a non-rotatable table or support 25 on which a dished plate 26 is detachably mounted by means of lugs 27 and set screws 28. The plate 26 is provided with a series of upstanding cams of ratchet shape as at 29, for a purpose which will hereinafter appear. Rotatably projecting through the table is a shaft 30 which, above the table, carries a rotating driving head 31 on which is removably mounted, a lap 32, provided with a through passageway 33 and a liquid discharge branch passageway opening through the operating face of the lap 32 as heretofore described.

In the type of machine here shown the head 31 and the lap 32 are relatively slowly turned and the lens 35 is held down on the lap by means of an eccentric arbor 36 in engagement with the lens block 37. The arbor is relatively rapidly rotated by shaft 38, and inasmuch as the block 37 has a pair of arms 39 loosely received within a pair of forks 40 rockingly mounted on and turned with the head 31, the result of the combined motions is to impart to the lens a continuous helical motion over the surface of the lap.

As stated, in the present machine, the lap 32 is rotated as distinguished from the machine shown in Figures 1 and 2, and to provide a force feed means for the polishing compound, a strap 41 is secured to the head 31, and said strap, at its upper end, carries a liquid supply container 42. Mounted within the container, for convenience, is a reciprocatory or plunger pump, which may be made as follows: A pump cylinder 43 is mounted in one end of the container, and said cylinder has an inlet opening 44 closed against outward movement of liquid by a disk valve 45, and said pump has an outlet opening 46 closed against inflow of liquid by a disk valve 47. Mounted to reciprocate in the pump cylinder is a piston 48 provided at its upper end with a headed reduced neck 49 to receive a fork 50 which is carried by the upper end of an operating rod 51 extending downwardly through a guide sleeve 52 in the container, and provided at its lower end with a roller 53 which is adapted to ride over the cams or ratchet teeth 29.

Inserted between the roller 53 and the bottom of the container, is an expansion spring 54. With the construction described and illustrated, it will be apparent that as the roller 53 rides up the inclined plane of one of the ratchet teeth 29, the plunger 48 will be raised and the pump cylinder 43 will be filled with liquid. When the roller drops off the end of the ratchet tooth, the pump plunger 48 will be forced downwardly by the action of the spring 54 to discharge through the discharge opening. The pump is, therefore, intermittently operated.

As in the other embodiment of the invention, the pump outlet is connected by a tube 55 to one end of the lap passageway, and the other end of said passageway is connected by a tube 56 to a shut off and control valve 57 carried at the inlet side of the container. The return liquid supply to the container also terminates in a discharge nozzle as shown in Figure 7, for main-

taining the liquid in the container in an agitated condition.

The operation of the valve 57 is the same as described in connection with the corresponding control valve of Figures 1 and 2. It will be noted that in this embodiment of the invention the liquid is intermittently fed through the feeding tubes, but otherwise it is the same as that heretofore described.

From the above description it is apparent that I have produced a construction embodying all of the features of advantage set forth as desirable, and while I have described the preferred embodiments, it is to be understood that I reserve the right to all changes within the spirit and scope of the appended claims.

I claim:—

1. The combination with a lens grinding or polishing machine, of a lap and block arranged for cooperative action, said lap being formed with a passageway leading through the lap and having a branch passageway opening through the operating face of the lap and connected to said through passageway, a liquid container, and pressure means associated with said liquid container for delivering liquid therefrom under pressure to one end of said through passageway in the lap, and a connection from the other end of the passageway back to the container.

2. The combination with a lens grinding or polishing machine, of a lap and block arranged for cooperative action, a liquid container, a conduit having its opposite ends communicating with the liquid container, a branch passage from the conduit to feed liquid between the lap and block, means for feeding liquid under pressure from the container through said conduit, and controllable means for obstructing the return of the liquid to the container to vary the pressure imposed on the liquid flowing through the branch passage.

3. The combination in a lens grinding machine having a stationary table, a rotary head above the table, a lap carried by said head, a lens block for cooperation with the lap, said lap being provided with a through passageway having a branch opening onto the operating face of the lap, a liquid container for rotating with the head, conduits connected to the opposite ends of the through passageway in the lap and leading to the container, a pump for forcing liquid to circulate in one direction through said conduits, and means associated with the fixed table and pump for driving the latter upon rotation of the rotary head.

4. The combination in a lens grinding machine having a stationary table, a series of inclined planes on said table, a rotary head above the table, a lap carried by said head, a lens block for cooperation with the lap, a liquid polishing container for rotating with said head, a conduit for delivering liquid from said container to the operating face of the lap, a pump for forcing fluid through said conduit, and means associated with the fixed table and pump and operative by said inclined plates for operating the pump upon the rotation of the rotary head.

5. In a lens grinding or polishing machine, a lap and block arranged for cooperative action, said lap being formed with a passageway leading through the lap and having a branch passageway opening through the operating face of the lap and connected to said through passageway, a liquid container, and pressure means associated with said liquid container for delivering liquid therefrom under pressure to one end of said through passageway in the lap.

6. In a lens grinding or polishing machine, a lap and block arranged for cooperative action, said lap being formed with a passageway leading through the lap and having a branch passageway opening through the operating face of the lap and connected to said through passageway, a liquid container, pressure means associated with said liquid container for delivering liquid therefrom under pressure to one end of said through passageway in the lap, and means for adjustably restricting the flow of liquid at the other end of said through passageway.

7. The combination in a lens grinding machine having a rotary head, a fixed table, a lap carried by said head, a liquid container rotating with said head, a conduit carried by the rotating container for feeding liquid to the lap, and means associated with the fixed table and rotating container to forcibly expel liquid through said conduit.

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