

April 14, 1931.

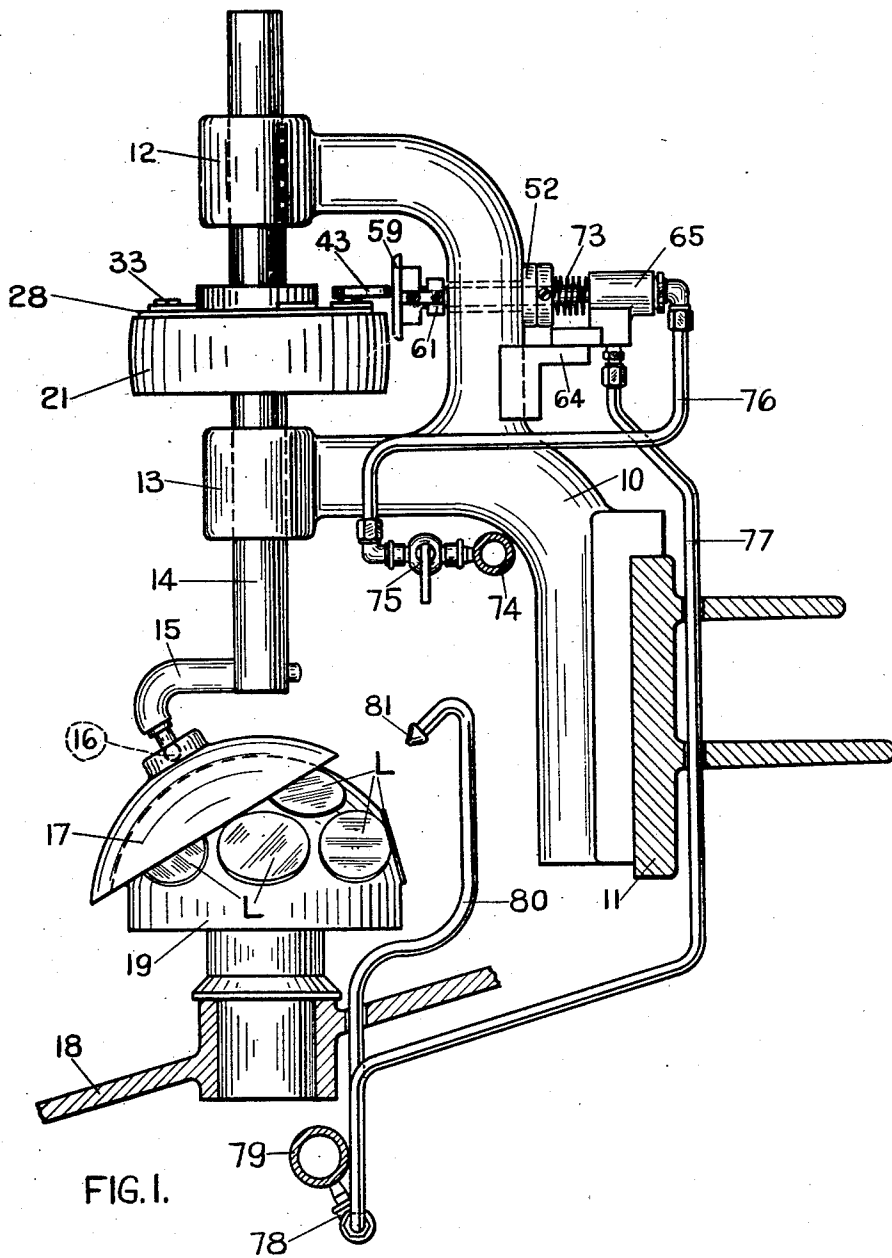
E. M. MORRIS

1,800,743

POLISHING AND GRINDING MACHINE

Filed Feb. 9, 1929

3 Sheets-Sheet 1



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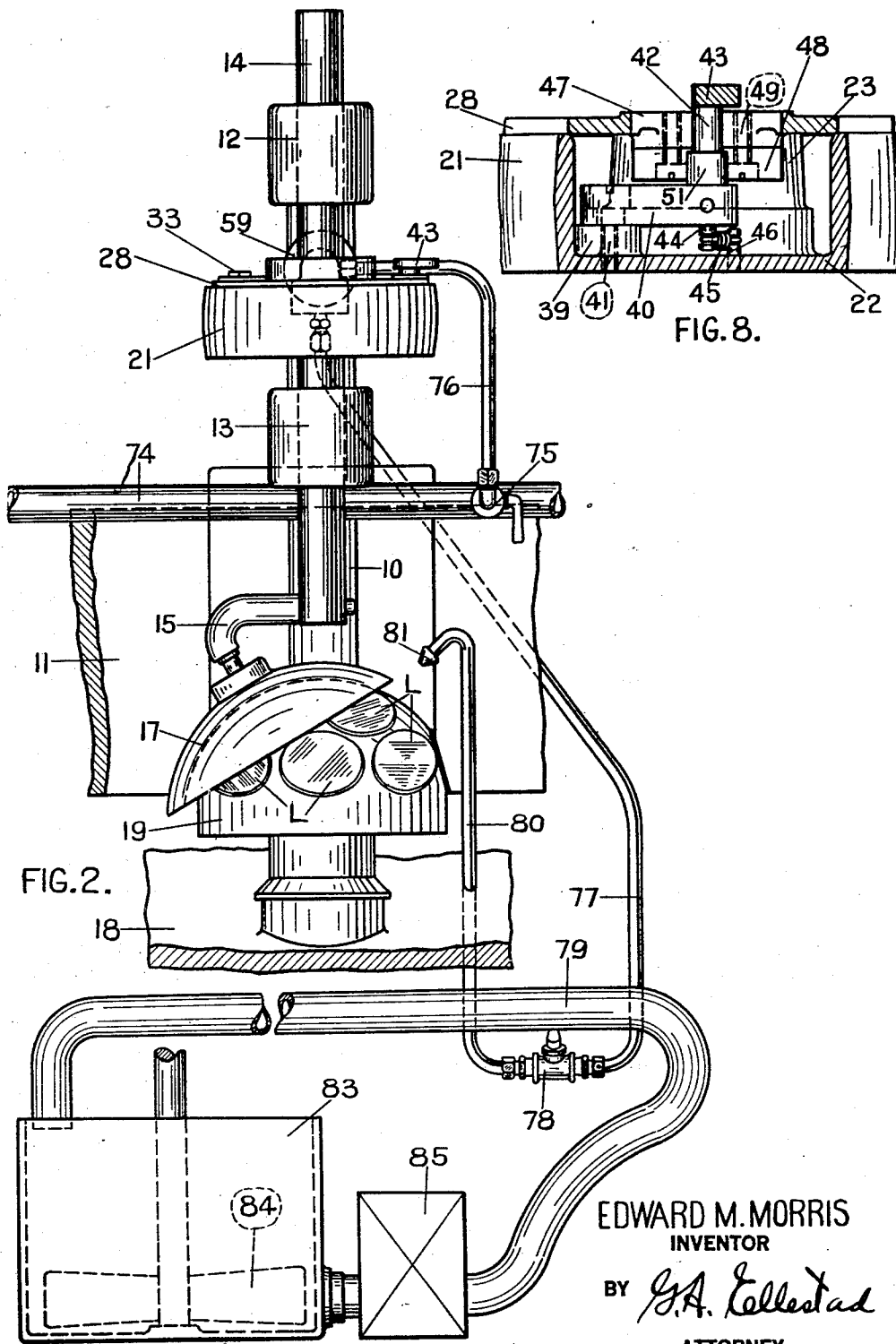
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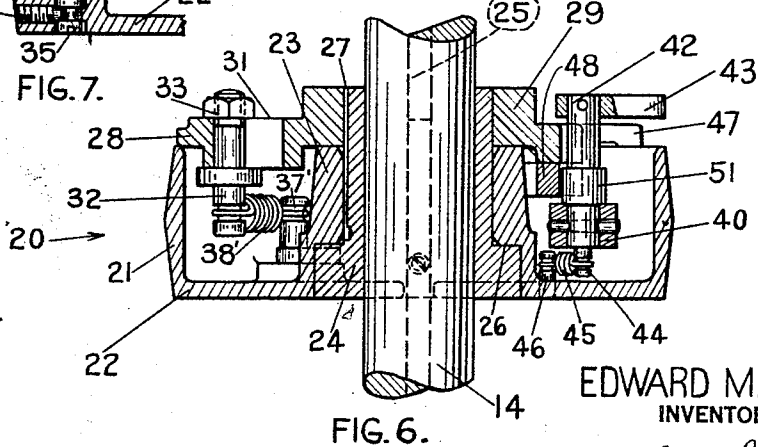
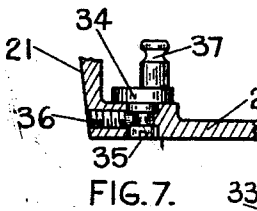
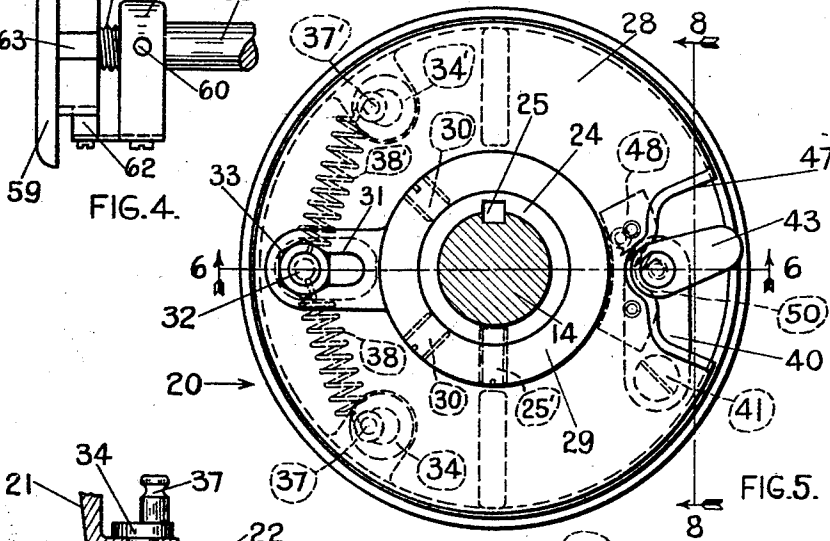
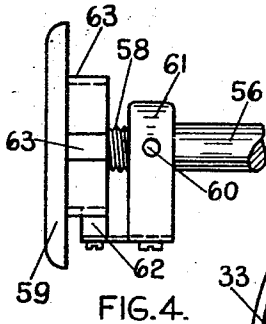
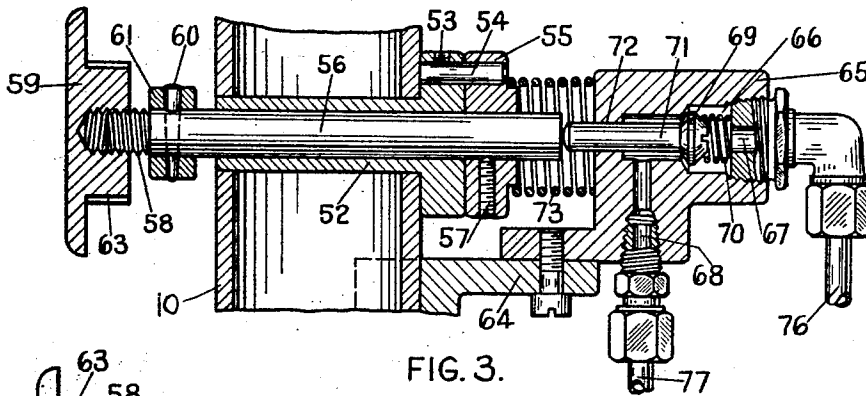
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POLISHING AND GRINDING MACHINE

Filed Feb. 9, 1929

3 Sheets-Sheet 3



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POLISHING AND GRINDING MACHINE

Application filed February 9, 1929. Serial No. 338,762.

This invention relates to abrading machinery and more particularly it has reference to apparatus for grinding and polishing glass, such as lenses, for example.

5 In polishing lenses, an abrasive, such as rouge, is usually mixed with water and applied to the work at proper intervals by the operator. The application of this mixture of rouge and water has a lubricating effect and, of course, tends to reduce the friction between the polishing shell and the work. As the movement of the polishing shell continues, the friction between it and the work gradually increases as the abrasive mixture 10 evaporates and becomes exhausted. It is important that a fresh application of the abrasive mixture be made at the proper time so as to avoid excessive friction and resulting high temperatures and other conditions 15 which would be detrimental to the lenses or objects which are being polished. On the other hand, it is also important that a certain amount of friction should exist between the polishing shell and the work in order that the polishing operation will be efficiently accomplished. In polishing lenses, for example, on a large scale, it is customary for one operator to attend to a large number of polishing units and make periodical applications of rouge and water. Such a procedure makes it impossible, from a practical standpoint, to supply each polishing unit with an application of rouge and water at the proper time in order to insure the most 25 efficient operation.

Likewise, in the grinding of lenses, an abrasive such as emery and water is applied periodically to the work and it is also important that the abrasive be applied at the proper time in order to insure the desired results and efficiency in operation. Under the prevailing practice the grinding abrasive, such as emery and water, is also applied to the abrading tool by the operator who must attend to a large number of grinding units, thereby making it practically impossible to apply the abrasive so as to insure the greatest grinding efficiency for each individual 35 unit.

By means of my invention, however, I am able to overcome the difficulties due to improper applications of abrasive and provide means for controlling and applying the abrasive so as to insure the greatest efficiency of operation, as will hereinafter be more fully described. 55

One of the objects of the present invention is to provide means for automatically controlling the application of an abrasive to the work which is being abraded. Another object is to provide frictionally controlled means for applying an abrasive to an abrading tool. Still another object of the present invention is to provide fluid pressure means for periodically applying an abrasive substance to the tool, and a further object is to provide abrasive applying means which will utilize fluid pressure and be controlled by the friction between the abrading tool and 60 the work.

These and other objects reside in certain novel features of construction, arrangement and combination of parts as will hereinafter be more fully described and pointed out in 65 the appended claims.

Referring to the drawings:

Fig. 1 shows a side elevation of a polishing unit embodying my invention.

Fig. 2 shows a front elevation of the unit 70 with the abrasive circulating system shown schematically.

Fig. 3 is an enlarged vertical sectional view of the air valve.

Fig. 4 shows an enlarged view of a detail. 75

Fig. 5 shows a top plan view of the pulley assembly.

Fig. 6 shows a sectional view of the pulley assembly taken on line 6—6.

Fig. 7 shows a detail. 80

Fig. 8 is a sectional view of the pulley assembly taken on the line 8—8 and showing parts in elevation.

One embodiment of my invention is illustrated in the drawings as adapted to a lens 85 polishing unit which comprises a bracket 10 which is mounted on the horizontal frame member 11. The bracket 10 carries two aligned bearings 12 and 13 in which the spindle 14 is freely mounted for rotation and 90

axial movement. Rigidly secured to the lower end of the spindle 14 is the crank arm 15 terminating in a spherical shaped portion 16 which cooperates with a bearing recess in the top of polishing shell 17 to afford a universal movement for the shell 17. Removably secured to the shelf 18 is the work holder or block 19 which carries the work or objects such as lenses L which are secured thereto by pitch or other suitable means. The concave side of the polishing shell 17 carries a suitable polishing pad, such as felt impregnated with a wax mixture, for example, which polishes the lenses L when the spindle 14 is rotated, all as will be apparent to one skilled in the art.

Mounted on the spindle 14, between the bearings 12 and 13, is the pulley assembly which is indicated generally by 20. The pulley assembly 20 comprises the pulley shell 21 which has, integral therewith, a floor plate 22 which carries an internal hub 23, the whole preferably being formed of a single casting. Disposed within the hub 23 is a bushing 24 which is fixedly secured to spindle 14 by means of a key 25 and set screw 25'. A shoulder on the hub 23 bears on a shoulder 26 on the bushing 24 so that the pulley 21 is supported by and freely rotatable about the bushing 24, lubrication being afforded by the oil groove 27.

Mounted on top of pulley shell 21 is the cover plate 28 which has a centrally disposed collar 29 integral therewith. Set screws 30, mounted in the collar 29, serve to fixedly secure the cover plate 28 to the bushing 24. The cover plate 28 is provided with a slot 31 in which a downwardly projecting pin 32 is adjustably mounted and adapted to be held in adjusted position by means of the nut 33. Mounted in the floor plate 22 are the rotatable members 34 and 34' which may be turned by applying a screw driver to the slotted head 35 on the under side of the floor plate 22 and secured in adjusted position by means of the set screw 36, as clearly shown in Fig. 7. The upstanding pins 37 and 37' are mounted, respectively, on the rotatable members 34 and 34' with the axes of the pins eccentric to the axes of the rotatable members. One end of each of the two coil springs 38 and 38' is secured to the pin 32 which projects downwardly from cover plate 28 and the other ends of springs 38 and 38' are secured, respectively, to the upstanding pins 37 and 37' which are mounted on the floor plate 22.

Integral with the floor plate 22 is the boss 39 on which the lever 40 is pivotally mounted by means of screw 41. Fixedly secured to the lever 40 is the post 42 which has the trip lever 43 rigidly secured to its upper end. The lower end of post 42 terminates in a downwardly projecting pin 44 to which is fastened one end of the coil spring 45, the

other end of the spring being fastened to the pin 46 which is mounted on the floor plate 22. The cover plate 28 is provided with an opening 47 so that the post 42 may extend there-through and be permitted to move laterally, as will hereinafter be described. A cam member 48 is secured, by means of screws 49, to the under side of cover plate 28 adjacent the opening 47. The cam member 48, which is preferably of steel, has a notch 50 formed therein and spring 45 normally keeps the portion 51 of the post 42 in the notch of the cam member. From the foregoing it will be apparent that the pulley shell 21 and the cover plate 28 may be angularly moved a certain amount relative to each other. When such a relative movement occurs, the post 42, carrying trip lever 43, is cammed outwardly toward the periphery of the pulley by means of the cam member 48, as will hereinafter be more fully explained.

Mounted on bracket 10 is the air valve whose structure is shown in detail in Figs. 3 and 4. This structure comprises a long bushing 52 which is rigidly mounted in an opening drilled in the bracket 10. Fixedly secured to the bushing 52, by means of screw 53, is the pin 54 which slidably engages an opening in the collar 55. The plunger 56 is slidably mounted in the bushing 52 and the collar 55 is fixed to the plunger 56 by a screw 57 whereby the plunger may slide freely within bushing 52 but will be prevented from rotating therein. One end of the plunger 56 is threaded as at 58 to receive the plate 59. Fixed to the plunger 56, by means of pin 60, is the block 61 which carries the spring mounted detent 62 which cooperates with the spaced notches 63 on the plate 59 to hold it in adjusted position. It will thus be apparent that the effective length of plunger 56 may be increased or decreased by turning the plate 59 on the threaded end of the plunger, the spring detent serving to hold the plate in adjusted position.

Secured to the casting 10 by means of bracket 64 is the block 65 which is bored out to provide a chamber 66 with a communicating inlet opening 67 and outlet opening 68. Mounted within the chamber 66, on a ground seat, is the valve member 69 which is normally held seated by the spring 70. The valve member 69 has a stem 71 which is slidably mounted in the opening 72 in block 65 and projects outwardly therefrom with its end in contact with the plunger 56. A coil spring 73 serves to keep the collar 55, attached to plunger 56, normally in contact with the bushing 52 so that the valve stem 71 just contacts with the plunger 56 when the valve member 69 is seated.

Compressed air is conducted from an air supply pipe 74 through a suitable valve 75 and thence through the tubing 76 to the inlet opening 67 in the block 65. The outlet

opening 68 in the block 65 is connected by suitable tubing 77 to one end of the T coupling 78 which has its lateral arm in communication with the abrasive supply pipe 79, the T coupling 78 being attached to the under side of pipe 79 at an angle to the vertical, as clearly shown in Fig. 1. The other end of the T coupling 78 is connected to a suitable tubing 80 which terminates in the nozzle 81 that is positioned adjacent the work holder so as to direct the abrasive onto the work, such as the lenses L, as will hereinafter be described. The abrasive substance, such as rouge and water, for example, is contained in the reservoir 83 which is provided with an agitator 84, driven by any suitable means, for keeping the rouge and water properly stirred so the rouge will not settle to the bottom of the reservoir. The rouge and water mixture is circulated through the supply pipe 79 by means of a suitable pump indicated at 85. Compressed air is supplied to the air line 74 by any suitable compressor.

In operation of my device, power is applied to the pulley 21 by means of a belt driven by any suitable source. The power is transmitted from the pulley 21 through the springs 38 and 38' to the cover plate 28 which is secured to the bushing 24 and thence to the spindle 14 which is fixedly secured to the bushing 24. The lenses L are preferably moistened before the block 19 is placed on the machine, after which the power is applied to pulley 21 and the air valve 75 is opened.

As the shell 17 moves over the lenses L, the friction between the polishing pad, secured to shell 17, and the lenses gradually increases in amount. When the frictional drag reaches a substantially predetermined point, the cover plate 28 is caused to turn slightly relative to the pulley shell 21. By this relative movement the post 42 is cammed outwardly by the cam member 48 so that the trip lever 43 strikes the plate 59 and unseats the valve member 69 thereby permitting a blast of air to pass from the tubing 76 into the tubing 77. As the rouge and water mixture circulates through the supply pipe 79, some of the mixture fills in the T coupling 78 so that when a blast of air enters tubing 77 it forcibly blows the rouge mixture out of the T into the tubing 80 and out the nozzle 81 and onto the lenses L.

As soon as sufficient rouge is applied to the lenses the friction between them and the shell 17 is reduced so that the pulley shell 21 and cover plate 28 return substantially to their normal position relative to each other, with the spring 45 tending to urge the post 42 into the deep notch of cam member 48. The polishing then continues with the friction gradually increasing as the rouge dries off until the predetermined point is reached, whereupon the cover plate 28 moves slightly relative

to the pulley shell 21, the post 42 is cammed outwardly and the trip lever 43 strikes the plate 59 to trip the air valve and send another charge of rouge out of nozzle 81 and onto the lenses L. The operation thus repeats itself so that the lenses are automatically supplied with rouge at required operative intervals until the polishing is completed.

It is obvious that the tension of the springs 38 and 38' will determine the amount of frictional drag which must be produced before the air valve 69 will be tripped to make an application of rouge. Hence, by adjusting the tension in springs 38 and 38', I am able to set a fixed time in the polishing operation for the application of rouge. The tension of springs 38 and 38' may be adjusted by locating the pin 32 at various positions in the slot 31 and also by loosening set screws 36 and turning the members 34 and 34' which carry the eccentrically mounted pins 37 and 37' respectively.

The time for the application of rouge can also be adjusted by turning plate 59 on the threaded end of plunger 56 to vary the effective length of the plunger. Thus if the effective length of the plunger 56 is shortened, a greater amount of friction will be necessary in order to cam the trip lever outwardly far enough to contact with plate 59 to trip the valve. If the effective length of plunger 56 is lengthened, less friction will be required to trip the valve. Since the polishing shell operates most effectively when the rouge has become partially dry, it is important that the rouge be applied at the proper time in order to obtain the greatest efficiency. If the rouge is applied too soon the efficacy of the polisher is diminished while if the rouge is not applied soon enough the lenses may be injured by excessive heat and friction.

The crank 15 and the trip lever 43 are so located with respect to each other that the polishing shell 17 is on the side of the block 19 that is remote from nozzle 81 when the trip lever 43 contacts with plate 59 so that the rouge is ejected from the nozzle 81 onto the uncovered lenses L and not on top of the polishing shell 17. When a blast of air passes through the tubing 77 and into the T coupling 78, the latter is thoroughly cleaned out so that rouge will not accumulate and clog the coupling. The sharp blast of air passing through the T coupling produces a violent action in the side nipple of the T which serves to agitate the water and rouge mixture in pipe 79. I have found it preferable to have the rouge and water mixture circulating through pipe 79 so that the pipe is about half full.

Although I have shown my invention as applied to the polishing of convex lens surfaces, it is obvious that the device will function equally well in polishing concave and plano lens surfaces. The tubing 80 is preferably a metal tubing which can be easily

bent so that the nozzle 81 may be located in any desired position. It is to be understood that my invention may be applied to the abrading operations of either grinding or
 5 polishing and that various abrasive substances such as rouge, emery, corundum and the like may be automatically applied to the abrading tool by my invention.

From the foregoing it will be apparent
 10 that I am able to attain the objects of my invention and provide a means for automatically applying an abrasive to the abrading tool so as to obtain the greatest efficiency of operation. In a practical application of
 15 my invention on a large scale, a plurality of units would be arranged side by side and each would be supplied with compressed air and the abrasive substance from common air and abrasive pipe lines. Since the abrasive
 20 is applied to the abrading tool at the proper time, the work, such as lenses, are polished in a minimum time. A single operator will also be able to attend to a large number of my automatic units. It is obvious that
 25 various modifications may be made without departing from the spirit of the invention as pointed out in the appended claims.

I claim:

1. In an abrading machine, the combination
 30 of a rotatable spindle carrying an abrading tool, a plate fixedly secured to said spindle, a pulley carried by the spindle, coil springs connecting said pulley to said plate whereby
 35 said pulley may move relative to said plate, means for adjusting the tension of said springs, a cam on said plate, a movable post on said pulley adapted to contact with said cam whereby the post is moved by the rela-
 tive movement of said pulley and plate.

2. In an abrading machine, the combina-
 40 tion of means for applying an abradant, valve means for controlling said applying means, a rotatable spindle carrying an abrading tool, a plate secured to said spindle, a
 45 pulley yieldably connected with said plate so that the pulley and plate are relatively movable, a trip lever carried by said pulley and means whereby the relative movement
 50 between the plate and pulley will move said trip lever to operate said valve means.

3. In an abrading machine, the combina-
 tion of fluid pressure means for applying an abradant, a valve for controlling said means,
 55 a rotatable spindle carrying an abrading tool, a plate secured to said spindle, a cam on said plate, a pulley connected to said plate by coil springs whereby said plate and pulley may be moved relative to each other,
 60 a movable post on said pulley adapted to contact with said cam, a trip lever on said post adapted to contact with said valve when the post is moved by the relative movement of
 said plate and pulley.

4. An abrading machine comprising a
 65 holder for the work, a movable spindle carry-

ing an abrading tool, a member fixedly se-
 cured to said spindle, a pulley connected by
 yieldable means to said member whereby the
 frictional contact between the work and said
 tool will cause a relative movement between
 70 said pulley and said member, means for ap-
 plying an abradant to the work and means
 actuated by said movement for controlling
 said abradant supplying means.

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