April 10, 1934. J. G. PARTLOW 1,954,489

POLISHER

Filed March 30, 1931 3 Sheets-Sheet 1

FIG. 1

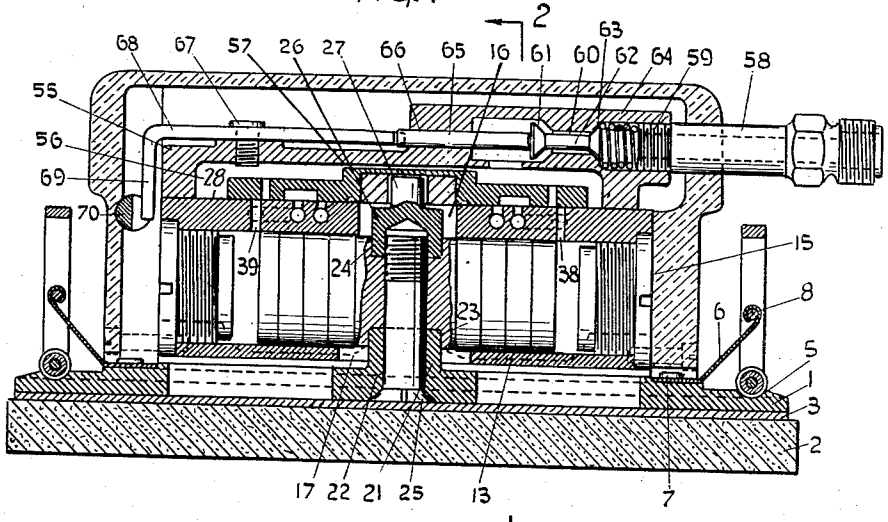


FIG. 3

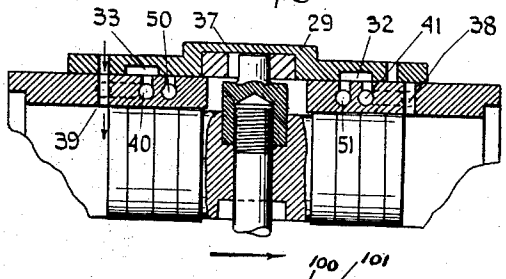


FIG. 4

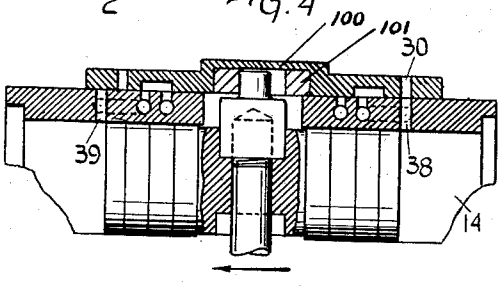
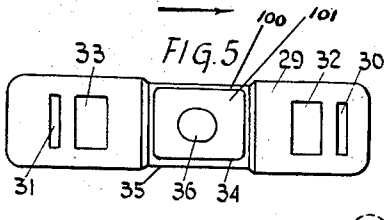


FIG. 5



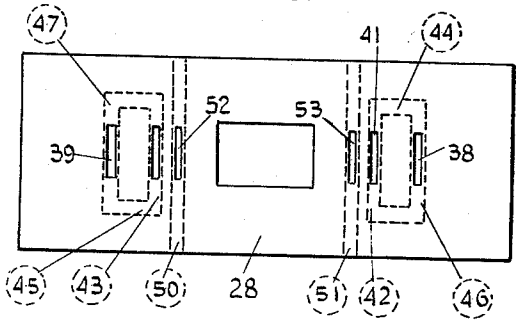


FIG. 6

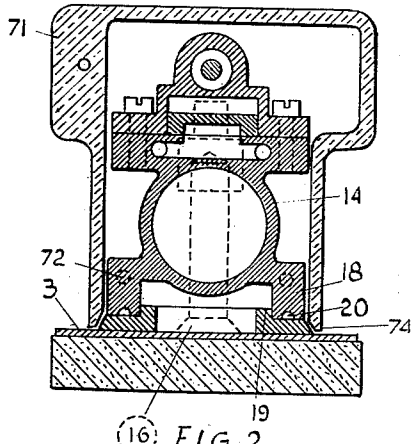


FIG. 2

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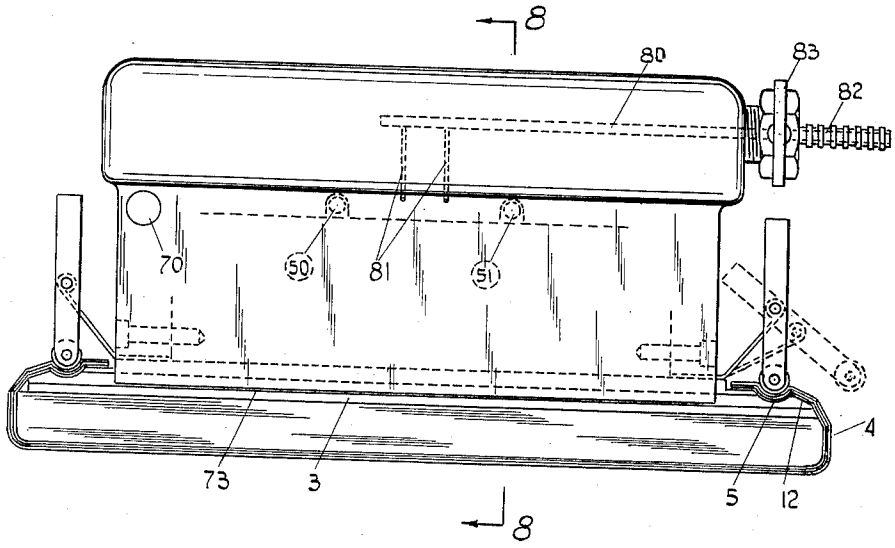


FIG. 7

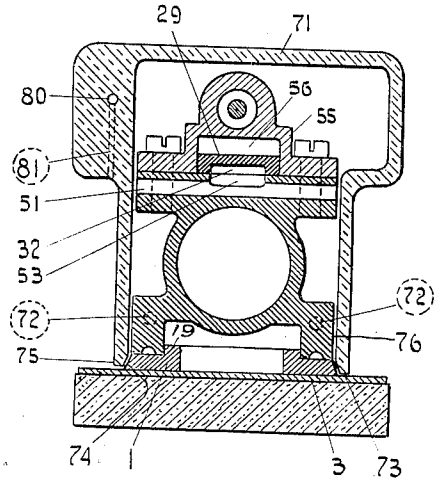


FIG. 8

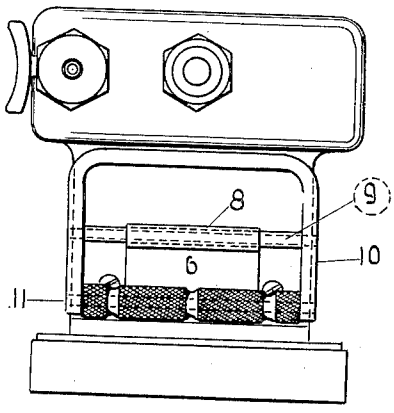


FIG. 9

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POLISHER

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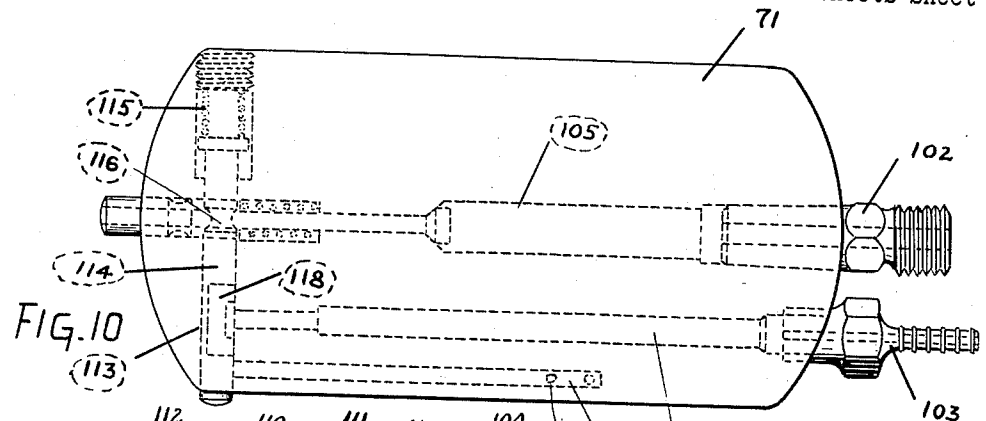


FIG. 10

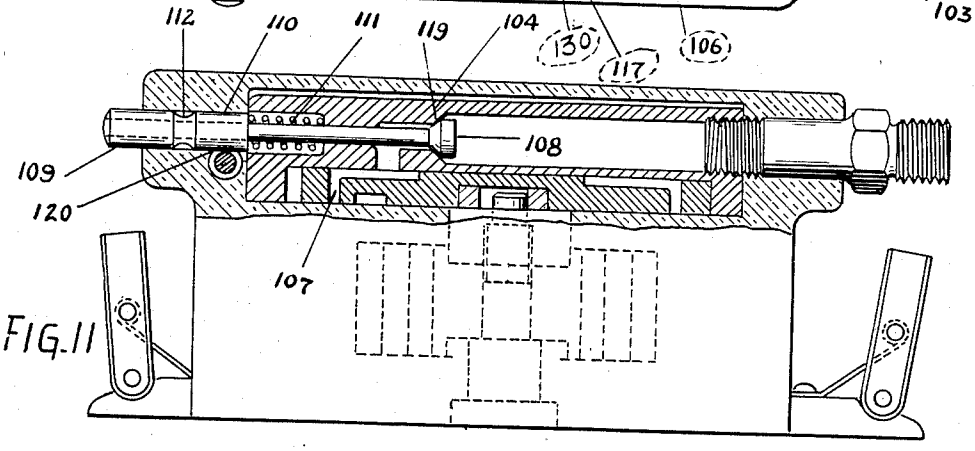


FIG. 11

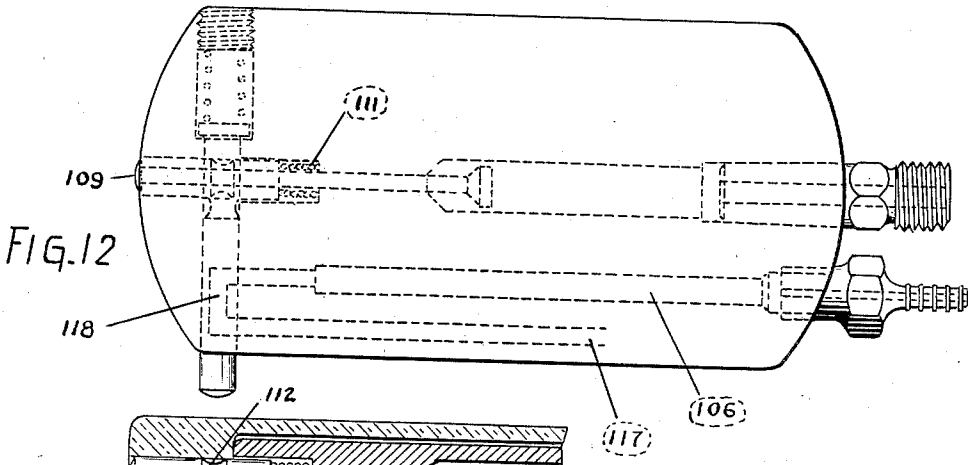


FIG. 12

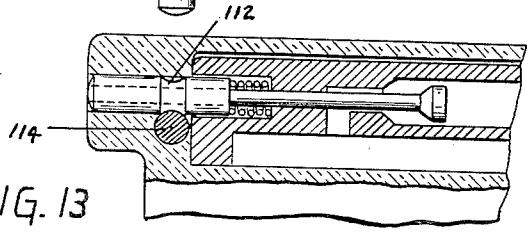


FIG. 13

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1,954,489

UNITED STATES PATENT OFFICE

1,954,489

POLISHER

John G. Partlow, Grand Ledge, Mich., assignor of one-half to Roy G. Michell, Detroit, Mich.

Application March 30, 1931, Serial No. 526,359

7 Claims. (Cl. 121—3)

This invention relates to a polisher of the reciprocating type.

In the polishing and wet sanding field, and particularly in the polishing of the finish on vehicle bodies, it has long been a desire to obtain a polishing machine that is light of weight, that will not scratch the finish, and which will have a minimum vibration. It is the object of this invention to produce a pneumatic polishing machine consisting of a minimum of parts which is readily assembled, light of weight, substantially free from undesirable vibration, and which will not scratch the finish.

Since, from the very nature of the work for which such a machine is constructed, it must operate in the presence of dust and grit, obviously if any dust or grit gets between the parts having a relative sliding engagement, the wear will be excessive and soon render the machine inoperative. Hence, it is a further object of this invention to produce a pneumatic polishing machine in which a fluid blast is utilized to prevent dust, grit and other foreign matter from getting between the sliding parts of the machine.

It is a further object of this invention to produce a novel means for securing the web of abrasive to the reciprocating pad support.

In the drawings:

Fig. 1 is a longitudinal section through the assembled polishing machine.

Fig. 2 is a section along the line 2—2 of Fig. 1.

Fig. 3 is a detail showing the position of the valve relative to one position of the piston.

Fig. 4 is a detail similar to Fig. 3 showing the valve relative to another position of the piston.

Fig. 5 is a detail of the valve slide.

Fig. 6 is a detail of the valve guide portion of the cylinder.

Fig. 7 is a side elevation of the motor.

Fig. 8 is a section along the line 8—8 of Fig. 7.

Fig. 9 is an end elevation of the machine.

Fig. 10 shows a plan view of the polisher having a modified form of water and air control.

Fig. 11 is a fragmentary combination sectional and elevational view of the polisher shown in Fig. 10 with the air and water turned off.

Figs. 12 and 13 are views similar to Figs. 10 and 11 showing the water and air turned on.

Referring more particularly to the drawings, it will be seen that this polisher is pneumatically operated and of the reciprocating type. Since this polisher may be used in various operations such as polishing Duco or on wet sanding, a suitable reciprocating work supporting plate 1 is used. This plate is arranged to have removably secured thereto, in any suitable manner, a pad 2. As shown, the pad securing means comprises a thin plate 3 which has glued or otherwise secured thereto the pad 2 which is preferably of any resilient material such as sponge rubber. The plate 3 is secured in any suitable way to the plate 1. The pad 2, when the machine is used for sanding, is arranged to be faced with one or more webs of sand paper 4 or any other abrasive material.

The plate 1 is provided at each end with a transverse groove 5. A relatively stiff spring 6 has one end fixed to the plate 1 as at 7 and the other end provided with a knuckle 8 which receives the pintle 9. The pintle 9 has mounted thereon the U-shaped member 10 which has rotatably mounted between the ends thereof the knurled roller 11. As shown in Fig. 7 a plurality of plies of abrasive material 4 are mounted upon the work supporting pad, the ends of which are held tightly in the groove 5 by the knurled roller 11 and associated spring 6. The spring 6, in order to hold several plies of abrasive upon the pad at one time, must necessarily be relatively stiff. The knurled roller 11 permits the use of a relatively stiff spring because of the fact that it assists the operator materially in overcoming the tension of the spring when the fastening means are shifted from the released position shown in the dotted lines (Fig. 7) to the locked position shown in the full lines by its rolling action over the inclined face 12 of the support plate 1.

The reciprocatory plate 1 is arranged to be directly fixed to the piston 13 which operates in the cylinder 14. The cylinder 14 is provided at each end with a threaded plug 15 and at the top and bottom with the slots 16 and 17 respectively. The cylinder 14 is provided with a pair of longitudinal ribs 18 which slidably engage the upstanding rib 19 of the plate 1 to guide the same in its reciprocation. The ribs 18 are provided with longitudinal grooves which receive the lubricating felt 20. The plate 1 is provided with the square boss 21 which has a round opening 22 centrally thereof. The piston 13 is provided with similar square openings 23 and 24. The boss 21 of the plate 1 is arranged to have a very snug fit with the opening 23 in the cylinder 14 and held in this position by means of the threaded stud 25. The threaded end of the stud 25 is threaded into a hardened steel plug 26 arranged to have a snug fit in the opening 24 of the cylinder 14. This plug 26 has an upstanding stud 27 which serves to reciprocate the valve slide. In opera-

tion the main working thrust will be borne by the boss 21 and the plug 26 and owing to their snug, square interfit with the openings 23 and 24 will effectively resist any shearing strains of operation.

The upper surface 28 of the cylinder is flat and serves as a guide and sliding surface for the reciprocating valve 29. The valve 29 is of the flat plate type and has a lap fit with the guide surface 28. This lap fit is perfect at all times because the valve, as it reciprocates, continually wears or laps itself into a more perfect contact with the guide surface 28.

The valve 29 is provided with the intake ports 30 and 31 which extend through the valve. The underside of the valve is provided at opposite ends with the recesses 32 and 33 respectively which cooperate with the valve slide surface 28 to form a chamber. The central portion 34 is somewhat narrower as at 35 than the end portions to permit passage of the air through the valve housing. The central portion 34 of the valve is provided with the recess 100 for the valve insert 101. The valve insert has an opening 36 for engagement with the stud 27. The opening 36 can be made any size desired to properly coordinate the valve structure with the piston structure. In other words, by altering the relative dimensions of the recess 36 and stud 27, lost play between the recess 36 and the stud 27 is increased or decreased to thereby change the length of the piston stroke. As shown, the valve 33 has a stroke of a suitable distance to cover the ports which in this instance is approximately $\frac{3}{16}$ of an inch whereas the piston stroke is slightly longer than the travel of the valve 29. Hence, a small clearance as at 37 (Fig. 3), is allowed between the sides of the recess 36 and the stud 27. The smaller this clearance 37 is made the nearer the stroke of the valve approaches that of the piston and vice versa. The stroke of the valve can be increased or decreased whenever it is desired by replacing the valve insert in the recess 100 of the valve with a different valve insert in which the opening 36 is of the proper size or diameter to get the desired stroke. In other words, the operator can have at hand a plurality of valve inserts 101 having various sized openings and whenever he desires to change the valve stroke he can merely remove the insert then in the valve recess 100 and replace the same with another valve insert having an appropriately sized opening 36.

The valve guide surface 28 of the cylinder member has the intake ports 38 and 39 which communicate with the inside of the cylinder 13. The valve guide surface likewise has the openings 40 and 41 extending from the guide surface 32 substantially half way through the valve guide where each communicate with the transverse openings 42 and 43 respectively. The openings 42 and 43 extend longitudinally as at 44 and 45 respectively (Fig. 6) where they again communicate with the transverse openings 46 and 47 which in turn communicate with the intake openings 38 and 39. The valve guide surface has bored therethrough the lateral openings 50 and 51 which communicate with the vertical openings 52 and 53 in the valve guide surface. The transverse openings 50 and 51 communicate with the openings 52 and 53 respectively to form the exhaust ports for the motor.

The valve 29 is arranged to have a lap fit with the valve guide surface 28 and is also arranged to be held against the guide surface by air pressure. Therefore, the valve is provided with a suitable housing 55 which cooperates with the guide surface to form the air chamber 56. The central portion 34 of the valve clears the valve housing as at 57. Compressed fluid, preferably air, is conducted through the air chamber through the air pressure line 58 which is attached to the valve housing by any suitable means such as the threads 59. The air line communicates with a suitable port 60 which in turn communicates with the chamber 56 as at 61. The port 60 is controlled by a spring pressed check valve 62 which is arranged to set against the valve seat 63 and is backed up by the coil spring 64. The check valve 62 is arranged to be operated by a plunger 65 which is slidably mounted in the opening 66 in the valve housing 55. The valve housing 55 has pivotally mounted thereon as at 67 the cam 68. The cam has a downwardly projecting finger 69 which is engaged on either side by the thumb slide 70. As the thumb slide 70 is pushed back and forth alternately, the cam action of the cam 68 against the end of the plunger 65 opens and closes the check valve 62 to in turn start and stop the pneumatic motor.

The motor is arranged to be enclosed by a casing 71, which in conjunction with the slide 1, completely encloses the motor. The casing 71 is secured to the motor at each end adjacent the bottom by the screws 72. Since it is very necessary to prevent the access of grit and dust to the slide surfaces, it is proposed to shield the guide surfaces against dust and grit by means of a fluid blast. Any suitable means may be utilized for providing this protective fluid blast. As here shown, it is proposed as a matter of convenience to use the exhaust blast from the exhaust ports 50 and 51. To this end the exhaust ports are enclosed by the casing 71, and the exhaust fluid permitted to escape as described below to serve an additional useful purpose. The bottom edges of the casing 71 have but a very small clearance, about .002 of an inch, with the plate 3 as at 73. The pad support member 1 is chamfered as at 74 and the inner face of the casing 71 is complementally chamfered along the lower edge as at 75. The casing 71 has a small clearance with the ribs 18 as at 76 and the chamfered faces 74 and 75 likewise have but a very small clearance, about .002 of an inch. Obviously, the showing of these clearances is exaggerated for clearness.

Hence, during operation the air from the exhaust ports 50 and 51 is prevented from escaping in every direction by the casing 71 except through the clearances 76 and 73 between the casing 71 and the ribs 72 and the slide member 1. This downward and outwardly directed blast of air not only prevents the access of dust to the sliding surfaces but also drives out any dust that might collect adjacent the driving surfaces when the machine is inoperative. A further advantage of this exhaust arrangement is that it provides a means for lubricating the motor and slide surfaces. For instance, the air hose can be disconnected and oil shot into the air line nozzle 58. The air hose again being connected and the valve 60 opened, the oil is shot into the cylinder and out through the exhaust ports 50 and 51 which completely atomizes the same. This atomized oil passes through the clearance 76 and lubricates the sliding surfaces between the ribs 18 and the work support plate 1 and rib 19.

Since this machine is also adapted for wet sanding, to this end the casing 71 is provided with a longitudinal bore 80 which extends half way throughout the length and connects with the ver-

tical jet producing bores 81. The longitudinal bore 80 is connected to a suitable water line 82 which is controlled by the pet-cock 83. Hence, when the pet-cock 83 is opened, the vertical bores 81 direct the jets of water upon the surface which is to be wet sanded.

In operation assuming that the check valve 62 has been opened as above described, the chamber 56 becomes a pressure chamber and the valve 29 is held against the valve guide surface 28 thus permitting the operation of the polisher in any desired position, that is, right side up or up side down. The air is free to pass the valve through the clearance 57 between the top of the valve and the top of the chamber 56 and between the sides of the chamber 56 and the clearance 35 permitted by the narrowed central portion 34 of the valve. As shown in Fig. 3, the piston is beginning to move to the right as indicated by the arrow. At this time the compressed air passes from the chamber 56 through the intake ports 31 and 39 into the left hand end of the cylinder 14 as indicated by the arrows. At this time the exhaust port 50 is cut off by the valve 29. The right hand intake port now serves as the exhaust port in that the air passes from the right hand end of the cylinder as indicated by the arrows into the intake port 38 through the connecting openings 46, 44, and 42 into the port 41 where it passes upwardly into the chamber 32 and then downwardly through the opening 53 and outwardly through the exhaust opening 51 into the interior of the enveloping casing 71 from which it escapes to the atmosphere through the clearances 76 and 73 as above described.

As soon as the stud 27 engages the right hand side of the opening 36 the valve begins to move to shut off the intake port 39 on the left and eventually places the valve in the position shown in Fig. 4. At this time the compressed air is being admitted through the intake ports 30 and 38 to the right hand end of the cylinder 14 which in turn causes the piston to move to the left as indicated by the arrow. The left hand end of the cylinder is exhausting through the intake port 39, the connecting ports 47, 45, 43 and 40, thence through the chamber 33 downwardly through the opening 52 and outwardly through the exhaust port 50 into the casing 71 from which it is exhausted through the clearances 76 and 73 between the casing 71 and the motor and work support slide as above described.

As shown in Figs. 10 to 13 the outer casing 71 is arranged to receive the air feed line 102 and the water feed line 103. The slide valve housing 104 is provided with the longitudinal opening 105 which communicates with the air feed line 102 and with the longitudinal opening 106 which communicates with the water feed line 103. The opening 105 communicates with the valve chamber 107 and is controlled by the valve 108. The valve 108 has fixed on one end the cylindrical push button 109 which slidably engages the opening 110 in the outer casing 71. The valve 108 is yieldably held in closed position by the coil spring 111. The push button 109 is provided with the annular groove 112.

The casing 71 is provided with the transverse opening 113 which is arranged to receive the water control valve. The water control valve 114 is of the push button elongated cylinder type, one end of which has a yieldable engagement with the coil spring 115. The valve 114 is provided with an annular groove 116. The casing 71 is likewise provided with a longitudinal bore 117 which communicates with the downwardly directed openings 130 to deliver the water upon the surface which is being worked. For the purpose of connecting the water line 106 with the water feed line 117 the valve 114 is provided with the U-shaped opening 118.

As shown in Fig. 10, both the air and the water are turned off. At this time the push button 109 and spring 111 are in extended position and the valve 108 is held tightly against the valve seat 119 and the water control push button 114 is pushed inwardly against the coil spring 115 which is in collapsed position. At this time the annular groove 116 of the valve 114 is engaged by the cylindrical push button 109 as shown at 120 (Fig. 11 and similarly in Fig. 10). Since the annular groove 116 has a curvature corresponding to the curvature of the cylindrical push button 109, the valve 114 is held in shut-off position and consequently the valve opening 118 is off-set from both the feed line 106 and 117.

When it is desired to turn the air and water on the push button 109 is pushed in as shown in Figs. 12 and 13 against the tension of the spring 111. As soon as the annular groove 112 coincides with the annular groove 116 in the water control push button 114, the coil spring 115 forces the push button 114 outwardly so that the opening 118 communicates with the water feed lines 106 and 117. At this time, as shown in Figs. 12 and 13, the pin 114 engages the pin 109 in the annular groove 112 thus retaining the valve 108 in open position. When it is desired to render the machine inoperative, the water valve 114 is pushed in which permits the spring 111 to again close the air valve 108, shut off the air, and simultaneously lock the water control valve in the position shown in Figs. 10 and 11.

I claim:

1. A machine of the type described comprising in combination of a cylinder, a piston having a pair of opposed recesses, a reciprocatory support for work performing means beneath the said cylinder and having a boss adapted to engage the said piston in one of the said recesses, a plug having a stud arranged to engage the said piston in the other of said recesses, a reciprocating valve having a lost motion connection with the said stud, and means passing through the said boss and cylinder for rigidly interconnecting the support, the cylinder, and the valve actuating stud.

2. A machine of the type described comprising in combination of a cylinder, a piston having a pair of opposed polygonal similar recesses, a reciprocatory support for work performing means beneath the said cylinder and having a boss adapted to snugly engage the said piston in one of the said recesses, a plug having a stud arranged to snugly engage the said piston in the other of said recesses, a reciprocating valve having a lost motion connection with the said stud, and a threaded stud passing through the said boss in the cylinder and threadedly engaging the said plug for rigidly interconnecting the support, the cylinder, and the valve actuating plug.

3. In a pneumatically operated machine of the type described, a cylinder, a piston for the cylinder, intake and exhaust ports, a reciprocating valve for controlling the intake and exhaust ports, the said valve having an opening substantially centrally thereof, and a replaceable apertured insert for the said opening, and means carried by the said piston having a lost motion connection with the said valve insert whereby the

valve is reciprocated to open and close the intake and exhaust ports.

4. In a pneumatically operated machine of the type described, a cylinder, a piston for the cylinder, a valve guide surface, a reciprocating valve having a recess substantially centrally thereof, a replaceable apertured insert for the said valve recess, and a stud rigidly fixed to the said piston and engaging the said valve insert in the aperture to actuate the valve, whereby the valve insert can be replaced by another valve insert having a different sized aperture to vary the stroke of the piston.

5. In a pneumatically operated machine of the type described having an air feed line and a water feed line, a spring pressed valve for controlling the air feed line, a spring pressed valve for controlling the water feed line, one of said springs being compressed when the other is expanded, each of said valves having a portion adapted to interlock with a portion of the other whereby either valve serves as a stop for holding the other valve in one of its predetermined positions.

6. In a pneumatically operated machine of the type described having an air feed line and a water feed line, a spring pressed valve for controlling the air feed line, said valve having an annular groove, a spring pressed valve for controlling the water feed line, said valve also having an annular groove, the said valves being positioned transversely of each other whereby the one valve engages the other in the annular groove to lock the same in a predetermined position.

7. In a pneumatically operated machine of the type having an air feed line and a water feed line, a spring pressed valve for controlling the air feed line, a spring pressed valve for controlling the water feed line, the said valves being positioned one across the other and each having a notch, the spring of the one valve being compressed when the spring of the other valve is expanded whereby as the one valve is actuated to a predetermined position the compressed spring of the other valve expands when the notches coincide thereby offsetting the notches and locking the said valve in the predetermined position.

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