Nov. 27, 1923 1,475,681

S. K. BROWN

SURFACE FINISHING MACHINE

Filed Feb. 5, 1918 3 Sheets-Sheet 1

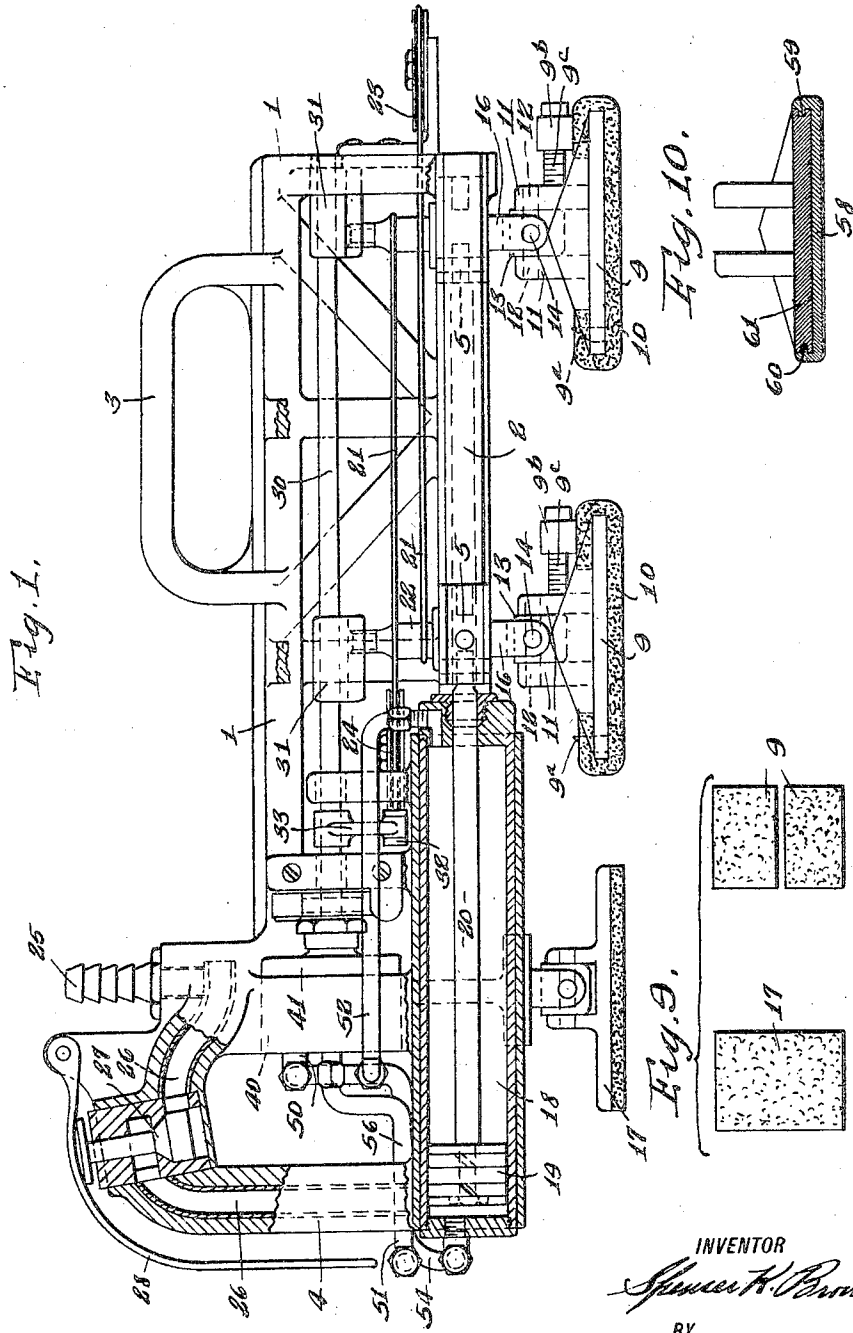


Fig. 1.

Fig. 10.

Fig. 9.

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Fig. 2.

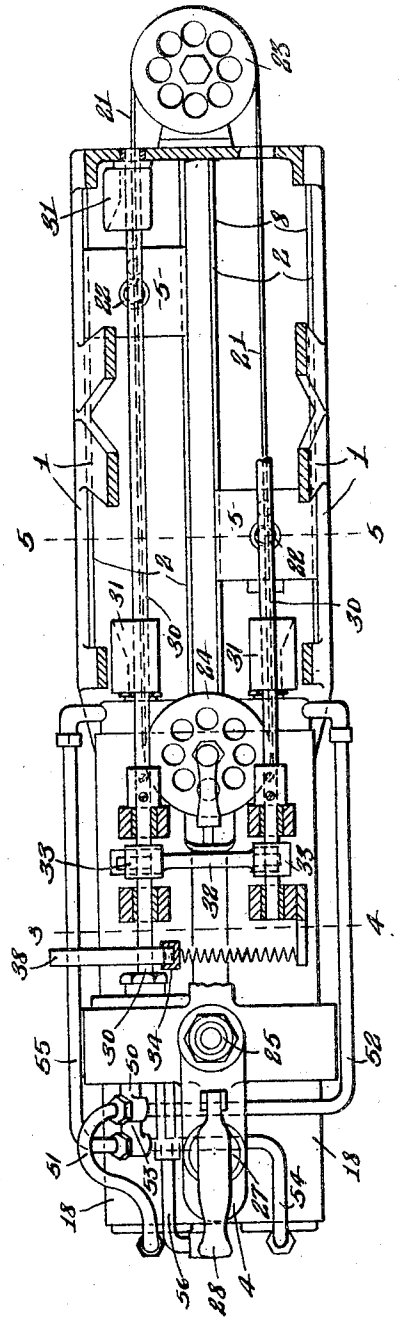


Fig. 4.

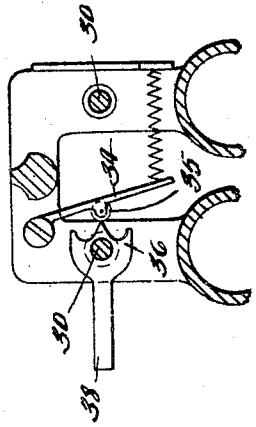
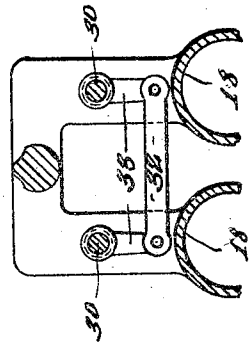


Fig. 5.



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Fig. 8.

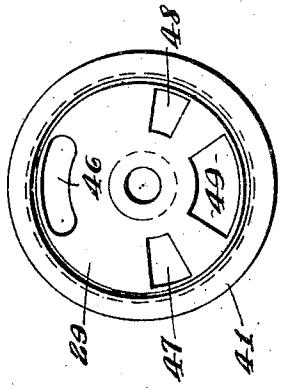


Fig. 5.

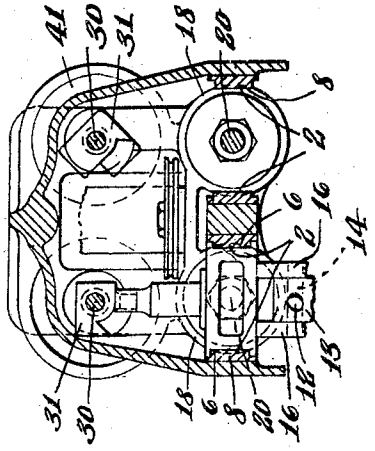


Fig. 7.

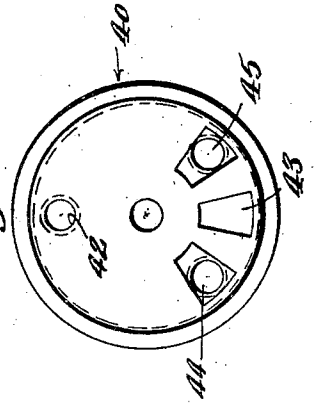
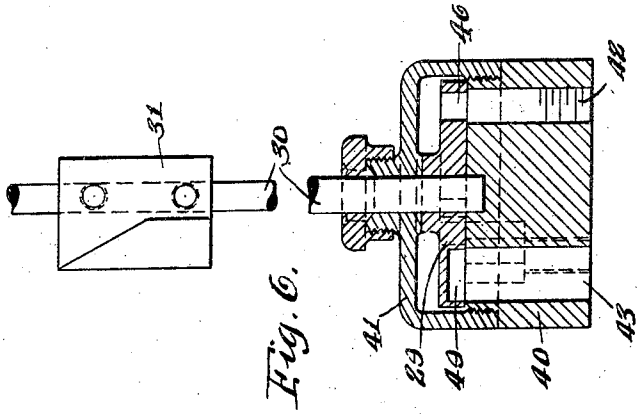


Fig. 6.



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UNITED STATES PATENT OFFICE.

SPENCER K. BROWN, OF SYRACUSE, NEW YORK.

SURFACE-FINISHING MACHINE.

Application filed February 5, 1918. Serial No. 215,492.

To all whom it may concern:

Be it known that I, SPENCER K. BROWN, a citizen of the United States, and a resident of Syracuse, in the county of Onondaga and State of New York, have invented a certain new and useful Surface-Finishing Machine, of which the following is a specification.

This invention relates to surface finishing machines of the type set forth in my Patent No. 1,276,167, dated August 20, 1918, and has for its object a particularly simple and efficient arrangement of the movable abrading members and the means for actuating them.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all of the views.

Figures 1 and 2 are respectively a side elevation and a plan view, partly in section, of this surface finishing machine.

Figures 3 and 4 are fragmentary elevations taken on line 3—4, Figure 2, looking respectively to the right and to the left.

Figure 5 is a sectional view on line 5—5, Fig. 1.

Figure 6 is a sectional view of the controlling valve for the motive fluid and contiguous part of the operating rod therefor.

Figure 7 is a plan view of the detached body of the valve.

Figure 8 is an inner face view of the cap portion of the valve and movable valve piece therein.

Figure 9 is a face view of the abrading member showing the relative arrangement thereof.

Figure 10 is an elevation of another form of abrading member.

This surface finishing machine comprises, generally, a frame, carriages reciprocally movable in the frame, abrading members connected to the carriages to be reciprocated thereby, means carried by the frame for actuating the carriages, and means also carried by the frame for controlling the operation of the former means.

1 designates the frame which may be of any suitable form, size and construction, it being here shown as elongated in form and having parallel horizontal guides 2 at its lower side extending from the front end and terminating between the ends thereof, and also having a handle 3 on its upper front portion and a handle 4 at its rear end.

5 are the carriages movable along the guides 2 in reverse directions relatively to each other, that is, one is moved forwardly while the other is moved rearwardly. The carriages are here shown as slides having channels 6 in their side faces which receive the raised ribs 8 of the guides, as seen in Figure 5.

9 are the abrading members carried by the carriages respectively, each being here shown as connected to its carriage by pivots arranged in horizontal planes at a right angle to each other, so that the abrading members have a limited rocking movement in all directions to readily conform to and ride over the surfaces being finished.

As here shown the abrading members 9 include a body having its under surface covered with abrading material, as felt 10, the body having upwardly extending spaced apart lugs 11, pivoted on trunnions 12 provided on a block 13 which in turn is pivoted at 14 to the depending spaced apart lugs 16 on the carriage. The axes of the trunnions 12 and pivot 14 are arranged at a right angle to each other.

The rear end of the frame is supported on a suitable foot piece or abrading member 17 which slides over the work during the movement back and forth on the frame by the operator. This abrading member is substantially the same as the abrading members 9 with the exception that it is fixedly secured to the frame by horizontal pivots arranged at an angle to each other and the felt surface is permanently secured thereto.

The felt 10 is secured to the members 9 by prongs 9^a extending through one margin thereof and a tightener engages the other margin. The tightener comprises a block 9^b engaging such other margin and having prongs entering the same and means, as a screw 9^c fixed from endwise movement to the abrading member and threading through the block 9^b. As the screw is turned, the block will be moved in one direction or the other to loosen or tighten the felt.

The means for actuating the carriages comprises cylinders 18 arranged in the lower rear end of the frame in horizontal alinement with the guides 2, pistons 19 movable in the cylinders and having their rods 20

rigid therewith and connected to the carriages 5, and means for controlling the actuation of the pistons.

The pistons 19 move reversely relatively to each other and are held in juxtaposition by means for transmitting and reversing the movement of one carriage 2 to the other. As here shown, this means comprises a cable or belt 21, secured to posts or shoulders 22 on the carriages 2 and running over pulleys 23, 24, supported by the frame. The motive power for actuating the pistons 19 is preferably compressed air and passes from a flexible pipe, not shown, coupled to the nipple 25 on the frame, through a passage 26 in the handle 4 to the cylinders, the passage 26 being controlled by a valve 27 having a grip handle 28 arranged to be gripped by the same hand engaged with the handle 4. The passage 26 communicates with a suitable valve which controls the direction of the flow of air to and from opposite ends of the cylinders.

The valve comprises a movable valve piece 29 which is operated by the carriages 5 as they approach the limit of their movements in either direction. Said means, as here shown, includes a rock shaft 30 on which the valve piece 28 is located, the shaft extending parallel to the movement of the carriages 5 and having means located in the path of shoulders 22 of the carriages to be engaged and rocked thereby.

As here shown, the rock shaft is provided with cams 31 arranged in the path of the shoulders 22 as the carriages 5 approach the limit of their movement in opposite directions, the incline of one cam being arranged to rock the shaft 30 in one direction and the incline of the other cam to rock the shaft in the opposite direction. Preferably there are two rock shafts 30 having cams 31 thereon arranged to be acted upon by both carriages 5 and these rock shafts are coupled together to work in unison by means of a link 32, Fig. 3, connected at its opposite ends to rock arms 33 on said shafts.

The rock shafts 30 are prevented from stopping at the half-way point, as when the pistons are at dead center, by means of a spring-pressed rock arm 34, Fig. 4, having a roller 35 which coacts with a cam 36 on one of the shafts, the high point of the cam 36 being arranged to coact with the roller 35 when the rock shaft is at the half-way point, so that in case of stopping of the pistons in the dead center line, the rock shaft will be forced in one direction or the other by the pressure of the compression spring 37 on the arm 34. This cam 36 is provided on a lever 38 which is operable by hand, if desired to work the valve piece 29 manually.

The valve may be of any suitable form, size and construction and as here shown, it includes body 40 and a cap 41 in which the valve piece 29 is mounted, the body having inlet 42 and exhaust passage 43, outlet passages 44 and 45, and the valve piece 29 is formed with an inlet 46 arranged to register with the inlet 42 in any position of the valve piece, outlet passages 47, 48 arranged to register with the passages 44 and 45, and a transfer passage 49 arranged to connect alternately the passages 44, 43, and 45, 43. The passage 44 is connected by a pipe 50 and branches 51, 52, to one end of one cylinder 18 and the opposite end of the other cylinder, and the passage 45 is connected by the pipe 53 and branches 54, 55, to the other ends of said cylinders. The feed passage 26 is connected by the pipe 56 to the intake passage 42. In operation, when the finger piece 28 is depressed, the air flows through the passage 26, pipe 56, passage 42, slot 46, around the cap of the valve casing above the valve piece 29, through one or the other of the passages 44 or 45, to one end of one cylinder 18 and to the other end of the other cylinder 18 to actuate the pistons therein in opposite directions. If the air passes out through the passage 44 and pipe 50 and branches 51, 52, the transfer passage 49 registers with the passages 43 and 45, so that the air exhausts from the cylinders through the branches 54, 55, pipe 53, passage 45, exhaust passage 43. When the air enters the cylinders through the passage 45, pipe 53 and branches 54 and 55, the air is exhausted from the opposite sides of the pistons of said cylinders through the pipe 50 and branches 51, 52, thereof, passage 44, transfer passage 49 and exhaust 43.

In operation, the operator can manipulate the tool by taking hold of the handles 3 and 4 and in some instances, it is necessary to take hold of the handle 4 only. Upon gripping tightly the handle 4 the air passes into the cylinders, and actuates the abrading members 9 back and forth, which rub over the surfaces being finished while the operator is moving the entire tool over the work.

Should the operator cause more weight to be brought to bear on one abrading member than the other, the member bearing the most weight is prevented from stopping by the equalizing means, that is the means for transferring and reversing the motion of one abrading member to the other. Owing to the two carriages running in parallel paths and to the two cylinders and pistons therein arranged as set forth the machine runs evenly without jumping.

In Figure 10 I have shown an abrading member provided with a rubbing surface of soft metal 58 capable of receiving an abrading material as powdered pumice stone which has been previously applied to the surface. The particles of pumice stone are imbedded in the soft metal. By the use of a soft metal the work of rubbing down sur-

faces such as automobile bodies is greatly facilitated.

This surface is usually lead and the lead is attached to the body by means of sets of tongues 59 fitting grooves 60 in the body 61 of the abrading member. Usually, the body of the abrader member with grooves therein is arranged in a mold and the lead cast into the mold and around the body so that it covers the lower face of the body and runs into the grooves 59.

This machine is particularly advantageous in that it performs an operation by machine which has heretofore been thought impossible to do by machine and at the same time does it better and quicker than it can be done by hand.

What I claim is:

1. A surface finishing machine comprising a frame, carriages reciprocally movable in parallel paths arranged side by side, abrading members pivotally connected to the carriages, means carried by the frame for reciprocating the carriages and operating to move one in one direction while the other is moving in the opposite direction, and means connecting the carriages for holding the same in juxtaposition to each other, the latter means comprising a pair of pulleys supported by the frame, and a belt secured to the carriages and running over the pulleys, substantially as and for the purpose described.

2. A machine for finishing surfaces comprising a frame, carriages reciprocally movable reversely relatively to each other in parallel paths, abrading members connected to the carriages respectively by universal joints, a stationary foot member connected to the frame at the rear of the abrading members by a universal joint, and means carried by the frame for reciprocating the carriages, substantially as and for the purpose specified.

3. A machine for finishing surfaces comprising a frame, a reciprocating rubbing member, a carriage for such member movable along the frame, the rubbing member being connected to the carriage by a universal joint to permit relative rocking movements in all directions of the abrading member and the frame, a stationary foot connected at one end to the frame by a universal joint whereby the frame can be tilted about the axis of the pivot connecting it and the foot, and means carried by the frame for reciprocating the carriage, substantially as and for the purpose set forth.

4. A machine for finishing surfaces comprising a frame, a reciprocating rubbing member carried by the frame, a carriage for the member movable along the frame, the rubbing member being connected to the carriage by a universal joint, a stationary foot at one end and connected thereto by a universal joint, and means carried by the frame for actuating the carriage, substantially as and for the purpose described.

5. In a surface finishing machine, the combination of a frame formed with a guide, a carriage movable along the guide, an abrading member carried by the carriage, a cylinder, a piston movable in the cylinder and connected to the carriage to actuate the same, means for controlling the flow of motive fluid to the cylinder on opposite sides of the piston, including valve gear comprising a rock shaft extending lengthwise of the cylinder and the guide and having means thereon arranged in the path of the carriage to be engaged and rocked thereby to rock the shaft, as the carriage approaches the limit of its movement in opposite directions, substantially as and for the purpose described.

6. A surface finishing machine comprising a frame having a pair of horizontal parallel guides, the guides being arranged on the lower side of the frame, cylinders supported by the frame in alinement with the guides, pistons movable in the cylinders, carriages movable along the guides, the piston rods being connected to the carriages, and valve mechanism for controlling the flow of motive fluid to the cylinders, said mechanism being arranged above the cylinders and the guides, in position to be operated by the carriages during their movements along the guides, substantially as and for the purpose specified.

7. A surface finishing machine comprising a frame having a pair of horizontal parallel guides, the guides being arranged in the lower side of the frame and the frame having handle portions on its upper side and rear end, cylinders supported by the frame in alinement with the guides, pistons movable in the cylinders, carriages movable along the guides, abrading members connected to the carriages, the piston rods being connected to the carriages, valve mechanism for controlling the flow of motive fluid to the cylinders, said mechanism being arranged above the cyliders and the guides in position to be operated by the carriages during their movements along the guides, and a stationary abrading member beneath the rear portion of the frame in the rear of the movable member, substantially as and for the purpose set forth.

In testimony whereof, I have hereunto signed my name, at Syracuse, in the county of Onondaga and State of New York, this 19th day of November, 1917.

SPENCER K. BROWN.