June 12, 1928.

1,673,529

R. A. PONSELLE

APPARATUS FOR CLEANING FLOORS

Filed Sept. 10, 1923

3 Sheets-Sheet 1

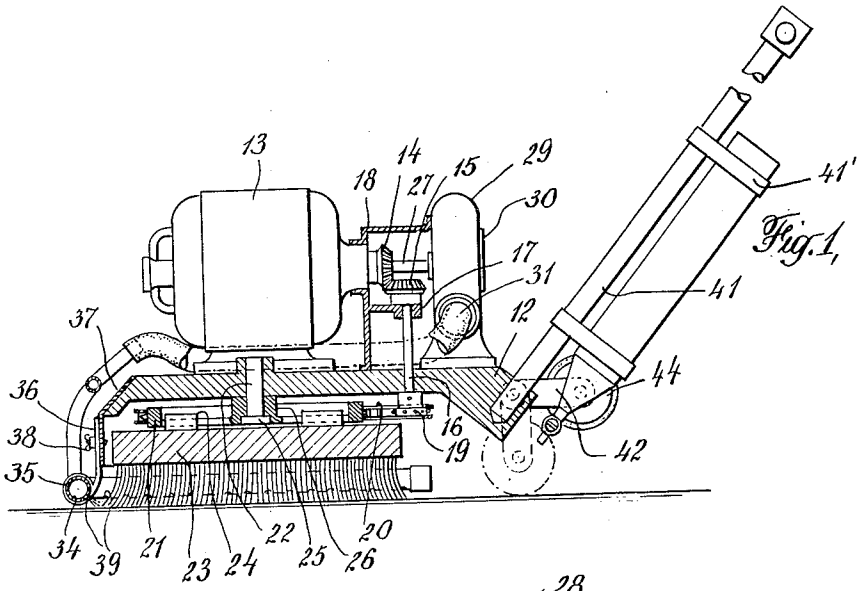

Fig. 1,

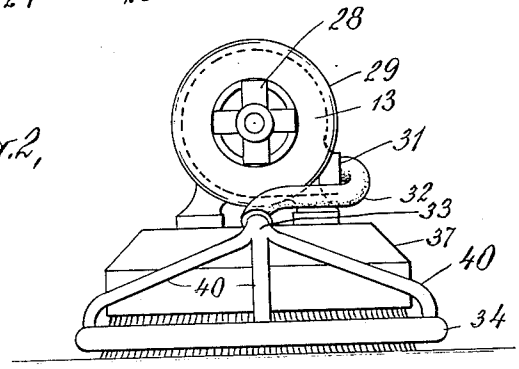

Fig. 2,

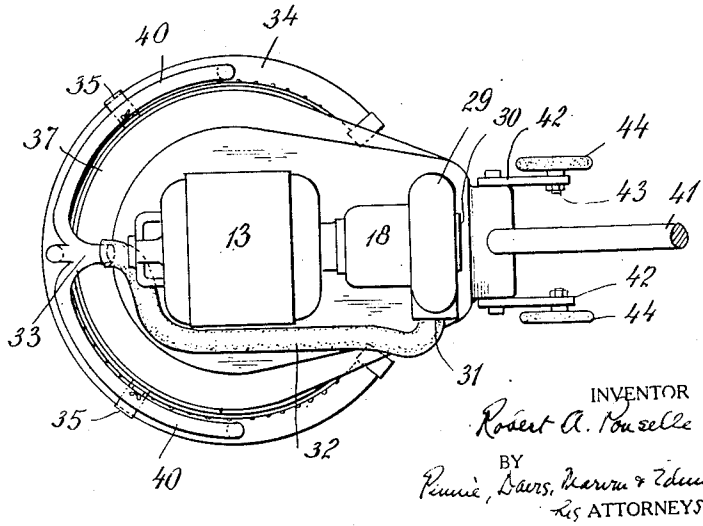

Fig. 3,

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Fig. 4,

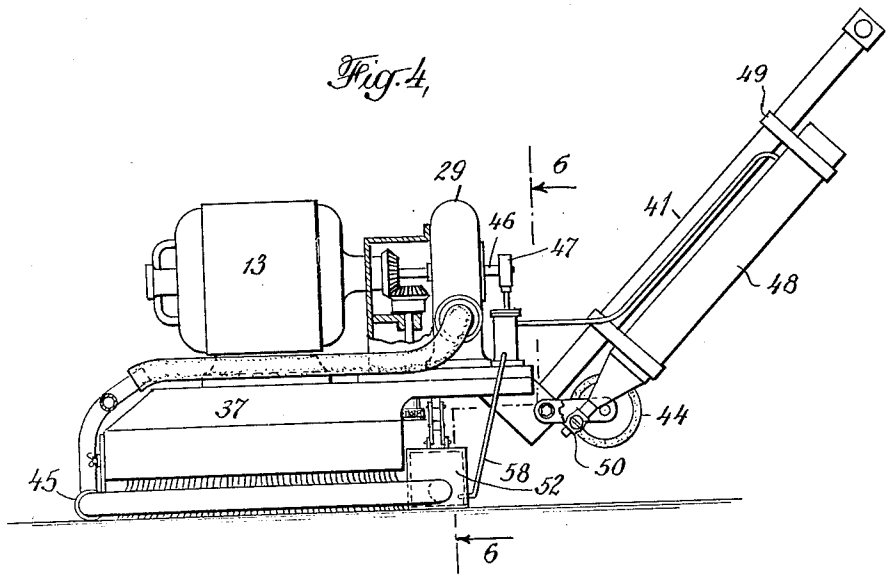


Fig. 5,

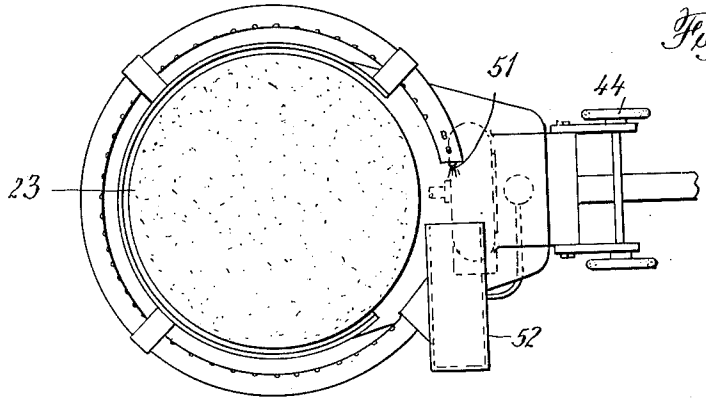
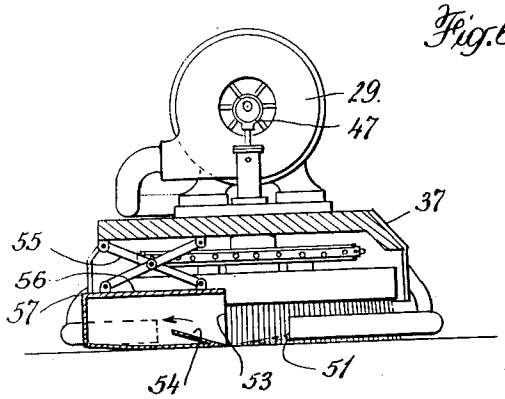


Fig. 6,



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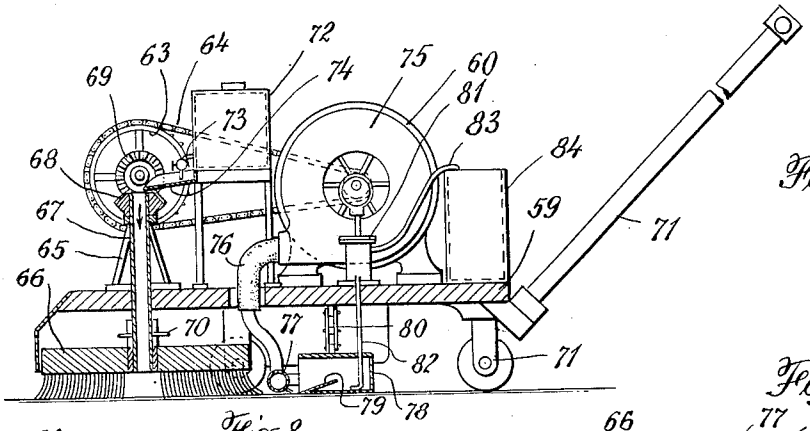


Fig. 7,

Fig. 8,

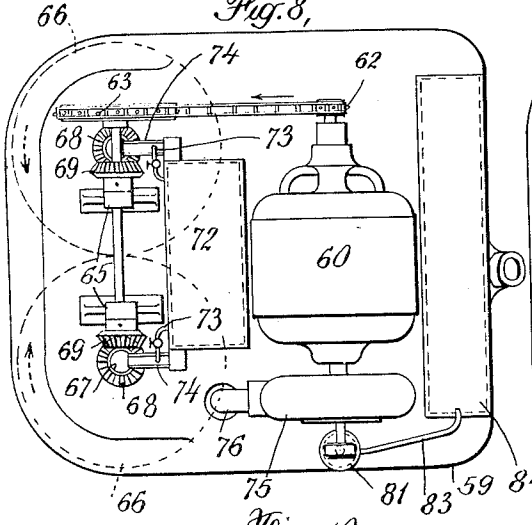


Fig. 9,

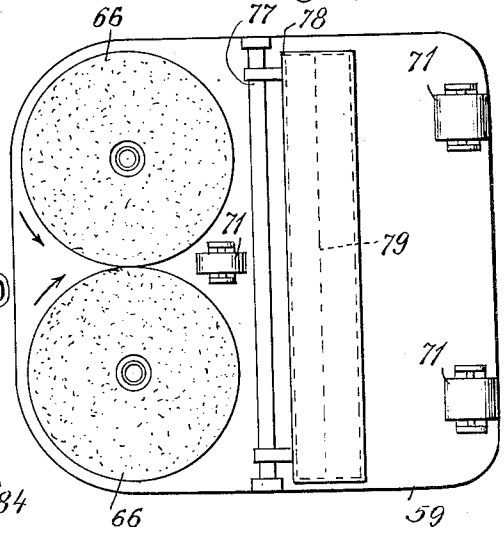


Fig. 10,

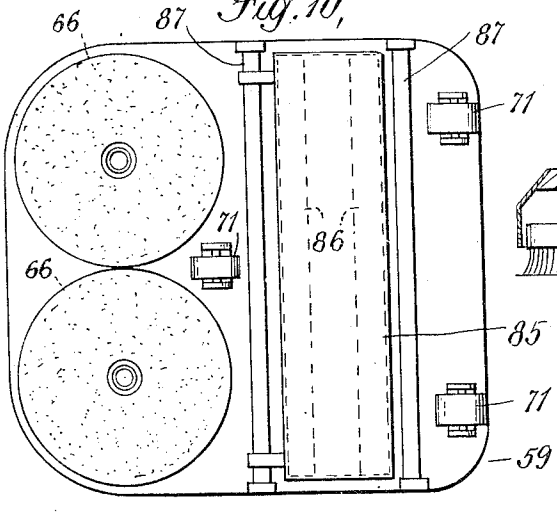
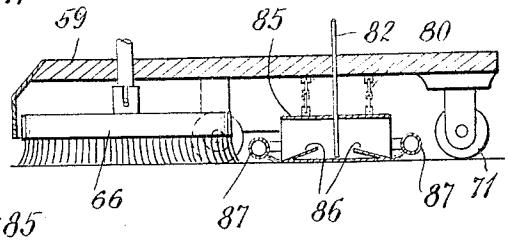


Fig. 11



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UNITED STATES PATENT OFFICE.

ROBERT A. PONSELLE, OF NEW YORK, N. Y.

APPARATUS FOR CLEANING FLOORS.

Application filed September 10, 1923. Serial No. 661,825.

This invention relates to apparatus for cleaning floors, particularly with liquid, and is intended to provide an apparatus by means of which the usual scrubbing and cleaning operations may be carried on so as to leave the treated surface in a clean, dry condition.

Floors such as are used in public buildings, hotel lobbies, halls, and the like, require frequent scrubbing and cleaning and when such floors are mopped with water by manual labor the process is expensive and laborious. Cleaning machines have been devised to carry on this treatment. Certain of these machines are used simply for the scrubbing operation; that is, the floor is previously wet or sprinkled with water with which there is sometimes mixed a cleaning powder, and the machine which includes a scrubbing brush driven by a motor, is moved around over the floor surface so as to scrub and clean all portions of it. The floor thus cleaned, however, is still covered with liquid and it is necessary to supplement the scrubbing by the machine with mopping to remove the dirty water. Usually this is done by workmen using rubber squeegees and pans, or by mops by which the water is taken up and removed. In somewhat larger machines there is provided a reservoir for the cleaning water which is applied to the floor just before the cleaning tool passes over it, but with such a machine, as before, it is necessary to remove the dirty water after the scrubbing operation.

In other forms of machine attempts have been made to remove the dirty water by means of mops or brushes, and on these machines the mop may take the form of an endless web which is passed over the floor and then led between wringing rollers which remove the excess water into a dirty water vessel. The brushes act in a somewhat similar manner and are driven from the motor which drives the cleaning tool.

The use of the small machine which is followed by the workman using the squeegee or mop is expensive since it only partially eliminates the manual operation, while larger machines are complicated and somewhat laborious to operate. Also the absorbing webs or brushes for taking up the water are likely to get out of order and are not altogether satisfactory for the purpose. Again, with either of the types of machines above described, the floor, even after the squeegee or web has passed over it, remains in a damp condition, although the excess of water has been removed.

The present invention is intended to provide an apparatus by means of which a floor may be scrubbed while wet, the cleaning water entirely removed, and the floor left in a substantially dry, clean condition. I have found that this result may be attained by the use of properly directed currents of air which strike the floor just after the tool has passed over it, and these currents of air tend to drive the water ahead of them so that as the machine passes over the floor the cleaning water flows along with the machine. These air currents, while driving the excess water along, produce a drying effect which is entirely absent in connection with the use of a squeegee or a mop. In using such machines it is customary to start at one end of the floor surface and move the machine over the surface from side to side so as to treat all portions of it. It is, therefore, possible with the apparatus of the present invention to provide means for directing the air currents in such a way as to carry the excess water along as the machine is moved, or else if desired, further provision may be made for taking up the dirty water and disposing of it in a vessel which may be emptied from time to time.

In the accompanying drawings that embodiment of the invention which is now preferred is illustrated in connection with machines of various types. In these drawings:

Fig. 1 is a side view partly in section of a simple form of machine,

Fig. 2 is a rear elevation of the same,

Fig. 3 is a top plan view,

Fig. 4 is a view of a machine somewhat similar to Fig. 1, but including provision for removing the water used,

Fig. 5 is a bottom plan view,

Fig. 6 is a sectional view on the line 6—6 of Fig. 4,

Fig. 7 is a vertical sectional view of a somewhat modified form of machine,

Fig. 8 is a top plan view of the same,

Fig. 9 is a bottom plan view,

Fig. 10 is a bottom plan view of another modified type of machine, and

Fig. 11 is a vertical sectional view of a detail of the machine illustrated in Fig. 10.

Referring to the drawings, the machine

illustrated in Fig. 1 consists of a base 12 which may be a casting of suitable shape. Mounted on this base is an electric motor 13 of the usual construction, and mounted on the motor shaft is a beveled gear 14, meshing with a similar gear 15 on an upright shaft 16. The shaft 16 projects through the base and is supported near its upper end in a bearing 17 which is mounted within a casing 18 which serves to enclose both gears and the shaft. At the lower end the shaft 17 is provided with a small sprocket 19 over which runs a chain 20, which in turn runs over a large sprocket 21, mounted on a shaft 22 supported in suitable bearings centrally of the base. The tool 23, here illustrated as a bristle brush, is provided with lugs 24 on its upper surface by means of which it is removably engaged with the arms of the sprocket, this arrangement serving to permit ready detachment of the brush should occasion arise. The shaft 22 terminates at its lower end in a head 25 which runs in a bearing 26, attached to the lower face of the base, and when the machine is in use on the floor its entire weight rests on the tool.

The motor shaft 27 extends beyond the gear 14 and at its extreme end is mounted the rotor 28 of a blower 29. This blower may be of any convenient construction, preferably one of light weight, and the rotor consists of a plurality of blades which serve to take in air through an opening 30 in the side of the blower, and force it through an outlet 31 near the bottom end. This outlet is connected through a flexible connection 32 with a distributing connection 33, which directs the air into an outlet pipe 34, here shown nearly circular in form. The outlet pipe 34 is provided with straps 35 which terminate at their upper ends in flat portions 36 which are adjustably held in place on the outside of a casing or apron 37, by means of thumb nuts 38. The apron 37 is mounted on the base and serves to partially enclose the brush 23 and the adjustable mounting of the outlet pipe is made necessary in order that its position may be regulated according to the thickness of the operating surface of the tool. In the present instance this will depend on the length of the bristles. The outlet pipe is seen to be provided with a plurality of outlets 39 which are located in such position as to direct a current of air at an angle to the floor and toward the center of the brush. The air which is blown through these apertures is distributed throughout the length of the pipe by means of the distributing connection 33, and this connection has three branches, 40 so that an even flow of air occurs through each of the apertures.

At the rear end the base is provided with a rigidly mounted handle 41 and secured on this handle by straps is a water tank 41', which may terminate at its lower end in a stop cock for directing a cleaning fluid on the floor in proximity to the tool. Near the base of the handle there is pivoted a yoke 42 across the ends of which is a shaft 43 which carries wheels 44. This yoke is mounted in such a way that it may be swung to the dotted line position illustrated in Fig. 1, whereupon by depressing the handle the machine may be moved over the floor with the brush out of contact. When the machine is to be used, however, it will be moved to the desired location, and the yoke will be swung to the full line position shown in Fig. 1, whereupon the entire weight of the device rests on the tool.

In using this type of machine the tank is filled with a cleaning fluid which may be water or water and a cleaning powder, and the machine is then moved to the far end of the floor, the carriage raised so as to let the machine rest on the brush, and the motor started. Ordinarily the motor leads will be connected with cables, not shown, which pass upwardly through or along the handle to a switch, from which the cables are led to a convenient lighting socket. When the motor is started the brush rotates at a comparatively low rate of speed, due to the reduction gearing, and as the cleaning fluid flows onto the floor the machine will be moved about so as to scrub the floor with a rotating brush. The rotation of the brush tends to throw the fluid outwardly from the center of the brush but the blower throws an air blast through the apertures in the outlet pipe so that this fluid is confined to that portion of the floor which is being treated, and as the machine is moved from side to side and drawn backwardly, this wall or curtain of air drives the fluid along with the machine as the latter is moved. With the curved outlet pipe here shown, the fluid is confined quite closely to the region around the brush. The blower produces a curtain of air which prevents the fluid from being thrown backwardly over the cleaned surface and as the machine is moved this curtain is carried with it so that the fluid is blown from the cleaned surface continually. The outlet pipe 35 will be adjusted in such position relative to the floor so that the angle of incidence is such as to produce the desired effect. Besides forcing the water on the floor along with the machine as the latter is moved, the currents of air give a drying effect so that when the machine has passed over the floor the latter is left in a substantially dry, clean condition. As has previously been explained, with this type of machine it is necessary, ordinarily, to have two workmen, one of whom moves the machine over the floor, while the other follows the machine with a squeegee or mop, push-

ing the water along with the machine. The workman who follows the machine is likely to leave foot marks on the floor so that even under the best conditions it is difficult to produce a floor which is entirely clean. With the present machine, however, this difficulty is eliminated, and not only can one man do the work previously performed by two, but the finished floor is much cleaner and is also left in a substantially dry condition.

In Fig. 4 there is shown a slightly modified form of machine, the general features of which, however, are somewhat similar to those previously described. This machine consists of the base, motor, tool, and air blower and the air is directed through a flexible connection to an outlet pipe 45 of the general construction of that previously referred to. This type of machine, however, is intended to take up the dirty water as the machine goes along. In the form of machine illustrated in Fig. 1, as the machine moves along the water is conveyed with it and whenever a sufficient quantity of water has been collected ahead of the machine the workman stops the machine and removes this water into a vessel by means of a mop or squeegee. In the machine illustrated in Fig. 4, however, the motor shaft extends through the blower and drives a small water pump 47, the outlet of which passes into a vessel 48 mounted on the handle by straps 49.

The air pipe 45 extends substantially around the tool and at one end is provided with a jet 51 which is directed circumferentially of the brush. Mounted near the other end of the pipe is a pan 52. This pan is illustrated more clearly in Fig. 6, and is shown to be provided with an open end 53 located opposite the jet 51. Extending upwardly and inwardly from the lower wall of the pan at the open end, is a dam 54 and the pan may be suspended from the base in any convenient manner permitting the pan to contact with the floor and to move up and down as irregularities in the floor are encountered. For example, the pan may be suspended by cross links 55 and 56. The intake pipe 58 from the water pump projects into the pan near its rear end behind the dam 54, and as the machine is moved along the wall of air which almost completely encircles the brush tends to keep the water confined to the effective area of the brush. The brush, however, rotating rapidly, tends to force this water around the brush area, eventually driving it to the point where it may be acted on by the jet 51 and this jet directs the water up over the dam into the pan, from whence it is sucked into the intake 58 and conveyed eventually to the tank 48.

It will be seen that this machine operates on substantially the same principles as the machine illustrated in Fig. 1, but the excess of dirty water is continually removed and introduced into the tank 48. The other features are substantially the same as those previously described, and with this type of machine it is not necessary to stop from time to time to remove the excess of dirty water manually.

In Fig. 7 there is shown a larger type of machine using two brushes. In this machine there is a base 59, mounted on which is an electric motor 60 which drives a horizontal shaft 61 through sprockets 62, 63, and the chain 64. This shaft is mounted in suitable bearing supports 65 located on the bed of the machine and the brushes 66 are driven by hollow shafts 67, supported in the bed in any convenient manner, and provided at their upper ends with beveled gears 68, meshing with similar gears 69 on the shaft 61. The brushes 66 are driven by the hollow shafts 67 by means of spline connections 70 so that the brushes are free to move up and down relative to the floor, while the driving connection is maintained.

The base of the machine is provided with a plurality of rollers 71 by means of which the machine may be moved over the floor, and also attached to the base is a handle 71. Mounted between the motor and the shaft 61 is a clean water tank 72 provided with outlets 73 by which clean water, either with or without a cleaning powder, may be introduced into troughs 74 which convey the water to the center of the hollow shafts 67. This water is thus led to the floor at the middle of the brushes.

On the end of the motor shaft opposite the sprocket 62 is a blower 75 of any convenient construction, provided with an outlet pipe 76 which is connected to a distributing pipe 77, located near the floor. The brushes 66 are driven in opposite directions, and are placed close together so that their adjacent edges touch. The pipe 77 extends across the machine to the farther edges of the brushes and is provided with a plurality of outlets so disposed as to direct jets of air to the rear of the machine; in this case, toward the end on which the handle is located. Mounted on the under surface of the base by suitable means is a pan 78, provided with a dam 79, the connection 80 by which the pan is attached to the base, being such that it will be free to move up and down so that the open end of the pan is always in contact with the floor. Mounted on the base below the blower 60 is a water pump 81 the intake 82 of which extends into the pan behind the dam, and the outlet 83 of the pump conveys the water sucked up from the pan into a dirty water tank 84, located at the rear of the base.

This type of machine is used for large floor areas and it wets the floor as the machine is moved over it The water directed

onto the floor through the hollow shaft 67 is thrown outwardly by the brushes and the water thrown to the rear is directed by the wall of air striking the floor behind the brushes into the pan 78, whence the dirty water is removed and placed in the tank 84. This type of machine is pushed over the floor, rather than being pulled, as was the case with the machines previously described, and it will be seen accordingly that as the machine is moved the floor behind it is free from excess water and is left substantially dry.

The machine illustrated in Fig. 10 is in general, similar to that illustrated in Fig. 7, but is provided with a double end pan 85, which is provided with dams 86 along the front and rear edges thereof. Also there are two air outlet pipes 87, from which jets of air are directed inwardly toward the pan, as illustated in Fig. 11. It sometimes happens that where the floor is somewhat irregular a single pan and air jet will not remove all of the water and some of the water may pass under the edge of the pan to the rear as the machine is moved. With the construction illustrated in Figs. 10 and 11, however, any water which escapes beneath the front edge of the pan is picked up by the wall of air delivered by the second pipe 87, which forces this water over the rear dam 86 into the pan. This water is then removed in the usual manner through the intake 82, of a water pump, and thence delivered into a dirty water tank.

It will be seen that I have devised an apparatus for cleaning floors which materially reduces the amount of manual labor required and which produces more satisfactory work, inasmuch as it leaves the floor in a dry, clean condition. The use of mops, squeegees, or the like is dispensed with, being replaced in this machine by means of air currents which not only serve the same purpose but in addition provide a drying effect. The wall of air which is directed onto the floor behind the brush strikes the floor at such an angle that it forces the water ahead of it as the machine is moved. This wall of air is highly efficient in removing the excess water as the machine is moved, and as has been explained, it may be used simply to force the water from the surface which has been treated by the brush, or, if desired, it may be used to take up this water and deposit it in a vessel. While the apparatus here illustrated is intended to show embodiments of the invention which are convenient, it is to be understood, of course, that other forms of apparatus may be suitable for the purpose. It is desirable, however, that in any form of apparatus the air currents should be directed at the floor in such a way as to produce a wall of air which forces the water along the floor as the machine is moved.

I claim:

1. Apparatus of the class described, comprising a base, a motor thereon, a tool and a blower driven by the motor, an outlet connected with the blower and formed to direct a plurality of fluid-driving jets against the floor around the tool, a pan located near the periphery of the tool, an aperture in the outlet to direct a fluid-driving jet of air to blow fluid from the floor into the pan, a tank and means for delivering the collected fluid from the pan to the tank.

2. Apparatus of the class described, comprising a tool operable to scrub a floor surface wet with a cleaning fluid and movable thereover, a perforate conduit encircling a portion of said tool, means for forcing air through the perforate conduit onto the floor, said conduit also having an aperture through which air may pass to cause the removal of the fluid on the floor, and a receptacle for receiving the fluid thus removed.

3. In a machine for cleaning floors, the combination of a tool operable to scrub a floor surface wet with a cleaning fluid and movable thereover, means for actuating the tool, an air blower, a perforate conduit connected with the discharge side of the blower and adapted to convey a blast of air onto the floor adjacent that part of the floor being acted upon by said tool, said blast of air bodily driving the fluid over the floor and assisting in the drying of the floor as the machine is moved.

4. In a machine for cleaning floors, the combination of a tool operable to scrub a floor surface wet with cleaning fluid and movable thereover, means for actuating the tool, an air blower, a perforate conduit connected with the discharge side of the blower and adapted to convey a blast of air onto the floor around at least a major portion of the floor surface being scrubbed to form an enclosed wall around that portion of the surface being scrubbed, said enclosing blast of air also moving the liquid along the floor within the defined area as the machine is moved and drying the floor from which the fluid has been thus removed.

5. In a machine for cleaning floors, the combination of a tool operable to scrub a floor surface wet with a cleaning fluid and movable thereover, means for actuating the tool, an air blower movable with said machine, a perforate conduit connected with the discharge side of the blower and adapted to convey a blast of air onto the floor adjacent that part of the floor being acted upon by said tool, said blast of air bodily driving the fluid over the floor and removing the fluid from the scrubbed floor as the machine is moved, and a receptacle for receiving the

fluid removed from the floor by said blast of air.

6. A machine for cleaning floors wet with a cleaning fluid comprising the combination of a base, a motor thereon, a rotating tool mounted beneath the base in position to act on the floor and driven by the motor, a blower on the base driven by the motor, a conduit extending around at least a major portion of the tool and being provided with a plurality of nozzle openings, means for supplying said conduit with air from the blower, said nozzle openings being directed downwardly and inwardly toward said tool to direct jets of air against the floor at an angle thereto, and an open ended receptacle adjacent said tool, a portion of said conduit being opposite the open end of said receptacle, said portion of the conduit being provided with an aperture whereby air from said conduit may blow the cleaning fluid from the floor into said receptacle.

7. Apparatus of the class described, comprising a base, a motor driven tool thereon a perforate conduit encircling a portion of the tool, means for forcing air through said perforate conduit onto the floor to form a blast of air around the tool, a pan located near the tool, and means for causing a fluid driving blast of air to blow fluid from the floor into the pan.

8. A machine for cleaning floors wet with a cleaning fluid comprising the combination of a base, a rotating tool mounted beneath the base, in position to act on the floor, means for actuating said tool, an air blower, a perforate conduit encircling a portion of said tool and vertically adjustable with respect to said base, means connecting said conduit with the discharge side of said blower whereby a blast of air may be directed onto the floor adjacent that part being acted upon by the tool, said blast of air bodily driving the fluid over the floor as the machine is moved.

In testimony whereof I affix my signature.

ROBERT A. PONSELLE.