

Jan. 3, 1933.

J. S. THOMPSON

1,892,792

SPOT CLEANING DEVICE

Filed Sept. 28, 1931

4 Sheets-Sheet 1

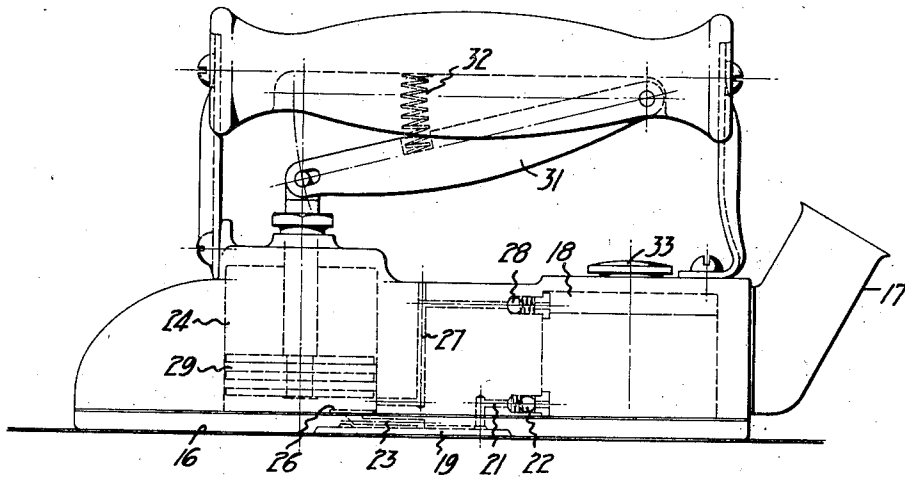
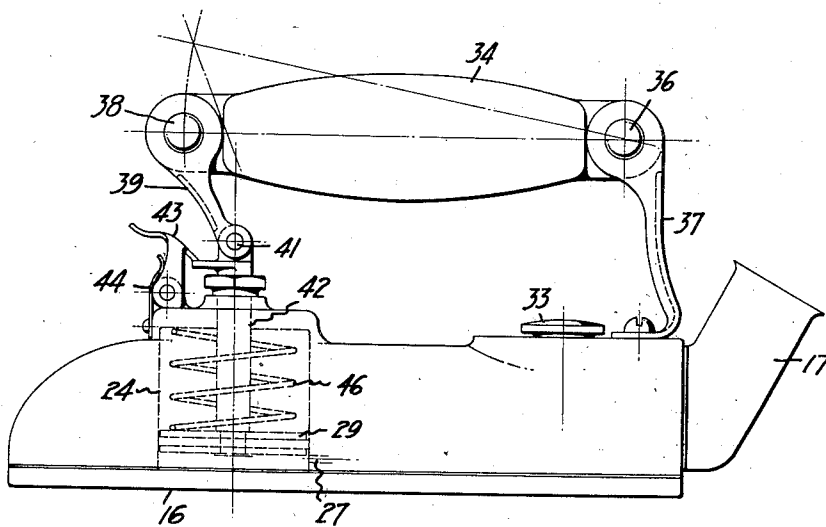


FIG. 1--

FIG. 2--



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4 Sheets-Sheet 2

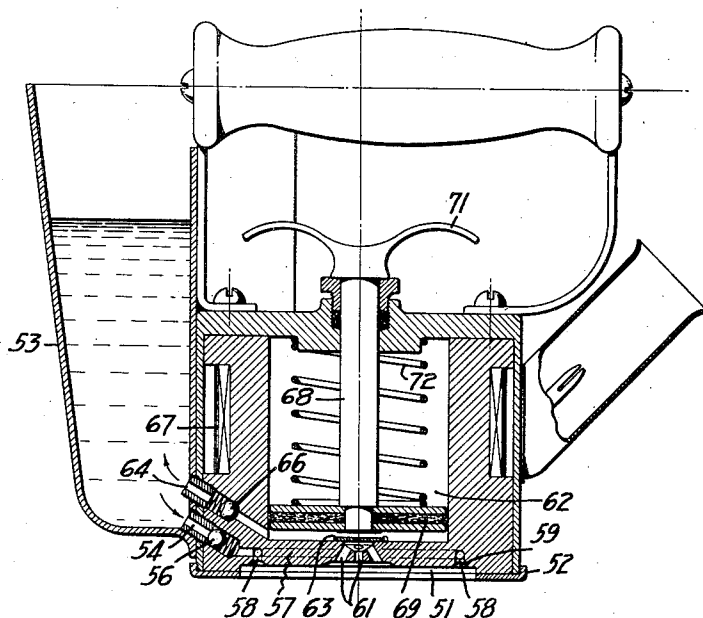
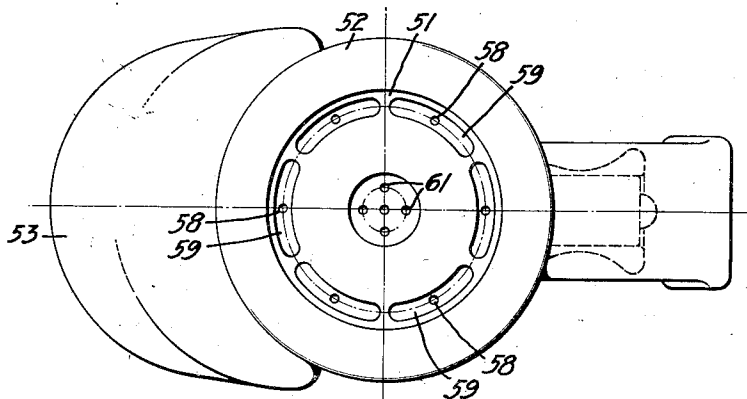


FIG. 3

FIG. 4



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4 Sheets-Sheet 3

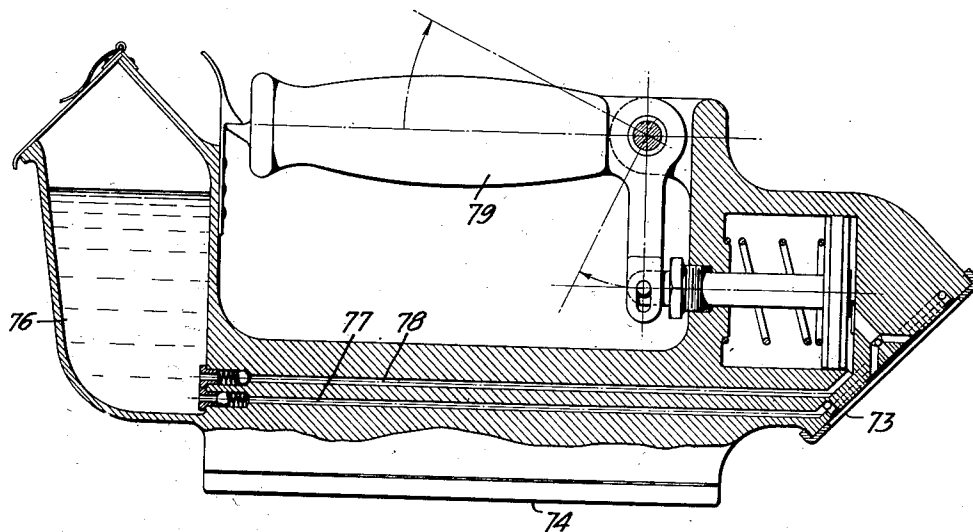
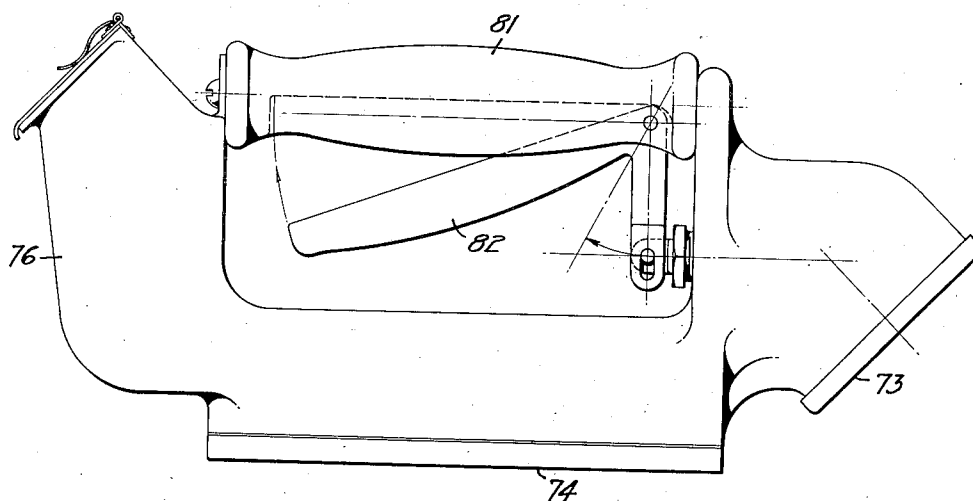


FIG. 5.

FIG. 6.



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4 Sheets-Sheet 4

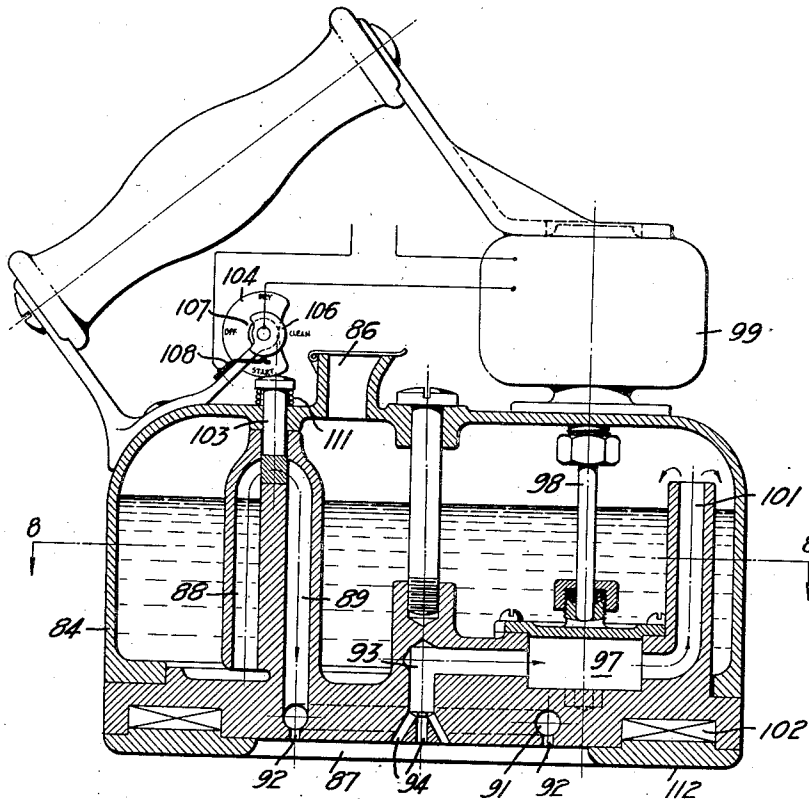


FIG. 7-

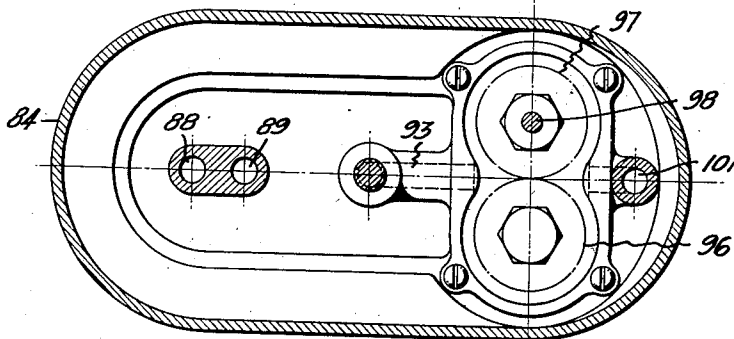


FIG. 8-

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JOSEPH S. THOMPSON, OF SAN FRANCISCO, CALIFORNIA

SPOT CLEANING DEVICE

Application filed September 28, 1931. Serial No. 565,449.

My invention relates to cleaning devices and more particularly it relates to a device for removing spots and stains from wearing apparel and other fabric materials.

5 It is one object of the invention to provide a cleaning device in which provision is made for circulating a cleaning liquid through and about a relatively small area adjacent the soiled portion of the material to be cleaned.

Another object is to provide a cleaning device of the character described in which means is provided for heating the cleaning liquid while it is being used.

15 Still another object is to provide a cleaning device of the character described in which an ironing surface is provided for drying and pressing the area of the material immediately after it has been subjected to a cleaning operation.

These and other objects and advantages are attained in the embodiments of my invention illustrated in the accompanying drawings, in which:

25 Figure 1 illustrates a cleaning device constructed in accordance with the invention built into the body of an electric flat iron.

Figure 2 illustrates a device somewhat similar to that shown in Figure 1 in which 30 the handle of the flat iron is pivoted and serves as a pump handle for the cleaning device.

Figure 3 is an elevational view partly in cross section of a modification.

35 Figure 4 is a bottom plan view of the modification shown in Figure 3.

Figure 5 illustrates a modification in which the base of the cleaning device is separate and offset at an angle from the ironing surface.

40 Figure 6 illustrates a device similar to that shown in Figure 5 but having a modified form of pump handle.

Figure 7 is a vertical cross sectional view of a modification utilizing an electrically operated pump.

45 Figure 8 is a cross sectional view taken along the plane indicated by line 8—8 of Figure 7.

50 In its preferred form the cleaning device of my invention comprises a relatively heavy

base portion having a shallow concavity or depression therein, the area through which the depression extends corresponding to the cleaning area when the device is in operation. A receptacle is provided for holding a 55 quantity of the desired cleaning fluid and a suitable pump is provided for circulating the cleaning fluid to and from the depression in the cleaning device. In operation the device is adapted to be positioned over the material to be cleaned so that the soiled area forms one wall of a closed chamber, the other sides of which are defined by the depression in the device. Preferably, means is provided for heating the cleaning liquid and if 60 desired, an ironing surface can be provided which can be heated by the same means.

Referring now to the drawings and first to Figure 1 thereof, I have shown a cleaning device having the form of the conventional electric flat iron. The ironing surface 16 is adapted to be heated by suitable electric heating elements, the electrical connections being made at the terminal socket 17 in a manner well known in the art. Disposed within the body 75 of the device is a receptacle 18 for holding a quantity of cleaning liquid which, if desired, may be ordinary soap and water. Preferably, the receptacle 18 is placed at a position in which sufficient heat is conducted from the heating element to raise the temperature of the cleaning fluid to the most effective value. When the device is designed for the use of soapy water, the design of the device can be such that the heat radiated and conducted to the receptacle 18 is sufficient to 80 raise the temperature to or near the boiling point of the solution. Near the center of the ironing surface 16 a depression 19 is formed having a horizontal area which corresponds with the area desired to be cleaned by the device at any one time.

Extending between the receptacle 18 and the depression 19 is a fluid conduit 21 having a check valve 22 therein so that fluid may 85 flow from the receptacle to the depression but not in the opposite direction through this conduit. Preferably, the conduit 21 opens into the depression near the outer edge thereof and if desired a manifold outlet can be 90 100

provided so that the fluid flows into the depression at a plurality of spaced points disposed about the boundary of the depression, as shown in Figure 4 in connection with another embodiment of the invention.

A conduit 23 leading from a point near the center of the depression extends to a pump cylinder 24. A one-way valve which may be in the form of a flap valve 26 can be employed for permitting flow of fluid from the depression 19 to the cylinder 24 and for checking the flow in the opposite direction. A return fluid conduit 27 having a check valve 28 therein communicates between the pump cylinder 24 and the receptacle 18 and permits the return of the fluid to the receptacle. A piston 29 is adapted to be reciprocated within the cylinder 24 upon actuation of a handle 31 which can be biased in one direction by a spring 32.

In the operation of the device shown in Figure 1 the material to be cleaned is placed upon a suitable supporting surface and the cleaning device is placed over the material so that the depression 19 is positioned over the soiled area. When in this position a shallow chamber is formed having one side defined by the material to be cleaned and the other side defined by the depression 19. Before placing the device in this position, however, the heating element can be energized so that the temperature of the cleaning fluid is raised to the desired degree. It is to be understood that under certain circumstances it may be desirable to use the cleaning fluid at its normal temperature in which event the heating element will not need to be energized prior to the cleaning operation.

After the device is placed in operative position relative to the material to be cleaned, the handle 31 is actuated to reciprocate the pump piston 29 thereby drawing the cleaning fluid from the receptacle 18 through the conduit 21, throughout the chamber formed by the depression 19 into intimate contact with the material to be cleaned and into the cylinder 24 on the suction stroke of the pump piston. On the compression stroke, the cleaning fluid is caused to be discharged from the cylinder 24 through the conduit 27 and is forced back into the receptacle 28. The circulation of the cleaning fluid can be continued until the soiled portion of the material is thoroughly cleaned and thereafter the device can be moved back and forth over the material to dry and press the area which has been cleaned, the ironing surface 16 serving its usual function during this operation. It is to be understood that the device can be used as a conventional flat iron whenever desired, a closure member 33 being provided for filling or draining the receptacle 18 as conditions may warrant.

In the embodiment shown in Figure 2, the handle 34 is pivotally connected at one end,

as at 36, to an upright member 37 secured to the device. The other end of the handle 34 is pivotally connected at 38 to a link 39 which in turn is pivoted at 41 to the piston rod 42 of the pump piston. A suitable latch 43, normally held in the position illustrated by a spring 44, can be employed to retain the handle 34 in a relatively fixed position with respect to the body of the device. When it is desired to operate the pump to effect circulation of the cleaning fluid, the latch 43 can be released, thereby permitting the handle 34 to be rocked about the pivot 36 to actuate the pump piston 29. Thus, the handle 34 serves as an ordinary flat iron handle and in addition serves as a handle for actuating the pump. In other respects the embodiment shown in Figure 2 operates in the manner of that shown in Figure 1. If desired, a spring 46 can be provided for biasing the piston 29 toward one end of its stroke.

In Figures 3 and 4 a modification is shown having a somewhat different construction but the principles of operation in general remain the same. This construction is designed primarily to act as a cleaning device and, therefore, an ironing surface is not provided. A depression 51, shown as being circular in outline is formed in the base of the device and an annular ring 52 surrounds the depression. A receptacle 53 for the cleaning fluid is mounted in any convenient position on the device and a conduit 54 having a check valve 56 therein communicates between the receptacle 53 and an annular conduit 57 disposed above and lying in a plane parallel with the depression 51. A plurality of fluid openings 58 pierce the annular conduit 57 and permit fluid to pass into the depression 51 at spaced points near the periphery thereof. Adjacent each of the inlet openings 58 a counter-sunk arcuate groove 59 can be provided for insuring uniform application of the cleaning fluid about the entire periphery of the depression 51. A plurality of outlet conduits 61 extend from the central portion of the depression 51 into the pump cylinder 62 and, as in the embodiment previously described, a suitable valve 63 can be provided for controlling the direction of flow of the fluid. For returning the fluid to the receptacle 53 a conduit 64 having a check valve 66 therein can extend between the pump cylinder 62 and the receptacle. A suitable electrical heating element 67 can be disposed within the body of the device for heating the cleaning fluid. The heating element 67 in the embodiment illustrated is shown positioned about the walls of the pump cylinder and adjacent one wall of the receptacle 53 so that the elevated temperature of the cleaning fluid is maintained as it circulates through the device, but it is to be understood that the heating element can be disposed in any desired position to effect the result sought. The

piston rod 68 of the pump piston 69 is connected to an actuating handle 71 and if desired, a spring 72 can be provided for biasing the piston in the position shown in Figure 3.

5 When the device is positioned over the material to be cleaned and the pump operated, the cleaning fluid is drawn from the receptacle 53 into the annular conduit 57 and through the openings 58 into contact with
10 the material after which it passes through the central openings 61 into the pump cylinder. On the compression stroke of the pump the fluid is returned to the receptacle 53 by way of the conduit 64. By positioning the openings
15 58 for admitting the fluid to the material near the periphery of the depression 51 and the exhaust openings 61 near the center of the depression, I have found that the tendency of leaving a ring about the cleaned
20 area is greatly minimized.

In Figure 5 I have shown a modification in which the base 73 of the cleaning device is off-set and disposed at an angle to the ironing surface 74, thereby providing an ironing
25 surface which is uninterrupted over its entire area. Preferably, the receptacle 76 for the cleaning fluid is disposed at one end of the device and communicates with the pump at the other end through conduits 77 and 78
30 passing through the body of the device. In the construction shown in Figure 5, the pump is adapted to be operated by actuation of the handle 79 in a manner somewhat similar to the embodiment illustrated in Figure 2. The
35 relationship of the base 73 of the cleaning device and the ironing surface 74 is such that either may be applied to the surface of the material to the exclusion of the other. In the modification shown in Figure 6 the parts
40 have the same general relationship as in the embodiment shown in Figure 5, but the main handle 81 of the device is made stationary and an auxiliary handle 82 is provided for operating the pump.

45 In Figures 7 and 8 a modification is illustrated which utilizes an electrically driven pump. The interior of the device is made relatively hollow to provide a receptacle 84 for the cleaning fluid, an opening 86 near the
50 top of the device permitting the receptacle to be filled or to be drained. A depression 87 is formed in the bottom surface of the device and is connected to the fluid receptacle 84 by a conduit which has an upwardly extending
55 portion 88 and a downwardly extending portion 89. The downward portion 89 of the conduit communicates with an annular or oval conduit 91 having a plurality of outlets 92 extending into the depression 87 at a num-
60 ber of points near the outer boundary of the depression. A suction conduit 93 having a plurality of openings 94 near the center of the depression extends to the gear elements 96 and 97 of a gear pump actuated by the
65 shaft 98 of an electric motor 99. After pass-

ing through the pump the cleaning fluid is discharged into a conduit 101 which returns the fluid to the receptacle 84. An electrical heating element 102 serves to heat the cleaning fluid to the desired temperature. 70

In the operation of the embodiment shown in Figures 7 and 8, the device is placed over the material with the depression 87 positioned over the area to be cleaned, as described in connection with the embodiments shown in
75 Figs. 1 to 6. If desired, a valve 103 can be provided for controlling the flow of the cleaning fluid between the receptacle 84 and the chamber formed by the depression 87 and the surface of the material to be cleaned, either
80 by obstructing the flow as shown, or by admitting air to the top of tube 89. The valve 103 can be actuated in accordance with the actuation of the motor control switch, if desired, and as representative of suitable means
85 for accomplishing this object, I have shown the valve 103 as being in the form of a plug which is moved to open and closed positions by a cam 104 controlled by the switch. The switch illustrated comprises a conducting seg-
90 ment 106 fixed to a shaft 107. The switch has four operating positions, designated on the drawing by the legends "Off", "Start", "Clean" and "Dry" and the segment 106 makes contact with an arm 108 to close the
95 motor circuit in all of the switch positions except the "Off" position. The cam 104 can be fixed to the shaft 107 or can be otherwise mounted to rotate therewith. In the embodiment illustrated a spring 111 is provided for
100 biasing the valve toward open position against the cam surface on cam 104.

When the switch is in "Off" position, the motor circuit is open between the segment 106 and the arm 108 and the cam bears against
105 the valve 103 to block the fluid passage formed by conduits 88 and 89. When the switch is moved to the "Start" position, the motor circuit is closed, as shown in Fig. 7, and the cam maintains the valve 103 in closed
110 position. Under this condition the motor 99 starts running and operates the pump 97, but no fluid is drawn from the receptacle 84 at this time for the reason that the valve 103 remains closed. Instead, air is drawn
115 through the material, entering beneath the surrounding ring 112 and passing through the conduits 94, 93 and 101. After the motor 99 has attained a proper speed, the switch can be moved to "Clean" position, thereby moving
120 the depression in the cam 104 adjacent the valve and permitting the spring 111 to move the valve to open position. Since the motor circuit remains closed, fluid is pumped from the receptacle 84, through conduits 88, 89, 91
125 and 92 to the chamber formed by the depression 87 and the surface of the material to be cleaned, from whence it passes through the conduit 93 to the pump and is returned to the receptacle 84 by the conduit 101. While the 130

fluid is circulating in this manner, it passes into direct contact with the soiled area of the material, thereby effectively cleaning the same. When the material has been cleaned sufficiently the switch can be moved to "Dry" position, in which position the motor circuit remains closed and the valve 103 is moved from open to closed position. The fluid conduit is therefore blocked and air is drawn through the material by way of the path described in connection with the "Start" position of the switch. The air passing through the material during this operation carries with it the moisture left in the material and in a relatively short time the material is thoroughly dried. Since the air passes beneath the heated ring 112 before it reaches the material being cleaned, the temperature of the air is raised, thereby enhancing and hastening the drying operation. At the end of the drying operation the switch can be moved to "Off" position, thereby opening the motor circuit and deenergizing the device. It is to be understood that any other suitable type of switch and valve can be employed, those shown in the drawing being selected merely to illustrate the principles of the invention.

While I have shown and described certain preferred embodiments of my invention, it is to be understood that I do not wish to be limited thereto, since the invention as defined in the appended claims can be embodied in a plurality of other forms.

I claim:

1. In a cleaning device of the character described, a plane base portion having a depression therein, said device adapted to be placed over the material to be cleaned whereby a chamber is defined by said depression and the surface of said material, and means for circulating a cleaning liquid through the chamber thus formed.

2. In a cleaning device of the character described, a plane base portion having a depression therein, said device adapted to be placed over the material to be cleaned whereby a chamber is defined by said depression and the surface of said material, means for circulating a cleaning fluid through the chamber thus formed, and means in said device for heating the cleaning fluid.

3. In a cleaning device of the character described, a plane base portion having a depression therein, said device adapted to be placed over the material to be cleaned whereby a chamber is defined by said depression and the surface of said material, means for circulating a cleaning fluid through the chamber thus formed, and an electric heating element for heating the cleaning fluid, said heating element being disposed adjacent the base portion of the device, whereby said heating element also serves to heat said base portion.

4. In a cleaning device of the character described, a body portion in the form of a flat iron, an ironing surface on said body portion and a pivoted handle for sliding the device over the surface of the material to be cleaned to iron the same, a receptacle for a cleaning liquid in said body portion and a pump for circulating the cleaning liquid from the receptacle to the material to be cleaned and back to the receptacle, said pump being operated by pivotal actuation of said handle.

5. In a cleaning device of the character described, a body portion in the form of a flat iron, an ironing surface on said body portion and a pivoted handle for sliding the device over the surface of the material to be cleaned to iron the same, a receptacle for a cleaning fluid in said body portion, and a pump for circulating the cleaning fluid from the receptacle to the material to be cleaned and back to the receptacle, said pump being operated by pivotal actuation of said handle, and a heating element for simultaneously heating said ironing surface and the cleaning fluid in said receptacle.

6. In a cleaning device of the character described, a flat base portion having a depression near the center thereof, said depression defining a closed chamber with the material to be cleaned when placed adjacent the surface of said material, an inlet and an outlet for a cleaning fluid communicating with the chamber thus formed, said inlet opening into the chamber near the outer boundary thereof, and said outlet leading from the chamber near the center thereof, and means for directing a cleaning fluid into and out of the chamber to clean the material forming one wall thereof.

7. In an electric flat iron, a cleaning device for circulating a heated cleaning fluid into contact with the surface of the material to be cleaned, the heating element of said flat iron serving to heat said cleaning fluid.

8. In an electric flat iron, a cleaning device for circulating a heated cleaning fluid into contact with the surface of the material to be cleaned, the heating element of said flat iron serving to heat said cleaning fluid, and means for effecting the circulation of said fluid operated by actuation of the handle of said flat iron.

9. In an electric flat iron, a cleaning device for circulating a heated cleaning fluid into contact with the surface of the material to be cleaned, the heating element of said flat iron serving to heat said cleaning fluid, the base of said flat iron being off-set and disposed at an angle to the base of said cleaning device, whereby either base may be applied to the material to the exclusion of the other.

10. In an electric flat iron, a cleaning device for circulating a heated cleaning fluid into contact with the surface of the material to be cleaned, the heating element of said flat

iron serving to heat said cleaning fluid, means for effecting the circulation of said fluid operated by actuation of the handle of said flat iron relative to the iron, and a base portion which is common to both the flat iron and the cleaning device.

11. In a cleaning device of the character described, a plane base portion having a depression therein, said device adapted to be placed over the material to be cleaned, whereby a chamber is defined by said depression and the surface of said material, a receptacle for storing a quantity of cleaning fluid, a heating element for heating said fluid and an electrically operated pump for effecting circulation of said fluid through the chamber thus formed and into contact with the surface of the material to be cleaned.

12. In a cleaning device of the character described, a plane base portion having a depression therein, said device adapted to be placed over the material to be cleaned whereby a chamber is defined by said depression and the surface of said material, means for circulating a cleaning fluid through the chamber thus formed, and means for blocking the path of the cleaning fluid and permitting a stream of air to be drawn through said chamber when desired.

13. In a cleaning device of the character described, a motor driven pump for circulating a cleaning fluid into contact with the material to be cleaned, a switch for controlling the circuit of said motor, a valve in the circulating path of the cleaning fluid movable into two positions for controlling the flow of the fluid, said valve in one of said positions blocking the flow of cleaning fluid and causing air to be drawn into the portion of the circulating path adjacent the material, and means connecting said switch with the valve to effect the actuation of the valve in accordance with the setting of the switch.

In testimony whereof, I have hereunto set my hand.

JOSEPH S. THOMPSON.