Feb. 16, 1932 E. SIEMERS 1,844,986

APPARATUS FOR DEVELOPING PHOTOPRINTS

Filed Nov. 28, 1930 2 Sheets-Sheet 1

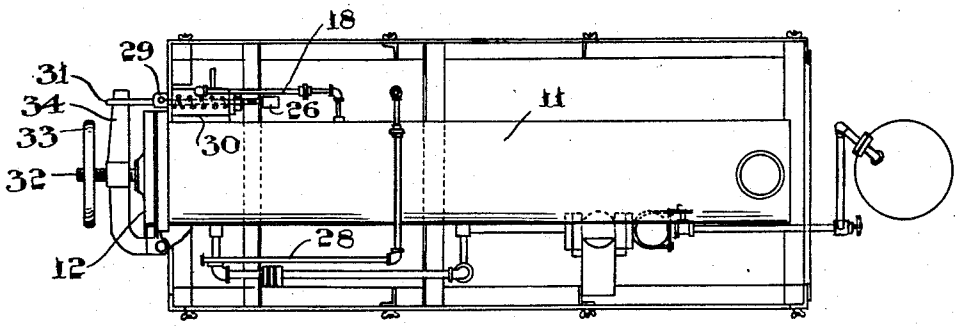


FIG. 4

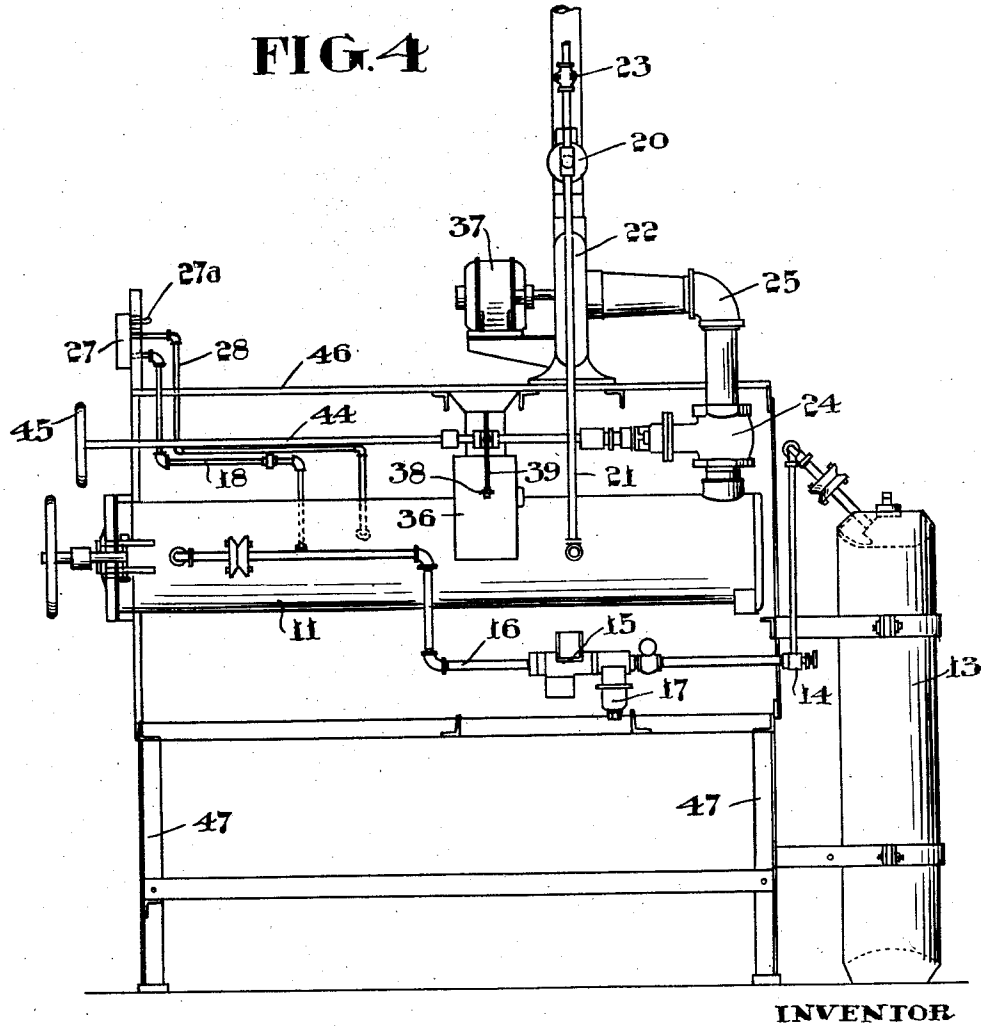


FIG. 1

INVENTOR
ERICH SIEMERS
BY J. D. O'Connell
ATTORNEY

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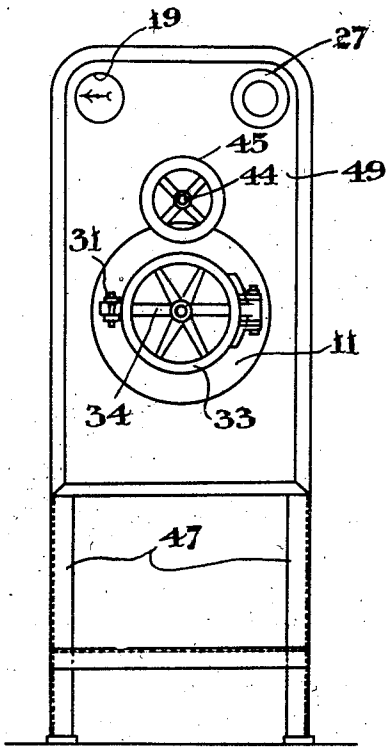


FIG. 2

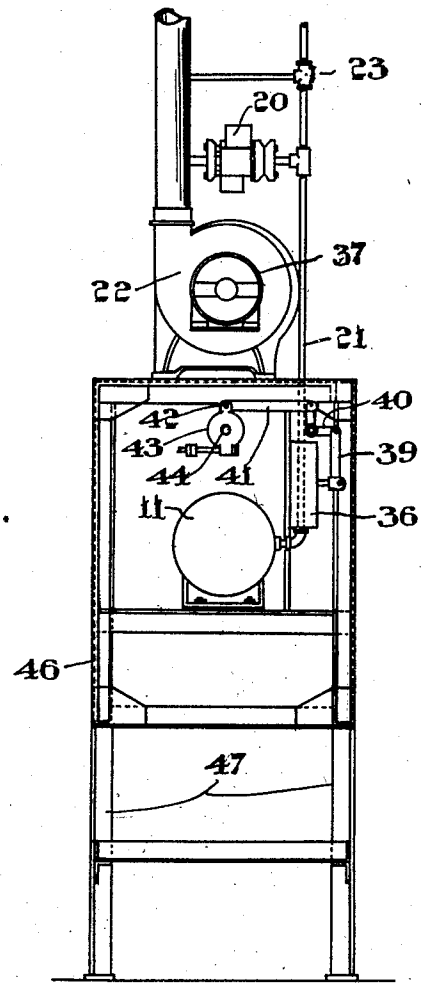


FIG. 3

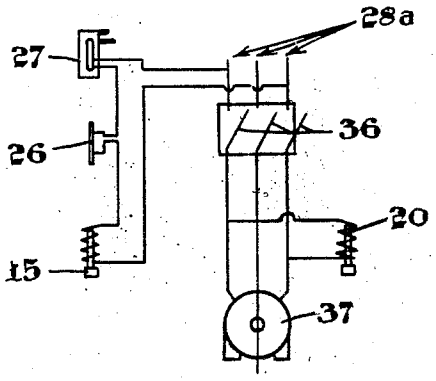


FIG. 5

INVENTOR
ERICH SIEMERS
BY J. D. O'Connell
ATTORNEY

Patented Feb. 16, 1932 1,844,986

UNITED STATES PATENT OFFICE

ERICH SIEMERS, OF MONTREAL, QUEBEC, CANADA, ASSIGNOR TO KALLE & CO. AKTIEN-GESELLSCHAFT, OF WIESBADEN-BIEBRICH, GERMANY

APPARATUS FOR DEVELOPING PHOTOPRINTS

Application filed November 28, 1930, Serial No. 498,872, and in Canada October 10, 1929.

This invention relates to apparatus for developing light sensitive materials, such as photographic prints of original drawings, pictures, tracings, and the like.

The principal object of the invention is to provide for the rapid and economical development of prints having a relatively clear, white background on which the lines of the original drawings, etc., are sharply and clearly reproduced.

Another object is to provide an improved apparatus for developing prints by subjecting the prints, while in a closed chamber, to the action of a gaseous developing medium, such as ammonia gas, which is introduced into the said chamber to develop a predetermined pressure therein.

In using the apparatus of this invention the prints are inserted in the developing chamber which is then sealed and placed in communication with a source of ammonia gas. When the gas pressure in the chamber reaches a predetermined value, sufficient to ensure full development of the prints, the supply of ammonia gas is discontinued and the developing chamber placed in communication with an exhaust connection. When the pressure in the chamber is reduced to around zero by escape of the gas through the exhaust connection, a current of air is then passed through the chamber to remove all residual traces of the gas from the prints.

Proceeding now to a more detail discussion of the invention, reference will be had to the accompanying drawings, wherein

Figure 1 is a side elevation of the developing apparatus.

Figure 2 is a front end view.

Figure 3 is a transverse sectional view.

Figure 4 is a sectional view taken along the line 4—4 of Figure 1. In this view certain parts appear in elevation.

Figure 5 is a wiring diagram.

Referring more particularly to the drawings, 11 designates a developing chamber equipped with a door 12 for controlling the opening through which the prints to be developed are inserted or removed. After insertion of the prints, the developing chamber is placed in communication with a tank 13 containing a gaseous developing medium such as liquid ammonia under pressure. This is accomplished by opening valves 14 and 15 in the supply line 16 which is preferably equipped with a filter 17. The liquid ammonia expands as it leaves the tank 13 and enters the developing chamber in gaseous form. The developing chamber is provided with a pipe connection 18 leading to a pressure gauge 19. When the gaseous developing medium reaches a predetermined pressure in the developing chamber, (usually about 15 lbs.) sufficient to ensure full development of the prints, the supply of the gaseous medium is discontinued by closure of the inlet valve 15. The gaseous medium is then discharged from the chamber by opening a valve 20 in an exhaust pipe 21 leading to the pressure side of a blower 22. Exhaust pipe 21 is also preferably provided with an automatic pressure release valve 23 in order to guard against the development of excessive pressure in the developing chamber. When the pressure in the developing chamber drops to around zero, following opening of the valve 20, the residual traces of the gaseous developing medium may be removed by opening both the door 12 and a gate valve 24, the latter being located in a pipe 25 connecting the developing chamber to the suction side of the blower 22. This causes a strong current of air to pass through the chamber in the direction of the valve 24 and thoroughly cleanses the prints of the last remaining traces of the ammonia or other gaseous developing medium.

When the apparatus is in use, the valve 15 functions as the main control valve for establishing and disrupting communication between the developing chamber and the tank 13. The valve 14 is a shut-off valve and during operation of the apparatus is used mainly to regulate the effective flow passage through the supply line 16. Valve 14 is fully closed only when use of the apparatus is to be temporarily discontinued. In the present instance, valve 15 is shown as a magnetic stop valve controlled by a self-closing door switch 26 and a pressure operated switch 27, the latter being of a well-known semi-automatic

"mercoid" type provided with a knob 27*a* capable of being manually operated to set the switch in a circuit closing position. Switch 27 is connected to the developing chamber through a pipe connection 28 and is adapted to be automatically opened when the gas pressure in the developing chamber reaches the predetermined value previously referred to. The door switch 26 is mounted at one side of the developing chamber 11 and is normally held open by one end of a spring pressed plunger 29. This plunger operates in a casing 30 and is provided with a pivoted bail 31. The door 12 of the developing chamber is carried by the inner end of a pressure applying screw 32 having an operating handle 33. This screw is threaded through a bar 34 having one end hinged to the developing chamber and the other end adapted to be engaged by the plunger bail 31 when the bar is swung to a door closing position. When the bail 31 is swung over the free end of the bar 34 and the door 13 is screwed home, the resulting outward pressure on the bar causes the plunger 29 to move away from switch 26 and permits the latter to close. The "mercoid" switch, which is normally open, is also closed by manual setting of the knob 27*a*. The closure of switches 26 and 27 energizes the normally closed magnetic inlet valve 15 and causes said valve to open automatically as will appear from an inspection of the wiring diagram shown in Fig. 5. In this diagram, the valve 15, door switch 26, and "mercoid" switch 27 are shown connected in series with two of the mains 28 of a three phase current supply line. When the pressure in the developing chamber reaches the desired value, it acts through the pipe connection 28 to open the "mercoid" switch 27, whereupon the valve 15 automatically closes to discontinue the supply of gaseous developing medium to the developing chamber. The door switch 26 serves, principally, as a safety switch which permits the valve 15 to open only when the door 12 is tightly closed.

The exhaust valve 20 is also shown as a magnetic stop valve controlled by a normally opened switch 36 which also controls the operation of a motor 37 driving the blower 22. The switch 36 is provided with a handle 38 connected, by a link 39, to one arm of a bell crank 40. The other arm of the bell crank is connected by a link 41 to the arm 42 of a disk 43. The said disk is a friction fit on a spindle 44 having one end connected to the gate valve 24 and the other end provided with an operating handle 45. When the ammonia gas is to be discharged from the developing chamber, the spindle 44 is given a very slight turn in a counter clockwise direction sufficient to close the switch 36 without opening the gate valve 24. This closure of switch 36 sets the motor 37 in operation and also causes the exhaust valve 20 to open automatically so that the ammonia gas is free to escape through the exhaust pipe 21 to the pressure side of the blower 22 from whence the gas is blown to a suitable point of discharge. The switch 36 is connected to the supply mains 28 in series with the valve 24 and motor 37, as clearly shown in Fig. 5. After the gas pressure in the developing chamber has been reduced to around zero by the opening of the valve 24, the developing chamber is placed in communication with the suction side of the blower 22 to ensure the complete removal of all residual traces of the gaseous developing medium. This is accomplished by again turning the spindle 44 in a counter clockwise direction until the gate valve is fully opened. At the same time the door 12 of the developing chamber is opened so that a current of air is caused to pass through the developing chamber in the direction of the valve 24 and serves to thoroughly cleanse the developed prints. It will be understood in this connection that the friction fit of the disk 43 on the spindle 44 permits the spindle to turn within the disk after the rotation of the latter is arrested by its connection to the valve handle 38. Subsequent rotation of the spindle 44 to open the switch 36 and close the valve 24 resets the developing apparatus for further operation.

The developing chamber, together with the motor, blower, valves and switches described in the foregoing may be supported and assembled in any desired relation. In the present instance, the developing chamber 11, valves 15 and 24, and switches 26 and 36 are shown enclosed by a casing structure 46 equipped with supporting legs 47. The blower 22 is mounted on the top of the casing structure 46 and is provided with a shelf 48 supporting the motor 37. The gauge 19 and the "mercoid" switch 27 are mounted on a panel board 49 secured to the front end of the casing structure.

Having thus described my invention, what I claim is:

1. In an apparatus for developing prints the combination of a developing chamber, a door adapted to close said chamber, means actuated by said door and operative only when said door is in closed position, for supplying a gaseous developing medium to said chamber, and automatic means actuated by the pressure within said chamber for shutting off said supply of gaseous developing agent when a predetermined pressure has been established within the chamber.

2. In an apparatus for developing prints the combination of a developing chamber, a door adapted to close said chamber, an inlet valve for supplying a gaseous developing agent to said chamber, means actuated by the closure of said door for allowing the opening of said inlet valve only when said door is in closed position, and automatic means ac-

tuated by the pressure within said chamber for shutting said inlet valve when a predetermined pressure has been established within the chamber.

3. In an apparatus for developing prints the combination of a developing chamber, a door adapted to close said chamber, a magnetic valve for supplying a gaseous developing agent to said chamber, an electric switch actuated by the closure of said door and connected with said valve so as to permit the opening of said valve only when said door is in closed position, and an electric switch actuated by the pressure within said chamber and connected with said valve so as to close the valve when a predetermined pressure has been established within the chamber.

In witness whereof I have hereunto set my hand.

ERICH SIEMERS.