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APPARATUS FOR DEVELOPING SENSITIZED PAPER

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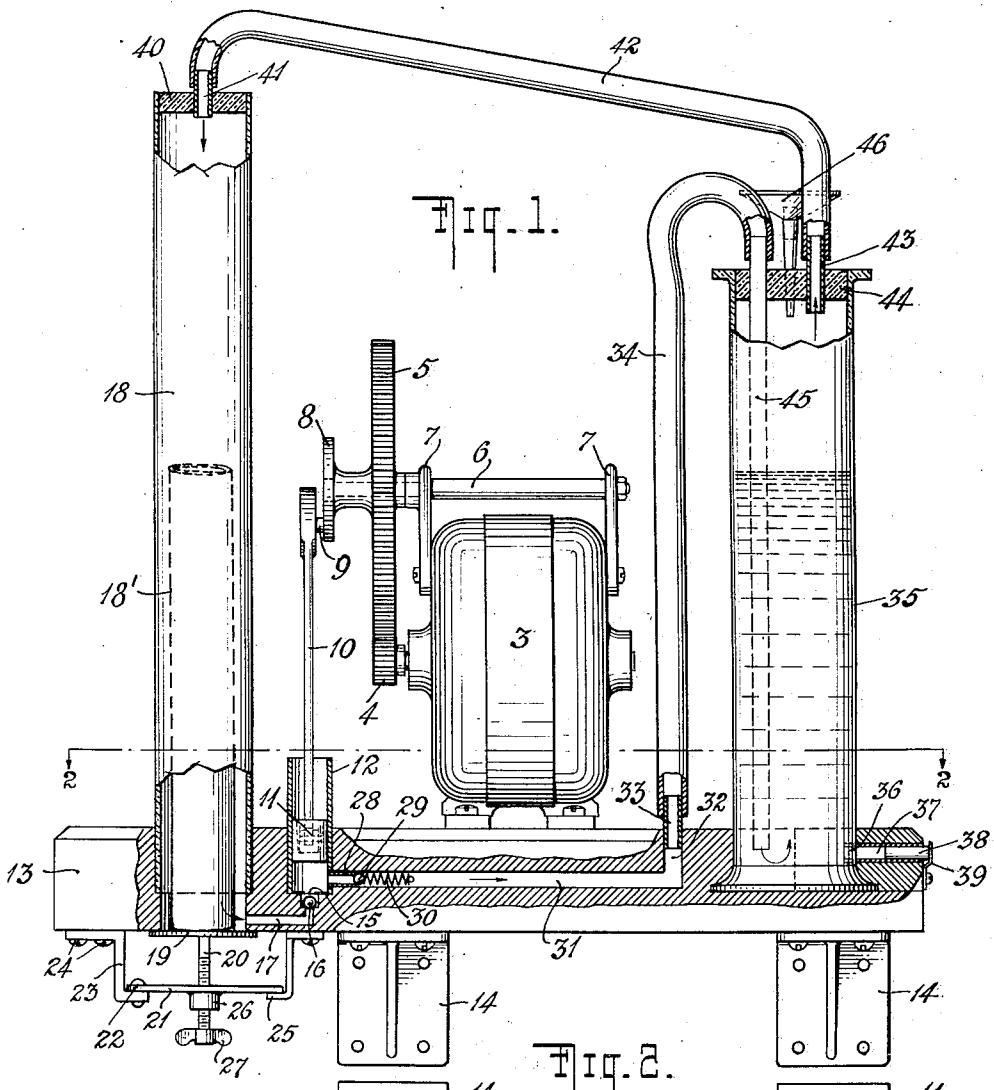


Fig. 1.

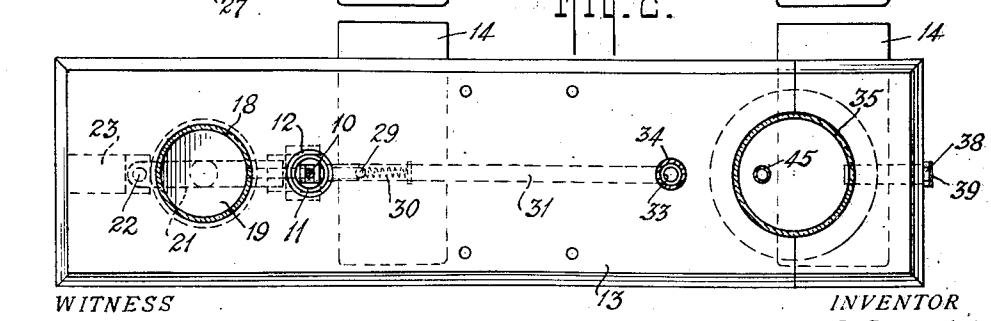


Fig. 2.

WITNESS

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APPARATUS FOR DEVELOPING SENSITIZED PAPER

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My invention relates to apparatus for developing paper sensitive to light and particularly to apparatus for developing such paper by means of fumes liberated from an ammonia solution. Such fumes are mixed, in accordance with my invention, with air which has been permitted to bubble through the solution of ammonia, the admixture of air and ammonia fumes being continuously circulated through an apparatus including a glass container into which the sensitized paper to be developed is placed so as to subject such paper to such admixture of air and ammonia fumes.

The sensitized paper which is to be developed by my apparatus is such that the print made by the exposure of the paper to light is developed in a dry condition by the ammonia gas admixed with the air circulated over the paper.

An object of my invention is to provide apparatus for a process of developing sensitized paper by the circulation and recirculation of air through a liquid charged with a developing medium in such a manner that a rapid and uniform developing action by reason of the instantaneous gas generation from the ammoniated solution is obtained. A further object of my invention is to provide apparatus for a process for developing sensitized paper in which the necessary ammonia fumes can be developed rapidly, even from an extremely weak solution of the developing medium. Thus a greater economy in the practice of the process is possible than has been afforded by the prior art practice, in which a strong or concentrated solution of the developing medium was necessary in order to obtain satisfactory results. A still further object of my invention is the provision of a process which makes the development of the sensitized paper a simple and rapid method characterized by continuity and uniformity of action. The apparatus for carrying out my process necessitates an extremely small amount of attention, both with respect to the mechanical steps of inserting into and extracting prints from the apparatus and the ease with which the developing medium can be changed or replenished. The apparatus is further characterized by the absence of any possibility of corrosion of any of its parts. A further and important feature of such apparatus is its capacity to permit the operator to observe the development of the print, eliminating the necessity of periodically opening the print container to ascertain the degree of development, with its attendant loss of developing medium, time, and efficiency of the process.

A particular embodiment of an apparatus in accordance with my invention is shown by way of illustration, but not by way of limitation, in the accompanying drawing in which

Fig. 1 is a front view, partially in section, of the apparatus showing the arrangement of parts thereof, and

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

Referring more particularly to the drawing, 3 is an electric motor having a pinion 4 at the end of its shaft, meshing with gear 5 mounted on a shaft in sleeve 6, supported on and above the motor 3 by brackets 7, 7.

Integral with the gear 5 is an eccentric crank 8 to which is connected by means of a crank pin 9 connecting rod 10 having at its end, piston 11, sliding vertically within the cylinder 12 of a plunger pump, suitably mounted within the base 13 supporting the apparatus. The base 13 may be mounted on a wall by means of brackets 14, 14.

In the bottom surface of the cylinder 12 of the plunger pump is an aperture 15 providing a seat for a ball valve 16 adapted to be seated when the piston 11 moves downwardly so as to close channel 17 communicating with a glass container 18 mounted in the base 13, access to the interior of the container 18 for inserting the print 18′ thereinto being provided by a cover 19 having depending therefrom bolt 20 passing through a plate 21 pivoted at 22 on a bracket 23 secured to the base 13 by screws 24, 24. The end of the plate 21 opposite its pivoted end is supported by a bracket 25. The plate 21 is provided with a lock nut 26 and bolt 20 carries a wing nut 27.

In the side of the cylinder 12 adjacent its bottom end is a sleeve 28, the end of which serves as the seat of a ball valve 29 seated against the sleeve by means of spring 30. The sleeve 28, valve 29, and spring 30 are disposed within channel 31 running longitudinally of the base 13 and having an upwardly directed elbow 32 into which is inserted a sleeve 33 to which may be attached a tube of rubber or similar material 34. A glass container 35 is mounted partially within the base 13 and has in its side adjacent its bottom surface an opening 36 communicating with a drain channel 37 having a plug 38 inserted therein, retained therein by any suitable means such as a pivoted metal strap 39.

The container 18 is provided at its upper end with a rubber stopper 40 into which is inserted a sleeve 41 connected by rubber tubing 42 to a sleeve 43 in a rubber stopper 44 closing the upper end of the container 35. The tubing 34 is attached to a glass tube 45 passed through the stopper 44 of the container 35, such glass tube extending throughout the length of the container and terminating at a point adjacent its inner bottom surface.

A stoppered funnel 46 is provided in the stopper 44 of container 35 for replenishing the supply of liquid in such container.

The operation of the apparatus is as follows:

The motor 3 actuates the plunger pump which extracts air from the glass tube 18 through the channel 17 and forces the air through the channel 31, rubber tube 34, and glass tube 45 as shown by the arrows. The air is liberated at the bottom of the glass container 35 and bubbles up through the ammoniated solution in such container. The agitation caused by the flowing of the air through the solution releases the ammonia, and the admixture of gases is forced through the tube 42 so as to reenter the glass tube 18 at the top thereof. While the motor is running, a continuous circulation of air and ammonia is thus obtained, the admixture of gases (air and fumes of ammonia) passing over the sensitized paper placed in the glass tube 18, thus developing such sensitized paper in a dry condition.

The degree of development of the print or sensitized paper inserted in the tube 18 may be observed by the operator so that as soon as the developing process has reached the proper stage, the operator may remove the print from the tube 18 by opening the cover 19 by pivoting the plate 21. The developed print will drop out of the tube 18. As the operation of removing the print from the tube 18 takes but a moment, after which the tube may be again closed by means of the plate 19, very little if any ammonia is lost during the removal of the print.

It may be noted that the direction of circulation of the admixture of ammonia fumes and air is in itself an important feature of my process. The natural tendency of ammonia gas is to rise to the top of a tube containing air and the direction of circulation is purposely opposed to this with the object of steadying the action by forcing a solid column of ammonia downwardly through the tube 18 and always extracting from the developing tube 18 that part of the contents which contains the least amount of ammonia.

By reason of the fact that in accordance with my process a continuous circulation and recirculation of the air contained in the apparatus through the liquid charged with developing medium is maintained, running the apparatus empty, i. e. without the insertion in the developing tube of a print, does not deteriorate the developing medium. The only loss of ammonia occurs in the actual chemical process of development and while admitting or withdrawing prints. The apparatus will therefore continue to run for a substantial length of time without replenishment of the ammoniated solution contained in the glass jar 35.

While I have described a particular embodiment of an apparatus adapted to carry out my process, it is obvious that various changes therein, particularly in the disposition and arrangement of parts, may be made without departing from the invention.

I claim:

1. In an apparatus for developing sensitized paper, the combination of a motor, a plunger pump, a glass tube for retaining the paper to be developed, a container having therein a liquid charged with a developing medium, and conduits between said glass tube, plunger pump and liquid container for circulating air charged with the developing medium in a continuous path.

2. In an apparatus for developing sensitized paper, the combination of a motor, a pump, a glass tube into which the paper to be developed is to be inserted, a container charged with an ammoniated solution, a conduit between said glass tube and said pump, a second conduit between said pump and said container for conducting a mixture of air and ammonia fumes from said glass tube into the solution in said container, and a conduit connecting the upper portion of said container with the upper portion of said glass tube.

3. In an apparatus for developing sensitized paper in dry condition, the combination of a glass developing tube into which the paper to be developed is inserted, a plunger pump, a conduit connecting said plunger pump with the bottom portion of said glass tube, a glass jar containing a liq-

uid charged with ammonia, a conduit between said plunger pump and said glass jar delivering a mixture of air and ammonia fumes to the bottom portion of said glass jar, and a conduit connecting the upper portion of said glass jar with the upper portion of the tube containing the print whereby a continuous stream of admixed air and ammonia is passed over the print to be developed.

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