in at the large lower orifice is determined by the ratio of upper exit area to gas volume, since the upper exit is responsible for back pressure from the gas passing through it. This critical ratio may be varied by adjustment of either gas flow or exit width, or both.

Several constructional details are important. The "skirt" is made of hard asbestos plates (sheet metal warps badly) attached to end-plates by single bolts, so as to permit adjustment by rotation of the sides. The end-plates are mounted upon the ends of the burner tube, the whole forming a chamber surrounding the flame and parallel to it. The upper orifice is situated about one and a half inches above the burner tube, and the lower orifice about an inch below this tube (not critical). All screw-heads on the inner surface must be countersunk, as the flame mirrors faithfully any such irregularities.

Because of the great improvement in uniformity of the flame it has been found advantageous to insure constancy of the paper surface during smoking. This has been accomplished by mounting adjustable uprights at either end carrying roller discs between which the drum shaft rests and rotates during smoking. The paper surface should not be nearer than about one inch from the upper orifice, as the amount of gray ash deposited increases with nearness to the flame exit.

In practice, the upper orifice must be made a little wider than that which yields the coolest and smokiest flame. This limitation is imposed by the fact that combustion can be made so incomplete as to deposit an admixture of gray ash along with the carbon.

With this relatively cool flame the carbon deposit possesses remarkably little adhesive power, consequently requiring very little writing-point pressure. However, this improvement carries with it the penalty that the deposit may be partially removed by the slight force of immersion in shellac solution, causing streaking. This may be entirely obviated by the simple expedient of floating the record on the shellac surface for a few seconds before plunging it in as usual, so that the carbon deposit is gently moistened by the liquid soaking through the paper, and is then not removed by subsequent immersion. Parenthetically, this same method has also been found to yield great improvement in the optical qualities of records smoked by the conventional flame. It appears that the initial submersion method removes a loosely adherent surface carbon layer, leaving a thinner and more shiny surface which is optically much poorer. This great difference may be very easily and convincingly demonstrated by "float wetting" only half of a record prior to immersion of the whole. The preliminary flotation wetting requires no appreciable increase in time, and is sufficiently complete as soon as the surface changes perceptibly, which occurs within a few seconds.

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OXIDATION PREVENTION

RAPID spoilage of photographic developing solutions by oxidation is common, annoying and expensive. The usual method for reducing such loss is by repeated transfer of the solutions as they are used up to successively smaller bottles, so that there will be a minimum of air between the liquid and the stopper. Such transfer is a nuisance and requires maintenance of a stock of bottles varying in capacity, each kept scrupulously clean, ready for filling and labeling.

A layer of cheap mineral oil an eighth of an inch deep will float on the top of developer in any bottle, will prohibit this destructive oxidation and will adjust its level to the volume of unused solution. Developer may be removed from below the oil or added under the oil by such a siphoning arrangement as shown. Developer may be induced to rise in the glass tube *A*

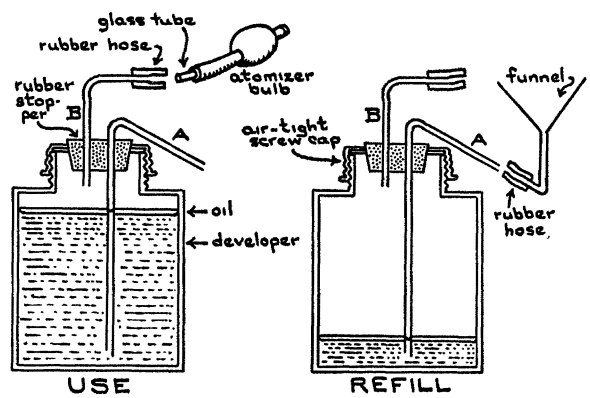

FIG. 1

and overflow into any container by blowing into the glass tube *B*. For such blowing, a cheap atomizer bulb may be "plugged in" to the *B* tubes of any number of such units, one after the other, and used to increase the air pressure over the developer. Unplugging the atomizer unit quickly releases the pressure and stops the flow. The only air–developer contact is in the tube *A* and is of negligible area. It is good technique to dry off the open end of tube *A* after removal or addition of solution since a drop will collect there, but otherwise there is nothing to wash, wipe, move or label.

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