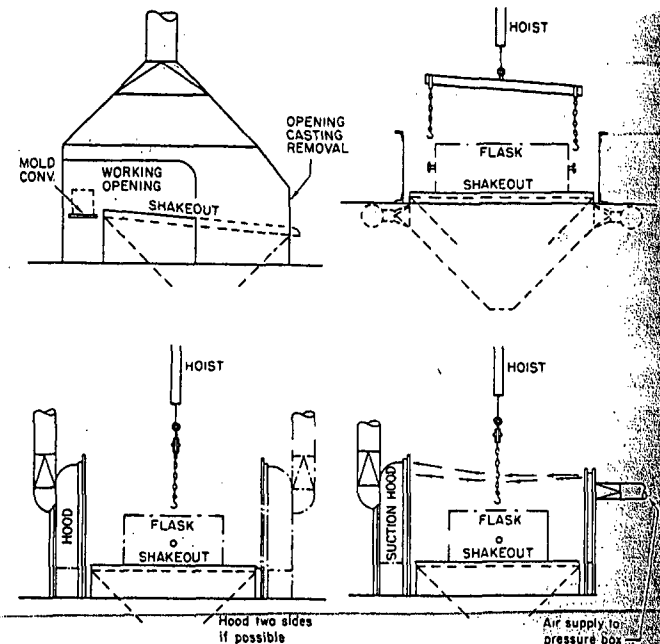

Figure 11. Several methods of ventilating shakeout processes. (From J. M. Kane, *Foundry*, **66**, 30 (January, 1938).)

moving down into the hood. To succeed under such conditions the air velocity downward must be generously in excess of the thermal updraft velocity. Another problem is the inevitable obstruction created by the work as it is placed upon the grille or openwork of the downdraft hood. The solution is to provide a grille considerably larger than the product to permit the required amount of air to pass down alongside the work fast enough to oppose crossdrafts and thermal effects.

10. Slot-Exhaust Ventilation for Tank Processes

Figure 12 illustrates the slot or lateral-exhaust type of ventilation commonly applied to tanks for cleaning or degreasing, stripping, paint dipping, heat treating, anodizing, electroplating, and deplating. The air velocity into the exhaust slot is determined by the total quantity of air flow required to suppress or hold the contaminant within the tank, and the size of slot selected by mechanical considerations.

The *minimum* practical slot velocity for the design of Figure 12 is about 1000 l.f.m. in the interest of reasonably uniform distribution of air flow, when a single duct connection is used with slot extending around the tank. Lower velocities will

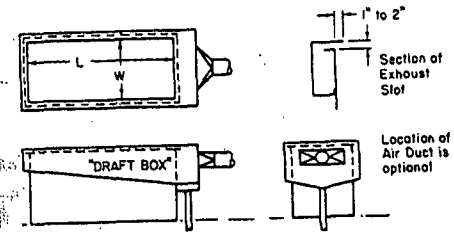

Figure 12. Slot exhaust ventilation for tank processes. Slope draft box to drain for flushing purposes; provide drain pipe with water seal or trap deep enough to prevent air flow up through pipe. An alternate method of draft box design is extension to the floor to connect with ducts below floor level.

give uniform distribution only when several duct connections can be made to the "draft box" or when the box or manifold is unusually large.

The *maximum* practical slot velocity is about 3000 l.f.m. in the interest of power economy, and minimum entrainment of mists or agitation of tank contents. Higher air velocities through very narrow slots *may* improve the uniformity of air distribution around the tank when the mechanical design or construction of duct-work is not good, but they should not be used unless power cost is of no consequence, or unlimited exhaust fan capacity is available.

The quantity of air flow required is determined by the equation:

$$\text{c.f.m.} = (\text{volume factor})\ (L)\ (W)$$

where c.f.m. = the total air flow in c.f.m., L = length of tank in feet, and W = width of tank in feet. *Volume factors* are suggested in Table 11.

TABLE 11

Air Volume Factors for Tank Ventilation[a]

Volume factor (c.f.m./sq. ft.)	Process or application
50	Solvent or vapor degreaser (trichloroethylene)
100	Hot water rinsing tank (nuisance control)
150	Chromium electroplating, cyanide solution
150	Plating solutions giving off much gas or mist
150	Muriatic acid (HCl) pickling
150	Molten salt baths for heat-treating
150	Aluminum anodizing
200	Electrolytic cleaning with sodium hydroxide
200	Hot caustic or alkali cleaning or degreasing
200	Boiling water solutions (steam and mist control)
250	Stripping with concentrated nitric acid
250	Stripping with concentrated nitric and sulfuric acids
250	Hot nitric-hydrofluoric acid pickling
250	Hot sulfuric acid pickling

[a] See also recommendations in American Standard for Ventilation and Safe Operation of Open Surface Tanks, Z9.1–1951. American Standards Association, New York, 1951.