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CONSTRUCTION OF A GENERATOR FOR DRY AEROSOLS, (U)  
FEB 77 R FONTANGES, J - FOURNIER

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K98. CONSTRUCTION OF A GENERATOR FOR DRY AEROSOLS

by R. FONTANGES, and J.-M. FOURNIER

TRAVAUX SCIENTIFIQUES, ANNEE 1971, CENTRE DE RECHERCHES DU SERVICE DE SANTE DES ARMEES, pp. 301-302.

(Translated by Phebe W. Summers)

OBJECTIVE

↙ Vaccination by dried antigen aerosols necessitates use of generators for solid particles of controlled size. This should be between 1 and <sup>MICROMETERS</sup> 5<sub>μ</sub>. In this case, the antigens could reach the lower respiratory passages and instigate local immunity.

APPROACH

↙ Production of liquid aerosols at controlled size is well known. On the contrary, it is very *difficult* to obtain a homogeneous powder and disperse it in aerosol form for inhalation. Phenomena of coalescence and hydration develop and the kinetics of settling are not very reproducible. The apparatus which we have used for the problem in the Microbiology Division seems to respond to the specific criteria <sup>THAT HAS BEEN</sup> ~~we have~~ established.

---- optimum sizing between 2 and 3 μg,

---- rapid delivery,

---- easy manipulation.

RESULTS (Fig. 1 and 2)

The solid aerosol generator constructed according to our plan functions according to the principal of blast-pipe grinder which reduces the dried product to fine particles by action of jets of compressed fluid (air or nitrogen, for example) in a circular chamber called a micronizer.

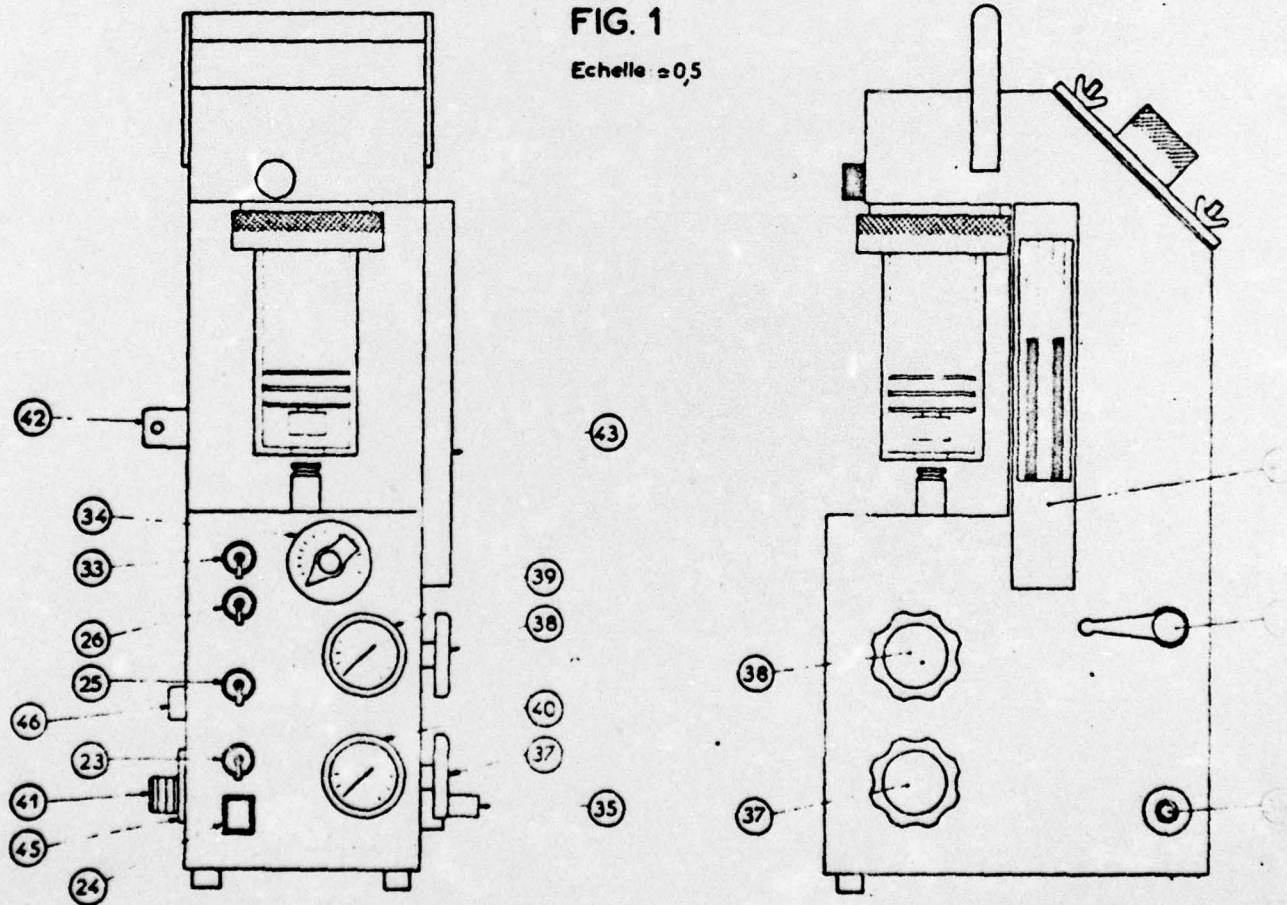
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NOMENCLATURE OF THE APPARATUS PARTS

- 23 -- General switch for electric current
- 24 -- Signal light
- 25 -- Grinding motor switch
- 26 -- Piston switch
- 33 -- Inverter of the piston thrust
- 34 -- Potentiometer for regulating piston speed
- 35 -- Orifice of the fluid input
- 36 -- Pipe valve
- 37 -- Needle valve: for regulation of venturi pressure
- 38 -- Needle valve: for regulation of micronizer pressure
- 39 -- Manometer: micronizer pressure
- 40 -- Manometer: venturi pressure
- 41 -- Secondary orifice for exit to the outside
- 42 -- Pipe valve
- 43 -- Mercury manometer: control of supply reservoir level
- 45 -- Electric supply
- 46 -- Fuse



The micronizer is thus the essential part of the generator. It grinds, on the one hand, by the action of particles colliding against each other or against the walls of the grinding chamber and, on the other hand, it provides for particle size selection according to particle mass. In effect the centrifugal force created by the turbulent flux of compressed fluid carries the particles toward the chamber walls, but gradually as their size is diminished by the effect of repeated collisions, they come together in the center of the grinding chamber. When the particles are sufficiently fine and buoyant, they are carried to the outside by means of an orifice oriented with the axis of symmetry of the micronizer chamber. This orifice can be provided with a tornado.

The lyophilized product is introduced into the micronizer by a supply line which carries three elements, a venturi, a reservoir with a piston and a grinder blade.

The two electric motors which act on the inflow line are governed and regulated by an electric circuit. Finally, a circuit of compressed fluid (air or  $N_2$ ) assures the distribution and regulation of pressures to the venturi of the supply line and the micronizer.

#### CONCLUSION

In this technical resume, we have described an aerosol generator for dried products. This apparatus functions on the principle of a blast-pipe grinder. Its delivery is of the order of 1 gm of dry material per minute. The sizing of the powder obtained corresponds to the optimal conditions for aerosol vaccination.