In the Laboratory

A Vibrating Muller for the Preparation of Dispersions of Fine Pigments for Electron Microscopy [1]

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In the preparation of fine pigments for examination in the electron microscope it is often difficult to break apart the smaller aggregates of the material. Where it is desired to resolve the ultimate particles in the micrograph, a considerable amount of work must be exerted upon the pigment.

A small portion of pigment, oil, and plastic are generally placed upon a flat glass plate, and a hand muller is used to press and grind and thus disperse the powder in the matrix. From a solution of the mixture a thin film is cast upon water and forms a support for the included pigment particles (*1*). Some other aspects of the technique involving solvents and the wetting of pigments have been described (*2*).

In the mulling of fine-particle pigments such as carbon black the aggregates remain unbroken in the film between the muller and the glass plate.

A new mechanical vibrating muller (Fig. 1), greatly increases the work exerted upon such a pigment mix-

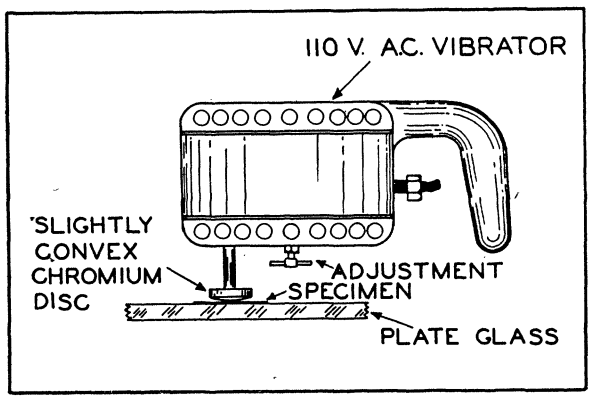

FIG. 1

ture. It consists of a 110-volt A.C. electromagnetic vibrator unit, to which is attached a hardened steel mulling head. The mulling head is very slightly convex so that more perfect contact with the glass plate is obtained. The vibration occurs in an arc with the mulling head shaft as its radius. A handle on the vibrator unit permits hand-mulling concurrent with the vibrating effect.

The use of this device results in greatly increased work upon the pigment through direct contact and through the transfer of energy by vibrations in the matrix. By this method the time and effort required to disperse ultimate particles is substantially decreased.

[1] Acknowledgment is made of the helpful cooperation of the Buhl Foundation Research Project, University of Pittsburgh.

References

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A Note on the Silencing of Air-stirring Motors

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Air-stirring motors are often viewed with disparagement in the laboratory because of the rather large amount of noise which attends their use. This noise may be traced to four sources: (1) that arising from the turbulent discharge of air from the compressed air lines into tubing connecting with the motor; (2) that due to air rushing through the pipes and the connecting tubing; (3) that inherent in the use of an air motor, *i.e.* bearing noise and the clear tone of audio-frequency which is associated with all turbines; and (4) that resulting from the air rushing out of the small escape ports generally provided in the flat surface on top of the motor. Of these sources, the first and fourth are by far the most important because of both the intensity and the raucous character of the noise arising from them. The devices suggested here have been found very useful in reducing to a very large extent the noise from these two sources. The second and third sources enumerated are of smaller importance, but their contribution to the total noise may be minimized by suitable choice of connective tubing and by judicious oiling.

The noise associated with the discharge of air through a regulating valve from the compressed air lines into the connecting tubing may be reduced greatly if the air flow is controlled not by this valve, but rather by a screw clamp operating on the tubing a few inches from its junction with the air line. If the air is supplied at high pressure, it will probably be found necessary to wire the tubing onto the outlet.

It is thought that the procedure suggested here is effective because the turbulence resulting from the discharge of air under a high-pressure gradient at a sharp corner is eliminated and replaced by laminar flow past the constriction caused by the screw clamp.

The source of sound waves in connection with air discharged through the escape ports is undoubtedly the sharp edges of these ports. If the edges could be rounded and their radius of curvature increased, the noise would probably be reduced greatly. However, such a process is not generally desirable because it effectively requires reconstruction of the motor. The same end may be accomplished by clamping over the motor a small glass funnel, the diameter of which is less than that of the top of the motor but is sufficiently large to permit the funnel to cover the escape ports. The 2½-in. funnels generally available in chemical laboratories have about the correct diameter so that they fit readily over the top of the motor and may be held in place by many simple devices. The length of the stem is not critical; a very short stem seems to be as satisfactory as a long stem and is certainly much less in the way. The device presumably depends in its operation upon minimizing the relaxation oscillations from the escape ports, deadening the sound resulting from the oscillations which remain, and avoiding further oscillations by discharging the air at a smaller rate and in a state more nearly approaching laminar flow. Little or no effect upon the efficiency of the motor has been observed.

Letters to the Editor

Safeguarding Science in the NSF

The great interest of scientists in the various bills proposed to support scientific research is amply reflected in the continuing articles in *Science*.

It seems to me that scientists must not lose sight of the fundamental values in such appropriations. They will be valuable directly in proportion as they are valuable for research that is genuinely an effort to seek after the truth. They will become less valuable, and may even become a menace, if they are not protected at the outset so that the unvarnished truth may be sought after and properly published in the scientific journals now available for that purpose.

The history of all federal appropriations for educational research must be carefully scrutinized. There have been instances where funds for such purposes have been deliberately utilized for the production of propaganda to support the program of a given bureau or of a bureaucrat. Such utilization of funds will be condemned by all true scientists wherever they are.

One of the questions seems to be whether or not it is not better to obtain the money first and set up the safeguards afterward, and the rather competent statement is made that there is a certain amount of politics in connection with all funds available, whether it be within the great privately controlled research institutions or whether it be in public-supported research institutions. However, it is my opinion that it is very much better at the outset to put up every available safeguard, even at the risk of losing the appropriation, than it is to attempt to set up these safeguards after the bill or bills are written and entrenched interests established.

One has only to look at the ludicrous findings of the so-called "fact-finding boards" in instances already reported to know that no mathematical genius could ever have found the facts reported in the time that was available, coming out with figures that were identical for diverse industries. The layman can only look at the figures and say the fact finders were told what to find. The same sort of figures have been reported in the press in regard to what constitutes a sustaining diet for our people, and then the figures and results reported indicated that a large portion of the American citizens could not obtain a sufficient diet. An actual examination of the basis for the figures indicated rather clearly that a very large portion of our citizens had bad eating habits, but such a conclusion did not support the purpose of the interested bureaucrats. It must be evident to all scientists that this sort of thing is a waste of public funds and would become undesirable from the standpoint of scientists themselves.

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On the New Kilgore-Magnuson Bill—S. 1850

The new Kilgore-Magnuson Bill (S. 1850) inevitably is disappointing to anyone who believes in the efficacy of the democratic tradition as accepted in this country. It concentrates power in the hands of too few persons. It does not derive its authority from the "scientific people," great and small. Its great defect is the ease with which it can lead to regimentation. The Administrator provided in this new bill, together with the Board, appointed by the President, and the Committees which the Administrator appoints, will be exercising power without the consent of the governed. These are the men and women who actually do the work and who alone are