piano itself. The film, therefore, furnishes a full and adequate record of piano performance.

This preliminary notice of the camera was sent to this journal because it was felt that the method here employed has many possibilities for application in other fields of science.

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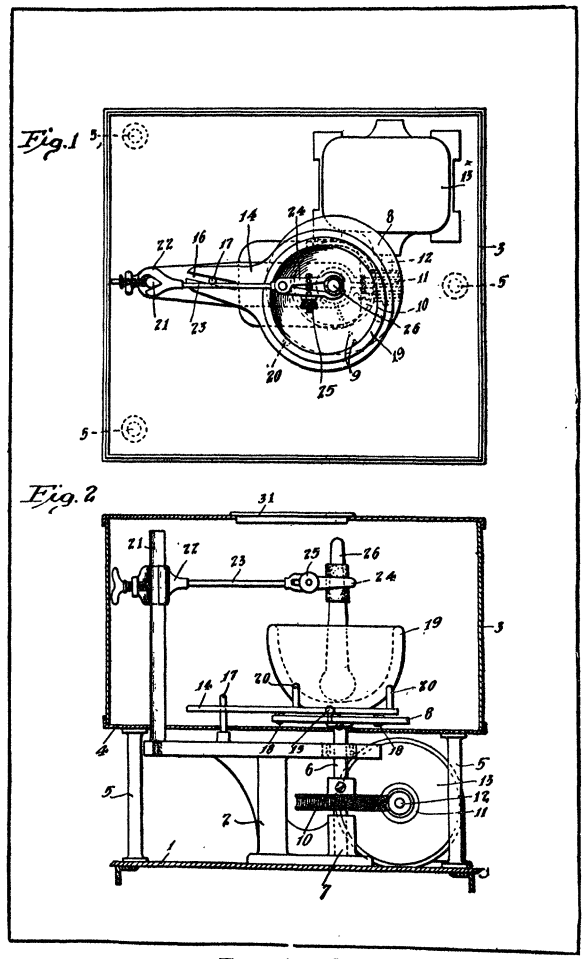
A NEW MECHANICAL DISINTEGRATOR

INVESTIGATORS working with filterable viruses appreciate how much time may be consumed in reducing virus tissues to a finely divided physical state, a task generally carried out by hand with the aid of a mortar and pestle. This method of grinding tissues is not only comparatively inefficient but also exceedingly monotonous and tiring. In order to overcome these objections in our own work, we designed a machine some time ago whereby the mortar and pestle could be operated mechanically. This apparatus has proved so satisfactory that we offer a brief description of it for the benefit of those who may be interested.



FIGS. 1 and 2

Fig. 1 gives a top view and Fig. 2 a lateral view of the machine. It consists of a suitable cast-iron pedestal (2), provided with a thrust bearing (7), into which is fitted a shaft (6), which passes through the floor (4) of the grinding chamber and bears at its upper end a driving disk (8) provided with several eccentrically placed apertures (9). Shaft (6) is driven by means of worm gear (10), which engages with a worm (11), attached to the horizontal shaft (12) of an electric motor (13). The machine is fastened to a metal base (1) on which rest also the legs (5) which support the floor (4) of the grinding chamber.

Within the grinding chamber a platen (14) is movably positioned above disk (8) by means of a pin (15) which fits into one of the eccentric apertures (9). The platen (14) is provided with a bifurcated end (16), which engages with a fixed pin (17) attached to the pedestal (2). The mortar may be fixed into position on the platen by means of rubber-covered metal fingers (20) extending upward from the platen (14).

The pestle (26) is held in position by means of a round flexible metal arm (23) provided with a clamp (24), operated with a thumb screw (25). The metal arm (23) is fastened by means of a special clamp (22) to a vertical triangular rod (21) fixed to the pedestal (2).

The mechanism described imparts to the platen holding the mortar an eccentric motion. By thus moving the mortar the pestle is brought into essentially the same operable relationship with the mortar as when the grinding process is carried out by hand. When desirable, grinding may be carried on under a hood (3), which may be entered by means of a hinged lid, provided with a glass window (31) to facilitate inspection of the material while the machine is in operation.

The machine described should prove useful not only in grinding virus tissues, but also in grinding most substances that are commonly disintegrated by means of a mortar and pestle.

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A METHOD OF TITRATING PROTEOLYTIC ENZYMES

IN 1927[1] the author published a brief note on a method of enzyme titration, which was later somewhat modified and demonstrated at the 1928 meeting

[1] *Proc. Soc. Exp. Biol. and Med.*, 24: 936, 1927.

of the Federation of American Societies for Experimental Biology. Since it has not yet been found possible to elaborate the technique, with protocols, in a longer article, as had been hoped, it seems best to publish these suggestions now and so to make them generally available for adaptation to individual problems in enzyme research.

The method is based on a reduction in the density of pieces of exposed photographic film by the release of silver through the progressive proteolysis of the gelatin layer. The relative densities before and after exposure to the enzyme solution are read against a suspension of the same gelatin-silver emulsion in a Duboscque type colorimeter, or by means of a photometer.

The film: Eastman Commercial, 8″ x 10″; 2 to 6 in a pile, irradiated by Roentgen ray, 50,000 v., 10 m.a., 25″ target distance, 2 min. exposure. (Small rectangles may be defined and numbered by lead strips and figures cemented to the cassette.) The exposed film is fully developed, fixed in plain hypo (no hardener), washed, dried, rewashed, dried again and cut into rectangles 2 x 2.5 cm.

The cells: No. 14 (1.5 mm) copper wire coiled around a 1.3 cm rod is snipped off in nearly complete circles (0.5 cm opening), bent flat and sealed with paraffin on 1.5 x 2 cm glass slips, with the opening on a 2 cm side. Backs are glass slips 1.5 x 2 cm. Cell, film and back are clipped together with a spring clothes-pin.

The colorimeter: A Klett, Bausch and Lomb or other Duboscque type is used, with spring clips under the tube shelves to hold the film carriers. These carriers are double leaves of thin brass, lacquered flat black, with centered 1 cm holes, between which the film is slipped for insertion under the shelf in the light path. The suspension for comparison is made of gelatin-silver emulsion, dissolved off of two films in hot water. Glycerin is added to 50 per cent. to delay sedimentation. A completely cleared film is used in the carrier under this tube. Fifty per cent. glycerin solution fills the tube above the test films. Both tubes must be at the same level when readings are made.

Method of use: Readings are made on each film before use, one film being reserved as a control. The others are each placed between a glass back and the copper ring of a cell, gelatin side to copper ring, and the whole held together with a spring clothes-pin. Enzyme solution is filled into the cell with a capillary pipette, and the cell placed upside down, gelatin film surface forming the roof, at constant temperature for a carefully timed interval. (A separate film is used for each determination desired.) Then the clothes-pin is released, the film is rinsed quickly in cold water and dried rapidly, clipped by one corner, before a fan. Units should be started at not less than fifteen-second intervals to allow for this rinsing of the successive films. When dry the density of each film is again read against the gelatin-silver suspension. Any change in the density of this suspension is revealed by a recheck on the control film, and the other control readings are corrected accordingly. Results are obtained in percentage of gelatin unaffected—the ratio of the final to the (corrected) control reading on each film. 100 minus this ratio, (*i.e.,* the percentage of gelatin affected) is proportional to the enzyme activity at the time and under the conditions of the test.

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SPECIAL ARTICLES

THE PRODUCTION OF HOMOZYGOTES THROUGH INDUCED PARTHENOGENESIS

BOTANISTS attempting to produce species hybrids have frequently obtained plants which resemble the maternal species exclusively. I have myself noted such results in various efforts to cross species of Nicotiana and of Fragaria. Obviously the most likely explanations of these phenomena (apart from certain special cases to which it is unnecessary to refer in this note) are (a) induced development of vegetative tissue, such as that of the nucellus, and (b) induced parthenogenesis.

More than a decade ago I endeavored to determine the true cause by an experiment on certain species of Nicotiana; but was unable to obtain positive results owing to the difficulty in finding satisfactory quantitative characters in the species employed. Some six years ago a similar experiment was started on the genus Fragaria. Two similar types of *F. vesca* ($2n = 14$) were crossed, in order to study the inheritance of the contrasting characters, red fruit and white fruit, and pink flower and white flower. These characters proved to be due to independent pairs of factors *R* and *r* and *P* and *p*, in which dominance of color was virtually complete. Accordingly, a first generation hybrid RrPp was pollinated with pollen from species such as *F. chiloensis* and *F. virginiana* ($2n = 56$). A number of maternals were obtained