Observatory, Johannesburg. The University of Michigan southern station is on Naval Hill, Bloemfontein; the Yale University southern station is in the grounds of the University of the Witwatersrand, Johannesburg.

The southern branch of the Harvard Observatory is at Mazelspoort, about fourteen miles outside Bloemfontein.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

SHAKING MACHINE FOR ANALYTICAL WORK

THE world's industrial progress has been measured by a number of different inventions, especially applied mechanical devices. When time became very precious, as it is in our days, human ingenuity had to stretch its limits seeking some machinery to save labor and energy.

A chemist in his laboratory, for example, knows how to appreciate all his apparatus which make him able to carry on his research or routine work quite conveniently. The shaking process, which is sometimes an important factor in analyses, is a very tedious and time-consuming operation. Yet, using a properly constructed shaking machine, the process becomes easy and simple. The shaking machine will do good and rapid work in many instances.

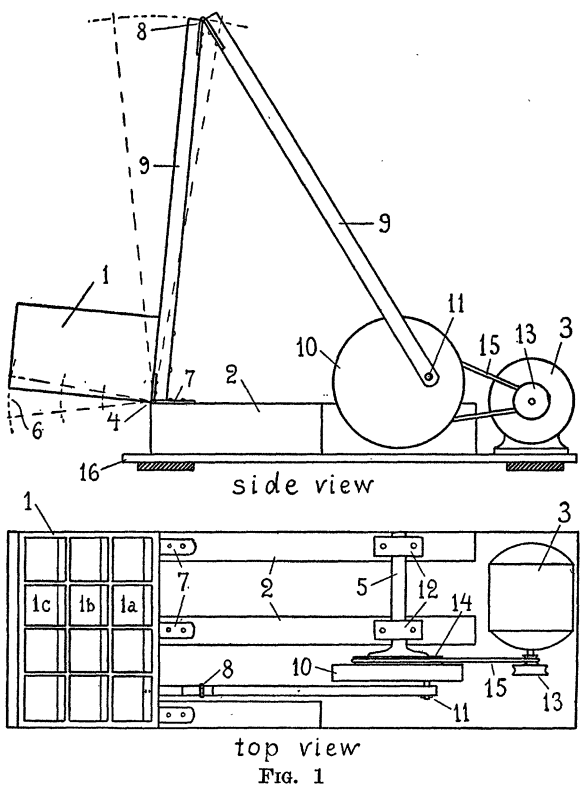

FIG. 1

The accompanying diagram represents one of the many useful shaking machines which have been designed and used in my laboratory of experimental embryology. This machine consists of a box with compartments (1) hinged to a base (2) and brought into a swinging motion by an electric motor (3) through a mechanical "system of four-links chain," where (4) and (5) are the axes of oscillation and rotation, and (6) is the maximum amplitude of swinging. Other parts of the machine are indicated: the hinges (7) and (8), shear legs (9), fly wheel (10) with crank and pin (11), bearings (12), motor pulley (13), driving pulley (14), belt (15) and base plate (16).

The shaking can be done in the box (1) with several samples under various amplitudes of swinging. The first row of compartments (1a) provides mild, the second (1b) moderate and the third (1c) intense shaking. If it is necessary, the amplitude of swinging in the machine can be easily adjusted by displacing the crank pin (11); and the speed of rotation can be regulated by the speed of the motor (3), using either a rheostat or several sizes of driven motor pulleys (13).

The machine described above, owing to its double action, or "swinging motion," might be particularly desirable in a thorough but gentle shaking or in any other special type of analytical work.

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AN APPLICATION OF STREAK AND HARDNESS USED IN CLAY GRADING

THE streak of a mineral is commonly used by mineralogists and geologists in its determination when the hardness of the mineral is less than that of the streak plate, but it is seldom that the mineral specimen itself serves as the streak plate for another substance and is thereby identified. This latter method, however, is used by workmen mining diaspore clay in Missouri to estimate the quality of the diaspore in the clay pits.

They have observed that when a lump of diaspore clay is broken by either a pick or "gad" (a steel wedge) a dark mark, the streak of the abraded steel tool, is left upon first-grade clay, whereas the inferior clay is only crushed or compressed where it is tooled. The workmen speak of the clay as "blacking" or "marking" well when the streak left upon the clay boulder by the iron tool is distinct.

Furthermore, it is known that the degree of "blacking," *i.e.*, the intensity and depth of color of the streak, varies directly with the alumina content of the clay. Since the value of high alumina clay is determined by its refractory quality and since this is dependent largely upon the alumina content, the depth of color of the dark streak is a valuable aid in estimating the quality of the clay. In practice a grader observes the "mark" made by the tool or his grading hammer, and quickly noting the fracture, texture and oolites present in the clay, sorts it into first grade, second grade or burley with a speed and accuracy that are surprising. An estimation of the alumina content to within 5 per cent. is regularly made, and under favorable conditions car-load quantities and even larger of one grade may be supplied with still less variation.

Although, upon a cursory examination, the test as outlined above might seem crude and undependable, its practicability is more evident after a review of some of the factors involved. Diaspore and burley clay are made up of the mineral diaspore, which contains 85 per cent. Al_2O_3, and a bonding matrix that is kaolin-like, its alumina content being in the neighborhood of 40 per cent. The hardness of diaspore is 6.5–7 (Dana), whereas that of kaolin is 2–2.5. It is evident that diaspore will scratch or cut steel, and that the kaolin-like matrix will not. Hence, the higher the diaspore content of the sample the more marked its abrasive action will be, the darker the streak of steel and the higher the alumina content. The clay functions both as a hardness element and as a streak plate. Quantitatively, clay containing 60 per cent. alumina and above will usually retain a mark, whereas that below 60 per cent. only packs or crushes to a slightly darker color and does not cut steel. An intense black to blue-black color is left upon clay running over 70 per cent. in alumina.

It might also be noted here that the clays higher in silica break with a more typical conchoidal fracture, those lower in silica with a more hackly break, similating, in this respect, the rhyolite-basalt fracture contrast. While the writer does not wish to indicate that the cause of the conchoidal fracture lies entirely in the high silica content he does wish to show that a relationship is suggested, and he points out the analogy to the igneous rocks because of its lithologic interest. A fuller discussion of the various means used in grading the high alumina clays of Missouri is published in *Brick and Clay Record,* October 8, 1929.

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SPECIAL ARTICLES

AN AQUEOUS EXTRACT OF THE SUPRARENAL CORTEX WHICH MAINTAINS THE LIFE OF BILATERALLY ADRENALECTOMIZED CATS

IT is a well-established fact that in cats and dogs bilateral adrenal extirpation results in death within a short time, generally within eight to ten days. The animals exhibit a train of symptoms which has come to be recognized as typical of adrenal insufficiency. Experiments have shown, moreover, that death is due to removal of the cortical portion of the suprarenal complex and not to interference with, or loss of, the medulla or adrenalin-containing portion.

Administration of adrenalin to bilaterally operated animals has been repeatedly tried but without success, since animals so treated derive no benefit from the injections and die with characteristic symptoms of adrenal insufficiency. We have made numerous attempts to prolong the life-span of adrenalectomized cats by injections of adrenalin, employing various dosages, but in no case have we noted any improvement in the condition of the animals or been able to prevent the onset of symptoms.

During the past two years the writers have concentrated their efforts upon the cortex of the suprarenal and have prepared and tested a large number of different cortical extracts and have used over three hundred and fifty cats in the experiments. Varying degrees of activity were obtained from several of the preparations, and one lipid fraction revealed a considerable degree of potency. A brief report of the early work was published in the abstracts of the American Society of Zoologists.[1] Since the abstract was written, however, the lipid fraction was further fractionated and an aqueous preparation obtained which shows greater potency than the original lipid extract. This fraction is prepared in the following manner.

The suprarenal glands (beef) packed in ice are received from the slaughterhouse within twenty-four hours after the death of the animals, and the cortex dissected as free as possible from extraneous fat and medullary tissue. The ground cortical tissue is extracted at room temperature successively with 95 per cent. ethyl alcohol and 80 per cent. ethyl alcohol for varying periods of time, usually about three or four days, although we have obtained active extracts from material stored in 95 per cent. ethyl alcohol at room temperature for three weeks. The extractives are

[1] *Anatomical Record,* 44: 225, 1929.