TABLE III
Comparison of Analytical Results With Analyses in the Literature *

Seed Oil	Percent Linoleic Found	Percent Linoleic Reported in the Literature		
		Single Value or Range of Linoleic Acid Content	Number of Analyses	References
Alfalfa	22	68	1	(9)
Cherry	34	42	1	(10)
Clover	36	....	....	....
Cucumber	61	....	....	....
Hemp	31	18-69	4	(10)
Linseed	27	23-62	15	(10, 11)
Muskmelon	70	68	1	(12)
Perilla	20	33-59	5	(10, 11)
Poppy	68	62, 65	2	(10)
Pumpkin	49	45, 46	2	(10)
Raisin	61	46-73	6	(10)
Sesame	39	37-47	3	(10)
Squash	49	44	1	(10)
Sunflower	58	54, 59	2	(11)
Watermelon	66	68	1	(13)

* Comparisons are limited to linoleic acid content since this acid was the major fatty acid present in most of the oils.

and cucumber seed oils were also found to be very meager. All comparisons were limited to the linoleic acid content since two-thirds of the oils tested contained linoleic acid as the major component.

Summary

1. A rapid method for determining the saturated, oleic, linoleic and linolenic acids in a 1-gram sample of fat has been described.

2. Saturated fatty acids were separated by quantitative crystallization from acetone solution at —40° C.

3. The three unsaturated acids, oleic, linoleic and linolenic, were calculated from the iodine and thiocyanogen values of the remaining liquid acids.

4. Analysis of known mixtures of fatty acids demonstrated the accuracy of the method to be approximately ± 2 units percent.

5. Duplicate determinations of the fatty acid distribution in natural oils agreed within 0 to 4 units percent.

6. Data on the oleic, linoleic, and linolenic acid content of 15 seed oils were presented.

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The Preparation of Standard Soil Material for Testing Detersive Efficiency

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Introduction

During the several years that we have been working upon a test for the evaluation of detergency in this laboratory we have tried every soiling formula that has come to our attention. It is, however, very rare to find in the published article a description of the method of applying the soiling solution or mixture to the fabric.

A brief survey of the literature discloses that Brauner (1) (2) used a Standard Soil consisting of various oils with cocoa, coffee, wine, milk, blood, rust and ink. Bergell (3) used linden charcoal in a fat ether solution and determined the amount of "dirt" deposited by weighing the goods before and after soiling. Gehm (4) prepared a mixture of oil, lanolin, egg yolk, egg albumin, milk, cocoa, soot, starch and sugar in water and applied this to desized cotton and rayon fabric with a viscose sponge. Hill (5) used a mixture of Oildag, olive oil, tallow and mineral oil and applied it to the goods in a small agitator type washing machine, claiming uniform deposition of the mixture over the surface of the fabric. Hoyt (6) prepared a mixture of lubricating oil, edible tallow and lamp black but made no mention of the method of application. He also reported (7) the use of an emulsion of lanolin, white mineral oil and deflocculated graphite in water, but again failed to state how he applied it. Morgan (8) studied the technic of applying a mixture of carbon tetrachloride, Russian Tallow, Nujol and lamp black to white cotton sheeting. He also wrote (9) about a test for detergency but gave no data on his soiling formula or its application. Schreive and Stiepel (10) applied mixtures of mineral oil, fatty oil, fatty acid and linden charcoal to linen cloth by means of a brush. Rhodes and Brainard (11) applied the A. O. C. S. soiling mixture by placing 100 ml. in a porcelain evaporating dish and drawing strips of desized cotton sheeting through the mixture until the desired degree of blackness was obtained. Snell (12) used a similar method. Vaughn, Vittone and Bacon (13) applied a mixture of Norit C, No. 30 lubricating oil, Crisco and Stoddard Solvent to cotton sheeting, by agitation in a commercial laundry wheel, which is very similar to the method used by Mack and her co-workers at Pennsylvania State College.

Preliminary Experiments

In our work we have found that a very simple soil formula consisting of carbon black, mineral oil and vegetable oil in carbon tetrachloride gave the most consistent results and that the method and conditions of applying the soil to the fabric caused more variation than a considerable change in soiling formula or concentration. Our first method of applying the soil was similar to that of Rhodes and Brainard (11) except that we used a Nausbaum photographic developing tray for the evaporating dish. After applying the soil in this manner the strips were hung vertically to dry. During the drying, the soiling solution would run down the strip causing a graduation in black from top to bottom, which made the "average black" of any one piece difficult, if not impossible, to obtain. Since the most important requirement of a standard oil fabric is uniformity of soil content, the soil prepared in this manner was very unsatisfactory.

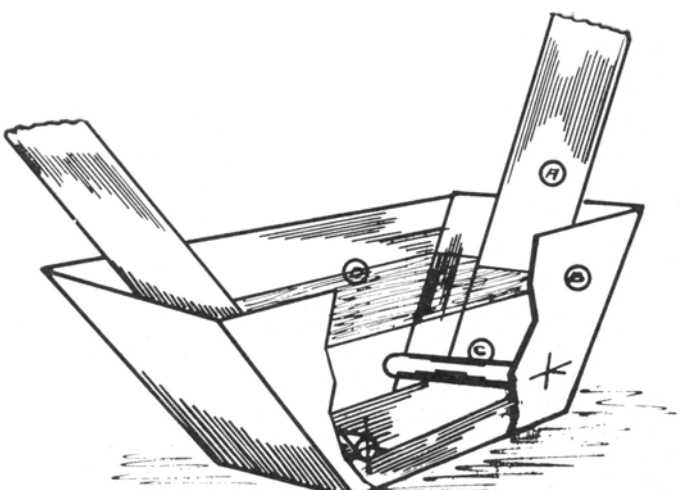

FIG. 1.

A—Strip C—Roller
B—Metal Box D—Liquid Level

We next substituted a "soiling box," see Fig. 1, for the Nausbaum tray and drew 5 yard strips of fabric through the soiling solution. These strips were hung horizontally to dry. The standard soil fabric prepared in this manner was much superior to that prepared with the Nausbaum tray but there still were aggravating differences between batches of soil prepared at different times. We found, for instance, that on very humid days the evaporation of the carbon tetrachloride would cool the fabric below the dewpoint, causing moisture to deposit. This retarded the pick up of soil on the second and third passes through the soiling box necessitating one or more additional passes to obtain the desired degree of blackness. We also noticed that standard soil made on humid days aged differently than that made on dry days. To mitigate this variation we only made soil on days when the relative humidity was not over 30%. In Jersey City in the summer this meant that we could not make soil fabric for several weeks at a time so our next attempt at improvement was the construction of a soiling machine. A diagram of this machine is given in Fig. 2.

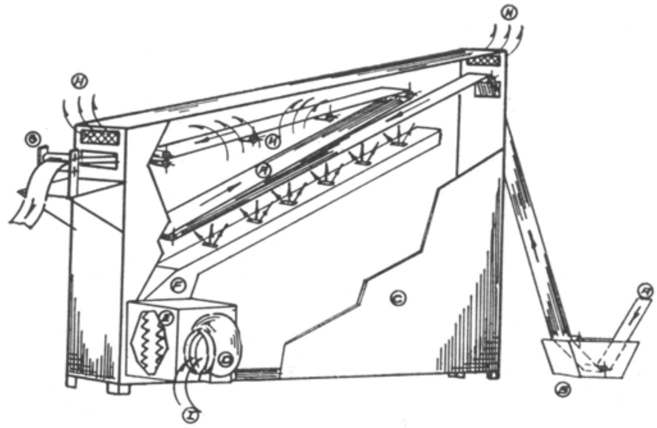

FIG. 2.

A—Strip D—Fan G—Power Roll
B—Soil Pan E—Heaters H—Vapor Vents
C—Housing F—Air Duct I—Air Intake

The fabric was drawn through the soiling solution in the soiling box and then over rollers in the machine, so located that the fabric traveled the length of the machine three times, during which it was dried by a current of hot air. This entirely prevented the deposition of moisture and the uniformity of our standard soil fabric was greatly improved. The machine, however, had many mechanical difficulties and after many experimental changes, over a period of two years, we decided that we had accumulated sufficient data to design and build a very much improved soiling machine.

Description of Present Machine

This machine is illustrated in Figs. 3, 4, and 5. The ten kilowatt heaters are controlled by switches so that the heat can be regulated in steps of 250 watts. The hot air is drawn, instead of forced, through the machine making it possible to vent the machine through

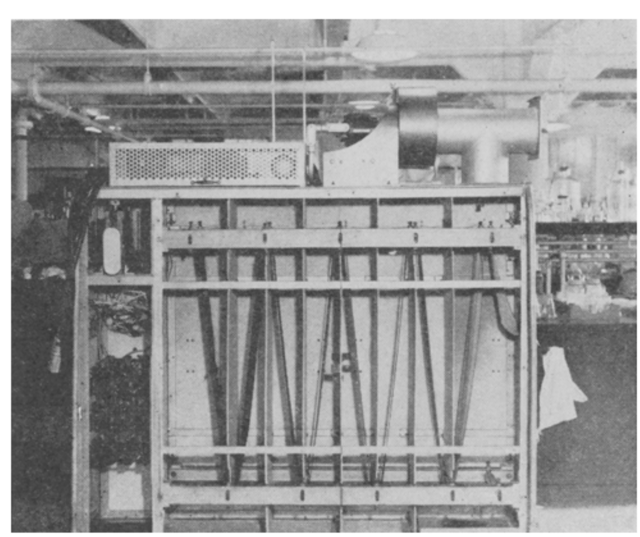

FIG. 3.

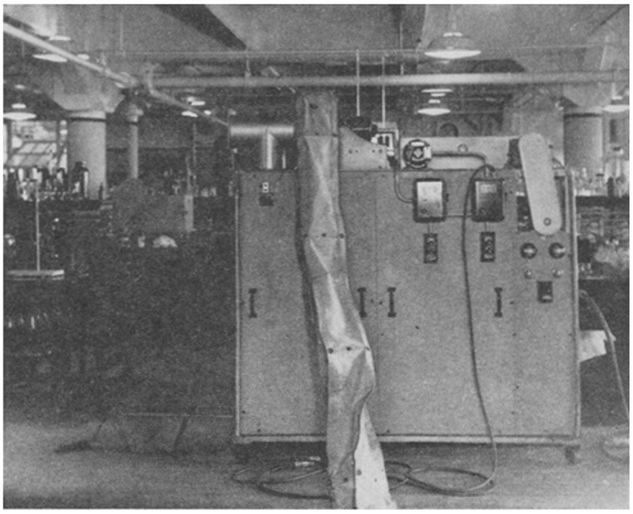

FIG. 4.

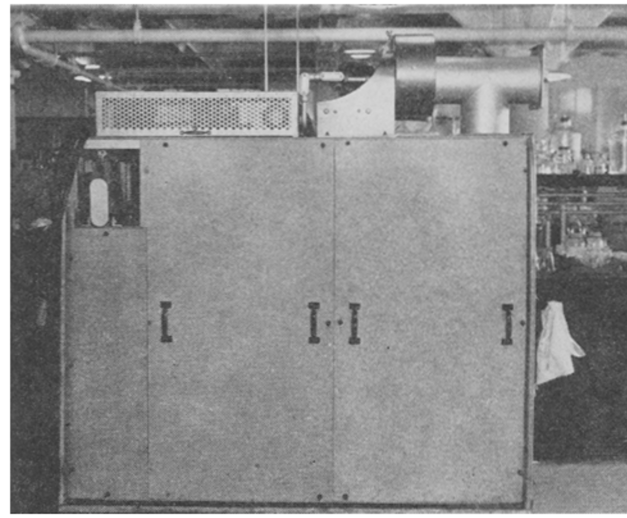

FIG. 5.

a canvas duct out of a window. When one realizes that a batch of soil as we make it requires the evaporation of six gallons of carbon tetrachloride, it can be seen that this was a great improvement, from a health angle. The current of air is controlled by a variable speed drive on the blower. The course of the fabric and hot air is shown in the diagram Fig. 6. This

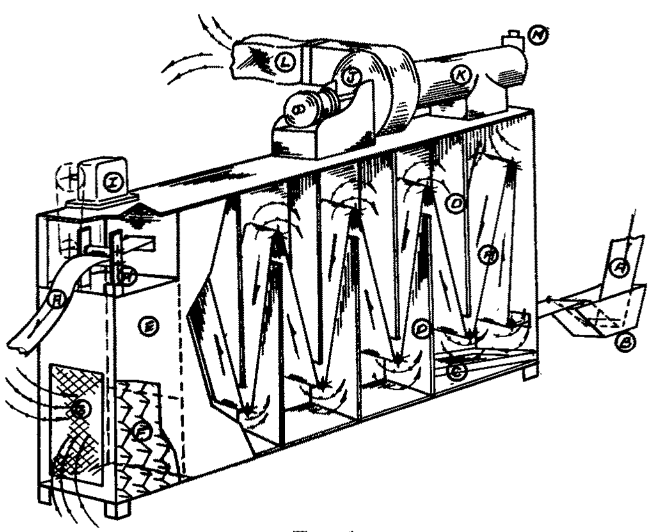

FIG. 6.

A—Strip	E—Housing	J—Blower Discharge
B—Soil Pan	F—Heater	K—Canvas Duct
C—Drip Pan	G—Air Inlet	L—Flue
D—Baffle	H—Power Roll	M—Damper
	I—Vari Speed	

machine is large and somewhat cumbersome but we have full control of the amount of heat, the amount of air, and the speed of the fabric. We have also included some safety features so that the current to the heaters is broken should the blower fail, or if it should be forgotten. We have been using this machine for over a year and our standard soil fabric is remarkably uniform in both color and performance.

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