

## Basic Research in the Field of Fats

**A** COMMENTARY, according to the dictionaries, is essentially a series of explanatory notes, and until now this editorial page has really been something much better. It has been a monthly account of activities of special interest to readers of the Journal, regularly written by someone with a high degree of responsibility for the activity reported. Lacking any current responsibility, I will delve into the past 35 years and attempt a few comments—below the level of commentary—on the progress of basic research in the field of fats.



A. S. Richardson

From efforts in the early 1920's to absorb the scientific background of soap and edible fat manufacture my best-remembered impressions come from trying to take a close look at two very important mixing operations, soap crutching and the preparation of plastic shortening. We seemed to have a fairly good working knowledge of each molten fat mixture from which these products were made. However, as the mixing operations proceeded, we knew less and less about what we were mixing with what, and our ignorance of the component parts of the final product, soap and shortening, was really profound.

I believe that the basic research most needed by manufacturers in our field 35 years ago was systematic study of the individual triglycerides in our fat fixtures and of the physical forms of both glycerides and soaps. The progress made in this area has been quite gratifying. Notwithstanding the remaining gaps in our information and some disagreements about the polymorphic forms of both glycerides and soaps, we have begun to make good use of the data now available. One inspiring feature of this research was the ability of laboratories in this country to agree on essentials in their early independent work.

**T**O THE WORLD AT LARGE there can be no more basic problems on fat than those concerned with nutrition. Steady progress in this large area has been made for many years and is continuing. On the subject of fat digestion the average chemist is more confused today than he was three or four decades ago, but this is a part of the price which we pay for progress. Formerly we thought that fats must be split completely into fatty acids and glycerol to be absorbed. Now we must be patient until the story is more nearly complete.

The mechanism of detergent action is one of the most obviously basic problems of our field; it has been more vigorously discussed than attacked. We can be reasonably sure that the really active soap or other detergent is the fraction adsorbed at the surface of the particles of dispersed soil, but we have very little definite and precise knowledge about this all-important fraction. We have in recent years made important progress of a somewhat negative character in this area for we now understand an ever-present limiting factor in detergency. The cleansing action of a soap solution increases with increasing concentration up to a critical value, above which additional soap serves mainly to form more micelles with little change in cleansing action. Thus it makes less sense than ever to say that soap cleanses because it is a colloid.

**S**PACE DOES NOT PERMIT a complete recital of recent progress of basic research in our field. This is fortunate for otherwise we would face serious difficulties, including much hard work. The subject of sterol chemistry, for example, is now more complicated than the whole subject of fat chemistry a generation ago. Another difficulty would be the lack of definite criteria for distinguishing between really basic research and other research aimed at broadly useful information. For instance, should we classify as basic the splendid series of researches which have closed many of the gaps in our knowledge of the unsaturated fatty acids? I could easily argue either side of the question.

The outstanding general characteristic of recent and current research in our field, and in chemical research elsewhere, is its high degree of dependence on instrumentation. We are leaning very heavily on development work in the field of physics and on the manufacturers of scientific instruments. Many chemical research organizations would suffer collapse if they were suddenly deprived of all instruments less than 10 years old.

**T**HIS KIND OF DEPENDENCE on manufactured scientific apparatus is a threat to the development of our imagination as chemists. I can barely refrain from saying that the satisfactory progress of research in our field has been accomplished with no display of outstanding imaginativeness. This is not a criticism for the current vogue in chemical research is a timely and desirable one. It would be sheer neglect of duty not to be concentrating a large proportion of our energies on these wonderful modern instruments. But let us beware! There is more to chemical research than skilled use of instruments handed to us on a platter for our employer's silver.

Retired Associate Director  
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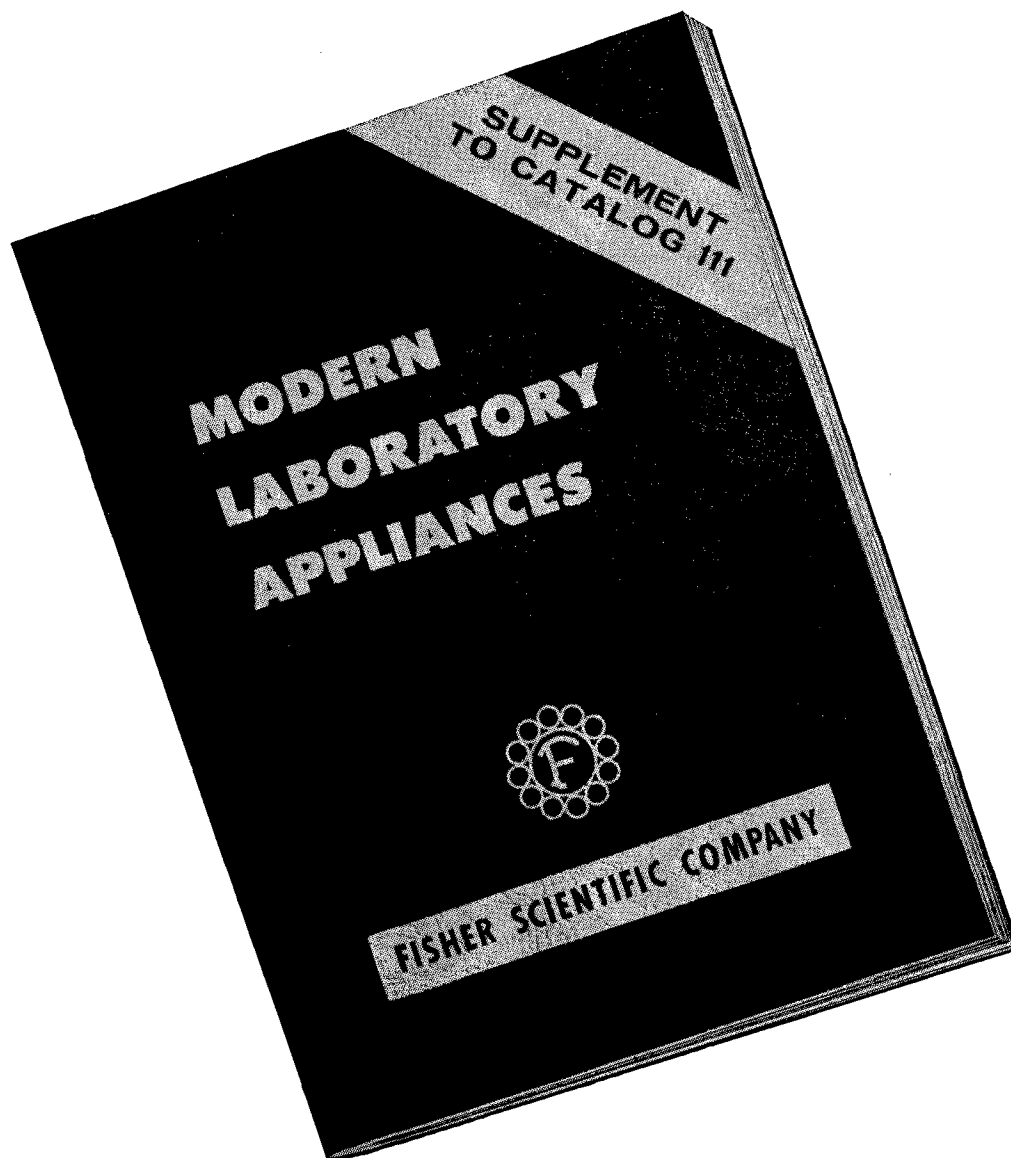
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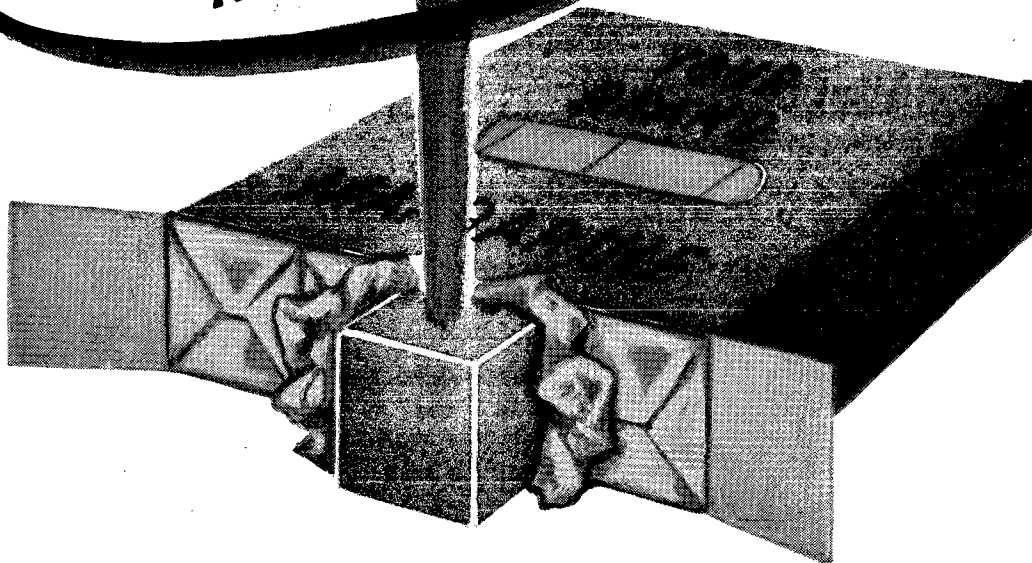
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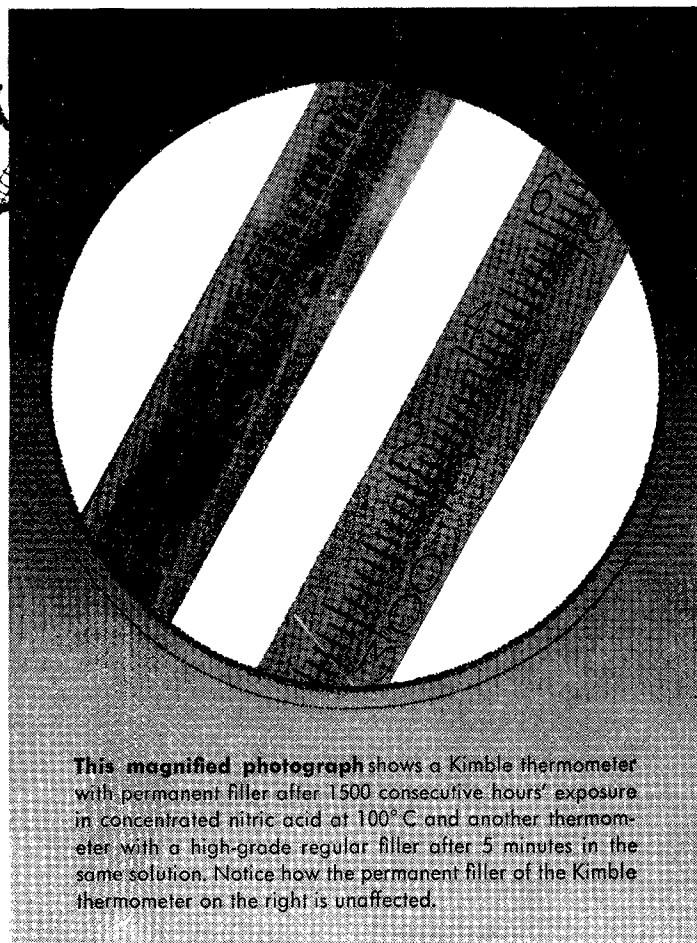
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			Each	1 case	5 cases	10 cases	25 cases
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Thermometer #43554 Freezing Point	—5 to +5° C	8	2.38	17.14	16.28	15.42	14.57
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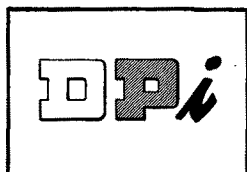
He, surrounded by chemists, bakes all day. The chemists keep measuring the exact monoester content\* of every production run of Myverol® Distilled Monoglycerides. They also make other chemical tests known to measure factors important for food components. No Myverol order leaves the plant until these chemists are satisfied; but then, just to make sure that some chemically negligible factor has not tripped us up, we have our master baker bake with it and evaluate his results with a skeptical old pro's eye. If he's happy, then we are too, as we go home to dinner clutching our individual fair shares of his labors.

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## 1955 Additions and Revisions A.O.C.S. Tentative and Official Methods—\$2.75

### Tentative to Official Status:

<b>A. Commercial Fats and Oils</b>	
1. Ash.....	Ca 11 -55
2. Phosphorus.....	Ca 12 -55
3. Refined and bleached color of tallows and greases.....	Ce 8d-55
<b>B. Lecithin</b>	
1. Benzene insoluble matter.....	Ja 3 -55
2. Phosphorus.....	Ja 5 -55
3. Acid value.....	Ja 6 -55
<b>C. Drying Oils</b>	
1. Acid value.....	Ka 2 -55
2. Refractive index.....	Ka 4 -55
3. Specific gravity.....	Ka 5 -55
4. Viscosity.....	Ka 6 -55
5. Flash and fire points, open cup.....	Ka 7 -55
6. Ash.....	Ka 10 -55
7. Acetone tolerance.....	Ka 11 -55

### Revised:

<b>A. Commercial Fats and Oils</b>	
1. Moisture, distillation method.....	Ca 2a-45
2. Moisture and volatile matter, hot plate.....	Ca 2b-45
3. Moisture and volatile matter, air oven.....	Ca 2c-25
4. Moisture and volatile matter, vacuum oven.....	Ca 2d-25
5. Refining loss.....	Ca 9a-52
6. Bleaching test, cottonseed oil.....	Cc 8a-52
7. Bleaching test, soybean oil.....	Cc 8b-52
8. Saponification value.....	Cd 3 -25
<b>B. Soap and Soap Products</b>	
1. Total alkalinity.....	Da 7 -48
2. Total alkalinity.....	Db 5 -48
<b>C. Drying Oils</b>	
1. Saponification value.....	Ka 8 -48

### Corrected:

<b>A. Sulfonated and Sulfated Oils</b>	
1. Organically combined SO <sub>2</sub> .....	F 2a-44
<b>B. Soap Stock</b>	
1. Total fatty acids.....	G 3 -53

### Replaced:

<b>A. Vegetable Oil Source Materials</b>	
1. Residual lint, cottonseed.....	Aa 7 -55
<b>B. Oilseed By-Products</b>	
1. Free gossypol, cottonseed cake, meal, and meats.....	Ba 7 -55
<b>C. Commercial Fats and Oils</b>	
1. Flash point, closed cup method.....	Cc 9b-55
<b>D. Specifications</b>	
1. Flash point thermometers.....	H 10 -55

### Deleted:

<b>A. Specifications</b>	
1. Flash point thermometers.....	H 11 -48

### New Methods:

<b>A. Oilseed By-Products</b>	
1. Total gossypol, cottonseed cake, meal, and meats.....	Ba 8 -55
<b>B. Commercial Fats and Oils</b>	
1. Moisture, modified Karl Fischer.....	Ca 2e-55
<b>C. Soap and Soap Products</b>	
1. Chlorides, potentiometric.....	Db 7b-55
<b>D. Drying Oils</b>	
1. Diene value.....	Ka 12 -55
<b>E. Commercial Fatty Acids</b>	
1. Sampling.....	L 1 -55
2. Moisture, hot plate.....	L 2a-55
3. Moisture, distillation.....	L 2b-55
4. Acid value.....	L 3a-55
5. Unsaponifiable matter.....	L 4a-55
6. Ash.....	L 5a-55
7. Titer.....	L 6a-55
8. Saponification value.....	L 7a-55
9. Iodine value.....	L 8a-55
10. Refractive index.....	L 9a-55
11. Specific gravity.....	L 10a-55
12. Flash and fire points, open cup.....	L 11a-55
13. Polyunsaturated acids.....	L 12a-55

T. H. HOPPER, Editor, Methods.



**He studies the relationship between  
vitamin A and life**

We produce a great many gallons of vitamin A each year, but we never tell the man in the street what it will do for him. We prefer to let him find out from his doctor, his nutrition adviser, or from those who make the vitamin A products he buys.

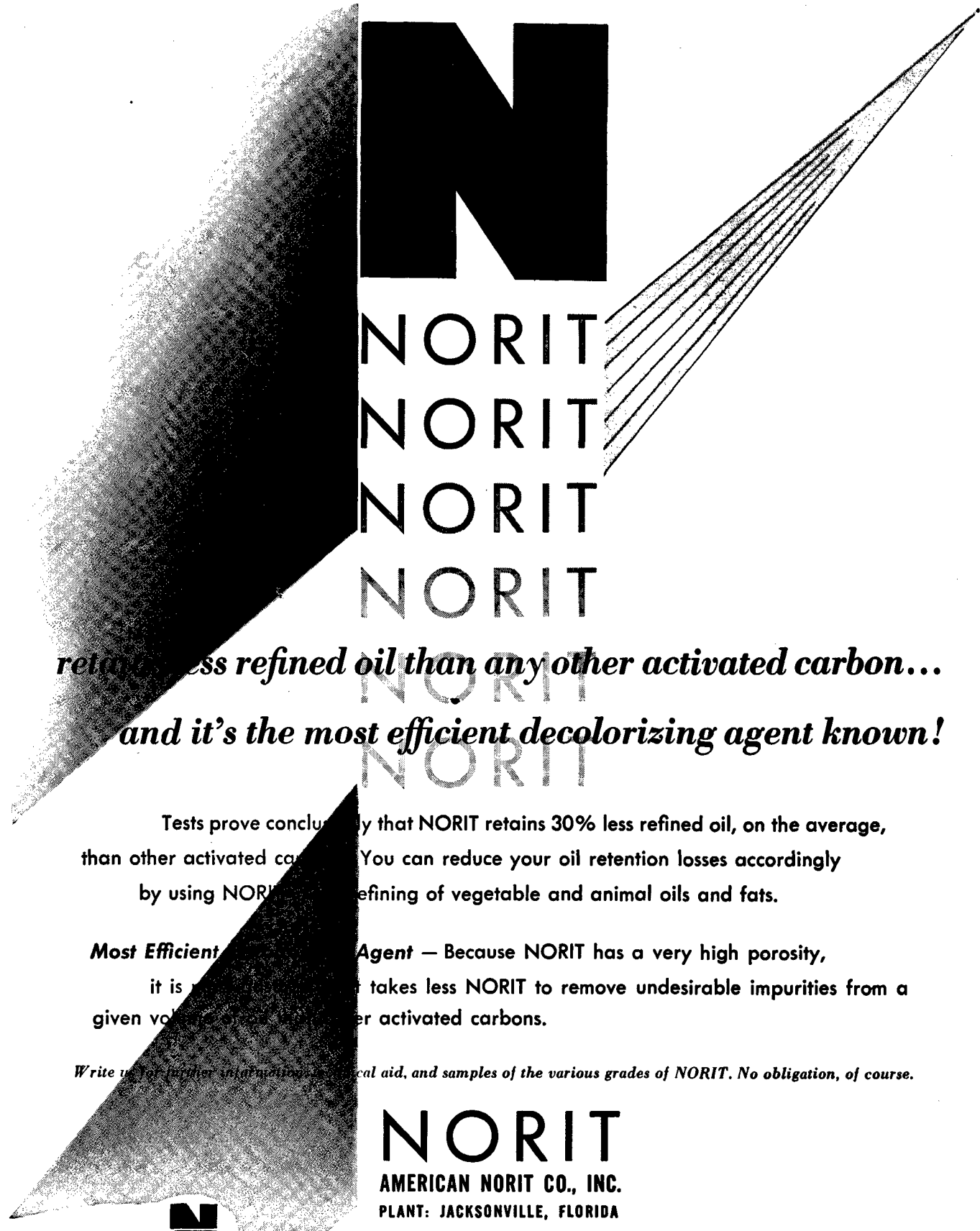
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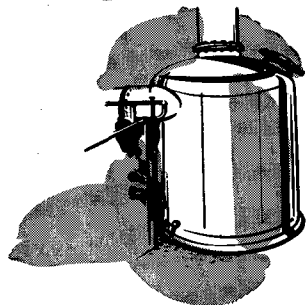
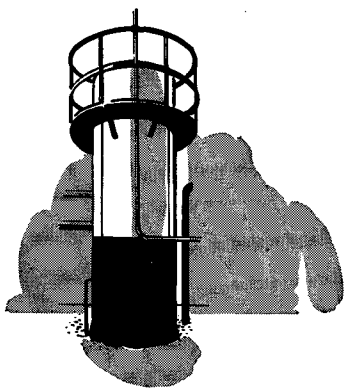
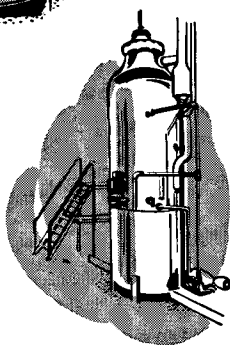
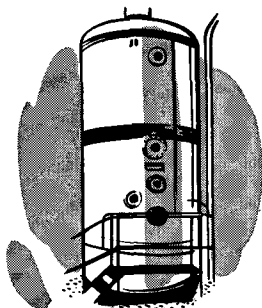
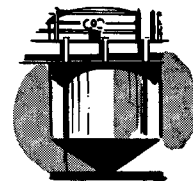
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