

FOOD MANUFACTURE

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Fortification of Oil, Fat and Flour

The fortification of foods with vitamins is obviously useless if the vitamins have decomposed before the foods are consumed.

R. W. Morgal, L. W. Byers and E. J. Miller (*Ind. and Eng. Chem.*, 35, 7, 794) have conducted tests to determine the stability of added carotene and the effect of antioxidants in connexion with the fortification of oil, fat and flour.

The stability of carotene is greatly influenced by the presence or absence of antioxidants contained in the solvent. In solvents free of antioxidants, the addition of antioxidants has a strong stabilising effect; in solvents like Wesson oil, which contain naturally occurring antioxidants, little additional effect is observed.

Carotene is much more stable in solvent-extracted than in expeller-extracted soybean meal. Soybean lecithin improves the stability of carotene in soybean flour.

Alfalfa carotene concentrate showed better stability in many of these products than crystalline carotene, an indication that the naturally occurring antioxidants present in the concentrate are effective in these food products.

Quality of Dried Whole Egg Powders

Three papers in the *Canadian Journal of Research* 21D, No. 7, 1943, by W. H. White and others deal with respectively: II, effect of heat treatment on quality (pp. 194-202); III, a refractometric method for the determination of solubility (203-210); IV, effect of moisture content on keeping quality (211-222). This work is continued in No. 8 with paper V, Definition and properties of low-grade egg powders (267-269), by M. W. Thistle and others. The first three papers show the importance of moisture content as a factor in keeping quality. On the basis of the investigations it is now required that the moisture content of all Canadian egg powder prepared for export to England shall be as low as possible, and in any case not greater than 5 per cent. Moisture content and temperature together profoundly affect the keeping quality of egg powder, the rate of deterioration being rapid at moisture contents above 5 per cent. when the temperature approaches or exceeds 20° C.

The last paper presents a definition and describes

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The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.

January, 1944

[E]

the properties of low-grade egg powders. A system of scoring ranging from 10 for excellent to 0 for repulsive material was used, and a panel of four experienced tasters was selected. As shown by fluorescence measurements, the protein fraction of very low-grade samples had deteriorated badly. No evidence could be obtained of any trace of peroxide oxygen formation. Dried egg powder, therefore, appears to differ somewhat from other high-fat foods as far as the behaviour of the fat fraction is concerned. This point is receiving attention as the work on egg powder continues at the National Research Laboratories, Ottawa.

Bombers to Carry Produce

The use of bombers after the war to transport produce from the islands to markets on the mainland was envisaged by Mr. A. E. MacColl, Deputy Chairman of the Hydro-Electric Board and Mr. Neil S. Beaton, a member of the Board, at a meeting in Glasgow of the Highland Development League. In reply to a questioner who asked if he would use his influence to arrange transport to bring produce from the islands to the markets, Mr. Beaton said there would be a lot of bombers free after the war. Perhaps they could purchase a number of them and use them to take island produce to the market before it deteriorated.

Mr. MacColl said that suggestions had been made that after the war heavy bombers should be used for carrying herring from the islands straight to the English markets. Something might be done also for dairy produce. It was the intention of the Hydro-Electric Board, he said, to make electricity available as widely as possible not only to the mainland but to isolated communities and also the islands. Taken by themselves these island and isolated community schemes would not be economic, but they had other sources to create a pool of revenue from which they would subsidise these remote schemes. That was one of the advantages of dealing with the whole of the Highlands under one comprehensive scheme.

Better Milk for Manufacture

The pre-war fallacy held by many dairy farmers that milk of any quality was suitable for manufacturing purposes is gradually being killed by the Milk Testing and Advisory Scheme. Progress has been more rapid in some parts of the country than in others, and it is unfortunate that among the most backward areas is one in which a large proportion of the milk produced normally goes into manufacture.

Creameries are themselves responsible indirectly for slow improvement in the milk that comes from a number of farms. The Testing and Advisory Scheme has shown that a considerable proportion of the creameries and milk depôts fail to cleanse

churns satisfactorily, and that some of these buyers are consistently negligent in this respect. Officers operating under the scheme experience difficulty in inducing the farmers who supply these firms to introduce greater care and cleanliness on the farm. The reason for this reluctance is obvious.

Twelve months' working of the scheme has demonstrated that, in general, mechanical washing of churns gives more satisfactory results than hand washing, and although some improvement has been made in the average standard of cleanliness in churns, there is still much room for progress.

Every creamery proprietor and manager knows quite well that the quality of his manufactured products depends upon the quality of the milk that enters the factory. The Testing and Advisory Scheme has proved beyond all doubt that creameries that keep their churns bacteriologically clean are unconsciously encouraging farmers to take similar care.

Churns do not always travel between the same farmer and buyer; consequently clean and unclean churns may become interchanged. This emphasises the importance of *all* creameries and depôts paying equal importance to the bacteriological cleanliness of churns.

Fluorine-osis

A case of fluorine toxicity to skeletal structure has been reported in the U.S.A. in Texas, where the drinking water contained fluorine to the extent of from 4.4 to 12.0 p.p.m. (*Lancet*, 1943, 2, 242). It has been suggested that where the fluorine content of the water exceeds 3 p.p.m. there may be cases of secondary anæmia due to affection of the blood-forming marrow. Sources of fluorine are natural waters and rock phosphate, containing up to 3.5 per cent. fluorine, which is being imported from North Africa as a fertiliser. It is also suggested that some phosphates used in the manufacture of foodstuffs are obtained these days from unusual sources and that they may have fluorine contents larger than previously.

Sunflower Oil

Will sunflower oil become the first edible oil produced in this country? The question is asked, firstly, because the world shortage of olive oil is expected to continue for several years after the war, and, secondly, because research work conducted by the Imperial College of Science, with the aid of a grant from the Ministry of Agriculture, has proved that sunflowers can be grown commercially in this country.

Sunflower oil is declared to be equal in flavour and food value to the best olive oil, and in Russia, the world's largest producer, it has been used for table and cooking purposes for many years. World supplies of olive oil began to contract during the

Spanish Civil War, and that country has prohibited its export. Portugal has also insufficient for her own needs; and the present war has played havoc with production in Sicily, Italy and other parts of the Mediterranean. Brazil, Canada and the United States of America are among the countries that, during the past four years, have expanded vastly their production of sunflower oil as a substitute for olive oil.

Three varieties suitable for English conditions have been produced. They are Márs, Pole Star and Southern Cross. All are resistant to wind and frost and are well suited for growing in Midland and Southern counties. A useful acreage was planted this year, and some of the seed may be used experimentally for edible purposes. The yield of oil-seed is much greater than that obtained from linseed, which is not suitable for human consumption. The Ministry of Food is an importer of sunflower oil, but the bulk of this, it is understood, is used in the manufacture of soap.

Ice Cream Alliance, Ltd.

It had been hoped that Ice Cream Alliance, Ltd., would by this time have been inaugurated. But a further short delay has been found necessary before the inaugural meeting is called. The name is that proposed for the new single trade organisation which, it is hoped, will supersede both the Ice Cream Association and Associated Ice Cream Manufacturers, Ltd. (formerly the National Ice Cream Association).

Winding-up meetings for the existing organisations were held on December 15, but one resolution was declared to be not in the correct legal form. An adjournment therefore resulted.

The scheme is to wind up the two existing bodies and to transfer the whole of their members and their assets to the new Alliance. A feature of the scheme is to divide Great Britain into twelve divisions, all of which will elect their own representatives (probably two per division) to the Executive Council. Three additional members of the Council will be elected at the annual meeting. Until the divisions have been formed and the elections held, the personnel of the present Amalgamation Committee will act as the Council of the new body. This Committee comprises six representatives from each of the present associations.

A statement issued to the members of both organisations contains the following passage: "A standard acceptable to the members and to the Ministry of Health is to be agreed upon." The problem of statutory standards for ice cream has been the main reason for the existence of two trade organisations. One association favoured a definition

based on an American type of mix having a minimum of 8 per cent. butter-fat; the other desired a definition that would embrace makers of Italian mixes. The desire of the Amalgamation Committee has been to set up a new organisation that will have no preconceived ideas about the standard.

The Vitamin B₁ Content of Canned Pork

Raw lean pork muscle contains an appreciable amount of vitamin B₁, and has been shown (since 1935) to be a richer source of this food factor than beef, veal or poultry meat. Pork, in various forms, may thus constitute a valuable source of vitamin B₁ in human nutrition; uncanned, it seems to have been especially important in North American diet of some decades ago, as is witnessed by many allusions to "pork and beans" and the like. The true value of a food must be assessed after preparation for consumption. As a large amount of pork is now being canned, a study has been made by E. J. Reedman and L. Buckby of the amount of vitamin B₁ in some preparations of pork (*Canadian Journal of Research*, Vol. 21C, 1943, pp. 261-266).

The canned product studied was of the type known as spiced luncheon meat, packed in 6-lb. rectangular cans. Canned luncheon meat is marketed in Canada as Spiced Pork and Spiced Ham, which are manufactured from lean pork trimmings and lean sow ham respectively. It was found that there were losses of the original vitamin B₁ during the retorting process used for cooking and commercially sterilising the product. In three series of packs examined the losses of vitamin B₁ were 55, 56 and 42 per cent. of the amount originally present.

It was found possible to fortify 6-lb. export packs of canned pork with synthetic thiamin to a level equal to, or above, that of the raw pork. In the experimental procedure in which synthetic thiamin was added, it was necessary to re-pack, and the results given are therefore for packs not identical with the commercial product. However, since the effect of aeration and rendering would be to increase the destruction of vitamin B₁, the conditions of processing are no less severe in re-packed cans. If synthetic additions were to be made in commercial practice, the proper thing would be to add the vitamin during the mixing of the ingredients for the canned luncheon meats; the addition would thus involve no change of processing and no alteration of the appearance of the final commodity. Results given by the authors indicate that an appreciable amount of the synthetic vitamin was retained after the processing procedure used.

THE EDITOR SENDS SEASONAL GREETINGS TO ALL READERS

Beef Cattle

A correspondent in *The Times* raises some interesting points regarding the cost to the nation of meat animals and the deterioration of quality of livestock. "I believe I am correct in stating," he says, "that every beast now killed under control loses the taxpayer somewhere in the region of £5, and in the case of sheep the loss is proportionate."

During the period of control the livestock of this country have notably deteriorated, this deterioration being borne out by the protests of our beef breed societies, and confirmed by the very considerable falling off of entries into their herd books. The writer goes on to comment on the fact that American farmers were breeding with a definite purpose in view, but that owing to the present system of control and grading of livestock it was extremely difficult for British breeders of beef cattle to define their purpose, as the Ministry of Food has made it considerably more profitable to feed a big, rough, coarse-boned animal than to feed one of high quality which commanded such preference before the war. The writer comes to the conclusion that the present method of grading is playing into the hands of the foreign meat importers.

Compulsory Heat Treatment of Milk

At the request of the Ministry of Food, the initial meetings of Dairymen's Wartime Associations have already taken place in a number of towns in connexion with compulsory heat-treatment schemes for milk. Meetings will be held in other towns during January. Discussions have also taken place between the Ministry and the dairy engineers in regard to the provision of the necessary plant and equipment. No scheme can be put into operation until it has been approved by the Ministry, and it seems probable that no dairyman in a town of 10,000 population or more will be allowed to instal a heat-treatment plant or to extend his existing plant except with the consent of the Ministry in regard to a scheme for the district as a whole.

This raises the question to what extent will dairymen in these towns be permitted to instal plants solely for use in connexion with their own businesses. The Minister of Food has stated that he hopes heat-treatment schemes will be in operation in all towns of 10,000 population and over by the end of next year and that it would be impossible in that period to provide the plant necessary to extend compulsion to other areas.

The quantity of plant required for the larger towns is very considerable, but the quantity of metal available to manufacture it is limited. The Ministry of Food may therefore be compelled to give serious consideration to the maximum use of plants that will process the largest gallonage with the most economical use of metal. In fact,

we learn that the Ministry favours the use of plants that will process 250 gallons an hour. These would be operated for, say, 5½ to 6 hours a day, and 2 to 2½ hours would be allowed for cleaning. This suggests that the Ministry visualises as the "ideal" a plant that processes approximately 1,500 gallons a day, which is far beyond the requirements of a small dairyman. Preference is also likely to be shown to H.T.S.T. plants because, in general, they are more economical than "holder" plants in a number of directions.

The Ministry of Health has suggested that the phosphatase and methylene blue tests used in connexion with compulsorily heat-treated milk should be similar to those now in use for pasteurisation. The distributive trade, however, has suggested amendments to the methylene blue test, one proposal being that the summer and winter seasons should be sub-divided, with corresponding revision of the reduction times. The proposals are now receiving official consideration.

The Doctor with a Cold

In a letter to the *B.M.J.* a doctor points out that "whatever scheme may be evolved for the betterment of the medical services of the country, it must not be forgotten that it will depend for its success entirely on the good-will of the doctors, especially for the next ten to fifteen years". He points out that, "according to the Press, in the years before the war workers were advised at the onset of influenza or febrile cold to stop work and go to bed, and further reports of the large percentage of absentees showed that the advice was taken. A matter not brought to prominence was that many of the doctors were suffering likewise and should also have been in bed. It will cause a sense of grievance if doctors, as modified or wholly civil servants, are supposed to be the only workers not allowed to go sick. Such sickness takes place mostly at one period of the year, and simultaneously over the country, and means that a very large pool of doctors must be built up to carry on the normal services. At present and for many years this will be impossible, and unless the doctor behaves as he has always done, and works on while others go to bed, the whole scheme will fail."

An important angle of the matter has been omitted by the writer of the letter, and that is that each doctor with a cold will probably infect a good number of his patients with it and thus cause additional absenteeism.

TO AUTHORS

FOOD MANUFACTURE is prepared to consider the publication of any books on scientific and technical subjects which authors might care to submit.

Mechanical Handling Equipment

The expense entailed in the production of an article is a large proportion of its cost. Consequently production cost should be carefully watched. The production of goods of maximum quality at minimum cost involves the efficient use of man-power applied to mechanical methods as opposed to the old principle of its utilisation by the expenditure of maximum manual effort.

FRANK H. SLADE, A.M.I.Mech.E.

THE human machine used for producing mechanical effort is inefficient and costly and should be replaced when possible by manufactured power.

It is more efficient to utilise the human machine to control manufactured power; by so doing not only is a much higher rate of production but a more constant one achieved, the fatigue factor which causes so many fluctuations in the production curve being considerably lessened.

"Productive labour is that which is done to every piece" has been given as the definition of production; that is to say, productive labour is employed upon either (a) movement of materials or (b) operations carried out on these materials. While (b) should receive every consideration and care from an efficient production management, and the cost of production be reduced either by the use of machinery or by motion study, or a combination of the two, (a) is a factor of planning whereby many economies in man-power and production time may be lost unless given careful attention, for delay in movement is one of the most formidable obstacles to be surmounted if efficient production is to be achieved. These remarks apply to any industry where raw materials are received, are passed through various operational processes and are fully despatched as a finished product; but they are specially applicable to the food industry wherein the absence of man-handling and the speed at which the materials are conveyed from point to point may in many cases not only effect savings in man-power but assist in producing an article of higher quality.

Reducing Physical Effort

It is therefore evident that if labour be used to its maximum advantage, assistance must be given in the form of mechanical handling equipment to reduce physical effort.

There are many types of handling equipment available, but when an installation is being considered it is necessary to ensure that the labour saved justifies its capital cost. For example, continuous elevators and conveyors are installed for line flow production where conditions are such that the movement of relatively light materials is always fixed from point to point; not only must this planning factor be assured, but the production programme must cover a sufficient period of time to justify the cost installation.

Should these conditions not exist, it is necessary to utilise handling equipment of a more flexible nature. It is usual to split the "movement of materials" factor into two sub-divisions—that is, materials that need continuous movement and materials that need

intermittent movement. Expanding the meaning of movement as applied to production, "continuous movement" is a term applied when materials are received and despatched from the operation points in a steady stream, while "interrupted movement" is a term applied when materials are moved in the sense the name implies, or are moved in separate loads.

Some writers classify mechanical handling equipment directly in accordance with the type of movement desired; as already suggested, this is not strictly true, for, while fixed conveyors and elevators are confined to the continuous movement of materials, economic conditions may be such that their installation is not justified, and more flexible means of assisting movement must be utilised.

Continuous handling equipment is installed for line flow production wherein the conditions are such that the movement of relatively light materials can be fixed

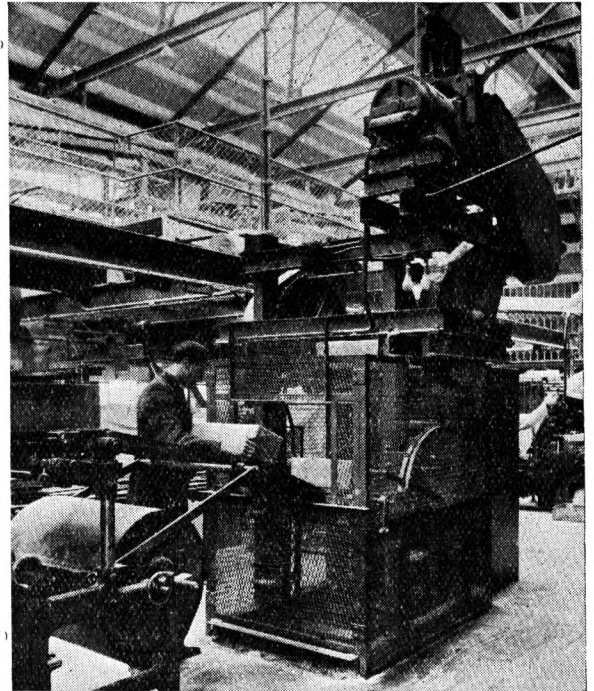


Fig. 1.—Showing packages being discharged from wrapping machine on the sixth floor and loaded on to ascending trays of the Lowerator by means of a roller grid table.

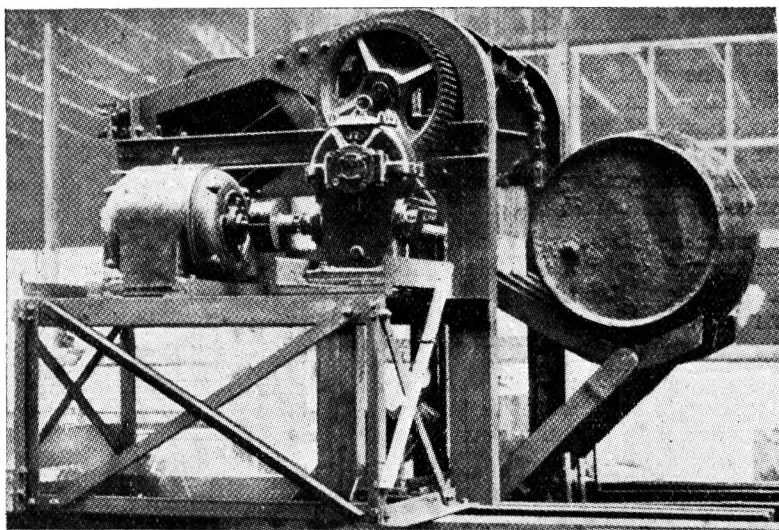


Fig. 2—Barrels being conveyed from one floor to another by means of an elevator.

from point to point, the material to be moved being evenly distributed over the entire length of the handling equipment.

Vertical Movement of Materials

One example of this is equipment for the movement of material in a vertical direction, or from one level to another; for instance, a power-operated appliance used as a continuous elevator in which the material is moved from low to high level.

Alternatively the material may be handled from a high to a lower level; this is illustrated in Fig. 1, in which a Lowerator is shown serving six floors of a warehouse with both ascending and descending strands, thereby operating as a dual purpose appliance. In this actual installation, machine-wrapped packages weighing 28 lbs., containing packets of cube sugar, are discharged from the weighing machine and are loaded by hand on to a roller grid table.

Finger trays of the Lowerator pick up the package from the table, pass round the head sprockets to the descending strand, where automatic unloading is effected at any one of the five floors, being fed on to gravity roller track tables which can be hinged up at will. At the ground floor, packages are unloaded from the ascending strand by cams tilting the trays as they rise. A further wrapping machine on the first floor whose packages must be loaded automatically and discharged to all floors also necessitates unloading from the ascending strand; this

is again effected by cams tilting the trays as for the ground floor.

Great difficulty is often encountered in shifting heavy barrels from one floor level to another; however, such troubles may be simply overcome by the utilisation of an elevator such as is illustrated in Fig. 2, which greatly facilitates the movement of barrels from one floor to another as a continuous operation.

An example of lowering material from a high to a low level by gravitational methods is the spiral chute, illustrated in Fig. 3. These take up a small amount of floor space and are an efficient means of lowering cases, bags, etc., from floor to floor, deflector plates or ploughs being inserted to discharge on any particular floor.

There are many types of power conveyors for the movement of materials in a horizontal direction, but the most generally used in the food industry are the belt and the slat conveyor, while the worm or Archimedean screw is sometimes used for conveying very fine materials.

The Belt Conveyor

The most commonly used of the power-driven conveyors is the belt conveyor; its power consumption is comparatively small, and the speed of operation can be set to suit any particular application. Figs. 4, 5, and 6 illustrate useful examples of the use of belt conveyors for application in the food industry. Fig. 4

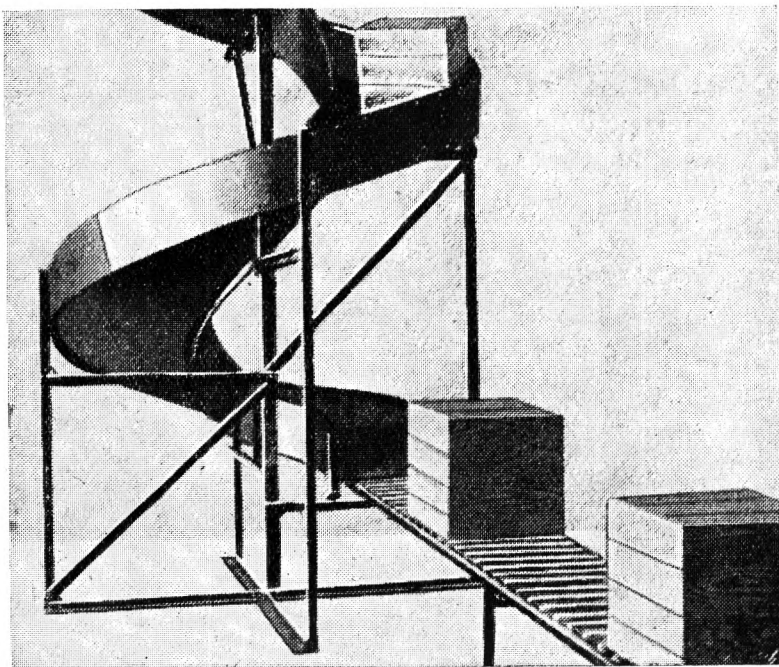


Fig. 3.—Spiral chute for conveying packages from one floor to another by gravitational methods.

shows the use of conveyors for assisting the process of wiping, labelling, capping and packing jars of jam in a modern preserve factory, the actual view being from the delivery terminal showing labelling machine, capping, wrapping and packing. In this process jars after filling are wiped clean of spillage, etc., placed on the band and pass down the first conveyor to a labelling machine. Taken off the band, they are labelled, placed on a second conveyor, capped, wrapped in paper, and sometimes again labelled, after which they are placed in crates ready for collection and delivery to stores. The power expended per conveyor is 1 B.H.P., while the speed of operation is 28-30 jars on each pair of conveyors per minute, at a conveyor speed of 20 feet per minute.

From Packing to Despatch Departments

Fig. 5 is a part view of a conveying system applied to the manufacture of confectionery; the views shows a 7° declined portion of Twin Palata Belt

Fig. 4.—View from the delivery terminal of conveyor for assisting the operations of labelling, capping, wrapping and packing jars of jam in a preserve factory.

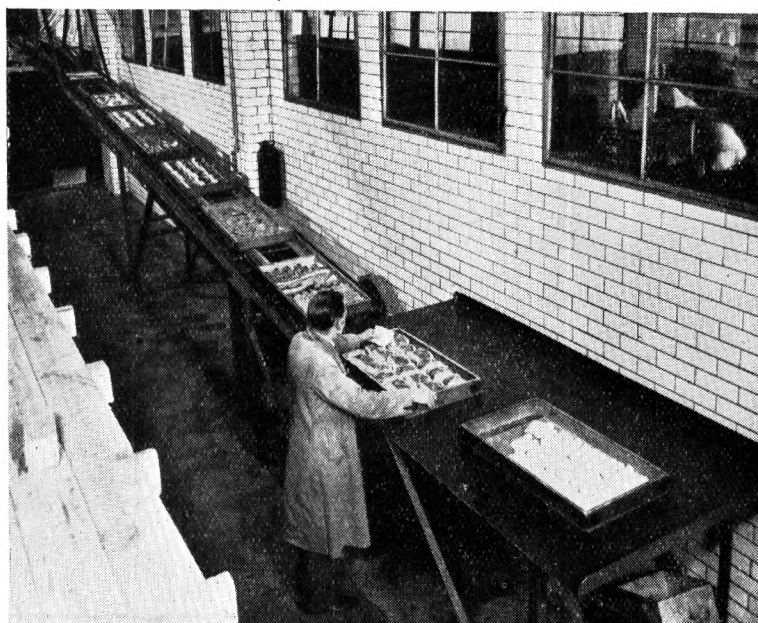


Fig. 5.—View showing 7° declined portion of Twin Balata Belt Conveyor with full trays of confectionery arriving at the unloading table in despatch department, from where the trays are transferred to vans for delivery to consumers.

Conveyor with full trays arriving at an unloading table in the despatch department, where they are transferred to vans serving various sales districts. This installation is of special interest in that it illustrates one that is applied from packing room to despatch department.

Full trays of confectionery are conveyed on the top strand of a 12-inch horizontal sliding steel band in the packing room on the first floor, and are delivered over driving terminals to a 90° gravity roller curve, of 2½-inch diameter rollers, 21 inches long and 9-inch pitch, and then on to a 11° declined Twin Balata Belt Conveyor.

The latter passes through the floor, and in turn delivers to another 4-inch Twin Balata Belt Conveyor declined at 3° and 7°, and finally discharges on to an unloading table in the despatch department at street level, as shown in Fig. 6.

The conveyors carry up to a maximum load at a speed of 50 feet per minute.

Conveying Raw Material

Fig. 6 is interesting in that it shows conveyors applied to the beginning,

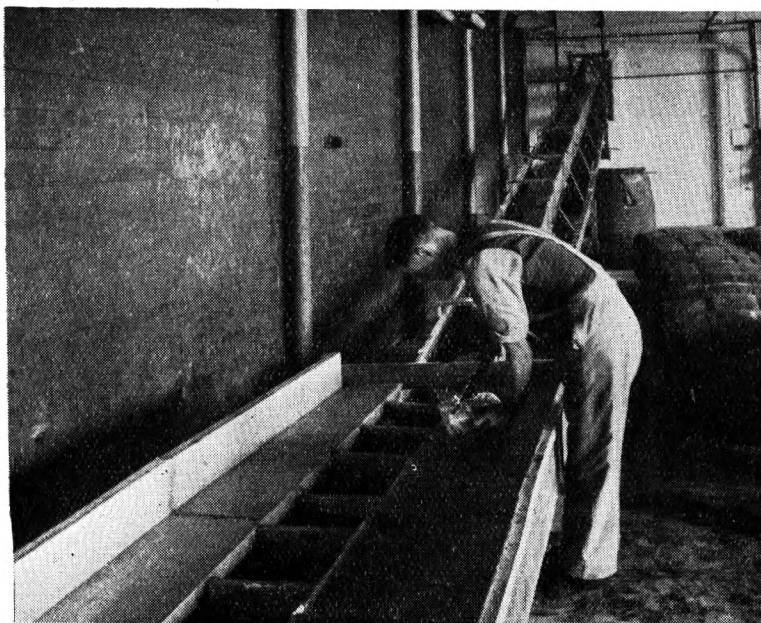


Fig. 6.—Band conveyor for delivering lumps of fat from the cutters to the press shop in a plant manufacturing shredded suet and similar foodstuffs.

These rollers vary in size from 1 inch to 4 inches in diameter. Their capacity varies from 5 lbs. per roller to 1,800 lbs. respectively, their spacing within the steel frame differs with the type of load to be carried—that is, the size and weight of the packages. It is important that not less than three rollers should constantly be in contact with the material being handled.

A great feature of this class of conveyor is that it can either be a fixture, or erected temporarily to effect handling at any point, thereby giving flexibility. The conveyor is mounted on adjustable trestles of sufficient number to carry the load and, to effect stability, gravitation movement is obtained by varying the gradient at

and not to the end, of a process. The equipment is used for collecting lumps of suet from an unpacking room and conveying them to shredding presses in a factory manufacturing shredded suet and similar foodstuffs.

The picture shows a man cutting the fat into pieces of suitable size for conveying. Barrels containing $2\frac{1}{2}$ cwt. of bulk suet are broken open and the contents cut up into pieces not more than 12-inch cube. These are loaded on to a band conveyor where they are carried up an incline of 90 to 20° to a press room, and are distributed down chutes to guillotine type presses by "ON" and "OFF" scraper ploughs controlled from the press platforms.

The carrying capacity of this system is from 125 to 250 tons of suet per 8-hour day.

which the conveyor was set from $1\frac{1}{2}^\circ$ to 7° to suit the weight and character of the material in contact with the rollers.

Conveyor for Sorting and Transport

An illustration of roller conveyors used for sorting and transport purposes is shown in Fig. 8. A typical installation of gravity conveyors is for conveying and

Conveyors for Bottles

An illustration of a completely different application of a conveyor is shown in Fig. 7. The conveying plant is specially designed to suit the job in hand, and there are illustrated two types of bottle-conveyors, both used for bottle-washing and delivery to fillers. The capacity of either machine is 400 to 500 dozen bottles per hour of half-pint, pint or quart sizes.

Another type of conveyor is one on which the material to be moved is both elevated and conveyed. The classification, however, does not apply to elevators and conveyors which also, as already illustrated, may both elevate and convey, but to equipment that is specially designed to carry out this task. Such an installation is the overhead chain, or the stabilised tray for continuous drying, cooling or conditioning.

Gravity Roller Conveyors

Gravity conveyors are the simplest of all labour-saving appliances, and consist of a series of rollers provided with ball bearings assembled crosswise between angle-iron runways.

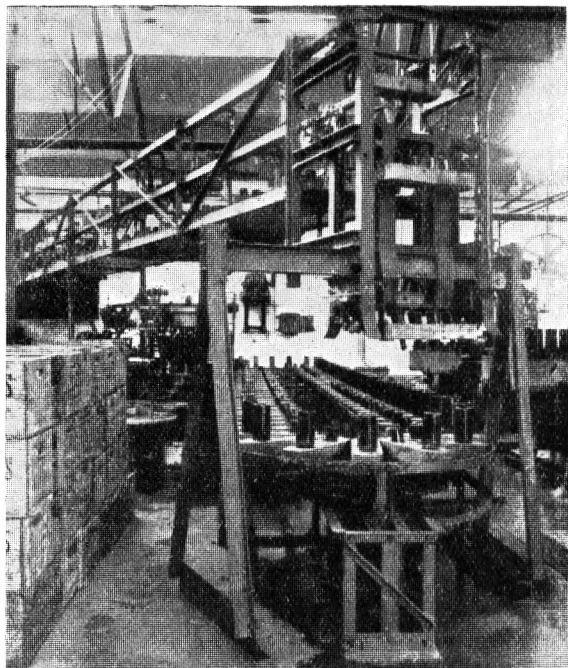


Fig. 7.—Two types of bottle conveyors, both used for bottle washing and delivery to fillers.

packing simultaneously. Cases to be packed travel in one continuous stream on the gravity conveyor to the packing rooms. Here they are run on to the packing tables, which can form a double loop that enables the operatives to work on both sides, thus allowing a greater number of workers, and more time for packing, without interruption to the steady flow of material. As the cases are packed, they continue their journey to the next stage, where they are sealed, stencilled, and conveyed to any desired point of despatch.

Power-Driven Trucks

Whenever applied to mechanical handling, power-driven trucks have proved to be a dividend-paying investment, two of their features being great flexibility and adaptability to any problem where mechanical assistance is needed to aid production.

Not only are they necessary for the efficient operation of any internal transport system, but can be used with equal success to service operatives on a production line in certain instances.

It is interesting to note that in a food plant one industrial truck operating with eight trailers and three men, on an internal transportation system, did more and better work than had formerly been done with twenty-four men using two hand-wheel trucks and an individual rail system.

American food manufacturers have rapidly realised the advantages of industrial trucks and have reorganised their handling equipment to accommodate these vehicles.

The Meat Packing Industry

An indication of this is evident in the meat-packing industry, an industry that perhaps has had more attention paid to the solution of material handling problems and the reduction of handling costs than any other in the world; so much so that the methods employed in the movement of the product throughout the various processes has won world renown.

Low material handling costs in this industry are of such importance that only methods that are fundamentally sound are accepted, and it was for this reason that industrial trucks were first utilised for material handling. The application has been fully justified, for in one part the cost of handling has been reduced by approximately 60 per cent. of the initial cost.

These economies were effected by utilising the industrial trucks as an integral part of an elaborate mechanical handling system, whereby the trucks were employed to carry out material handling that could not be economically carried out by fixed plant. It is therefore evident that to secure the maximum advantage from this class of equipment it should be part and parcel of a factory planing scheme, and be used to assist line production from the point of raw materials "in" to finished product "out".

Other Types of Equipment

Other handling equipment includes portable band conveyors, portable pilers, mechanical skids, mechanical elevators, etc., each of which can be applied to assist production effort. These will be dealt with in later articles.

The portable mechanical handling equipment is of special interest to those who encounter problems such as the manipulation of a large assortment of material in warehouses, the loading and unloading of goods on to and from common carriers, etc.

Such equipment, which can be rapidly moved from one working position to another, effects considerable economy in costly labour. For instance, one type of portable piler when in operation is capable of utilising the whole available headroom in a warehouse, and packages up to $2\frac{1}{2}$ cwt. in weight, at a speed of 1,000 packages per hour, can be coped with.

Among the large number of different materials capable of being handled by the piler are sacks, cases, crates and packages of all kinds.

The processing of foodstuffs is becoming a more scientific study with the progress of time, and those manufacturers who do not keep abreast of progress quickly become redundant. It can likewise be said that methods of production are equally as fluid, and those factories which are not equipped to produce commodities at a minimum cost while maintaining maximum quality will be equally redundant. The war is teaching everybody the value of man-power and production, and if the rehabilitation of industry is to be sound and rapid, it is evident that all available man-power must be utilised to its maximum physical advantage without undue fatigue, for to the balanced mind the methods of winning the war must be applied to winning the peace, and ensuring industrial prosperity.

Acknowledgment

The author wishes to acknowledge assistance in the provision of data and illustrations to the Steel Band Conveyor and Engineering Co., Ltd., Rownson, Drew and Clydesdale, Ltd., and the Industrial Truck Manufacturers' Association.

(To be continued)

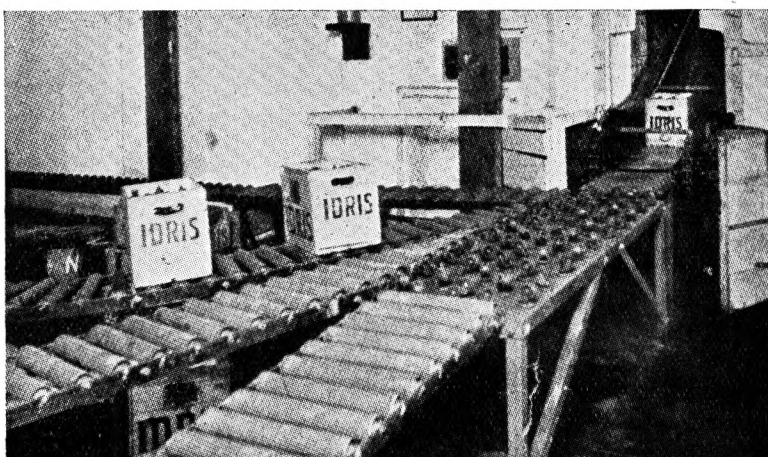


Fig. 8.—Five-track roller conveyor and distributing table receiving from push bar conveyor for sorting and transport purposes.

Ministry of Food

Latest Statutory Rules and Orders

The list given below is the continuation of the list of Orders published in *Food Manufacture*, December 1, page 422.

No.	Date. 1943.	PRICE FIXATION ORDERS	No.	Date. 1943.	DOCUMENTS
1125	Aug. 4.	Fruit Pulp (Control and Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 1650 and 2059.	1496	Oct. 16.	Food Documents (Fees) Order. Revokes S.R. & O. 1940 No. 173.
1134	" 5.	Leeks (Maximum Prices) Order. Revokes S.R. & O. 1941 No. 1723.			FEEDING STUFFS
1155	" 7.	Amending the Feeding Stuffs (Maximum Prices) Order, 1942, and giving Directions supplementary thereto.	1498	Oct. 23.	Feeding Stuffs (Rationing) Order. Revokes S.R. & O. 1942 Nos. 156, 337, 1674 and 1696; and 1943 Nos. 78, 514, 709 and 866.
1159	" 10.	Directions, supplementary to the Potatoes (1943 Crop) (Control and Prices) Order.	1499	" 23.	Directions, supplementary to the Feeding Stuffs (Rationing) Order, 1943.
1191	" 14.	Oat Products (Control and Maximum Prices) Order. Revokes S.R. & O. 1941 No. 2140; and 1942 Nos. 5, 524 and 978.	1500	" 21.	Feeding Stuffs (Licensing and Control) Order. Revokes S.R. & O. 1939 No. 1213; 1940 No. 528; 1942 Nos. 1668, 1694* and 1695; and 1943 No. 26.
1196	" 16.	Coffee (Retail Prices) Order. Revokes S.R. & O. 1941 No. 272.			* In so far as it relates to Great Britain.
1198	" 17.	Amending the Green Vegetables (Maximum Prices) Order.	1501	" 21.	General Licence (Retailers), under the Feeding Stuffs (Licensing and Control) Order, 1943.
1199	" 18.	Amending the Milk (Maximum Prices) (England and Wales) Order, 1943.			FISH
1215	" 21.	Amending the Sugar (Maximum Prices) Order, 1941.	1439	Oct. 2.	Order, revoking the General Licence, September 18, 1943, under the Fish (Supplies to Catering Establishments) Order, 1942. Revokes S.R. & O. 1943 No. 1347.
1223	" 21.	Onions (Distribution and Maximum Prices) Order. Revokes S.R. & O. 1942 Nos. 1774 and 2069.	1445	" 5.	Fish (Distribution) (No. 2) Order. Revokes S.R. & O. 1943 No. 546.
1224	" 21.	Amending the Carrots (1943 Crop) (Control and Prices) Order, 1943.	1507	" 19.	Fish Sales (Charges) (No. 3) Order, [Emergency Powers (Defence) Act, 1939, S.2.] Revokes S.R. & O. 1943 No. 847.
1244	" 24.	Amending the Technical Tallows and Greases (Home Melt) (Maximum Prices) Order, 1941.			FRUIT AND VEGETABLES
1246	" 24.	Amending the Plums (Maximum Prices) Order, 1943.	1433	Sept. 30.	Order, amending the Fresh Fruit and Vegetables (Restriction on Dealings) Order, 1943.
1254	" 26.	Amending the Jam and Marmalade (Maximum Prices) Order, 1942.			GRAIN
1255	" 25.	Order, revoking the Meat (Prescribed Wholesale Prices) (Northern Ireland) Order, 1940. Revokes S.R. & O. 1940 Nos. 43 and 340; and 1941 No. 11.	1449	Oct. 6.	Home-Grown Grain (Returns) (Great Britain) Order.
1263	" 28.	Amending the Hay (Control and Maximum Prices) (Great Britain) Order, 1943, and giving Directions supplementary thereto.			MANUFACTURED AND PRE-PACKED FOODS
1264	" 28.	Amending the Hay (Maximum Prices) (Northern Ireland) Order, 1943.	1318	Sept. 11.	Order, prescribing Appointed Days under the Manufactured and Pre-Packed Foods (Control) Order, 1942, and granting a General Licence thereunder. (Christmas puddings and baking powder.)
		DEFENCE (SALE OF FOOD) REGULATIONS			TRANSPORT
1553	Oct. 28.	Defence (Sale of Food) Regulations. Order in Council, October 28, 1943. (False labelling and advertisement of food; Requirements as to pre-packing and advertisement and composition of food; Entry and inspection and taking of samples; Enforcing authorities.)	1152	Aug. 9.	(Amendment) Direction (No. 2).
			1154	" 7.	Order, amending the Directions, April 30, 1943.
			1334	Sept. 15.	Direction. (Seed Potatoes.)
			1343	" 17.	Directions.

The Packaging of Food

PROGRESS IN 1943

R. L. ROWNEY.

AS FAR as new restriction on food packaging was concerned, 1943 came in like a lamb, and went out like one. This was certainly not for want of trying on the part of the authorities. They had the intention and the desire, but they lacked the scope for broad measures and had to content themselves with the minute particulars.

A Britain that had been at war for more than three years had pulled in the belt pretty nearly to the limit. Moreover, necessity, which will always mother invention, was not so powerful a compulsion that it sent us Heinz in a handkerchief and Batchelor in a bag. True, we had, in the closing days of 1942, reason to suppose that possibly the United States would discover a diminution in her ability to supply us with certain materials, but as the war in general stood we had lost all that we could lose, and the process of regaining was in train. It was at this stage that the tendency among writers on packaging materials and on materials generally to confuse reasonable wartime analysis with not so reasonable post-war hope and prediction became apparent.

We were treated to long and persuasive homilies on how wartime compulsion would inevitably mean that tins and bottles would give way to plastic containers, when what was in fact meant was that it would be extremely pleasant (for some) if they did give way to plastics in the big post-war industrial and trade drive. In fact, as we shall see later, the trend towards plastics substitution found in 1943 a singularly blank patch, except in the sphere of closures.

A Significant Development

Another matter developed more significantly during the year. Dehydration—a hydra-headed monster to many food manufacturers—did make substantial progress, and dehydration produces its own desiderata in packaging. Possibilities have been indicated by recent research which radically influence all long-term thinking on the packaging industry.

It has been said with some justice that what dehydration does is to posit a new common denominator for food packaging, erasing the line between solid and liquid food, obliterating chemical properties that have caused many headaches in packing “virgin” foods, and cutting down packaging necessity while simultaneously increasing packaging possibilities in the context of the four gods—Protection, Economy, Portability and Durability.

But, although 1943 did see the potentialities of dehydration more plainly indicated than ever before, the actual development of this food-processing system did not proceed to the point where we could perceive any prospect of its achieving a dominating influence. It may be said with justice that the war, which gave dehydration its great stimulus, also hindered its progress in one sense. A very large part of food sent to the

Forces of the United Nations was destined for consumption in the desert, and in the desert there is little water for the restoration of foods from which the liquid has been extracted. In 1944 it will be different, for we have done with the desert.

Transatlantic Passage

From the technical point of view the year was notable largely for the energy and imaginativeness of research across the Atlantic. The intimacy of relations between the United States and ourselves is leading to a prompt interchange of views and experiences in packaging, and it is certain that on several issues we should have followed their lead had it been possible to introduce the systems and their appliances. But the traffic in ideas has been two-way. The American packers have profited substantially from the experience of British manufacturers in the earlier stages of the war. To some specific illustrations of U.S.-G.B. collaboration we shall return later.

Dotting the i's

As to the general position in Britain, there was an inevitable acceleration in the rate of expansion in the industry. Notwithstanding the rationing of civilian food, 1940, 1941 and 1942 witnessed a great increase in the tempo and scale of food packaging, with the requirements of the Forces and the largely increased ratio of tinned and bottled foods in the ordinary public's dietary compelling the gearing up of production to the highest level. But in 1943 a condition of relative stasis was achieved, although in individual directions there were reports of considerably extended output.

Meanwhile, the industry grew still nearer to the breast of the Mother Ministry. *Inter alia*, the Minister of Food amended the Canned Meat and Canned Soup (Control and Maximum Prices) Order, S.R. and O. 1941, No. 2021, so that as from March 1, 1943, his Ministry became the sole purchaser of all canned meat products, other than meat pastes, fish pastes and soups, produced by licensed United Kingdom canners. Canners submitted details of their stocks held at the end of February, and were told (not that it made so much difference) that future production affected by the Order must be made to standard specifications.

All this was, of course, expected, and if our advertising managers pulled a wry face at the provision that the quota of this production earmarked for civilian consumption should confront the housewife in all its tinny nakedness, with only a standard Ministry label, with no other indication of origin—well, the advertising sections have become acclimatised to such occasions. Not an epoch-making Order, this, but symptomatic of a year which, with all the major jobs done previously, saw mainly the i's dotted and the t's crossed.

New Ideas

We do not need to accept the argument that 1943 was America's year in food packaging to endorse the view that her contribution to research was generally bigger than our own. This was natural enough, for the United States was still in the early throes of war compulsion, and, since her compulsions in the matter of raw material and productive apparatus are rather different from the British, there existed a scope for adjustment even after British lessons had been learned. This was a sort of virtuous circle. America learned from us, and when we had got to our final shape she found herself in the position where she had to make some special arrangements of her own. And we learned from these.

Much of the new development in the United States has only a suspended lesson for us, because conditions render it impracticable to adopt it in wartime. We, for instance, have not seen and will not see so substantial a degree of conversion from cans to glass as United States manufacturers have been compelled to accept because of the serious deprivation of metal containers in the domestic market.

The initial impediment of the closure problem to such large-scale conversion was overcome by the decision of the War Production Board at the end of 1942 to permit a fairly generous allocation under the closure control (tinplate) measures, and by the accentuation of the development of plastics for the closure job.

Paper closures have also been an outstanding feature, and they came forward with the seductive clarion call that they would effect long-term vacuum sealing without making demands on the rubber supply for gasketing. They have indeed, from specimens seen by the author, progressed remarkably well. The application of ceramic screw caps, whose production involves relatively high cost but no serious physical raw material problem, has been furthered to a degree which has surprised many observers this side of the Atlantic. For the long-term packing of acid-content foods they have a particular suitability. The benefits of American development here, however, were not capable of serious realisation in the British industry last year. They are a promise for the peace.

Wireless Waves

In metal packaging, where the pressing problem is to save tin, the United States has made a discovery, rather loosely called the "wireless process", which has attracted a great deal of attention in the British industry. This system requires lengthy exposition, impossible within the limits of space, but it consists essentially in the application of radio waves to steel strip coated with pure tin, and the effect is to put a highly polished finish on "crude" tinplate almost instantaneously. The great thing about the process is that it economises enormously on bulky plant and on time. Moreover, it does the job better than the old processes of oil and heat application, and is reckoned to provide packaging more resistant to the action of acid foods than any now produced by the normal methods. The author has not seen the new plant at work, or its results, but informed opinion speaks highly of it, and it has been claimed with some enthusiasm as 1943's major contribution to the technical side of metal packaging of food.

Tin Economy

In Britain the problem of conserving tin supplies has not been less important. During the year the development of production in the areas not infected by the Japanese blight continued, and the Belgian Congo and Nigeria showed a substantial expansion in production. But Japan, at the end of 1943, was still in possession of areas that supplied two-thirds of the world's demand, and the importance of effecting all possible economy in the use of the metal was undiminished by such expansion in production as proved feasible in the other production areas. The Tin Research Institute had done fine work in 1942 and 1941, evolving new alloys and new processing techniques (British cannery will remember with particular gratitude the elimination of the "blackening disease" in meat canning and the development of an alloy of tin and zinc whose coating properties in many ways surpassed those of tin). In 1943 a new step forward was taken when the Malayan Chamber of Mines in London requested the Colonial Office to subsidise the Institute in its work of research for the post-war.

New Methods of Tinning

It is natural that the tin industry should have been provoked by the various new methods of economy, notably the electrolytic tinning process, into a new awareness of its post-war problems, but the important thing for the packaging industry was that out of the post-war research there might come some important wartime advantages. But the major apprehension of tin producers is the substitution bogey. They are becoming very susceptible to talk of plastics, and many food manufacturers, who see in the vast publicity that plastics are commanding the prospect of a consumer demand for plastic containers after the war, without reference to fundamental packaging and manufacturing requirements and economies, will sympathise with the new alertness of the tin industry in grooming itself for the coming battle of competition. Certainly 1943 did not witness any appreciable easing of the raw material position for metal packaging, and in some respects the position grew tighter, but the war has proceeded into what we may reasonably regard as the final phase, and it is not unnatural that the packaging industry should look with some disfavour on the introduction of methods of whose aptness to post-war conditions they entertain reasonable doubt.

Dehydration Development

Dehydration has been called the victory over bulk, and food packers will do well not to under-estimate its importance. For reasons already mentioned, the course of the war so far has actually limited in some directions the practical application of the extensive laboratory experience that has been accumulated in the great scientific effort to overcome the manifold problems that dehydration presents, both in its initial and ultimate stages, when the water is taken out and when it is put back. Inspection of the dried products will show the extent to which a large-scale application of dehydration as a food process would upset the established ideas of food packers and require a vitally new orientation. The conjunction of dehydration and compression—already a well-established processing technique—removes water

and air, the two elements around which the food packaging industry has been built up. Weight is reduced to a tenth, or less, and in terms of space this tenth can be further cut by anything from a quarter to three-quarters by compression.

In America there were, during 1943, many trade and advertising pow-wows on the question of the influence of dehydration on packaging, and there has been a substantial adaptation of machinery for the purpose of fulfilling the important official orders for dehydrated foods.

Over here we made useful progress last year, and both the Milk Marketing Board and the Ministry of Food have been behind the erection of a number of plants. It seems to be the consensus of scientific opinion that nothing does so well as the tin can container for packaging dehydrated foods, and this is so, because, in addition to all that other packaging materials can offer, the can guarantees against the *bête noire* of dehydration, which is moisture.

War metal shortage does not spare dehydrated foods, however, and a considerable proportion of American production last year found itself packed in a variety of other materials, mostly of the Cellophane type, with thermoplastic seals. So far nothing has been discovered that will enable the dehydrated food to retain its vitamin content and its flavour like the can does, but the Ministry of Food has made it plain in its instructions for dehydrated eggs and milk that the products should be used within a limited time (two months is the average, though periods up to five or six months have been shown not to affect the food substantially) and this appears to have inculcated a consumer habit.

Peacetime Prospects

Although 1943 witnessed substantial commercial as well as laboratory achievement, the realm of dehydration is still basically a war sphere. Eggs and potatoes and milk are dehydrated and compressed, but calves-foot jelly and fricassee of chicken are not. Research is being conducted on the assumption, however, that the post-war world will be an aerial world, with all that that means to packaging and transport. Packaging requirements for dehydrated food are, moreover, not simply quantitatively, but to an almost equal degree qualitatively, affected. There is still much work to be done before we know exactly how the chemical properties of foods are affected by the temporary magician's wand of dehydration, and therefore the extent to which the specific resistant qualities of packs will no longer be required, but it is quite plain that where chemical attack is launched through liquid, either essential liquid or fortuitous liquid introduced into the packaging, it would not have to be met in a dehydration pack, even though the native chemical property of the commodity were unaffected.

The advantages of a dehydration pack in bulk carrying are too plain to need emphasis. They are, however, less apparent in the department of packing for sales to the public. Every food pack is the offspring of the parents of what is required and what is desired, but the scope for advertising design, for appeal packaging, has finally rested on the suitability of the pack. With dehydration every food, from oysters to omelettes, would *compel* no more inspiring a pack in the shop windows than a Cellophane carton. In the matter of prestige packing for dehydrated foods the packers, the

manufacturers and the advertising people will start from scratch, and the sphere of the ornate will automatically be closed to them unless they are to adopt packaging principles more customary in the cosmetic trade.

Glass a Seller's Market

An uneventful year was 1943 for glass packers. A leading man in the industry summed up the position thus: If you can get the bottles, O.K.—if you can get the bottles. For all that, however, the special virtues of glass packaging in a war whose economic aspect consists in attrition have been emphasised in a year which indicated alternative uses for tinplate rather than in the protection of foodstuffs for a prompt market. But glass has never in the war period been in supply greater than would cover absolutely basic requirements, and the domestic availability of the raw materials for pottery has provoked a tendency for a switching over from glass to pottery. The Wedgwood ceramic jars, and the Doulton stoneware jars, have been increasingly used, though 1943 did not witness any large-scale substitution of them, and other similar packages, for glass, and although the normal range of hardware products has been cut by 60 per cent.

Glass packers have been active enough. In his speech at the annual meeting of United Glass Bottle Manufacturers, Limited, Sir Walrond Sinclair showed that the drop of £10,000 in the trading profit—not a very significant decline in view of the total of £349,000—was the result of increased operating costs for which there was no compensating adjustment in selling prices, and he referred to the “regular outflow of production”.

This was the general picture of the glass-packing industry during 1943. Costs were higher, labour was extremely difficult, raw material did not drop from heaven, and selling prices displayed an awkward indisposition to move in sympathy with costs; but demand was insistent and production was maintained and in many instances increased. The big subsidiary trouble of closures naturally afflicted this section of the industry severely, but it was here that plastics showed their paces, and here, too, there have been other helps. Among these may be mentioned the development of commercial manufacture of special cork packings made from granulated cork, and the reinforcement of our old ties with Portugal and the obvious anxiety of Spain to be in on the winning side are auguries for the future, for these two countries have been the prime source of imported supplies of cork.

Plastics

And now we come to plastics, which have received a volume of publicity during 1943 that puts into the shade all that they received in the whole previous ten years put together. They are a wonderful and increasing family, bearing names old and new—Erinoid, Bakelite, Rhodoid, Melamine, Vinyl, Styrene, Beetle, and the rest—and they are proceeding from an increasing number of companies. Not only the big organisations like I.C.I. and Thomas de la Rue, but also many small companies have turned their attention to plastics, and last year witnessed a new “high” in the claims for this “usurper of materials”.

In particular, there was a tendency in 1943 for paper

companies to spread out into the plastics field, and this has been both a consequence and a cause of the partial changeover from paper to plastics packaging for some products. But the challenge of plastics has not gone unheeded. The research departments of metal, glass and paper packaging companies are on their toes, and they are doing remarkable work. One paper company, well aware of the plastics threat in the post-war, last year devised, for export use, a water-proofed paper board, which does admirably a job that plastics seem to have been born for. In the future it will be a straight fight, plastics *versus* the rest, and the result will be not victory for one and defeat for the other, but a division of spheres of utility.

During 1943 it has been plainly shown that it is altogether wrong to deduce the post-war scope of plastics from their wartime indications and promise. In war all that matters is to get the job done, whether it is taking Rome or finding a suitable closure for the bottle or sealing process for the can. And plastics, which now seem to many observers to offer the moon, have indeed a remarkably catholic application that makes them a strategic war material *par excellence*. When the world returns to normal economic considerations and prices and costs are dominant commercial factors it will not be enough for plastics to show that they can do a job. They will have to show that they can do it more cheaply and as efficiently as the older materials, and that may be a different story. A manufacturer of the author's acquaintance had an idea about plastics and went, very properly, to the right place to find out what sort of a job they could do for his product. He was well pleased with the sort of job they could do, but was acutely taken aback by the cost, and, in his own words, he is waiting till they "mass produce the things".

The New Vision

Much of plastics advertising has perceived this danger of exaggeration and has conducted a wholly commendable campaign to instruct rather than persuade about plastics. When all the cons have been stated there remain very many pros. Despite the energetic efforts of the Tin Research Institute, and the inventiveness of paper and board packaging concerns, and despite the unvarying ingenuity of glass packagers, plastics will still carve their very substantial niche even if they are not endowed with the economic merits that could enable them to sweep the market.

In the packaging world 1943 was a period when plastics found closures their main line of attack into the provinces of older materials, but they are preparing themselves for a much bigger assault, and their prospects here have to be considered, not in relation to packaging requirements as they now are, but in relation to secular developments in food processing. Their scope may best be seen in conjunction with the scope for dehydration, or for the preservation of food by freezing, both of which systems have an almost unlimited field for exploration, and which have it in them to throw present packaging systems into a flurry of readjustment.

Il Fait Froid

A word about freezing. In October, 1943, Hotel Catering Management made some quite remarkable pronouncements about the future of the quick-freezing

process. During 1943 there was a good deal of experiment with freezing processes in the laboratories of American freezing concerns, but neither in that country nor here was there any significant development. According to the prediction, however, the American companies will, after the war, convert the housewife into what Mr. Jack Warner might call a "warmer-upper". Most of America, said the Association, will be eating complete meals, all of which have been prepared and then processed by quick-freezing, and the range of foodstuffs is given at 265.

America is, of course, more intimately acquainted with frozen food than we are in Britain, and her freezing companies may know best. While not disputing the excellence of food reheated after efficient quick-freezing and appropriate packaging, however, the author does not incline to the view that the technique has a monopoly of virtue as a system of processing food, and is old-fashioned enough to believe that even a grecian-skirted H. G. Wells housewife of the year 2000 will still find raw foods well packed (and very probably many of them in tins and bottles and jars) on the plastic shelves of her plastic larder. The particular advantage of freezing is that it is able to produce food in something very like its raw state long after the orchard has shed its leaves and the field gone to its long winter sleep. It is essentially the out-of-season appeal that it answers.

Packaging Up To Date

In so short a review it has been possible merely to sketch in outline some of the major packaging trends of 1943, and to convey only in the most general terms their significance for the future. When we look back over the four and a quarter years of war that we have endured so far we can see that the sacrifices made by packaging have been matched by the opening up of new prospects, and it may be said of the packaging industry that the war drew in its belt but opened its eyes. The British Standards Institute has been cursed in its day, and we have seen the finery stripped off our packaging like the garments from a Victorian lady of fashion until we stand in our corsets and pantaloons. What the packaging industry must perceive clearly is that when the time comes we shall not dress ourselves in the same old gowns. There will be new fashions. And this is the good that the war has brought. It has vastly accelerated the business of research, so that now the housewife talks in familiar terms of things like dehydration and quick-freezing that would not otherwise have entered her ken, let alone her kitchen, for a decade. British packaging has done, and is doing, a fine war job, and it faces an eventful future of the highest promise.

"FOOD MANUFACTURE" 1943 INDEX

THE 1943 Index of FOOD MANUFACTURE is ready, and copies are available to subscribers on receipt of a stamped addressed envelope.

It is recommended that the envelope be 10 inches by 8 inches to avoid undue folding of the Index.

Grass and Grain Drying

DRIED grass was not considered to be a commercial proposition before about the end of 1936; today the picture is very different, and the demand is probably something like ten times that of the supply.

For many years prior to 1939 various types of sun-dried alfalfa meal, mainly from California, Canada and South Africa, were imported into this country, the total annual imports from all countries in the years immediately preceding the outbreak of war amounting to between 25,000 and 30,000 tons.

During the past five years the feeding value of dried grass to dairy herds and beef cattle has gained increasing recognition, and the interest that is being taken in it was demonstrated by the large attendance at the Farm Crop Drying Conference, arranged by the Farm Crop Driers' Association, Limited, on December 3.

Design of Plant

Discussing drying plants, Colonel Pollitt said that this country was a very long way behind others in the matter of design, and the associate members of the F.C.D.A. were studying the ideal requirements. Unfortunately drying had not developed on entirely scientific lines, and he wanted to stress to the manufacturers of driers that a definite specification is necessary. For instance, in his opinion an output of 10 cwt. dry matter per hour was needed from a feed material testing up to 85 per cent. moisture. The drier should be capable of handling such varied products as kale, potatoes, grass, and sugar beet tops. Labour-saving was another important factor, and the drier should, to all intents and purposes, be mechanical. There was no problem in the making of a drier which could not be solved by engineering science.

Another important point was the avoidance of the dilution of the flue gases with atmospheric oxygen. Colonel Pollitt said that he had no precise data on the decomposition of carotene by oxidation which occurred in the presence of oxygen, but the matter was an important one. The design of an ideal drier which would take care of the points mentioned was not yet settled, and he looked to the makers to produce one.

Leut.-Colonel Pollitt's Address

Lieut.-Colonel G. P. Pollitt, chairman of the Association, opened the proceedings with a general talk on dried grass. Referring to the best varieties of grass for drying, he put cocksfoot first, following on a first year's crop of Italian rye grass. Of the clovers, he found S 100 best because it grows high. Lucerne, san-foil and Italian grass also looked promising.

Dried grass is being used for food on its carbohydrate value, but this will not always be the case. It has a considerable future as a source of carotene. "We want to make it into an animal feeding stuff for the future market, but it is necessary to put our house in order in the matter of carotene content."

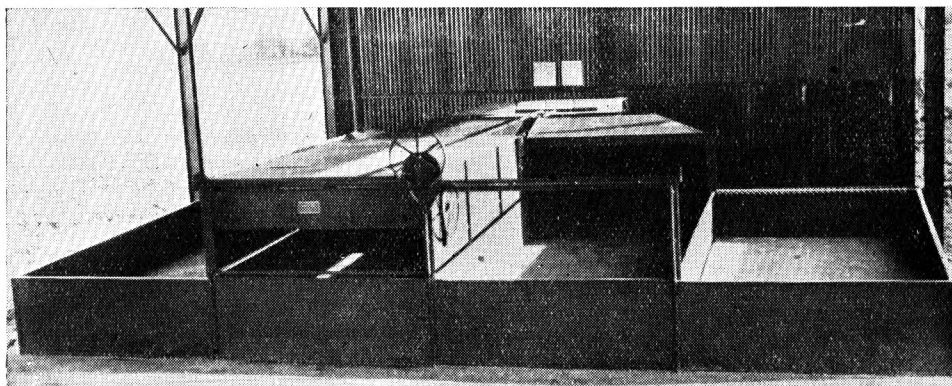
Referring to the differences between producers' and buyers' analytical figures for carotene, Colonel Pollitt stated that the Association had found on investigation that these were not due to faulty sampling. The producers' samples were taken as the grass was bagged, and it had been found that there occurs appreciable loss of carotene during storage, such losses being caused principally by excessively high temperatures. Efficient cooling of the material is necessary, and a number of driers have already incorporated atmospheric coolers in their equipment. The cooler the grass goes into the sacks the better, and it should never exceed 85° F.

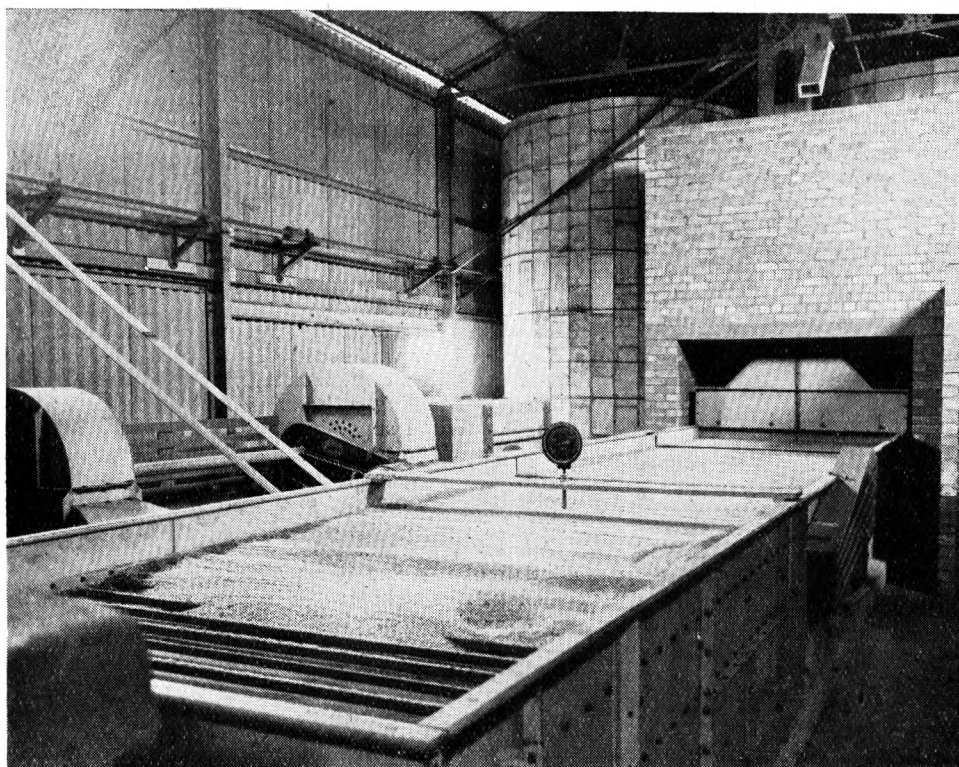
Glume Meal

Turning to the subject of glume meal, Colonel Pollitt said that there had been 1,500 tons sold this year. The glume is obtained from wheat, clover, barley, etc., and varies greatly in composition. He thought that this material would have a post-war value, and advised his hearers to obtain analyses of their glume meals. They came out in the ordinary threshing machine. For instance, glumes from barley undersown with clover contained about 14 per cent. protein and had a carotene value of about 80 mg. per kg. Such a type of meal would always have a value, but it was necessary to select glumes and keep figures in order to know which to collect and which to reject. So long as the present system of stacking and threshing was used, 3 cwt. to the acre of this grindable chaff would result. It would be useful to obtain information on the feeding of cattle with glume.

A typical Mark 3 drier installation.

(Courtesy: I.C.I. (Fertilizer and Synthetic Products Ltd.)





Grain Drier. View looking from discharge end, showing feed end of drier, furnace and fans. Two silos for undried grain in the background.

(Courtesy: Messrs. Ransomes, Sims and Jeffries, Ltd.)

Carotene Content of Dried Grass

After Colonel Pollitt's address, the carotene content of dried grass was discussed. Mr. W. M. Seaber, Official Analyst of the F.C.D. Association, said that most of it was in the β form, which converts to vitamin A almost quantitatively. The total figure for β -carotene in grasses included about 20 per cent. of "neo- β -carotene", but it had not been proved yet whether this modification is biologically active and convertible to vitamin A. At present it is the custom in this country and the U.S.A. to return neo- β -carotene with the total carotene in analytical certificates. Feeding experiments have been made which seem to indicate that neo- β -carotene is not a precursor of vitamin A. Mr. Seaber concluded by saying that he did not consider that sufficient work had been done to prove the value or otherwise of neo- β -carotene.

Mr. R. O. Davies discussed the losses of carotene which occurred between production and purchase. The temperature of storing was one of the most important factors. He also gave the substance of a paper he had previously read before the Food Group of the S.C.I. on the subject. Figures for losses under different conditions, which demonstrated the necessity for controlling the temperature of the meal, were given. Losses might amount to from 15 to 70 per cent.

During the subsequent discussion there was manifested a general desire that the price of dried grass should be based on a sliding scale per unit of carotene with increasing value as the carotene content increased.

The matter of the assimilation of carotene was touched upon. If the carotene in high-grade grasses were not wholly absorbed it would point to the advisability of the production of the lower grades.

Old v. New Pastures

Diverse opinions were expressed on the facility with which old and new pastures could be dried. It was stated by one member that meadow grass was easier to dry than cocksfoot, which caused surprise to Colonel Pollitt, who pointed out that cocksfoot was the only grass without a sheath. In drying rye grass, for example, by the time the stem was dry the leaves were too dry.

The subject of wilting produced several questions. It emerged that, although losses of carotene certainly occurred during wilting, as the wilted grass dries quicker, thereby reducing drying losses, the loss of carotene during wilting was more or less compensated for and could be ignored.

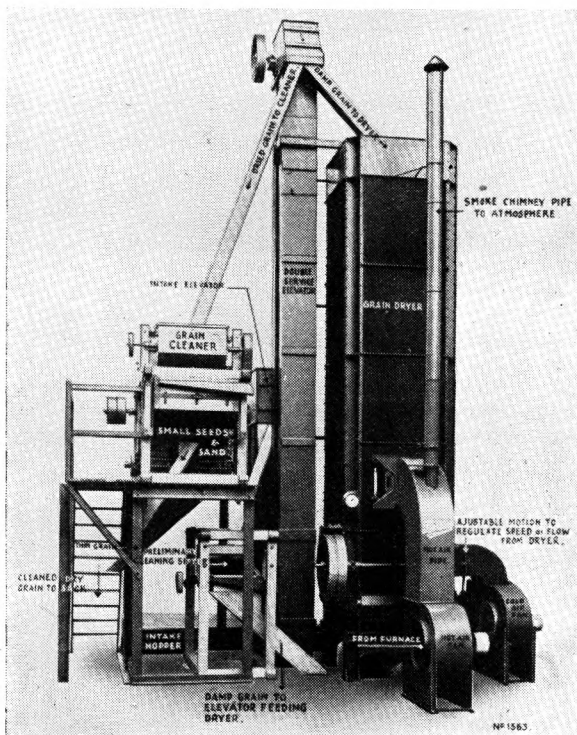
Grain Drying

Mr. Roland Dudley, who presided over the discussion on grain drying, said that he was aware that to some economists grain should be grown anywhere except in this country, which all statistics show is the most prolific and fertile grain-growing country of its size anywhere in the world. Year by year the average yield of grain in England and Wales—even with the prehistoric methods of the binder and other antediluvian implements—beats the world. The average production is about 30 to 33 bushels against 16 in the Argentine, 9 to 10 in Canada and 13 in the U.S.A. Mr. Dudley thought that the answer to the question: Why have we not grown more grain? was twofold. Firstly, that with our prehistoric methods of harvesting—handling each sheaf at least five times by hand labour—we could not possibly compete in price. The combine harvester can solve that part of the problem. Again, when the

grain has been cut by the combine harvester, how is it to be dealt with in that state of dryness and germinating power which is desired? The main difficulty was the treatment which the grain receives after harvesting. Unless the cereals ripen fully, endless difficulties will be encountered in drying it by any method that he knew of.

Mr. Dudley mentioned Desprez 80 and Cote D'Or as two early wheats and Holdfast and Yeoman II. and Quota as useful late varieties. Of the barleys, Camton, the new N.I.A.B. barley, was a heavy yielder.

The temperature of storing was one which must be settled by the experts who have been making experiments on the different temperatures and moistures at which grain has been cut. By next harvest there should be available a complete schedule embodying reports on these experiments. Mr. Dudley asked whether it would be possible by any means to have all grain inspected or tested before it leaves the farm. If such an inspection could be arranged it would be of very great benefit to all concerned. It is known that, whenever a consignment of grain goes to the malting, a man inspects every sack before it enters the kiln. Why should not something like that be done at the farm? The same thing can be said for milling. Owing to shortage of labour it is difficult at present, but it would be of immense benefit to everybody in the future.



Grain Drier.

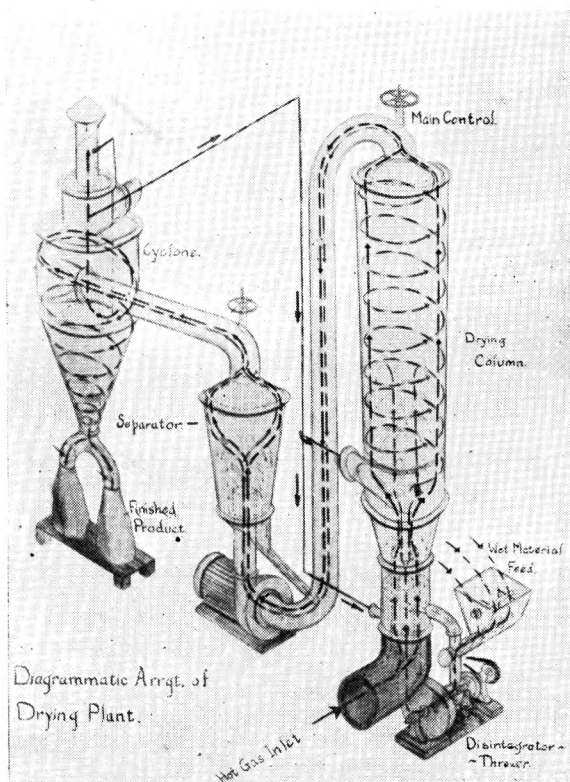
(Courtesy: Messrs. George Porteus and Sons (Leeds), Ltd.)

Bound up with the drying is the very difficult and important question of storage. Mr. Dudley found that grain cut with not more than 18 to 19 per cent. moisture and put in small bags not weighing more than 100 lbs. and stacked in tiers 2 bags wide on shelves, will keep for 6 to 8 weeks and dry well.

If the Ministry of Food driers were built in sufficient numbers and capacity to take all the grain, the necessity for the farm crop drier would not arise. But it is doubtful whether any such possibility is likely to occur and the idea was Utopian. The producer will have to rely on himself to get his stuff dry. The whole object of the Farm Crop Driers' Association is to help the farmer to fight his battles against ignorance and prejudice and to help his technique. It should be borne in mind, concluded Mr. Dudley, that this country can produce the highest quality grain in the highest amount if we set our minds to business.

During the discussion it was generally agreed that storage should be on the farm, although there were some who considered it was the responsibility of either the Ministry of Agriculture or of Food.

There were put several questions regarding the amount of water that grain growers who did not dry their product could sell to the miller. Mr. C. A. Loombe, of the Ministry of Food, said that he did not envisage quality payment beyond millability and non-millability. The system had worked exceedingly well. There was provision for appeal to the Ministry, but only four cases in the last crop came up for settlement.



Diagrammatic arrangement of two-stage high-velocity pneumatic drier for grass, clover, kale, sugar-beet tops, etc.

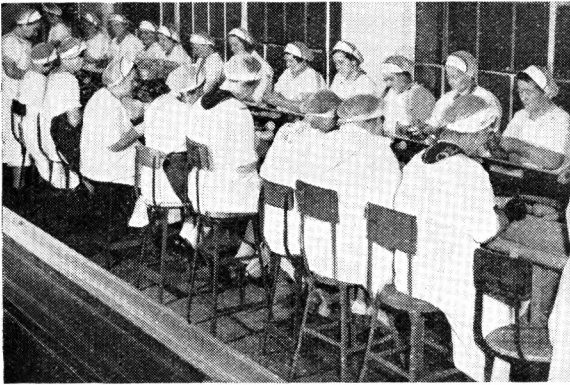
(Courtesy: Messrs. Bamag, Ltd)

(Continued on page 28)

First School of Dehydration

Dehydration of food goes on apace in the U.S.A. and has reached a position of vast importance. The latest advance is a school for teaching it. Recently opened in Rochester, U.S.A., it is described as the first dehydration school in the world.

IN the U.S.A. dehydration of food has reached such proportions that existing plants are taxed to capacity and the conversion of other plants or the erection of new ones is necessary. To facilitate this, the authorities have established an institute for teaching manufacturing technique. One hundred and thirty representatives of America's food processing industry—students of the first dehydration school—were in attendance at the opening session.



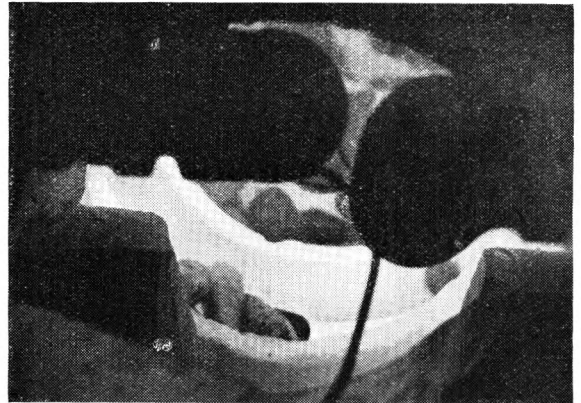
Hand trimming of peeled carrots.



Removing blanched carrots from a retort type blanching unit.



Teaching how to wash carrots.



View of the interior of the flame peeler. (Note metal at heat of incandescence.)

The headquarters for the classes are the Beech-Nut Packing Company Plant. Here, American Government, university and industrial figures are providing an intensive course of dehydration in an effort to marshal all of the industry concerned to increase production. The course covers the history of dehydration, varieties, handling and storage of fresh vegetables, plant sanitation, preparation for dehydration, dehydration equipment and its operation, storage of dehydrated products, packing materials and laboratory control. The tunnel drier, the shelf or tray drier, the vacuum drum drier and the spray drier are all in operation for study.

It is claimed that instruction is so complete that students can begin the conversion or the building of their own plant upon completion of the school course.

Food Manufacture

The Milling Industry

PROGRESS IN 1943

A. J. AMOS, Ph.D., B.Sc., F.I.C.

THE ANNUAL review of the milling industry, written by the present author at the close of 1942, drew attention to the outstanding success which had attended millers' efforts to accomplish the difficult task of raising the product furnished by milling to the compulsory 85 per cent. extraction from the category of a wheatmeal to that of a flour.

Despite their no less than remarkable achievements during 1942, however, millers had sufficient pride in their craftsmanship and faith in their practical skill to believe that an even greater progress might be attained. That their belief was justified is proved by the still further improvement in the fineness and fibre content which they have effected during the past twelve months. In November, 1942, the average fibre content of the flour being received at the author's laboratory was 0.5 per cent., and the average residue left on an 8-silk by a standardised mechanical sieving test was 3 per cent.; to-day the corresponding figures are 0.35 per cent. and 1 per cent.

It should perhaps be emphasised that this further reduction in the branny matter content of 85 per cent. flour has been accomplished without serious loss of vitamin B, and the B₁ content of present-day flour reaches the required level of 1 international unit per gram.

Fortification and Dilution

At the end of 1942 the decision that 85 per cent. flour with its higher phytic acid content should be fortified with creta præparata had been put into practice in comparatively few mills. During the earlier months of 1943 the number of mills completing their arrangements for the addition of creta steadily increased and, by the middle of the year, only a few mills were failing to make this fortification.

Analyses of some hundreds of commercial samples in the author's laboratory, supported by the evidence of some special tests, prove, however, that the distribution of the creta in the flour may be markedly variable. This finding is not unexpected. The regular mechanical addition of a given proportion of creta involves practical difficulties and no type of feeder—not even that favoured officially—has given complete satisfaction in each mill in which it has been tested. Even when a feeder is delivering accurately 7 ozs. creta per sack of flour, however, it would be surprising to find those 7 ozs. distributed uniformly throughout the whole 280 lbs. of flour.

In the manufacture of self-raising flour, for example, where the added aerating ingredients amount to at least 7 lbs. per sack and possess a physical nature rendering them more readily mixable with flour than is creta, at least 10-15 minutes' mixing in a special mixer is required in order to effect uniform distribution. It is unlikely, therefore, that one-sixteenth of this proportion of mineral matter, in the form of a powder which is not free-running, will become uniformly distributed as

a result of the relatively gentle treatment it receives in its passage through the worms and redressers of the later portion of the mill flow.

The dilution of flour with cereals other than wheat which was forecast in the author's previous annual review had become compulsory by the time that article appeared in print. Millers were instructed to replace up to 5 per cent. of home-grown wheat in the grist by barley, rye, oat products, or a mixture of any of these cereals. About a month later the rate of dilution was raised to 10 per cent., at which level it remained until about six weeks ago, when it was reduced to 7½ per cent.* Barley and rye have been used in the form of the natural grain, but the oat products have usually been supplied in the form of groats. The extractions to be obtained from these diluents were fixed at 75 per cent. for rye, 70 per cent. for barley and 85 per cent. for oat products, but some months later the figure for oat products was reduced to 80 per cent.

An unexpected instruction to millers, which came into force with the order to incorporate the cereal diluents in the grist, was the compulsory addition of milk powder to flour at the rate of 2 lbs. per sack. It would seem, however, that this addition was not decided upon because it met a nutritional want but as a means of avoiding the spoilage of a large surplus of milk powder which the authorities had accumulated.

The official decision that the non-wheaten diluent in a grist might be any one of three cereals naturally caused millers to be interested in the relative effects which the three cereals exerted upon baking quality. The question was studied in the author's laboratory, and the results of the tests indicated that, in general, barley had the least detrimental effect upon baking quality and colour. Rye, if sound and of good quality, did not cause serious deterioration of baking quality, although it tended to have a rather greater adverse effect than barley. Several samples of rye, however, were sufficiently sprouted or out of condition to impair markedly the breadmaking properties of the flour with which they were incorporated.

It was obvious, therefore, that rye purchased for the purposes of flour dilution would need to be selected with care. The effect of oat products upon the baking quality of flour varied with the nature of the product employed; oat products which had been heated had less serious effect than had "green" products.

Since commercial heated oat products vary appreciably in the degree of heat treatment which they have received, it was reassuring that millers were recommended to restrict the proportion of oat products to 3 per cent. of the grist, the remaining 7 per cent. of diluents being barley and/or rye. The general effect of these diluents is to cause the dough to feel slightly "dead" and to lose some of its liveness and spring, and indirectly therefore to reduce slightly the oven

* Since this article was written a further reduction to 2½ per cent. has been announced.

development. The reason for these effects is that cereals other than wheat do not contain gluten, and hence do not possess dough-forming properties; their incorporation in flour therefore amounts to dilution of the flour with an inert material.

When 85 per cent. extraction was made compulsory there were considerable stocks of imported Canadian flour in this country, and, in order to avoid wastage, it became necessary to dispose gradually of some of this by mixing it into the 85 per cent. national flour. The maximum admixture was at first $12\frac{1}{2}$ per cent., but this was later reduced to 10 per cent. and subsequently to $7\frac{1}{2}$ per cent.

Changes in Nature of Grists

During 1943 the composition of the wheaten portion of millers' grists changed very considerably, and the trend of this change, superimposed upon the effect of the diluents, eventually led to a perceptible deterioration of the breadmaking quality of the flour. There has, however, been one guiding motive behind the periodical instructions relating to the composition of grists, and the same motive that gave rise to the decision to introduce dilution with other cereals—namely, the saving of shipping space by the maximum utilisation of home-grown products. As the new crop English wheat became more freely available, therefore the minimum proportion of home-grown wheat in the blend was raised and the proportion of imported wheat accordingly reduced. Variations in the acreage under wheat cultivation in different districts, and other factors, have prevented the adoption of a standard grist for the whole country, but the official grists of each region have followed the same trend. The composition of grists employed in one of the regions at various periods during the year will serve as an example. (See table.)

This table reveals the marked change in the nature of grists, and hence of flours, which has occurred during 1943. In the district in question the proportion of strong Manitoba wheat in the blend has decreased from about 70 per cent. in July to a maximum of 40 per cent. in October.

Present-Day Flour and Bakery Technique

The gradual increase in the home-grown wheat content of the blend which became compulsory as the supplies of new crop wheat became progressively greater naturally led to a falling-off in the strength and general breadmaking qualities of the flour. The increase which raised the home-grown wheat content of the blend to 50 per cent. had, however, a greater effect than any of the previous increases, and resulted in a flour which necessitated adjustments being made in bakery technique if the best possible bread were to

be made. Much of this season's English wheat has a less distensible type of gluten than native wheat of many previous crops, and consequently the presence of 50 per cent. of it in the blend causes a distinct diminution of the liveliness and spring of the dough. A still further impairment in this direction is occasioned by the presence of the 10 per cent. of non-wheaten cereals, each of which has a slight "deadening" effect upon the dough, while the milk powder also causes a slight but perceptible variation in dough liveliness.

It is possible to make perfectly good bread from the flour from such grists, but bakers in this country have been accustomed to flour which is appreciably stronger and more springy in the dough. The Ministry of Food wisely, therefore, appointed a panel of experts to advise and to assist those bakers who might find themselves at a loss as to the best method of dealing with flours exhibiting this unusual weakness and lack of life in the dough.

In order to obtain the best possible bread from flour made from grists containing 50 per cent. English wheat and 10 per cent. diluents, it is more than ever essential to obey the golden rule of bakery practice—cool doughs and plenty of yeast. A short fermentation process should be employed—say, two to four hours—and during the "knock back" the dough should be gently stretched and folded and not subjected to severe mechanical treatment. The dough should go to the oven on a rising proof and should be well baked.

It is not to be expected that the bread from current flours will make the same appeal to the eye or to the palate of the average consumer as did the white bread of pre-war days, but the best bread being produced to-day is remarkably good when one remembers that it represents 85 per cent. extraction flour obtained from a grist containing over 50 per cent. of weak English wheat and $7\frac{1}{2}$ per cent. of inert diluents. There will always be bad bread and good bread, but the standard of bread quality which can be attained from present-day grists is a triumph for the milling and baking industries.

Difficulties with Native Wheat

When a grist contains as much as 50 per cent. home-grown wheat any undesirable feature in the English employed is bound to be reflected in a deterioration in the quality of the flour. Some samples of English may, of course, be inferior in quality owing to their inherent characteristics, but several instances of inferior flour quality which were brought to the author's notice in the early autumn of 1943 were due to mistreatment of the English wheat on the farm. The impairment of quality was attributable to misuse either of a combine

	June	July	August	September	October	November
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
Canadian Wheat :						
Maximum proportion ...	50	No limit	No limit	No limit	No limit	No limit
Home-grown Wheat :						
Minimum proportion ...	35	20	25	40	50	$52\frac{1}{2}$
Diluents ...	10	10	10	10	10	$7\frac{1}{2}$

harvester or of a farm drier. When wheat is harvested by means of a combine harvester, it does not undergo that maturing period in the "stook" which is given to wheat harvested and threshed independently. If, therefore, wheat should be combine harvested before it has attained the state of complete maturity, there is no opportunity for this defect to be remedied as there is in the instance of wheat which stays for a period in the stook. The necessity for using in the blend a high proportion of English wheat which had been combine harvested before it was properly ripe accounted for one instance of serious deterioration in flour quality investigated by the author.

A commoner cause of impairment of gluten quality in English wheat is the misuse of a farm drier. If wheat, particularly when high in moisture content, is subjected to too high a temperature, the gluten is rendered "dead" and claylike in character, losing its desirable distensibility and becoming "short". Unfortunately, too little attention is quite often paid to the temperature at which a farm drier is operated, and this season a number of samples of dried English wheat which revealed undoubted signs of heat damage to the gluten have been received by the author. This is, of course, a serious defect when home-grown wheat has to constitute 50 per cent. of the blend.

The necessarily restricted nature of our war-time dietary makes it imperative that the standard of quality of our bread should be maintained at the highest possible level. No matter how excellently millers and bakers may perform their respective processes, however, success in this direction will be achieved while the grists contain 50 per cent. or more of home-grown wheat only if active steps are taken to ensure that, as far as is possible, English wheat is properly harvested at the correct period, and particularly that farm driers are operated with strict and understanding control of the temperature.

Bread and Nutrition

The relative nutritive values of different types of bread have not attracted as much attention during the past year as in 1942, but one stimulating paper on this subject did appear, and this is discussed later. The situation which has developed in Eire has a direct bearing on this question, however, and it might well be, but probably will not be, taken to heart by those brown-bread faddists who so vehemently decry any flour other than wholemeal.

The Irish Free State authorities raised the extraction to 100 per cent. in 1940, and since then no bread other than wholemeal has been available. Despite the fact that a large proportion of the meal has been consumed in the form of soda-bread, which is made with soured milk, an alarming increase in the incidence of rickets has been reported. Two detailed investigations recently reported in the *Journal of the Medical Association of Eire* (Pringle, Reynolds and Jessop, 1943; Croasdaile, Collis, Pringle and Jessop, 1943) reveal:

(1) The incidence of rickets in Dublin has shown a significant increase since the summer of 1940.

(2) The present incidence in the groups of children examined is extremely high. It is 230 per 1,000 in all children under the age of four, and no less than 450 per 1,000 in children between one and a half and two years.

Undoubtedly it is the discovery of this alarming situation that has developed consequent upon the compulsory consumption of wheatmeal that lies behind the recent order that, from December 1, the extraction in Eire is to be reduced to 85 per cent.

Robertson (*Chem. and Ind.*, June 12, 1943) offered a critical comparison of the relative merits and demerits of white, National and wholemeal bread. He concluded from the facts presented that white bread had more merits and less demerits than wholemeal, and would appear to be superior to National bread, while, if fortified with aneurin, riboflavin and nicotinic acid, it was easily superior to the other two types.

It would not be fitting to close this review of the milling industry for 1943 without paying a tribute to the memory of one of the industry's outstanding personalities, Mr. Joseph Rank, whose death occurred on November 13, at the age of 89 years. Mr. Rank started in business for himself nearly seventy years ago in a small windmill, making about 25 sacks of flour a week. At the time of his death the firm bearing his name was producing an output of flour equivalent to about one-sixth of the bread consumption of the country.

Excess Profits Tax

THE tax (100 per cent.) is really the difference between what was (pre-war) and what is (wartime) the amount of assessed profits, and broadly the assessments are made on Income Tax principles and for yearly periods. But the year to apply is the accounting year of the firm concerned ending after April 1 each year, and not the year preceding year of assessment as with Schedule D; tax is due one month after date of assessment.

The pre-war profits are called "standard profits", and are taken for what is called the "standard period", and these apply for different years according to the age of the business, with the taxpayer having certain options. If business was commenced on or before January 1, 1935, the standard periods can be 1935 or 1936, or, if a two-year period is preferred (divided by two), the years 1935 and 1937 or 1936 and 1937; if established after January 1, 1935, but on or before January 1, 1936, the year is 1936 (1936 and 1937; two-year method). If commenced after January 1, 1936, but before July 2, 1936, the taxpayer can choose any consecutive twelve months period, ending not later than June 30, 1937. For all businesses established before July 1, 1936, it should be noted that the standard profits can be increased or decreased according to whether the capital employed currently is greater or less than in the standard period, the difference being by the "statutory percentage", this being, as regards an increase, 8 per cent. for companies, 10 per cent. for other firms, including director-controlled companies, of the increase in capital; if capital is decreased 6 per cent. of the decrease for all firms applies.

The amount which this statutory percentage put against the capital used returns constitutes the standard profits for any business commenced after July 1, 1936; any losses sustained since the start of the business and up to March 31, 1939, can be added to the capital for this purpose.

For any business commenced on or before July 1, 1936, instead of the above provisions applying, there can be a substituted standard, if the Commissioners are satisfied that it would be unfair to base the standard profits on the standard years as above, the firm in those years making no profits or only to a negligible extent, but this substituted standard cannot exceed 6 per cent. interest on the ordinary share capital (8 per cent. for director-controlled companies) plus the fixed interest rate for any other share capital. In cases where the paid-up capital is considered as not representing the assets, these percentages may operate against the assets instead.

Furthermore, if a firm so chooses, none of the provisions above need apply, but what is called "the minimum amount" may be adopted, which method is perhaps the best for smaller firms with low profits pre-war, as then for the standard profits the pre-war sum to apply in assessing any excess would be higher than the actual figures. Ordinarily, the minimum amount is £1,000; broadly, this sum applying to ordinary companies or a concern run by an individual taking no active part in the business. But where there are working proprietors (in this category come persons who for more than half of the current accounting period were actively engaged full time in the business) the minimum amount can go up to £6,000, arrived at by allowing £1,500 for each working proprietor. Furthermore, if the Commissioners consider this sum inadequate, they can increase this sum (up to £4,000 in the aggregate) for not more than four working proprietors £1,000 for each proprietor. The foregoing applies to a business run by a single individual, or by a partnership or by a director-controlled company, and the term "proprietor" as regards a partnership means a partner, and as regards a company, any director owning more than 5 per cent. of the share capital of the company.

Annual payments, such as interest, annuities, royalties, and other payments, which under I.T. (Schedule D) are not deductible for trading expenses are deductible for E.P. tax, and investment income chargeable under I.T. is also not chargeable to E.P. tax—that is, for ordinary concerns; to special companies such as building societies, banking and insurance companies, however, the tax applies for this income.

For Income-Tax, E.P. tax payments are deductible, but Income-Tax payments are not deductible for E.P. tax. Interest payable in connection with Treasury Tax Reserve certificates, taken out in advance of tax payments, is not assessable for E.P. tax, but amounts payable as premiums or contributions under the War Damage Act are not deductible.

Up to March 31, 1940, interest on borrowed money was deductible, but now no deduction applies, except where the "minimum amount" procedure is adopted or in the case of banking or assurance companies, building societies, etc., but whereas before the date mentioned borrowed money was not taken into account in computing "capital" for the purposes outlined above, borrowed money can now be included for this purpose.

Wear and tear percentage allowances for machinery and plant are deductible, and where machinery, etc., is being worked more than in normal times—as example, by shifts being worked, overtime and the like—increases in usual amounts can be obtained. Furthermore, there is also an allowance for exceptional depreciation of buildings, machinery and plant (provided since January 1, 1937), which with the end of the war

may be redundant or have suffered depreciation in consequence of the war. Wear and tear allowances are also given for anything of the nature of machinery and plant, as regards A.R.P. matters; other items, however, are allowable as trading expenses.

Annual value where premises are owned is not deductible as with Schedule D (I.T.), but the special deduction for mills, factories or other similar premises (given for depreciation mostly because of machinery, etc., being operated) applies. Although the tax payable is now 100 per cent. (tax was 60 per cent. up to March 31, 1940), there will be a rebate at the end of the war against the sums paid for tax at 100 per cent., which roughly will represent a rebate of 20 per cent.

Fodder for Humans

At least if they are grown under sunny conditions, fodder legumes and grasses have extraordinarily high contents of ascorbic acid and β -carotene. A recent Australian paper* states that leaves of lucerne during the early stages of growth usually contain over 1.2 per cent. of ascorbic acid on a dry basis. This percentage falls to 0.8-0.9 during the rapid growing period of hot summer. The concentration of β -carotene varies between 40 and 50 milligrams per 100 grams of dry weight. Lucerne—in modern parlance a legume—has been not unreasonably suggested to be the "grass" which Nebuchadnezzar ate.

The paper presents cogent data of a comprehensive study of the factors in destruction of ascorbic acid at all stages in harvesting and dehydration of lucerne. The oxidase system responsible for the destruction is inactivated at about 65° C. at pH 6.1, which is the reaction of the expressed juice. Leaf meal dehydrated at above 110° C., which is a temperature sufficiently high to ensure that the leaf mass is raised rapidly above 65°, retained 80 per cent. of its original content of ascorbic acid, and the β -carotene was practically all retained. If the meal is stored *in vacuo* at a low temperature the loss of ascorbic acid was very small in several months, but storage in air results in considerable destruction of the vitamin.

The meal is a brilliant green powder with a faint, pleasant odour. In the raw state it has a bland coumarin-like flavour, but that is dispelled on boiling for a minute or two and the material acquires a legume-like flavour suggestive of green peas. Three to five grams of the meal are needed to provide a daily protective dose of vitamin C (30 milligrams). It may be incorporated into acceptable sweets, and may be mixed with some classes of foodstuffs without impairing their flavour or appearance. Thus, a dehydrated pea soup may contain 54 per cent. of pea meal, 24 per cent. of dried mutton, 6 per cent. of lucerne leaf meal, and salt, mint, dried onion, etc. Though at present decidedly unorthodox as an article of human diet, lucerne leaf meal properly prepared from young plants is wholesome and its constituents are well digested.

* H. R. Marston, F. Quinlan-Watson, and D. W. Dewey: The dehydration of lucerne (*Medicago sativa*) and its potentialities as a concentrated source of ascorbic acid and of carotene for human consumption. *Journal of the Council for Scientific and Industrial Research (Australia)*, Vol. 16, 1943, pp. 113-124.

Fluorescence Analysis in the Food Industry

PART II

J. A. RADLEY, M.Sc., F.I.C.

Halogen Compounds (continued)

THE brown solutions may be dyestuff solutions or caramel solutions, but not beers, which are themselves strongly fluorescent.

When the light is bad in the laboratory, R. Burstein⁴³ suggests that acids can be titrated, using a mixture of methyl red or methyl orange and fluorescein as an indicator, using ultra-violet light as illuminant. The brilliant green fluorescence at pH 4.5-4.8 marks the end point in the addition of alkali. This worker considers that fluorescein alone is sufficient for titrating coloured solutions.

A solution of alpha-naphthoflavone emits a blue fluorescence, which is destroyed by the presence of free iodine or bromine, but returns when the iodine or bromine is removed by titration. For example, it can be used in the titration of iodine by sodium thiosulphate and the titration of arsenious acid by potassium bromate. Y. Volmar⁴⁴ points out that umbelliferone with its sharp change from colourless to blue at pH 6.6 is useful not only for coloured aqueous solutions but also for oils dissolved in organic solvents. This indicator is also useful for titrating acidity in emulsions. In the determination of the saponification value of paprika oils β -methyl umbelliferone has been successfully used to show the end point.

Acidity in Oils

The titration of acidity in oils is not very easy, and the pH range must preferably be in the neighbourhood of 8-9. Many oils have a blue fluorescence, so that an indicator used in the titration of oils should have a fluorescence which is readily distinguished from that of the oil itself. Usually alcoholic or aqueous-alcoholic solutions of the oil are employed, the titration being carried out against phenolphthalein as the indicator, or an electrometric method can be used. In an alcoholic solution phenolphthalein has an end point at pH 10 (checked with the Cambridge valve potentiometer method). An indicator which has been found of use in fluorescent work is the sodium salt of orthocoumaric acid, which under the above conditions has its end point at pH 10.2. To make the sodium salt 20-25 ml. of an alcoholic solution, containing 1.5 gms. of ortho-coumaric acid per litre, is titrated with 0.1 N caustic soda solution under the lamp until the original pale blue fluorescent goes to a brilliant green. This solution is then used to extract the acid from the oil by the usual method, after which it is retitrated with vigorous stirring until a brilliant green fluorescence shows the end point has been reached. The intensity of the fluorescence appears unaffected by the concentration; the bluish fluorescence due to oils does not interfere, nor does the colour of the oil. Check tests with palmitic acid in alcohol show

very good agreement with the results obtained by other methods.

Besides dichlorofluorescein, fluorescein, eosine, phloxine, β -naphtholsulphonic acid, β -naphthol and umbelliferone have also been used successfully as fluorescent absorption indicators for the titration⁴⁵ of chlorides with silver nitrate.

Fluorescein or eosin in the presence of Bi⁺⁺ ions serve as an indicator when titrating nitric acid by sodium hydroxide or sodium carbonate⁴⁶. Lead salts can be titrated with sodium carbonate, using fluorescein as the fluorescent indicator.⁴⁷

Enough has been said to indicate the wide scope of fluorescent indicators. Those interested in the titration of wines and cordials and general volumetric work will find the subject has received special attention from a number of workers,^{48,52} and has been dealt with at some length by the author and J. Grant.¹

SOME APPLICATIONS OF FLUORESCENCE ANALYSIS TO FOODS

Oils

Much has been done on the fluorescence of fats and oils and the changes in their fluorescent when submitted to the effect of heat,^{31, 77} light,^{11, 70} air, solvent extraction^{54, 72} and admixture with other oils and fats. The literature on this subject is extensive, so that only the salient points can be brought out here, and it is of interest that olive oil has received a large amount of attention.^{53,66} Providing the identity of the fat or oil is known, fluorescence tests give good indicators of its history. For example, virgin olive oil shows a yellow fluorescence, but oxidation by long exposure to air or to certain oxidising agents—e.g., benzoyl peroxide—or strong-heating changes the fluorescence to a blue tone. Solvent extracted oil or refined olive oil also shows this blue fluorescence, and much work has been done to determine how much of these can be detected in admixture with the virgin oil. It appears that by direct observation under the lamp the presence of 35 per cent. or over of refined oil in virgin oil can be detected with certainty, but some workers claim the detection of as little as 10 to 15 per cent. addition. The use of colour-analysing instruments such as a spectrocope, spectrophotometer,^{57, 69,71} or the Pulfrich stepphotometer^{67,68} with colour filters is to be recommended when as little as 5 per cent. of refined oil can be detected.

Adulteration of Oils

To overcome the blue fluorescence of the refined olive oil additions of tea-seed, arachis or sesame oils may be made. These may be detected^{72, 73, 76} by treating 100 c.c. of the oil with five 1-gm. portions of decolour-

ising carbon, filtering and examining under the lamp. A genuine olive oil then appears a faint blue, but if more than 5 per cent. of an adulterating oil is present a strong blue fluorescence is shown. This test is especially useful, as oils so adulterated may have analytical figures similar to those of a genuine oil except for the lower iodine value of the unsaponifiable matter. Chlorophyll, annatto and carotene have been added to refined oil to give it a fluorescence similar to that of virgin oil, and the detection of these substances has been dealt with by several workers.^{69, 78, 81} It is interesting to note the relationship between iodine value of an oil and the change in fluorescence on exposure to air. Thus compounds with a low iodine value show very little fluorescence or change in fluorescence on exposure to air, so that paraffin wax and water-white mineral oils show a faint bluish and a weak yellowish fluorescence, respectively, unchanged after a year and a half. Semi-drying oils, such as cotton-seed and rape oils, show a blue fluorescence of moderate intensity if spotted on to white filter paper, but after a year's exposure these spots give an intense yellow fluorescence. The faint fluorescence of non-saponifiable oils becomes deeper in colour, and, if the original unaged oil spot is blue, exposure for some months will cause a change to yellow. Even mineral lubricating oils will show this behaviour. Sperm oil and palm oil fatty acids show a faint fluorescence (which may vary from a weak yellow to a weak bluish colour) before exposure, but after twelve months spots of these oils on filter paper have a bright yellowish fluorescence. Raw linseed oil, castor oil and mutton tallow show a faint yellow fluorescence and behave similarly. Several workers have examined the effect of light on vegetable oils in a non-oxidising atmosphere and find that the fluorescence turns to a blue colour.^{83, 86}

With olive oils the ripeness of the fruit before pressing and the age of the oil can influence the fluorescence behaviour,⁷⁷ and S. Musher and C. E. Willoughby⁵⁷ have noted that *second pressing* oils are darker in fluorescence than those obtained from the first pressing. The first pressing of Californian oils resembles the second pressing oils from Europe in fluorescent behaviour. The blue fluorescence of olive oils treated with fuller's earth is changed back to the original yellowish fluorescence on exposure to ultra-violet light, but the addition of chlorophyll or carotene is without effect, although their addition to refined oil has the desired effect.

Interpretation of Results

Thus we see that the results of fluorescence analysis, in the case of oils, must be interpreted with care, bearing in mind the following points: One of the chief uses of the test is to compare the sample submitted with the bulk of the material delivered; by the use of instruments in conjunction with the lamp and by the use of the tests outlined above, information can be obtained as to the history of the oil, but the methods are strictly comparative and are therefore subject to additional limitations imposed by comparative methods; the results may be uncertain, due to the effect of heating, ageing, or because different oils may show the same fluorescence behaviour.

The same conclusions apply to the results obtained with other edible oils,⁸³ expressed oils such as walnut, sesame, almond, sunflower seed, showing a yellowish

fluorescence, whereas solvent extracted oils, such as rape-seed, sunflower seed, maize, castor seed or linseed, show a bluish violet fluorescence. Cod liver oils have also been examined, and show fluorescences ranging from golden yellow to chestnut brown in colour.^{87, 90} R. H. Common,⁹¹ however, has reported a grass-green fluorescence for samples of this oil, and indeed used the appearance of this colour as a method of detecting cod liver oil in sperm oil (said to give a greenish blue fluorescence, *vide supra*). Several workers have described the fluorescence of vegetable oils obtained by various extraction techniques, and a number agree that the detection or adulteration with mineral oils is extremely easy to detect by use of the lamp.^{92, 96}

Edible Fats⁹⁷⁻¹¹¹

Hydrogenation of cod liver oil destroys its fluorescence, although the oil itself can be heated without this effect appearing.⁸⁷ Whether the same behaviour is shown by other oils or not does not appear to have been investigated. Butter has a yellowish fluorescence which, like many oils, changes to blue on long exposure to air and light and on the development of rancidity. Margarine has a blue fluorescence, and 25 per cent. of this in butter is readily detectable under the lamp.¹⁰² By dissolving the sample in petroleum spirit this blue fluorescence is unchanged, whereas the yellow fluorescence of butter becomes very much weaker, and hence additions of 15 per cent. can be detected in solution.⁹⁸ Butter fat from animals other than the cow shows a similar behaviour to cow-butter, but develop a definite dirty blue fluorescence after a month's storage. For detecting the adulteration of native rendered butter-fat (*samneh*), G. W. Baker^{110, 111} considers the fluorescence method is of considerable practical value; more so, perhaps, than any other single routine test with the exception of the determination of the volatile fatty acids. This conclusion is strongly supported by the results of Baker's examination of some 959 samples, of which 89 were adulterated. Of these 89 all but three showed the characteristic blue fluorescence indicating adulteration.

Lard and Cocoa Butter

From the large amount of work on lard^{98, 101, 112, 120} only one fact emerges with implications valuable for rapid routine analysis, and that is that the addition of very small amounts (0.001 per cent.) of "white grease" to lard causes the appearance of an intense bluish-violet fluorescence.^{115, 118, 119} The other observations made on lard are as varied in their results as those obtained with olive oils, and those particularly interested in the examination of this material are referred to the original papers, especially those of Weiss,¹¹⁵ Braunsdorf,¹¹⁶ Nesini¹²⁴ and Van Raalte.¹¹⁷

A solution of 0.1 to 2.5 per cent. of expressed cocoa butter in petroleum spirit is inert under the lamp, but the addition of as little as 1 per cent. of cocoa extract or waste butter to the mechanically expressed butter causes the appearance of a bright blue fluorescence.¹²³ Some doubts have been thrown upon this figure of 1 per cent., and 25 per cent. has been suggested as being nearer the correct figure for certainty to be expressed about the results.¹²⁶ A chemical test, described by A. Castiglioni¹²⁷ can be carried out on

suspected samples as a confirmatory test. Three c.c. of glacial acetic acid are added to 0.5 gm. of the melted butter when the appearance of a yellow-green fluorescence under the lamp indicates the presence of solvent extracted butter. Pure pressure-extracted butter shows no fluorescence after this treatment. Lubricating greases or vaseline, even in traces, impart a strong blue fluorescence to edible oils and fats, and contamination by these compounds, due to accident or faulty machinery, can readily be detected under the lamp. Of other papers^{121,124, 128,132, 158,161} dealing with the fluorescence examination of cocoa butter, that of Knapp *et al.* is of interest in that these workers detect the addition of borneo tallow to cocoa butter by bleaching the sample with ultra-violet light when the yellow fluorescence of pure cocoa butter is destroyed, whereas the green colour due to borneo tallow is not so bleached.¹²²

Milk

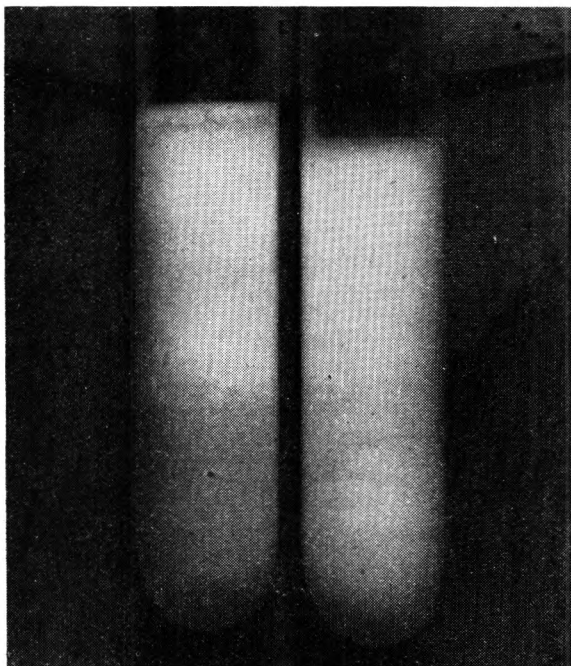
Fresh milk from various animals shows a wide range of yellow shades under the lamp, but these shades may change on storage to lesser or greater extents.^{110, 111, 120, 123, 134,147} Some workers¹³⁹ have published a colour chart purporting to show that milks from various animals show characteristic colours, but the author^{141, 142} was able to match every colour in the chart with samples of cow's milk. It appears very probable from the work of the author and others^{110, 111, 141, 142} that the change in the fluorescence of milk on ageing is closely connected with the action of the bacterial population of the milk. On standing, a blue fluorescence appears at the bottom of the tubes of milk and gradually

spreads upwards until the entire test tube shows a blue fluorescence. Shaking partially restores the yellow fluorescence, and the blue colour takes much longer to appear in samples with low bacterial counts than with those with a high count. Two workers¹⁴⁸ have found that 12 p.p.m. of chlorine in milk and coffee cream and 17 p.p.m. in full cream can be detected by treating the product with strong sulphuric acid containing stannous chloride, centrifuging and examining under the lamp when a yellow fluorescence shows the presence of an oxidising agent. For details of the test the reader is referred to the original paper, which is readily available.

Powdered dry milk produced by spray drying shows a yellow fluorescence when reconstituted to give liquid milk, but if the milk has been roller dried it has been found by the author that a bluish white fluorescing liquid results if liquid milk or "cream" is made from it.^{141, 142} "Cream" made from hardened fats invariably shows a blue-white fluorescence. In the case of cheese no advantage is apparent by following the various processes under the lamp, but on the finished cheese it is interesting to note that living fungi often show bright fluorescence effects, whereas dead fungi are inert. This is of value in the examination of Roquefort and Gorgonzola cheese. Other work on milk and milk products will be found in the bibliography.^{150,158}

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Note blue fluorescence extending from bottom of left-hand tube showing progress of bacterial action. Right-hand tube—fresh milk. (Taken on orthothromatic plate.)

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(To be continued)

NOTE.—References in the text not included in the above list will be found in the next instalment.

Soil and Health

THE RECENT debate in the House of Lords, opened by Lord Teviot, cannot be said to have greatly illuminated the subject of the relationship between soils and disease and health. The allegations of Lord Teviot, and of the Earl of Warwick and the new Earl of Portsmouth (better known as Lord Lymington) received wide but not deep publicity in the daily press. Lord Teviot declared that:

The soil, suffering from the strain upon it, has had to be boosted up with stimulants. . . . Surely crops doped with stimulants, dressings or sprays, cannot impart to those who partake of them resistance to disease if they have to be, if I may use the term, so much gingered up in order to exist.

The tenor of the speeches of these noble lords was similar; it amounted to an uncritical anger against artificial manures and praise of "natural" ones; the whole supported by some rather disparate examples and much quotation of a few "authorities"—an authority being anyone of note who agrees that natural manures yield healthier crops, and thus healthier people and stock, than do artificials. A wider reading of the "natural manure" thesis than is afforded by the report of the debate in the House of Lords suggests that while its exponents often adopt the scientific *form*—even to the extent of going in for experimentation—they have little of the scientific habit; it is notable how much they subsist by faith and testimony.

A Case to be Answered

Yet, in spite of the mysticism and bad reasoning with which the question of the relations between soil fertility and human and plant and animal health has been encumbered, there is a case to be answered. There can be few among us who will not support Viscount Bledisloe's plea (made in the same debate):

I want to press very strongly upon His Majesty's Government that the time has come when there ought to be research—research not merely conducted in watertight compartments affecting on the one hand the health of plants, on the other the health of animals, and in the third place the health of human beings and some relation between the soil and all of them, but comparative research on the important problem of the inter-relation between the morbid conditions of soil, plant, animal and human beings.

We may doubt whether the outcome of such investigation will give much comfort to the "compost" theorists; it is more likely to underline the known necessity for ample provision of lime and phosphates and other inorganic material, for lack of which herbage and crops are prone to be of poor nutritive quality (low mineral content), and thus to predispose to animal disease and even to human malnutrition. Lord Bledisloe raised the question whether a cow grazed on pasture deficient in phosphate would transmit that deficiency to her milk. He said that he was informed that the cow would starve her own bone structure and constitution, to the detriment of her health and vitality, before there appeared a deficiency in the milk. This

plain, non-mystical example suggests that to a nation like ours the question of soil impoverishment is primarily a matter of more minerals for livestock. It would be interesting to see how far vaccines and inoculation are needed to sustain the resistance of cattle to disease, if the cattle are fed from fields abundantly supplied with what is already known to be necessary.

The Earl of Warwick (who incidentally referred to "those awful dehydrating plants being put up all over the country") was sure that if only we can keep the soil fertile disease can and will disappear in plant, in beast and in man. He pointed out that there is "really no such thing as scientific proof; there is only scientific probability." One feels that this was meant as a nasty one for the scientists, and that his lordship would be surprised to learn that the most percipient scientists would agree with him on that philosophic point.

Unique Standard of Health

The most factual contribution to the debate was made by Lord Geddes, whose remarkable speech seems to have had little publicity. He devoted much of his time to expounding the demographic investigations of Dr. Enid Charles, who has recently examined the situation in Prince Edward Island. Here, there is a population of mainly British, Irish and French stock which maintains "a standard of health, a standard of well-being and a standard of reproduction which is unique among Western Europeans at the present time." The Islanders live "very much as Lord Teviot has suggested we all should live, drawing their food fresh from the sea and from the field in the traditional manner, living upon simple foodstuffs." Until Lord Geddes presented these facts the compost authorities had always quoted the Hunzas (a Himalayan tribe) as the perfect example of man unspoiled by artificial conditions.

As an example of cure, and not prevention, Viscount Bledisloe mentioned the improvement in the health of natives working in the copper mines of Northern Rhodesia. These mines are under the management of a company of which Lord Geddes is chairman. Originally under-nourished, the natives were poor specimens and had little heart for work, and their later efficiency was largely due to the fact that Lord Geddes had caused experiments to be made ("I believe not swayed solely by philanthropic motives but by economic considerations") to discover what is a properly balanced ration for the native.

"Joy Through Food"

Given vitamin C in the form of citrous fruit, the native increases his output (said Lord Bledisloe) by 30 or 40 per cent., and if he is also given meat twice a week there is a gain of a further 30 or 40 per cent; but a third allowance of meat in the same week is "found not to be strictly an economic proposition." There must be vast areas in which the vitality of the population is capable of some such improvement, and where "Joy through Food" would be an appropriate slogan. It would be understood, of course, that mere gluttony should be ruled out: what is wanted is quality and balance.

Raising Soil Fertility

Another overseas problem is the loss of topsoil through erosion, which is due to unsuitable cropping and inadequate return of organic matter to the soil. Here, too, the remedy is known, and it is mainly economic and social conditions that prevent its application. The compost propagandists of Britain tend to confuse erosion with the evils of soil intoxication, which they allege are in evidence due to the use of artificials. Soil erosion is not a serious problem in Great Britain, but ill-informed propaganda against the use of artificial manures may easily set a problem. The cause of our soil distress at home is not that the soil is being intoxicated, but that it is being frequently starved. Propaganda intended to rule out the use of artificial manures is to be deprecated, since it may embarrass the post-war policy for which most of us hope—namely, the raising of soil fertility by every available and rational means.

We have insufficient space to review or to attempt to correct the many misunderstandings that arise through inexpert discussion of the relationship between soil fertility and human well-being. The fundamental misunderstanding seems to be that a vaguely expressed "quality" of human food depends directly upon the soil—this "quality" being often identified with vitamin content. The available evidence suggests that the vitamin content of plants is largely, indeed almost wholly, independent of the manuring of the soil and of its treatment with organic matter; thus plants and crops grown in proper nutrient solutions containing no soil or organic matter are (as far as we know) fully equal to those grown with the aid of organic manures. Nor, apparently, have organic manures necessarily a singular beneficial influence upon plant disease; plants grown under rational conditions of soilless culture on the large scale have been free from the common diseases of the same crops grown in the field.

Function of Compost

The principal nutritional function of compost and animal manures is to keep plant nutrients in circulation. The old agricultural leases which insisted on periodical dunging of the land and forbade the sale of straw and dung off the farm were founded upon a practical if unconscious appreciation of this. The ideal agricultural sales-policy of those days was sound. It was expressed in the saying that "the crops should all walk to market". To-day, however, thanks to artificial supplements, it is no longer needful to observe these old practices in their full rigour, though the rules of good husbandry still apply. In particular, it is essential not to deplete the soil of inorganic nutrients such as lime, phosphate, and the minor elements; and it is essential for other reasons to keep up the stock of organic matter in the soil. The organic matter in the soil may be maintained by several methods, including the incorporation of a ley in the rotation; but during the operations of farming there is nevertheless a constant drain of inorganic elements even if nothing more than meat leaves the farm. The diminishing balance can be kept in circulation by intensive composting of plant residues; but the stock of nutrients can only be increased from outside the farm.

This is the nub of the organic *versus* inorganic question. It will be seen that it is a rather futile subject for

controversy. Yet we should like to see experiments begun on animal health in relation to soil fertility. We do not doubt that they would add considerably to our knowledge. As the Earl of Portsmouth said in the debate: "If there is more than a shadow of suspicion that our methods are wrong, we cannot afford to wait." Under modern conditions the simple cycle of nutrients on the land has been broken, and the average farmer has not learnt how to restore it rationally, or is prevented by economic causes from doing so. There is reason to suspect that the usual medical and veterinary approach—with its insistence on the infective agents rather than on the agents that build up resistance to infection—is wrong. So it will be surprising if the two great industries of agriculture and food do not energetically pursue a matter of such high importance to both of them.

HUGH NICOL.

Grass and Grain Drying

(Continued from page 17)

Mr. R. H. Franklin, of the Ministry of Agriculture, said that high temperatures, transport and storage were being investigated by the Ministry. Commenting on the difficulty of disposal of grain due to the extension of harvesting by combines, he said that there was an argument in favour of more storage on farms where they had big barns. Modern concrete or wooden bins may be required, and that was one of the matters that the Ministry was looking into. The technical problems of drying were also being examined. The Ministry had been collecting, partly with the help of the Farm Crop Driers' Association, the experiences of farmers during the past harvest. One was the effect of the double drying of barley on germination and its malting capacity. Another was the matter of varieties most suited to harvesting with combines and the needs of the ultimate buyer.

The Miller's Standpoint

From the miller's standpoint, Mr. W. F. C. George warned growers of the danger of high temperatures and the need for uniform and ripe grain. He criticised many driers for having no provision for turning the grain, thereby producing uneven drying. Mr. H. Réad, also speaking on behalf of millers, said that the science of drying is still very little understood. The millers objected only on one ground to drying, and that was the troubles resulting since crop driers had been introduced. The average crop drier has in it very great danger to the crop. He also suggested that a great deal of research should be put into the combine, which was far from being perfect. The millers would not accept in ordinary commercial times what the farming industry was putting over today.

Mr. P. N. Savory, on behalf of the manufacturers of driers, declared that their object was to make a drier which pleased their customers and one in which the temperatures are kept sufficiently low that no grain which goes through is spoilt. It was necessary for the millers to make known what was wanted, and the farmers would know whether or not to put in an elaborate type of drier.

News from the Industry

Milk Order Amended

The Minister of Food has amended the Milk (Maximum Prices) Order for England and Wales. The amending Order, which came into operation on November 21, prescribes a maximum retail price of 3s. 4d. per gallon (5d. per pint) for tuberculin tested milk (other than Certified milk). The maximum price for tuberculin tested milk on sale by wholesale is 2s. 3½d. per gallon and 2s. 10½d. per gallon on an intermediate sale.

The prices of tuberculin tested (Certified) milk and certain other special milks, namely Channel Islands, Homogenised, Kosher and sterilised milk, respectively, continue to be based on prices charged in 1941, except that the prices quoted above for tuberculin tested milk may be charged where there was no sale in 1941 or where the prices based on that year are less than the corresponding prices prescribed for tuberculin tested milk.

The maximum prices of accredited milk are the same as for ordinary milk.

These prices will remain in force until further notice but will be subject to a revision next spring.

* * *

Home-Grown Wheat in Grist

As from Monday, November 22, the compulsory fixed percentage of barley, rye or oatmeal in blended grist, was reduced to 7½ per cent. In all areas the percentage of home-grown wheat in all blended grists has been increased correspondingly by 2½ per cent.

* * *

Mr. S. N. Whibley

Mr. S. N. Whibley, director of warehousing at the Ministry of Food since 1941, has relinquished his appointment owing to ill-health. Mr. L. W. Phillips, director of freight, will combine the post vacated by Mr. Whibley with his own.

January, 1944

Points Two Years Old

The second year's working of the points rationing scheme ended in November.

Reviewing its achievement, a Ministry of Food official said that in the two years 1,500,000 tons of foodstuffs had been distributed on points by the use of 26,000,000,000 coupons.

As illustrating how difficult it would have been to secure an equitable distribution by any other means, he said: "If you take all the purchases together, imported and home-produced alike, which are on points, it works out at less than 2 ozs. per head per week."

No new foodstuffs had been placed on points since oatmeal flakes were added about twelve months ago. It had been sufficient to adjust the pointage to meet supplies.

The value of the foods distributed on points worked out at 2s. 6d. per book for the four-week ration period.

* * *

Sugar Orders Consolidated

An Order has been made consolidating the Sugar (Maximum Prices) Order of 1941 and the amending Order of 1943.

The Sugar (Requisition and Control) Order of 1939 is revoked, but Article 4 of that Order (which deals with the sale of sugar situated outside the United Kingdom) is re-enacted in the new Order.

The Sugar (Restriction of Use) Order of 1940 is revoked, as the addition of any edible product to cakes after baking is prohibited by Article 3 of the Cake and Flour Confectionery (Control and Maximum Prices) Order, 1943.

The maximum prices for sugar, both wholesale and retail, remain unaltered.

* * *

Pearl Barley By-Products

By-products of the manufacture of pearl barley which contain not more than 20 per cent. of fibre became rationed feeding-stuffs on January 1.

Open-Pack Meat Products

At the urgent request of the Ministry of Food, the manufacturers of open-pack meat products (sausages, pies, etc.) have recently been considering, through the Food Manufacturers' Federation, how economies in the transport of their products could be effected so as to relieve the transport system and to ensure the least possible delay in the movement of these perishable foodstuffs.

The methods adopted have been the exchange of the more distant customers, and similar arrangements for the supply of goods by a manufacturer nearer to the customer, on behalf of a more distant original supplier, to eliminate long hauls and cross hauls.

The interests of the customers have been safeguarded by providing that they shall continue to receive, as nearly as possible, goods of a similar type and equivalent weight to their original supplies.

The result has been to achieve an annual saving of transport of over 5,000 tons of goods, equivalent to nearly 1,000,000 ton miles.

The manufacturers concerned and the Food Manufacturers' Federation are to be congratulated on a valuable saving in transport.

* * *

Crops Before Livestock

Whereas shortage of shipping used to be the principal factor for the Ministry of Food to consider, shortage of food itself is now more important, stated Mr. Ma-bane, Parliamentary Secretary to the Ministry, during a recent debate in the House of Commons.

The Government had gone out of its way to warn the world about the possible shortage, he said. Moreover, it had initiated action.

Until the danger of actual hunger had passed there should be concentration on obtaining the maximum acreage of human food crops, even if this meant deferring for the time the restoration of depleted livestock herds.

Storing Home-Grown Grain

Mr. William Mabane, M.P., Parliamentary Secretary to the Ministry of Food, urged at the opening of a home-grown wheat silo and drying plant in the Home Counties that the proportion of home-produced grain in our bread should be kept at the lowest possible figure.

"At present, in most parts of the country, the proportion of grist in bread is now 60 per cent. home-produced grain. We do want the proportion of home-produced grain in the bread kept to the lowest possible figure."

* * *

Flour from Home-Grown Wheat

Owing to the record harvest, home-grown grain comprises 60 per cent. of the grist used at present for National flour in most parts of England and Wales. Even such a high proportion is hardly sufficient to absorb supplies, and it is essential in the national interest that all native wheat be used for human consumption purposes as it comes from the farms.

The Ministry of Food wishes to point out to bakers, therefore, that by using a flour milled wholly from home-grown wheat for all purposes for which a "soft" flour is suitable, they will assist in keeping the proportion of English wheat in the bread flour grist at the lowest possible level. The baking trade can thus help itself in the direction of improving bread flour by making cakes and flour confectionery from all English flour or by blending English flour with National flour for these purposes. Every baker should aim at securing that at least half the flour he uses other than for bread making should be of the all-English type.

Bakers should ask suppliers with whom they are registered for flour from 100 per cent. home-grown grain. The price is the same as that of National flour, as is the rate of extraction and admixture of diluents and imported white flour.

The character of English wheat flour renders it particularly suitable for many lines, especially chemically aerated goods. It is not, however, suitable for fermented goods. Flour packed for

sale, whether plain or self-raising, may consist of a blend of 50 per cent. National flour and 50 per cent. all-English, unless a soft flour of about this blend is already being obtained for the purpose. This quality is suitable for domestic pastry and cake making.

* * *

For Seed Growers

The Ministry of Agriculture and Fisheries announces that an Order will shortly be made in similar terms to those of the present Growing of Seed Crops (Control) Order, 1943, which will prohibit any grower in England and Wales from growing on for the production of seeds certain kinds of crops for harvesting in 1944 and 1945 unless he has entered into a contract, before a specified date, with a "licensed vendor", being a person licensed by the Minister for the purpose of the Order.

The kinds of seeds to which this Order will relate will be the same as those included in the existing Order, except that it is intended to add broad, dwarf and runner beans. The full list of seeds affected by the new Order will be as follows:

Annals for harvest, 1944:
Broad Beans, Dwarf Beans, Runner Beans, Cress, Radish, Spinach.
Biennials for harvest, 1945:
Garden Beet, Spinach Beet, Sugar Beet, Heading Broccoli, Sprouting Broccoli, Brussels Sprouts, Cabbage, Carrot, Celery, Chicory, Kale, Kohl Rabi, Mangold, Parsley, Parsnip, Rape, Savoy, Swede, Turnip.

* * *

Anti-Freeze Mixture

The Ministry of Supply wishes to draw the attention of motor vehicle users to the fact that there are six brands of commercial anti-freeze mixture approved under the Control of Engine, etc., Anti-freeze (No. 1) Order, 1942, which may be purchased without restriction. Licences have been granted to the following firms, subject to supplies of the necessary raw materials being available:

Auto Vaporisers, Ltd., Froidene Works, New Road, Lymm, nr. Warrington; Surridge's Patents, Ltd., New Works, Croydon Road, Elmers End, Beckenham, Kent;

William Clark (Spare Parts), Ltd., Nobby House, Elgin Avenue, W. 9; Baco Motor Products, Abbey Manufacturing Estate, Alpertan, Middx.; Wingard (M. A.), Ltd., Eugene Works, Edgware Road, West Hendon, N.W. 9; County Chemico Co., Ltd., Chemical Works, Shirley, Birmingham.

The solutions must be regarded as wartime substitutes for materials in short supply. Compared with pre-war mixtures they will be found to give a reduced measure of protection (down to 20° of frost only) and to have a slightly corrosive action on solder, mild steel, aluminium and aluminium alloys. This corrosive action, while greater than that of tap water, is not, however, sufficiently severe to affect the efficient running of vehicles if manufacturers' instructions are complied with.

* * *

Limitation of Supplies

The Board of Trade have issued an Order dated December 6, 1943 (S.R. & O. 1943, No. 1637) under Regulation 55AA of the Defence (General) Regulations, 1939, requiring every person whose name was at July 31, 1943, entered in the Home Trade Register to make a return on Form Misc./17, showing, *inter alia*, the value of controlled goods supplied by him during the standard period (June 1, 1939, to May 31, 1940) and during the restriction period (February 1 to July 31, 1943).

A copy of the appropriate form is being sent to each person concerned.

* * *

Extra Clothing Coupons for Manual Workers

The Board of Trade announce that it has been decided, on the advice of the British Employers' Confederation and the Trades Union Congress, to issue for the current rationing period ten additional clothing coupons to a wide range of manual workers in agriculture and industry. Details of the workers eligible and of the method of application and issue are set out in leaflet I.T.44.

This extra ration, usually known

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as the "Industrial Ten", is similar to that given out in the 1942-43 rationing period, and the categories of workers eligible are mainly the same as then.

Part-time workers in eligible occupations will be able to apply if they work twenty-two hours a week or more, and supervisory workers if they are exposed to exceptionally hazardous conditions. Arrangements have again been made to issue the coupons to workers newly entering employment in the course of the rationing period.

Special arrangements are being made for certain industries in which there are some workers with exceptionally heavy needs. Details of these are being notified to the employers and workers concerned through employers' organisations and trade unions.

* * *

Ministry of Fuel and Power

The Minister of Fuel and Power announces that Dr. H. S. Houldsworth, K.C., D.Sc., has accepted his invitation to become Controller-General of the Ministry of Fuel and Power from the beginning of this year.

Lord Hyndley, who has been Controller-General of the Ministry since its creation, but is retiring from the end of last year, will, at the request of the Minister of Production and the Minister of Fuel and Power, continue to act as Chairman of the Coal Sub-Committee of the London Committee of the Combined Production and Resources Board.

Mr. J. Eaton Griffith, O.B.E., has been appointed a Principal Assistant Secretary in the Ministry of Fuel and Power, and will occupy the position of Chief Administrative Assistant to the Controller-General.

* * *

Flour Expert for Palestine

Mr. Bernard C. Robinson, a director of Joseph Rank, Ltd., and chairman and director of many other flour-milling companies, is shortly going to Palestine for a few months to advise the Government on matters in connection with the flour-milling and bread-baking industries there.

Cocoa Disease Investigation

Dr. H. A. Tempany, Agricultural Adviser to the Colonial Office, has begun his tour of the cocoa-producing area of British West Africa, and is now in the Gold Coast. One of the main objects of his visit, which is to last two or three months, is to organize more intensive investigations into cocoa diseases.

* * *

Delegation Praises N.Z. Farmers

Sir Walter Layton, Sir Neville Pearson and Mr. Samuel Storey, members of the British Press Delegation which has been visiting Australia, expressed on their arrival in New Zealand the greatest admiration of New Zealand's production effort towards feeding the people of Britain.

The Dominion's contribution in butter and meat has been of major importance to Britain, so that the delegates welcomed the opportunity of seeing as much as possible of the country's farms and factories at the height of the production season.

New Zealand producers, they declared, shared with the armed forces the gratitude of the British people. They added that they expected the Dominion would experience the full benefits of post-war developments in aviation and in news services.

Mr. Alan Wood, the fourth delegate, has remained in Australia.—*Reuter*.

* * *

Mustard Gas Contamination

Representatives of scientific bodies and Civil Defence organisations from all parts of England attended a recent demonstration at Hurlingham showing the contaminating effects on foodstuffs of liquid mustard gas distributed by bomb over a food store. The foodstuffs involved were beef, grain, flour, bread, sugar, tea, potatoes, green vegetables, dried fruit, cheese, lard and canned goods. Dr. J. C. Drummond, Scientific Adviser to the Ministry of Food, watched the tests, and Lord Woolton was represented by Brigadier-General Sir Julian Young, Chief Divisional Officer of the Ministry for the Southern Counties.

Brazil Controls Meat Industry

To avoid a shortage of meat in the great towns of Brazil, particularly Rio de Janeiro and San Paulo, the Government has decided to ban for six months the export of meat. At the same time all refrigerating plants will be put under direct official control, as well as the meat industry in all central areas of the country. The decision has been well received by the public as a first step towards limiting the increasing cost of living.—*Reuter*.

* * *

Fires Still Take Toll

Fires of recent months show that much valuable material is still being lost daily.

For instance, a recent outbreak in a flour store with a loss to the owner of over £70,000 has a far deeper meaning than its mere significance in terms of sterling.

The flour lost in this fire may either mean loss of sustenance to the population of these islands or deprivation to the starving millions in occupied Europe should we suddenly be confronted with peace and its commitments of international rehabilitation and relief.

The serious consequences of fires on the home front do not go unnoticed by men of the Services.

* * *

Post-War Australian Canning

Australia will become one of the world's greatest exporters of preserved tinned food after the war, according to Government plans now taking shape.

Representatives of a variety of food interests in Australia are being sent to Britain and the United States to learn how Australia can extend and improve her food processing industries.

The Australian Government aims at supplying a great variety of preserved food in markets in the Pacific and Asia. It is hoped that this will help to raise the food standard in India and China.

It is also expected to ensure permanent new plants in Australia to supply United Nations forces in the South Pacific.

Great improvements are already being made in Australia's food processing capacity.—*Reuter*.

Australian Food Targets

Food production targets for 1943-44, fixed by the Food Production Executive, with last year's in brackets, are: Butter 175,000 tons (166,000), beef and veal 560,000 (515,000), mutton and lamb 477,000 (411,000), pig meat 143,000 (76,000), and cheese 45,000 tons (unavailable).—*Reuter*.

* * *

Oranges in Sheet Form

Citrus fruit growers in Palestine are experimenting with dried citrus fruit pulp for export to Britain, and samples are being sent for tests.

The fruit is pressed into sheets about the thickness and texture of lightweight leather, and is said to have the real fruit flavour.

The dried fruit may be suitable for manufacture into marmalade and other food products.

* * *

Beet Sugar Research

Beet-sugar research is being encouraged under a scheme whereby the British Sugar Corporation and the growers both pay a levy of $\frac{1}{2}$ d. on every ton of home-grown beet. To date over £15,000 has been spent this year on research, £1,450 being used for manurial trials at Rothamsted and £1,200 going to insecticidal research and development. Details of the project are given in S.R. & O. No. 1413, 1943.

* * *

Wanted: Foreign Reference Books

The enemy naturally exerts every effort to conceal all information about the location of vital war industries. Fortunately, such information can be gleaned from the minute examination of books brought into this country before the war.

Individuals or organisations who possess European reference books—guides, maps, directories, catalogues and technical dictionaries—can help to foil enemy secrecy measures by giving or lending such books to the nation.

It should be particularly noted that the correct address to which to send these books is: Room 629, Ministry of Economic Warfare, Lansdowne House, Berkeley Square, London, W. 1.

New Bacon Agreement

Mr. J. C. Gardiner, Canadian Minister of Agriculture, said recently that he was about to negotiate a new agreement with Great Britain for the delivery by Canada of 900,000,000 lbs. of bacon and ham over a two-years period starting January 1, 1944.—*Reuter*.

* * *

A Real Headline

President Roosevelt disclosed recently that beef and veal being supplied to American forces in Australia in reverse lend-lease equals the total amount of beef and veal the U.S. is sending out to the European theatre of war under lend-lease.

Mr. Roosevelt described this as an amazing statement—a real headline.—*Reuter*.

* * *

Price Limitation in Brazil

It is reported from Rio de Janeiro that the Brazilian Minister, Joao Alberto Lins Barros, who is mobilising Brazilian economic life, has issued a decree whereby Brazilian merchants are prevented from making a profit higher than 10 per cent. on indispensable goods.

The main objects which are subject to this price limitation are milk, sugar, cereals, bread, coffee, potatoes, meat, salt and eggs. The 10 per cent. profit will be added to the net price, exclusive of transport, insurance and tax expenses.—*Reuter*.

* * *

Confectionery in Russia

Mexican tomatoes which can be used in the manufacture of confectionery are to be sown for the first time in the experimental fields of the Stalinabad Institute of Tropical Flora. A rich harvest of 13 tons per acre is expected. Moscow factories are producing a million lbs. more sweets and confectionery a month as a result of experiments conducted by Professor Sokolovsky on the extraction of sugar from sugared flour. Under this method one ton of confectionery requires only 250 lbs. of sugar per ton instead of 300 lbs. of beet sugar.—*Soviet Monitor*.

U.S. 1944 Shipments of Food

The United States will ship to Britain, Russia and other United Nations 11 per cent. of her estimated food supplies during the twelve months ending September 30, 1944.

This was disclosed by Mr. Roy F. Hendrickson, Director of Food Distribution of the U.S. War Food Administration.

Four per cent. will go to Great Britain, $3\frac{1}{2}$ per cent. to Russia and $3\frac{1}{2}$ per cent. to other United Nations and liberated areas.—*Reuter*.

* * *

Argentine Meat Exports

Doctor Horacio Burzzone, President of the Argentine Meat Board, has been invited to Montevideo by the Uruguayan Government to explain the organisation of the Argentine meat industry for the benefit of Uruguayan producers. Interviewed by *Reuter* regarding Argentina's contribution to post-war succour for Europe's needy countries, he stated that he was especially optimistic regarding meat supplies. He added that, if meat producers were assured of reasonable prices for a prudential number of years, "we will not only be able to continue exporting the quantities exported in the last few years but will also be able to increase them".

* * *

South Africa's Future

The view that South Africa has a great future in fisheries and all-round industrial development, "in which only a beginning has been made", was expressed recently by Mr. Lincoln MacVeagh, U.S. Minister to the Union of South Africa.

Mr. MacVeagh is leaving Pretoria to take up his new appointment in Cairo as Ambassador to Greece and Yugoslavia, says *Reuter*.

South Africa's land problems were, he said, similar to those of the U.S.—problems of land conservation and the preservation of water for irrigation.

The South African climate was such that, if man gave the land the chance it needed, "the whole country would be a garden".

Food Manufacture

Society of Chemical Industry

Referring to the paragraph in **FOOD MANUFACTURE**, December, page 427, under the caption "The Nutrition Society", the Food Group of the Society of Chemical Industry inform us that there is no Glasgow Section of the Food Group of the Society. The meeting was a joint one of the Glasgow Section of the Society of Chemical Industry and the Scottish Group of the Nutrition Society.

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Preserving Eggs

The preparation "Oteg" has been in use for nearly 20 years and it is stated that its efficiency is such that eggs have been boiled and eaten quite fresh when two years old and even longer.

The process is a dipping one and the preparation seals the pores in the shell of the egg. The eggs are simply dipped in and out of a thin liquid, allowed to lie for half an hour for the thin invisible film to set and then stored dry in any box.

* * *

Vacuum Egg-Pulping Machine

The elimination of hand-cracking of eggs for dehydration purposes by the invention of a vacuum pulping machine by Vacuum Extractors, Ltd., Australia, is described in *Scope*, July, 1943. The principle involved is the piercing of the egg by a hollow needle, and the sucking of the egg pulp by vacuum through the needle into a reservoir made to contain either 28 lbs. or 40 lbs. of pulp. When the reservoir is filled to capacity the vacuum is automatically released and the reservoir emptied. As an indication of the capacity of the machine, one operator is said to be able to produce fifty-six tins of pulp of 40 lbs. each in an eight-hour shift.

The bacteriological results show a pulp superior to the best hand-cracking methods. Fifty tests carried out on pulp produced with the machines showed that the total bacterial count was usually lower than 2,000 per c.c., with less than 1 *B. coli* per c.c. It is also claimed that pulp made by the process will keep about three times as long as the best hand-cracked egg pulp.

Gelozone

The manufacturers of Gelozone, the well-known stabilising agent, Whiffen and Sons, Ltd., report that supplies have greatly improved and that they will welcome enquiries from manufacturers requiring a product of this nature.

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Professor A. V. Hill

Professor A. V. Hill, O.B.E., M.P., Secretary to the Royal Society, has been invited to visit India to advise on problems of scientific and industrial research in relation to reconstruction problems and the co-ordination of such research in India with that elsewhere. Professor Hill's tour is being undertaken at the invitation of the Government of India and with the consent of the Royal Society.

* * *

Standard for Test Sieves

The British Standards Institution has recently issued a revision of the B.S. 410 for Test Sieves.

While no fundamental changes have been made in the British Standard series of meshes, particular attention has been paid in this revision to the question of the tolerances on the apertures, as a result of which modified tolerances on "average" and maximum apertures have been adopted which are more evenly graded throughout the series. Furthermore an additional tolerance has been introduced called the "intermediate tolerance" and the maximum percentage of apertures that may exceed this intermediate dimension is specified.

It had been appreciated that even these revised tolerances might permit of too great a variation in sieving results to meet some special requirements such as may exist in research and control work, and the new specification includes a second series of sieves with more stringent tolerances designated "Special Test Sieves". This special series of sieves will not, however, be manufactured during the war.

Copies of the specification may be obtained from Publications Department, British Standards Institution, price 2s., post free.

Morton Machine Co., Ltd.

As from November 29, 1943, the telephone numbers of Morton Machine Co., Ltd., will be Re-
liance 2273-2274.

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Fruit Tree Spraying

Of interest to canners and jam manufacturers is a chart which the Ministry of Agriculture has issued depicting in natural colours the stages of fruit bud development in fruit trees when particular spraying should be applied. The opportunity has also been taken to give the various bud stages standard descriptions. The best results from spraying can be obtained only when the sprays are applied at the proper stage of fruit bud growth.

Another chart deals with plums, and both are available from the Ministry of Agriculture, Lindum Hotel, Lytham St. Annes, Lancs. Enquiries for the charts should be accompanied by a description of the enquirer's connection with the fruit-growing industry.

* * *

University Scholarships from Industry

A practical step in planning for the future of Britain's industry and to ensure her world markets has been taken with the inauguration of a scheme by the Nuffield Organisation.

The scheme is based on the fostering of youth welfare, training and opportunity, and provides the sons of working men with the chance of attaining the highest technical qualifications and leading positions in the world of commerce.

Free technical education, scholarships to the university and special dietetic supervision are included in the responsibilities undertaken in this long-term plan.

Another aspect of youth welfare from which every junior employee will benefit is the subsidising by the Organisation of the midday meal for all persons under 18. It is appreciated that young people will require special nourishment and food in adequate quantities, and the canteens are providing high-vitamin content meals to foster sturdy growth and virile maturity.

Scientific Horticulture

The Horticultural Education Association announces a wartime Occasional Publication on Scientific Horticulture to meet the demand for guidance on leading questions of horticultural policy and practice in relation to the nation's food.

According to the announcement, this number contains twenty-one articles dealing with wartime fruit and vegetable production written by well-known research workers and horticultural advisers. "It is," says the announcement, "a wartime austerity version of *Scientific Horticulture*, maintaining the standard set by the popular peacetime numbers compressed into a smaller space."

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Institute of Refrigeration

The tendency to improve the status of the technician in modern industry is illustrated by a forward step taken recently in London by the world's oldest society of mechanical refrigeration, the British Association of Refrigeration. It was decided at the forty-fourth annual meeting of that organisation to include in its constitution a qualified class of technical membership, attainable by examination on the lines of the major engineering institutions. At the same time this pioneer society has renamed itself the Institute of Refrigeration; the change in name and constitution to take place on March 26, 1944. The President of the B.A.R., Dr. S. F. Dorey, and the Executive Council are now engaged in the foundational arrangements. In refrigerating practice, which is an essential factor in modern industrial life, there are mainly three branches of technician—viz., engineers, insulation specialists and biological experts in the food trades—and for each of these sections the entrance examination must ensure an adequate rank of technician. Associated with this technical class of member in the amenities of the new Institute will be, as formerly, that wide range of members of the refrigerated shipping, importing and produce-handling industries who in allied trades are disciples of the modern and progressive branch of engineering known as "mechanical refrigeration".

OBITER DICTA

● Farmhouse cheese-making is a doomed industry.—*Dr. J. G. Davis.*

● No more shorthand and typing in a city office for me.—*Miss Jean Thomson, Women's Land Army.*

● What is bovine tuberculosis, and why are no deaths reported from it in the Registrar-General's returns or the Ministry of Health figures?—*Mr. Leach, in the House of Commons.*

● Asked in the House of Commons whether the war and its effects had produced any deterioration in the quality of livestock, the Minister of Agriculture gave a simple and direct reply, "No, sir."—*Ministry of Agriculture Circular.*

● How far food, and food alone, is responsible for the ill-health of this or that population it is not possible to say definitely without complete demographic examination and also external experimentation.—*Lord Geddes, in the House of Lords.*

● In the fulness of time there may be perhaps fewer occasions when it is necessary for old ladies to stand in a queue to buy wholesome, but not very beautiful, fish, fewer occasions for elderly gentlemen to carry coals about the house and help with the cooking and washing up.—*Editorial, "J.S.C.I."*

● It is not too much to say that during the war agriculture has saved the country from semi-starvation. The stupendous efforts of our farmers and their workers have increased home food production beyond anything the experts believed possible.—*Ministry of Agriculture Circular.*

● Fish cakes were defined in the Fish Cakes (Maximum Prices) Order, 1943, as articles customarily known as fish cakes and similar products made up in the form of slabs or otherwise.—*Mr. Russell.*

● . . . the Ministry of Food, from the beginning, has made a mess of the fishing industry—at the very start it led to the downfall of one Minister—and I think that they now have got an inferiority complex about it. If they have not they ought to have.—*Mr. Boothby, in the House of Commons.*

Dried Bananas

It is reported that a 1-ton trial shipment of dried bananas from Nigeria (British West Africa) is being arranged and that the Ministry of Food are to consider further quantities.

The dried bananas, prepared from fully ripe fruit, are said to be very sweet and to have a natural flavour.

They have no important vitamins, but their high sugar content—somewhere about 60 per cent.—makes them an excellent source of energy.

In 1942 the Germans requisitioned at extremely high prices all the dried bananas unloaded at Marseilles from French African territories, and they were sent to feed troops on the Russian front.

* * *

Work of British Legion

Mr. J. R. Griffin, General Secretary, British Legion, speaking at a Conference of Trade Press representatives in November, said that while the Legion believed that men and women disabled in the Services should receive adequate compensation, that did not solve the problem.

The real solution was to rehabilitate them and train them to take a job. The average age of men and women serving in this war was very much lower than in the last war and consequently interruptions of careers took place at an earlier age. That raised the question of training and rehabilitation in a much acuter form.

The Legion policy was that resettlement, etc., were national responsibilities and was trying to educate public opinion to that point. Their object was to assist the State to absorb disabled people into normal employment. After this war training schemes must be available for fit as well as disabled men and women, but the trades and industries concerned must be consulted, especially as to how many they could absorb.

So far as re-employment was concerned, the Legion stood for a system of preference for those drawing a disability pension as a result of disablement incurred while serving with the Armed Forces or Merchant Navy.

Food Manufacture

Potato Plastics

Spotted and damaged potatoes, formerly left to rot in the fields, can be converted successfully into plastic dishes, ovenware, machinery parts, and similar articles, is reported from Columbus (Ohio).

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Dairy Engineers' Association

At a recent meeting of the Association's Board of Directors careful consideration was given to the question of staff. This arose as a result of the large amount of detailed work which now faces the Association in its co-operation with the Government to implement the new White Paper scheme relating to the heat treatment of milk on a national basis.

The outcome of these deliberations has been the appointment of Mr. Peter K. MacKenzie as salaried Secretary of the Association. It will be recalled that Mr. MacKenzie had been acting as Secretary in an honorary capacity.

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New Rubber-making Method

A new mass-production method designed to speed up the making of rubber from the cryptostegia vine has begun in Haiti.

One of the obstacles confronting those attempting to use the vine for rubber was the problem of tapping for latex. Partly with the aid of milk bottles, the tapping problem has been solved.

The development of the method, which is part of a programme to replace the natural rubber supply of the Malay Peninsula and Dutch East Indies cut off by the war, was announced by the Office of the U.S. Co-ordinator of Inter-American Affairs, after the official visit to the U.S. of President Elie Lescot, of Haiti.

Natural rubber of the type produced from cryptostegia, hevea or castilla trees is needed to mix with the synthetic rubber being produced in the U.S.

Hevea requires five or six years before it will produce; when it does come into production the Haitian plantations will produce 1,000 lbs. per acre from it, in contrast with the 300 lbs. per acre from cryptostegia.—*Reuter*.

Sir John Russell Visits Spain

Sir John Russell arrived recently in Madrid at the invitation of the Spanish Government.

He is giving three lectures, two of them at the Ministry of Agriculture.

He was met at the station by the Marquis of Aunon, head of the Cultural Relations Department of the Spanish Foreign Office, Señor Morales, representing the Spanish Ministry of Agriculture, and Professor Walter Starkie, Director of British Institute in Madrid.

—*Reuter*.

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Research in Post-War Britain

A report on Scientific Research and the Universities in Post-War Britain, drawn up by a sub-committee of the Parliamentary and Scientific Committee and unanimously adopted by the parent body, was issued on October 18. The report has been formally submitted to the Lord President of the Council, the Chancellor of the Exchequer, the Secretary for Scotland, the President of the Board of Education, and the Paymaster-General, and it is presented now in the hope that it may be considered in connexion with the Government plans for demobilisation, post-war planning, and educational reform.

It is recommended that university staffs, stipends and buildings should be increased, that £10,000,000 should be spent in the first five post-war years on the provision of buildings and equipment, and that the present Treasury grant to the universities of approximately £2,250,000 per annum be increased to £6,000,000 or £7,000,000.

* * *

Potatoes—A Vital Factor

Potatoes may be a vital factor in feeding war-impooverished Europe immediately after the armistice, and a far-reaching marketing scheme worked out by the Potato Marketing Board suggests that relief stocks of canned dehydrated potatoes should be prepared now, states the *News of the World*.

Before the war we produced about four million tons of potatoes a year. The scheme proposes that after this relief period we should

concentrate on producing about five and a half million tons in specially selected areas, and that prices should be kept down by various economies in distribution, a good start on which has been made during the war. The continuation of some form of control is also envisaged.

* * *

Colouring Matters

Caramel and cochineal have long been used to give a good depth of colour to food and pharmaceutical preparations, and there is no doubt that the psychological effect is by no means negligible. The manufacture of caramel, being a waste of good carbohydrate, is not permissible, but it can be partly replaced by one or another of the brown dyes available. The second volume of Martindale's *Extra Pharmacopœia* contains a valuable list of dyestuffs permissible for use for medicaments, confectionery, etc., and although not all of those listed are available to-day, there remains a selection sufficient for many purposes.

* * *

The Induction of Lactation

During the last two years experiments on the use of stilboestrol as a means of inducing lactation in barren heifers and cows have been carried out under the co-ordination of the Agricultural Research Council. The method consists in placing (implanting) a number of tablets of stilboestrol under the skin and their removal at a later date. The results of these experiments indicate that about 50 per cent. of the treated barren heifers have produced an economic quantity of milk. The other treated animals either failed entirely to respond to the treatment or produced only small quantities of milk. About half the treated animals were later successfully bred from.

It would appear that this treatment may have a useful, though limited, practical application in bringing into milk valuable dairy heifers which have failed to get in calf, and which, for this reason, may be fattened and slaughtered. Following a lactation induced in this way, a proportion of such heifers may be got into calf, and so saved for the dairy herd.

COMPANIES

Leach's Argentine Estates

The thirty-first ordinary general meeting of Leach's Argentine Estates, Ltd., was held recently in London, Mr. H. Roy Leach (the chairman) presiding.

The chairman, in the course of his address, said: The profit on trading at £176,624 is £12,732 less than that of the previous year. The directors now recommend the payment of 3 per cent. on the 6 per cent. Preference stock and 6 per cent. on the Ordinary stock. In view of the general conditions ruling during the past year, we feel that the results obtained may be considered as not unsatisfactory. It must be borne in mind that the stockholders' stake in the company is represented not only by the share capital of £1,052,500, but also by the figure of reserves amounting to over £450,000 retained in the business. Consequently the real capital to be remunerated is some £1,500,000, upon which these dividends represent approximately 4 per cent. per annum, a very moderate return, especially when it is taken into account that for nine years prior to 1936 no dividends had been paid on any part of the share capital.

* * *

Foster Clark, Ltd.

At the annual general meeting of Foster Clark, Ltd., Mr. Henry C. Clark, J.P. (the chairman), in the course of his speech, said: The accounts for the year ending September 15, 1943, show a trading profit, after provision for National Defence Contribution, of £65,620. Income from investments was £28,683. The combined trading profit and investment income thus amounts to £94,303. After deducting War Risks Insurance, £6,964, Air Raid Precautions, £2,444, and directors' fees, £2,500, there remains a balance of £82,395, which compares with £91,277 in the previous year.

Your directors recommend a final dividend on the Ordinary stock of 12½ per cent. (making a total for the eleventh successive year of 20 per cent.).

Manufacture of some of our specialities has been further reduced, as our production is limited to the supply of materials rationed to us by the Government. Demand for most of the company's products exceeds supply, and great care is exercised to distribute fairly the available goods to our regular customers, with whom our relations continue to be most excellent.

The demand is particularly insistent for our Custard Powder, which serves such a special purpose in war-time. The total weight of our output is naturally limited by the releases to us of the necessary materials, but to meet the desire of the Ministry of Food to obtain wider distribution we are packing a much larger proportion of our production in small packets.

A considerable increase in Government contracts with their low margin of profit has not altogether compensated for the decrease in our normal trade. Although the cost of materials and wages has again increased, much of the company's production is still being sold at pre-war prices. This policy, while limiting profit for the time being, should further increase the goodwill of the business. Reviewing all the circumstances, your directors consider the result of the year satisfactory.

Regarding the future—in war-time so many unknown factors can affect results that it is wise to adopt a rule of caution. The company's factories are still busy, however, and your directors feel they can face the future with confidence.

The report and accounts were adopted.

* * *

The Youma Company

Youma, the Kirkcaldy flour milling company, is seeking Court confirmation of a reduction of capital from £50,000 to £20,050 by cancelling 9,900 £1 shares which have never been taken up and by returning 10s. per share to holders of the issued 401,011 £1 shares.

On the reduction becoming effective, the capital is to be restored to £50,000 by creating 59,900 shares of 10s. each.

CHANGE OF ADDRESS

The Bradford Dyers' Association, Ltd.

On and after November 29, 1943, the address of the Manchester Office of the Bradford Dyers' Association, Ltd., will be 34, Princess Street, Manchester, 1. Telephone: Central 2141 (13 lines).

* * *

Margarine and War

Stating that it was a war emergency which first put margarine on the world's food table, Mr. William Scott, a former managing director of the Craigmillar Creamery Co., addressed a meeting of the Royal Scottish Society of Arts in Edinburgh on "The Development of the Margarine Industry."

Mr. Scott explained that research by Mouries, a French chemist, resulted in the provision of a butter substitute in the days of the Franco-Prussian War, since when, in two successive European wars, margarine has supported and implemented the slender supplies of butter.

He added that, with modern developments in margarine production, the vitamin content of most table margarine was now equal to that of the best dairy butter.

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OBITUARY

Mr. Joseph Rank

Mr. Joseph Rank died on November 13, aged 89. He was chairman of Joseph Rank and of Ranks, and a director of Buchanan's Flour Mills.

He was the father of Mr. Joseph Arthur Rank, who is chairman or a director of over fifty companies, the majority of which are concerned with the milling and film industries. Mr. J. V. Rank, the other son, is managing director of Joseph Rank and of Ranks.

The late Mr. Joseph Rank entered the milling business at fourteen years of age, in his father's windmill at Hull. He started on his own account in 1875 with a windmill near Hull.

Mr. Rank, who has helped many causes, was a great benefactor of Hull, his native city.

Food Manufacture

Information and Advice

Sardine Canning

8,860. *Required, information on canning of sardines. Is it the practice of sardine canners generally to keep a sardine pack for 2 to 3 years to mellow before marketing?* (London.)

The maturing of sardines (and other canned fish) in tins has a good effect on the pack. Among other effects the bones become soft. We have not been able to trace any published data dealing with the minimum time required for fairly complete maturation. This would depend on different factors, among which is the temperature of storage.

Within reasonable limits, the more complete the maturation the better the pack.

Some years ago a French brand of sardines, very popular in the English market, was stated to have been matured for 5 years in tins before being despatched for sale. All canned flesh foods improve by maturation.

Coffee Essence

8,881. *Required, information on the manufacture of coffee essence.* (Leics.)

It is difficult to give advice as to what method should be followed in the manufacture of coffee essence. Before it is possible to recommend any particular type of process it would be necessary to know the output that it is intended to produce, the amount of money intended to be laid out on plant and equipment, the grade, flavour, consistency, etc., of the product, and, in fact, all particulars that bear on the question.

The following formula was published in *FOOD MANUFACTURE*, Vol. XVII, 9, 271:

Coffee (a mixture of suitable grades, with or without chicory)	4 lb.
Water	10 gal.
Glycerin	3 lb.
White sugar	18 "
Glucose	18 "
Caramel	½ "

A great deal depends on the choice of raw materials and on the blending of these, and also on the method of extraction employed.

Owing to the restriction on, and scarcity of, material you would be obliged to modify the above formula, and it is given solely as a basis for experiment.

Swedish Rye Bread

9,020. *Required, literature on Swedish Rye Bread, also formula for same.* (Canada.)

There is a reference in *Handbook for Bakers*, by A. F. Gerhard, to Sour Rye Bread, and a formula is given.

A note on this type of bread by J. Kirkland may be found in *The Modern Baker, Confectioner and Caterer*, I., 223, as follows:

"A peculiar kind of rye bread, different from the English or Dutch rye bread, is very popular in Sweden. 15-20 lb. of water, at 105° F., 50 lb. rye meal, 8 ozs. salt, 4 ozs. yeast, and a little caraway seed (if wanted)

is made into a dough. When the dough has been made it is dusted with flour, wrapped up in a cloth, and covered with a woollen blanket, and allowed to prove for two or three hours in a warm place. If after that time the dough has shifted, it is kneaded again with some flour, and allowed to ferment some time again in the same way.

"After sufficient proof it is scaled off and moulded. The lumps of dough are made into flat round cakes, either with a rolling pin or by hand, from 12 to 14 inches in diameter and $\frac{1}{2}$ inch thick. In the centre a hole of 2 inches in diameter is cut. These cakes are moved by special forks to a board and allowed to prove sufficiently. Then they are baked on the bottom of the oven, which has been previously heated by a wood fire. After baking, the cakes are brushed to remove the dust and placed on sticks. To dry the cakes thoroughly, the sticks are suspended from the ceiling of a warm room for a couple of days. When baked they should have a light yellow-brown appearance. They are made to keep any length of time when thoroughly dried. A better quality of this bread is made by using milk instead of water, and by the addition of a small quantity of butter and white flour."

The modern method of making rye crisps would be that used in a biscuit factory, as follows: When the dough is well matured pass it through the roller brakes and thin it down gradually to $\frac{1}{8}$ inch thick, and stamp the biscuits out into squares while running them on to heated travelling trays. After proving for a time bake them in a hot oven. After baking, transfer the crisps to a warm cupboard to dry thoroughly before packing ready for sale.

Information Supplied

8,915. *Information with regard to the scaling and weighing of ingredients of various forms (liquid, semi-liquid, powder, etc.) for manufacturing purposes.* (London.)

8,920. *Information on vibration rapid drier for making blood albumen.* (Wilts.)

9,821. *Information regarding the adjustment of pH.* (London.)

8,922. *Suppliers of machinery for packing custard powder, porridge, flakes, etc., in collapsible cartons with moisture-proof wrappers.* (Surrey.)

8,925. *Information regarding biscuit ovens of the treble type.* (Lancs.)

8,927. *Daily units of vitamins required by average person.* (London.)

British Material for Export

Overseas readers are advised that the fact that goods made of raw materials in short supply owing to war conditions are advertised in *FOOD MANUFACTURE* should not be taken as an indication that they are necessarily available for export.

Recent Patents

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

An Improved Process for Treating Edible Animal Flesh for the Production of Food Products

The object of the present invention is to provide a treatment suitable for the production of dried or dehydrated animal flesh for human consumption which will preclude the existence of hard, dry fibres gritty to the palate and which can be carried out commercially according to a pre-arranged standard treatment for a given product, and the invention consists of a process for treating edible animal flesh for the production of a dried or dehydrated food product for human consumption, according to which the carcase meat is first butchered for the removal of bone and fat, the resulting lean meat is then minced to produce particles of substantially regular size, the mince is then treated with an acid while being cooked, or partially cooked, and after the cooking process the mass is neutralised by the addition of an alkaline reagent which will react with the acid to form an edible salt, the neutralised product then being dried in known manner to produce a granular dehydrated meat product. The neutralisation is preferably such as to restore the mixture to the original pH value of the meat. We have successfully carried out the process by heating the meat in minced condition with a solution of hydrochloric acid and then neutralising with caustic soda, which reacts with the acid to form sodium chloride or common salt.

The common salt added in the manner indicated contributes to the keeping properties of the dried meat, and as a consequence the meat need not be dried to the extent which would otherwise be necessary, a factor which helps in the subsequent rehydration of the dried product. In our experiments the salt added by the carrying out of the process proved rather less than taste demands in various products containing the dried meat (sausages, rissoles, soups, and the like), but since the quantity of acid used is the factor determining the salt content in the final product this salt content can be varied by varying the quantity of acid, and, of course, as a consequence the quantity of the neutralising alkali employed. Care must be taken that such an ex-

cessive quantity of salt is not produced in the final product as will render it unpalatable. In this connection regard may, of course, be had as to whether the product is intended for use alone or in admixture with other ingredients.

550,421. J. Lyons and Company Limited and John Herbert Bushill, D.Sc.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

552,533. PEET, A.: Electric water-heating apparatus.

552,537. HUNTLEY AND PALMERS, LTD., and RABONE, H. M.: Apparatus for the treatment of biscuits and the like with oil or similar liquids.

552,544. BRITISH HARTFORD - FAIRMONT SYNDICATE, LTD. (Preston, F. W.): Means for testing articles such as glass bottles by impact.

552,548. TURNER, LTD., E. R. AND F., and HALL, T. W.: Centrifugal dressing machine, primarily for separating flour and meal from crushed cereal products.

552,575. BERENGER, A. E., and VILLIERS, O. D'H. DE: Method of clarifying sugar cane mill juices.

552,580. ELECTROLUX, LTD. (Aktiebolaget Elektrolux): Dish-washing machines.

552,591. CRITTALL AND CO., LTD., R., and ADSHEAD, B.: Electrical systems for heating fluids in pipes and in containers.

552,614. SVENSKA MJOLKPRODUKTER AKTIEBOLAG and FORSHELL, R.: Process for production of vitaminised dry milk.

552,655. HUNTLEY AND PALMERS, LTD., VICARS, LTD., T. AND T., and RABONE, H. M.: Coating of articles with liquid.

552,704. AMERICAN DAIRIES, INC.: Extraction of nutritive components from vegetable matter.

552,771. PORTEOUS, W. K.: Control systems for regulating to co-ordinated filling and emptying of a number of tanks or containers.

552,820. EVERY, C. E. (Alton, T.): Methods of and apparatus for canning fruits.

552,867. AKTIEBOLAGET ELEKTROLUX: Refrigerator cabinets.

Trade Marks

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

CANNONS.—622,306. *Advertised before acceptance.* Section 18(1) (*proviso*). Use claimed from the year 1832. Section 12(2). Cereals (prepared for food for human consumption) and flour. **Cannon and Gaze, Ltd.**, Bank-side House, Leadenhall Street, London, E.C. 3; Millers. To be Associated with No. 518,480 (2763) xlii.

HERDMANS.—622,312. *Advertised before acceptance.* Section 18(1) (*proviso*). Cereals (prepared for food for human consumption) and flour. **John Herdman and Sons, Ltd.**, Haymarket Mills, Edinburgh; Millers. To be Associated with No. 574,184 (3083) xlii.

New Companies

Anning, Chadwick and Kiver, Limited. (380447.) To take over the bus, of hide, skin and produce merchants formerly cd. on at 15, Arthur Street, E.C., as "Anning, Chadwick and Kiver." Nom. cap.: £100,000 in £1 shares (84,000 cum. pref. and 16,000 ord.). Dirs.: E. R. Cobb, H. W. Chadwick, J. R. Cobb and K. G. Hollebhone, all of 15, Arthur Street, E.C. 4.

W. W. Holdings, Limited. (380490.) 24, Empire House, E.C. 1. To take over the issued share capitals of Western Margarine, Ltd., and Peden Reid and Walker, Ltd., to enter into an agreement with Peter Keevil and Sons, Ltd., and Geo. Walker, and to carry on bus. of produce and provision merchants, etc. Nom. cap.: £100,000 in £1 shares. Dirs.: F. E. Keevil, Brook House, Wooburn Green, Bucks; L. Keevil, address not stated; G. Walker, 46, Parkhill Drive, Rutherglen, Lanarkshire.

Lowfields Pig Company, Limited. (380527.) Lowfield Farm, Bardney, Lincs. Nom. cap.: £1,000 in £1 shares. Dirs.: G. W. White, Lowfields Farm, Bardney, Lincs; S. Haynes, Brudenelle Villa, Bardney, Lincs.

Nappers Bakeries, Limited. (380572.) 391, Durnsford Road, S.W. 19. Nom. cap.: £2,000 in £1 shares. Dirs.: D. A. Lock and Doris Lock, both of 63, Revelstoke Road, S.W. 18.

Taken from the Daily Register, compiled by Jordan and Sons, Limited, Company Registration Agents, 116, Chancery Lane, London, W.C. 2.

Food Manufacture