CHEMONICS

PROEXAG

NON-TRADITIONAL AGRICULTURAL EXPORT SUPPORT PROJECT

PREFEASIBILITY STUDY FOR A TROPICAL FRUIT DEHYDRATION PLANT IN LA CEIBA, HONDURAS

FINAL REPORT

Assignment Number: 87-45

SUBMITTED TO:

Regional Office for Central America and Panama (ROCAP)
U.S. Agency for International Development
Guatemala City, Guatemala

SUBMITTED BY:

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DEHIDRATADORA DE PAPAYA Y PINA -COSTO ESTIMADO DE LA INVERSION.

INVERSION	DESCRIPCION	VALOR US$	%
1. Terreno	1 Manzana-L$ 5,000	2,500	0.31
2. Edificio	795.42 m/2 L$ 350	139,299	17.40
3. Caminos	L$ 6 m/linealx 4m	600	--
4. Maquinaria para Procesar		363,100	45,39
5. Equipo de Oficina		8,000	1.00
6. Equipo de Laboratorio		6,000	0.75
7. Taller Mecanico		9,000	1.12
8. Vehiculos	1 Jeep/1 Pick-up 3/4T	22,000	2.75
9. Instalacion y Puesto en Marcha	20% sobre US$ 363,100	72,600	9.07
10. Costos de Organizacion	Formar la Sociedad	20,000	2.50
11. Miscelaneos	10% sobre US$ 643,000	64,000	8.00
SUB-TOTAL		US$ 707,000	88.29
12. Capital de Trabajo Estimado		93,000	11.62
TOTAL ESTIMADO DE LA INVERSION		**US$ 800,000**	**99.91**

FORMA DE LA INVERSION:

Capital Social	US$ 320,000	40.00
Emprestamo a Largo Plazo	480,000	60.00
TOTAL DE LA INVERSION Y EMPRESTAMO	**US$ 800,000**	**100.00**

RESUMEN DE COSTOS PARA LA PLANTA DESHIDRATADORA DE PAPAYA Y PINA.
(Y OTRAS FRUTAS TROPICALES)

DESCRIPCION	Precio US$	Primer Ano Volumen Lbs.	Primer Ano Ventas US$	Segundo Ano Volumen Lbs.	Segundo Ano Ventas US$	Tercer Ano Volumen Lbs.	Tercer Ano Ventas US$	Cuarto Ano Volumen Lbs.	Cuarto Ano Ventas US$
I. VOLUMEN DE VENTAS									
A. Papaya	0.77/Lb	-------	-------	150,000	225,000	225,000	173,250	249,000	191,700
B. Pina	0.86/Lb	375,000	322,500	375,000	322,500	500,000	430,000	625,000	537,500
TOTAL DE VENTAS		375,000	322,500	525,000	438,000	725,000	603,250	874,000	729,200
COSTOS DE PRODUCCION			COSTOS US$	%	COSTOS US$	%	COSTOS US$	%	COSTOS US$
A. MATERIA PRIMA.									
1. Papaya	US$ 60/TM		-----		5,700		8,600		9,500
2. Pina	90/TM		27,900		27,900		37,200		46,500
Sub-Total			27,900	7.7	33,600	7.6	48,800	7.7	56,000
B. INGREDIENTES.									
1. Azucar	US$ 0.245/Lb		87,050	27.7	121,450	27.9	168,010	27.7	202,420
2. Sodium Metabisulphate	US$ 0.60/Lb		320		450		620		750
3. Potassium Sorbate	US$ 4.25/Lb		150		210		290		350
Sub-Total			87,250	27.7	122,110	27.9	168,920	27.7	203,520
C. MANO DE OBRA DIRECTA			10,080	3.2	14,070	3.2	19,460	3.2	23,450
D. INSUMOS			44,400	13.9	61,000	13.8	83,400	13.7	100,000
E. EMPAQUES			11,700	3.7	16,400	3.7	22,700	3.7	27,300
F. ADMINISTRACION/VENTAS			52,900	12.5	54,600	9.5	57,000	8.1	59,000
G. MANTENIMIENTO			14,100	3.2	14,100	2.3	14,100	1.9	14,100
H. DEPRECIACION			50,000	11.4	50,000	8.3	50,000	6.8	50,000
I. INTERES-LARGO PLAZO			57,600	13.1	57,600	9.6	57,600	7.9	57,600
J. AMORTIZACION			15.660	3.6	15,660	2.6	15,660	2.1	15,660
K. IMPUESTOS			------	----	------	----	------	----	------
L. PAGO DEL EMPRESTAMO			------	----	------	----	------	6.6	48,000
COSTO TOTAL DE PRODUCCION			371,860	100.0	439,140	88.6	534,640	89.4	648,920
GANANCIA O PERDIDA									
VENTAS			322,500		438,000	11.2	603,250	11.1	729,200
MENOS COSTO DE PRODUCCION			371,860		439,140		534,640		648,920
GANCIA O PERDIDA ESTIMADA			(49,360)		(1,140)	99.8	68,610	100.5	80,280
RETORNO SOBRE CAPITAL SOCIAL							21.44%		25.08%

SUPOCICIONES PARA BAJAR LOS COSTOS.

I. Bajar el costo de azucar al precio mundial o a US$ 0.1225/Lb

COSTO ESTIMADOS.				
A. Costo en el Estudio	US$ 87,050	US$ 121,450	US$ 168,010	US$ 202,420
B. Costo a US$ 0.1225/Lb	43,525	60,725	84,005	101,210
AHORRO ANUAL ESTIMADO	43,523	60,725	84,005	101,210
GANANCIA O PERDIDA	**(5,835)**	**59,585**	**151,615**	**182,200**
CAMBIO EN EL RETORNO		**18,62%**	**47,38%**	**56,94%**

II. Si se puede mejorar el tiempo de secado sin danar el producto, de 16 horas diarias a 4 horas diarias. (Los fabricantes del equipo han sugerido que el secado se podria hacer en 4 horas.)

A. Costo en el Estudio	US$ 44,400	US$ 61,000	US$ 83,400	US$ 100,000
B. Costo a 4/horas	14,900	19,900	26,500	31,500
AHORRO ANUAL	**29,500**	**41,100**	**56,900**	**68,500**

CAMBIO EN EL RETORNO SOBRE CAPITAL SOCIAL SI AMBOS AHORROS SE PUEDEN HACER.

7.4%	31.46%	65.2%	78.3%

PREFEASIBILITY STUDY FOR A TROPICAL FRUIT DEHYDRATION PLANT IN LA CEIBA, HONDURAS

PREPARED FOR

CHEMONICS INTERNATIONAL CONSULTING DIVISION

WASHINGTON, D.C.

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(Revised March 11, 1988)

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I. INTRODUCTION.

This study has been made under a contract with Waldo G. Heron, President of FOOD PROCESSING CONSULTANTS COMPANY and CHEMONICS, INC., as part of USAID/ROCAP Non-Traditional Agricultural Export Support Project (PROEXAG).

The terms of reference were to prepare a prefeasibility analysis for the production of dried tropical fruit flakes in Honduras. The scope of work included a visit to La Ceiba to discuss the project with a group of local entrepreneurs who are interested in investing in the venture if it appears to be feasible, to review a prefeasibilty study prepared by Lic. Manuel Enrique Borjas of FEPROEXAAH, a study prepared by Johannes Fehrs, Departamento de Desarrollo Industrial, BCIE, and then complete the work in Fillmore, California.

The consultant arrived in La Ceiba, Honduras, on May 25th and returned to Fillmore on May 29th. During the visit at La Ceiba several meetings were held with the investment group and the two above mentioned studies were reviewed. At a final meeting on May 28th the following decisions were reached:

A. A new prefeasibility study for dehydrated tropical fruits would be made, primarily to export product to the U.S. market.

B. The products which were selected for dehydration were bananas and pineapple that are currently being grown in the area. Papaya was discussed and a recommendation was made to develop a commercial plantation in La Ceiba to supply the plant with its requirements, since papaya can be harvested within a year after starting the plantation. Both mangoes and papaya could be obtained from the Comayagua area, however transportation costs made the fruit expensive for processing in La Ceiba when compared with prices from other countries with a more accessible fruit supply.

C. The previous studies recommended an investment of between US$ 1,500,000 and 1,850,000. However, as this would be a new venture with a relatively limited potential market, a small plant that could be expanded as a market for the products was developed seemed to offer the best possibilities for the project.

D. Emphasis would be placed on the marketing aspects of the project, since this would determine the plant size, product specifications and processing methods to be used.

This study has been made on these premises. The orignal report contained errors in the processing methods used and in sugar prices. This data has now been corrected and the project seems to be feasible.

II. SUMMARY OF RECOMMENDATIONS.

A. The project seems to be viable as there is a market demand in the United States for dehydrated bananas, papaya and pineapple in addition to banana chips. The first year of operation shows a loss due to the limited volume of product that has been programmed, however from the second year the project starts showing a profit. In the fourth and succeeding years, profits are estimated at US$ 203,600 before taxes per year or 28.3% of equity capital.

B. An investment of US$ 1,800,000 is required for the project, that includes a long term loan of US$ 1,080,000 and equity capital of US$ 720,000. About 57.6% of the investment is for equipment, 14.9% for the land purchase, building and roads, 17.9% allocated to a variety pre-operating expenses and working capital of 9.4%. Some savings may be made in the money allocated to start-up, miscellaneous and organizational expenses, but it is best to plan on the full amount and not find that additional capital will be needed before the plant start operations.

C. An analysis was made for separate facilities, that is a dehydration plant and for a banana chip plant. The former required a total investment of US$ 800,000 and would show a pre-tax profit after the third year of operation of about 21.4% on equity capital, increasing to 25.0% in succeeding years. The banana chip plant would need an investment of US$ 1,200,000, however the pre-tax return after the fourth year of operation was only 7.5%.

D. The present U.S. import market has been estimated at between 6,000,000 and 7,500,000 pounds of bananas, papaya, pineapple and banana chips. If the major cereal manufacturers start using tropical fruits in the " fruit and fiber " cereals, the demand could be much larger. Health food stores are an important segment of the market and can be developed through specialty importers who distribute these products to retail stores.

D. Competition can be expected from traditional suppliers of dried fruits such as Thailand, the Philippines, Taiwan and Ecuador. Price, quality and reliability will play an important role in obtaining a share of the market. Data was not available to estimate potential sales in Europe, however this market should be explored as it offers excellent possibilities.

E. The processing methods to be used are standard in the trade, though it is recommended that for the first and second year operations that technical assistance be obtained to train local personnel in quality control procedures and production.

F. Production costs have been estimated conservatively and some

savings may be made here by increasing yields and improving plant efficiency.

III. MARKETING INFORMATION.

The statistical data available on U.S. imports of dehydrated tropical fruits is limited, for only dried bananas have a separate Tariff Schedule. Mango, papaya and pineapple are included in broad categories such as Mangoes, Prepared or Preserved; Pineapples, Prepared or Preserved, Not in Airtight Containers or Papayas, Prepared or Preserved. As these categories cover all forms of preservation, it is impossible to separate dehydrated products from the other forms of processing.

In order to obtain reliable data a telephone marketing survey was conducted and contacts were made with industrial users, importers, distributors and retail outlets. In discussing dehydrated tropical fruit with the different groups the information requested covered estimated volume of imports, pricing, specifications, packaging requirements and trends. A list of the people contacted is contained in Annex A.

Many of the people contacted were reluctant to disclose their import volumes and pricing information, consequently estimates were made for volume and prices ranges.

The U. S. market for dehydrated bananas, papaya and pineapple seems to be growing and will increase substantially if the cereal manufacturers start using tropical fruits in their " fruit and fibre " mixtures. At present they are using apples, raisins, dates and nuts as the main ingredients, but some of the major companies are looking towards " tropicals " as an innovation to increase their market share. NABISCO has also come out with a line of DEL MONTE Fruit Snacks that include Yoghurt Raisins, Orchard Fruit Mix, Sierra Trail Mix, Pineapple Nuggets, Strawberry Yoghurt Raisins and a Tropical Fruit Mix.

Other than the cereal companies, the major outlets for dehydrated tropical fruits are health food stores and to a lesser extent, super markets. The latter are selling more raisins, dates, prunes and apricots than tropicals, however much depends on the store location and local taste preference. Many of the health food stores use bulk packaging in selling tropicals, that is in large containers, though some products are available in 6, 8 and 12 ounce plastic bags. A large percentage of the super market trade is in small packages sold under private lables. Most health food stores and supermarkets buy directly from importers or through importing distributors who in turn buy in bulk and repackage under their own lable or under their customers brand names.

The cereal manufacturers who buy in large quantities do their own importing, usually in bulk packages which they then repackage according to their needs. Some of these companies also deal with large distributors rather than do their own importing, so a local producer should look to both outlets in planning their marketing strategy.

Specifications vary enormously with the different buyers, though the trend seems to be for products with less sugar, little or no sulphides and in some instances, honey dipped fruits. The health food market is also becoming interested in organically grown products. This trend may increase as people who are looking for foods with no artificial additives such as fertilizers and insecticides demand these specialty items.

Specifications from two major food companies and two smaller importers are included in Annex B. These specifications have been used in engineering the plant and selecting the processing methods to be used in the Honduran project.

Prices also vary considerably depending on the specifications of the individual buyers. The price range for bananas went from US$ 0.60 to 1.00/lb., papaya from US$ 0.50 to 1.10/lb., and for pineapple from US$ 0.60 to 1.20/lb. Another factor in the price variations was the level at which quotations were obtained, that is an importer, importer-distributor or break/bulk outlet. For purposes of this study the following prices were used:

Bananas.....	US$ 0.87
Papaya.....	0.77
Pineapple.....	0.86

With a high quality product and a careful selection of the distribution system to be used, these prices seem reasonable and obtainable.

Retail prices in health food stores and supermarkets are of course much higher, since they are specialty items that have a high markup due to their low sales volume. A package called " Tropical Trade Mix " consisting of bananas, coconut, peanuts and pineapple was selling for US$ 2.99/lb.; dried papaya chunks were priced at US$ 3.29/lb.; dried mango chunks US$ 5.99/lb.; honey dipped pineapple chunks US$ 3.29/lb. and banana chips US$ 1.79/lb. At another health food store unsweetened banana chips were selling for US$ 2.50/lb., while a third store was selling banana chips for US$ 1.49/lb. and papaya spears for US$ 1.99/lb.

The Del Monte Tropical Fruit Mix carton with six 0.9 ounce snack pouches had a price of US$ 1.95/5.4 ounces. The ingredients are dried pineapple (pineapple with sugar and citric acid), dried apricots, dried papaya (papaya with sugar), seedless raisins, golden seedless raisins, dried apples, coconut, potassium metabisulfite, sodium bi-sulphite and sulphur dioxide (to preserve the color).

In order to estimate the volume of U.S. imports, discussions were held with over 25 different potential buyers of dehydrated tropical fruits . The information they furnished was analyzed and compared to actual statistical data from the Department of Commerce. Based on the resulting figures, it is reasonable to assume that the total U.S. Imports of the following products can be estimated

at:

Dried Banana Chips	2,000,000 to 2,500,000/lbs.
Dried Papaya	1,500,000 to 2,000,000/lbs.
Dried Pineapple	2,500,000 to 3,000,000/lbs.
TOTAL ESTIMATED U.S. IMPORTS	**6,000,000 to 7,500,000/lbs.**

If the cereal manufacturers find that dried tropical fruits have customer acceptance, these estimates could increase substantially.

Trade channels have already been developed for the products to be manufactured in Honduras, with several American companies forming joint ventures with local partners in the Far East to supply part of their requirements. Price will play an important role in obtaining a market share, however quality and reliability are of equal importance, especially in selling to the cereal manufacturers.

The Philippines, Taiwan and Thailand are the major suppliers of dehydrated papaya and pineapple to the American market, while Ecuador and the Philippines are the main competitors for dried bananas and banana chips. A project is under development in the Dominican Republic for organically grown dehydrated tropical fruits. There have also been several unsuccessful ventures in Central America and while the reasons for the failures are not known, they can probably be attributed to a lack of marketing expertise and poor quality.

SUMMARY OF SPECIFICATIONS FOR DEHYDRATED TROPICAL FRUITS USED IN THIS STUDY.

A. PAPAYA.

Description	General Foods	Nabisco	Bonner	Cade	Grayson
1. Original Moisture		88.7%	88.7%		88.7%
2. Particle Size		8-10 mm	1/2" Screen		10-14 mm
3. Final Moisture		12.5% +/- 1.5%	5 - 10%		16% +/- 4%
4. Sulpher Dioxide PPM		Less Than 500	1,500/ 2,000		100/ 500
5. Sugar Content		Free flowing, sugar(dextrose) dusting permitted.			
6. Color		Golden yellow/ Light orange	Bright typical color		Red to yellow, typical color

B. PINEAPPLE.

1. Original Moisture	85.0%	85.0%	85.0%		85.0%
2. Particle Size	8 mm Range 6-10 mm	8 -10 mm	1/2" Screen		10 - 14 mm
3. Final Moisture	9 - 15%	12.5% +/- 1.5%	5 - 10%		14.0% +/- 4.0%
4. Sulpher Dioxide PPM	Less than 500	Less than 500	1,500/ 2,000		100/ 500
5. Sugar Content	65 - 88% Total sugars	Free flowing, sugar (dextrose) dusting permitted.			60 -70% Natural & added sugars
6. Color	Typical	Light yellow, bright appearance	Typical		Yellow to amber

BANANA CHIPS.

Description	General Foods	Nabisco	Bonner	Cade Grayson
1. Original Moisture	75.7%	75.7%	------	75.7%
2. Particle Size (chip thickness)	2.80 mm +/- 1.50 mm	1/8 to 3/16"		1/8 to 3/16"
3. Final Moisture	3.0% maximum	2.0 to 3.0%		Less than 5%
4. Sugar Content	12.0 to 20.0% (Sucrose coating)	Sucrose coating permitted		Honey Dipped 63.6% Carbohydrates
5. Fat Content (Coconut oil)	38.0% Maximum	40.0 to 45.0%		28.5%
6. Color	Off white to light amber	Yellow		Yellow
7. Flavoring	Artificial Banana Flavor Permitted			

a mixture of water and sugar, based on a ratio of clean raw fruit to sugar of 1 : 1 by weight.

For best results, it is recommended that the fruit be placed in a weak 25% sugar solution for about 4 hours, then transferred into a 70% sugar solution. The first more diluted sugar treatment is to minimize leaching of flavor and fruit solids into the sugar medium.

The fruit is held in the second solution until it reaches 65 degrees Brix. This may require 18 to 24 hours, preferably at about 65 degrees C. The sorbate-sulphite additives in the sugar solution is used to control fermentation. Insect control is very important during this phase of the operation.

In order to save sugar costs, the spent sugar solution used in the second operation may be adjusted to 25 degrees Brix, heated to control yeast and other contaminations, then used as the first soaking solution for the next batch of product.

After the fruit pieces have reached the 65 degrees Brix equilibrium, they should be placed on the drying trays and moved into the cabinet drier. Drying takes place at 65 degrees C and may require 16 to 20 hours to achieve a 14-18% moisture in the product. The actual drying times will have to be determined by practical experience as there is some difference of opinion on the drying times required.

After drying the fruit should be cooled to room temperature on the trays, then packed into plastic bags that are placed in cartons. Moisture equalization will take place in the bags and will avoid the formation of large clusters that may occur in an equalizing bin.

Based on this process an overall recovery of 55% from fresh fruit to dried low moisture product can be expected based on actual experiences obtained in New Zealand using a similar process. The shelf life of the product is 8 to 10 months at 60 degrees F.

Raw material selection is very important in a high quality product, therefore all of the fruit must have the same maturity or ripeness and be free from bruises or other damage that will lower yields of the finished product.

There is a demand for fried banana chips, therefore a special line will be required for this product since the process is different than that used in dehydrating papaya and pineapple.

Bananas will be received either in stems or preferably hands, from the field to avoid unnecessary waste material at the plant, however this will have to be decided by an expert in handling fruit after harvesting. Bananas may require special ripening rooms to insure that all of the fruit has the same degree of maturity before processing.

Ripening rooms have not been included in the equipment proposal but can be added if this need becomes apparent. The normal ripening cycle can be four to ten days, under controlled temperature and humidity conditions. Depending on the time used in ripening, temperatures can vary from 64 o/ F down to 58 o/ F and humidity can be up to 95%. Ethylene gas is used in the ripening process, at a rate of 1 cu.ft. per 1,000/cu.ft./storage. The size of the rooms can vary according to fruit needed for the production line which in this case is 5,965 kilos during one eight hour shift. As the plant will eventually be operating two shifts a day, it would be best to design the ripening rooms for this capacity. A four day cycle is recommended.

The ripe bananas will be removed from the stems or hands in the cleaning section of the plant and dumped into a soak tank washer. After washing, the fruit is conveyed to the peeling table where it is peeled and inspected for defects. The clean wholesome fruit is then moved to the banana frying line.

The bananas are sliced and conveyed automatically to the first stage fryer followed by an ambient air cooling unit. The cool fruit can then be dipped into a sugar solution depending on the clients specifications and moved to the second stage fryer for further processing and cooling. The fried bananas are then transferred to a tumbling drum with a dry seasoning applicator to add artificial flavoring if required by the clients specifications.

The fried bananas are then inspected for defects prior to weighing and packaging into poly bags that will be packed in export shipping cartons. The filled cartons will be stored in the warehouse until such time as the order is completed or a container load assembled.

V. PLANT ENGINEERING.

The estimated U.S. imports have been used to develop the following sales projections and production schedules for the plant in Honduras:

ESTIMATED SALES PROJECTIONS AND PRODUCTION SCHEDULE FOR PAPAYA AND PINEAPPLE.

		Papaya			Pineapple		
Years	Production Volume/lbs.	Sales Volume/lb.	Price US$/lb	Sales US$	Sales Volume/lb	Price US$ lb.	Sales US$
1st year	375,000	-------	----	-------	375,000	0.86	322,500
2nd year	525,000	150,000	0.77	115,500	375,000	0.86	322,500
3rd year	725,000	225,000	0.77	173,250	500,000	0.86	430,000
4th year	874,000	249,000	0.77	191,700	625,000	0.86	537,500

ESTIMATED SALES PROJECTIONS AND PRODUCTION SCHEDULE FOR BANANA CHIPS.

1st year	400,000	400,000	0.87	348,000
2nd year	600,000	600,000	0.87	522,000
3rd year	900,000	900,000	0.87	783,000
4th year	1,200.000	1,200,000	0.87	1,044,000

The production schedule calls for the dehydration section of the plant to operate 129 days of the first year, 180 days the second year, 249 days the third year and 300 days in the fourth and future years. The banana chip section will operate 200 days the first year, 300 days the second year, 450 days the third year and 600 days in the fourth and succeeding years. This will be acomplished by working one and a half shifts and two shifts during these years, which is normal in a food processing plant.

The working year in Honduras is considered to be about 300 days, after eliminating 52 Sundays and 11 paid holidays. According to the local investors group, bananas, papaya and pineapple can be obtained throughout the year in the La Ceiba area as they are not seasonal products, consequently raw material should not present a problem. It is not reasonable to expect plant operating efficiency to be over 85% of its rated capacity, therefore this figure has been used in calculating the requirements of raw materials and finished products.

In designing this plant, flexibility has been one of the major considerations since two separate types of processing will be used, one for dehydrated bananas, papaya and pineapple and the other for fried banana chips.

In order to accomodate both processes, one section of the plant will handle the dehydrated products using batch type methods and the other, fried bananas which requires a continuous straight production line for maximum efficiency.

The cabinet dryer and the banana fryer are the limiting factors in each of the lines, since these units can only handle a certain volume of product per hour. A nine cart cabinet dryer has been selected as this will produce approximately 2,913 pounds of finished product per day in during a 16 hour drying cycles or about 874,800 pounds of finished product per year.

A banana fryer has been chosen with a capacity of 300 pounds of finished product per hour or about 600,000 pounds of product working one shift per day. A larger unit that can produce about 2,400,000 pounds of finished product per year working one daily shift, would only cost an additional US$ 85,000, however as this would equal the annual estimated U.S. imports, it is doubtful that any one producer could achieve this market penetration. This means that the line would be operating at a reduced capacity with less efficiency and it would also require a much larger fresh fruit handling line and mechanized packaging which would increase the overall investment. For these reasons, the larger line did not seem to meet the needs of the Honduran plant.

The plant can be placed on one manzana of land that is equal to 6,972m/2, which will allow for future expansion if needed. The section for offices and dehydrated fruit requires a building 92' x 92' or about 8464 sq.ft, while the banana chip ripening rooms, cleaning area, processing line and warehouse requires an area of about 7,870 sq. ft. The plan is flexible so that the dehydrated fruit section is in one unit the banana chip line is in the other in case a decision is made to implement only one of the lines.

The Following Building Areas Will Be Needed For The Plant Facilities.

Description	Dimensions	Sq.Ft.	M/2
1. Fruit Receiving Platform	16' x 40'	640	59.456
2. Dehydration Production Area 38' x 62' + 38' x 72'= 5,092 sq.ft 5,092 sq.ft- QC Lab 210 sq.ft		4,882	453.538
3. Banana Chip Production Area and storage		7,238	672.689
4. Quality Control Laboratory	14' x 15'	210	19.509
5. Sugar Storage	20' x 30'	600	55.740
6. Boiler Room	16' x 20'	320	29.728
7. Machine Shop	14' x 20'	280	26.012
8. Warehouse	30' x 51'	792	73,578
9. Office	30' x 34'	1,020	94.758
10. Womans Dressing Room	14' x 16'	224	20.809
11. Mens Dressing Room	8' x 16'	128	11.891
TOTAL		**16,334**	**1,517.708**

1. Receiving Platform.

The 16' x 40' receiving platform should be ample to handle the daily requirement of raw material. The fruit that arrives in lug boxes can be weighed on the platform scale and stored until needed on the production floor. A popular size lug box in the United States measures 24" long x 12" wide by 12" high with a capacity of about 1.8 cu.ft. The weight of the contents will vary according to the different fruit, however this should average out to about 60 pounds or 27 kilos.

The method for handling bananas will depend on how they will be received at the plant and this can be decided once this has been determined.

2. Dehydration Production Area.

This area was designed to handle bananas, papaya and pineapple using the cabinet dryer. Bananas were included as there is a limited market for product dried in this fashion, though the demand for banana fried chips is much greater.

The soak tank washer has a rated capacity of about 10 tons per hour depending on the fruit to be handled and will allow the fruit to be moved rapidly to the production line. A discharge conveyor moves the fruit from the washer and drops it on the peeling and trimming conveyor. The spray on the conveyor removes any dirt that might remain on the fruit after soaking.

The peeling and trimming conveyor is 30" wide x 12' long and can accomodate up to 4 women per side to perform this work. The fruit is then dropped onto a 24" x 6' inspection conveyor to insure that it has been properly cleaned before further processing.

The fruit will be moved manually to the slicing and dicing equipment and from there to the blanching and cooling units. The products are then transferred to the sugaring and sulphuring area. In the United States a glucose syrup is used instead of sugar, however as it may not be available in Honduras, heated syrup mixing tanks have been included to prepare the syrup solution.

The tray loading and unloading roller conveyor will be used for both operations, as the sixteen hour drying cycle will allow the operators to load one day and the next batch the following day.

The 24" wide x 12' long final inspection conveyor is necessary to insure that all of the dried fruit meets the clients specifications as to quality and size. In larger plants a size grader is used to remove undersized pieces, chips, fines or other material that is not acceptable, but this was not considered necessary in a small operation.

3. Banana Chip Production Area.

The 300 pound per hour frying line requires a space of about 6' wide x 85' in length to accomodate the various pieces of equipment needed for this line. Sufficient space has been allowed around the equipment to permit movement of personnel and product.

If banana ripening rooms are to be used, they can be placed outside of the processing area with space for the washing and peeling line. However in any case the washing and peeling section should be separated from the frying room .

4. Quality Control Laboratory.

A small 14' x 15' laboratory is necessary for quality control and should be large enough to conduct any tests that may be needed to insure that the finished products meet the clients specifications.

5. Sugar Storage.

A separate sugar storage area has been included near the area where it will be used.

6. Boiler Room.

The boiler will be housed in an area adjacent to the cabinet dryer to provide steam with a minimum of distance between the units. The boiler fuel tank is in an open area between the boiler room and sugar storage area.

7. Machine Shop.

A small machine shop is needed to repair and maintain plant equipment in good operating shape. It is next to the boiler room to allow the mechanic to supervise the boiler operation.

8. Warehouse.

A 33' long x 24' wide warehouse has been designed to store incoming materials such as packaging and finished product, prior to shipment. This section should be large enough to accomodate all of the plants requiremnts.

9. Office.

The office space is 30' x 34' and is sufficient for the number of people that will be needed to supervise the operation

10 and 11. Women's and Men's Dressing Rooms.

A 16' x 14' and a 8' x 16' area has been allocated for the women's and men's dressing rooms. This should be sufficient to meet the requirements of the plant personnel.

SUMMARY OF ESTIMATED SALES AND PRODUCTION COSTS.

	Price US$	1st Year Volume lbs	1st Year Sales US$	2nd Year Volume lbs	2nd Year Sales US$	3rd Year Volume lbs	3rd Year Sales US$	4th Year Volume lbs	4th Year Sales US$
I. SALES VOLUME.									
A. Papaya	0.77	-------	-------	150,000	115,500	225,000	173,250	249,000	191,700
B. Pineapple	0.86	375,000	322,500	375,000	322,500	500,000	430,000	625,000	537,500
C. Banana Chips	0.87	400,000	348,000	600,000	522,000	900,000	783,000	1,200,000	1,044,000
TOTAL SALES		775,000	670,500	1,125,000	960,000	1,625,000	1,386,250	2,074,000	1,773,200
II. PRODUCTION COSTS.									
A. RAW MATERIAL.									
1. Papaya	60/MT	---	------		5,700		8,600		9,500
2. Pineapple	90/MT		27,900		27,900		37,200		46,500
3. Bananas	36/MT		42,950		64,420		96,530		128,850
Sub-Total			70,850		98,020		142,430		184,850
B. INGREDIENTS.									
1. Sugar	0.246		87,050		121,450		168,010		202,420
2. Sodium Metabisulphate			320		450		620		750
3. Potassium Sorbate			150		210		290		350
4. Coconut Oil	0.65		81,380		122,070		183,100		244,140
Sub-total			168,900		244,180		352,020		447,660
C. DIRECT LABOR.			34,380		50,520		74,130		96,350
D. UTILITIES.			76,900		109,800		156,600		195,700
E. PACKAGING.			36,700		53,900		74,900		102,350
F. ADMINISTRATION/SALES.			78,950		86,900		111,470		134,180
G. MAINTENANCE.			32,240		32,240		32,240		32,240
H. DEPRECIATION.			119,300		119,300		119,300		119,300
I. LONG TERM INTEREST.			129,600		129,600		129,600		116,640
J. AMMORTIZATION.			32,330		32,330		32,330		32,330
K. TAXES.			------		------		------		-------
L. LOAN REPAYMENT.			------		------		------		108,000
TOTAL PRODUCTION COSTS.			780,150		956,790		1,225,020		1,569,600
PROFIT OR LOSS.									
GROSS SALES.			670,500		960,000		1,386,250		1,773,200
LESS PRODUCTION COSTS.			780,150		956,790		1,225,020		1,569,600
ESTIMATED PROFIT OR LOSS			(119,650)		3,210		161,230		203,600
RETURN OF CAPITAL INVESTMENT			------		0.44%		23.39%		28.27%

VI. ESTIMATED PRODUCTION COSTS.

A. Raw Material Costs.

The amount of waste for the raw materials to be consumed at the plant have been estimated based on the follwing information:

Fruit	Refuse	Waste Materials	Water
Bananas - Good Quality	32%	Skin	75.7%
Bananas - Fair Quality	45%	Skin & Defects	75.7%
Papaya -	33%	Skin & Seed	88.7%
Pineapple -	48%	Crown, Core, Parings Defects	85.0%

Source: Composition of Foods, Agricultural Handbook # 8, USDA.

In selecting the osmotic drying process the data used was obtained from a successful pineapple dehydration plant in New Zealand. The estimated yield of finished product was 55% of the raw fruit weight which is greater than the clean peeled pineapple because of the added weight of sugar that the fruit picks up.

In planning the production rate for the cabinet drier, the limiting factors are the load of sugared fruit per cart and the drying time required to each the 14-18% moisture content of the clients specifications. A load factor of 1.5lbs/sq.ft of tray was used and as the tray measure 3' x 2' or 6 sq.ft, the load per tray would be 9 lbs. 40 trays are loaded onto a truck and there are 9 trucks per cabinet, therefore the capacity of the drier is 3,240 lbs. An operating efficiency of 85% was used since it is impossible for a plant to operate at 100% of its rated capacity, therefore the volume of fruit per drier was calculated at 2,754 lbs/load.

1. Papaya.

Based on the cabinet drying capacity of 2,754 lbs/load, the volume of raw fruit required at a yield of 67% would be 4,110 pounds or 1,864 kilos times US$ 60/MT represents a cost of US$ 111.84 per day rounded out to US$ 111.90.

The plant will start processing papaya during the second year of operation and to meet the projected sales volume, the plant would work the following number of days:

2nd. year 51 days/year x US$ 111.90 cost/day = US$ 5,706
3rd. year 77 days/year x US$ 111.90 cost/day = US$ 8,616
4th. year 85 days/year x US$ 111.90 cost/day = US$ 9,511

In the cost analysis these figures have been rounded out.

2. Pineapple.

Using the same method of calculating the pineapple requirements with a yield of 52% from raw fruit, the plant would need 5,296 pounds of fruit or 2,402 kilos of fruit per day. The price per ton of pineapple is US$ 90/MT, therefore the cost of fruit per day would be US$ 216.18.

In order to meet the anticipated sales volume the plant would operate the following number of days on pineapple:

1st. year 129 days/year x US$ 216.19/day = US$ 27,887
2nd. year 129 days/year x US$ 216.19/day = US$ 27,887
3rd. year 172 days/year x US$ 216.19/day = US$ 32,182
4th. year 215 days/year x US$ 216.19/day = US$ 46,479

The figures have also been rounded out in the cost analysis.

3. Bananas.

The yields for bananas can vary from a ratio of 6.45 to 1 according to the USDA or 5 to 1 from data obtained from Food Machinery Corporation. In order to be conservative, the higher figure has been used in this study.

The production line will produce 300 pounds of finished product per hour which multiplied by the above ratio represents 1,935 pounds of raw fruit/hour at 85% efficiency = 1,644 pounds per hour x 8 hours = 13,152 pounds per day or 5,965 kilos/day. The cost of bananas is US$ 36/MT, therefore the raw fruit cost per day would be US$ 214,74.

In order to meet the projected sales volume, the following production schedule was used:

1st. year 400,000/Lbs = 200 days x US$ 214.74/day = US$ 42,948
2nd. year 600,000/Lbs = 300 days x US$ 214.74/day = US$ 64,420
3rd. year 900,000/Lbs = 450 days x US$ 214.74/day = US$ 96,630
4th year 1,200,000/Lbs= 600 days x US$ 214,74/day = US$ 128,850

B. INGREDIENTS.

The basic ingredients for the plant are sugar, sodium metabisulphite and potassium sorbate for bananas, papaya and pineapple and coconut oil for the banana chips. The sugar price in Honduras is US$ 0.245/ Lb and the prices obtained in the United States for sodium metabisulphite was US$ 0.45/Lb,and for potassium sorbate US$ 3.20/Lb, both in 100 pound quantities. In order to obtain a CIF price, 33% was added to the FOB price. The cost for coconut oil in Honduras was estimated at US$ 0.65/Lb

1. Sugar.

The amount of sugar required per day is 2,754/Lbs. using a 1 to

1 ratio. 2,754/Lbs sugar x US$ 0.245 = US$ 674.73.

1st. year US$ 674.73/day x 129 days/year = US$ 87,040
2nd. year US$ 674.73/day x 180 days/year = US$ 121,451
3rd. year US$ 674.73/day x 249 days/year = US$ 168,005
4th. year US$ 674.73/day x 300 days/year = US$ 202,419

2. Sodium Metabisulphite.

The requirement for sodium metabisulphite is 1,500 ppm or 0.15% by weight or 4.13 Lbs/day x US$ 0.60/Lb.= US$ 2.48/day

1st. year US$ 2.48/day x 129 days/year = US$ 320
2nd. year US$ 2.48/day x 180 days/year = US$ 446
3rd. year US$ 2.48/day x 249 days/year = US$ 618
4th. year US$ 2.48/day x 300 days/year = US$ 744

3. Potassium Sorbate.

The amount of potassium sorbate used is 100 ppm or 0.01% by weight or 0.2754 Lbs/day x US$ 4.25/Lb = US$ 1.17/day.

1st. year US$ 1.17/day x 129 days/year = US$ 150.93
2nd. year US$ 1.17/day x 180 days/year = US$ 210.93
3rd. year US$ 1.17/day x 249 days/year = US$ 291.33
4th. year US$ 1.17/day x 300 days/year = US$ 351.00

4. Coconut Oil.

The volume of coconut oil used in frying banana chips is about 31.3% of finished product weight. The price for coconut oil in Honduras is US$ 0.65/Lb or about US$ 0.20/Lb higher than in the United States.

1st. year 400,000 Lbs x 31.3% = 125,200 Lbs/oil x US$ 0.65/Lb
= US$ 81,380
2nd. year 600,000 Lbs x 31.3% = 187,800 Lbs/oil x US$ 0,65/Lb
= US$ 122,070
3rd. year 900,000 Lbs x 31.3% = 281,700 Lbs/oil x US$ 0.65/Lb
= US$ 183,105
4th. year 1.200,000 Lbs x 31.3% = 375,600 lbs/oil x US$ 0.65/Lb
= US$ 244,140

C.DIRECT LABOR.

It is difficult to estimate the amount of direct labor needed in a plant as the workers efficiencies vary from country to country. The labor force for the plant in Honduras has been analyzed according to the tasks that must be performed and the number of people allocated to each of the major operations.

The crew for the papaya and pineapple line has been estimated at 2 skilled workers, 1 unskilled worker, 8 women and 1 supervisor.

Based on a rate of US$ 112.50 per month for unskilled labor, US$ 0.75 per hour for skilled labor and US$ 1.15 per hour for the supervisors, plus a 13th month salary bonus and 17% social benefits, the annual labor costs per day would be US$ 78.15. The direct labor costs for the papaya and pineapple operation has been calculated as follows:

1st. year 129 days/year x US$ 78.15 = US$ 10,080
2nd. year 180 days/year x US$ 78.15 = US$ 14,070
3rd. year 249 days/year x US$ 78.15 = US$ 19,459
4th. year 300 days/year x US$ 78.15 = US$ 23,445

The crew for the banana chip line has been estimated at 20 workers and a supervisor, broken down in the following manner:

Receiving and storage of raw fruit	2 men
Destemming	1 man
Peeling	11 women
Feeding the banana slicer	1 man
1st operation fryer & cooler	1 man*
2nd operation fryer & cooler	1 man*
Final inspection	2 women
Packaging	1 man
Supervision	1 man
TOTAL DIRECT LABOR	21 people

* Skilled Labor

Using the pay formula mentioned above, the daily cost for direct labor would be US$ 121.51 and the annual cost as outlined below:

1st. year 200 days/year x US$ 121.51/day = US$ 24,302
2nd. year 300 days/year x US$ 121.51/day = US$ 36,453
3rd. year 450 days/year x US$ 121.51/day = US$ 54,670
4th. year 600 days/year x US$ 121.51/day = US$ 72,906

D. UTILITIES.

1. Fuel and Diesel Oil.

Boiler.

Two boilers have been suggested for the plant, a 100 HP boiler for the dehydration plant and a 30 HP boiler for the banana chip operation to be used primarily for clean up and to supply additional capacity for the dehydration unit. The large boiler will use Bunker C fuel or similar heavy oil, while the smaller boiler will use light oil or diesel oil.

The large boiler consumes 42 gallons of fuel/hour and will opperate 16 hours/day. Fuel consumption will therefore be 448 gallons/ at a cost of US$ 0.68/gallon = US$ 304.64/day. The small boiler consumes 9 gallons of diesel fuel/hour and will

operate about 3 hours/day so consumption would be 27 gallons/day at a cost of US$ 1.20/gallon = US$ 32.40/day.

The banana chip line requires 1,200,000 BTU/hour and diesel fuel provides 140,000 BTU/hour, consequently the line uses 8.57 gallons/hour. During an 8 hour day consumption would be 68.56 gallons at a price of US$ 1.20/gal, fuel costs would be US$ 82.27/day.

The annual costs for fuel would be the following:

1. Large boiler operating 16 hours/day.

   1st. year 129 days/year x US$ 304.64/day = US$ 39,300
   2nd. year 180 days/year x US$ 304.64/day = US$ 54,835
   3rd. year 249 days/year x US$ 304.64/day = US$ 75,855
   4th. year 300 days/year x US$ 304.64/day = US$ 91.392

2. Small boiler and banana chip line.

   1st. year 200 days/year x US$ 114.67/day = US$ 22,934
   2nd. year 300 days/year x US$ 114.67/day = US$ 34,401
   3rd. year 450 days/year x US$ 114.67/day = US$ 51,601
   4th. year 600 days/year x US$ 114.67/day = US$ 68,802

Electricity.

The cost per kilowatt hour in Honduras is US$ 0.085. The dehydration lines equipment uses relatively small motors most of them under 2 HP, so the daily consumption of electricity for this section of the plant has been calculated at about 184.93 KWH/16 hour day x US$ 0.085/KWH = US$ 15.72/day.

The fryer uses a total a 60 HP and the motors for the washing, peeling and boiler are estimated at 25 HP, for a total of 85 HP, that is equal to 63.4/KWH or 507/KWH during an eight hour shift. The cost per shift would therefore be US$ 43.00/day.

The annual costs for electricty are estimated as follows:

1. Dehydration line.

   1st. year 129 days/year x US$ 15.72 = US$ 2,208
   2nd. year 180 days/year x US$ 15.72 = US$ 2,830
   3rd. year 249 days/year x US$ 15.72 = US$ 3,915
   4th. year 300 days/year x US$ 15.72 = US$ 4,716

2. Banana chip line.

   1st. year 200 days/year x US$ 43.00 = US$ 8,600
   2nd. year 300 days/year x US$ 43.00 = US$ 12,900
   3rd. year 450 days/year x US$ 43.00 = US$ 19,350
   4th. year 600 days/year x US$ 43.00 = US$ 25,800

Gasoline.

The plant would have a four wheel drive jeep or similar vehicle and a 3/4 ton pick-up for general use. It is estimated that these vehicles would get about 20 miles/gallon and each will operate 12,000 miles/ year. The price of gasolene in Honduras is US$ 1.98/ gallon, so the annual consumption would be US$ 2,400.

Water.

Water consumption has been estimated 40 cubic meters per day at a rate of US$ 0.25/cubic meter or US$ 10.00/day.

ESTIMATED ANNUAL UTILITY COSTS.

Description	1st Year US$	2nd Year US$	3rd Year US$	4th Year US$
Boiler - Fuel Oil	39,300	54,835	75,855	91,392
Banana line - Diesel Oil	22,934	34,401	51,601	68,802
Electricity Dehydration line	2,208	2,830	3,915	4,716
Electricity Banana Line	8,600	12,900	19,350	25,800
Gasoline	2,400	2,400	2,400	2,400
Water	1,650	2,400	3,500	4,500
TOTAL ANNUAL COST	76,912	109,766	156,621	195,710

E. PACKAGING.

Packaging specifications vary according to each buyers requirements as shown in the following chart:

1. General Foods.

   Pineapple Dices - 4 11/lb poly bags in a 250# test carton
   Banana Chips - 1 double poly bag holding 20/lbs in a 250# test carton.

2. Bonner Packing Company.

   Papaya Dices - 10/lb poly bag in a carton
   Papaya Dices - 30/lb poly bag in a carton
   Papaya Chunks - 25/lb poly bag in a carton
   Papaya Chunks - 44/lb poly bag in a carton
   Pineapple Chunks- 25/lb poly bag in a carton

3. Cade-Grayson.

   Papaya - 50/lb poly bag in a carton
   Pineapple - 50/lb poly bag in a carton

4. Nabisco Brands.

No weight specified packed for poly bags in cartons.

The above differences made it difficult to select a poly bag and carton that would meet all of the specifications, therefore an average weigth of 28/lbs per poly bag was used for papaya and pineapple and 20/lbs per poly bag for banana chips. All over packed in a corrugated shipping case. The estimated cost per package that was used in this report was US$ 0.75/poly bag and US$ 0.50 per carton for a total of US$ 1.25/package.

ESTIMATED PACKAGING COSTS.

Product	1st year		2nd Year		3rd Year		4th Year	
	Packages	Cost US$	Packages	Cost US$	Packages	Cost US$	Packages	Cost US$
Pineapple-Papaya	9,375	11,718	13,125	16,406	18,125	22,656	21,870	27,337
Banana Chips	20,000	25,000	30,000	37,500	45,000	52,250	60,000	75,000
TOTAL		36,718		53,906		74,906		102,337

F.ADMINISTRATION & SALES.

The permanent staff will start out the first year with 7 people and by the fourth year grow to 9 people. Salaries were started at a minimum level the first year because of the limited sales volume and increased annually until they reached an acceptable range for the different skills required in management personnel.

The major responsibilities are held by the Manager, Accountant, Quality Control Supervisor and Fieldman. When the second shifts are started during the third and fourth years, additional people will be required to supervise these operations.

As this is a small plant the members of the management staff will have to assume dual roles, that is the Manager should also be responsible for sales, the Quality Control Supervisor would be in charge of production and the Fieldman would work with raw material suppliers to coordinate the flow of fruit to the plant. The latter may also be given additional plant supervisory duties once the raw material problems have been taken care of.

The following chart shows the planned adminstration staff and annual salaries:

ADMINISTRATION STAFF AND SALARIES.

Title	1st Year		2nd Year		3rd Year		4th Year	
	No.	Salary US$	No.	Salary US$	No.	Salary US$	No.	Salary US$
Manager	1	19,500	1	23,400	1	27,300	1	32,500
Accountant	1	9,750	1	9,750	1	9,750	1	9,750

Secretary	1	3,900	1	3,900	1	3,900	1	3,900
Conserje	1	1,625	1	1,625	1	1,625	1	1,625
Quality Con.	1	13,000	1	13,000	1	16,250	1	19,500
Lab.Asst.	-	------	-	------	1	7,800	1	7,800
Fieldman	1	13,000	1	13,000	1	16,150	1	19,500
Mechanic	1	7,800	1	7,800	1	7,800	1	7,800
Asst.Mech.	-	------	-	------	1	5,200	1	5,200
TOTAL	7	68,575	7	72,475	9	90,675	9	107,575

Sales and administrative expenses were calculated at 1 1/2% of sales during the four year period

TOTAL SALES AND ADMINSTRATIVE EXPENSES.

	1st Year	2nd Year	3rd Year	4th Year
Sales	US$ 670,500	US$ 960,000	US$ 1,386,250	US$ 1,773,200
Sales & Admin.Exp.	US$ 10,375	US$ 14,400	US$ 20,794	US$ 26,608
Admin. Salaries.	68,575	72,475	90,675	107,575
TOTAL	US$ 78,950	US$ 86,875	US$ 111,469	US$ 134,183

Technical assistance will be an important factor during the start-up period and in the first and second year operations to train local personnel in production methods and quality control standards. A minimum program would be 25 man/days in Honduras with a cost of about US$ 16,000 the first year and 10 days the second year at a cost of about US$ 7,000. This program has not been included in the cost analysis as funding for this type of service may be obtained from outside sources.

G.MAINTENANCE.

Proper maintenance of the processing machinery and equipment is a very important factor in plant operations. This should include a daily, weekly and monthly schedule of preventive maintenance, in addition to an annual overhaul of all the equipment.
The following chart shows the budget which has been allocated to cover these expenses:

ESTIMATED ANNUAL MAINTENANCE EXPENSES.

Description	Value US$	Amount	Annual Budget
Site and Buildings	266,650	1%	US$ 2,666
Production Equipment	1,015,800	3%	30,474
Automotive Equipment	22,000	5%	1,100
TOTAL ANNUAL BUDGET	1,304,450		34,240

H. DEPRECIATION.

Depreciation is a needed expense as it allocates funds for future equipment and building replacements. The following chart shows the amounts charged to the depreciation account:

ANNUAL DEPRECIATION EXPENSES.

Description	Value US$	Period	Amount	Annual Budget
Buildings & Roads	266,650	20 years	5%	US$ 13,332
Plant Equipment	1,015,800	10 years	10%	101,580
Automotive Equipment	22,000	5 years	20%	4,400
TOTAL ANNUAL BUDGET	1,304,450			US$ 119,312

I. INTEREST EXPENSE.

A long term loan of US$ 1,080,000 has been considered as a part of the financial package for the project. This loan would carry a 12% interest rate, a 10 year repayment program with three years of grace to allow the company to start making a profit before having to repay the loan.

The annual interest on US$ 1,080,000 at 12% would be US$ 129,600.

J. AMORTIZATION SCHEDULE.

This account covers items that will require funding before the plant starts operations and should be amortized over a period of years. The following chart shows the planned annual amortization charges:

AMORTIZATION SCHEDULE.

Description	Value US$	Period	Amount	Annual Cost
Equipment Installation	144,600	10 Years	10%	US$ 14,460
Organizational Expenses	33,000	10 years	10%	3,300
Miscellaneous Expenses	145,700	10 years	10%	14,570
TOTAL ANNUAL BUDGET	323,300			32,330

K. TAXES.

Honduran tax schedules are complicated, therefore to avoid errors, it is suggested that these be calculated locally.

L. LOAN REPAYMENT SCHEDULE AND INTEREST.

The following chart shows repayment of the US$ 1,080,000 long term loan used in the study and an annual interest rate of 12% on the declining balance:

LOAN REPAYMENT SCHEDULE AND INTEREST PAYMENTS.

Number of Years	Declining Loan Balance US$	Loan Repayment	Interest Payments US$
1	1,080,000	------	129,600
2	1,080,000	------	129,600
3	1,080,000	------	129,600
4	1,080,000	108,000	116,640
5	972,000	108,000	103,680
6	864,000	108,000	90,720
7	756,000	108,000	77,760
8	648,000	108,000	64,800
9	540,000	108,000	51,840
10	432,000	108,000	38,880
11	324,000	108,000	25,920
12	216,000	108,000	12,960
13	108,000	108,000	------
TOTAL REPAYMENTS AND INTEREST		1,080,000	972,000

M. WORKING CAPITAL.

The major working capital needs are to finance imported ingredients and packaging, accounts receivable and inventory. The following chart show the estimated working capital that might be required for both lines during the first year of operation.

ESTIMATED WORKING CAPITAL REQUIREMENTS.

Description	Time	Value US$	Amount US$
1. Raw Materials	1 month	70,850	5,904
2. Ingredients	2 months	168,900	28,150
3. Direct Labor	1 month	34,382	2,865
4. Utilities	1 month	76,900	6,408
5. Packaging	2 months	36,700	6,116
6. Administration	1 month	78,950	6,579
7. Accounts Receivable and Inventory	2 months	670,500	117,750
TOTAL ESTIMATED WORKING CAPITAL REQUIREMENTS			173,772

Payment of the accounts recivable will depend on the sales contracts with the buyers and this can be negotiated to keep the collection time at a minimum. Most importers will not purchase under a letter of credit, but some will advance a part of the value against documents and the balance within 30 days.

SUMMARY OF INVESTMENT COSTS.

INVESTMENT	L$ Cost	US$ Costs	%
1. Land	5,000	2,500	.01
2. Buildings	531,300	265,650	14.60
3. Roads	2,000	1,000	.05
4. Processing Equipment		988,800	54.93
5. Office Equipment		8,000	.44
6. Laboratory Equipment		10,000	.55
7. Machine Shop		9,000	.50
8. Vehicles		22,000	1.22
9. Equipment Installation & Start-up		144,600	8.03
10. Organizational Expenses		33,000	1.83
11. Miscellaneous Expenses		145,700	8.10
SUB-TOTAL		1,630,250	90.44
12. Estimated Working Capital		169,750	9.43
TOTAL ESTIMATED CAPITAL REQUIREMENTS		**1,800,000**	**98.85**

SUGGESTED CAPITAL STRUCTURE:

Equity Capital	40%	720,000
Long Term Loan	60%	1,080,000
TOTAL CAPITAL INVESTMENT	**100%**	**1,800,000**

VII. DISCUSSION OF INVESTMENT COSTS.

1. LAND.

A manzana of land should be sufficient for the proposed buildings and road, with some room for future expansion. The cost for a manzana of land which measures 6,972m/2 according to the local investors would be L$ 5,000.

2. BUILDINGS.

The building space required for both units would be about 1,518 m/2. The estimated cost at US$ 175 m/2 would be US$ 265,650. The build- should have adequate light and ventilation. The doors and other openings should be protected with screens or air curtains to avoid insects enter the production areas.

3. ROADS.

The access road to the plant, parking spaces and necessary roads around the buildings have been estimated at L$ 6 per lineal meter by 4 meters wide. This figure seemsd low. therefore roads have been estimated at US$ 1,000.

4. PROCESSING EQUIPMENT.

The estimated CIF costs for the two processing lines and boilers is US$ 988,800. Detailed costs are shown in the following section.

5. OFFICE EQUIPMENT.

The equipment needed for the offices are the usual typewriters, calculating machines, possibly a computer with word processing capabilities and furniture. An amount of US$ 8,000 has been allocated to cover these expenses.

6. LABORATORY EQUIPMENT.

The plant should have a small quality control laboratory to insure that the products meet the clients specifications. An amount of US$ 10,000 has been budgeted for the necessary equipment.

7. MACHINE SHOP.

The plant should have a machine shop to take care of maintenance and light repair work. The equipment should include hand tools, vises, welding equipment and a small lathe. US$ 9,000 should cover the cost of the shop.

8. VEHICLES.

A four wheel drive jeep or similar unit is suggested for the fieldman's use in visiting the raw material procurement areas. A 3/4 ton pick-up truck should be available for general work

around the plant and in La Ceiba to handle the normal demands of a plant.

9. EQUIPMENT INSTALLATION AND START-UP.

The equipment for the dehydration section is not complicated except for the drying cabinet and boiler, consequently foreign technicians may be required to install these units.The banana chip line is more difficult to install and to start operating so it is recommended that the supplier send an equipment engineer to supervise this installation. An amount of US$ 144,600 has allocated for this expense.

10. ORGANZATIONAL EXPENSES.

The section covers a variety of costs such as legal advice in forming the company,possibly a feasibility study or engineering drawings of the plant and some salaries prior to starting operations. An amount of US# 33,000 has been budgeted for these espenses.

11. MISCELLANEOUS EXPENSES.

There are always unforseen expenses in starting a new venture, so an amount of US$ 145,700 has been budgeted for these costs.

12. WORKING CAPITAL.

The working capital requirements were extimated at US$ 173,772, however in order meet the US$ 1,800,000 capital investment, an amount of US$ 169,750 was used.

RECOMMENDED EQUIPMENT LIST FOR THE HONDURAN DEHYDRTION AND BANANA CHIP PLANT.

DESCRIPTION.	PRICE F.O.B. PLANT U.S.A.
A. DEHYDRATION EQUIPMENT.	
1. Robbins Soak Tank Washer with extended discharge equipped with a 24" x 1" x1" mesh galvanized wire conveyor belt, water sprays on the discharge section, 3/4 HP motor.	US$ 6,000
2. Robbins Peeling and Trimming Conveyor, 30" wide x 12" long, stainless steel product contact parts, white food grade belt and hi-density polypropylene removable cutting boards, 9' long on each side of the conveyor. 1 HP gearhead motor drive.	10,500
3. Robbins Waste Conveyor, 24" wide x 30' long, 1 HP motor gearhead motor.	4,000
4. Robbins Bucket Waste Elevator with receiving hopper, 24" wide x 16 1/2 high, 2 HP gearhead motor drive.	6,000
5. Waste Bin with gate dumper. To be manufactured in Honduras.	-----
6. Robbins Inspection Conveyor, 24" wide x 6' long, with stainless steel product contact parts, white food grade belt, mild steel frame. 1/2 HP gearhead motor drive.	5,500
7. Robbins Hot Water Rotary Blancher and cooler, sized to blanch 2,916 Lbs of raw product, 3 minutes at 90 degrees C, then cool the product rapidly.	19,000
8. Urschel Model G Dicer, equipped for dicing, strip cutting and slicing papaya and pineapple. Complete with stainless steel product contact parts, 2 HP totally enclosed motor and standard spare parts.	24,000
9. Two Lee Stainless Steel Mixing Tanks, 400 gallon capacity, jacketed to be used with hot water, including a removable agitator. Price each US$ 11,600.	23,200
10. Two Lee Syrup Stainless Steel Mixing Tanks, one with a capacity of 100 gallons the other 250 gallons, steam heated, with agitators.	23,400
11. Elliott Semi-Automatic Pineapple Sizer and Corer, with two sizing and coring tubes, V block hand	

centering device. 1 1/2 HP motor and drive.	15,350
12. Elliott Manual Tidbit and Spear Cutter, for two sizes of pineapple.	8,800
13, Robbins Steel Roller Conveyor for loading and unloading fruit trays, 30" wide x 18' long.	4,000
14. One Sargent Nine Truck Cabinet Drier, 15'6" deep x 12'6" wide x 8' high, to dry approximately 3,200 Lbs of 65 degree Brix fruit in a 16 hour cycle. Complete with 9 carts, 5' deep x 2 1/2" wide x 5' High, and 360 product trays.	80,000
15, An additional 9 trucks with 360 product trays.	45,000
16. Robbins Inspection Conveyor, 24" wide x 12' long, stainless steel product contact parts, with white food grade belt. 1/2 gearhead motor.	9,000
17. Two scales, one a portable Platform Beam Scale to be used on the receiving platform and the other a bean type Bench Scale for weighing cartons with finished product.	3,500
18. One Clamco Bag Sealer, manually operated, to seal the polyethylene bags.	1,250
19. Manual Carton Sealer to tape the cartons.	500
20. One Cleaver Brooks Model CB-100 High Pressure Steam Boiler, rated capacity 3,450 pounds steam/hr, complete with duplex boiler feed system, blowdown separator and chemical feed system. The Boiler is to operate on Bunker C fuel or heavy oil.	41,600
21. Two Waukesha Stainless Steel Centrifugal Pumps, 1 HP motor and base.	3,500
ESTIMATED COST OF THE DEHYDRATION EQUIPMENT	US$ 334,100
ESTIMATED COST OF BOXING AND FREIGHT TO HONDURAS	29,000
ESTIMATED COST C.I.F. HONDURAS/DEHYDRATION LINE	**US$ 363,100**
B. BANANA CHIP PROCESSING LINE.	
22. Robbins Soak Tank Washer, with extended discharge, equipped with a 24" x 1" x 1" mesh galvanized wire conveyor belt, water sprays on the discharge conveyor, mild steel construction. 3/4 HP gearhead motor.	6,000
23. Robbins Peeling and Trimming Conveyor, 36" wide	

x 12' long, mild steel contruction, food grade belt. 1 HP motor.	5,000
24. Robbins Peeling and Trimming Conveyor, 36" wide x 20' long, with two food grade belts, 10 trim chute, and hi-density polypropylene removable cutting boards, 20' long on each side, 5 HP motor.	15,500
25. Waste Material Screw Conveyor, 12" wide x 20' long. 1 HP motor.	7,000
26. Feed Conveyor and Hopper to supply peeled bananas to the chip line.	1,500
27. Heat and Control Banana Chip Frying Line, capacity 300 Lbs/Hr finished product. Consisting of an Urschel OV Slicer, First Stage Cooker and ambient air cooler, sugar dip, Second Stage Cooker and ambient air cooler and a tumble drum seasoning applicator. The line is complete with all necessary catch boxes, heat exchangers and filters. Diesel oil heating system and electrical motors with a total demand of 60 HP.	487,900
28. Robbins Inspection Conveyor with metal detector, 24" wide x 10' long. 1 HP motor.	10,500
28. Finished Product Packing Station consisting of a bench type scale, elevator and dump hopper. 2 HP motors required.	8,500
29. Cleaver Brooks Model CB-30 High Pressure Steam Boiler, rated capacity 1,035 Lbs/Steam/ hour, complete with duplex boiler feed system, blow-separator and chemical feed system.	23,100
ESTMATED COST OF THE BANANA CHIP LINE	565,000
ESTIMATED COSTS OF BOXING AND SHIPPING TO HONDURAS	60,700
ESTIMATED COST C.I.F. HONDURAS/ BANANA CHIPS	**625,700**
ESTIMATED COST FOR BOTH LINES C.I.F. HONDURAS	**988,800**

Robins Sanitary Inspection Conveyor

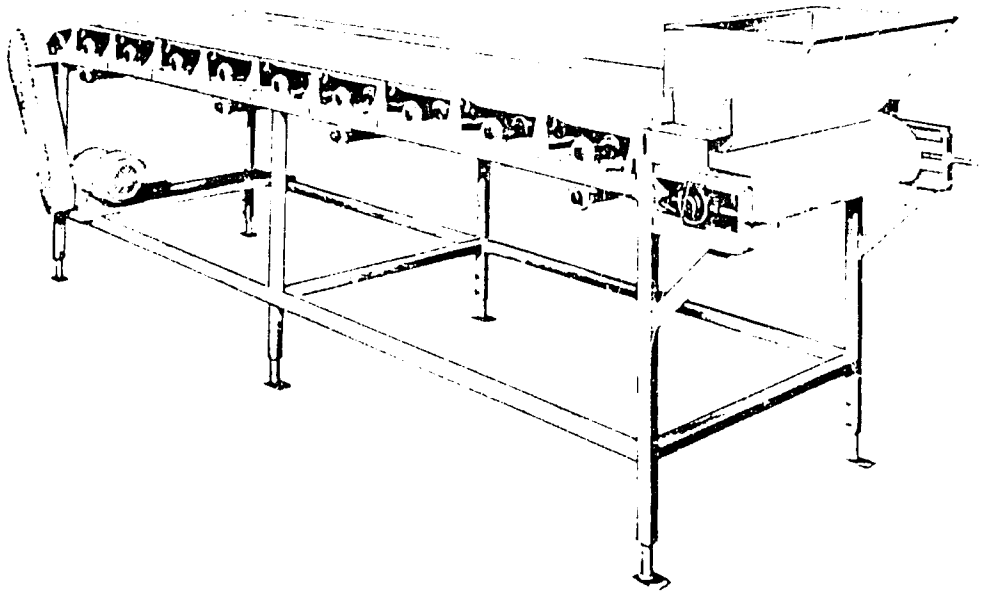


FIG. 1592-S

The Robins Sanitary Inspection Conveyor conveys fruit and vegetables on a continuous belt for inspection, sorting and trimming purposes. This Conveyor was designed with sanitation as its main objective.

This Inspection Conveyor is equipped with a specially designed troughing belt which allows the product that is being conveyed or inspected to touch no other material other than the sanitary Neoprene belt. Both the top and underside of the belt comes in contact with no other materials, other than Neoprene, nylon, or other rust preventive materials. The troughing rollers are of nylon, the belt conveyor rollers are of aluminum. Stainless steel side guards are provided which are removable without the use of any tools. The special troughing rollers insure complete alignment of the belt at all times.

This Inspection Conveyor can be built in any width up to 60" and length up to 100'. The frame is of tubular construction. All bearings are of the anti-friction type, self-aligning. Feed and discharge hoppers are of stainless steel materials.

SPECIFICATIONS

	10' Table 24" Width	20' Table 30" Width		10' Table 24" Width	20' Table 30" Width
Height Overall	32"	32"	Inspection Length	10'	10'
Length Overall	11'	11'	Height of Discharge	1' 9"	1' 9"
Width Overall, incl. Motor Drive	2' 8"	3' 2"	Power Required	½ H.P.	½ H.P.
Height of Belt	2' 6"	2' 6"	Approximate Weight	850 lbs.	950 lb.

A.K.Robins
AND COMPANY, INCORPORATED
713-729 EAST LOMBARD STREET
BALTIMORE, MARYLAND 21202 U.S.A.

33

Robins Soaker-Washer with Extension Discharge

FOR WASHING TOMATOES, BEETS, APPLES, TURNIPS, POTATOES, ETC.

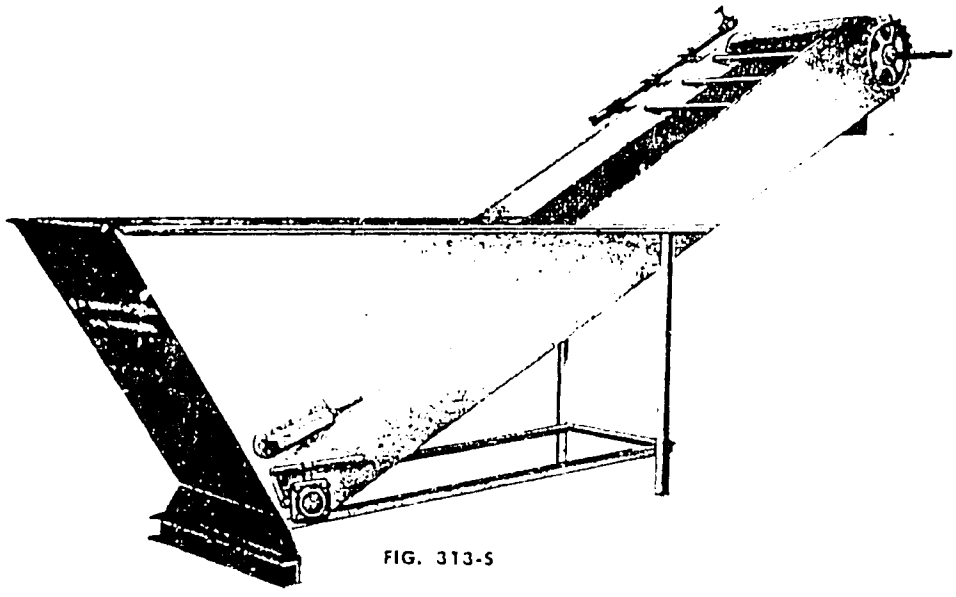


FIG. 313-S

[illegible] Robins Soaker-Washer with extension discharge is used when operating as a soaker tank. [illegible] being automatically discharged into the [illegible] Rotary Washer, the Robins Niagara Washer, [illegible]ins Paddle Washer, or other similar machines where the second or final wash is required, as in the manufacturing of tomato pulp, or washing stock of tomato juice, etc.

This machine can be furnished either with or without water sprays at top of discharge, although when using the machine in connection with a second washer, the water spray would not be necessary.

We show on this page, specifications of the standard type of Robins Soaker-Washers. Machines of larger size built to order.

SPECIFICATIONS

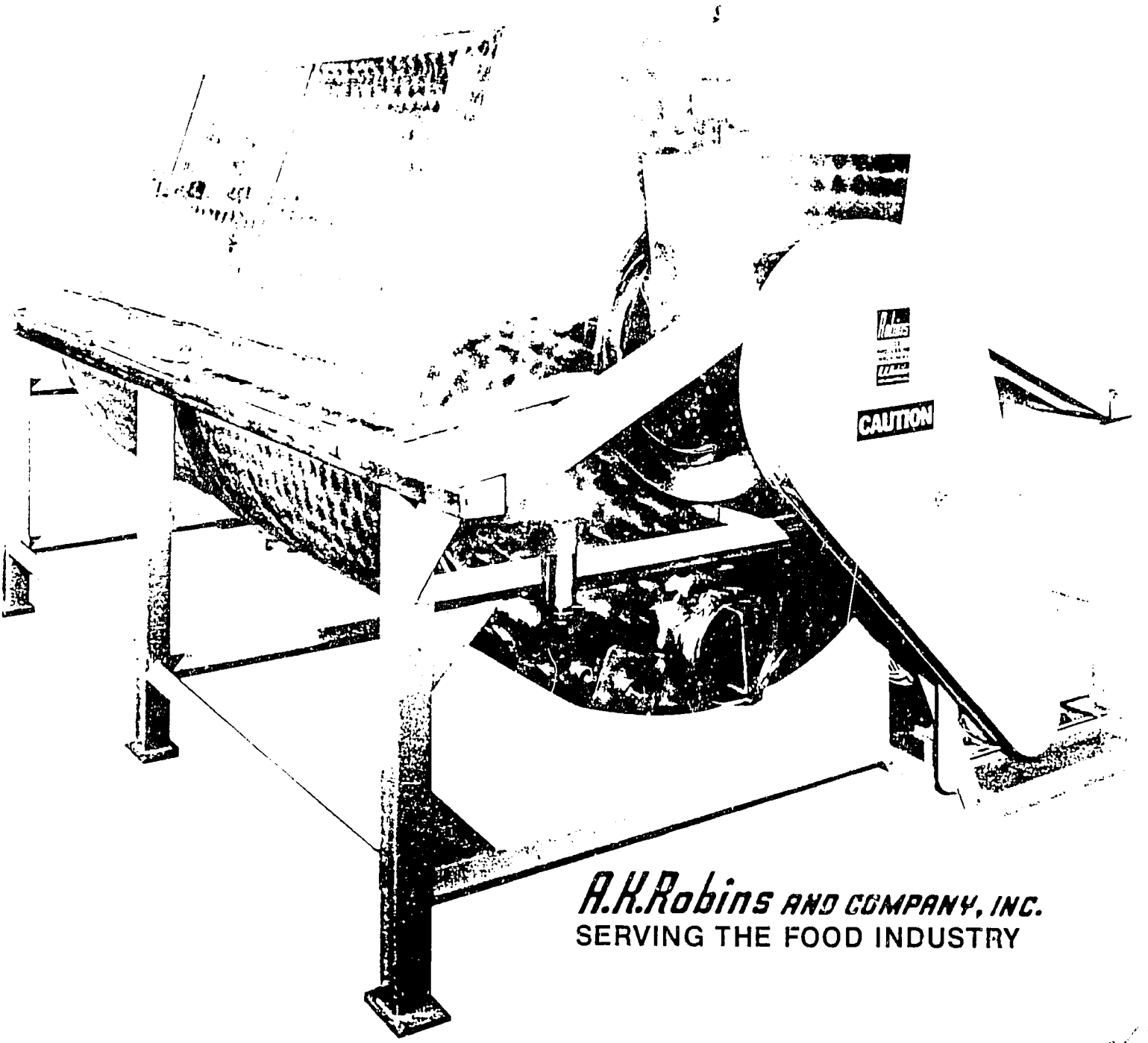
[illegible] extension to discharge into Robins Rotary Washer, Niagara washer or paddle washer on any standard type washer.

Height overall	6' 2"
Length overall	10' 4"
Width overall	3' "5
Height of tank feed end	3' 7"
Length of water bath	4' 8"
Height of discharge	5' 0"
Width of conveyor	24½"
Size of drain	3"
Size of overflow	2"
Size of water inlet	1¼"
Sprocket drive, No. 145 chain 27 teeth friction clutch speed	10 to 14 R.P.M.
Power required	1 H.P.
Capacity	10 tons per hour
Weight on skids	1250 lbs.
Crated for export	2050 lbs.

A.K.Robins
AND COMPANY, INCORPORATED
713-729 EAST LOMBARD STREET
BALTIMORE, MARYLAND · 21202 U.S.A.

Robins New Style Rotary Hot Water Blancher

A versatile, high capacity, uniform hot water treatment blancher that meets all sanitation recommendations of the NCA Blancher Sanitation Committee.



A.H.Robins AND COMPANY, INC.
SERVING THE FOOD INDUSTRY

35

The purpose of the Robins New Style Rotary Hot Water Blancher is to precook or blanch vegetables and similar products prior to canning or freezing.

Many food products require blanching to remove entrapped air, soften product tissue and to inactivate enzymes. This important step in the processing of food products preserves color and natural flavor and properly treats the product for uniform and adequate weights for filling.

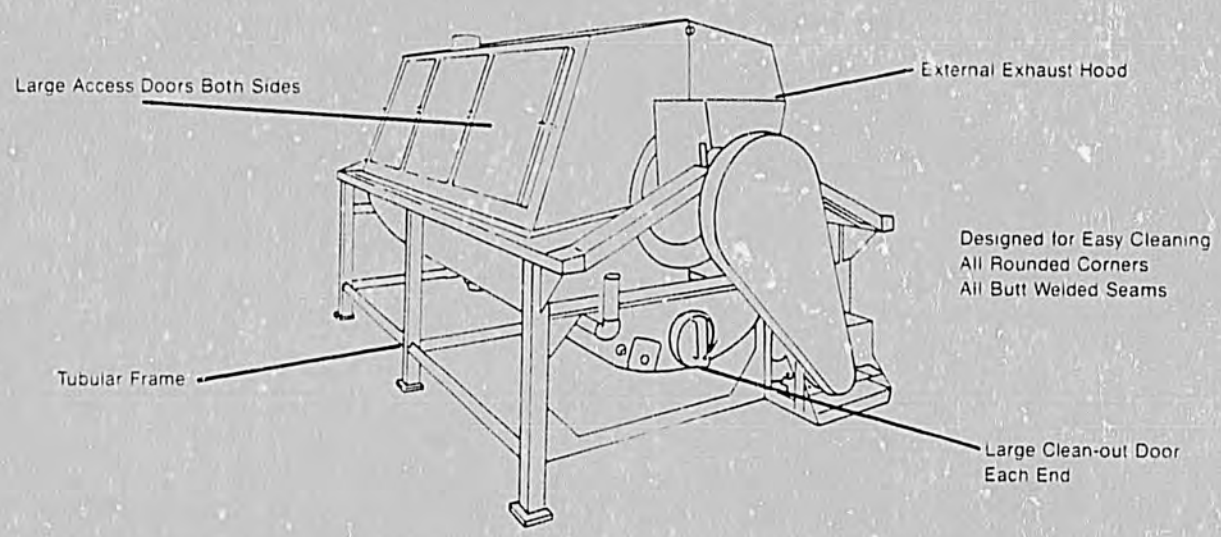
The Robins New Style Rotary Hot Water Blancher handles a wide variety of food products including green beans, peas, lima beans, southern peas, asparagus, beets, carrots, white potatoes, sweet potatoes, brussels sprouts, dry beans, rice and a wide range of pasta products, making it one of the most versatile blanchers on the market today.

The product to be blanched is fed into a gravity feed hopper that gently moves the product into the blanching drum where the product is conveyed through the length of the drum to the discharge. The blanching drum is equipped with a continuous spiral that accurately controls the residence time in the blancher. The blanching medium is held at a constant predetermined temperature by means of temperature control equipment. A vari-speed motor drive permits quick and easy change of time of the blanch.

Other innovative engineered Robins features include large clean-out doors and large access doors on each side of the unit for easier cleaning and inspection. The unit's fabrication includes rounded corners and ground and polished butt welded seams to eliminate cracks, crevices and other gaps where food products can lodge. At the end of the blanching cylinder are perforated discharge buckets that gently pick up, drain and discharge the product in an even flow.

The Robins New Style Rotary Hot Water Blancher gives you high capacity, greater sanitation, longer life, faster come up time, uniform and constant water temperature control and vari-speed for effective, efficient blanching without product damage.

See your Robins representative or contact Robins directly for more information, price and delivery.



Specifications: Robins New Style Rotary Hot Water Blancher

Model	A	B	C	D	E	F	G	H	I	K
Cylinder Diameter	40"	40"	40"	40"	40"	40"	48"	48"	48"	40"
Cylinder Length	11'-0"	13'-0"	13'-0"	18'-0"	8'-0"	8'-0"	8'-0"	18'-0"	13'-0"	15'-0"
Spiral Lead	12"	11"	7"	7"	8"	12"	14"	7"	10"	7½"
Overall Length	15'-1"	17'-1"	17'-1"	22'-1"	12'-1"	12'-1"	12'-1"	22'-1"	17'-1"	19'-1"
Horsepower Vari-drive	2	2	2	3	1	1	2	3	3	3

A.K.Robins AND COMPANY, INC.

Manufacturers of Food Processing Equipment Since 1855

713-729 E. Lombard St., Baltimore, Maryland 21202, U.S.A.

CONSULTING • DESIGNING • PLANT LAYOUT • MANUFACTURING • SERVICE

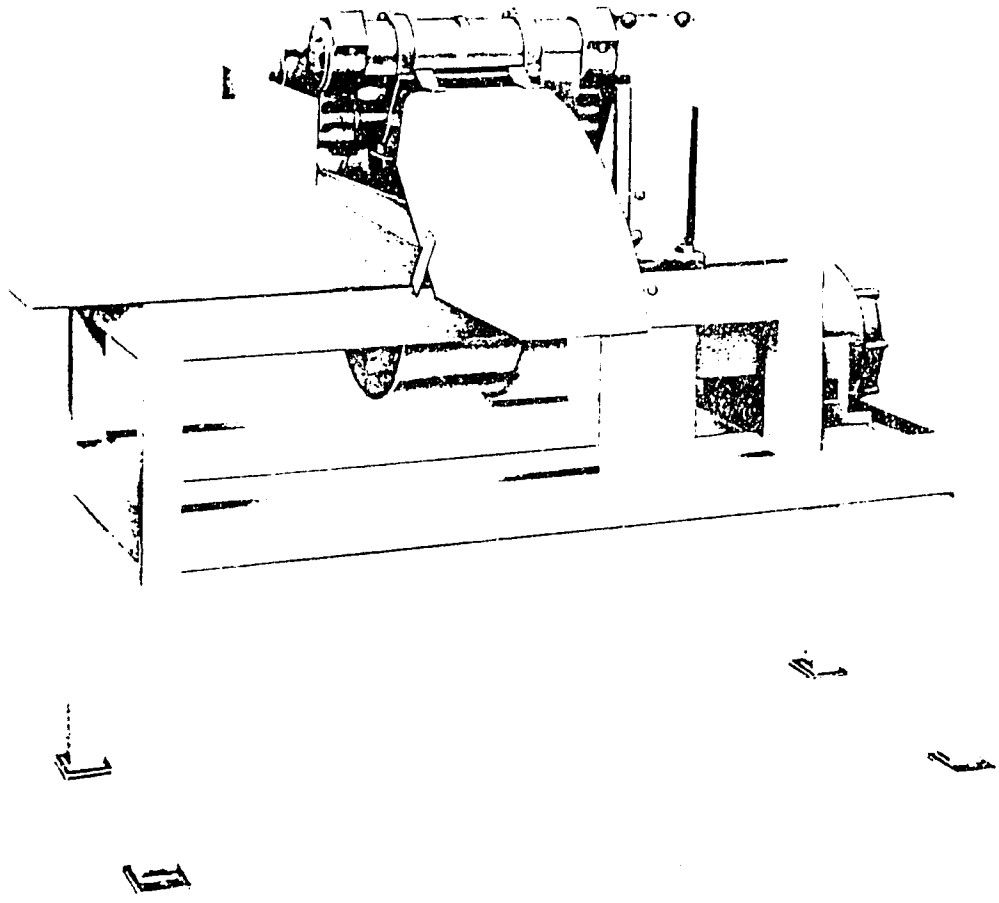
Robins FOOD MACHINERY

36

URSCHEL

MODEL G

DICER, STRIP CUTTER and SLICER



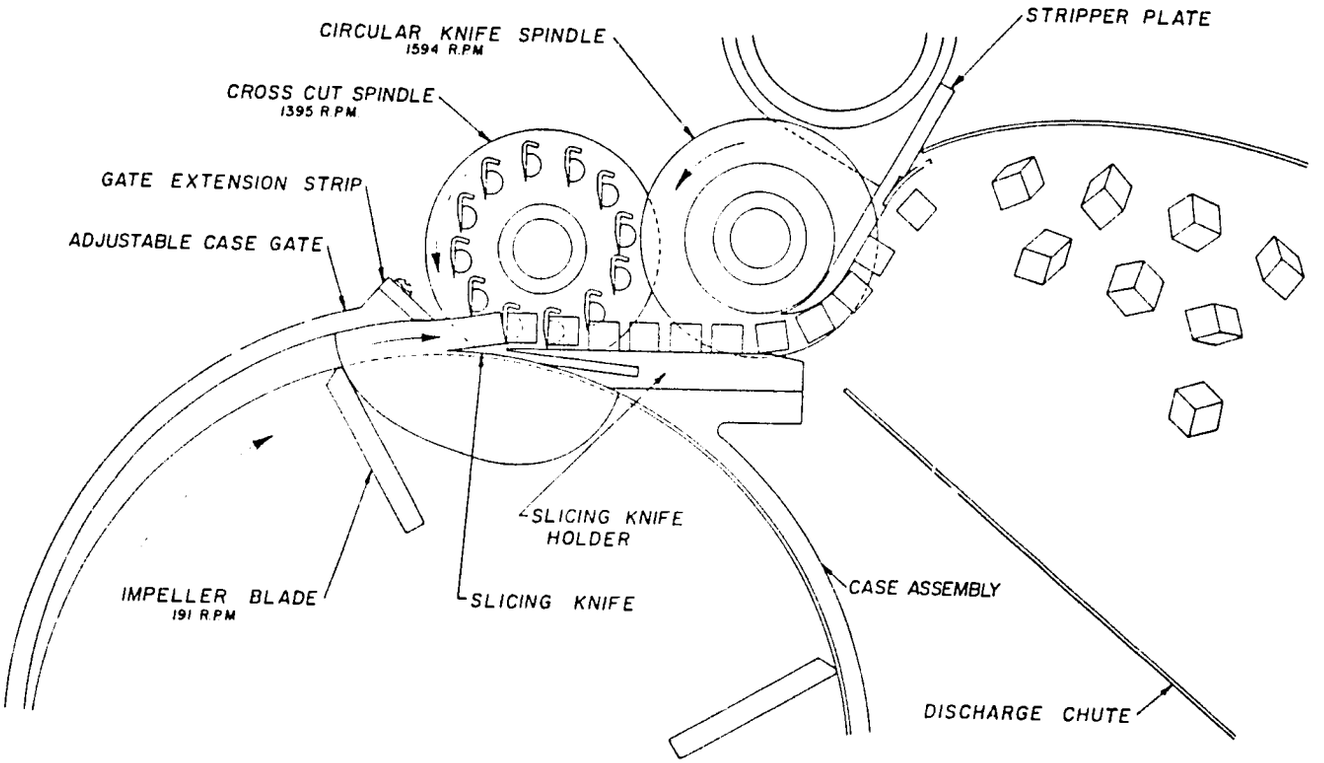
MANUFACTURED BY

URSCHEL LABORATORIES INCORPORATED

VALPARAISO, INDIANA 46383

manufacturers of precision, high-speed cutting equipment for food products

PRECISION HIGH-SPEED FOOD CUTTING EQUIPMENT



GENERAL INFORMATION

PURPOSE

The Urschel Model G Cutter is for the production of plain French fry cuts on potatoes, and dicing, strip cutting or slicing a wide variety of fruits and vegetables.

The Urschel Model GK, a similar machine, must be used if crinkle cuts are required. Design of the Model G impeller prevents use of the 13104 crinkle slicing knife, and the inner surface of the slicing shell does not contain grooves necessary to insure proper alignment of crinkles in each side of the slice.

The Model F Dicer operates in the same way as the Model G machine except it is limited to a single cube size of 3/8". The Model F will make 3/8" and 7/16" French fry cuts. The floor plan and elevation dimensions for the Model F are the same as those for the Model G.

The Model H Dicer operates in the same way as the Model G and is for making 3/4" cubes and for cutting pieces as large as 3/4" x 1-1/2" x 1-1/2".

None of the above machines when used as a slicer will make cross cuts or transverse cuts on elongated products such as pickles, carrots, celery, rhubarb or okra. These products should be sliced on a Model OV Transverse Slicer.

None of the above machines are suitable for the dicing of fibrous products, such as meats, as these should be diced on the Model L or Model SL Dicers.

Small cuts of pickles for relish and many other products should be cut on a Model RA Dicer.

Write for bulletin *"How to Cut Food Products on Urschel High Speed Cutting Equipment"* for more complete information.

DESCRIPTION

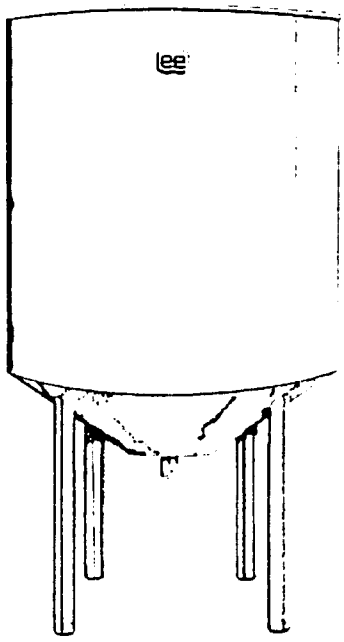
The above illustration explains the operation of the Model G. Product enters the inside of the case assembly and is moved in a circular path by the impeller. Centrifugal force causes the product to press tightly against the inside surface with several times its own weight. As the product approaches the top of the case assembly, an adjustable case gate controls the slice thickness. As slices emerge, cross cut knives move downward producing strips or French fry cuts. Strips move without interruption across the top surface of the slicing knife holder into circular knives. Strips are then transversely cut by the circular knives to form cubes or three dimensional cuts of selected size.

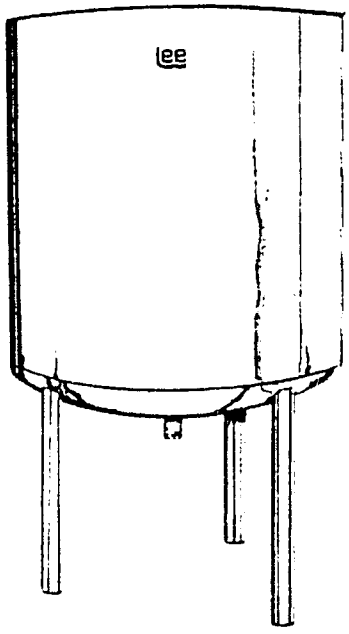
This advanced cutting principle has distinct advantages over previously used methods. Many products tend to crack parallel with the knife edge during slicing. This is particularly true of brittle root vegetables which may have been stored at low temperatures. Cross cut knife edges are parallel with the edge of the slicing knife so that slicing strains are relieved as strips are cut, and before actual cracking can occur.

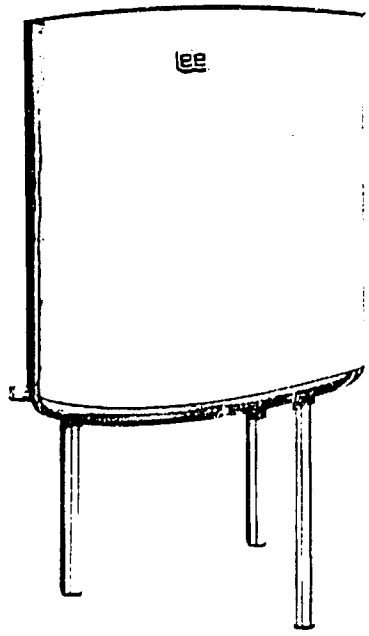
Product damage is further reduced by moving slices in a single plane from first cut to last. The crushing and impact which accompanies rapid changes in direction is eliminated and makes gentle, high speed cutting a reality.

CAPACITY

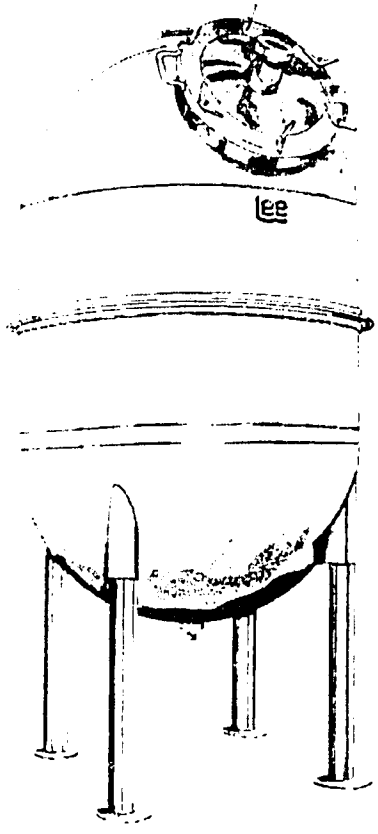
The capacity is determined by the thickness of slice made by the slicing knife. On most products, the capacity is 5,500 pounds per hour for each 1/8" of slice setting.







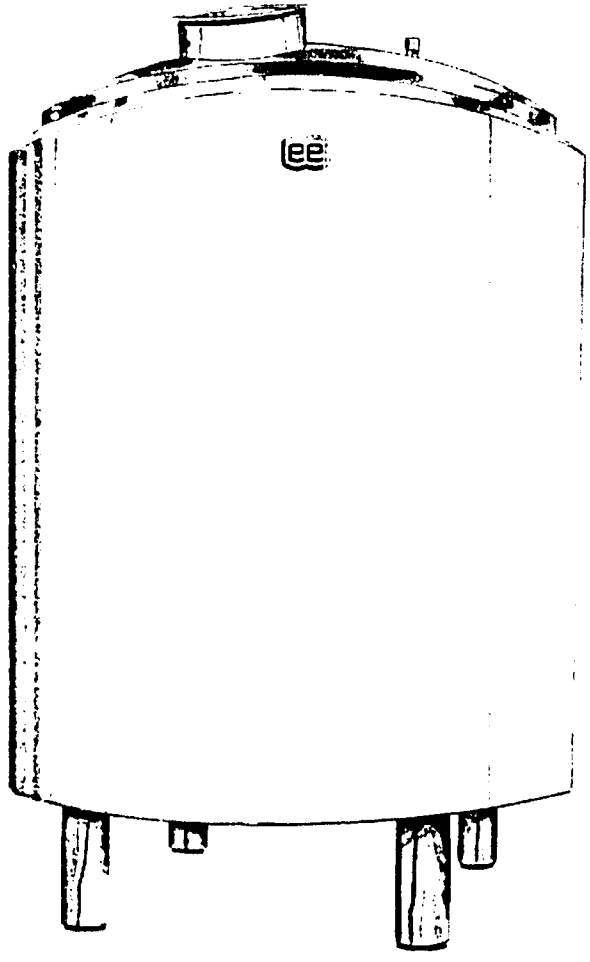
LEE SINGLE SHELL TANKS ARE THE CHOICE OF LEADING COMPANIES. A complete range of sizes, styles and finishes are available. Choose a cone, dished or pitched bottom in any finish from 2B to No. 7.



LEE VACUUM PROCESSORS SOLVE YOUR PRODUCT CONCENTRATION PROBLEMS

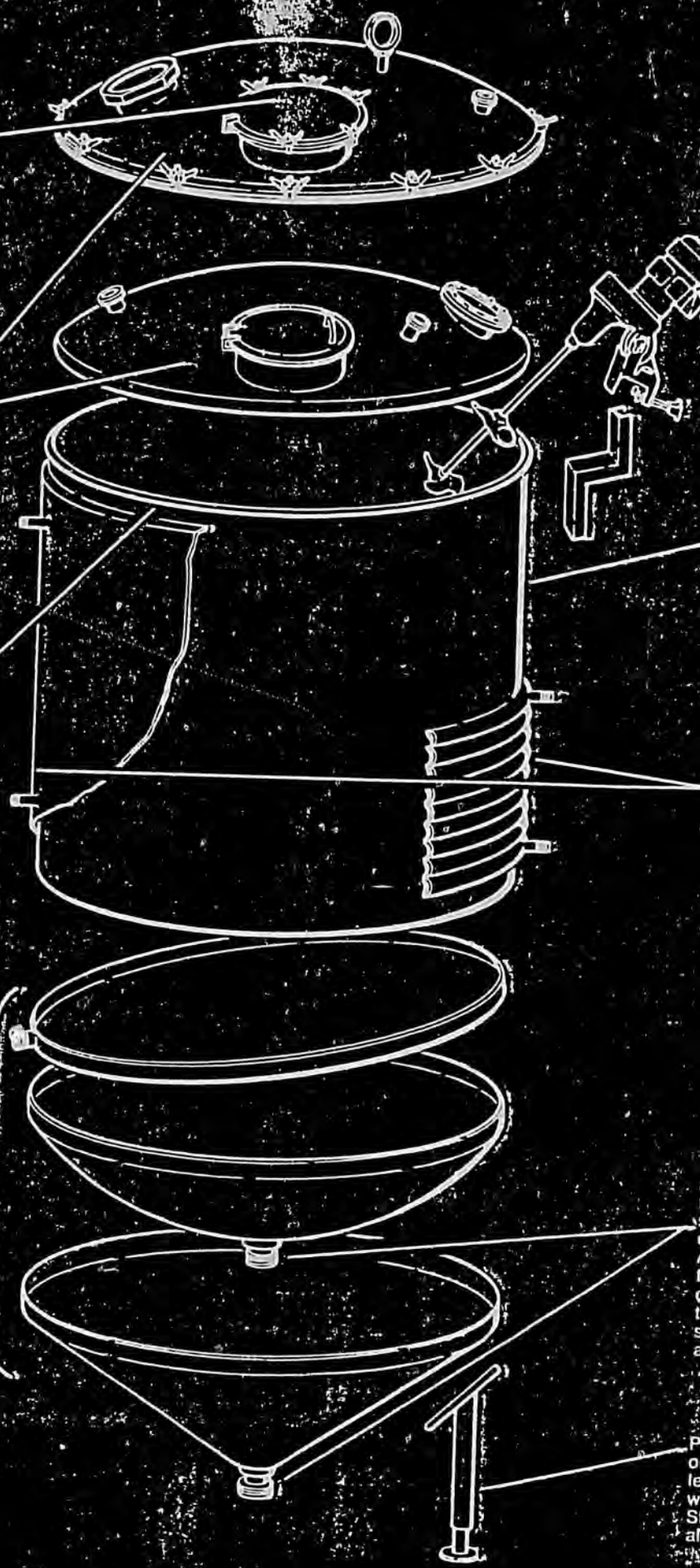
Available in a wide range of sizes with complete system accessories, these units are used as concentrators, separators and stills. LEE offers complete technical consultation to aid in your selection of vacuum processors.

LEE can select a hemispherical, pitched, dished or conical processor with scraped surface, sweep or Turbo-Shear agitation to customize the unit for your particular application.



LEE PROCESSORS ARE FOR YOUR REQUIREMENTS

Whether your needs are dissolving granular sugar, melting waxes or blending dyes, LEE is the only manufacturer with a complete line of vessels and agitators for every purpose.



Standard Manholes, Openings and Connections are available for either head or cylinder mounting. In addition, LEE engineers are experienced in the design and application of special manholes and openings for pressure or vacuum vessels. Sanitary or ASA type connections can be added to any unit in any orientation.

Mountings can be furnished for either portable or stationary type agitators. Portable agitators are nozzle mounted or on brackets as illustrated. Stationary agitators can be bridge or dome mounted. LEE offers scraped surface, sweep or Turbo Shear standard agitators for all units.

Covers designed for pressure or vacuum applications are available for all LEE tanks. The cover can be a bolt-on type, quick release style or welded directly to the cylinder. One piece or hinged style removable covers are also available. (See LEE Accessories Bulletin 700)

Diameter and depth of tank cylinder can vary to correspond to size and process requirements. The Standard finish is #4 inside and out. Non-polished 2B and Lee No. 7 finish are also available.

Standard LEE tanks have open tops with a sanitary rolled rim. Solid stainless steel wire or angle style rims are also available. (See LEE Accessories Bulletin 700)

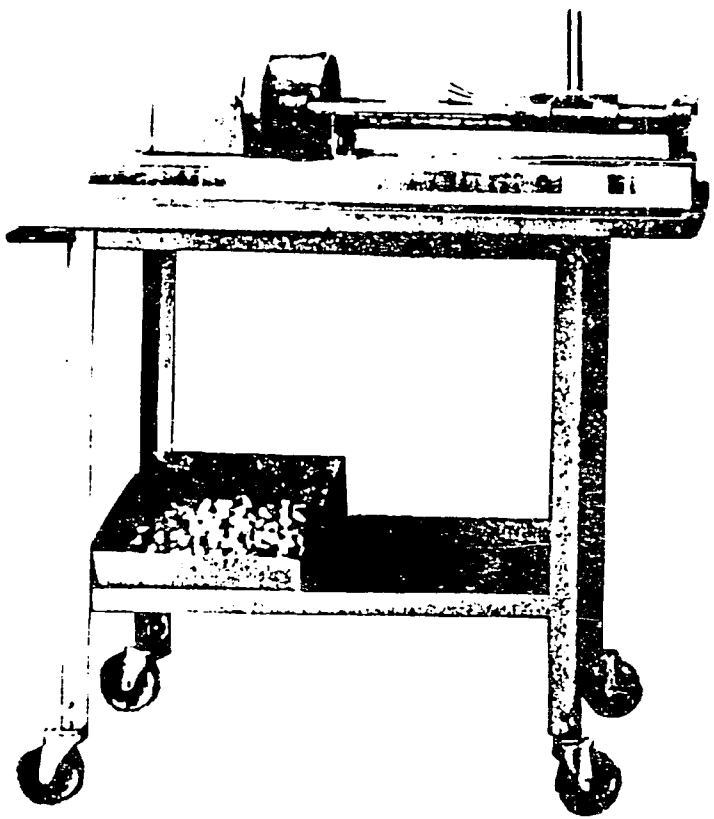
Open or "Uniflow" coil style heat transfer jackets are available for all LEE tanks. The open style jacket is applicable to smaller tanks and lower pressure requirements. LEE's "Uniflow" coil jacket is ideal for all heating and cooling media and can be used in high or low pressure applications. LEE "Uniflow" jackets can be applied to flat, dished or cone bottoms. Insulation and stainless steel sheathing can be installed over any jackets.

Three styles of bottoms are offered as options for LEE tanks. Each style offers unique advantages for various processing applications.

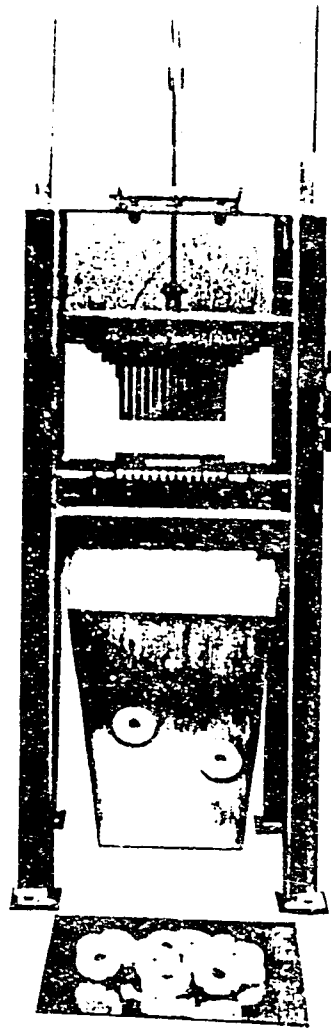
- Pitched — offers excellent drainage for liquids and places the outlet on a horizontal axis.
- Dished — offers center draining for more viscous products. Reverse dished bottoms are also available.
- Cone — ideal for viscous or semi-solid materials. The standard cone bottom angle is 120°, but can be varied to suit process or product requirements.

Various types of outlets are available for LEE tanks. All outlet pipes are stainless steel with optional I.P.S., sanitary, Acme thread, ASA flange, or sanitary quick clamp. LEE manufactures two (2) types of flush style outlet valves which are ideal tank outlets.

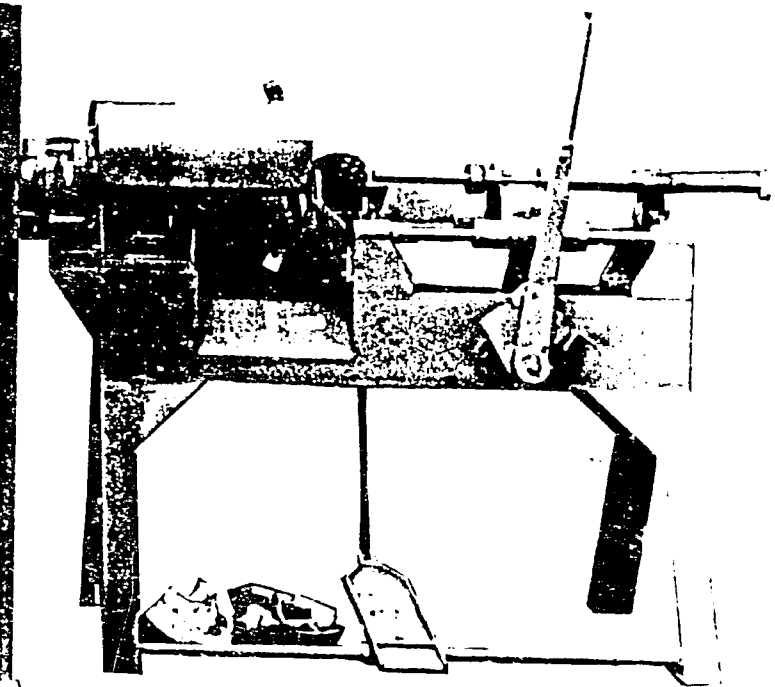
Pipe legs are standard on all tank styles. The legs can be provided with adjustable feet. Stainless steel legs are also available.



TID BIT CUTTER



SLICER



SIZER AND CORER

ELLIOTT SEMI-AUTOMATIC PINEAPPLE PREPARATION EQUIPMENT

HOBART

FOOD EQUIPMENT

PORTABLE BEAM SCALES

PROTECT PROFITS . . .

To a food service operator, a reliable receiving scale is like having a cash register at the back door. Protect profits by weighing meats, produce or other incoming items invoiced by weight. The Hobart Portable Beam Scale is rugged, versatile and will serve for years.

STANDARD FEATURES

PORTABLE SCALE FEATURES:

1. **Pillar** – offset pillar allows for a narrower scale without reducing platform size – permits movement through smaller aisles and doorways.
2. **Beam** – Rust free, aluminum beam for longer life and easy to read operation.
3. **Beam Lock** – Protects against damage to beam and beam pivots.
4. **Beam Poises** – Open beam poises allow for an easier to read weight-beam thereby reducing chance of error.
5. **Wheels**–External composition wheels for maximum portability.
6. **Platform** – 18" x 27" steel.

SINGLE BEAM SCALE:

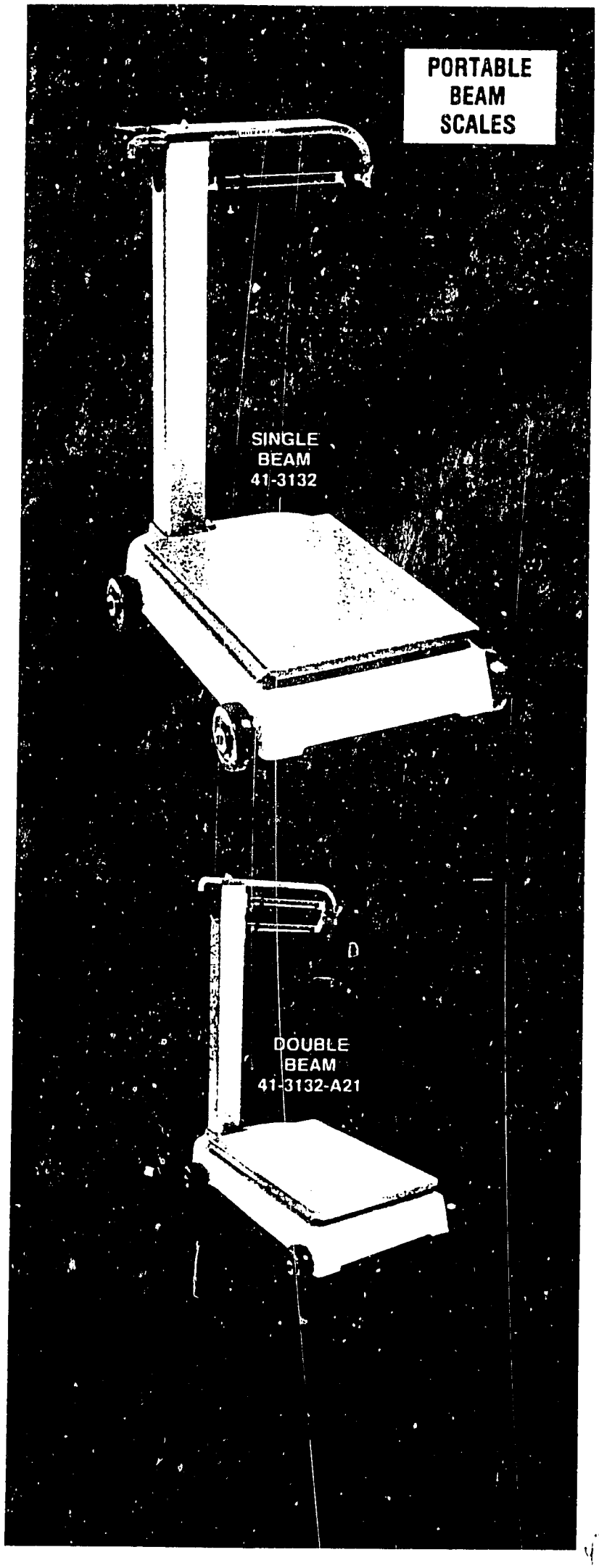
1. **Beam Cap** – Wide beam cap protects against damage to beam.
2. **Counterpose Weights** – Stored on side bracket for operator convenience.

DOUBLE BEAM SCALE:

1. **Beam Cap** – Wide beam cap protects against damage to beam.
2. **Counterpoise Weights** – Stored on side bracket for operator convenience.
3. **Tare** – Second beam allows for tare setting up to 100 lbs.

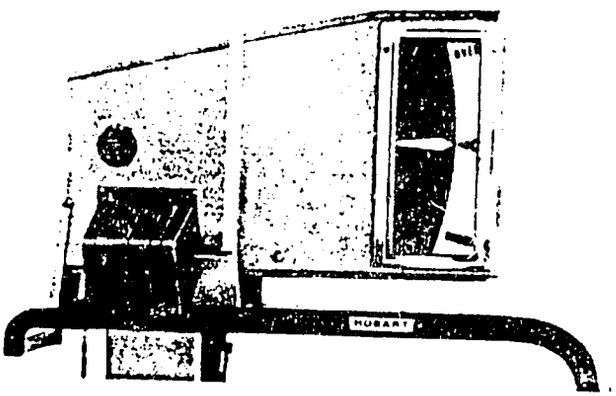
Specifications, Details and Dimensions on Reverse Side

WORLD HEADQUARTERS
TROY, OHIO 45374



ACCESSORIES:

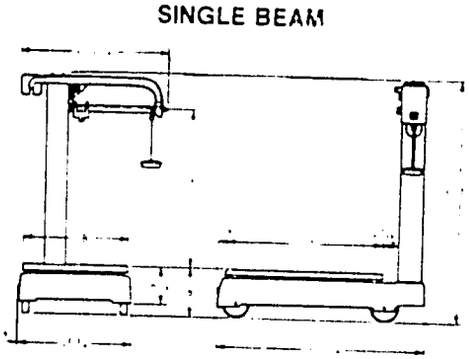
BALANCE INDICATOR: Model VZ-9000 – Large indicator aids the operator in reading balance.



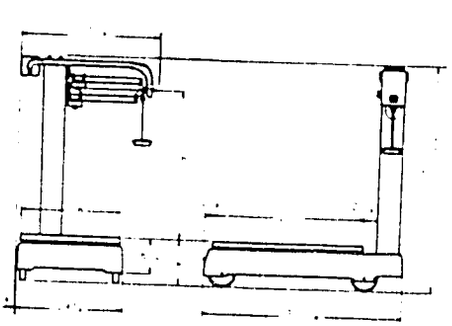
	MODEL	BEAM GRADUATIONS: MAIN BEAM	BEAM GRADUATIONS: FRACTIONAL BEAM	TOTAL CAPACITY
Single Beam	41-3132	100 lbs x ½ lb		1000 lbs
Single Beam	41-3132-A02	50 lbs x ¼ lb		1000 lbs
Double Beam	41-3132-A21	100 lbs x ½ lb	100 lbs x ½ lb	1000 lbs

DETAILS AND DIMENSIONS

SINGLE BEAM



DOUBLE BEAM



HOBART CORPORATION

HOBART

FOOD EQUIPMENT

HOB 15 COUNTER SPRING DIAL SCALE

For Profit Protection

A low cost profit protecting scale for commercial and foodservice application. This fast operating dial scale is ideal for receiving meats, produce and other commodities invoiced by weight.

Hobart Counter Spring Dial Scales meet various duty requirements for a receiving scale and also fits food service operations requiring ingredient weighing.

Choice of three avoirdupois and three metric charts to fit your weighing requirements.

FEATURES

CHART: Non-glare three plated lock steel face with large vertical numbers for maximum readability.

WEIGHING MECHANISM: Temperature compensated precision spring, rack and pinion mechanism.

TARE KNOB: Allows a tare setting up to 10% of chart capacity.

LEVELING BUBBLE: Conveniently located next to column.

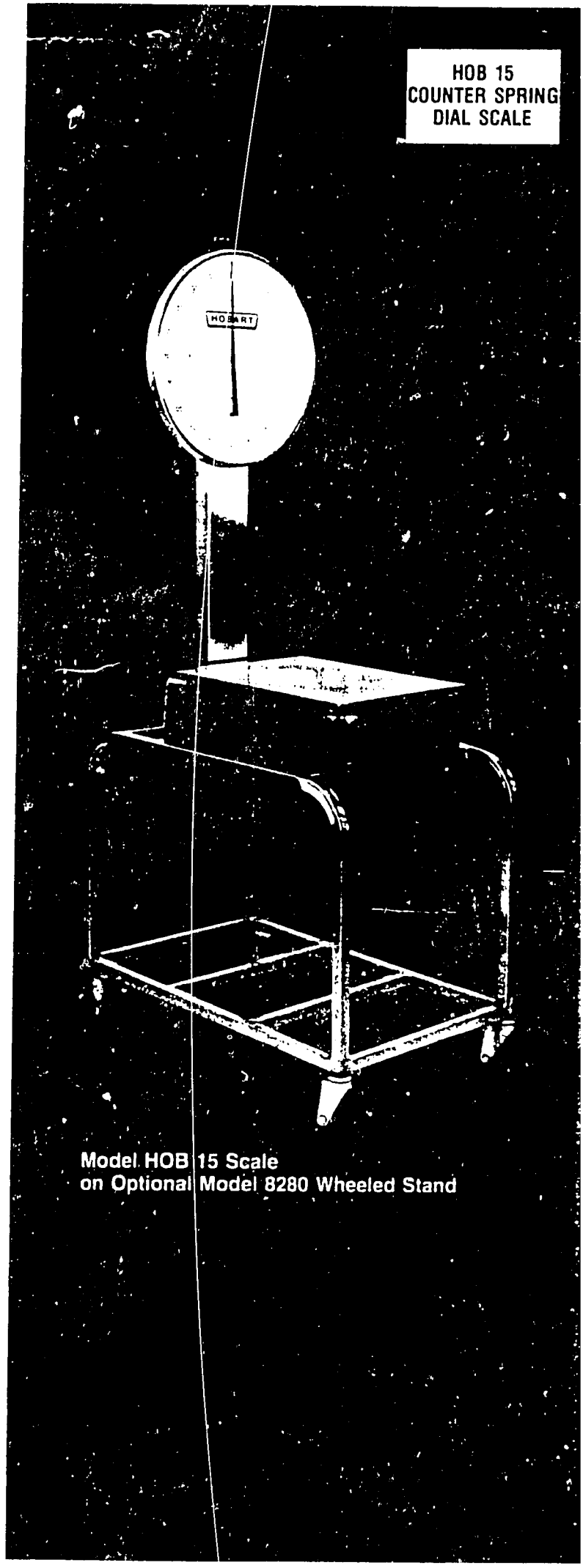
COLUMN: Stainless steel wrap around is standard. Tall column offers an unobstructed view of the indicator.

PLATFORM: Stainless steel platform cover is standard 13¼ x 19.

FINISH: Grey Gloss Baked Enamel.

Specifications, Details and Dimensions on Reverse Side

WORLD HEADQUARTERS
TROY, OHIO 45374



Model HOB 15 Scale
on Optional Model 8280 Wheeled Stand

HOB 15
COUNTER SPRING
DIAL SCALE

SPECIFICATIONS

AVAILABLE CHARTS

Chart	Avoirdupois Capacity	Chart	Metric Capacity
50A	50 lb. × 1 oz.	25M	25kg × 50g
100A	100 lb. × 2 oz.	50M	50kg × 100g
200A	200 lb. × 4 oz.	100M	100kg × 250g

NOTE: When ordering specify Model Number, Chart and accessory stand, if required.

Standard Accessories:

Stainless Steel Column Wrap-Around, 16" Tall.

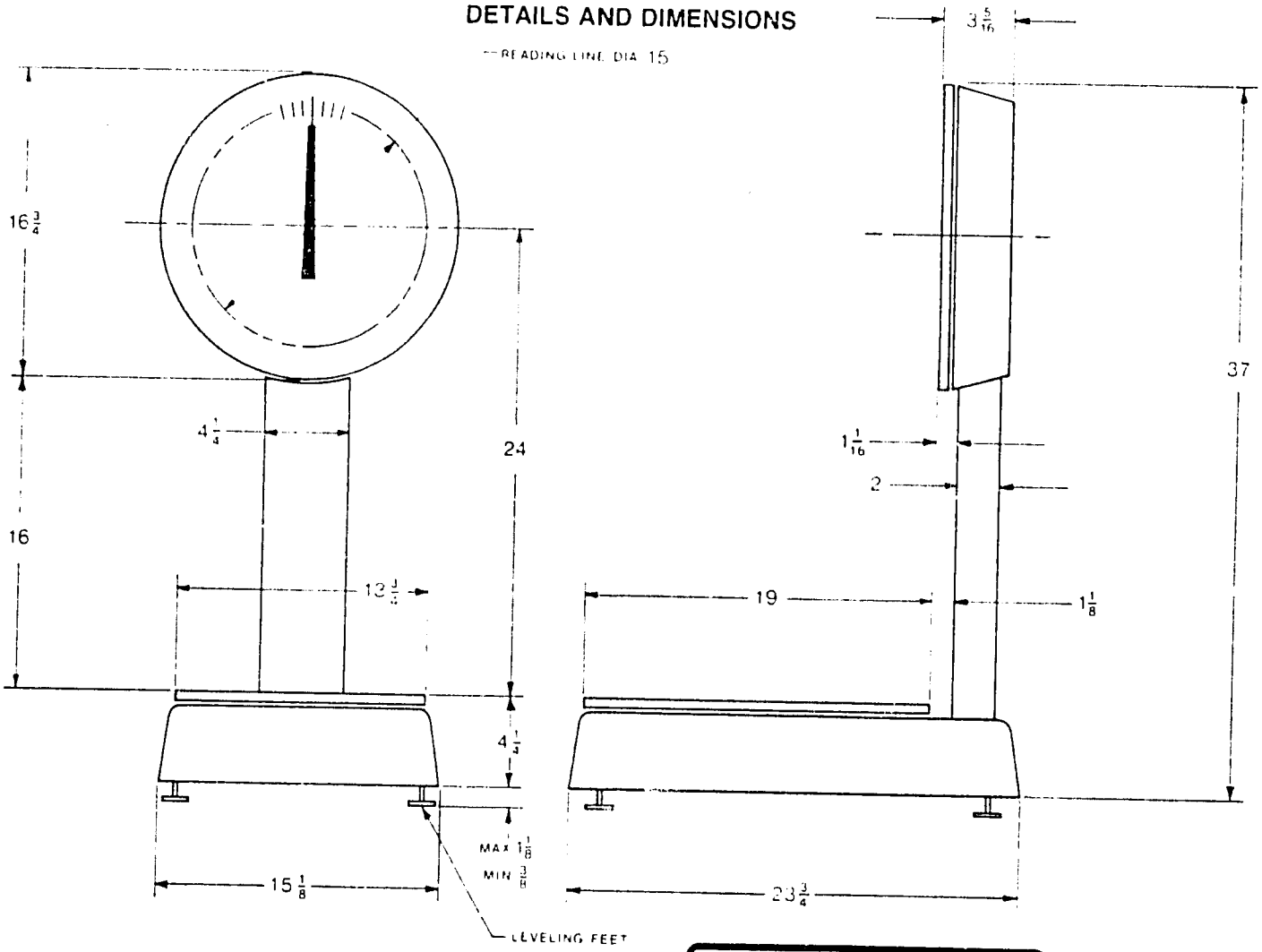
Stainless Steel Platform Cover: 13¾" x 19" Stainless steel meets USDA requirements.

Optional Accessory:

Wheeled Stand: 19" wide; 31⅝" long; 26" high. Square steel tubing; chrome finished for maximum rust prevention. Large wheels for stability as well as portability.

As continued product improvement is a policy of Hobart, specifications are subject to change without notice.

DETAILS AND DIMENSIONS



HOBART CORPORATION

Form F-8388 (181)

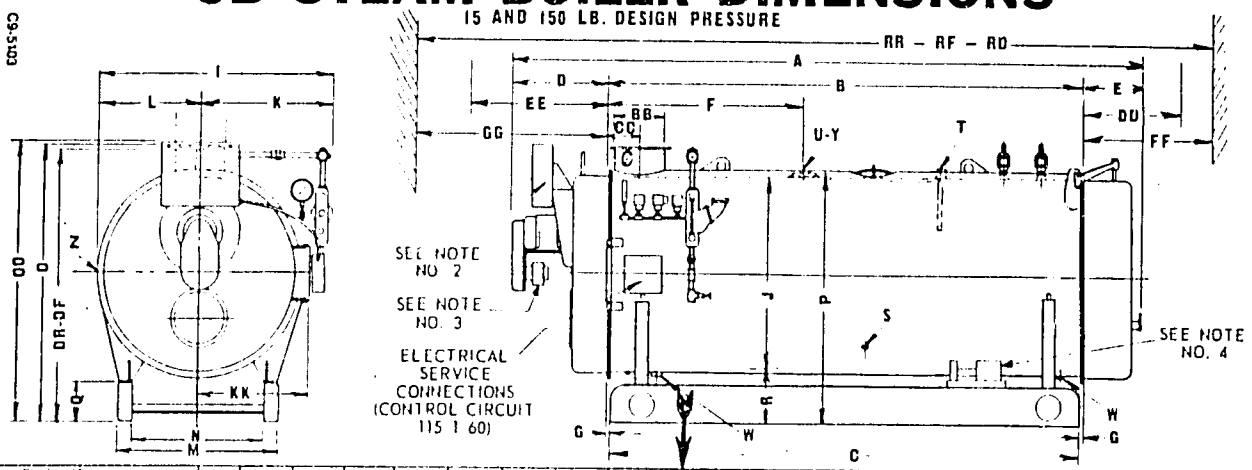
Litho in U.S.A. (G-03)

— FOR U.S. ONLY —

CB STEAM BOILER DIMENSIONS (SEE NOTE 1)

C9-5103

15 AND 150 LB. DESIGN PRESSURE



Boiler Horsepower	Dim.	15	20	30	40	50	60	70	80	100	125	150	200	250	300	350	400	500	600	700
LENGTHS																				
Overall	A	8' 0"	8' 0"	9' 6"	11' 8"	10' 11"	10' 11"	14' 3"	14' 3"	15' 10"	14' 7"	16' 7"	19' 7"	16' 9"	19' 2"	21' 10"	20' 11"	19' 11"	23' 2"	25' 11"
Shell	B	5' 3"	5' 3"	6' 9"	8' 11"	7' 8"	7' 8"	10' 11"	10' 11"	12' 6"	10' 5"	12' 5"	15' 0"	12' 0"	14' 3"	16' 9"	17' 8"	15' 6"	18' 6"	21' 3"
Base Frame	C	4' 11"	4' 11"	6' 5"	8' 7"	7' 7"	7' 7"	10' 10"	10' 10"	12' 4"	10' 4"	12' 4"	14' 11"	11' 11"	14' 2"	16' 8"	17' 7"	15' 5"	18' 5"	21' 2"
Front Head Extension	D	18"	18"	16"	18"	21"	21"	22"	22"	27"	31"	31"	36"	34"	36"	38"	24"	25"	29"	29"
Rear Head Extension	E	15"	15"	15"	15"	18"	18"	18"	18"	18"	19"	19"	19"	23"	23"	23"	27"	27"	27"	27"
Front Ring Flange to nozzle – 15 lb	F	36"	36"	45"	57"	46"	46"	66"	66"	75"	63"	75"	90"	72"	86"	101"	70"	93"	111"	128"
Front Ring Flange to Nozzle – 150 lb	F	36"	36"	45"	57"	46"	46"	73"	73"	82"	56"	66"	78"	60"	73"	68"	62"	79"	97"	128"
Ring Flange to Base	G	7"	7"	7"	7"	½"	½"	½"	½"	1"	½"	½"	½"	½"	½"	½"	½"	½"	½"	½"
WIDTHS																				
Overall	I	50"	50"	50"	50"	63"	63"	63"	63"	63"	78"	78"	78"	98"	98"	98"	116"	116"	116"	116"
I. D. Boiler	J	36"	36"	36"	36"	48"	48"	48"	48"	48"	60"	60"	60"	78"	78"	78"	96"	96"	96"	96"
Center to Water Column	K	30"	30"	30"	30"	36"	36"	36"	36"	36"	43"	43"	43"	56"	56"	56"	65"	65"	65"	65"
Center to Outside Hinge	KK	22"	22"	22"	22"	29"	29"	29"	29"	29"	35"	35"	35"	49"	49"	49"	62"	62"	62"	62"
Center to Lagging	L	20"	20"	20"	20"	27"	27"	27"	27"	27"	33"	33"	33"	42"	42"	42"	51"	51"	51"	51"
Base, Outside	M	29"	29"	29"	29"	36"	36"	36"	36"	36"	51"	51"	51"	64"	64"	64"	72"	72"	72"	72"
Base, Inside	N	22"	22"	22"	22"	30"	30"	30"	30"	30"	42"	42"	42"	52"	52"	52"	58"	58"	58"	58"
HEIGHTS																				
Overall		4' 11"	4' 11"	4' 11"	4' 11"	6' 5"	6' 5"	6' 5"	6' 5"	6' 5"	7' 2"	7' 2"	7' 2"	8' 10"	8' 10"	8' 10"	10' 8"	10' 8"	10' 8"	10' 8"
Base to Vent Outlet		4' 6"	4' 6"	4' 6"	4' 6"	5' 10"	5' 10"	5' 10"	5' 10"	5' 10"	7' 1"	7' 1"	7' 1"	8' 10"	8' 10"	8' 10"	10' 8"	10' 8"	10' 8"	10' 8"
Base to Steam Outlet		4' 1"	4' 1"	4' 1"	4' 1"	5' 6"	5' 6"	5' 6"	5' 6"	5' 6"	6' 5"	6' 5"	6' 5"	8' 0"	8' 0"	8' 0"	9' 10"	9' 10"	9' 10"	9' 10"
Davit (Front)		–	–	–	–	–	–	–	–	–	–	–	–	8' 8"	8' 8"	8' 8"	10' 7"	10' 7"	10' 7"	10' 7"
Davit (Rear)	S	–	–	–	–	–	–	–	–	–	7' 0"	7' 0"	7' 0"	8' 8"	8' 8"	8' 8"	10' 8"	10' 8"	10' 8"	10' 8"
Height of Base		9"	9"	9"	9"	12"	12"	12"	12"	12"	12"	12"	12"	11"	11"	11"	18"	18"	18"	18"
Base to Bottom of Boiler	R	12"	12"	12"	12"	16"	16"	16"	16"	16"	16"	16"	16"	17"	17"	17"	21"	21"	21"	21"
BOILER CONNECTIONS																				
Feedwater, Right and Left	S	1"	1"	1"	1"	1¼"	1¼"	1¼"	1¼"	1¼"	1½"	1½"	2"	2"	2"	2½"	2½"	2½"	2½"	2½"
Auxiliary Connection	Z	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"	1¼"
Low Pressure (15 lb only)																				
Steam Nozzle	U	4"	4"	4"	6" FLG	6" FLG	6" FLG	6" FLG	6" FLG	8" FLG	8" FLG	8" FLG	10" FLG	10" FLG	12" FLG	12" FLG	12" FLG	12" FLG	12" FLG	12" FLG
Drain, Front and Rear	W	1"	1"	1"	1¼"	1¼"	1¼"	1½"	1½"	1½"	1½"	1½"	2"	2"	2"	2"	2"	2"	2"	2"
High Pressure (150 lb only)																				
Surface Blowoff, Top ℄	T	–	–	–	–	–	–	–	–	–	1"	1"	1"	1"	1"	1"	1"	1"	1"	1"
Steam Nozzle	Y	1½"	1½"	2"	2"	3"	3"	3"	3"	4" FLG	4" FLG	4" FLG	4" FLG	6" FLG	6" FLG	6" FLG	6" FLG	8" FLG	8" FLG	8" FLG
Blowdown, Front and Rear	W	1"	1"	1"	1"	1¼"	1¼"	1¼"	1¼"	1¼"	1½"	1½"	1½"	1½"	1½"	1½"	2"	2"	2"	2"
Connections threaded unless indicated – †flg. 150#, §flg. 300# ASA																				
VENT STACK																				
Diameter (flpd. connection)	DD	6"	6"	8"	8"	10"	10"	12"	12"	12"	16"	16"	16"	20"	20"	20"	24"	24"	24"	24"
Front Ring Flange to Vent ℄	CC	4"	4"	5"	5"	6"	6"	7"	7"	7"	9"	9"	9"	11"	11"	11"	13"	13"	13"	13"
MIN. CLEARANCES *																				
Rear Door Swing	DD	3' 8"	3' 8"	3' 8"	3' 8"	4' 7"	4' 7"	4' 7"	4' 7"	4' 7"	7' 8"	7' 8"	7' 8"	7' 7"	7' 7"	7' 7"	4' 5"	4' 5"	4' 5"	4' 5"
Front Door Swing	EE	3' 8"	3' 8"	3' 8"	3' 8"	4' 7"	4' 7"	4' 7"	4' 7"	4' 7"	5' 7"	5' 7"	5' 7"	7' 5"	7' 5"	7' 5"	9' 0"	9' 0"	9' 0"	9' 0"
Tube Removal, Rear	FF	4' 8"	4' 8"	6' 7"	8' 4"	7' 0"	7' 0"	10' 3"	10' 3"	11' 10"	9' 7"	11' 7"	14' 2"	10' 11"	13' 1"	15' 7"	11' 3"	14' 1"	17' 1"	19' 10"
Tube Removal, Front	GG	3' 10"	3' 10"	5' 4"	7' 6"	5' 2"	6' 2"	9' 5"	9' 5"	11' 0"	8' 7"	10' 7"	13' 2"	9' 8"	11' 10"	14' 4"	9' 9"	12' 7"	15' 7"	18' 4"
MINIMUM BOILER ROOM LENGTH ALLOWING FOR DOOR SWING AND TUBE REMOVAL FROM:																				
Rear of Boiler	RR	13' 7"	13' 7"	16' 7"	20' 11"	19' 3"	19' 3"	25' 9"	25' 9"	28' 11"	25' 7"	29' 7"	34' 9"	30' 4"	34' 9"	39' 9"	32' 11"	38' 7"	44' 7"	50' 1"
Front of Boiler	RF	12' 9"	12' 9"	15' 9"	20' 1"	18' 5"	18' 5"	24' 11"	24' 11"	28' 1"	21' 8"	25' 8"	30' 10"	25' 3"	29' 8"	34' 8"	26' 10"	32' 6"	38' 6"	44' 0"
Thru Window or Doorway	RD	12' 7"	12' 7"	14' 1"	16' 3"	16' 10"	16' 10"	20' 1"	20' 1"	21' 8"	18' 8"	20' 8"	23' 3"	22' 11"	25' 7"	27' 8"	26' 1"	28' 11"	31' 11"	34' 8"
WEIGHT IN LBS.																				
Normal Water Capacity		1,340	1,300	1,710	2,290	3,130	2,920	4,620	4,460	5,080	5,750	7,250	8,625	10,670	13,000	15,465	15,340	19,300	23,425	27,790
Approx. Ship Wgt – 15 lb		2,950	3,050	3,600	4,250	6,650	6,750	7,900	8,000	8,800	11,750	12,650	14,850	21,300	23,600	26,800	33,000	38,000	43,400	50,600
Approx. Ship Wgt – 150 lb		3,050	3,150	3,750	4,400	6,750	6,900	8,600	8,800	9,300	12,400	13,590	15,900	22,700	25,400	28,000	36,000	41,000	46,300	53,300
Approx. Ship Wgt – 200 lb		3,250	3,350	4,050	4,700	7,150	7,300	9,100	9,300	9,800	13,000	14,700	16,700	24,500	27,400	29,600	37,800	43,500	49,800	57,000

Note 1 Accompanying dimensions, while sufficiently accurate for layout purposes, must be confirmed for construction by certified dimension prints. For 250 lb. design pressure or higher, contact factory for certified dimension prints.

Note 2 Control panel relocated on boilers 250 hp and up.

Note 3 Air compressor belt driven from blower motor on sizes 15 through 40 HP and 125 through 350 HP.

Note 4 Air compressor module on sizes 50 through 100 HP and 400 through 700 HP.

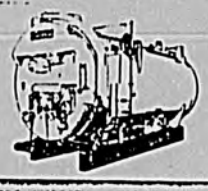
* See back page for boilers equipped with davits.

FEB. 1980

Cleaver-Brooks

MODEL **CB STEAM BOILERS**

15 HP THROUGH 700 HP



dimensions and ratings

(FOR U.S. ONLY)

FEB. 1980

RATINGS sea level to 3000 ft ***

Boiler HP	115	120	130	140	50	60	70	80	100	125	150	200	250	300	350	400	500	600	700
Rated Capacity in lbs steam hr (212 F)	518	690	1,035	1,380	1,725	2,070	2,415	2,760	3,450	4,313	5,175	6,900	8,625	10,350	12,075	13,800	17,250	20,700	24,150
BTU Output (1000 BTU hr)	502	670	1,004	1,339	1,674	2,009	2,343	2,678	3,348	4,184	5,021	6,695	8,369	10,043	11,716	13,390	16,738	20,085	23,432
EDR steam gross, sq. ft.	2,090	2,790	4,185	5,580	6,970	8,370	9,760	11,160	13,950	17,450	20,920	27,900	34,900	41,850	48,820	55,800	69,750	83,700	97,640

APPROXIMATE FUEL CONSUMPTION . . . at rated capacity

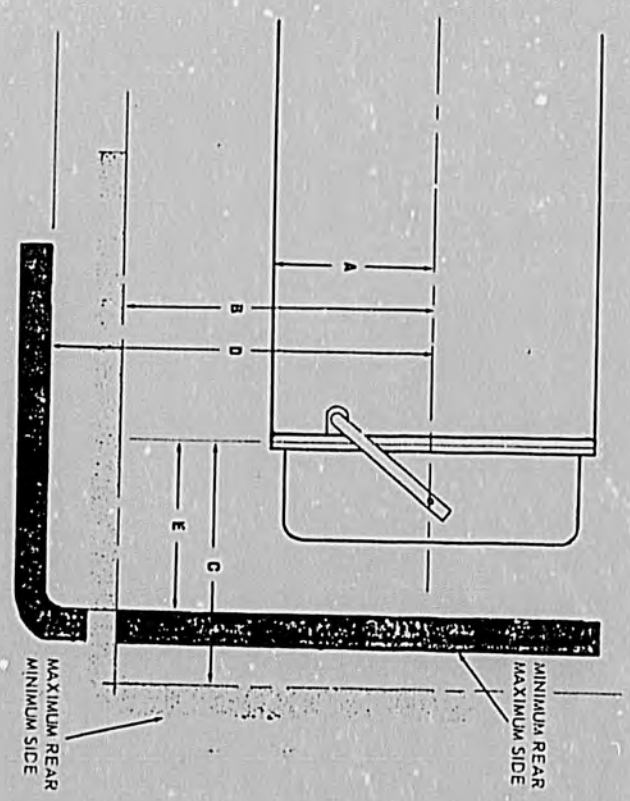
Oil GPH*	4.5	6.0	9.0	12.0	15.0	18.0	21.0	24.0	30.0	37.5	45.0	60.0	74.5	89.5	104.5	119.5	149.5	179.5	209.0
Heavy Oil GPH**	–	–	–	–	14.0	16.5	19.5	22.5	28.0	35.0	42.0	56.0	69.5	83.5	97.5	111.5	139.5	167.5	195.5
Gas CFH																			
500 BTU mfg	1,250	1,670	2,510	3,350	4,190	5,020	5,860	6,700	8,370	10,460	12,560	16,740	20,920	25,110	29,300	33,500	41,850	50,200	58,600
800 BTU mixed	789	1,045	1,570	2,095	2,615	3,140	3,665	4,190	5,235	6,540	7,850	10,460	13,080	15,695	18,315	20,940	26,155	31,375	36,610
1000 BTU natural	625	835	1,255	1,675	2,095	2,510	2,930	3,350	4,185	5,230	6,280	8,370	10,460	12,555	14,650	16,750	20,925	25,100	29,300
Gas (therms per hr)	6.3	8.4	12.6	16.8	21.0	25.1	29.3	33.5	41.9	52.3	62.8	83.7	104.6	125.5	146.5	167.5	209.3	251.0	293.0

* Based on 140,000 BTU/Gal.
** Based on 150,000 BTU/Gal.
***Sea level to 2,500 ft. for 300 and 350 HP sizes.
† No. 4, No. 5 and No. 6 Oil not available in 15-40 HP Range.

POWER REQUIREMENTS sea level to 3000 ft, 60 Hz

Blower Motor, HP All Models Except Gas	1	1	1½	2	2	2	2	** 2	3	5	7½	10	7½	*** 10	**** 15	*** 10	▲ 15	▲▲ 20	▲▲▲ 30
Gas Models Only	1	1	1½	2						5	5	10	7½	• 7½	15				
Oil Pump Motor, HP †† No. 2 Oil	11	11	11	11	½	½	½	½	½	½	½	½	½	¾	¾	¾	¾	¾	1
No. 4 Oil	–	–	–	–	½	½	½	½	½	½	½	½	–	–	–	–	–	–	–
No. 5 & No. 6 Oil	–	–	–	–	½	½	½	½	½	½	½	½	½	½	¾	¾	¾	¾	½
Oil Heater, KW No. 4 Oil	–	–	–	–	3	3	3	3	3	3	3	3	–	–	–	–	–	–	–
No. 5 & No. 6 Oil	–	–	–	–	5	5	5	5	5	5	5	15/(7½)	7½	7½	7½	7½	7½	7½	7½
Air Compressor	← Air Compressor Belt-Driven From Blower Motor →				2	2	2	2	2	← Air Compressor Belt Driven From Blower Motor →						5	5	5	5

†† Oil Pump Belt Driven from Blower
† No. 6 Oil
† No. 5 Oil
* 10 kw on low pressure
** 3 HP above 2000'
*** 15 HP above 2500'
**** 20 HP above 2500'
▲ 20 HP above 2000'
▲▲ 30 HP above 2500'
▲▲▲ 40 HP above 2000'
• 10 HP above 2500'



SPACE REQUIRED TO OPEN REAR HEAD ON BOILERS EQUIPPED WITH DAVITS

BOILER SIZE	A	B	C	D	E
*CB-50 thru CB-100	2'-3"	4'-0"	3'-2"	5'-0"	2'-2"
CB-125 thru CB-200	2'-9"	4'-7"	3'-9"	5'-8"	2'-8"
CB-250 thru CB-350	3'-6"	5'-9"	4'-10"	7'-2"	3'-6"
CB-400 thru CB-700	4'-3"	7'-4"	5'-11"	9'-1"	4'-5"

* CB-50 thru CB-100 standardly equipped with hinges. Davit available at extra cost and on special order.

CB-5103 FEB. 1980
Printed in U.S.A.

46a

SARGENT IND

TOBACCO DRYERS — Strip, stem, chopped tobacco film, dipped filler and other tobacco dryers by Sargent are completely dependable high quality production machines. Designed for careful handling of all types of tobacco; and for uniform drying. Together with Sargent feeders, coolers, and ordering machines (with Sargent's patented SarJet ordering heads and Sargent's patented straddle pans) they have raised tobacco processing standards for quality and economy to a new high.

WHEREVER there's a drying process, there's a SARGENT to do the job — to bring you new high standards of uniform drying, product quality and real production economy. The broad practical experience that comes of years of research in drying methods and of designing and building machines for ever more effective product drying, saves you time and money on your dryers, when you select SARGENT.

Sargent has pioneered in many fields, the first gas-fired rubber dryer was a Sargent. The first flashless powder was dried in a Sargent. New man-made textiles and innumerable other products have come to the market dried by special-design Sargents. Each dryer is designed and built to the exact needs of product and of production. From small table and lab models, from tray and truck dryers, to huge, high capacity 3-decker, multi-section conveyor dryers, each is designed to serve profitably and well for many years to come.

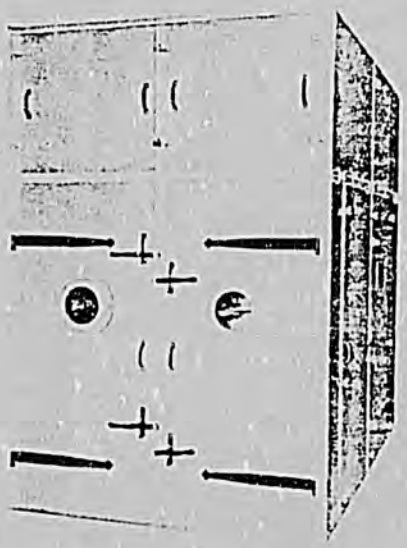
Unusually rugged, Sargent Dryers take continuous volume production with little operator attention. Sargent's exclusive "free access" design assures ease and speed of clean-out — the fan side of a dryer is covered with easily removable panels, and the non-fan side with full height, hinged door panels. Conveyors may be slat, rod, perforated steel or mesh. Heat source may be gas, oil, steam or electricity. Additional sections, pre-assembled at Sargent plants, may be added easily and quickly at any time, with minimum interruption of production.

Operating economy is standard with a Sargent. For many products, "pound for pound" is the rule of thumb — less than a pound and a half of steam used to remove a pound of water. The product is uniformly dried throughout the entire bed to exact specified moisture content. Air may be up or down — usually on big dryers, a carefully calculated combination.

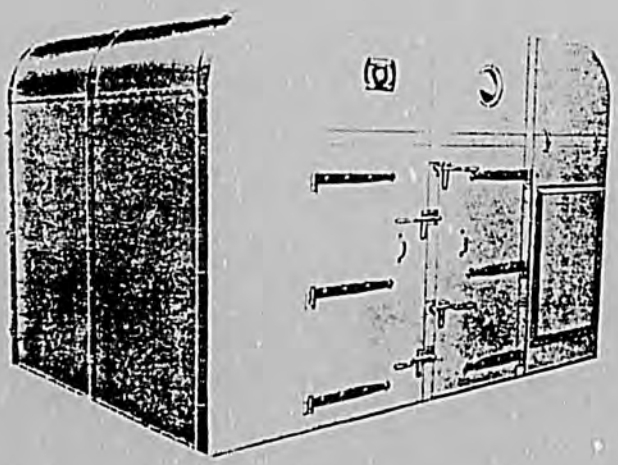
DRYERS (CONVEYOR, TRAY, TRUCK, TUNNEL, ROTARY, POLE)
FEEDS (OSCILLATING CONVEYOR, VIBRATING SCREEN, AND STANDARD)
COOLERS • EXTRUDERS • GRANULATORS

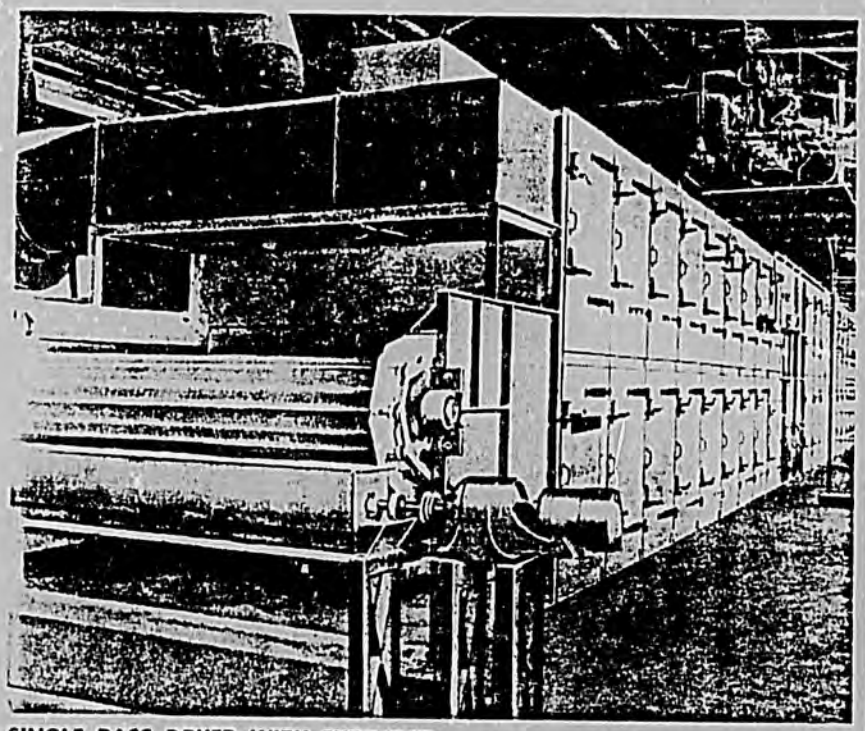
TRAY and TRUCK DRYERS

For safest, most efficient drying of wet-powdered, heat-sensitive or unstable materials. Small models for lab or pilot plant; many tray, multi-stacked, or sectional models for production. For chemicals, pharmaceuticals, batch drying of many products.



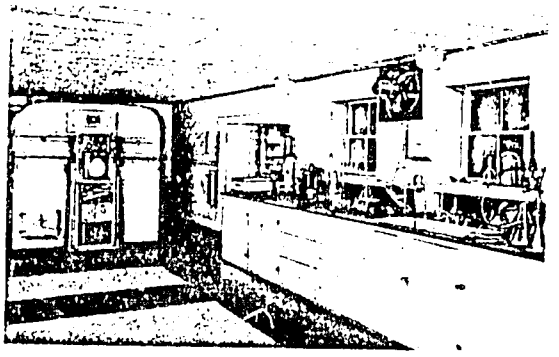
Two compartments, tray dryer, above. Truck dryer, below, of large capacity, with precisely uniform drying throughout the entire truck load.





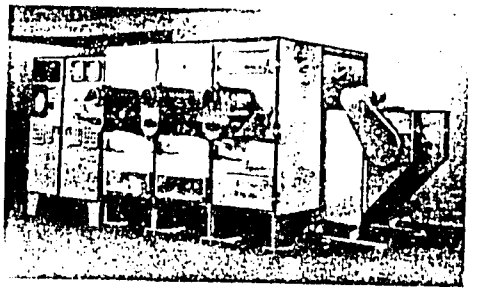
SINGLE PASS DRYER WITH EXTRUDER — This 2-stage dryer, for Kaolin, is typical of Sargent creative engineering. 20 drying sections, 2 cooling sections, both up and down airflow. Four zones, each independently controlled. Great volume capacity — dries clay rods (from extruder mounted at the feed) from 37% entering moisture to 3% when leaving cooler. Note access doors, each section, for quick, easy cleanout. Uses both gas and oil for greatest economy in the particular area. Combination burners are mounted on top of dryer.

RESEARCH *Comes First*



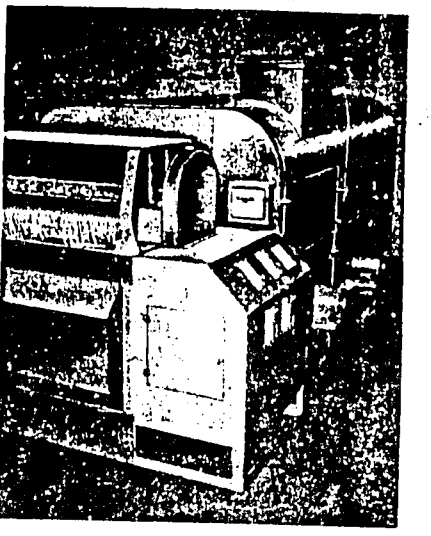
SARGENT'S DRYING RESEARCH LABORATORY

Sargent's Drying Research Laboratory will tackle any drying problem you have. It is staffed by men highly qualified by training and experience to come up with an exact, practical, production-cost-conscious answer. Together with Sargent engineers, these men will serve, advise, recommend or design special drying equipment for your particular products, your particular process. Here is an invaluable source of broad experience and knowledge to serve you and your industry. Send us your problems. The more difficult they are, the better we like them.



SARGENT R & D DRYER

A new basic concept for test-drying any product by any method, this single machine provides all processing methods of product testing including drying, cooling, moistening, curing, baking, etc. A full selection of air-flow patterns and techniques is available. The basic module is a complete all-methods product-testing unit. A retractable modular carriage holds method-test components and materials handling equipment such as apron or vibratory conveyors, trays, trucks, or other conveying or holding equipment. Modules easily interlock with each other.



SARGENT PILOT PLANT DRYER

Two drying, one cooling section and Sargent's 4-foot single hopper extruder are combined in this compact, highly efficient and versatile research or pilot plant dryer. Stainless steel extruder has chrome-plated grid and paddles, is used for a great variety of products. Total power requirement is 3½ H.P. Uses, as do all Sargent dryers, well under 1½ lbs. of steam per pound of moisture removed from product. Shipped completely assembled.

SARGENT Machines Are Pre-Assembled for Record-Quick Installations At Lowest Costs

Sargent Dryers are installed and in operation faster than any other dryers on the market. For example, the large synthetic rubber dryer shown back of this page, upper right, was installed in less than four weeks. Years ago, Sargent pioneered its famous pre-assembly method, with consequent saving of installation costs. Sargent ships smaller dryers completely assembled, needing only service connections at the customer's plant. Larger dryers, after assembly at our plant are separated into shipping size units — size of units being limited only by handling capacity at the customer's plant.

On Flat Cars At Our Railway Siding

A completely assembled pilot plant rubber dryer (with crated motors inside), ready for weather cover and shipment

Some completely assembled fan sections of large tobacco dryer with complementary assembled framework, being readied for shipment.

A corner of one of our fabrication plants with banks of dryers being pre-assembled.

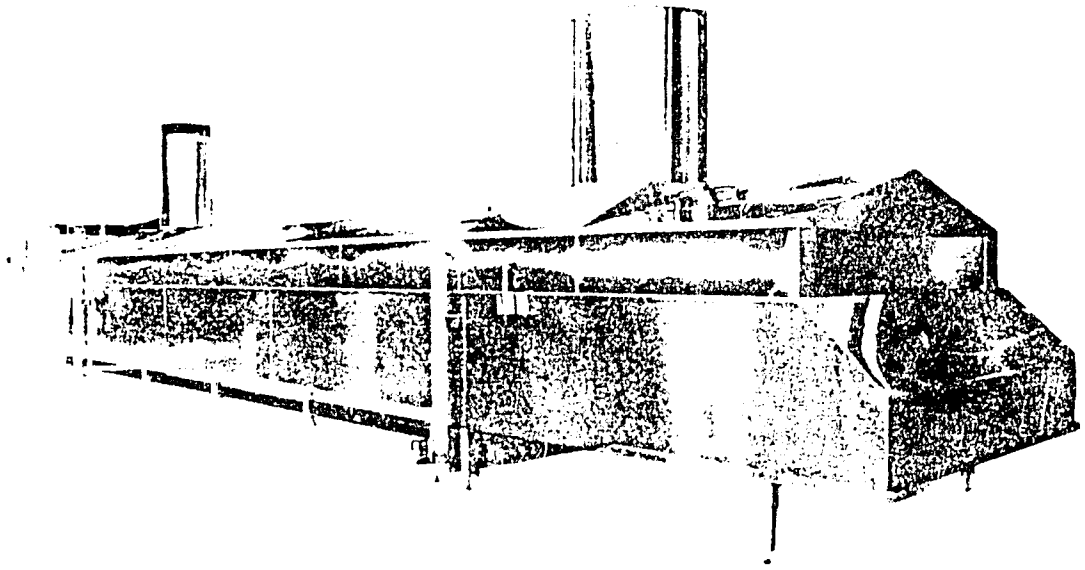
C. G. SARGENT'S SONS CORPORATION

Graniteville, Massachusetts — SINCE 1852

NEW YORK • PHILADELPHIA • CHICAGO • LOS ANGELES • SEATTLE • HOUSTON
ST. LOUIS • DETROIT • CINCINNATI • CHARLOTTE • ATLANTA • TORONTO

HEAT AND CONTROL, INC.

• Model PC Potato Chip Cooker



- *Continuous fines removal*
- *Rapid turnover of cooking oil*
- *Low FFA for longer shelf life*
- *Sizes from 400 to 5,000 pounds/hour*

- In operation since 1957, our first Potato Chip Cooker is still producing uniform chips. And today's cookers are built for even greater reliability and efficiency.
- Angled stainless steel paddles gently meter chips to a submerger conveyor that holds them beneath the cooking oil for uniform color and texture.
- Continuous circulation of externally heated cooking oil keeps fines in suspension. During every minute of operation, 100% of the oil in the entire cooking system circulates through a motorized catch box for continuous fines removal. Together with the economically low oil volume, these features provide rapid oil turnover rates and consistently low FFA levels.
- Automatic fresh oil makeup is actuated by a pneumatic oil level control system.
- Conveyor systems are powered by two variable speed, totally enclosed motors; one motor drives the paddle/submerger system; the other drives both the takeout and salter conveyors.
- Submerger and takeout conveyors feature durable woven wire mesh belt with roller chain edges. Easy-to-clean flat-wire belt is used on the salter conveyor.
- Self-locking motorized screw jacks raise the hood and paddle/submerger conveyor clear of the pan for complete inspection and access. Under the hood, there's a clean-in-place system including a separate spray nozzle for installation in the exhaust stack.
- Potato Chip Cookers are available in sizes to process from 400 to 5,000 pounds/hour. And as with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

Special Processing Options

- Increase capacity while reducing cooker fuel and oil usage with our patented Oil/Heat Economizer conveyor system. It mounts beneath the cooker hood, utilizing rising oil, steam vapors to preheat incoming potato slices and reduce oil losses up the stack.
- Continuous fines removal efficiency beyond that of the motorized catch box is available with our Drum Pre-Filter.
- Fuel-fired, fluid transfer or steam-oil external heat exchangers can be ordered to supply hot oil to the Potato Chip Cooker.

Constant improvement and engineering innovations mean these specifications may change without notice.

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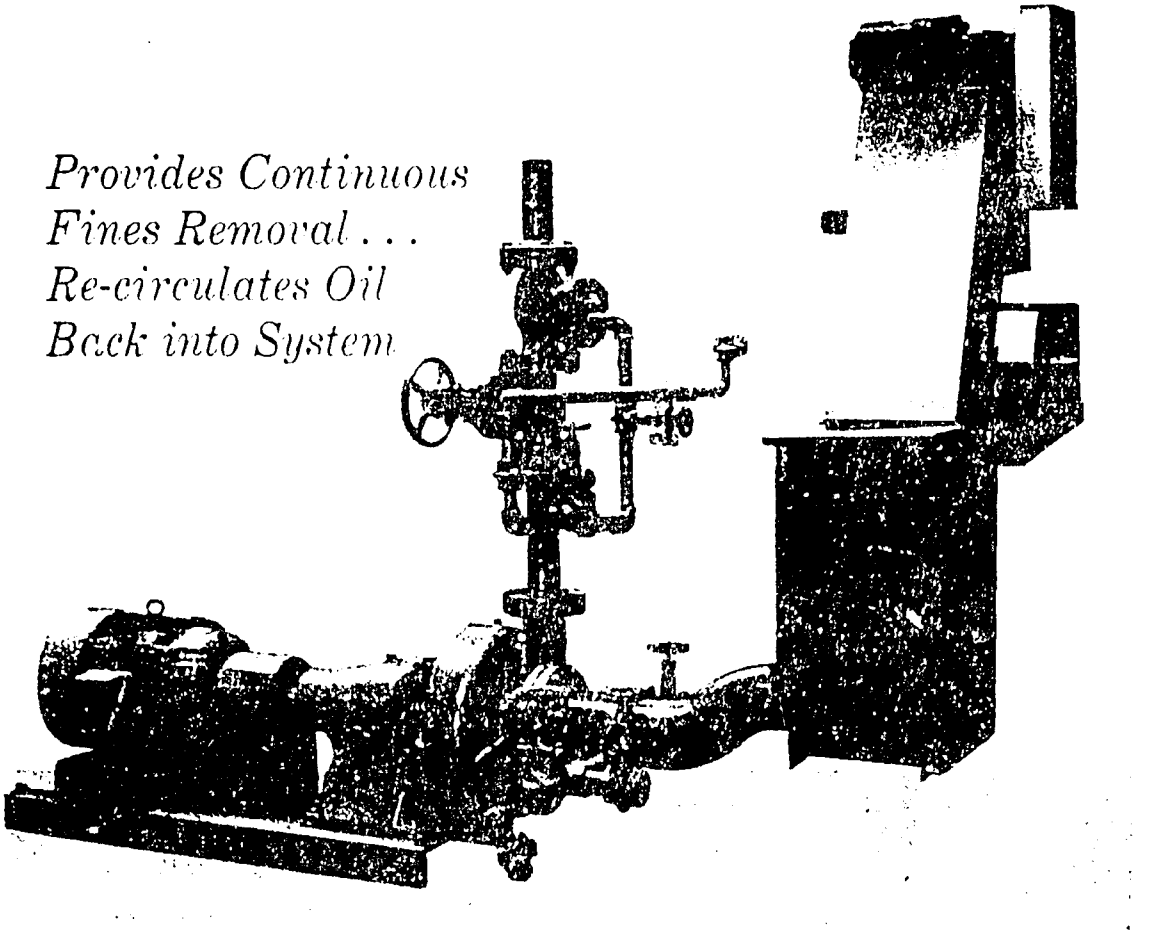
HEAT AND CONTROL, INC.

• Model MCB Motorized Catch Box



- The motorized catch box not only continuously removes fines . . . bits and pieces contained in cooking oil . . . it also prevents foreign matter from entering the pump suction.
- All oil in the circulation system passes through a special mesh belt, constructed with lifter flights that remove the fines and large particles from the oil. These pieces are blown off into a catch basket, and the entrained oil re-circulates back into the system.
- Unit is standard on all Heat and Control potato chip, corn chip, french fry and snack food cookers.
- Shown in addition to the motorized catch box is the centrifugal oil circulating pump set with mechanical shaft seal, coupling, guard, base and TEFC motor.
- Oil piping includes oil throttle valve; system drain valves; CIP take-off valve; and pump scroll drain valve.
- Inclined conveyor is driven by a fixed-speed gear reducer; air-ductor utilizing plant high pressure air is provided to minimize air supply requirement.
- The fines removal assembly is constructed of mild steel and is provided with stainless steel covers and heat shield trim.

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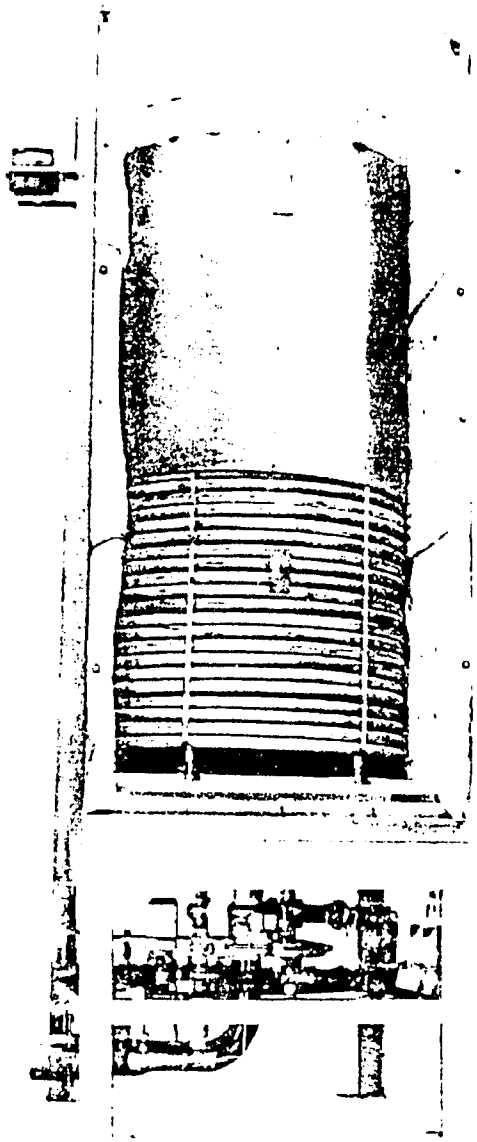
HEAT AND CONTROL, INC.®

• Model CTHX Coil-Type Heat Exchanger



Shown with front panel removed, the CTHX features a fully insulated casing with removable tubing coil.

- Coil-Type Heat Exchangers come ready-for-operation with transfer capacities from 150,000 to 3 million BTU/hour. And as with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

Special Processing Options

- Light oil, LPG or combination oil/gas burners.
- Oil temperature control and fuel flow recording systems.
- Pump sets to circulate oil between the CTHX and cooker.
- FM and IRI burner control systems.

- *Rapid, uniform external heating of cooking oil.*
- *High thermal efficiency with 2-pass heat circulation.*
- *Removable stainless steel tubing coil.*
- *Fully insulated, welded steel casing.*
- *Economical, ready-to-run package unit.*

- Burner heat circulates past the heat transfer coil two times for maximum thermal efficiency. The welded stainless steel tubing coil is constructed to expose maximum surface area without producing hot spots or requiring excessive oil volume.

- Flanged inlet and outlet headers are built into the unitized stainless tubing coil, which is mounted on a slide-out frame for easy service.

- Rapid, continuous circulation of cooking oil through the coil improves heat transfer and keeps the tubing clean of particle accumulations. Low oil volume contributes to fast turnover rates in the cooking system for better quality finished product.

- Compact and vertical, the casing requires about one-quarter of the floor space of comparable horizontal heat exchangers. The welded steel casing includes a removable front panel and a pressure release panel.

- Multiple layers of block and blanket insulation provide low exterior casing temperatures, rapid heating and quick cooling. Alloy fasteners secure the insulation to the casing.

- A single natural gas burner is mounted in the casing base. Its firing rate modulates automatically to maintain the desired oil temperature and compensate for product load variations in the cooker.

- All combustion piping is mounted beneath the casing and includes a separate blower for remote mounting. Burner safety features include electronic flame protection, spark pilot ignition and oil over-temperature shut-off systems. Controls for burner, blower and combustion safeguards are contained in a NEMA 1 cabinet mounted to the casing.

Constant improvement and engineering innovations mean these specifications may change without notice.

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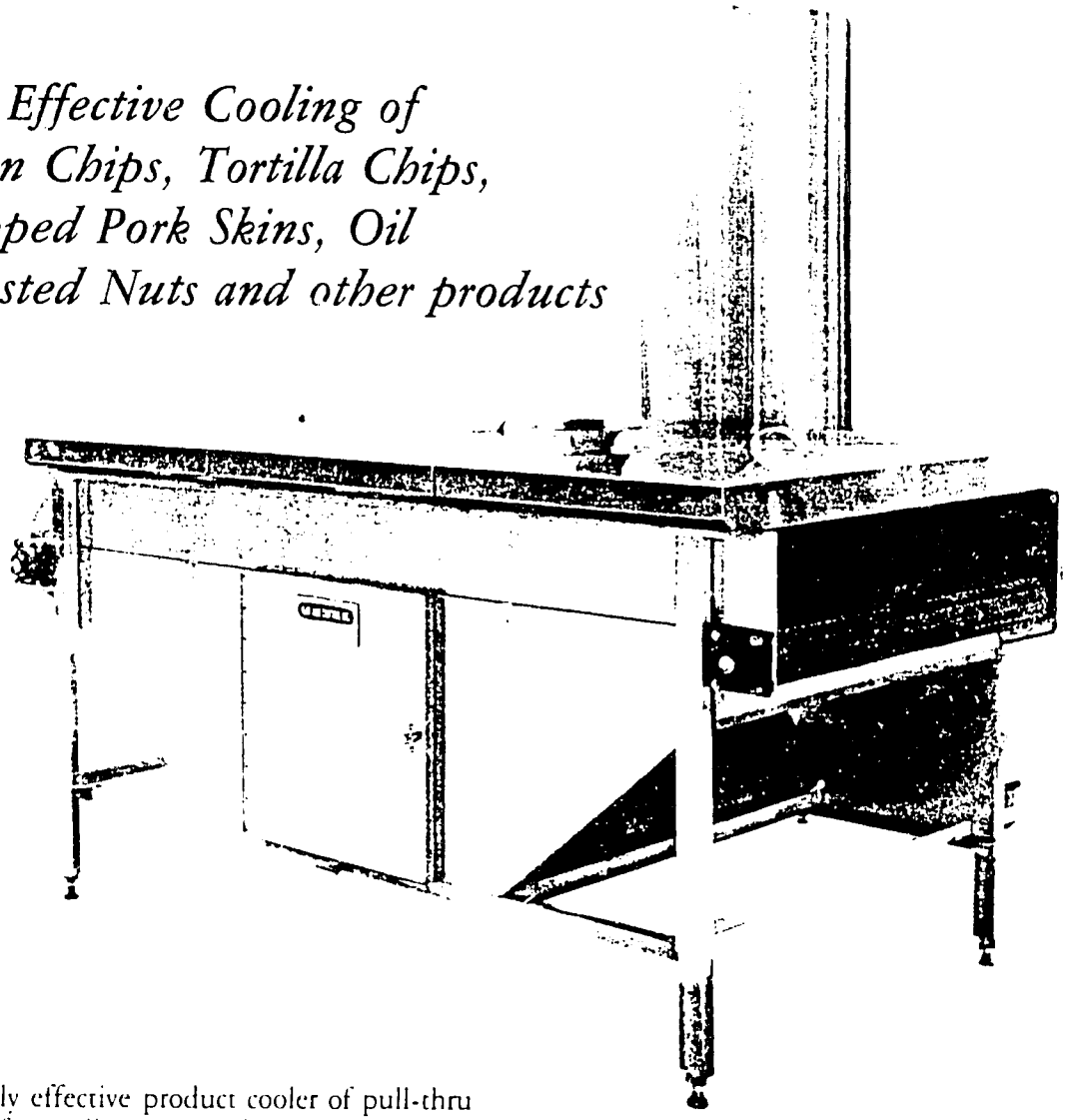
HEAT AND CONTROL, INC.®

• Model AAC Ambient Air Cooler

For Effective Cooling of Corn Chips, Tortilla Chips, Popped Pork Skins, Oil Roasted Nuts and other products



- Highly effective product cooler of pull-thru type for cooling corn and tortilla chips, popped pork skins, oil roasted nuts and a variety of other food products.
- Stainless steel construction with removable covers and hinged access door for easy to clean operation.
- Washable air filters in exhaust air duct.
- Steel exhaust fan with TEFC drive is included for field installation by purchaser.
- Choice of conveyor mesh to suit product: modified ½" × 1" stainless steel flat wire is standard for corn chips and tortillas; roller chain edged woven wire conveyor is available as an option for handling small size products such as nuts and stick items.
- Conveyor drive is TEFC variable speed.
- Model AAC Coolers are available in a range of sizes to match our standard cookers.

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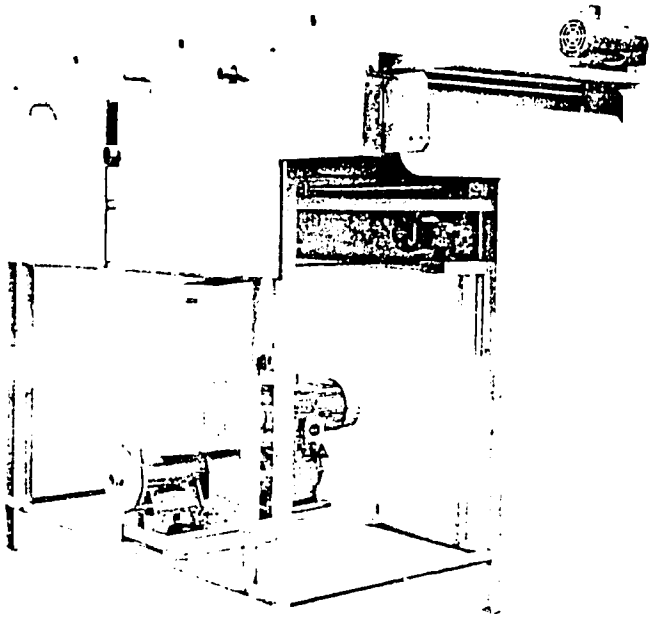
HEAT AND CONTROL, INC.®

• Model CF Continuous Oil Filter



Continuously Filters Cooking Oil

Gravity Flow Using Roll Stock Filter Medium

Simple to Operate, Easy to Clean

- Oil flows by gravity through the concave filtering area formed by the conveyor belt that holds the filtering medium. The oil level control, coupled to the conveyor drive, automatically advances conveyor when flow through the filter medium is reduced below incoming flow rate. Oil passing through the medium collects in the sloped pan bottom where it is continuously discharged through a drain connection.
- Manual lift is included to raise the hood for inspection. Further raising of the hood pivots the medium conveyor to give access to pan bottom for ease of inspection or maintenance.
- Return pump can be provided when oil remote system location is desired.
- Model CF-T Continuous Oil Filter — with storage tank below filter — is available as an option.
- Hood with vent stack opening covers the entire filter area. Clean-in-place spray ball is located under hood for connection to fryer CIP system.
- Special filtering medium is available in 250 yard rolls, in a variety of porosities, to suit specific requirements. Medium is USDA approved.
- Portable disposal cart for used filtering medium is an optional item.
- Stainless steel construction — USDA approved.
- Package assembly, ready for quick installation.
- Two size filters are standard:

  Size 366 – using 36" wide roll with 6 ft. filter length

  Size 369 – using 36" wide roll with 9 ft. filter length.

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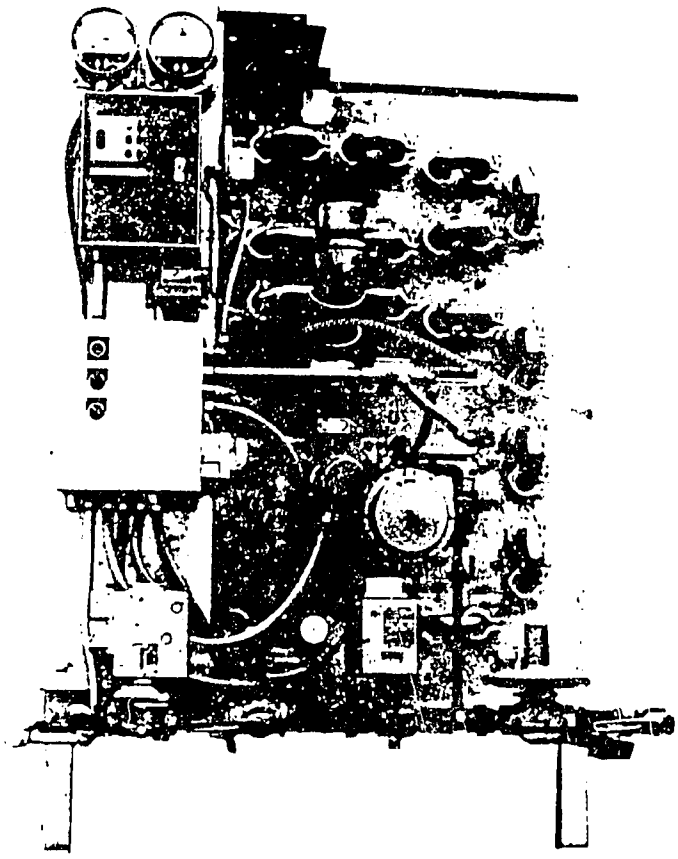
HEAT AND CONTROL, INC.®

• Model HU USDA approved fuel-fired heat exchanger



- *Inspectable stainless steel oil tubing.*
- *High thermal efficiency. No hot spots.*
- *Low heat-storage insulation.*
- *Ready-for-operation package unit.*

- Welded steel plate casing. Internal seams are sealed to prevent heat leaks.
- Multi-layer block and blanket insulation provides low casing temperatures, rapid heat-ups and quick cool-downs.
- Natural gas burner firing rates modulate automatically for a uniform oil outlet temperature.
- Burner safety features include electronic flame protection, spark pilot ignition and oil over-temperature shut-off systems. Explosion-release panels are built into the casing.
- Combustion control/safety systems are prepiped and wired to a single control panel.
- Stainless steel heat transfer tubing is internally inspectable. Return bends and headers are externally clamp-connected.
- Rapid, continuous circulation of cooking oil improves heat transfer and keeps the tubes clean of particle accumulations.
- Low oil volume contributes to fast turnover rates in the cooker system.
- USDA approved HU heat exchangers are available in standard sizes designed for most fryers. As with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

Optional Equipment

- Light oil, LPG or combination oil/gas burners.
- Oil temperature control systems.
- Inspectable pumps and piping to circulate oil between the heat exchanger and fryer.

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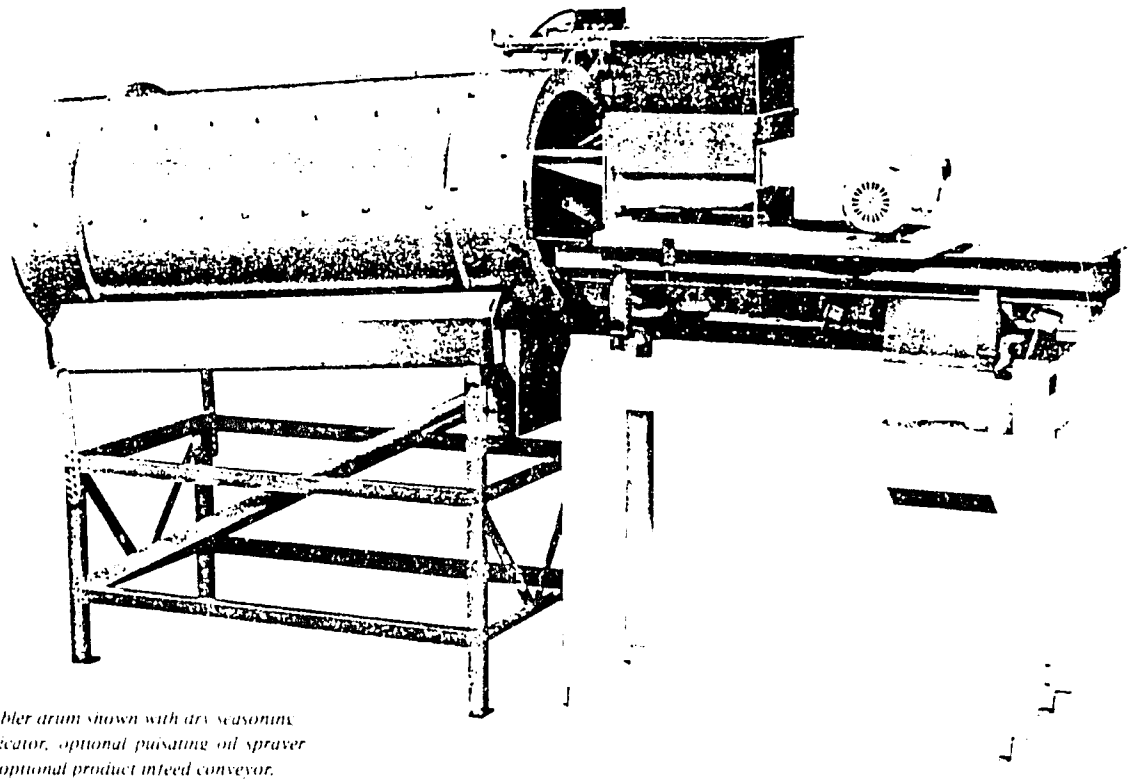
HEAT AND CONTROL, INC.

• Model TD Tumbler Drum Seasoner



Tumbler drum shown with dry seasoning applicator, optional pulsating oil sprayer and optional product infeed conveyor.

- *The Tumbler Drum accepts dispensers for three forms of seasonings*
- *Adjustable ribs prevent product breakage.*
- *Gently tumbles chips inside a rotating drum to evenly season all sides*
- *Rugged stainless steel construction*

- Inside the stainless steel drum, adjustable longitudinal ribs gently tumble chips to provide uniform seasoning distribution. The angled form of the ribs eliminates the build-up and break-off of clumps of seasoning.
- The drum is mounted on a portable stainless steel frame and can be adjusted to different angles for various production and dwell rates.
- A variable speed totally enclosed motor powers the drum. And for safety, all drive components are completely shielded.
- The Tumbler Drum Seasoner is available in several standard sizes or, as with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

Special Processing Options

- The basic Tumbler Drum can be ordered with dispensing systems for dry, slurry, or combination oil spray and dry seasonings.
- Fixed infeed chutes or vibratory infeed conveyors are available to direct your product into the Tumbler Drum Seasoner.

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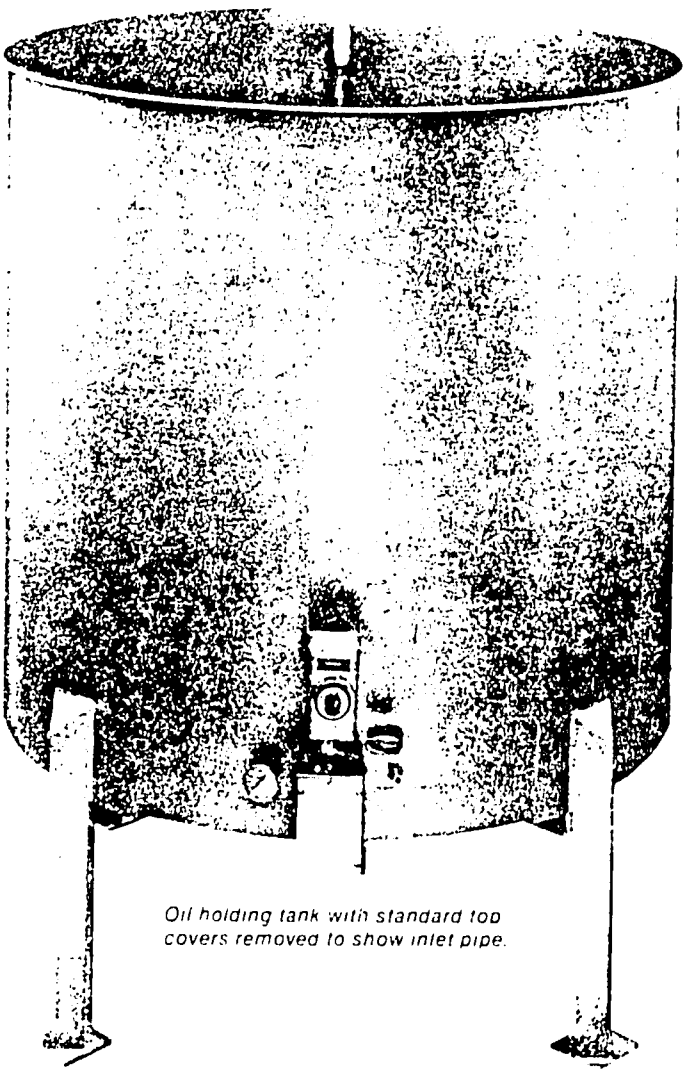
HEAT AND CONTROL, INC.

Oil Holding Tank

- *Available in many capacities*
- *Thermostat-controlled electric heating elements*



Oil holding tank with standard top covers removed to show inlet pipe.

- Holding tanks conveniently store cooking oil during system non-operation, cleaning or maintenance.
- Oil enters the tank from the bottom to minimize aeration, a leading cause of oil-fouling oxidation.
- A thermostat operates the electric heating elements to keep oil warm and prevent solidification.
- Top covers provide access for internal inspection and cleaning.
- Available in stainless or mild steel construction, holding tanks can be ordered in a variety of standard capacities and heights. And as with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

SPECIAL PROCESSING OPTIONS

- An internal clean-in-place system can be included to reduce cleanup labor.
- Completely sealed tanks are available for additional protection.
- Tanks can also be ordered in water-heated or non-heated models, for oils and other liquids.

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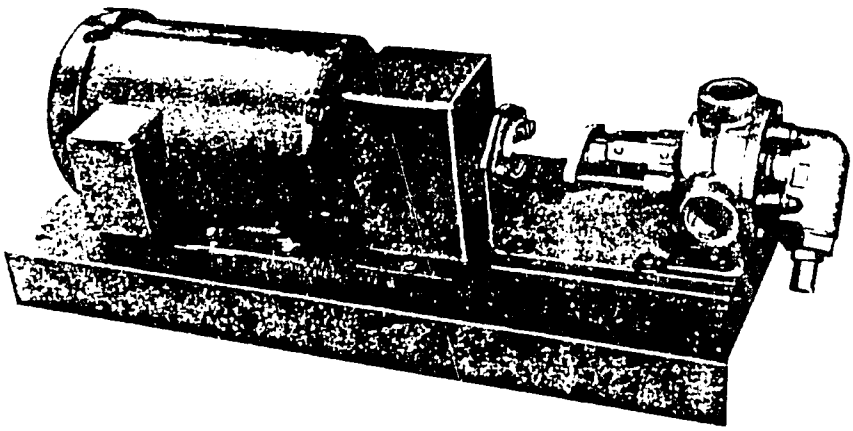
HEAT AND CONTROL, INC.

• Optional Pump Sets



- *Sets for oil make-up and transfer*
- *Ready-to-install*
- *Heavy-duty construction*

- Fresh oil make-up or reliable transfer, Heat and Control has an optional pump set to meet your unique processing and plant layout requirements.
- For oil make-up, a positive displacement pump with pressure relief valve is activated by a sensing unit in the cooker pan to maintain a constant volume of oil in the cooker.
- Transfer sets use a centrifugal pump to assure a smooth flow of oil between the cooker, heat exchanger and holding tanks—no matter how complex your plant layout.
- Whatever the application, both sets are built for reliable operation. Each features a cast iron pump and a totally enclosed motor, all mounted on a rugged steel base. A flexible coupling links pump to motor and is shielded by a steel cover.
- Pump sets are ready-to-install units which do not include interconnecting valves, fittings or piping.
- Pump sets are available in a variety of sizes or, as with any component of a Heat and Control cooking system, you may request custom engineering to meet your unique processing needs.

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ANNEX A.

SOURCES OF MARKETING INFORMATION.

Person Contacted	Company Name	Location	Telephone
1. Dan Milinovich	Bonner Packing Co.,	Fresno, Ca.	209-441-7400
2. Randy Welty	Cade-Grayson ,	Vista, Ca.	619-941-2733
3. Ben. Benigno	J.F. Braun Co.		515-997-2200
4. Geo. Souza,Jr.	Mariani Packing Co.,	San Jose,Ca.	408-288-8300
5. Steve Stapleton	Stapleton Spence,		408-297-8815
6. Bert Goldman	L.A. Nut House,	Los Angeles,Ca.	213-
7. Mike Carbonaro	Hershey Imports,	Nj.	201-388-9000
8. Harold Zwirn	Fiesta Nut Co.,		800-645-3318
9. Michael Kraidy	Sun Ripe Co.,	College Park,Md.	301-474-4783
10. James Rinella	Sun World	Irvine,Ca.	
11. Frank Light	Consultant	La Jolla,Ca.	619-454-8014
12. Brad Eisold	Organic Farms	Md.	301-595-5151
13. Donald Shugrue	Vacu Pack	Ca.	707-823-3976
14. Gladstone Soloman		Miami, Fl.	305-223-8991
15. R.D. Fizzell	General Foods,	White Plains,NY.	914-335-5708
16. R.C. Turner,Jr.	Nabisco Brands,	East Harbor,NJ.	201-884-3277
17. E. McNeil	USDA	Washington,DC.	202-447-2083
18. Cy Plutzer	Richmore Trail Mix,	Ca.	818-787-2510
19. Robert Soto	Hadley Farms	Palm Springs,Ca.	714-849-4668
20. F. Crawford	Pacific Fruit News,	Ca.	408-728-3113
21. D. Spanser	Calif. Livestock Reporting,	Ca.	916-445-4478
22. J. Quinn	Rio Del Mar	San Francisco,Ca.	415-421-6902
23. Zizi Gibbs	Gentry Foods,	Watsonville,Ca.	408-842-8261
24. Brian Todd	American Inst. of Food Dist.	NJ.	201-791-5570
25. Dan Judge	The Almanac	Md.	301-876-2052
26. Frank Mosebar	Dried Fruit Assn. of Calif.	Ca.	408-727-9302
27. David Rospin	California Delicacies	Ca.	408-727-0137

Sources of Technical Information.

1. Dr. J.H. Moy	University of Hawaii	Ha.	808-948-8210
2. Dr. Lazlo Somogyi	ETEL, Inc.	Ca.	415-527-7430
3. Charles Schoitsleeve	Sargent Co.	Ma.	617-692-6371
4. G. Martinez	Procter & Schwartz, Inc.	Pa.	215-443-5200
5. Thomas McKenzie	Heat & Control	Ca.	415-871-9234
6. Dr. Victor M. Lewis	Bryon Agricultural Pty.Ltd Rushcutters Bay, NSW, Australia		61-02-31-0671