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MAHAWELI AGRO PROCESSING PREPARATORY ASSISTANCE

DP/SRL/86/015/11-51

SRI LANKA

Terminal report*

Prepared for the Government of Sri Lanka
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Mr. P. Bauchau, consultant in food processing

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United Nations Industrial Development Organization
Vienna

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The present Mission Report has been prepared to serve as a supporting document to the drafted project document DP/SRL/86/015/C/01/37 which is attached to the present report.

This report will therefore not inform or penetrate the background, the justification, the development objectives and immediate objectives of the project which are presented in the drafted project document.

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INTRODUCTION

The activity reported here started on the 20th of June 1987 and was completed on the 15th of September 1987.

The duty station, was Colombo, with travels to Tambuttegama which is the township selected by the Mahaweli Authority of Sri Lanka (MASL) for the setting-up of a Small Enterprise Development Facility.

1. The Terms of Reference of the Consultant are :

In close co-operation with the Mahaweli Authority of Sri Lanka (MASL) as well as consultations with the UNDP Resident Representative, the food processing technologist is expected to carry out the following duties.

a. Assess the situation of one or more Mahaweli Areas to be specified with regard to the structural aspects involved, the agricultural products produced or expected to be produced, the production scale, the human and social requirements and other aspects relevant to the setting-up and operation of the Small Enterprise Development Facility.

b. Draw conclusions from the assessments made and specify the area(s) the development of which can substantially be supported by the establishment of agro-product processing facilities.

c. Specify the processing facilities required at one or more areas with regard to the equipment to be installed and the operational inputs needed such as energy, water, processing materials, storage arrangements, etc.

d. Specify other requirements of the Enterprise Development Facility such as training facilities, advisory services with regard to materials handling, product marketing, finance controls, book keeping, product quality control facilities and others.

e. Define the required inputs divided in UNDP/UNIDO inputs and inputs by the Mahaweli Authority and prepare relevant cost calculations in line with UNDP/UNIDO proforma costing data.

f. In co-operation with the UNDP Resident Representative and his staff, prepare the draft of a relevant Project Document in line with UNDP/UNIDO rules and regulations for approval and finalization if required by UNIDO Headquarters.

2. Assessment of the Situation:

It would not have been correct to assess the situation in Mahaweli Areas without assessing the situation in Sri Lanka. For that reason a large part of the main chapters concerns the situation in Sri Lanka.

3. Previous Reports:

Number of reports concerning Subsidiary Crops Production and Processing in Sri Lanka have already been prepared, some of them are listed in the Annex I.

Those documents have largely been used as background information for the present mission. Some paragraphs have been reproduced "In extenso".

CHAPTER I. MARKETING

1. MARKETING INSTITUTIONS

These are currently six State or parastatal marketing enterprises involved in the marketing of subsidiary crops:

- Department for the Development of Marketing
- Co-operative Department (CDD)
- Co-operative Wholesale Establishment (CWE)
- Sri Lanka State Trading Corporation (CONSOLEEXPO)
- Paddy Marketing Board (PMB)
- Co-operative Marketing Federation

In addition there are seven organizations acting in a supporting role with regard to the marketing of subsidiary crops:

- Sri Lanka Export Development Board (EDB)
- Agricultural Research & Training Institute (ARTI)
- Mahaweli Economic Agency (MEA)
- Central Freight Bureau (CFB)
- Sri Lanka USA Joint Agricultural Co-operation Committee (JACC)
- Ceylon Chamber of Commerce (CCC)

1.1 Linkages to Processing & Production

A major weakness exists in the links between the marketing institutions, and in particular the supporting institutions and the producers. This is reflected in terms of:

- volume of produce
- variety requirements
- quality

On the export side this is well recognised by EDB and the Exporters Association.

1.2 Marketing Information

There are deficiencies in the provision of four types of data:

- data on primary producer intentions (for processors and the fresh trade);
- data on local demand, (for primary producers);
- macro-data on international market trends (for exporters, processors, producers and government policy makers);
- micro-data on international markets in terms of specific outlets, packaging, competitors' activities, new products, variety requirements (for exporters and producers).

1.3 Marketing of Produce from Mahaweli Areas

The Ministry of Mahaweli is responsible for most activities within the area. Now that the basic infrastructure has been installed in most areas, it is concerning itself with downstream activities, in particular, the marketing of agricultural produce. Its policy is to retain as much as possible of the benefits and value added within its regions and is currently seeking solutions to its marketing problems.

However, from the point of view of the country as a whole the marketing of produce from Mahaweli must be co-ordinated with those of the rest of the country to ensure the countrys requirements are fulfilled and over productions does not occur. At the moment there appears to be little liaison between the 12 marketing institutions and the Ministry of Mahaweli Development.

2. MARKETING MECHANISM

2.1 Functions

The functions performed by the marketing systems are the most rudimentary, largely bulking and distribution. There is little storage and virtually no drying, cleaning and grading. Packaging is also rudimentary. Effectively as the system performs these limited functions, quality standards are inevitably low and losses high.

2.2 Effectiveness of the System

The marketing system serves its purpose, namely, the bulking and distribution of a highly fragmented supply, and serves it effectively. It is competitive at all its levels - producer, trader, wholesaler and retailer. Multiplicity of links in the chain is an inherent feature of the system as produce is bulked successively at village, district, region and terminal points. However, as a mechanism for transmitting volume and quality signals down to the producer, it fails.

2.3 Marketing Chain

Multiplicity of links is not in itself undesirable. On the contrary, with a highly fragmented supply situation the intermediaries perform a useful function and they serve both producer and consumer. Also there is no evidence to indicate that they charge excessively for the service they provide. Reduction in the number and influence of intermediaries will come with the integration of supply resulting in fewer and larger units. This integration of supply will also serve to remedy the two serious failings in subsidiary crops production, sustained commercial volume and acceptable quality standards. Major exporters have been

forced to invest in new washing, cleaning, drying, grading and packaging measures in an attempt to improve quality to the greatest possible extent. Quality control, however, should begin where the produce is grown and has to be maintained by the marketing system.

2.4 Post-Harvest Handling Technology

This aspect will be discussed in Chapter II but in terms of marketing the following points are relevant:

- A lack of know-how persists at all levels from the producer to the exporter. Inadequate degrees of demonstration and teaching exist throughout the system, particularly with regard to the trader and farmer.

- Research is required to determine the precise character and cost of present practice, and from this the scope for the investment improvement can be examined.

- Awareness of and the utilization of quality and grading standards diminishes at each level down the chain. There is a cause and effect situation to some extent, in that quality and post-harvest technology are closely inter-related. Lack of appreciation of the technology can affect quality and vice versa.

3. DOMESTIC MARKETING

3.1 Demand for Fresh Unprocessed Products

It is likely that demand for this category of product will grow in line with population and income growth. There are seasonal shortage and gluts.

The demand for supplies of produce all the year round is likely to increase as standards of living increases.

3.2 Demand for Semi Processed and Processed Products

i. Vegetables

The majority of supplies are utilised at the home or village level. A small amount is utilised in pickles and chutneys.

ii. Fruit

Outlets are jams, chutneys and soft drinks. The latter is the largest and the fastest growing sector. There are some problems with supply of seasonal raw materials.

4. EXPORT OF PROCESSED FRUIT & VEGETABLE PRODUCTS

4.1 Vegetables

Exports of processed vegetable do not exist to any extent. However, as a general area, the export of semi-processed vegetables, such as chillies and gherkins in pickeled form or in brine, are felt to have good prospects, the reason being that low labour costs in Sri Lanka of picking makes the produce competitive in countries where picking costs are high.

Shipments have been made to Australia, and Japan is considered to be a potential market although no investigations have been made.

4.2 Fruit

Exports of processed fruit have been in a state of decline since the period in 1960s when significant passion fruit exports took place. At present, exports consist of:

	Tonnes	Rs.'000
Jams, Jellies and Marmalade	5.8	0.169
Fruits processed otherwise	527	1.696
Unfermented fruit juices-citrus	46	1.242
-others	302	9.246
-mixes	26	0.673

The major problem is in obtaining access to sufficient volumes of raw material and producing a product of the quality required by the international community.

There appears to be scope for the export of the juice of passion fruits, soursop and pineapple. This type of product is not so dependant on quality and can cope with the wide ranges in fruit quality experienced in Sri Lanka due to varietal differences.

5. OPPORTUNITIES

5.1 Export of Processed Products

There is a definite export potential for semi-processed product in bulk.

i Fruit, in particular, passion fruit, pineapple, soursop

ii Vegetables such as gherkins and chillies in pickle or brine.

5.2 Processed and Semi Processed Products for the Local Market

Such an opportunity is specifically applicable for the Tambuttegama demonstration plant.

Most of the processors contacted during the mission have shown a real interest in establishing contracts for the supply of processed or semi-processed products such as frozen passion fruit juice, frozen fruit pulp (mango, guava, soursop), tomato concentrate.

Processors-Exporters have indicated their interest in purchasing semi processed products.

Products	Quantity ('000 kg/year)
Tomato Concentrate	240
Frozen Passion Fruit Juice	500
Mango Pulp	60
Lime Juice	20
Soursop	Not Specified
Wood Apple Pulp	Not Specified
Guava Pulp	Not Specified
Orange Juice	Not Specified
Various Fruit Pulp and Juice (mainly lime)	Up to 1,000

Some processors have indicated their interest to have some of their finished products manufactured in Tambuttegama under their brand.

CHAPTER II. PROCESSING & POST-HARVESTING

1. INDUSTRY STRUCTURE

1.1 Fruits & Vegetables

The industry is characterised by a small number of processors and exporters dependent on highly fragmented production base. However, there is a defined trend by processors and exporters to source their supplies directly via contract growers or Export Production Villages. At present 5 percent (5%) is obtained directly.

i. Exporters of Fresh Produce

There are five major enterprises which have their own association: the Sri Lanka Fruit & Vegetable Producers, Processors and Exporters Association, along with exporters of processed fruit. They are all based in Colombo with facilities for grading and packaging. They purchase supplies from either EPVs or from the Colombo wholesale market. The major commodities exported are green chillies, pineapple, cassava, mangoes and ginger. In general, exporters are handling only 50 percent of their capacity in terms of staff, grading and packaging facilities, largely due to lack of access to airfreight.

ii. Fruit Processors

There are 11 companied involved. One of these, Lanka Canneries Limited, is Government owned. These 11 companies account for 95 percent of the output. There are a number of much smaller regional based companies. The largest fruit processing enterprises are located in or near Colombo and are divided into two groups, those with capital assets of Rs.2-4 million, manufacturing for

the local market, and those with capital assets in the range Rs.4-60 million; both manufacture jams, squash, chutney, sauce, preserves and ready to drink beverages (for both local and export markets) and mainly passion fruit juice, canned mango, canned fruit cocktail (exclusively for exports).

The level of technology is behind the advanced technology in use outside Sri Lanka but is adequate for the markets currently being served. Skill levels in the private sector appear to vary. There is a shortage of trained technical personnel throughout the industry.

1.2 Food Packaging

i. Fresh Produce

Poor packaging of fresh produce utilising mainly bags, or the absence of any packaging whatsoever, is responsible for the large post-harvest losses, estimates of which vary from 20 percent for tubers such as cassava, to 70 percent for leafy vegetables.

ii. Processed Products

There tinplate and glass containers have been standard, virtually monopolistic imports and monopolistic local manufacture have up to now been the major constraints. But planned investments by local manufacturers in new can fabrication equipment and in better machinery for glass bottle and jar manufacture are likely to bring some relief very soon. However, the high proportion of the cost of the retail containers to that of the final product is a problem. Bulk export of fruit and vegetables, juices and pulp, frozen or otherwise, form a part of this same broad problem.

2. SUPPORTING INSTITUTIONS

All these institutions are Government Organizations and are concerned with three areas of activity.

- Research
- Training
- Standards

2.1 Research

i. Facilities

Research on post-harvest technology and processing is carried out by five different institutions belonging to two different ministries, and located in three different districts of Sri Lanka. There is very little co-ordination between the various research institutions, some of which were created by Government in response to the needs of the day, while other, more recently created, institutions came into being as a response to the need for and availability of, bilateral and multilateral donor aid. No consideration was given to the consequences of this type of development for the work programmes, staffing and budgets of existing institutions. One result of this is that Government is left with an increasing burden of the costs associated with the upkeep and staffing of the various institutions once donor aid is withdrawn. Current problems are:

- staffing difficulties resulting from low pay in the Government service;
- lack of opportunity to engage in state-of-the-art research and product development for which many of the staff have been trained overseas;
- inadequate laboratory and pilot plant facilities;

- bureaucracy which stunts initiative;
- lack of mobility of staff;
- inadequate schooling facilities and the relatively poor quality of life in research stations outside the capital.

About 50 percent of those who receive post-graduate training overseas fail to return to Sri Lanka. There appears to be no policy of 'train and retain'. Bonding does exist but the period has been reduced recently and is largely ignored.

ii. Deficiencies in Research

These also occur:

- The Food Technology section of CISIR is responsible for work on the post-harvest technology and processing of fruits and vegetables, but has never managed to make a practical impact on the development of the processing industry comparable with that made by the Fruit and Vegetable Utilization Laboratory of the Marketing Department (FVUL). Since the latter's closure in 1979, this section of the industry has received very little technical support.

- Work on the evaluation of the suitability of new varieties of fruits and vegetables, for processing, is not undertaken on an organized basis. Thus the Food Technology Section at CARI lacks facilities for determining the suitability of new fruit and vegetable varieties for processing or fresh consumption.

2.2 Training

i. Training of Technicians

The training of laboratory technicians, undertaken by the independent Institute of Chemistry in Colombo, contributes to the provision of laboratory staff needed for industrial and government laboratories. However, there is no provision for holders of the LTTC to proceed further with their studies in process engineering of food technology, and by stages, over a number of years, gain qualifications at senior technician or graduate level. Some system which provides for further training to graduate level for those with the necessary ability who are unable to attend a university on a full-time basis, should be considered.

ii. Graduate Training

Graduate level training Food Science and Technology at the University of Peradeniya as part of the B.Sc (Agriculture) and post-graduate training at the same university and also at the University of Sri Jayawardenapura, suffers from the lack of facilities for practical work in product development, process engineering, unit operation, pilot plant trials and plant design layout and construction, for full-scale processing activities. Attachment of graduates to the limited number of the processing companies or research centres for practical training during vacation periods is unsatisfactory, and is often difficult to arrange. As a consequence, university teaching tends to focus on food science rather than food technology, which by its very nature is a practical subject.

2.3 Food Standards

With reference to statutory food standards, adoption of new food regulations under the 1980 Food Act is proceeding but is constrained by the lack of adequate trained manpower and laboratory facilities. It is easy to understand that other development needs are given higher priority in Sri Lanka.

The work of the Sri Lanka Standards Institute (SLSI) in formulating new standards of importance to the food industry, is proceeding satisfactorily and the introduction of the certification scheme seem to have yielded positive results by improving the hygiene in fruit processing factories and the quality of products destined for local or export markets.

3. FRUIT & VEGETABLE POST HARVEST HANDLING AND PROCESSING TECHNOLOGY

This sector as a whole is characterised by a lack of co-ordination of primary production with post-harvest treatment and handling, processing and local and export marketing.

3.1 Post-Harvest Handling of Fruit & Vegetables

The performance of this sector can be characterised as follows:

i. Post Harvest Handling

Post-harvest handling technology is not utilised at any stage between the producer and consumer for the local

market, except for washing and trimming at retailer level only. At the farm level, produce is generally not graded (except for papaya, pineapple and passion fruit) and only tomatoes are packed in wooden boxes. Most other crops are packed in gunny bags or transported loose.

ii. Storage

The utilization of any formal storage, both short term and medium term, to lesses the effect of gluts, does not take place.

iii. New Developments

Exporters of pineapples, green chillies and yams have begun to utilize reefers for sea shipment to the Middle East. This has identified a need for facilities to reduce field heat of produce for export and the need for these crops to be kept under cool conditions from harvesting.

3.3 Variety Selection for Processing & Export

Insufficient attention is being paid to the introduction of varieties of fruits and vegetables, which have the characteristics required by exporters or processors. At present, there is no mechanism to facilitate co-ordination between exporter and processors on the one hand and producers and Government institutions on the other.

CHAPTER III, RAW MATERIAL PRODUCTION

1. LAND USE

Current Land Utilization

The following table summarises current land use in Sri Lanka with particular relevance to subsidiary crop production.

TABLE

EXTENT OF LAND USE & VEGETATION COVER IN SRI LANKA (1984/85)

	EXTENT('000 Ha.) Sub Total	Total
Non-agricultural Land -		
Urban Areas	23	
Natural Forest, Forest Plantation/Grassland & Scrubland	2,356	
		2,379
Perennial Crop Production -		
Plantation Crops(tea, rubber, coconut)	901	
- Homestea gardens & Fruit	1,052	
- TEC	60	
		2,013
Irrigated Crop Production		
- Paddy	483	
- Sugar	6	
		489

	EXTENT('000 Ha.)	
	Sub Total	Total
Rainfed Crop Production		
- Paddy	275	
- Sugar	6	
- Other Field Crops	239	
		520
Shifting Cultivation	1,000	
		1,000
TOTAL		1,401

Source: Department of Census & Statistics, Ministry of Agricultural Development & Research.

2. FRUIT & VEGETABLE PRODUCTION

2.1 Production

The data has limitations in that while extents under cultivation are given in hectare units, the outputs are reported in terms of numbers of fruits. National time series data indicate that the extents under cultivation of certain crops fluctuated slightly but there has been an overall increase in area from 73,965 hectare in 1980 to 82,670 hectares in 1985. The order of pricrity crops based on extents cultivated is as follows:

	Percent		Percent
Banana	42.6	Pineapple	4.0
Jak	22.3	Orange	3.3
Mango	12.0	Passion Fruit	1.0
Breadfruit	6.0	Minor Fruits	3.8

The time series data also show that with the exception of orange and pineapple, which showed a decline in extents cultivated, the others increased. Significant increased in extents cultivated were reported in mango by 22 percent and banana by 18 percent. Minor fruits include avocado, guava and soursop. Planting material used is reported as mostly 'local' and therefore of uncertain genetic percentage.

2.2 Productivity

Estimates of productivity in terms of tonnes per hectare are unrealistic as this involves conversion of numbers of fruits of different varieties in weight. Nevertheless, even considering output in terms of numbers, there is a very wide fluctuation during the year.

2.3 Extension of the Production Season

There are currently seasonal gluts of fruits, in particular limes and mangoes, during harvesting and shortages out of season. The extension of the production season is one of the objectives of the Horticulture division. There are regional differences which can extend the season of such crops as mangoes. Other approaches being adopted by the Horticulture Division are:

- identification of existing varieties in the country producing out of season;
- use of irrigated Production.

3. IRRIGATION

3.1 Present Extent

At present about 489,000 hectares of land are provided with irrigation facilities, classified as follows:

- 'Major schemes including the Mahaweli development area, 307,000 hectares

- 'Minor' schemes, 185,000 hectares

Of these, 84,000 hectares falling under the command of the major schemes are on well drained soils, where under paddy cultivation irrigation requirements are high.

Mahaweli areas under System B, C, G and H account for 30,000 hectares of these well-drained soils and the balance, 54,000 hectares, comes under the command of the existing major schemes outside the Mahaweli Authority area.

3.2 Potential for Subsidiary Crops

If the 84,000 hectares of well-drained lands is taken out of the full extent of 362,000 hectares (including 5,000 hectares of imperfectly drained soils, not yet developed, and 4,000 hectares of well-drained soils coming under the major irrigation schemes after completion of Mahaweli Systems B and C), 739,000 hectares of rainfed and irrigated land are available for rice production. This extent, at an average cropping intensity of 140 per cent and yield of 3.30 tonnes/ha of paddy can produce an amount of rice slightly in excess of the 1986 requirements of 1,655,000 tonnes.

To avoid a glut in rice and conserve irrigation water, the well-drained lands can be utilised for subsidiary crop production. Almost 80,000 hectares of well-drained land are immediately available with irrigation facilities and another 4,000 hectares will become available on completion of Mahaweli Systems B and C.

3.3 Irrigated Subsidiary Crop Production

Traditionally irrigated subsidiary crop production has been extensively practised only by small-scale Jaffna farmers using groundwater sources and by the Sri Lanka Sugar Corporation under major irrigation schemes. Recently, due to a massive extension effort by the Department of Agriculture and the Mahaweli Authority of Sri Lanka, around 20,000 hectares of irrigated lands, mostly under major reservoirs, have been cultivated with subsidiary crops during the dry season (Yala). Advice on appropriate water management techniques for subsidiary crops has not accompanied the extension effort, with the result that there has not been much saving on water nor is there any subsidiary crop production during the rainy season (Maha) as paddy is grown exclusively.

Certain limited studies have been carried out to ascertain the production response of some subsidiary crops to irrigation. Though the results of these studies are not conclusive, a qualitative assessment is possible on the basis of figures in Table below:

These figures show that there is considerable scope for introducing irrigated subsidiary crop production. However the data available are not sufficient to provide the basis for a viable extension message. No work has been done on rotations or on varieties suited to irrigated crop production.

TABLE

COMPARISON OF PRODUCTION RESPONSE OF CROPS TO IRRIGATION

Crop	Yield kg/ha		Percentage Increase with Irrigation
	Rainfed	Irrigated	
1. Chillie	400	1,000	150
2. Cowpea	700	1,500	114
3. Black Gram	800	1,500	88
4. Groundnut	800	1,500	88
5. Green Gram	600	1,000	67
6. Onions	7,000	10,000	43
7. Soyabean	1,500	2,000	33

There are no available data concerning the production response of fruit trees to irrigation, but researches conducted by the Division of Horticulture have shown a very positive response for certain fruit trees. In particular the season could be considerably extended for some fruits like limes.

The table below shows the seasons for various fruits and vegetables in Sri Lanka.

3.4 Situation in Mahaweli System "H"

A very limited amount of data are available and are summarized in the tables below.

FRUIT CULTIVATION (in Ha)

	Planted	Proposed Extension
Lime	98.76	36.0
Orange	56.62	37.0
Mango	229.0	80.0
Banana	1,048.0	274.0

Source: Mahaweli Authority Economic Agency

Data concerning other minor crops are not available such as guava, soursop, woodapple, jackfruit, papaya etc. Nevertheless, those crops exist and the writer personally saw some of them. It was impossible to quantify those minor crops for they have never been commercialized. It is said that guava grows wild in abundance.

Concerning the vegetable production the same source gives the following figures in hectares (Ha).

VEGETABLE & LEGUME CULTIVATION

	1986 (under irrigation)	1986/: (Under Rainfed)
Chilles	11,025	207.3
Coupea	647.9	321.1
Green gram	377.8	214.0
Black gram	284.0	36.1
Red onions	72.1	20.0
B. Onions	105.7	19.45
Vegetables	456.8	457.77

The yield per hectare is not available, nor the various vegetables which have been grown.

3.5 Perspectives in Mahaweli System "H"

With the existing conditions: A dry zone with an irrigation scheme, system "H", is in an ideal position to diversify its crops production.

At present the 23,600 ha of the System H are utilized for paddy production. But out of the 23,600 ha, 9,600 ha are of well-drained soil which could be more profitably utilized.

An end-product oriented diversification will doubtless give a higher profit to the farmers.

But, there are two major factors influencing costs and returns:

(i) Labour

For most of the less intensive crops (mainly the rainfed cereal legume and tree crops), the cash cost component in production is vey small. The main input is the farmer's time. The main factor affecting a farmer's attitude to cash crops is, therefore, probably price of the end product. Where a crop is being produced for home consumption, like paddy, this is less important as it is viewed as food and thus a strategic requirement for the family. Even though in some cases where a farmer theoretically can earn more from other crops, thereby permitting rice needs to be purchased, very rarely does this happen. For the rainfed farmer there is currently very little option other than growing legumes and cereals. It is unlikely that the Government floor support scheme provides any psychological support to the farmer as regards guaranteeing some level of return.

(ii) Prices

Crop prices are also a particularly important influencing factor with the SEC farmers. Wildly fluctuating farmgate prices for farmers, who have very small sized areas of these crops, are unlikely to persuade them to maintain a high degree of husbandry requiring cash input. Consequently, these crops will be viewed as opportunist. The crop is profitable when prices are high but when prices are low and the crop not worth harvesting (e.g. cinnamon at the present time) the farmer has not lost money on expensive inputs.

To balance those factors, Mahaweli Authority should guarantee a minimum level of return to the farmers diversifying their crops according to the recommendation and needs of the market.

CHAPTER IV: AGROPROCESSING FACILITIES IN TAMBUTTEGAMA

1. PRODUCTS

1.1 Fresh Products

(i) Off- season fruits in particular limes.
(ii) Vegetables

1.2 Semi-processed products for export or to supply existing processors and established exporters. Some of those products have been identified in the Chapter III : fruit pulp, lime juice, tomato concentrate.

1.3 Processed products.

1.3.1. Local market
(i) Products marketed under an existing brand.
(ii) Jam. There are indications that the existing one lb. jar are too expensive for many customers. The production of jam in small flexible containers (25 gm.) that could be sold for about 2 Rupees could be a very profitable venture.
(iii) Fruit juices and cordials.
(iv) Banana Chips.
(v) Dried fruits and vegetables.
(vi) Spices.

1.3.2. Export
Directly or through existing exporters.
(i) Vegetables in brine.
(ii) Dried fruits and vegetables.
(iii) Tomato concentrate, and sauces.
(iv) Fruits in syrup : Jack fruit, mangoes, tropical fruit cocktail.

1.4 Assistance and support

1.4.1. C. I. S. I. R.
1.4.2. Export Development Board
1.4.3. Sri Lanka Standards Institute
1.4.4. Sri Lanka State Trading Corporation
1.4.5. Mahaweli Economic Agency
1.4.6. Private Consulting Company specialized in marketing

2.PRODUCTION OF RAW MATERIAL

2.1 Production in general

The Production of raw material will be end-products oriented. It must be kept in mind that the settlers have been paddy farmers since ever and unless they are convinced that they will have a substantially higher profit, they will not easily venture into cash crops production.

If the diversification of their production implies a relatively important investment, it will be even more difficult to convince them. And higher is the initial investment (like passion fruit which is 6,000 to 12,000 rupees per acre) stronger will be their resistance to diversify their production.

As far as the production of fruits and vegetables is concerned in System "H", we can consider four categories.

i) Existing and known fruit trees : mainly banana, mango, lime and orange as described in Chapter III.

ii) Existing fruit trees for which no data are available such as papaya, soursop, guava, jack, woodapple etc.

It is important to have information on those crops in order to give proper recommendation for new plantations.

iii) Vegetables which are known by the farmers and could subsequently grown without any problem. The most important ones being tomatoes and chillies.

iv) Fruit trees which are not grown in sufficient quantity or are unknown or should be cultivated under irrigation to extend the season. This category is the most important not in terms of quantity but in terms of quality and diversification. And it implies : the utilization of well-drained soil (now used for paddy production), a period of three to five years before expecting an income in the case of fruit trees, an initial investment that can be high in the case of passion fruit but which gives a higher return, new techniques like, pruning, mulching and proper harvesting.

2.2 Demonstration farm

The Mahaweli Authority is commited to established a 10 to 20 acre demonstration farm. It will be organized and supervised with the assistance of the Horticulture Division of the Department of Agriculture and the Maha Illuppallama Research Station. Such a demonstration farm will serve many purposes :

- To supply the processing plant with adequate raw material not available yet in System "H".
- To introduce at a production level, selected and well adapted varieties for processing and fresh consumption.
- To demonstrate the techniques for irrigation, maintenance, manuering, mulching, pruning, harvesting etc.
- To demonstrate intercropping possibilities.
- To demonstrate the importance of rotation.

2.3 Home gardens

With the assistance of the Maha Illuppallama Research Station the home gardens could be upgraded to meet the market demand. The improvement could be achieved through demonstration garden.

2.4 Assistance and Support

(i) The Horticulture Division and the Maha Illuppallama Research Station. Their assistance is much needed.

- For the demonstration farm (2.2).
- To give training and guidance to the extension officers.
- To give guidance for the establishment of a nursery, such a nursery could be managed by settlers.

(ii) Financial Support
As explained earlier, the establishment of fruit tree farms could require important investments and delays (up to 5 years) in receiving revenues. Most of the settlers cannot afford it. EIED will have to find out a financing support and if they cannot, the farmers could start their diversification with half an acre.

3. PROCESSING AND POST-HARVESTING

3.1 Staff management will include one manager, two food technologists and one post-harvest Physiologist. Such trained technical staffs are not available in Sri Lanka at the present time. They will be trained at different levels :

(i) In land training with local industries and organizations.

- The food technologists with Lanka Canneries Ltd. and hopefully with other processing industries which have indicated their interest in purchasing semi-finished products.

- The post-harvest physiologist with CISIR and the Horticulture Division.

- The three of them with the Sri Lanka Standard Institute.

(ii) On the job training with consultants.

(iii) fellowship.

3.2 Other Staffs

The laboratory assistants and the foreman will be trained by the food-technologists with the assistance of the consultants.

3.3 Entrepreneurs

The labour force of the demonstration plant will consist of potential entrepreneurs. They will be trained for a period not exceeding 12 months with the hope that some of them will set up their own small business. Some guidelines to achieve such a goal are given in Chapter V. A special attention will be given to avoid the departure of all these trainees at the same time.

The trainees will be selected during the Entrepreneurs Development Training Programme as described in the Drafted Project Document. Full advantage should be taken of the International Labour Organization Project "Integrated Entrepreneurship Development Programme" (SRL/87/035). It is believed that those entrepreneurs should be paid during their training, as normal workers.

3.4 Facilities

Three 120 square meter existing buildings have been entified and will be upgraded according to the general layout (annex V attached).

The following facilities will be provided :

- Toilet Block
- Renovated Office
- Electricity : 64 K.V.A. (3 phases 380 volts)
- Water : 3 cubic meters per hour
- An adequate sewerage system
- Water cooling tower

3.5 Equipment

3.5.1. For analysis and quality control. Only the following simple analysis will be performed.

- Total soluble solid (refactometer)
- PH and acidity as citric and acetic acid
- Moisture content
- Salt content (Hydrometer and Refractometer)
- Vacuum

If more specific analysis have to be carried out the assistance of C.I.S.I.R. could be requested.

3.5.2.Processing Equipment

The annex VI of the drafted project document gives the list of the proposed equipment.
The annex II of the present report gives some information concerning the equipment.

The selection of the equipment has deliberately been end-product oriented. A market exists in Colombo and on the other hand Mahaweli could produce the raw material to satisfy the market.

The writer believes that it would be a mistake to select equipment with the criterium that financially speaking it could be purchased by an entrepreneur. This does not mean that there is no room for the small entrepreneur. A different approach will be developed in Chapter V.

4. THE DEMONSTRATION PLANT

It will be profit oriented in order to achieve the following results :

- To become a self-supporting body offering attractive incentives to the staffs and able to pay a sufficient salary to the trainees.
- To demonstrate to the private sector that investing in Agro-processing in Mahaweli can be a profitable venture.
- To be able to financially assist entrepreneurs in setting up their own enterprise.

CHAPTER V: EXPECTED RESULTS

The original concept of RIED of MASL was that the setting up of an "Incubator" could be the ideal mean for potential entrepreneurs to be trained and to set-up their own small factory in purchasing equipments similar to the ones they were utilising in the incubator during their training.

The writer believes that such an approach is dangerous for it presupposes that the size of the enterprise (which implies identified targeted market), the type of products, the suitable equipment etc. are already known, which is not the case.

Therefore, another approach is developed under the 9th section of this Chapter. If, on one hand, the initial cost of the project is higher than the one that could be duplicated by an entrepreneur, on the other hand the proposed demonstration plant will hopefully be economically viable, and will offer to the potential entrepreneur more possibilities to set up his factory with less risk.

The expected results are as follows:

1. MAXIMISATION OF IRRIGATION POTENTIAL

The well drained soil now used to produce paddy could be more profitably utilized to produce fruit crops and vegetables which will provide a higher return to the farmer (see the table below). In many cases diversification will imply new jobs.

It estimated that 100 hectares of well drained soil will be needed to supply enough raw material to have the demonstration plant fully utilized.

2. STRENGTHENING OF VERTICAL LINKAGES

By strengthening the linkages of those involved in production, post-harvest handling, processing and marketing the following results can be expected:

- increase in the volume of products reaching the end user through loss reduction;
- increase in production through clearer market signals reaching the producers.

Perennial Crops												
Cardamom (Ha/ha)	66	6600	805	42	825	170	13000	106	13500	106	17	4700
Cardamom (Ha/Ll)	32	2900	640	26								
Cinnamon (Kandle)	900	8700	60	432	670	320	4200	53	4200	53	3	-2,600
Cinnamon (Matara)	250	-2200	20	192								
Pepper	900	90000	200	170	900	240	23000	12a	23000	12a	23	32000
Cloves	840	20000	565	54	800	324	20000	20a	20600	20a	84	-2300
Cocoa (Ha/ha)	370	3700	57	163	670	146	10000	113	10600	113	84	-3000
Cocoa (Ha/Ll)	300	30000	206	87								
Coffee (Ha/Ll)	600	30000	537	78	630	217	12500	90	17500	90	84	6000
Coffee (Ha/ha)	600	33000	305	95								
Passion Fruit (?)	7500	27000	144	200	10600	171	52000	343	53000	343	1000	170000
Guava (?)	3000	10000	235	52	9400	96	10000	157	11000	157	1000	32000
Pineapple (?)	4000	4200	70	117	12500	243	24000	300	27000	300	50	66250
Papaya (?)	12000	60000	120	200	11300	90	14000	224	16000	224	1000	42000
Mango	6000	13000	30a	50	6000	90	6500	132	8300	132	17	2000
Limes	7000	42000	60a	95	9000	105	47000	600	47000	600	65	115000
Orange	6000	60000	1900	37	7000	105	63000	640	63000	640	57	174000
Cashew					700	20	14000	540	14000	540	26	17500
Coconut (Nut/Ha)					14000 nts	65	11000	20a	10600	270	37	24000
Coconut (Nut.$/Ha)					14000 nts	65	14000	642	17600	420	47	64000
Tea					2000	300	-3000	30	-3000	30		-30000

Gross margin data derived from budgets not presented in this report

TABLE

SUMMARY OF CROP GROSS MARGINS

Crop (1)	Irrigation source	Yield (2)				Variable costs (3)		Fixed costs (4)		Economic (5)		Labour (6)	Capital (7)
		kg/ha	qx/ha (Rs.)	qx/ad (Rs.)	cx/ha (Rs.)	kg/ha	cx/ha (Rs.)	qx/ha (Rs.)	qx/ad (Rs.)	qx/ha (Rs.)	qx/ad (Rs.)	(%)	qx/ha @ 15% (Rs.)
Annual Crops													
Cassava	R	1000	4000	20	135	600	225	940	40	1240	46		
	I					1200	180	4000	80	4300	79		
Green Gram	R	1000	8000	100	225	600	225	3300	67	3900	67		
	I					1000	190	7000	200	6400	90		
Black Gram	R	1200	17700	157	941	600	225	4000	76	5600	76		
	I					1200	192	10000	134	10450	132		
Groundnut	R	2000	6000	85	206	1000	250	2200	55	2700	56		
	I					2000	225	9000	222	9200	166		
Soya Bean	R	1600	5600	96	205	600	220	-1400	26	-1720	21		
	I					1600	200	6452	80	2400	60		
Sesame	R	600	3200	40	64	600	225	600	43	650	41		
Maize	R	2000	8000	64	122	1200	160	1040	55	2760	63		
Paddy (recommended variety)	R					2500	130	3800	63	5300	77		
Paddy (improved variety)						2500	130	3800	63	5100	65		
Cassava	G	7500	3200	65	160	7500	160	5600	96	6300	76		
Vegetables (a)	I	15000	67000	227	240	15000	600	24000	120	28000	114		
Tomatoes	I	8000	24000	120	126	12000	450	28000	60	24000	70		
Potatoes	I	14500	55000	97	275	14500	330	22000	80	44000	91		
Dry beans	R	2500	10000	120	160	2500	300	14500	96	15000	86		
Cowpea	R	2500	10500	175	125	4500	160	15000	167	15000	142		
Green Pigeon	I	15000	60000	205	160	12000	450	17000	70	17500	75		

3. PRIVATE SECTOR INVOLVEMENT

The Crop Agriculture Development Strategy (October 1984) stresses the need, in particular, for agro-industrial development, to restructure policies, to provide investment incentives, remove administrative bottlenecks and reduce perceived risks to investment. Of these, perhaps the latter is seen by the private sector as the greatest obstacle and Government is already taking steps to overcome the first two. These perceived risks can be isolated as two inter-related aspects. The first is the purely financial risk, and second the technical risk due to unfamiliarity with non-traditional crops, and in the case of Mahaweli, uncertainty concerning the raw material potential.

A successful demonstration plant could be the necessary incentive to attract the private sector in Mahaweli and set up viable commercial units. These investments are likely to be based on the output of settlers, resulting in increased productivity and increased incomes.

4. SKILLED LABOURS

A core of skilled labours will be developed consiting of:

- Trained farmers familiar with non-traditional crops in Mahaweli.
- Trained farmers familiar with harvesting and post-harvesting techniques.
- Trained workers familiar with food processing techniques.

Such a core of trained and skilled labours will be a very valuable asset for the private sector.

5. HARVESTING AND POST-HARVESTING IMPROVEMENTS

Improved harvesting, post-harvesting and handling techniques will obviously reduce the wastage and improve the quality of the raw material for fresh consumption and for processing, it will subsequently give a higher profit to all levels from the producer to the retailer.

6. GLUT SEASON

An important part of the excess of production during the glut season will be utilized by the demonstration plant.

That excess is usually lost; processing it will give additional incomes and jobs.

7. MARKET RECOMMENDATION

One of the immediate objectives of the proposed project is: "To validate the economic and technical viability of fruit and vegetable products by research, development, production and marketing on small scale.

In tern of budget, that component is small, but the conclusions and recommendation of the technico-economic reports concerning the products developed by the demonstration plant are of vital importance because they will form the background material to guide the potential entrepreneur in its decision to set up a small enterprise.

8. JOBS CREATION

At all level, production, harvesting, handling, processing and distribution such a project will promote new employment.

9. SELF-EMPLOYMENT

The writer believes that to "make entrepreneurs" through courses and training is a very hazardous and artificial way to promote entrepreuneurship; it is particularly hazardous for the potential entrepreneur who is the one taking all the risks. And when dealing with food processing, the risk is even greater for the basic raw material is perishable and with prices varying with the season.

But the "born entrepreneur" should receive all possible help and assistance to set up and to develop its own small business. To achieve such an assistance in System H some measures have already been taken by the EIED: EDTP courses and small business advisory service.

To give the necessary technical training and to minimize the risks taken by the entrepreneur, the following approach is proposed:

Step one: EDTP

During that course EIED should be in a position to make a pre-selection of potential entrepreneurs interested in setting up a small food processing unit.

Such a selection should be based on pre-established criteria; e.g. willingness to diversify their production, implementation of post-harvesting techniques, equity etc.

Step Two: On-the-job training in the demonstration plant.

The training will have two components:

- Purely technical training: sanitation, techniques, procedure, equipment etc.
- Management training by keeping the trainees fully informed concerning the performances of the demonstration plant and the results of the market study.

They will often be reminded that the ultimate goal of the demonstration plant is to promote entrepreneurship.

Step Three: It is hoped that during the training some individual(s) will show some willingness to become an entrepreneur. At this stage, the role of the plant staff can be determinant.

Step Four: By discussion with the potential entrepreneur, it should be possible to determine quite accurately the type of enterprise he has in mind: size, type of products, targeted market, necessary equipment, source of raw material, equity, partnership etc. It is a long but extremely important exercise.

Step Five: To confirm or to infirm the economical viability of the proposed business. If necessary additional market studies will be conducted.

Step Six: (only if step five is positive) To determine what are the main constraints to implement the proposed business: equipment, facilities, finance, raw material.

Step Seven: to remove the constraints. Those constraints can already be forseen. Lack of finances to have the proper facilities, equipment, stocks, working capital. To finance it by a loan, (if the entrepreneur's equity is negligible), can become a very frustrating exercise for the entrepreneur whose earning is utilized to reimburse his loan.

For that reason it is proposed to minimize the initial investment. Among the possibilities to do it, two of them have been identified.

(i) To purchase semi-finished products from the demonstration plant like fruit pulp to make juices or jams. This will eliminate the important investment represented by the equipment necessary to extract the pulp and which often varies for each raw material.

The only necessary equipment will usually consists of cooking vessels, balance, laboratory equipment (refractometer), pasteurizing and cooling tank, closing equipment, working tables.

(ii) To rent from the demonstration plant adequately equipped premises to transform raw material or semi-finished products into finished products. It is not exactly an incubator because its objectives are not training or promoting entrepreneurship but to assist the identified entrepreneur to start its business with very limited risks.

The premises will be erected near the demonstration plant and will enjoy common facilities; e.g. steam, water, electricity, sewerage.

It can be foreseen that the following products will be considered:

Fruit juices and Cordials, Sauces, Jams and Fruit in syrup, Pickels and Chutneys, Banana and Bread fruit chips. In term of equipment, five units could be equipped for a total of US $30,00(. It is briefly described in the Annex III. The entrepreneur should be aware that he will be allowed to rent the premises for a limited time.

CONCLUSIONS AND RECOMMENDATIONS

1. Crops Diversification

- To maximise the irrigation potential in Mahaweli
- To satisfy the market demand for fresh and processed products.
- To initiate the agro-processing development of Mahaweli.
- To increase the income of the settlers.

The following measures should be taken:

1.1 Setting up of a 10 to 20 hectare demonstration horticultural and vegetable farm whose objectives will be:

- introduction of new varieties.
- introduction of selected well adapted varieties, suitable for fresh consumption or for processing.
- demonstration of innovative production methods.

1.2 Modification and diversification of the home gardens to satisfy the market demand.

1.3 The utilization of well drained soils (9,600 hectares in System H) to produce crops under irrigation with the expected results to have off-season fruits (eg., lime), and enough raw material to satisfy the existing demand: tomatoes, passion-fruits, soursop, guava etc.

1.4 Full assistance from the Horticulture Division is needed to implement such a diversification.

2. Harvesting, Post-harvesting, Handling

Losses are very important and training is needed at all levels: traders, wholesalers, farmers, extension staff etc.

The initial training can be given by a consultant with a detailed experience of fruit handling in tropical environments. The training will include a practical and realistic approach to assist the farmers of Mahaweli.

3. Marketing

There is a relatively important demand for semi-finished products in Colombo; mainly tomato concentrate, passion fruit juice, lime juice, soursop pulp, mango pulp, guava pulp, woodapple pulp etc.

This market is composed of processors and exporters who cannot fulfill the demand due to the lack of reliable supply of raw material. To satisfy the existing demand should be considered as a priority.

There is probably a limited market in Mahaweli and around Tambuttegama; such a market has not been identified yet. Any advise to an entrepreneur to set-up a processing plant must be very cautious and based on facts showing the profitablility of such a venture.

4. Processing

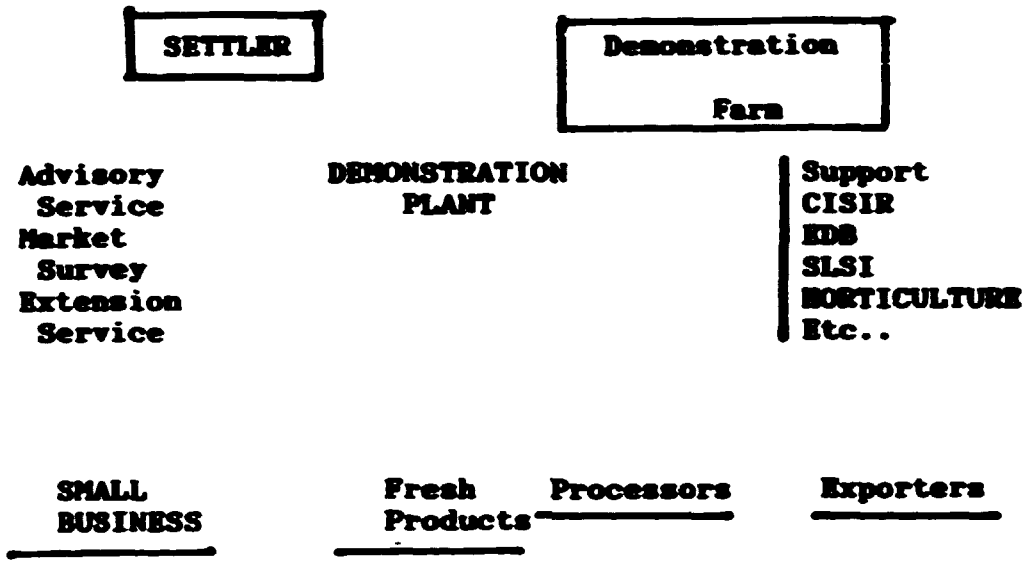
It is recommended to set-up in Tambuttegama a demonstration plant with a capacity of about 3 tons of raw material per day (8 hours).

A too small plant will not be economically viable and, more important, will not have a real impact on the development of agro-processing in Mahaweli.

Such a plant will be the core of the system. It will transmit the signals along the chain producer - utilizer and will establish the necessary linkages between all the organisations and individuals involved.

A special consideration must be given to the potential entrepreneur in terms of training and setting-up assistance.

The role of the Demonstration Plant can be summarized as follows:



ANNEX I

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2. Sri Lanka Trade Promotion and Export Development by J. Bunnell, UNCTAD/GATT - GATT-ITC/DTC/84/83 May 1984

3. Horticulture (Fruit) Research and Development Project (Phase II) SRL/84/013 by J. Bunnel.

4. A study of Food Processing and Product Development Technology - Sri Lanka by J. Bunnel and J. Ross. Ronco Consulting Corporation 1629K street, NW. Suite 401 Washington DC 20006 - July 1986

5. Investment opportunities. Fruit and Vegetable Industry by L.A.C. Alles and R. Curtis, Industrial Development Board, October 1985.

6. Agro-Industry Development in Mahaweli System "H". UNIDO SI/SRL/84/802 April 1986.

7. Subsidiary Crops Production and Processing Project. TA NO. 743SRI CAS/S/86 225, Minister Agriculture Limited, UK. 1987

Annex II

EQUIPMENT

1. The Annex VI of the drafted Project Document gives a list of the proposed equipment.

2. The appendix attached to the present report includes leaflets and technical information concerning the proposed equipment.

3. Equipment to be purchased locally :

   - Steam generator, water, softener and water treatment plant can be supplied by :

     Samuel Sons & Company Limited
     164 Messenger Street
     P. O. Box 46 Colombo 12.

   - Cold rooms and freezing rooms can be supplied by :

     St. Anthony's Consolidated Ltd.
     516 Sri Sangaraja Mawatha
     Colombo 10.

   - Locally available equipment includes :

5	preparation tables 8' x 3' x 32" covered with aluminium sheet	
2	sterilizing tanks	5' x 3' x 18"
2	cooling tanks	5' x 3' x 18"
2	exhausting boxes	5' x 3' x 18"
1	blancher	5' x 3' x 18"

4. Suppliers for imported equipment :

   - Bertuzzi, Bruggherio (Milano), Italy
   - Biaugeaud, Arcueil (Paris), France
   - Dixie, Athens (Georgia), U. S. A.
   - Alfa-laval, Lund, Sweden

5. Equipment justification (for major equipment when needed)

5.1. Boiler
The "Steamax" Boiler offers two main advantages.

- Steam at full working pressure is available within 3-5 minutes.

- Low stored energy, inherent in a water-tube design, precludes explosion hazards.

If a separate set - up for small entrepreneurs (described in Annex III) is foreseen or / and if a larger vacuum kettle is considered, a boiler with an output of 400 kg. / 500 kg. of steam per hour should be purchased.

5.2. Discontinuous drum washer can be replaced by hand washing.

5.3. Pulper - finisher - creamer
With a 7HP motor and suitable screens this equipment in conjunction of the continuous blancher - cooker (5.14) will make the mango de stoner (5.11) not necessary.

5.4. Vacuum kettle 200 L
The equipment proposed (evaporation capacity : 200 L of water per hour) can be used as a tomato or fruit concentrator but also to remove the SO2 from the temporarily preserved juices and pulps.

5.5. Vertical retort
Super imposed air pressure control has been included in order to sterilize flexible packaging (pouches).

5.6. Rasper - Peeler
Is necessary for the preliminary treatment of guavas, and wood apples in order to have a better finished products.

5.7. Citrus extractor
Expensive but indispensable equipment to absorb the production during the gluts.

5.8. Passion fruit juice extractor
There is an important identified market for frozen passion fruit juice for export. Also the production of passion fruit gives a high return to the farmer.

The proposed equipment is the smallest possible one.

5.9. Mango Destoner
This equipment can be replaced by the modified pulper finisher (5.4) in conjonction with the blancher cooker (5.14).

5.10. Flash pasteurizer
Indispensable for frozen passion fruit juice and frozen lime juice.

5.11. Solar Dryer
Such an equipment has been designed by CISIR and could be made locally. It will have a capacity of 200 kg. of raw material per day. It will be equiped with a fan and devices to divert the air flow according to the needs.

5.12. Continuous Blancher Cooker
Ideal for fruit pre-cooking, and to prevent oxydation.

5.13. Cold rooms and freezing rooms
4 rooms with a capacity of 10 cubic meters, each.

Annex III

FACILITIES TO START AN ENTERPRISE

Unit 1 : Banana and other chips

- -1 working table
- -1 slicing machine (manual)
- -1 dipping tank
- -1 deep fryer
- -1 balance
- -1 set of trays
- -1 plastic bags sealing machine

Unit 2 : Sauces

- -1 working table
- -1 cooking kettle (50 litre)
- -1 balance
- -1 spices motar
- -1 set of small utencils
- -1 water tank

Unit 3 : Jams

- -1 working table
- -1 cooking kettle (100 litre)
- -1 balance
- -1 closing machine
- -1 set of small utensils
- -1 water tank

Unit 4 : Juices

- -1 working table
- -1 cooking kettle (100 litre)
- -1 pasteurizing tank
- -1 balance
- -1 closing machine

Unit 5 : Undefined

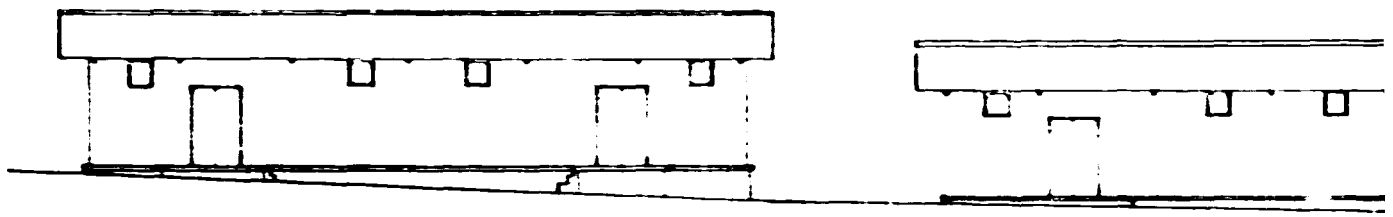
Common : small quality control laboratory with themometers, hand refractometers etc.

TOTAL COST US $: 5,000.-

ANNEX IV

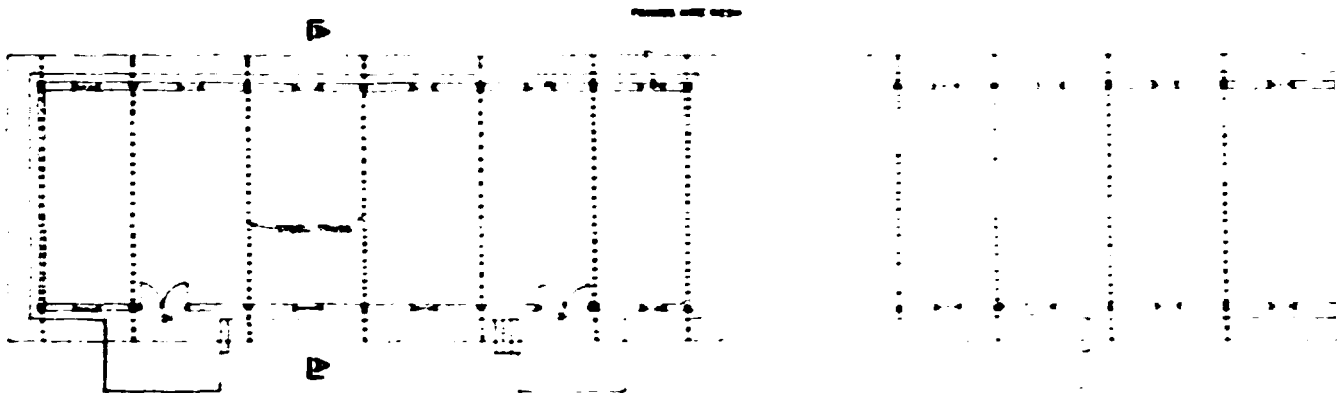
PERSONS MET

Mr S. Ericsson	SIDFA, UNDP
Mr M. Kahane	Deputy Resident Representative, UNDP
Dr B. Thapa	Resident Representative, UNDP
Mr Hogekamp	UNIDO Consultant to the CISIR
Mr B Pereira	EIED Manager
Mr A. Gunawardane	UNDP Programme Officer
Mr H.B. Kapuwatte	EIED Director
Mr L.K.B. Godamunne	MASL Secretary-General
Mr Samaratunge	Research Officer at Thambuttegama Agriculture Department
Mr M. de Soysa	Assistant Director, Export Development Board
Mrs de Silva	External Resources Department
Dr K.G. Gunatileke	Head, Food Technology Section, CISIR
Mr N. Peiris	Project Manager, Pure Beverages Co Ltd
Mr G. Sarath	Manager R & D, Pure Beverages Co Ltd
Mr R. Ramanayake	Chairman and Managing Director, Lanka Canneries Ltd
Mr N. Pararajasingham	Director, Lanka Canneries Ltd
Mr J. Perera	Manager, Kelani Valley Canneries Ltd
Mr S.W. Alahakoon	Director, Smak Products
Mr M. Pinto	Additional Deputy Director, Agriculture and National project Coordinator
Mr L. Alles	Food Scientist and Consultant
Mr D.C. Gunawardena	EIED Director

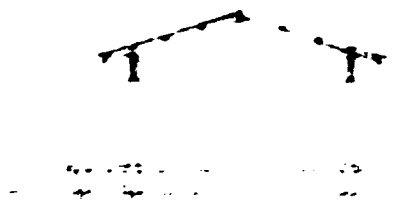


BUILDING No.1 (STORE)

BUILDING No.2 (STO

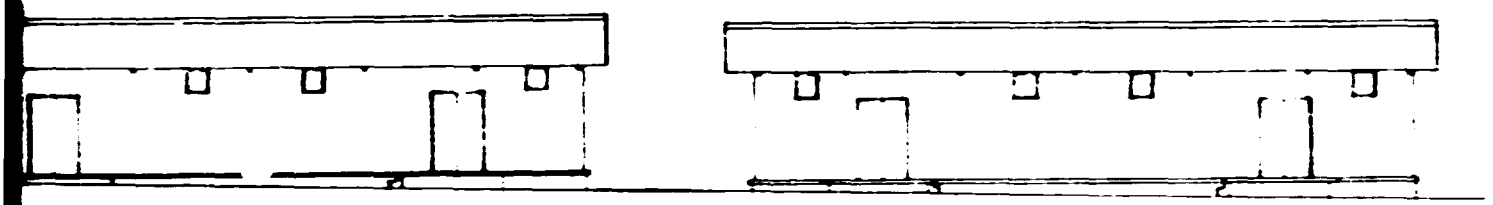


PLAN



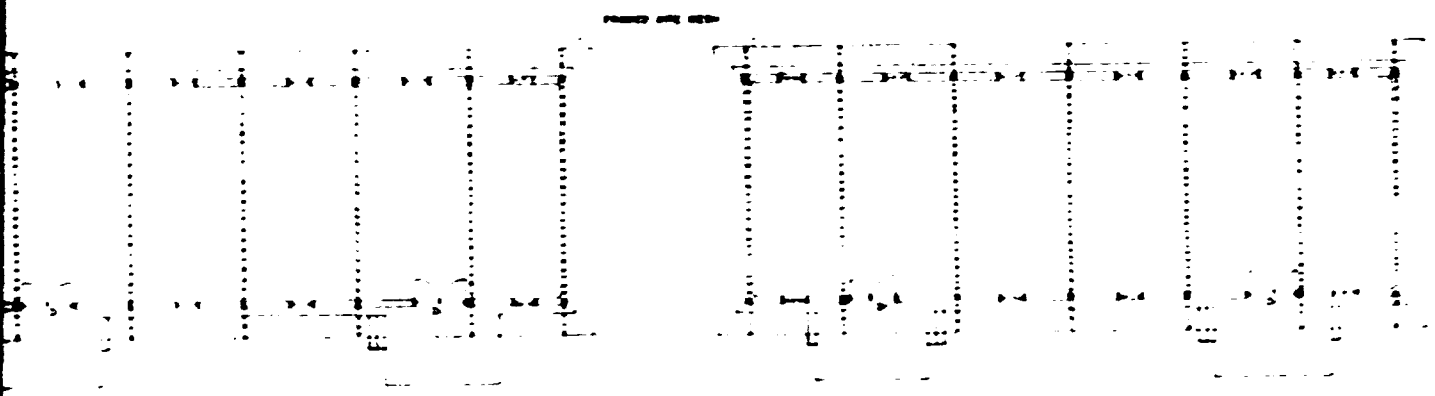
SECTION A-A

SECTION 1



BUILDING No2 (STORE)

BUILDING No3 (STORE)



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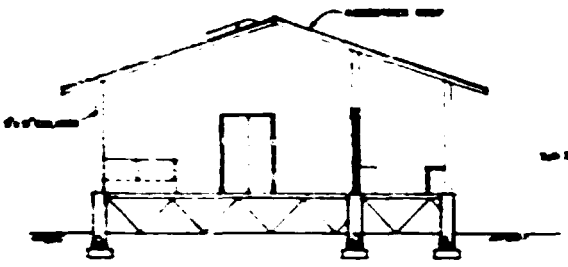
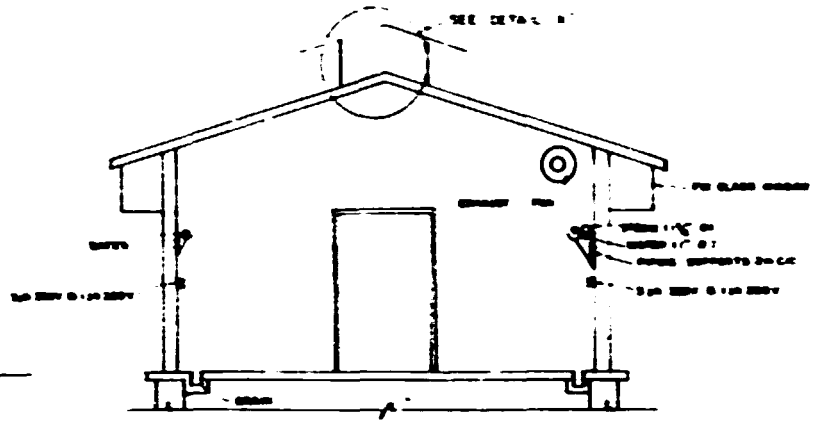


SECTION A - A



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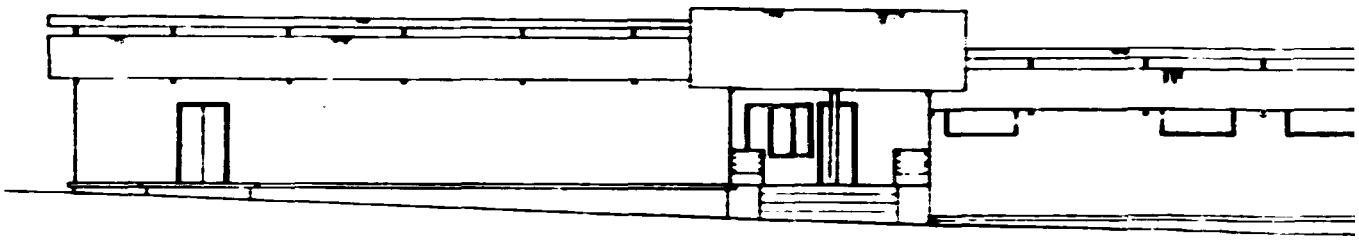
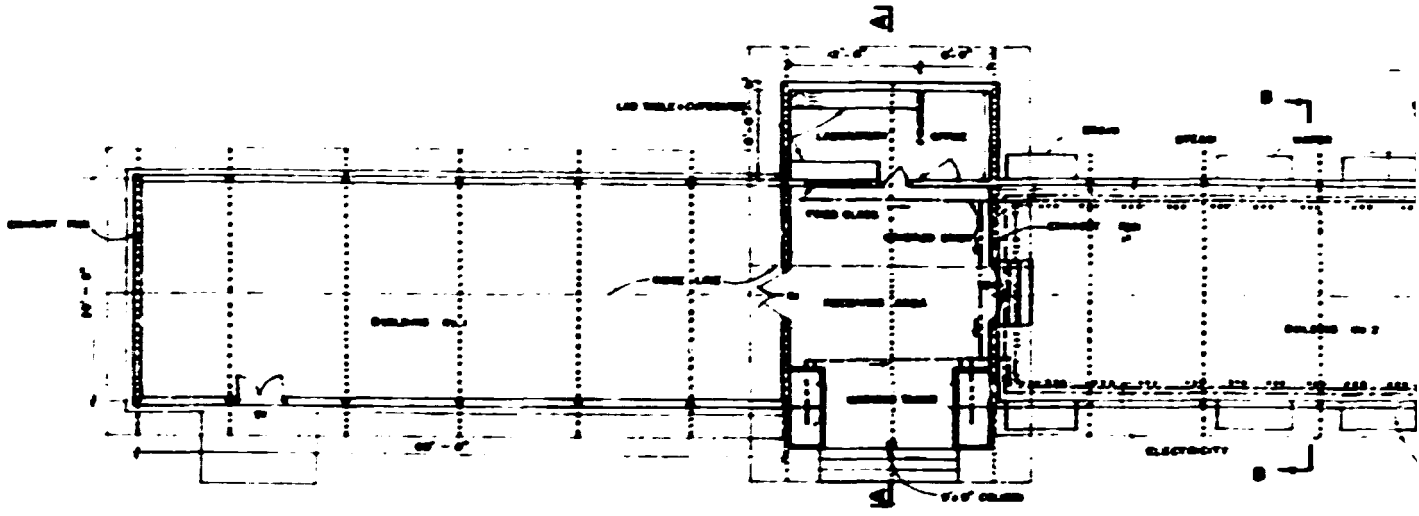


BUILDING No.1 (STORAGE)

BUILDING No.2 (PROCES



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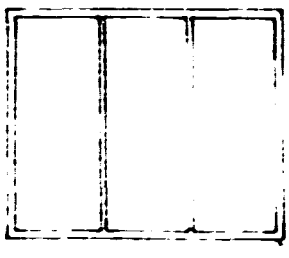
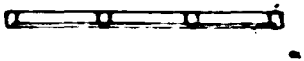
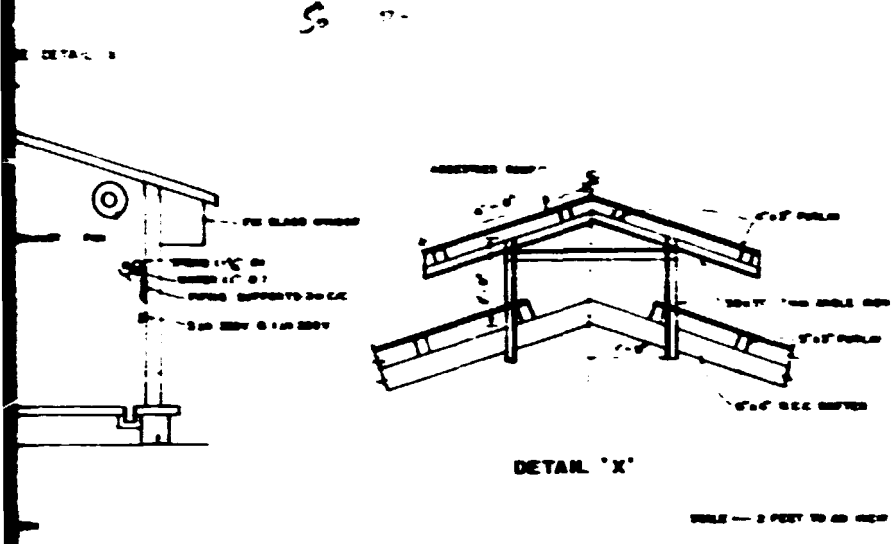


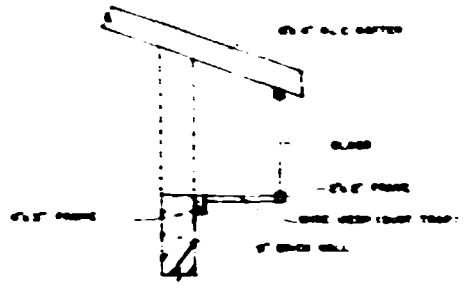


DETAIL OF FIXING GLASS

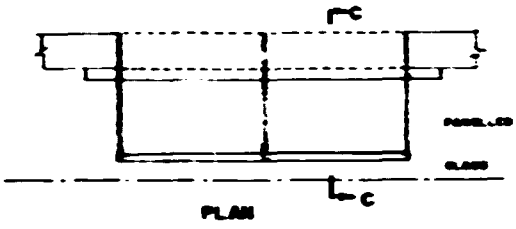
SECTION 1



DETAIL 'X'

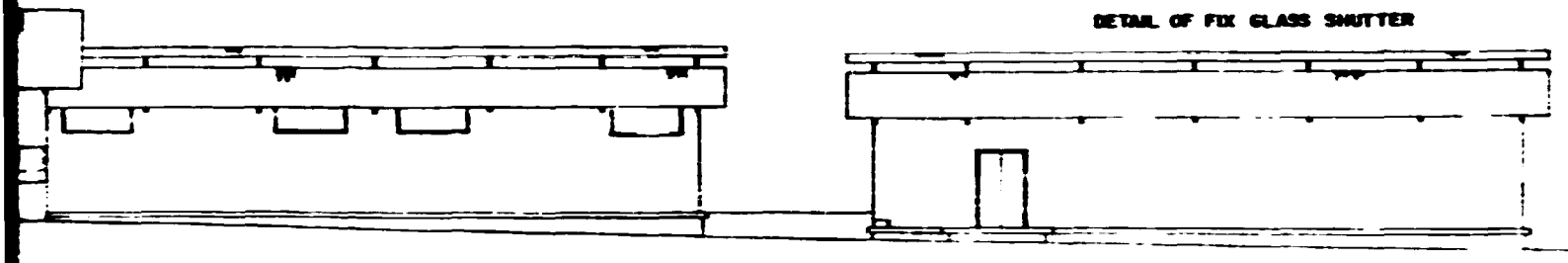


SECTION C-C



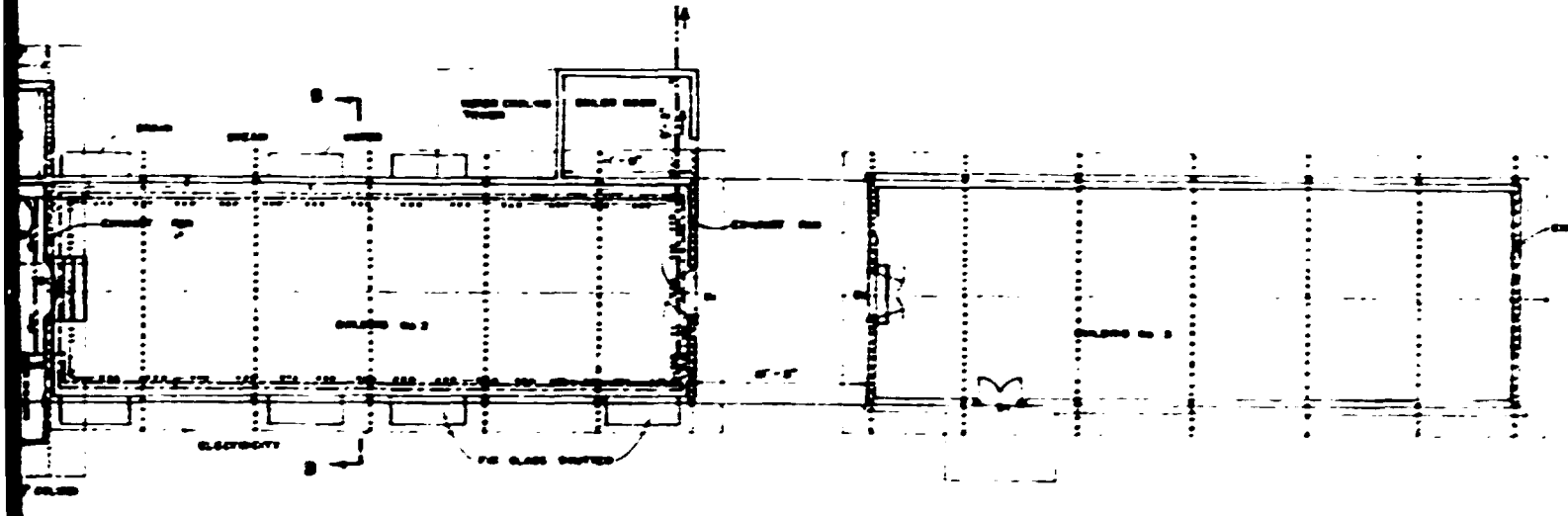
PLAN

DETAIL OF FIX GLASS SHUTTER



BUILDING No.2 (PROCESSING)

BUILDING No.3 (STORAGE)



PLAN

NOTES

MAHAWELI ENGINEERING & CONSTRUCTION AID

FRUIT PROCESSING UNIT AT THAMBUTTEG

PROPOSED BUILDING

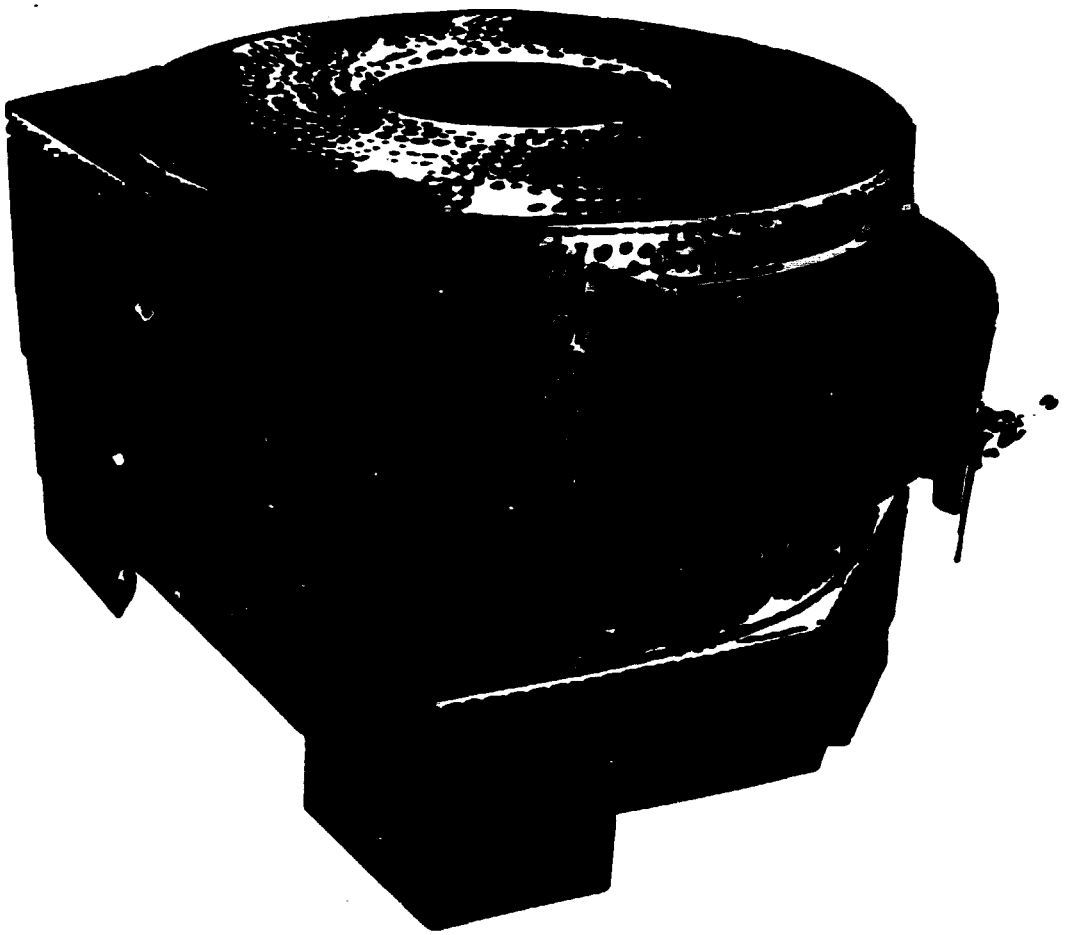
SECTION 2

APPENDIX

E Q U I P M E N T

N. 1	.....	Peeler A 302 M
N. 2	.....	Cutting Machine CL 14
N. 3	.....	Chopper M2 - M2G
N. 4	.....	Citrus Manual Extractor T 72 A 802
N. 5	.....	Vertical Pulper A 601 V
N. 6	.....	Pulper Finisher Creamer A 602
N. 7	.....	Passypress, Passion Fruit Juice Extractor
N. 8	.....	Citrus Extractor Citronic 1S - 1Q
N. 9	.....	Vacuum Pans Concentration Groups
N. 10	.....	Laboratory Concentrating Pan Model 420/I
N. 11	.....	Semi-industrial Concentrating Vacuum Pan Model 600/I
N. 12	.....	Vacuum Pan for the Production of Jam and jellies Mod. 800/I
N. 13	.....	Vacuum Pan Model 1100/I
N. 14	.....	Vacuum Pan for the Production of Jam and Jellies Mod. 1300/I
N. 15	.....	Steam Heating Kettles
N. 16	.....	Storage Tanks
N. 17	.....	Centrifugal Extractor A 701
N. 18	.....	Steam Heating Retorts
N. 19	.....	Vaccum Bottling Unit

PELEUSES A 302 M



Peeling with abrasives according to treated product.

Movable and interchangeable abrasive supports.

Water inlet

Construction in cast iron and stainless steel 18/10.
Water proof machine

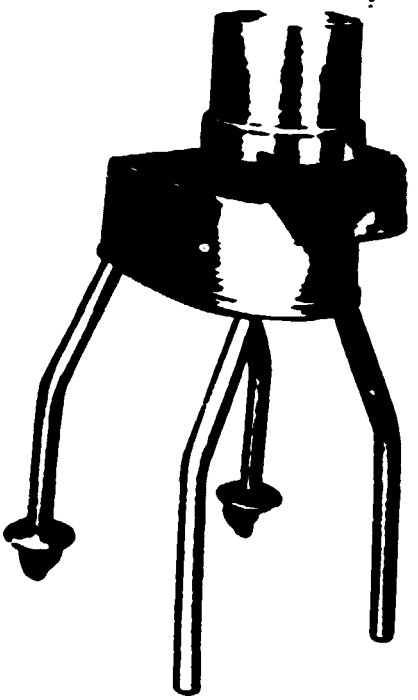
ADVANTAGES :

- Noiseless
- Strongly built
- Little maintenance
- Economical rise due to movable abrasives support

MODEL	DIAMETER (M)	CHARGE PER SHIFT KG		HOURLY OUTPUT KG		
		potatoes, carrots, celery	onions	potatoes carrots	celery	onions
GKS N°2	1,—	100	50/60	400/1200	750	700

II. 2

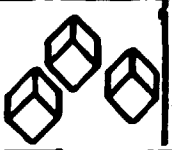
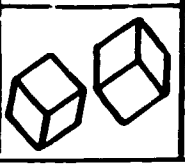
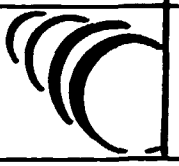
CUTTING MACHINE CL 14



TECHNICAL DATA

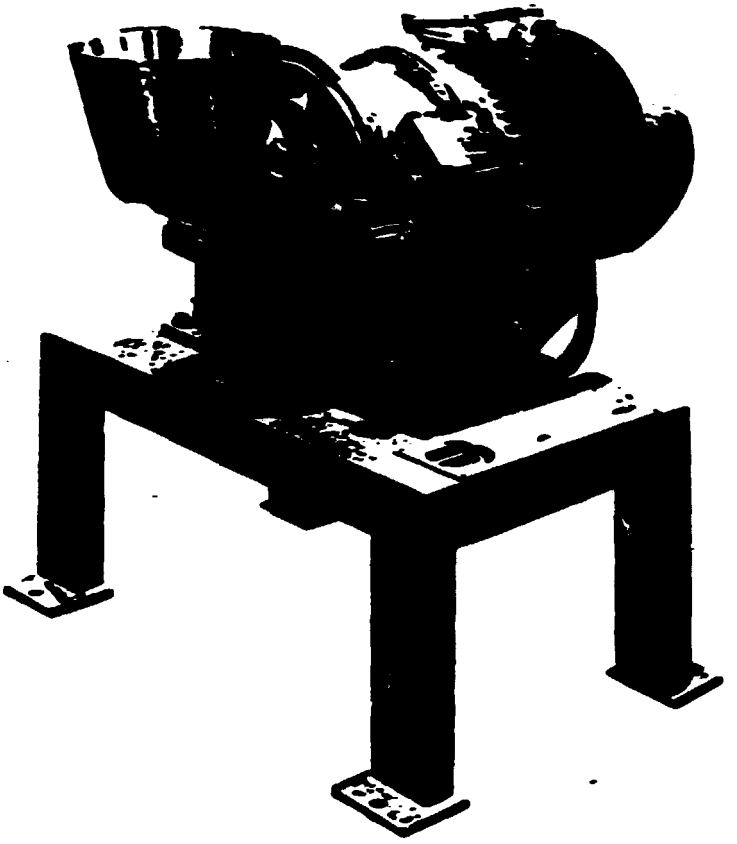
- fabrication in stainless steel and cast aluminium
- motor cover in polystyren - 2 wheels support in painted steel
- 0,5 HP 3 phases motor - 3 phases interruptor with electro mechanical security
- geared motor
- length 500 mm
  Width 410 mm
  Hight 880 mm

  Feeding hight 980 mm
  Exit hight 630 mm

OPERATIONS	FRENCH FRIED POTATOES	DICES	DICES	SLICES	RASPS
DIMENSIONS OF CUTTING	10X10	10X10X10 OR 8X8X8	15X15X15	1,5 - 3 - 5 - 10 - 15	
OUTPUT IN KG/HOUR	600	600	750	200 TO 750	250
					

M2 - M2G

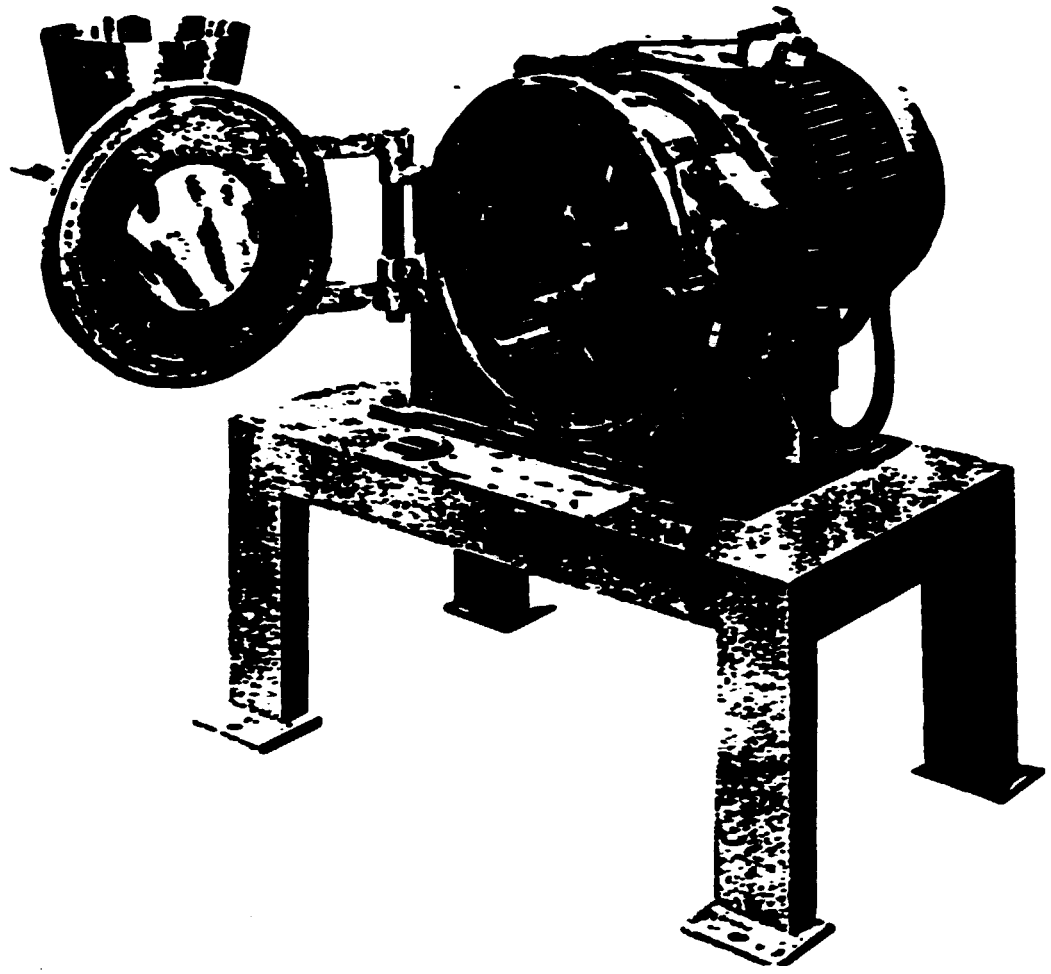
BROYEURS
CHOPPERS
TRITURADORES



Broyeurs de moyenne débit M2 et M2G équipés de grilles perforées, capable de réaliser différents degrés de broyage de fruits et légumes et pour préparer une crème ou une purée intégrale pour particulières applications technologiques.
(ex. tomate broyé avec peau et graines ou carottes à traiter avec digestion enzymatique).

Choppers of average capacity M2 and M2G fitted with bored chopping tools, suitable to obtain different grinding degrees with fruit and vegetables or to prepare integral creams or mashes for particular technological applications.
(ex. tomato chopped with peel and seeds or carrots to treat with enzymatic digestion).

Trituradores de capacidad media M2 y M2G dotado de una serie de laminas perforadas para obtenir diversos grados de finura en productos hortofruticolas y tambien para preparar pure o crema integral de particulares aplicaciones tecnologicas.
(ej. tomate triturado con piel y semilla, remolacha para someter a digestion enzimatica).



Toutes les pieces en contact avec le produit sont en acier inox AISI 304.
La machine peut être facilement ouverte et inspectionnée et ça rende possible un simpl. et complet entretien et nettoyage.

All parts in contact with the product are in stainless steel AISI 304.
The machine in easy to open and to examine and this makes possible a simple and complete maintenance and cleaning.

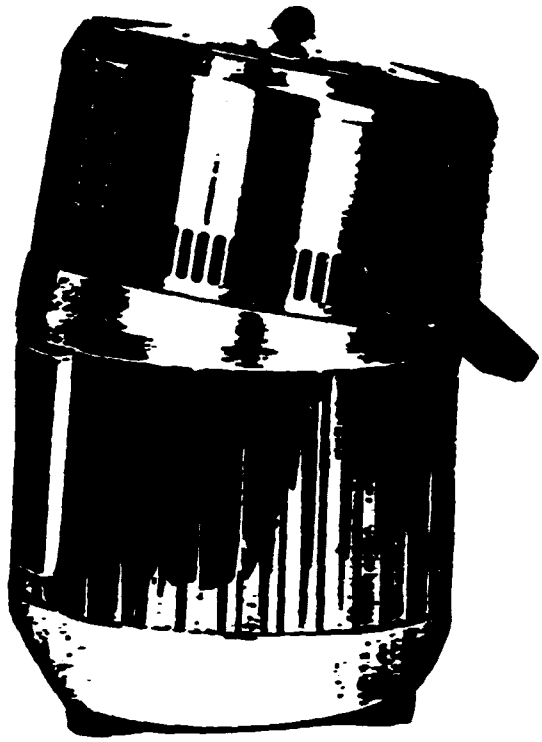
Todas las partes en contacto con el producto has sido construidas en acero inoxidable tipo AISI 304.
La maquina se abre facilmente lo que permite ser inspeccionada, garantizando asi una facil manutencion y una completa limpieza.

MODELES MODELS *MODELOS*	*DEBIT* CAPACITY *CAPACIDAD* kg/h	*MOTEUR* MOTOR *MOTOR* kW
M 2	1500	5,5
M 2G	1000	5,5

M. 4

EXTRACTEUR JUS AGRUMES T 72 A 802

CITRUS MANUAL EXTRACTOR

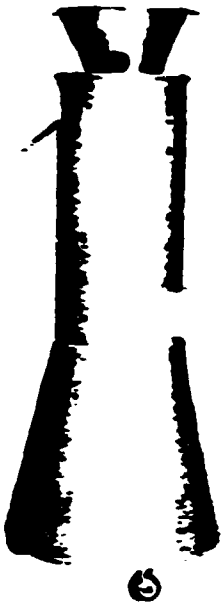


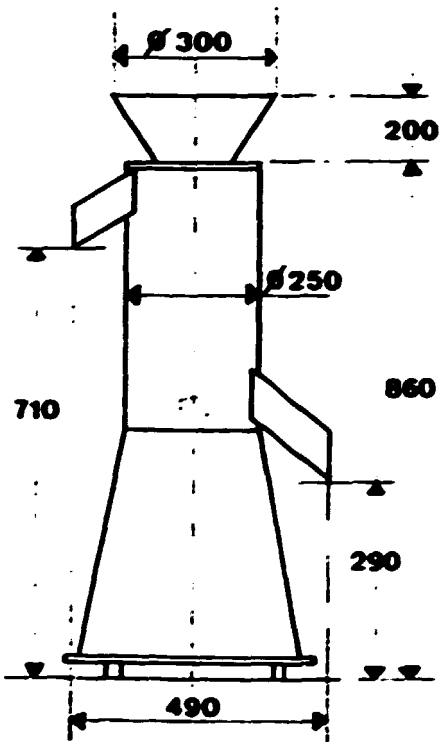
. Extracteur industriel manuel de jus d'agrumes avec corps aluminium recouvert d'une jaquette en acier inoxydable
. moteur refroidi par air (ventilateur)
. ensemble d'extraction en acier inoxydable
. moteur 0,40 CV
. dimensions max 25X27X33 cms
. poids net 10 KGS
. débit 50/70 litres heure

. Citrus manual extractor with aluminium jacked covered by stainless steel
. Air cooled motor (incorporated fan)
. All stainless steel extracting group
. 0,40 HP motor
. max dimension 23X27X23 CMS
. weight 10 KG
. Output 50/70 Liters/hour

PASSOIRE VERTICALE A 601 V

N. 5





pour fruits, légumes, soupes de poissons

UTILISATION

- Passage et tamisage de pulpes de fruits
- Passage de légumes cuits et broyés
- Broyage et tamisage de légumes et fruits crus
- Passage de soupes de poissons
- Confection de compotes, purées, etc

PRINCIPE DE FONCTIONNEMENT

Le produit est déversé en continu dans un tamis vertical à perforations au choix
Un batteur tournant à grande vitesse (000 tours) fait passer par effet centrifuge, ce produit au travers des perforations. Tous les déchets et refus remontent et rejaillissent par l'orifice d'évacuation placé en partie haute
Le produit tamisé s'écoule par un orifice placé en partie inférieure

CONSTRUCTION

Appareil entier entièrement en acier inoxydable (corps, trémie de chargement, tamis et socle, batteur)
Palettes en caoutchouc repérées selon perforations et produits
Moteur 2 CV - 220/380 V.
Perforations : de 0,5 à 3 mm de diamètre
Interchangeabilité facile du tamis.
Démontable rapidement pour nettoyage facile
Tamis Ø 200 mm - Hauteur 330 mm
Poids approximatif 75 kg

vertical pulper

fruits, vegetables, fish soup

USES

- Fruit pulping and brushing
- Cooked and crushed fruit pulping
- Fish soup brushing
- Marmalade

OPERATION

The product is poured continuously in a vertical screen by a feeding hopper
Rotating paddles (000 R/Min.) by centrifugal effect force the product through the screen
All waste refuses go up and are ejected by upper vent
Finished products discharge in lower place

CONSTRUCTION

All stainless steel built (body, hopper, screen, paddle)
Adjustable Rubber paddles according to holes and product
2 HP motor
Screenology from 0.5 to 6 mm
Easy interchangeability of screens - Easy cleaning
Screens Ø 200 mm - Height 330 mm
Weight 75 Kgs

PASSOIRE RAFFINEUSE CREAMER A 602

II. 6

PULPER FINISHER CREAMER

UTILISATION

Extraction de pulpe de fruits ou légumes précuits (cuisson continu ou autre).

Raffinage des pulpes de fruits ou légumes.

Dénoyautage de fruits cuits.

Dépulpage des noyaux sortant de dénoyauteuses automatiques.

MATERIAUX

Toutes les parties en contact avec le produit en acier inox AISI 304. Battes et brosses en nylon ou caoutchouc.

TAMIS

Les perforations disponibles sont de Ø 6, 2, 1, 0,5 mm. Autres dimensions sur demande. Les deux premières sont utilisées pour le dénoyautage, la plus petite pour le raffinage.

MODELE SUPERCREAMER

Pour produits durs et difficiles à traiter : épinards, fruits à noyaux, etc. : un modèle existe avec moteur de 7 CV, construction plus robuste, batteurs spéciaux, tamis 6 mm avec pales pour écrasement du produit dans la goulotte de chargement.

UTILISATION

Fruit pulp extraction.

Cooked vegetables or tomatoes pulp extraction.

Fruit and vegetable pulp finisher.

Cooked fruit destoning.

MATERIALS

Every part in contact with product is made of AISI 316 stainless steel (screens excepted in AISI 304).

SCREENS

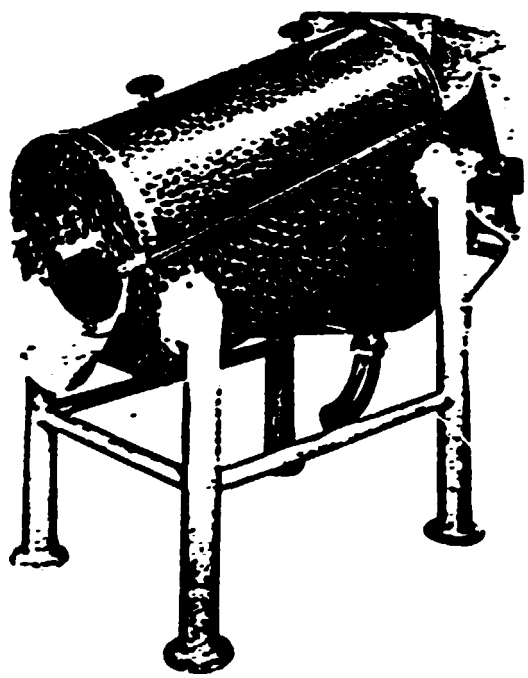
Available screens are Ø 6, 2, 1, 0,5 and 0,4 mm — holes other dimensions on request. The first two are for destoning, the others for pulping and finishing.

SUPER CREAMER MODEL

For special and difficult products, such as, spinach, stone fruits, a 7 HP motor model with special paddles with built in crusher in feeding hopper.

CARACTERISTIQUES MECANIQUES

Trémie de chargement, deux têtes et deux côtés, un tamis avec perforation de Ø à préciser, goulotte de sortie du produit raffiné, une évacuation des déchets, carter de serrage, moteur de 4 CV avec poulies et carter de protection, charpente tubulaire en acier peint, jeu de pièces de rechange et accessoires.



MECHANICAL CHARACTERISTICS

Feeding hopper, heads, sides, shaft in stainless steel basin for cream collection, brush holder paddles chute for waste discharge, 4 HP motor with pulleys, belts and protective guard iron legs with motor support — set of spares and accessories.

DEBITS

700 à 2.500 kg/h
selon produits à traiter,
cuisson et Ø trous du tamis.

OUTPUTS

700 to 2.500 Kgs/Hour
according to product
cooking and screen holes.

MANGO DESTONER "SUPER CREAMER"

One particular utilization of our super pulper "SUPER CREAMER" is the mango destoning, that is to say the perfect removing of the mango stone and its pulping.

This action avoids manual intervention and gives minimum lost of pulp with interesting output.

By replacement of screen (sieve) and paddles, it becomes a very powerful pulper allowing

. continuous extraction of pulp of all kinds of cooked fruit

. refining and finishing fruit and vegetable cream

. pitting of all kinds of cooked fruit

. pulping of all fruit-stones as apricots, peaches and so on...

MECHANIC CHARACTERISTICS :

. feeding hopper with built-in crusher

. heads and sides, shaft, basin for cream collection, special shredding arm and chute in stainless steel (AISI 316)

. 7,5 HP motor with pulleys, belts and protective guard

. four iron legs

. one sieve with large holes in stainless steel (AISI 304)

EXTRA CHARGES :

. a large range of screens (sieves) of various diameter of holes for pulping, refining, paddles and brushes for pulping and destoning of the other fruits.

M. 7

PASSYPRESS Extracteur JUS de PASSIFLORE

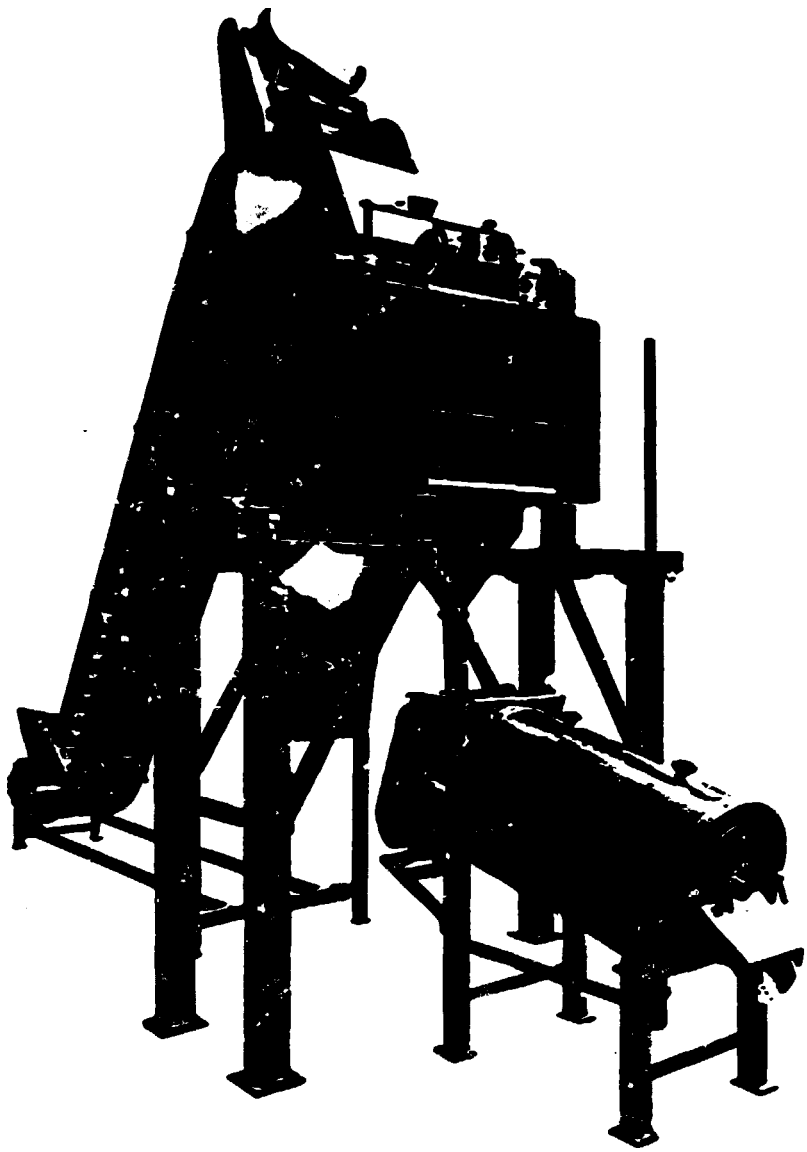
PASSION FRUIT JUICE Extractor

***PASSYPRESS** est la machine qui résout le problème du traitement du fruit de la Passiflore produisant un jus d'haute qualité et rendement.*

PASSYPRESS is the machine solving the passion fruit processing problem with a high quality production and juice yield.

***PASSYPRESS** es la máquina que ha resuelto el problema de la elaboración del Maracujá dando un jugo de óptima cualidad y elevado rendimiento.*

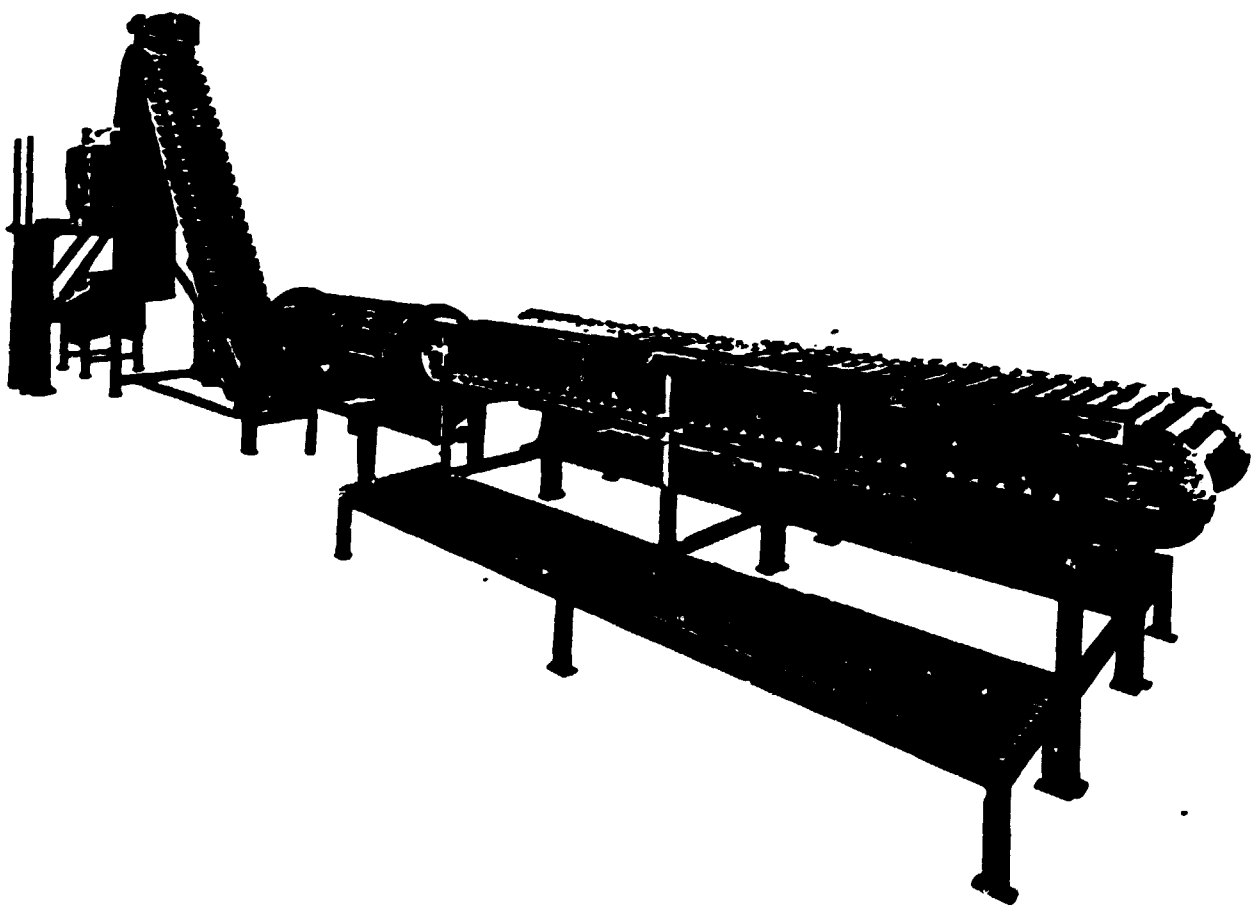
Extraccion jugo de MARACUJA



Ligne complète pour le traitement du fruit de la Passiflore avec triage, lavage, élévateur et groupe pour l'extraction Passypress-raffineuse.
Deux modèles avec débits 1-2 et 2-4 ton/h.

A complete line for processing Passion Fruit complete with sorting, and washing section, elevator and group for juice extraction Passy-press-refining.
Two models with 1-2 and 2-4 ton/h capacity.

Linea completa para la elaboración del maracujá; compuesta de selección, lavado, elevador y equipo de extracción Passy-press-refinador.
Existen 2 modelos para las capacidades de 1-2 y 2-4 ton/h.



OFFER MO/117

PASSYPRESS - PASSION FRUIT JUICE EXTRACTORS

TECHNOLOGICAL FEATURES

For the processing of passion fruit, called also in many countries maracuja, we have studied and made this new machine that has given the best results in both juice yield and quality.
The juice in fact maintains its light colour also processing the variety of fruits highly pigmented.

The unit compresses the fruits between the two rollers: and upper thrust device causes the breakage of the peel permitting the outcoming of seed and juice that can easily flow through a squeezing grill.

The outcoming juice and seeds are collected into a pipe and conveyed to pulper-refiner "Creamer" that eliminates the seed and allows the passage to the juice.

MODELS AND CAPACITIES

We manufacture the four following models:

- Passypress 250 for capacities of about 800 kg/h, powered by a 2 HP motor;
- Passypress 450 for capacities of about 1500 kg/h, powered by a 3 HP motor;
- Passypress 600 for capacities of about 2500 kg/h, powered by a 4 HP motor;
- Passypress 1000 for capacities of about 4500 kg/h, powered by a 5,5 HP motor.

MECHANICAL FEATURES

Each unit is formed by:

- a stainless steel feeding hopper;
- a carbon steel roller covered by a special rubber;
- a stainless steel roller with special teeth that permits the squeezing of fruit and the feeding of the peel against the squeezing grill;
- a diaphragm with up and down movement for squeezing the fruit between the two rotating convergent drum;

- a scraper of the rubber drum; the scraper, of adjustable type, is manufactured in teflon;
- a hopper for collecting and discharging the juice and seeds;
- a discharging hopper for peels;
- two panels for closing the mechanical devices in movement;
- a motor drive chain type;
- a motor reducer with gears in oil bath.

MANUFACTURING MATERIALS

All parts in contact with the fruits are in stainless steel AISI 304 and sanitary rubber; the remaining parts are in painted carbon steel or in bronze or plastic, according to the manufacturing requirements.

WEIGHTS AND VOLUMES OF THE MACHINES

- Passypress 250
  Net weight: kg 400 - gross weight: kg 500 - volume: mc 2
- Passypress 450
  Net weight: kg 500 - gross weight: kg 650 - mc 2,5
- Passypress 600
  Net weight: kg 550 - gross weight: kg 700 - volume: mc 3
- Passypress 1000
  Net weight: kg 800 - gross weight; kg 1000 - volume: mc 4

DE ad
282/9

CITRUS EXTRACTOR

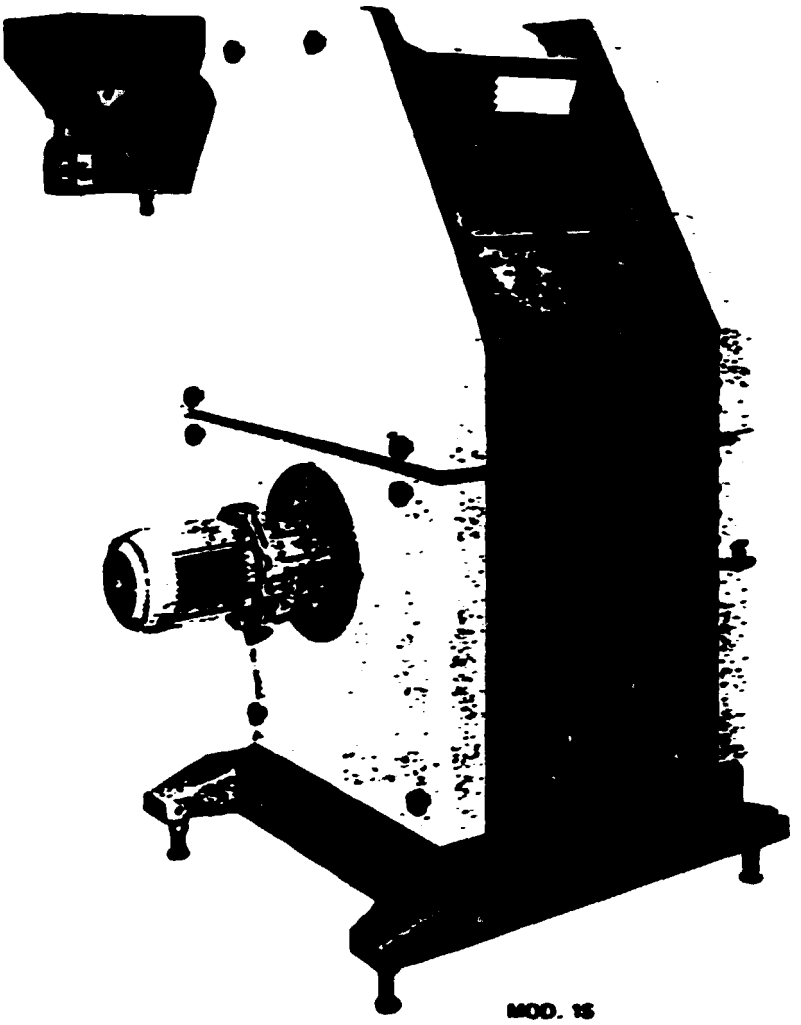
CITRONIC° 1S - 1Q

II. 8

C'est la machine qui résout le problème pour une exploitation plus économique et complète des agrumes.
- *Elle traite les fruits pas calibrés (mod. 1S)*
- *Elle peut préparer les écorces coupées en cubes (mod. 1Q)*
- *Elle peut traiter jusqu'à 2 ton/h d'agrumes et plus*
- *Elle produit et sépare jus avec haut rendement, écorces sans albedo, pulpe pour comminuted ou squash.*

This unit solves completely and economically the problem of exploitation of citrus fruits.
- It processes fruits without pre-sizing (mod. 1S)
- It prepares diced peels (mod. 1Q)
- It can process more than 2 ton/h of citrus fruits
- It extracts juice with a high yield, produces clean peels and pulp for comminuted or squashes.

Esta es la máquina que ha resuelto el problema de la explotación de la fruta cítrica, en la forma más económica y completa posible.
- *Procesa la fruta sin seleccionarla (mod. 1S)*
- *Puede preparar cáscaras cortadas in cuartos (1Q)*
- *Puede beneficiar más de 2 ton/h de cítricos.*
- *Produce y aisla el jugo con un rendimiento muy elevado entregando las cáscaras muy limpias, además de la pulpa a destinar a los comminuted o squash.*

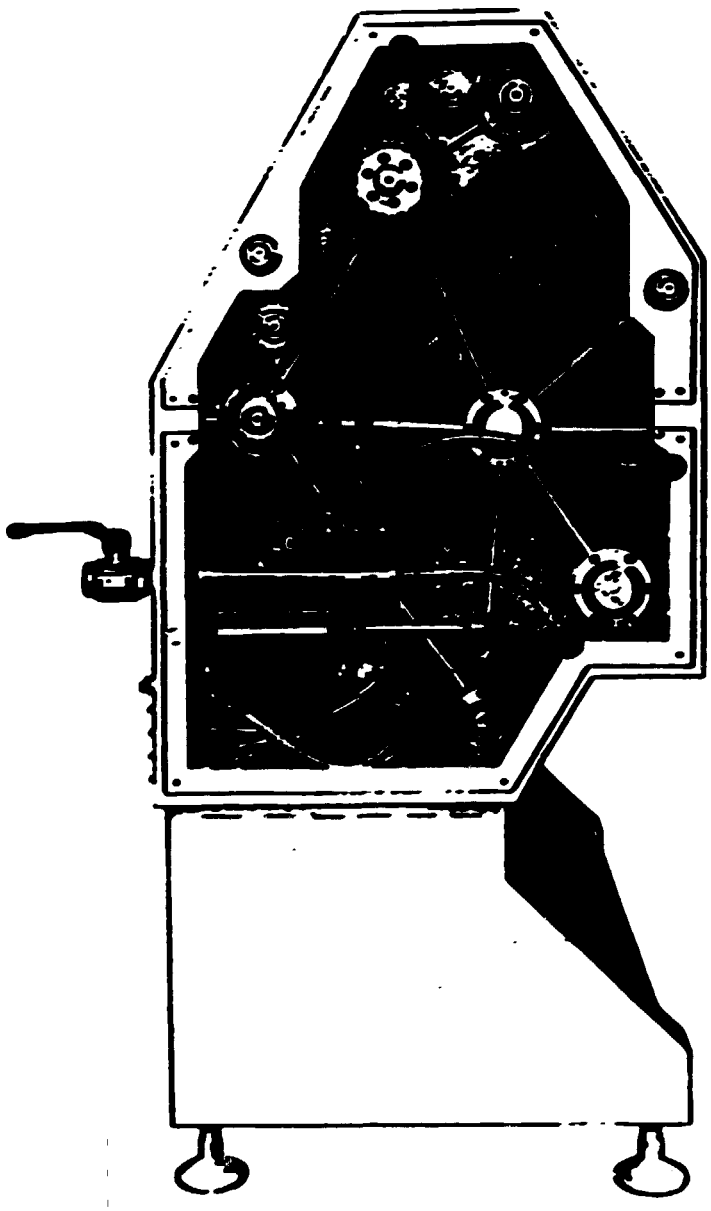


MOD. 1S

Dans les côtés ils sont réunis tous les organes mécaniques qui peuvent être graissés d'un seul point de l'extérieur et qui peuvent être facilement inspectés. Aussi le lavage et la désinfection des dispositifs de pressage est simple; ouvrant un robinet, un réseau de distribution de 6 tuyaux avec 60 injecteurs arrosent violemment l'eau ou le liquide détergent partout.

All mechanical devices are lubricated from the outside through a centralized system. They are assembled in the sides which makes inspection easy. Also washing and disinfection of the pressing mechanism is easy. Opening a cock the system of 6 pipes with 60 nozzles spray violently the water or detergng fluid throughout the mechanism.

A los costados de la máquina se encuentran todas las piezas mecánicas que se mantien constantemente lubrificadas gracias a la presencia de un solo punto de lubrificación muy fácil de inspeccionar. El lavado y la desinfección de las piezas de oprimido se pueden realizar sin ningún problema porque se necesita solamente abrir el grifo respectivo para que la red distribuidora incorporada, compuesta por 6 tuberías y 60 toberas se encargue de rociar con mucha fuerza todas las piezas y rincones de la máquina ya sea con agua sola que con el líquido detergente.



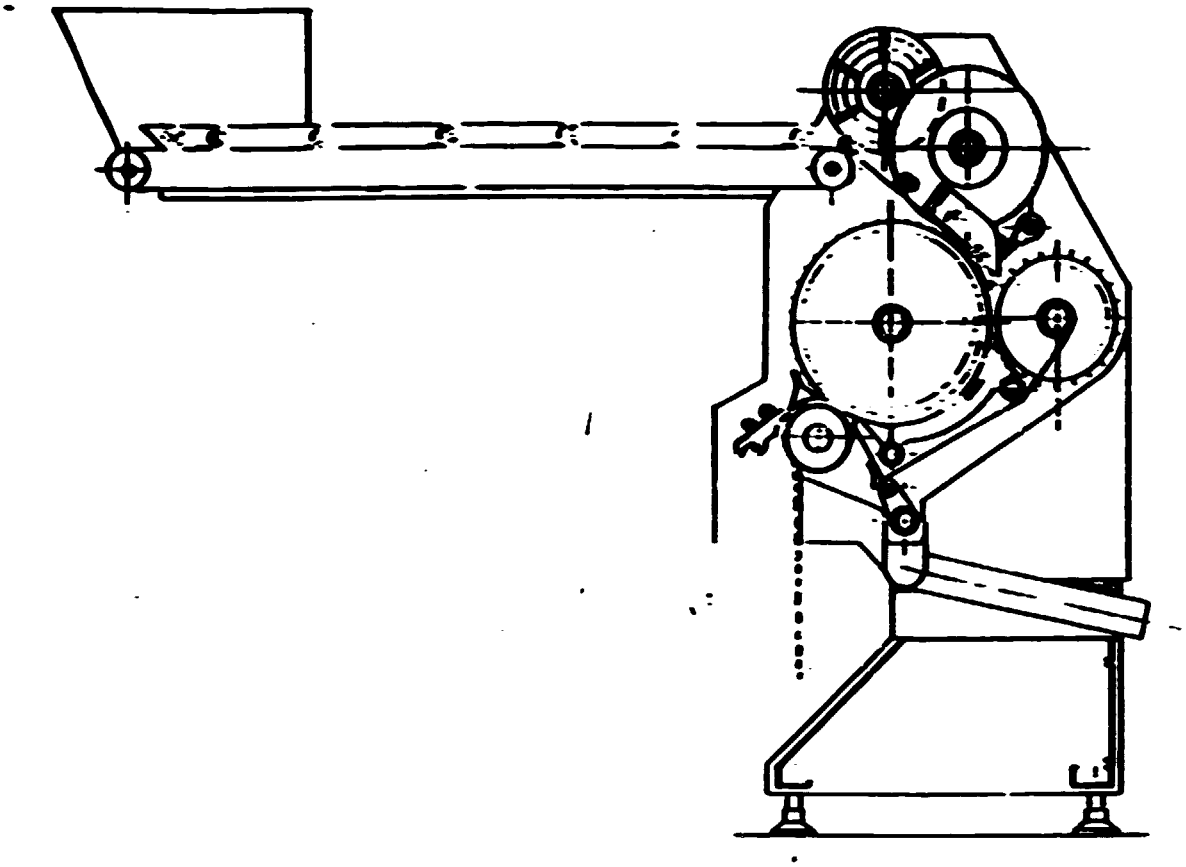


Schéma du fonctionnement du Citronic

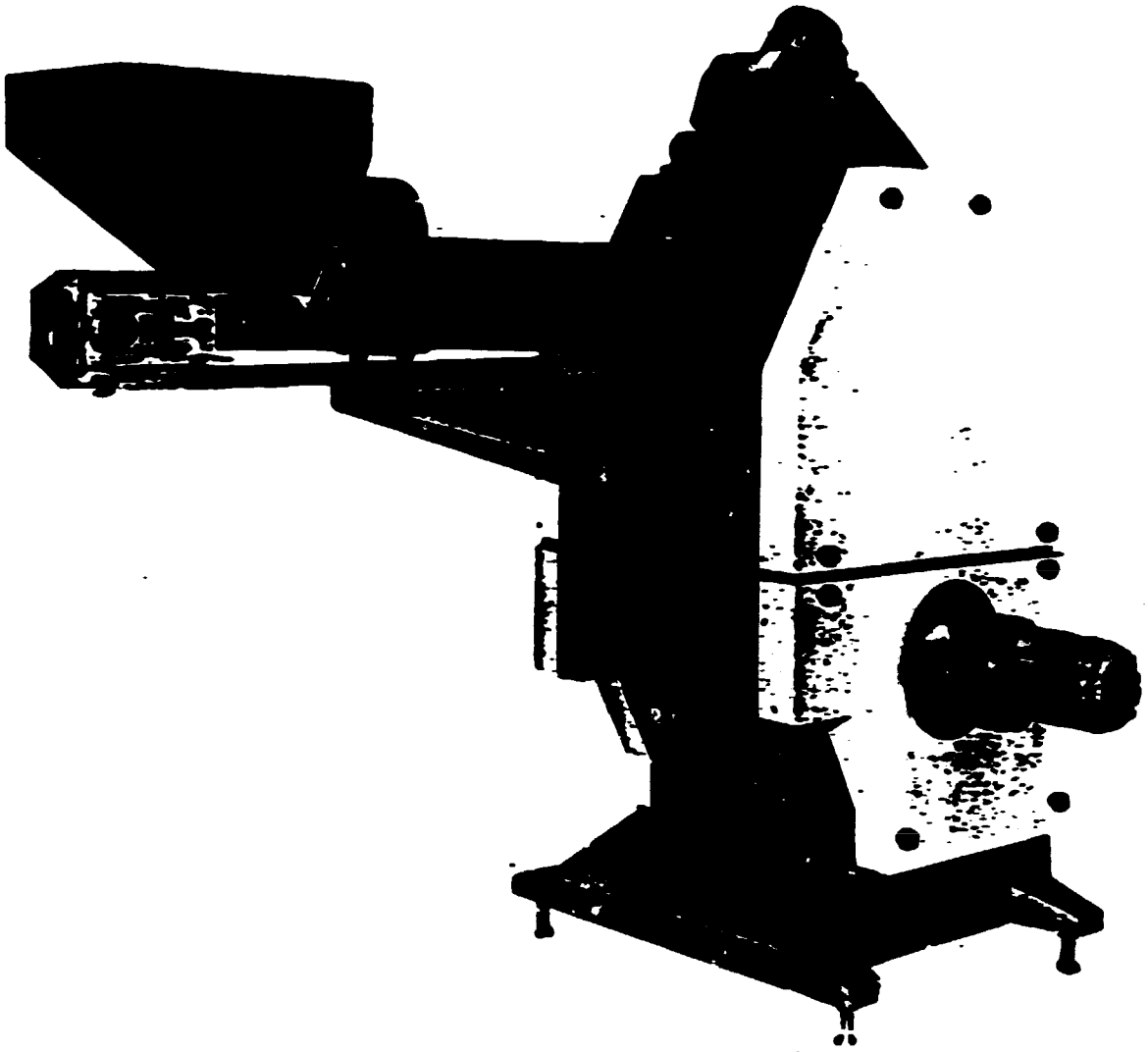
Le fruit est placé en position par un dispositif apte à ce travail, il est coupé en deux moitiés et pressé. L'écorce est poussée contre une lame qui la coupe et sépare le flavédo de l'albédo.
De cette façon on peut obtenir rapidement les trois produits du Citronic:
– Jus
– Pulpe
– Ecorces sans albédo

Working sketch of Citronic

The fruit is centered by the rubber feed-in mechanism, halved and squeezed against an adjustable grill.
The peel is then pushed against a blade that cuts and separates the flavedo from the albedo.
Thus are obtained the three products of the Citronic:
– Juice
– Pulp
– Clean ed peels

Esquema de funcionamiento del Citronic

El fruto es introducido gracias a la acción de un centrador elástico, luego es cortado por la mitad y exprimido contra una rejilla que se puede regular o ajustar.
Seguidamente la cáscara estrujada es expulsada contra una hoja de corte que le saca el albedo y el flavedo.
Con el Citronic 3 se obtienen 3 productos simultáneamente:
– Jugo
– Pulpa
– Cáscaras limpias a cortar



Modèle 10 pour préparer les écorces coupées en cubes employées pour la production de fruits confits ou confitures d'haute qualité.

Model 10 for preparing diced peels to be employed in the production of candied products and marmelades of top quality.

Modelo 10 para preparar cáscaras cortadas in cuartos por la producción de almíbaradas y confituras de calidad elevada.

CITRONIC MODEL 1S

TECHNOLOGICAL FEATURES

This unit has been engineered for the processing of all citrus and the production of :

- juice pulp content, of good quality suitable for concentration
- peels cleaned (flavedo) ready for dicing or preserving
- pulp (albedo) for further pressing of a second quality juice or milling for the preparation of comminuted

The unit can process indiffa ently oranges, lemons and grapefruits.
The input varies in accordance with the diameter and weight of each fruit.

The fruits are processed without any previous sizing provided that the diameters have not a relevant difference.

OPERATION

The citrus fruit are conveyed in the loading hopper and are led to the centering group that pushes each fruit against the rotary blade, cutting them diametrically.

The half fruit fall down overturning and are driven between the central grilles; then are driven and squeezed against the grille with holes of great dimensions allowing the easy yield of the juice. The exhausted peels are then taken by a toothed drum that drives the peels against a rectilinear blade, carrying out the separation between the flavedo and the albedo.

The unit can be easily adjusted according to the processing requirements and operates on the fruit with diameter varying between a few cm to 10 cm and over.

The squeezing grille can be approached or parted in respect of the drum in order to achieve an ideal juice yield.

The peel cutting unit can be adjusted in order to obtain a thickness of 1-2 mm and also 4-5 mm according to the consistence of the peels.

The citronic has the great advantage of processing fruit at random without any previous sizing; it can give a good quality juice suitable for concentration besides peels ready for further applications in the food industries and particularly in the sweet, confectionary and marmelade industry or also in the liqueur or aperitif industry.

In consideration of the great hourly input and maximum exploitation of citrus, this unit can work aside or replace the traditional type of juice extractors normally employed to these days.

INPUT

About 500-1500 kg/h (this varies in accordance with the diameter and the weight of the fruit).

MECHANICAL FEATURES

The unit is inclusive of :

- a loading hopper in stainless steel
- a rotary centering mechanism with elastic grooves self adjusting according to the size of fruit
- rotary blades of great dimensions with the blade of special profile
- shoots leading the half fruit in stainless steel
- two drums, one for the inlet of fruit and one for the squeezing process. These drums are both in stainless steel, one provided with sharp studs for driving the fruit against the squeezing drum, the other one for squeezing is assembled with much shorter studs
- a squeezing grille with ample holes supported by a mobile structure, operated by a pneumatic piston allowing a fast opening during the cleaning operations
- rotary grooved drum for driving the peels against the blade separating and cutting the flavedo from the albedo
- two shoots, one for the collection of the cleaned peels and one for the collection of the albedo
- a short for the collection of juice, leading it away from the unit
- a motor drive with gear reducer in oil bath HP 2, gears and drive chain
- a supporting structure in carbon steel protected with a double coat of anti-acid sanitary paint. Inside there are assembled all mechanical complements for the transmission of movements
- a lubricating centralized group for conveying grease to the supports of mechanical devices
- a centralized group for washing of the machine in operation
- an electric control board with overload cutout and on-off switches; warning light and timer for adjusting the opening and closing time of the squeezing grille.

MANUFACTURING MATERIALS

All parts in contact with the product are made in stainless steel AISI 304, with the exception of some parts manufactured in bronze, rubber, teflon or other sanitary materials for manufacturing and processing purposes.

WEIGHTS AND DIMENSIONS

- Net weight : about 650 kg
- Gross weight : about 900 kg
- Volume : 3,5 M^3

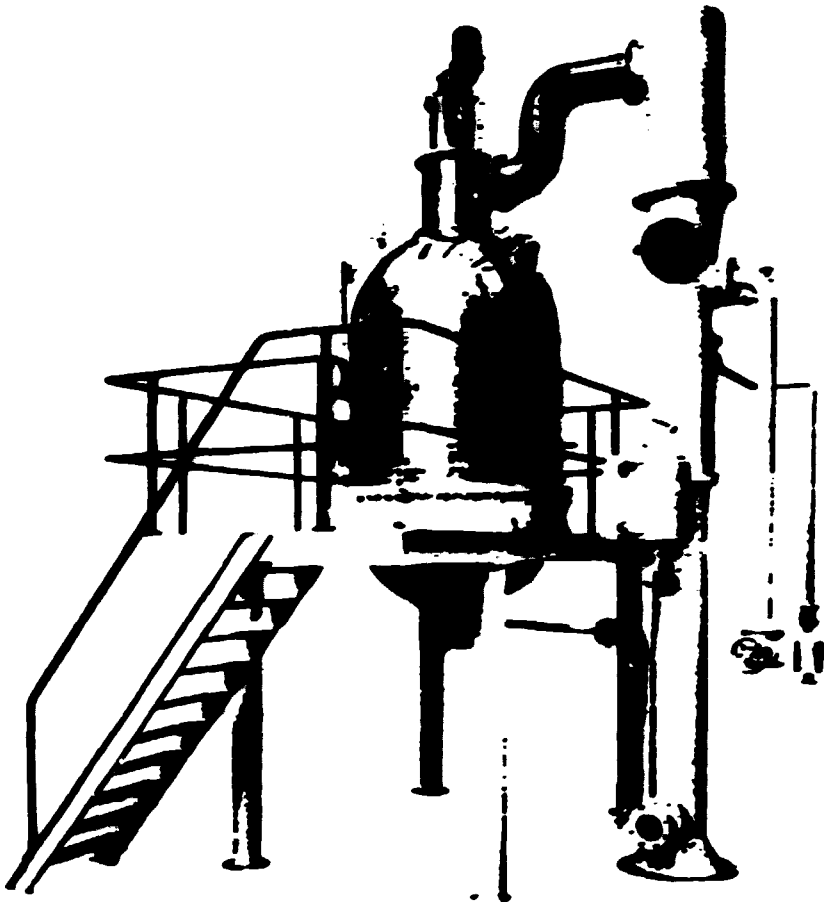
BOULES DE CONCENTRATION

GROUPES DE CONCENTRATION A BOULES
VACUUM PANS CONCENTRATION GROUPS
CONCENTRADOR DE DOS BOLAS

Boule de concentration sous vide Ø 1300 mm avec condenseur semi-barométrique pour évaporer 650 l/h d'eau.
Particulièrement apte pour la concentration de jus de tomate.
Sur demande nous pouvons livrer des versions spéciales.

Ø 1300 mm vacuum pan with semi-barometric type condenser for the evaporation of 650 l/h of water.
Specially designed for tomato juice concentration.
The vacuum pan can also be manufactured in special versions, on request.

Bola de concentración bajo vacio Ø 1300 mm con condensador semibarometrico capacidad de evaporación 650 l/h de agua.
Se presta en especial para la concentración del jugo de tomate.

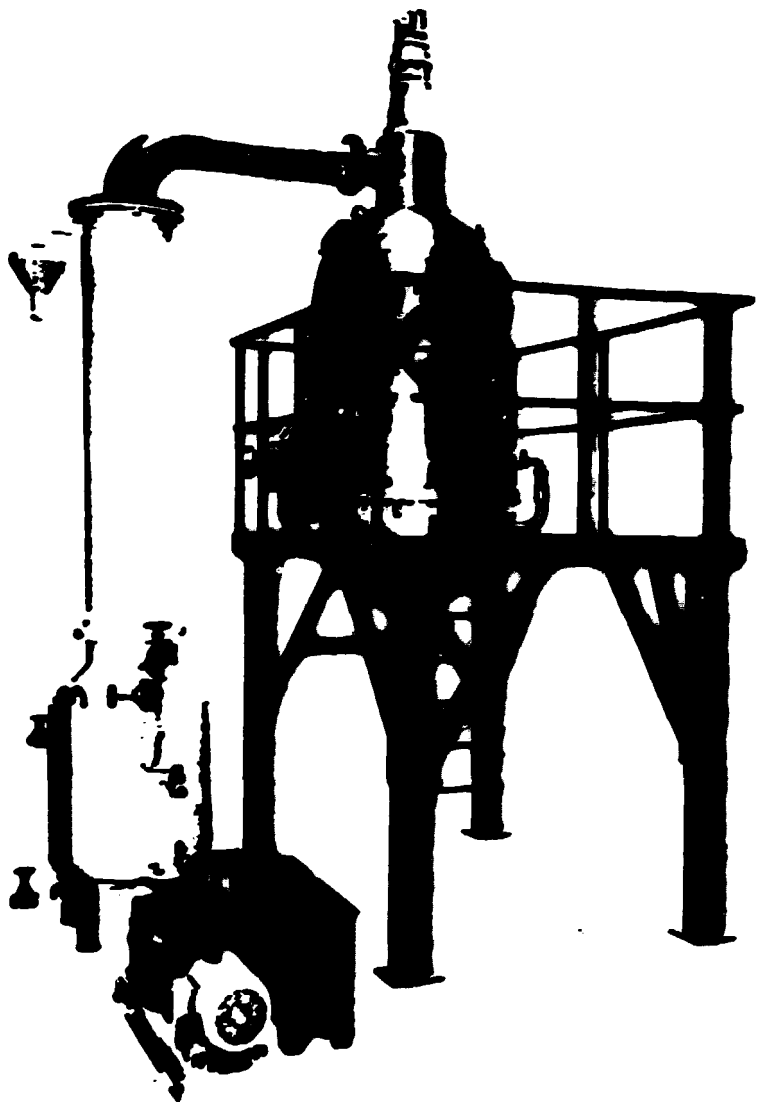


M. 9.1.

Boule de concentration Ø 800 mm avec condenseur à surface.
Particulièrement apte pour la préparation de marmelades, confitures, sauces condiments pour effectuer des distillations ou de petits traitements.

Ø 800 mm vacuum pan with surface type condenser.
Suitable for the production of jams, sauces, marmelades etc.
Also suitable for small scale productions.

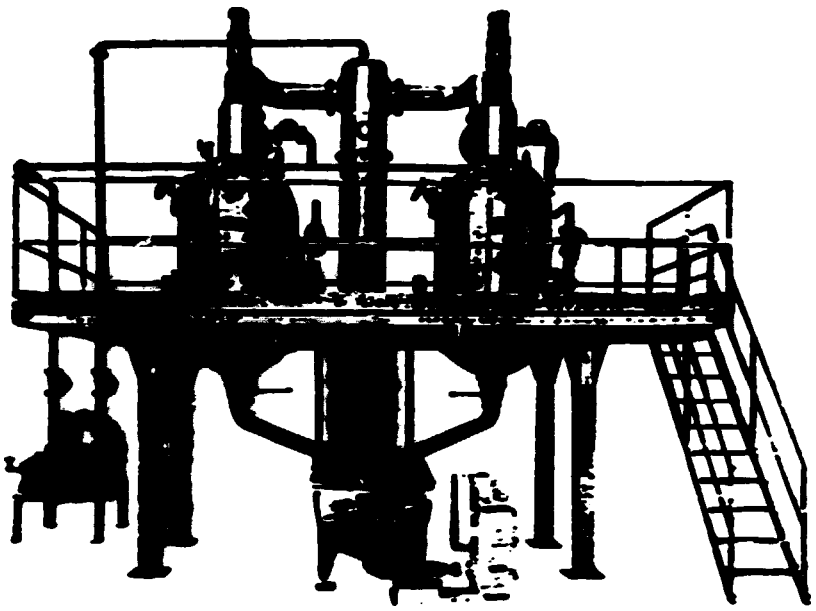
Bola de concentración Ø 800 mm con condensador de superficie.
Especialmente adapta para la preparación de marmeladas, confituras, salsas, condimentos y además para destilar o realizar elaboraciones de poco alcance.



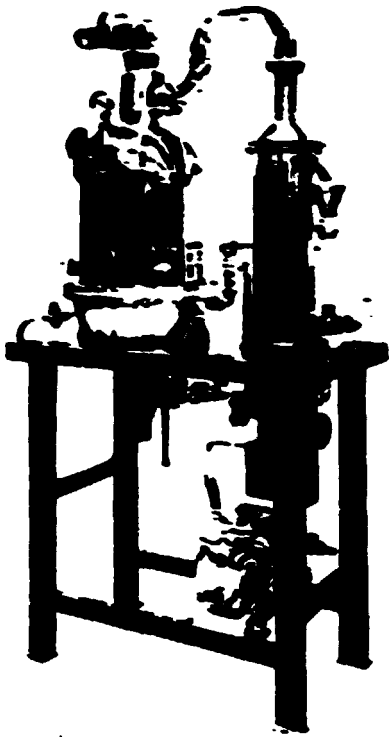
Boules gémellaires Ø 1100/l avec condenseur à surface pour la récolte de condensés aromatiques et cuve thermoisolée pour accumulation de confiture.

Twinned pans Ø 1100/l with surface condenser for collecting aromatic condensates a. . with thermoinsulated tank for storage of jams.

Grupo de bolas con condensador de superficie para recojer las condensas aromaticas y con tanque termoaislado para descarga de las mermeladas.



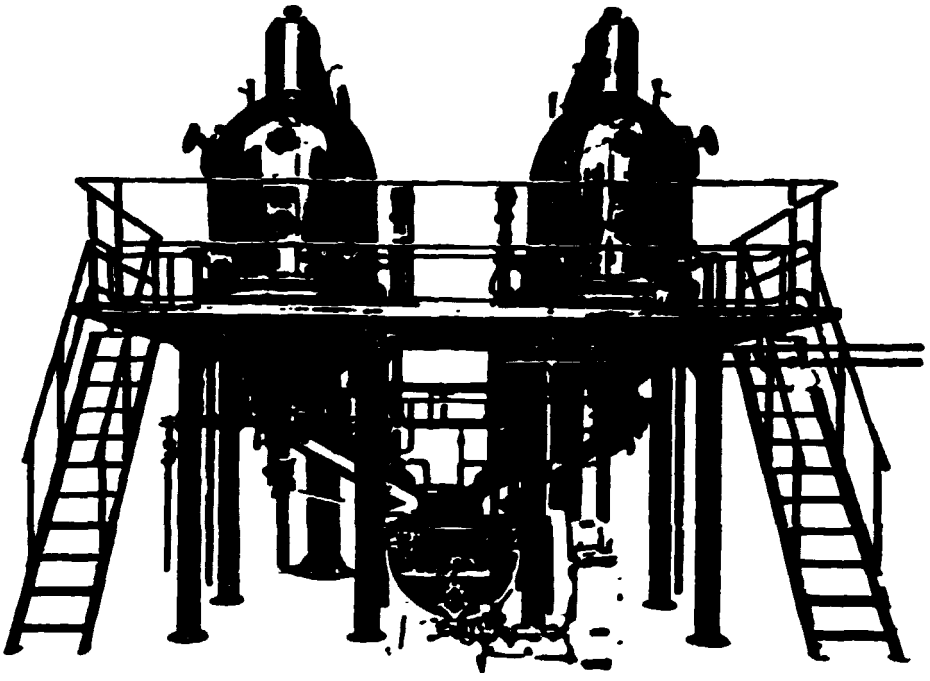
Modèles Models *Modelos*	*Emplois* Employs *Empleos*	*Evaporation* Evaporation *Evaporación* kg/h	*Contenance fond* Bottom capacity *Capacidad* litri	*Surface d'échange* Exchange surface *Superficie de intercambio* m^2	*Hauteur maximum* Maximum height *Altura máxima* mm	*Encombrement au plan* Plant dimensions *Dimensiones planta* mm x mm
420/l	*Laboratoire* Laboratory *Laboratorio*	50	20	0,28	1850	1400 x 900
800/l	*Confitures* Jams *Confituras*	280	140	1	3800	2670 x 2800
1100/l	*Confitures* Jams *Confituras*	300	350	1,9	5000	4000 x 3800
1300/R	*Tomate* Tomato *Tomate*	600	500	2,66	5000	4000 x 4000
1300/l	*Confitures* Jams *Confituras*	400	500	2,66	5000	4000 x 4000



Boule de laboratoire Ø 420 mm avec condenseur à surface pour effectuer des expérimentations.

Ø 420 mm laboratory vacuum pan with surface type condenser for laboratory and experimental use.

Bola para laboratorios Ø 420 mm con condensador de superficie para elaboraciones experimentales.



Groupe de concentration à deux boules Ø 1300/l à simple effet, en version spéciale pour la production de confitures et marmelades.

Special version of two vacuum Ø 1300/l pans concentration group running with simple effect, for the production of jams and marmelades.

Concentrador con dos bolas Ø 1300/l de simple efecto tipo especial para la producción de confituras y mermeladas.

LABORATORY CONCENTRATING PAN MODEL 420/I

Our laboratory concentrating pan is suitable to be used with small quantities of products, for laboratory tests, or for the preparation of samples and for teaching technical staff.

Consequently the concentrating pan can be employed for the concentration of tomato juice or eventually of other more delicated fruits. It can concentrate fruit pulp, realize marmelades and jams, sauces and so on.

Its working system is discontinuous: feeding, concentration, eventual sterilization and discharge.

After reaching the suitable concentration, the product will be discharged by the flush bottom valve.

The thermic surface of the pan dished bottom is constantly kept cleaned by a stirrer with scraper. In this way it is possible to avoid deposits and to have the pan always clean also at the end of the working cycle.

CAPACITY

The capacity depends on the concentration degree the product has to reach.
The water evaporation per hour is up to 50 l in accordance with the product or the cooling water temperature.

CONSUMPTIONS

Steam : 60 kg/h
Water : 1 m^3/h
Electricity: HP 1

COMPOSITION

Our supply includes:

1) Laboratory concentrating pan Ø 420 mm with bottom and body in stainless steel Aisi 304, completed with mixer device HP 0,25 and automatic nylon scraper of the stainless steel bottom.

   The outside steam jacket is in carbon steel and it is suitable to stand-up a pressure up to 3 ate. The vacuum pan is completed with all the necessary accessories: manhole, sight glasses, connections for feeding valves, vacuum breaker, vacuum pressure gauge, steam interception group supplied with gate and safety valves, pressure gauge, discharge valves of the products.

2) A surface condenser with outside cylinder manufactured in stainless steel. The condenser is completed with connections for feeding and water discharge, tubular plate and main heads manufactured in stainless steel.

3) Vacuum pump, hydropneumatic type, water seal ring, with an electric motor HP 0,75 connected by an elastic joint.

The pump is straightly connected to the surface condenser.

4) Supporting trestle for the pan and the condenser, manufactured in carbon steel.

MANUFACTURING MATERIALS

All contacting parts are manufactured in stainless steel Aisi 304, or other sanitary materials where needed by specific requests.

SUPPLEMENTS ON REQUEST

A) The construction in stainless steel Aisi 316
B) Steam reduction group with counterweight valve, by-pass, filters.

WEIGHTS AND CUBES

Net weight: kg. 200 - Gross weight: kg 400 - cubature: m^3 2

ENCLOSURES

Catalogue n. 113

DE/GA/ad
5711/6

OFFER MO/244

SEMI-INDUSTRIAL CONCENTRATING VACUUM PAN MODEL 600/I

Our semi-industrial concentrating vacuum pan is suitable to be used with small quantities of products for laboratory tests, for the preparation of samples and for teaching technical staff.

Consequently the concentrating pan can be employed for the concentration of tomato juice or also for other more delicate fruits. It can concentrate fruit pulps, marmalades and jams, sauces, seasonings or it is also suitable for honey dehydration.

Its working system is discontinuous: feeding, concentration, eventual sterilization and discharge. During the concentration process the product can be controlled inside the vacuum pan by means of a feeder.
After reaching the suitable concentration, the product will be discharged.

The thermic surface of the bottom pan is constantly kept clean by a stirrer with scraper. In this way it is possible to avoid deposits and to have the pan always clean also at the end of the working cycle.

CAPACITY

The capacity of the pan depends on the desired concentration degree.
The water evaporation is up to 100 l per hour, in accordance to the product or the cooling water temperature.

MECHANICAL FEATURES

Our supply includes:

- Main body having a diameter of 600 mm. with inside bottom manufactured in stainless steel AISI 304, complete with mixer driven by kW 0.5 motoreducer group scraper manufactured in stainless steel and nylon.
  The outside steam jacket is in carbon steel and its is suitable to stand-up a pressure of 3 Bar.
  The vacuum pan is complete with al the necessary accessories: manhole, sight glass, etchings with taps for product feeding, vacuum breaker, vacuum pressure gauge, steam interception group supplied with gate and safety valves, pressure gauge and product discharging valve.

- surface condenser with outside cylinder manufactured in stainless steel. The condenser is complete with etchings for feeding and water discharge, tubular plate, main heads and condensation pipings manufactured in stainless steel.
- vacuum pump hydropneumatic type, water seal ring, with 0.5 kW electric motor, connected by an elastic joint.
  The pump is straightly connected to the surface condenser in order to remove the uncondensable gases and also the steam condensated into the tubular plate.
- support scaffolding for the pan and the condeser, manufactured in stainless steel.

SUPPLEMENTS ON REQUEST

On request and with extra price we could also supply the pan complete with a closer condenser of pressed plates type, having the same performances of the standard surface model.

MANUFACTURING MATERIALS

All the parts in contact with the product are manufactured in stainless steel AISI 304, or other sanitary materials, where needed by specific requests.

CONSUMPTIONS

Steam: about 120 kg/h
Water: 1 m3/h
Motors: 1 kW

TECHNICAL DATA

- Net weight: kg. 300
- Gross weight: kg. 500
- Volume: m3 3

DE/La
5610/52

VACUUM PAN FOR THE PRODUCTION OF JAM AND JELLIES MOD. 800/I

GENERAL FEATURES

The above machines, due to its simplicity and practicality, is a unit which is very well known in all food industries where cooking or concentration under vacuum is required.

The vacuum pan is supplied with three etchings for fruits, sugar and other ingredients feeding. Such ingredients are mixed up by the inside stirrer and the water evaporates for about 15 minutes. After this, the vacuum is broken and then a sudden cooking is provided for final sterilization.

The vacuum pan is also suitable for processing pulps or juices preserved with SO_2 thanks to the fact that the condentration under vacuum provides also the elimination of this chemical additive.

CAPACITY

The capacity of the vacuum pan ranges within wide limits according to the technological process.

It can be said that generally, the capacity of the vacuum pan varies from 300 to 600 kg/h of finished product; however it is to be considered that the hourly evaporation is of about 200 kg/h of water.

CONSUMPTIONS

- steam: about 250 kg/h (at 3 ate)
- water: about 6000 l/h at a temperature of about 15°C.
- electricity: HP 6.

MECHANICAL LAYOUT

Our supply includes:

- 1°) Main body having a ø of 800 mm, outside bottm manufactured in common steel, inside bottom and dome manufactured in stainless steel AISI 304. The body is completed with an inside stirrer driven by a HP 1,5 speed reducer. The bottom scraper is manufactured in stainless steel and nylon.

The steam jacket is tested at 3 ate. The pan is completed with all the necessary accessories: manhole, sight glasses, three etchings with cocks for product feeding, one vacuum breaker, one vacuum meter, steam interception group supplied with gate and safety valves, manometer, ϕ 90 mm outlet gate for product.

- 2°) One surface condenser: with outside cylinder manufactured in carbon steel. The condenser is completed with etchings for feeding and water discharge, tubular plates and main heads manufactured in stainless steel. copper tubes ϕ 18 mm.

  The surface condenser is connected to the vacuum pan by means of piping, (under vacuum- manufactured in stainless steel AISI 304.

- 3°) One vacuum pump: hydropneumatic type water seal ring. The pump is connected to the condenser by means of a flexible coupling and base with a carbon steel piping.

- 4°) One tank: under vacuum with sight glass level for the collection of the condensed vapours delivered by the vacuum pan. The tank has a capacity of about 130 litres, ϕ 600 mm and height 450 mm.
  The tank is manufactured in carbon steel AISI 304 and completed with delivery cocks and intercepting valves.

  The tank is also the support of the surface which is directly coupled by flanges and joints in asbestos.

- 5°) A stand scaffolding for the concentration pan. It is manufactured in carbon steel with footboard, inlet scale and handrail.

MATERIALS

All contacting parts are manufactured in stainless steel AISI 304 or other sanitary materials where needed by the specific manufacturing requirements

WEIGHTS AND VOLUMES

Net weight: kg 2000 Gross weight: kg 2800 Volume m^3 8.

ENCLOSURES

Catalogue n. 113

DE/ad
5711/91

OFFER NO 1

VACUUM PAN MODEL 1100/I

GENERAL FEATURES

Our vacuum pan for the production of jam and jellies, due to its simplicity and practicality, is very well known in all preserving industries because it is employed also for processing where cooking or concentration under vacuum is required.

The vacuum pan is supplied with etchings for fruits, sugar and other ingredients. Such ingredients are mixed up by the inside stirrer and the water evaporates for about 15 minutes. After this, the vacuum is broken and then a sudden cooking is provided for final sterilization.

The vacuum pan is also suitable for processing pulps or juices preserved with SO2, thanks to the fact that concentration under vacuum provides also the elimination of this chemical additive.

CAPACITY

The capacity of the vacuum pan ranges within wide limits according to the technological process.
It can be said that generally, the capacity of the vacuum pan varies from 1050 to 1600 kg/h of finished product; however it is to be considered that the hourly evaporation is of about 300 kg of water.

MECHANICAL LAYOUT

Our supply includes:

1) Main body, having a diameter of 1100 mm, inside bottom dome manufactured in stainless steel AISI 304, outside bottom manufactured in common steel. The body is completed with an inside stirrer and scrapers for cleaning the semi-spherical bottom; the stirrer/scraper group is driven by a 1,5 HP speed reducer.
   The steam jacket is tested at 3 Ate. It is completed with interception valve, safety valve, manometer, air outlet and condensate automatic discharger. The pan has all the necessary accessories: manhole, sight glasses etchings with cocks for product feeding, vacuum breaker, vacuum meter, outlet gate for the product.

2) Mixing condenser, semi-barometric, water and steam counter current type. It is manufactured in painted carbon steel. The condenser is self supported and it is equipped with an auxiliary condenser with automatic level regulator operating a floating valve for the cooling water regulation.
The condenser is also supplied with inspection door, etchings with vacuum pipes and water pipes with relative interception valves.

3) Vacuum pump, hydropneumatic type water seal ring, with bronze impellers and stainless steel shaft. The pump is equipped with a 5,5 HP electric motor and with all the connections for the barometric condenser

4) Centrifugal pump for suction of water from the semi-barometric condenser; the pump is manufactured in cast-iron and coupled to a 3 HP electric motor

5) Scaffolding to support the vacuum pan. It is manufactured in painted carbon steel with footboard, ladder and handrail

MANUFACTURING MATERIALS

All the parts in contact with the product are manufactured in stainless steel AISI 304, exception made for some pieces that due to manufacturing requirements are in teflon, bronze or rubber.

CONSUMPTIONS

Steam at 3 Ate: about 400 kg/h
Water at 15°C: about 10 m3/h
Motive power: HP 10

AUXILIARY EQUIPMENT ON PAYMENT

With additional price the vacuum pan is supplied with:

a) material in contact with the product in stainless steel 314 instead of 304

b) steam reduction group with regulating valve by-pass, connections, cocks and manometer

c) surface condenser, in stainless steel with pump for the extraction of condensate

d) electrical control board for the operation and protection of pumps and mixer

VACUUM PAN FOR THE PRODUCTION OF JAM AND JELLIES MOD. 1300/I

GENERAL FEATURES

The above machine, due to its simplicity and practicality, is a unit which is very well known in all food industries where cooking or concentration under vacuum is required.

The vacuum pan is supplied with three etchings for fruits, sugar and other ingredients feeding. Such ingredients are mixed up by the inside stirrer and the water evaporates for about 15 minutes. After this, the vacuum is broken and then, a sudden cooking is provided for final sterilization.

The vacuum pan is also suitable for processing pulps or juices preserved with SO_2 thanks to the fact that concentration under vacuum provides also the elimination of this chemical additive.

CAPACITY

The capacity of the vacuum pan ranges within wide limits according to the technological process.

It can be said that generally, the capacity of the vacuum pan varies from 00 to 1800 Kg/h of finished product; however it is to be considered that the hourly evaporation is of about 450 Kg of water.

CONSUMPTIONS

- Steam : about 600 kg/h at 3 ate
- Water: about 14 m^3/h at a temperature of about 15°C
- Electricity: HP 11

MECHANICAL LAYOUT

Our supply includes:

1°) Main body having a Ø of 1300 mm, outside bottom manufactured in common steel, inside bottom and dome manufactured in stainless steel AISI 304. The body is completed with an inside stirrer driven by a 1,5 HP speed reducer. The bottom scraper is manufactured in stainless steel and nylon.

The steam jacket is tested at 3 ate. The pan is completed with all the necessary accessories: manhole, sight glasses, three etchings with cocks for product feeding, one vacuum breaker, one vacuum meter, steam interception group supplied with gate and safety valves, manometer, outlet gate

for the product.

2°) Mixing condenser, semi-barometric, water and steam counter current type.
It is manufactured in painted carbon steel. The condenser is self supported and it is equipped with an auxiliary condenser with automatic level regulator operating a floating valve for the cooling water regulation.

The condenser is also supplied with inspection door, etchings with vacuum pipes and water pipes with relative interception valves.

3°) Vacuum pump hydropneumatic type water seal ring, with bronze impellers and stainless steel shaft. The pump is equipped with a 5,5 HP electric motor and with all the connections for the barometric condenser.

4°) Centrifugal pump for suction of water from the semi-barometric condenser. The pump is manufactured in cast-iron and coupled to a 4 HP electric motor.

5°) Scaffolding to support the vacuum pan. It is manufactured in carbon steel with footboard, ladder and handrail.

MATERIALS

All contacting parts are manufactured in stainless steel Aisi 304.

AUXILIARY EQUIPMENT ON PAYMENT

A) Material in contact with the product in stainless steel Aisi 316

B) Steam reduction group complete with regulating valve, by-pass, cocks, connections and manometer

C) Surface condenser in stainless steel with pump for the extraction of condensate

D) Electrical control board for the operation and protection of pumps and agitator motors.

WEIGHTS AND CUBES

Net weight: kg 2900 Gross weight; kg 3800 cube: m^3 21

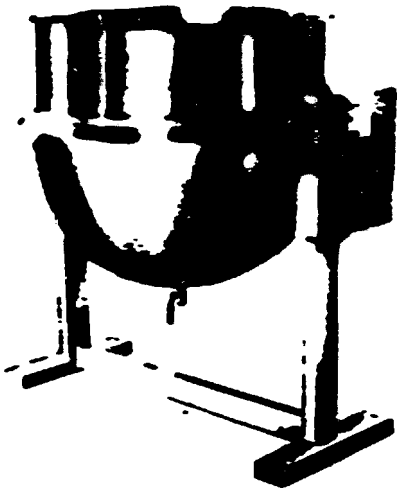
ENCLOSURES

Catalogue n. 113

DE/Gt/Ad
5711/91

STEAM HEATING KETTLES

Tilting
Steam heating 6 Bars
All capacities

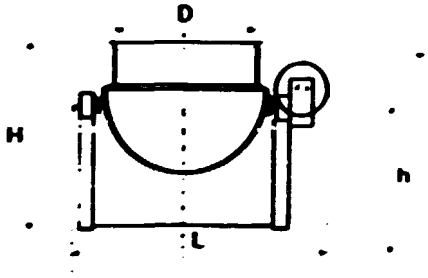


CONSTRUCTION :

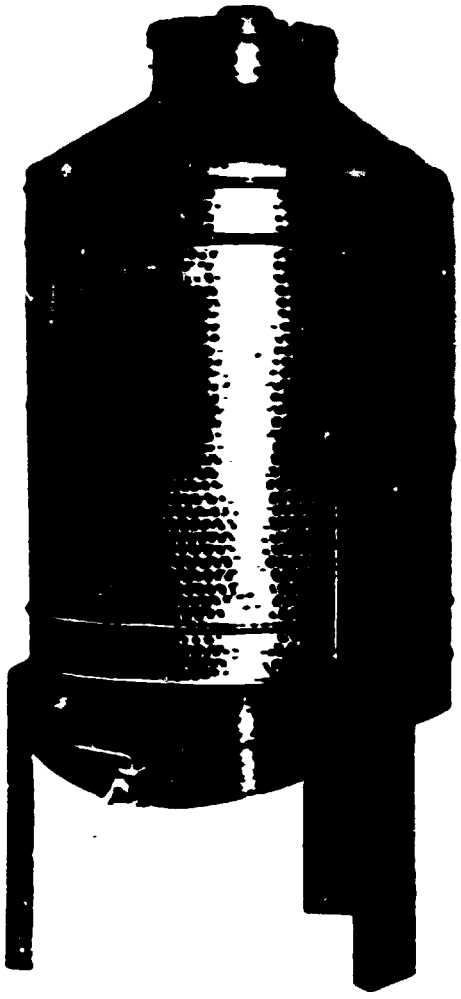
- Stainless steel
- Hemispheric bottom
- steel jacketed for steam heating
- steam inlet and condensed water outlet by rotating joints
- tilting device with screw and fly wheel
- stainless steel cover (optional)
- painted steel feet

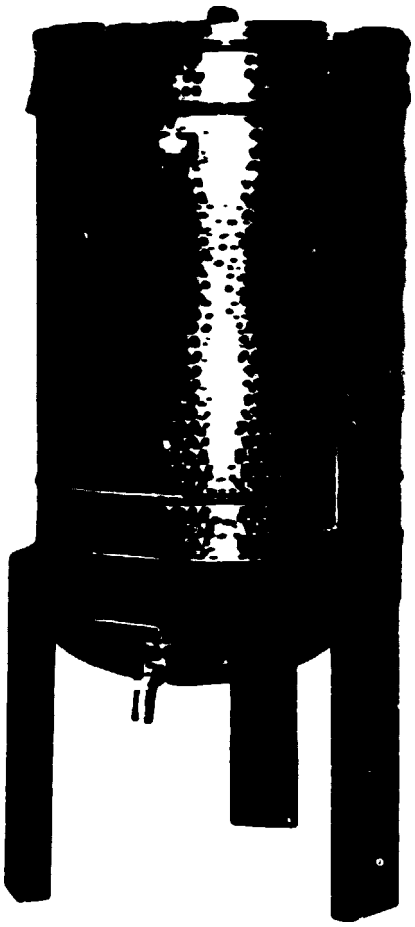
EXTRAS AND VARIANTS :

- Special capacities and shaps
  stationnary models with drain
- flat bottom pans - large radius bottom section kettles
- pressured kettles (0,5 KG/CM2 107/110°) with closing cover
- temperature control
- agitators, mixers, scrapers (special
- copper construction leaflet)



Capacity	D	H	L	h	Entry Steam
50	500	1000	1020	825	12/17
100	600	1100	1180	825	12/17
150	700	1100	1250	825	12/17
200	800	1100	1370	825	12/17
300	875	1200	1450	825	15/21
400	940	1300	1450	825	15/21
500	982	1320	1650	825	20/27
600	1050	1400	1740	825	20/27
1000	sur demande				





Réservoirs Standard avec pas d'homme, fabriqués en plusieurs modèles avec capacité de 350 - 600 - 1000 - 1500 - 2200 - 2900 - 3600 l.

Standard tanks with manhole, manufactured in the models 350 - 600 - 1000 - 1500 - 2200 - 2900 - 3600 l.

Deposito Standard bocapuerta disponible en las siguientes versiones: 350 - 600 - 1000 - 1500 - 2200 - 2900 - 3600 l.

Récipients et réservoirs Standard avec couvercle plat fabriqués en plusieurs modèles avec capacité de 100 - 200 - 300 - 500 - 1000 - 1500 - 2000 - 2500 - 3200 l.

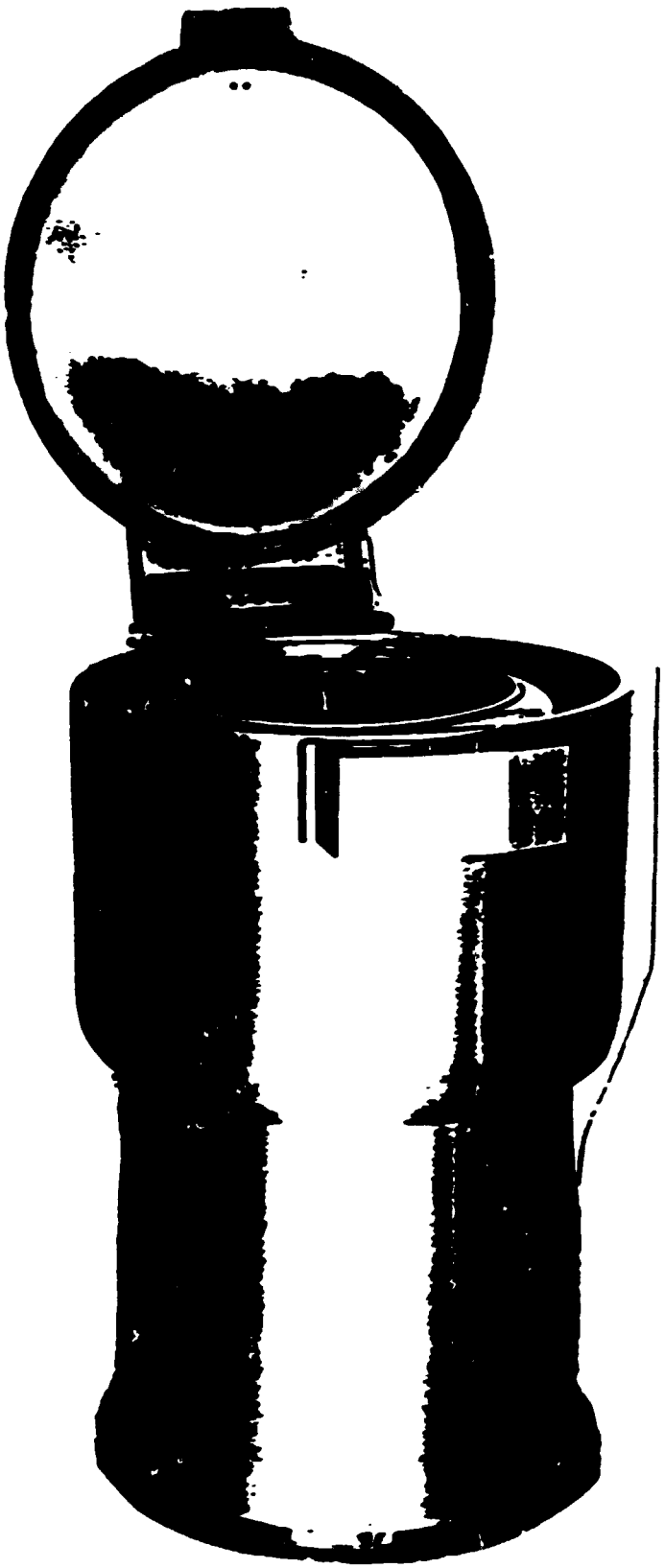
Standard Tanks with movable cover manufactured in the models 100 - 200 - 300 - 500 - 1000 - 1500 - 2000 - 2500 - 3200 l.

Recipientes y depositos Standard con tapa movible disponibles en las versiones siguientes: 100 - 200 - 300 - 500 - 1000 - 1500 - 2000 - 2500 - 3200 l.

CENTRIFUGAL EXTRACTOR

M. 17

CENTRIFUGEUSE A 701



CENTRIFUGAL EXTRACTOR A 701

N. 17.1.

- Water or juice extractor for recuperation of dry composants of juices.
- For extractor of juices coming from crushed pulps, it is necessary to place a textile pocket inside steady basket

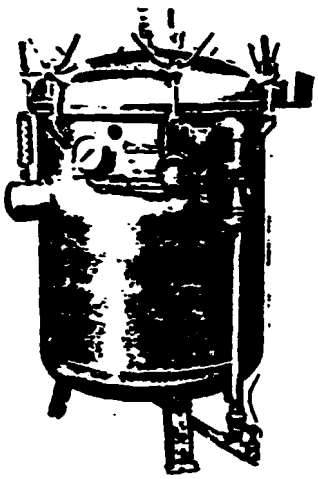
CHARACTERISTICS :

- Centrifugal action on fruits or vegetables, fish, meat, for juice or water extraction
- Stainless steel body and cover
- Stainless steel steady and movable basket
- Auto brake motor on damping device
- Safety waterproof electrical system with safety device on cover
- Standard perforated strainer Ø 4 mm (other on request)

TWO MODELS MINOR & EDY 6

DESCRIPTION	MINOR.	EDY 6
Rotation speed	700 or 1500 RPM	700 RPM
MOTOR POWER	1,5 HP	2 HP
MOVABLE BASKET CAPACITY	15 KGS MAX.	30 KGS MAX.
OUTPUT	ONE BASKET EVERY 3 MINUTES	
MOVABLE BASKET	Ø 365 MM H 300 MM	Ø 490 MM H 300 MM
MACHINE DIMENSIONS HIGH	800 MM	800 MM
MAX WIDTH	550 MM	750 MM
WEIGHT	110 MM	130 MM

STEAM HEATING RETORTS



. steam heating 6/8 Bars
. maxi operating pressure 2 Bars
. test pressure 4 Bars

Processing of
. metal cans, jars, plastic bags
. max process time 135°

CONSTRUCTION

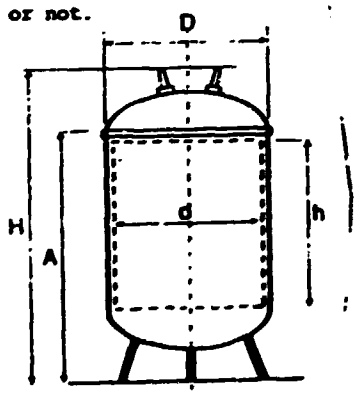
. heavy steel protected by special paint
. direct steam inlet
. counter balanced cover with swinged nuts
. normal accessories : security valves, vent valve drain cook, thermomanometer
. spacious thermometer pocket with 3 outlets
. high visibility steam thermometer
. all outlets provided for controls
. perforated basket

OPTIONNAL

. Registering thermometer
. Extra baskets and or special design
. temperature/timing controls counter pressure control
. complete regulation
. timing simple control - pressured cooling - counter pressure inlet

SPECIAL CONSTRUCTION
. stainless steel cooking retorts, all capacities, tilting or not.

4/4 Cap.	S/1	A	H	D	h	d
50		—	—	—	—	—
100		830	1150	700	500	650
150		—	—	—	—	—
200	30	1000	1350	870	750	750
300	40	1150	1530	950	750	880
400	65	1400	1880	950	900	880
800	140	2400	2880	950	900 deux paniers	880



RETORT CONTROL SYSTEMS

FOR VERTICAL PROCESSING RETORTS

Processing is a very important operation, surely the most important in general treatment of preserved products (cans, jars, plastic bags).

The most important because of A) security of preservation
B) final product quality

SECURITY OF PRESERVATION

In order to obtain a suffisant preservation time without any risk of alteration by germs, it is necessary to assure a complete destruction of these germs at a well defined and combined set of temperature and time. The parameters, very well studied and adjusted by experienced and specialised laboratories, according to products, can capacity, are to be strictly applied for sure results.

FINAL PRODUCT QUALITY

If the security obliges to have well defined processing temperatures accorded to processing times, the product quality requests the shorter possible cooking time. The choice of the right values for the best result requires a good precision in chosen parameters.

MEANS OF WORKING

Without process control system, the operator must be obligatory present near the retort during all the processing time which lasts very often long time. The results completely depends on his capacity, availability, vigilance. Nowodays according to the multiple problems of a cannery, these qualities are found with many difficulties.

A retort control system with setting of processing table parameters eliminates human factor and its errors during direction and control of the processing.

In case of jars and plastic bags, an other parameter, super-imposed pressure in retort during processing and cooling avoids damage of contenants.

Our retort control systems give for minimum investment, security and product quality.

A registering thermometer (extra charge) brings the verification of a good working. a good processing.

CONTROL EQUIPMENT

Temperature/time control A) temperature measurement (thermostat)
B) heating mean control (valve)
C) control panel with timing mechanism

.../...

3 MODELS OF PROCESS CONTROL SYSTEMS

A) TEMPERATURE/TIME VERSION

This model gives the control of processing temperature during the exact desired time. The temperature setting is done directly on the precision thermostat dial and the time on the timing mechanism placed on control panel.

The processing temperature setting starts the heating (steam or gas electromagnetic valve). This system controls the retort temperature itself and not the pressure which is too dependent of steam pressure, venting, etc...

At the end of processing, the heating stops automatically. Sound and optic signals warn the operator who can then proceed to manual cooling operations.

This system does not exempt from venting retort during come in period (4 to 5 mn at 110°C with 1° cork in a 800 liters retort).

B) TEMPERATURE/TIME + SUPER IMPOSED AIR PRESSURE CONTROL

Added to first version, a single system provides constant pressure during cooling period and even during processing period if necessary (jars and plastic bages in water phase sterilisation).

Compressed air entry is done at a pressure a little higher than processing one. When retort inside pressure is above the set one, the valve opens. In the contrary, the valves shuts and pressure elevates by meam of compressed air or cooling water pressure. This retort pressure is so kept at the proper point during all the wanted period.

This system is independant from the first one and is started manually as wanted.

C) TEMPERATURE/TIME + SUPER IMPOSED AIR PRESSURE CONTROL + AUTOMATIC TIME COOLING

This system includes the first, the second, + automatic joining between them. This combination allows automatic compressed air entry at the end of processing tim (for steam phase processing). A little time after (delay set on timer dial) automat cooling water inlet is open. Cooling time is adjustable on a mechanism timerpla inside the control panel.

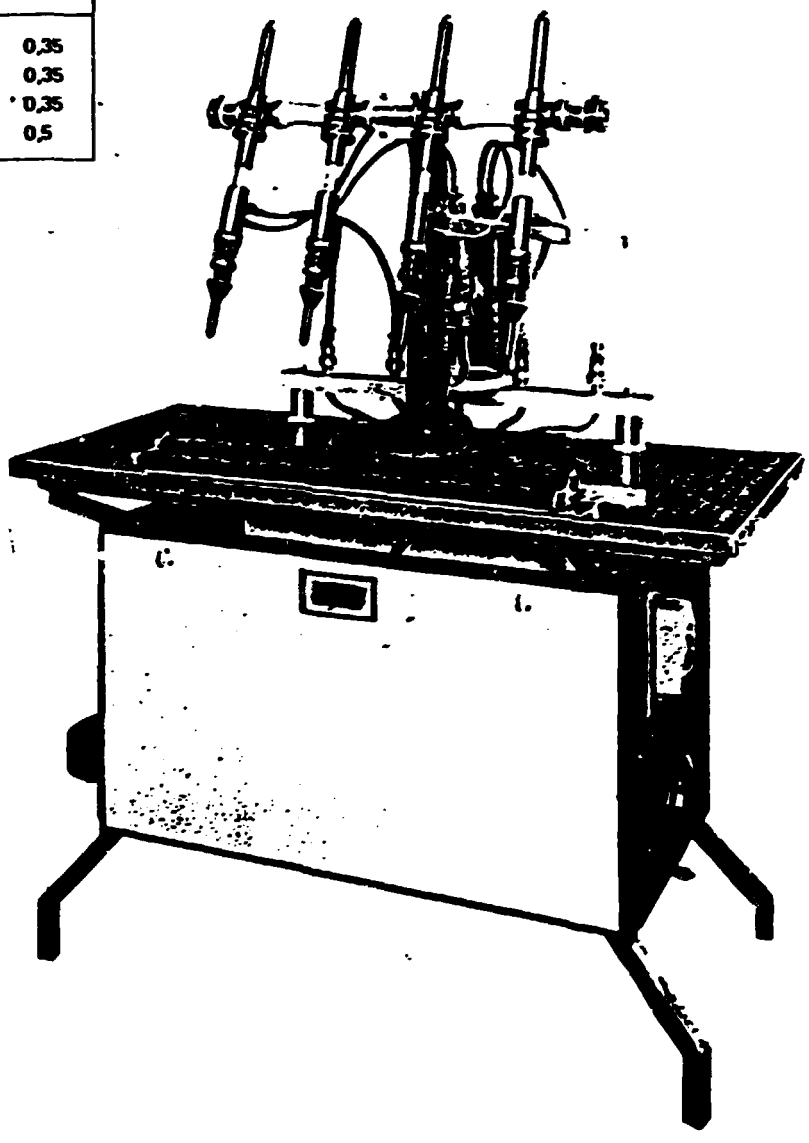
A sound and light signal shows the operator that the cycle is over for manual blow-down, draining and unloading.

Super imposed air pressure control	A) pressure measurement (pressostat) B) pressure control (outlet valve) C) pressured air inlet setting (without air compressor)
Automatic cooling control	A) cooling timing mechanism B) air inlet control (valve) C) water inlet control (valve)
Extra charge	Temperature recorder Temperature/pressure recorder

All these elements are easily installed on new or already used retorts by the customer. All necessary indications are given with equipments, according to retort specifications

MACHINE A EMBOUTEILLER A DEPRESSION
VACUUM BOTTLING UNIT
EMBOTELLADORA A DEPRESION

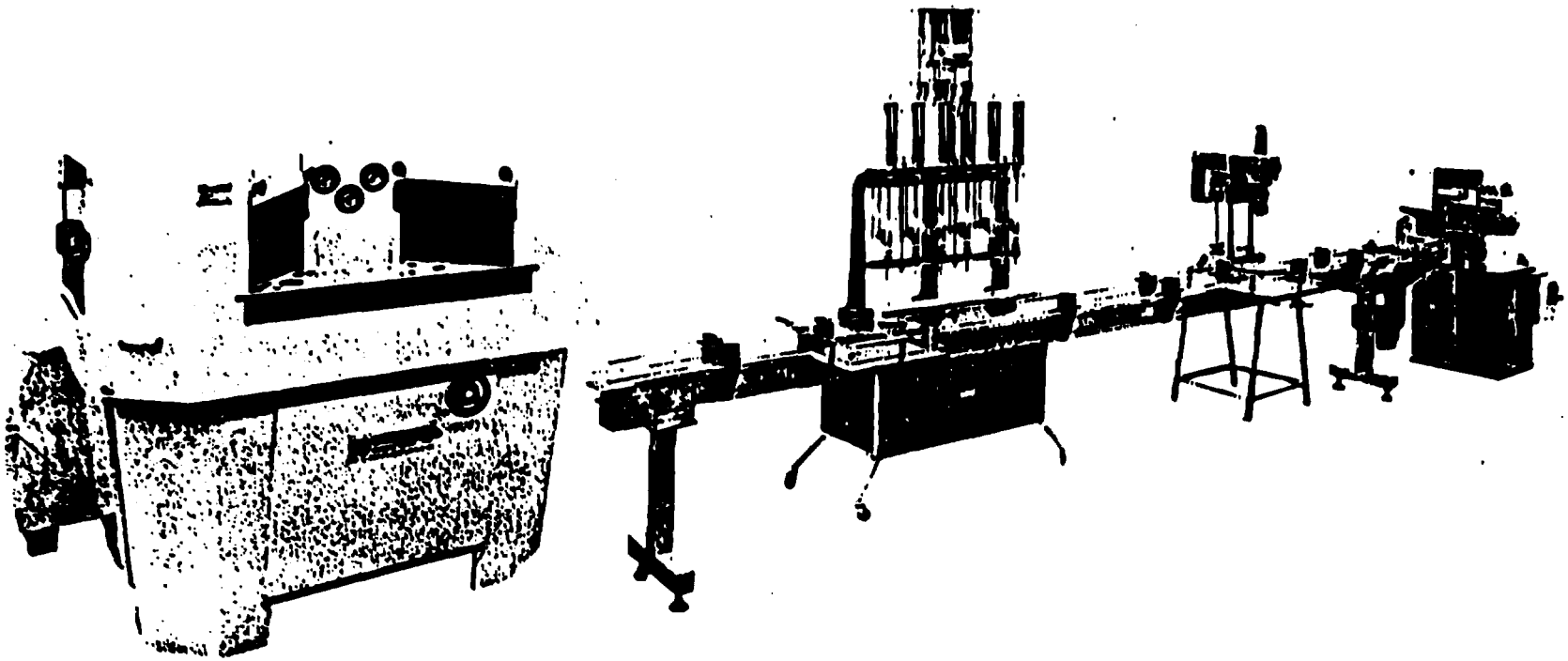
Modèle	DEBIT B/H 0,2 L	DEBIT B/H 2 L	Moteur
2	300	200	0,35
4	600	400	0,35
6	900	600	0,35
8	1200	800	0,5



Pour les jus de fruits, vins, liqueurs, huile, parfums et produits chimiques, pour bouteilles jusqu'à 2 litres. Quatre modèles à 2-4-6-8 têtes avec une production de 200 à 1200 bouteilles/heure.

For fruit juices, wines, liqururs, oil, parfumes and chemical products, for bottles up to 2 litres.
Four models with 2-4-6-8 heads with an hourly production from 200 up to 1200 bottles.

Para jugos de fruta, vinos, licores, aceite, perfumes y productos químicos para botellas hasta 2 litros.
Cuatro modelos de 2-4-6-8 cabezas con una producción desde 200 hasta 1200 botellas/hora.



Ligne semiautomatique pour la mise en bouteille complète de: laveuse, convoyeur, remplisseuse, boucheuse à vis et etiqueteuse. Débit: 600 - 900 pcs/h; très employée pour liqueurs, sirops et autres liquides non gazeuses.

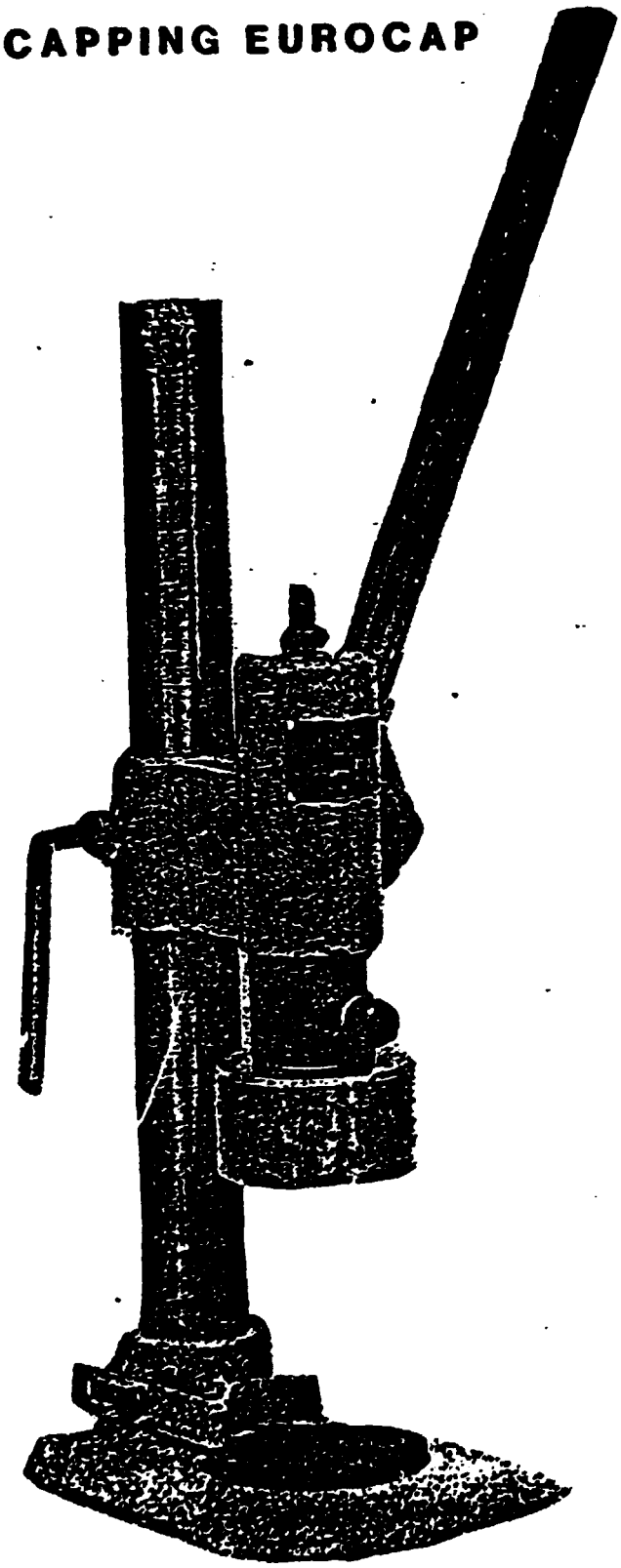
Semiautomatic bottling line complete with washer, conveyor, filler, screw-capping unit and labelling machine. Capacity: 600 - 900 pcs/h, particularly suitable for liqueurs, syrups and other plain liquids.

Linea de embotellamiento semiautomatica completa con lavadora, transportadora, llenadora, aplicadora de tapas roscadas y etiquetadora. Capacidad desde 600 hasta 900 piezas/hora, particularmente indicada para licores, jarabes y otros liquidos no gaseosos.

CAPSULEUSE MANUELLE EUROCAP

N. 20

MANUAL CAPPING EUROCAP



CAPSULEUSE EUROCAP AVEC OU SANS ATMOSPHERE VAPEUR TYPE SIMPLEX A MAIN

CARACTERISTIQUES :

- cadence : environ 600 à 900 pots/heure

Capacité de bouchage :
. capsules : tous les diamètres existants de 43 à 100 mm
. Pots : diamètre de 40 à 115 mm
hauteur de 40 à 300 mm

Encombrement de la machine :
. hauteur : avec levier de commande monté : 0,92 M
sans levier : 0,62 M
. largeur : 0,21 M
. longueur 0,27 M
. poids : - sans mandrin : 17,5 KG
- avec mandrin : 20,5 KG

CHARACTERISTIQUES :

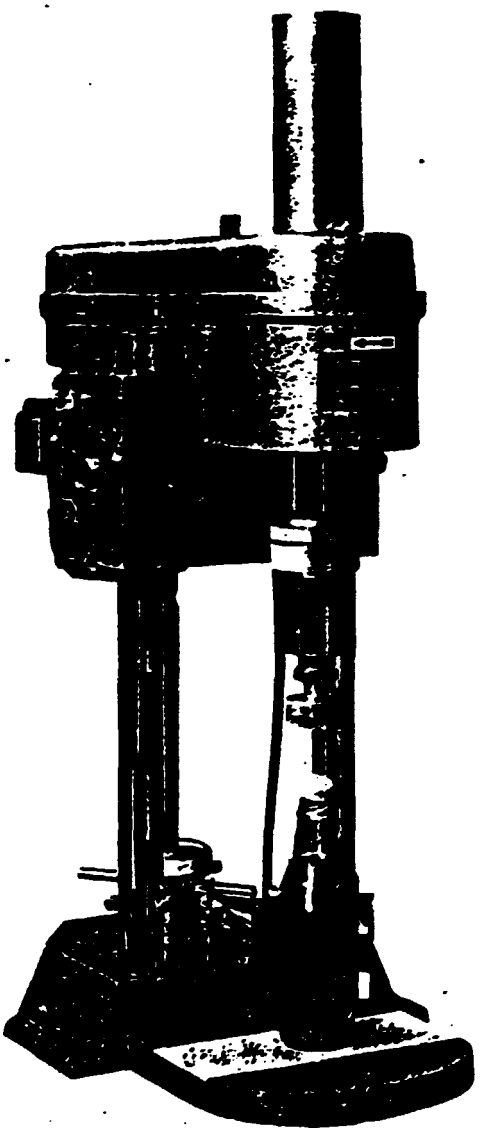
- output : about 600 to 900 jars/hour

Capacities :
. lids : Ø 40 to 115 mm
. Jars : Ø 40 to 115 mm
Height : 40 to 300 mm

Other dimensions upon request

Dimensions :
. height : - with mounted control lever : 0,92 M
- without lever: 0,62 M
. Widht : 0,21 M
. Length : 0,27 M
. Weight : - with chuck : 17,5 KG
- without chuch : 20,5 KG

CAPSULEUSE



TRIS - T -

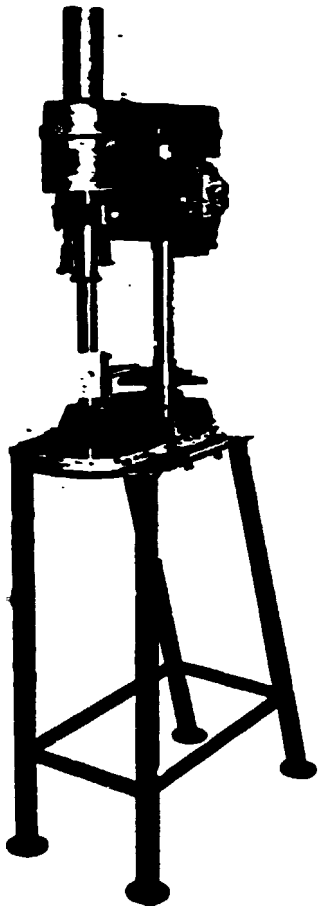
Machine avec tête spéciale à embrayage pour la fermeture semi-automatique de bouteilles avec bouchons twist - off ou similaires.

Unit with special clutching head for semiautomatic closing of bottles with twist-off caps or similar.

Màquina con cabeza tapadora especial a fricciòn para el cierre semi-automatico de botellas con tapas twist-off o parecidas.

- *Poids net.....90 KGS*
- *Poids brut.....150 KGS*
- *Cubage.....0,2 M³*

TRIS - A -



Boucheuse avec tête descendante pour la fermeture de bouteilles avec bouchons a vis.

Capping unit descending head for closing bottles with screw type caps.

Màquina enroscadora c'n cabeza tapadora descendente para botellas con tapas atornillables.

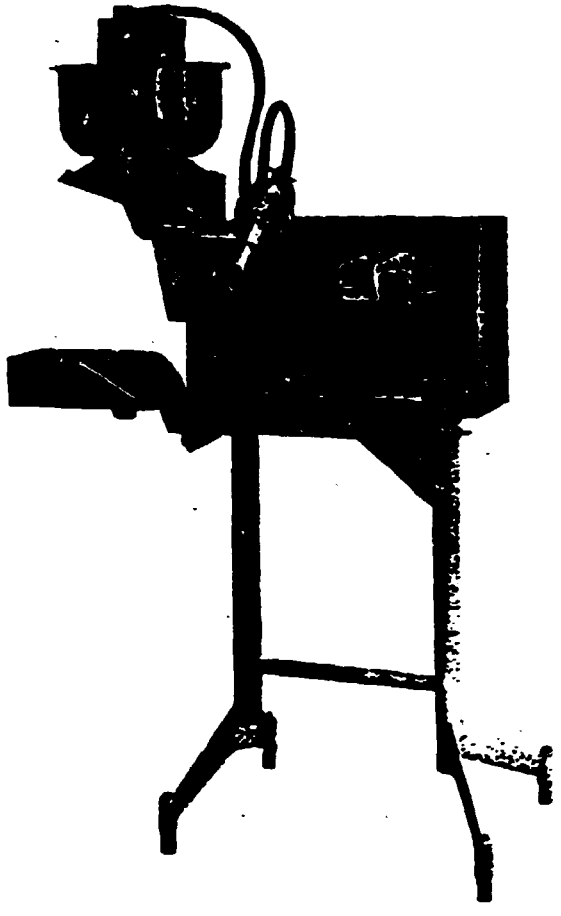
TRIS - C -

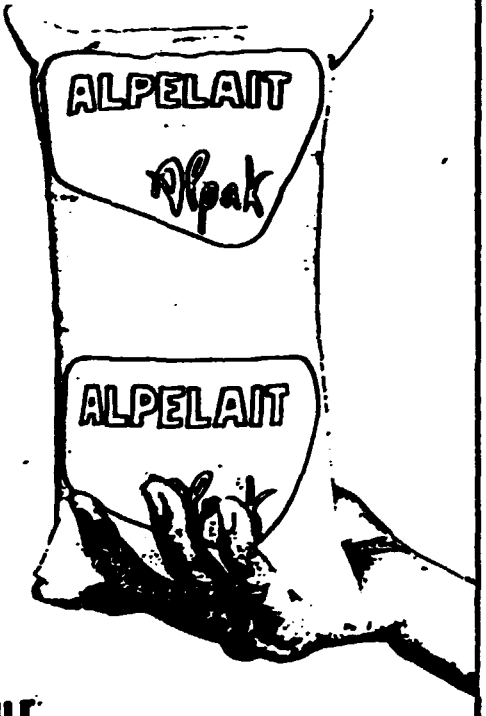
Cette machine est disponibile aussi dans la version pour la fermeture semi-automatique de bouteilles avec capsules déchirables ou de sûreté.

Version also available for the application of pilper-proof or safety caps on bottles.

Esta màquinas disponibile en la versiòn para capsuladora para 'a cierre semi-automatico de botellas con tapas de tiro o de seguridad.

MODEL MODELE *MODELO*	*CAPACITY* DEBIT *PRODUCCION*	*MOTOR* MOTEUR *MOTOR*	*NET WEIGHT* POIDS NET *PESO NETO*	*GROSS WEIGHT* POIDS BRUT *PESO BRUTO*	m^3 m^3 m^3 m^3
TRIS - A	600 - 800	0,5	90	150	0,2
TRIS - C	800 - 1000	0,5	90	150	0,2
TRIS - T	600 - 800	0,5	90	150	0,2





OUTPUT 500 pouches/hour

This machine is capable of dosing and sealing all types of heat-welded sachets whether they be in polyethylene or in complex materials. The version D 3 is for ordinary sachets, and the version D 3 D is for the DOYPACK sachets.
The capacity can be adjusted instantaneously from ONE QUARTER OF A LITRE TO ONE AND A HALF LITRES. It is also possible, on request, to obtain a timer which can dose up to TWO litres.
The maximum standard width of the sachets is 20 cm or 32 cm on request.

USE

The D 3 machine designed for semi-automatic packaging in thermo-weldable bags.
The material commonly used is polyéthylène, but laminates can also be used for filling and welding - DOYPACK bags for example. In this case double-acting welding jaws and a device for opening the bags must be provided for. The machine then becomes the D 3 D.

PRODUCTS PACKAGED

All liquids and, more particularly food-stuffs such as milk, fruit juice, wine, oil, sauce, etc . . .

OPERATION

A bag is placed in position in the filter. A touch of the back of the left hand triggers off the quantity measuring cycle. The filled bag is then moved to the side, to between the welding jaws which close automatically on a simple touch of the back of the right hand on a conveniently placed microswitch.
At this very moment another bag can be taken and the operation begun all over again; At the very moment the second full bag comes into position in front of the welding clamp the latter's cycle is completed; the jaws open automatically and the first bag is freed.
High rates can thus be achieved, thanks to the paralled arrangement of the quantity-measuring and welding elements.

SOURCES OF SUPPLY

ELECTRICITY : Single-phase current, 220 volts
power absorbed : 600 W.
COMPRESSED AIR : Pressure : 4 kg/cm^2
Approximate flow : 7 m^3/h.

CONSTRUCTION

This machine was designed for use in the Milk, Industry, so all parts in contact with the product measured are stainless steel; and all the electro-pneumatic control elements are enclosed in a sealed cabinet. The machine is small in size and calls for a minimum of maintenance.

TECHNICAL DATA

The machine comprises essentially :

1 – A constant level stainless steel tank fd direct by a vat under pressure, or by a low-pressure pump.

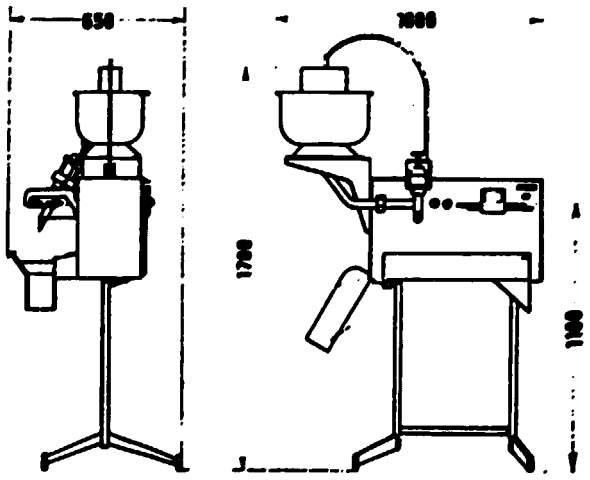
2 – A quantity-measuring cock fitted with a time-delayed pneumatic valve. The time the valve remains open is determined by the quantity of liquide measured, and this is set or adjuste instantly, as desired, by an automatic timing device.

3 – An anti-froth filling system ensuring very rapid measuring and filling with no froth – the milk being cold.

4 – A head closed pneumatically and welding by heat pulse, fully reliable. The jaws can be fitted with a marking device to show the date of filling. The cycle including the closing of the jaws, welding, cooling, and the opening of the jaws is fully automatic. It lasts only a few seconds and is controlled by a single pulse.

5 – A sealed cabinet containing the electric and pneumatic controls.

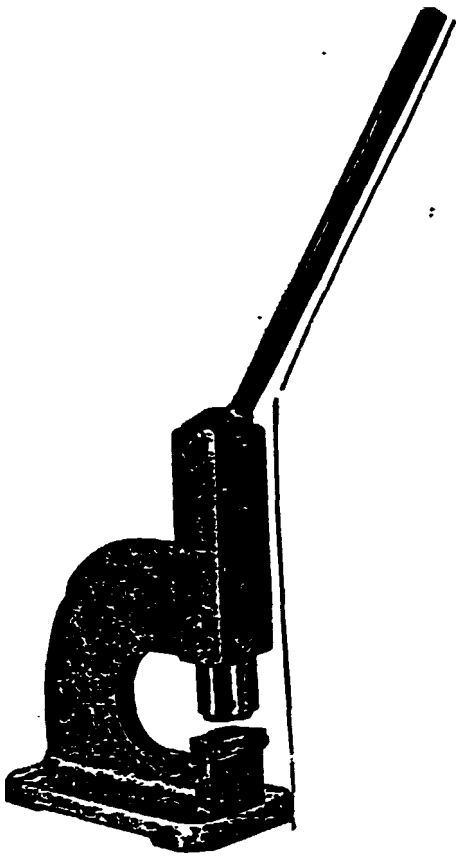
6 – A set of polished stainless-stee slides allowing the bag to be held while being filled, slid to the welding point, and held during welding.



MARQUEUSE DE COUVERCLES C 703

N. 23

LIDS MARKER



Pour couvercles de toutes dimensions

- *cette machine permet de se mettre en conformité avec la législation en vigueur.*
- *sa capacité de marquage est de 7 caractères sur deux rangées (soit 14 caractères en tout sur 12X28 mm).*
- *elle est fournie en standard avec lettre de l'année, 10 chiffres de 0 à 9 et 10 cales intermédiaires.*
- *particulièrement efficace grâce à son composteur en matière plastique et ses caractères en acier spécial, le marquage est très net.*
- *positionnement rapide et facile des caractères. Lettres et chiffres fournis sur demande en supplément*
- *poids approximatif 14 KG*

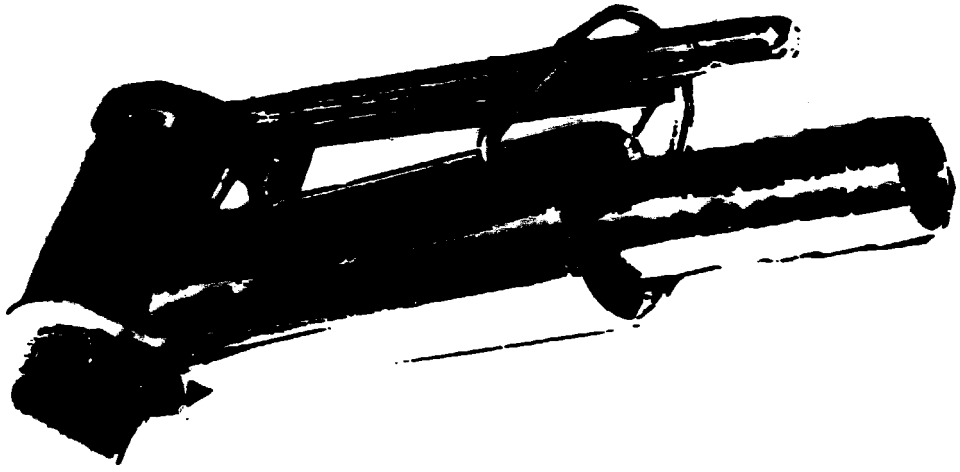
For all dimensions lids

- *this machine allows to mark the lids according the last legal rules.*
- *its marking capacity is 2 lines of 7 types (that is to say 14 types on 12X28 mm)*
- *it is delivered with one letter and 10 figures (0 to 9) and 10 blocks.*
- *really efficient with its plastic obliteration device and its special steel types, the marking is very neat.*
- *easy and rapid set up of types. All letters and figures on request.*
- *approx. weight 14 KG*

ROBINET DE JUTAGE INOX C 202

N. 24

JUICING TAP



- *pour le remplissage à chaud des bocaux, boîtes, etc... de saumure, vinaigre, sirop, etc...*
- *à fermeture automatique et à manoeuvre rapide par levier*
- *bout cannelé porte caoutchouc sur arrivée, bout lisse sur écoulement*
- *en acier inox 18.8 MO pour température jusqu'à 100°C*
- *Ø d'entrée et de sortie du corps en acier inox 15 mm*
- *Ø extérieur du corps en acier inox (pour fixation tubulure d'arrivée) 18 mm*

- *for manual filling at hight temperature of cans, jars... with brine, syrup, vinegar, etc...*
- *automatic closing and rapid lever operation*
- *special inlet for rubber tube, polished outlet*
- *stainless steel 18.8 MO for temperature up to 100° C*
- *inlet and outlet diameter 15 mm*
- *tube diameter 18 mm*

CAT. 284

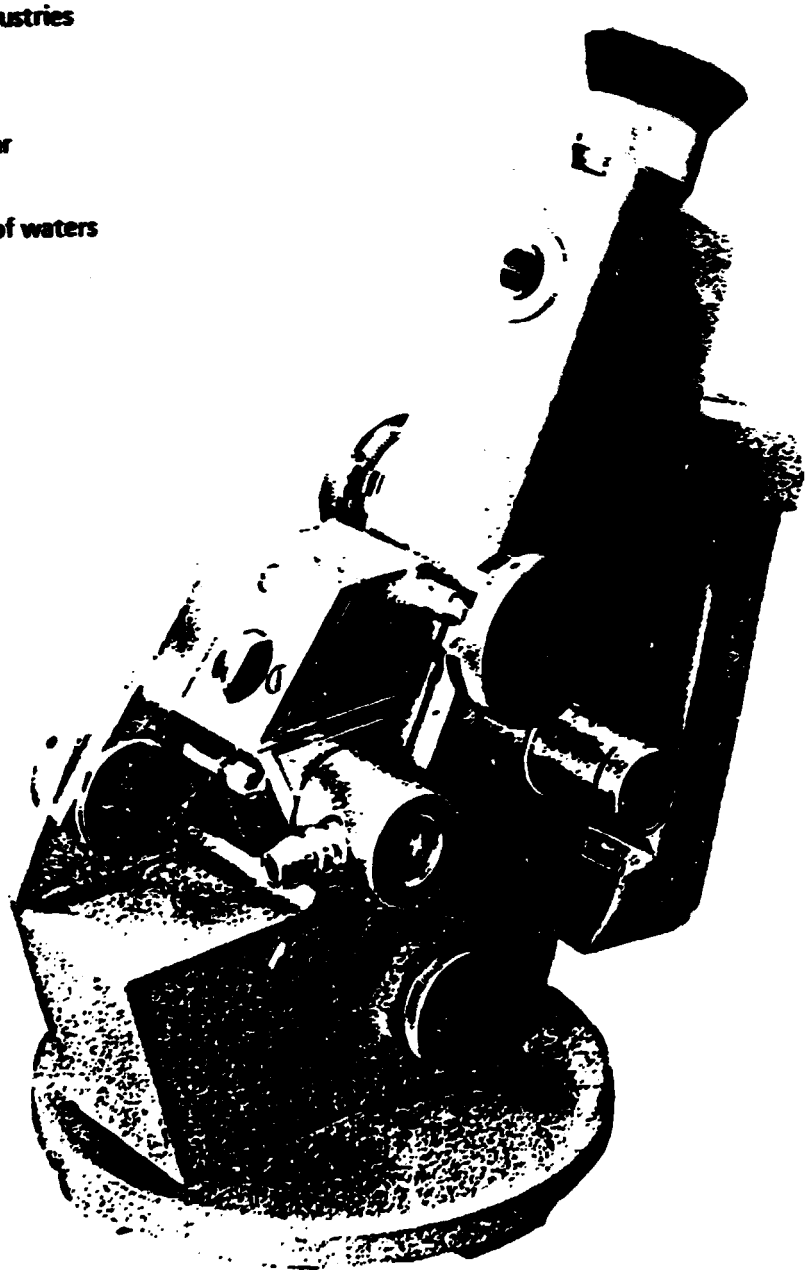
UNIVERSALE

II. 25

REFRACTOMETER UNIVERSALE OF ABBE

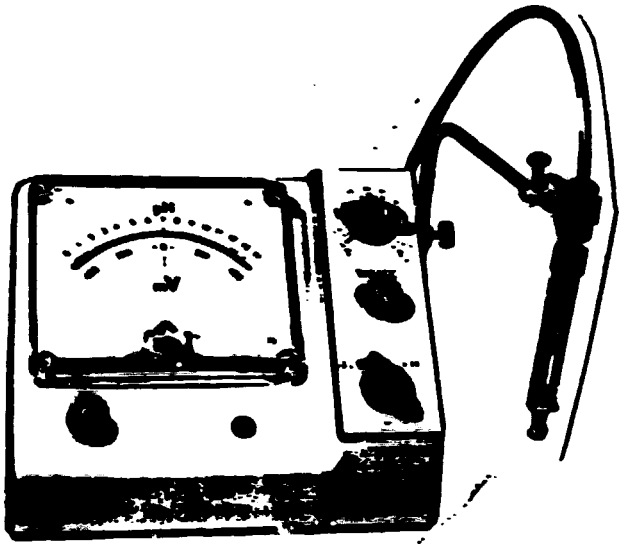
The instrument is suitable for laboratories of analyses and control of working process in the following industries:

- Drinks, juices and food industries
- Chemicals
- Fat materials
- Starches, dextrine and sugar
- Biochemistry
- Purification and desalting of waters
- Paints and resins



PH METRE DE LABORATOIRE F 1703

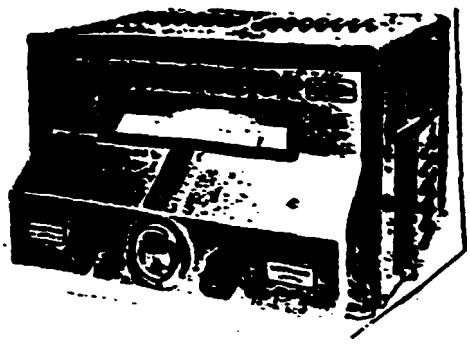
N. 26



Appareil d'usage courant et de grande diffusion.
Il se caractérise par sa fidélité, son insensibilité aux variations de tension du secteur et sa présentation moderne.
Son boîtier est en matière plastique moulée grise et le plastron du milliampèremètre de mesure est entièrement transparent.
D'un faible encombrement, il est muni d'une prise pour enregistreur avec grand galvanomètre.
Il est très utilisé pour des travaux pratiques sur le pH et le potentiel d'oxydoréduction.

Echelle longueur 110 mm
Graduation o - 14 pH - 500 mV
Précision 0,05 pH
Correcteur manuel de température : 0 - 100°
Alimentation 110 ou 220 volts pps.
Dimensions 23 X 17,5 X 13,8 CMS
Poids 2,7 KG

N. 27



MOISTURE METERS

CAMZ & CBMZ
with immediate zero adjustment

ADVANTAGES

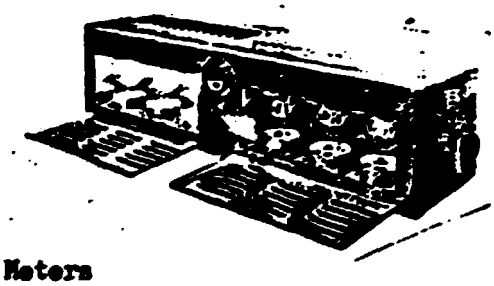
- SPEED : usually between 5 and 30 minutes
- SIMPLICITY : no handling of weights ; no calculations .
- EASY USE : easy removing, always ready for immediate operation
  results direct reading

MODEL CHOICE

CHARACTERISTICS	CAMZ	CBMZ
Scale	0 - 100 %	0 - 20 %
Sample	4,5 tc 5 g	9,8 to 10 g
Precision	± 0,25 %	± 0,10 %
Moisture content	High	Low

Length : 56 mm
Width : 40 cm
height : 28 cm

- net weight: 15 Kg
- gross weight : 20 Kg
  (in cardboard case)



ACCESSORIES

- Special cupel according to samples
  (pasty or low density products)
- Special device for high temperature measurements
  up to 600° C.
- Multicell oven employed jointly with CAMZ or CBMZ Meters
  allows 6 simultaneous studies and measures .
- Fatty Matter Extractor for percentage determination .

CONSTRUCTION

- stainless steel heating cell with infra-red lamp
- a new automatic double damping balance and optical transmission
  without twist thread
- Optical deivce which brings luminous spot on a calibrated scale,
  giving direct percentage
- A new mobile calibrated scale with immediate zero adjustment .

bio-insectes

matériel de destruction d'insectes ailés
flying insect killers

N. 28

Lorsque tous les autres tue-mouches ont épuisé leurs réserves de produits chimiques, ont perdu leur efficacité ou vous ont laissé exténué...

En voici trois qui attirent, tuent et recueillent toujours les insectes ailés.

DESTRUCTION EFFICACE - INSTANTANÉE - PROPRE

Avec un minimum d'entretien et un coût d'exploitation négligeable.

- **SANS DANGER,**
- **SANS ODEUR,**
- **SANS POLLUTION CHIMIQUE,**
- **SANS CADAVRES D'INSECTES ÉPARPILLÉS.**

Le système BIO-INSECTES possède une réputation mondiale bien établie comme étant la méthode de destruction des insectes ailés la plus efficace qui ne nécessite pas de produits chimiques.

A l'origine, BIO-INSECTES a été étudié pour utilisation dans les locaux industriels et dans des fabriques de produits alimentaires importantes, mais maintenant une gamme complète d'appareils a été mise au point pour assurer la protection de tous les domaines où les normes d'hygiène exigent des locaux dépourvus d'insectes ailés.

BIO-INSECTES est maintenant universellement reconnu comme étant un symbole d'hygiène. En effet, des milliers d'appareils sont en fonctionnement dans des boulangeries, usines, brasseries, restaurants, cuisines, hôpitaux, usines de manutention et transformation des produits alimentaires de toutes sortes, fabriques de papier, poulaillers, abris d'animaux – en fait, partout où les insectes peuvent causer la contamination, gâcher la qualité des produits ou ennuyer le personnel.

BIO-INSECTES offre une protection efficace et économique contre les insectes ailés 24 heures sur 24. Les insectes sont attirés vers une grille électrifiée au moyen de rayons ultra-violets. Ils sont instantanément tués sur cette grille électrifiés et recueillis dans un plateau solidaire qui peut être facilement vidé et nettoyé. Un nombre adéquat d'appareils placés à des points stratégiques dans les locaux à protéger assurera la quasi-totale élimination des insectes ailés.
Construction en acier inox et plastique anti-corrosion.

When other insect killing systems have no more chemical products, loses their efficiency...

Our BIO-INSECTES are always attracting, killing and collecting all flying insects.

EFFECTIVE INSTANTLY CLEAN INSECT DESTRUCTION

With minimum of maintenance at a neglectable cost.

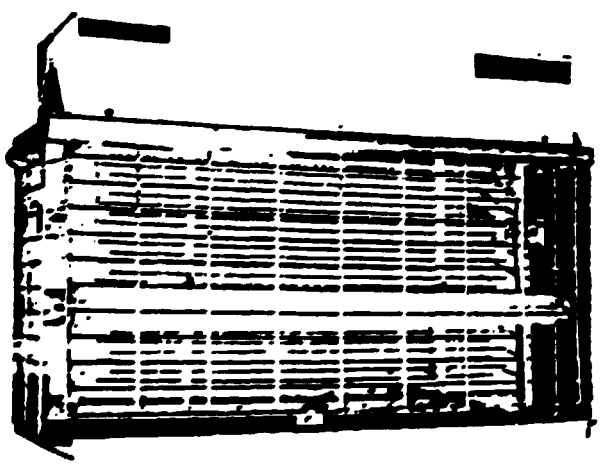
- **WITHOUT DANGER,**
- **WITHOUT ODOUR,**
- **WITHOUT CHEMICAL POLLUTION,**
- **WITHOUT DEAD FLIES IN FOODSTUFFS.**

BIO-INSECTES system is the most efficient and pollution free method of insect destruction.

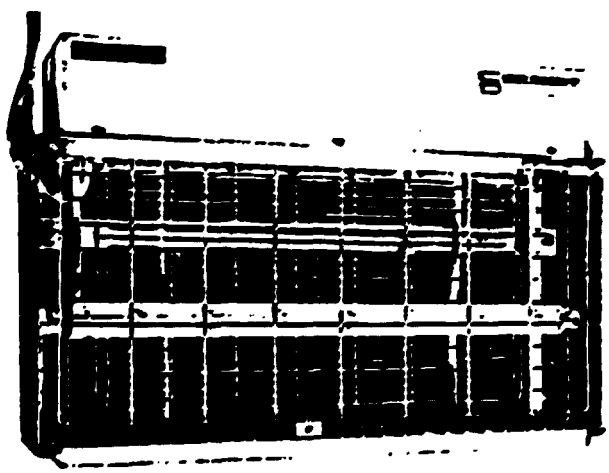
BIO-INSECTES was imagined for industrial and foodstuff factories applications but now a complete range of models is available for the protection against insect everywhere hygienic and pollution norms are to be followed.

BIO-INSECTES is an hygienic symbol. Thousand of devices are working in bakeries, factories, restaurants, kitchens, hospitals, foodstuff industries, paper industries, poultries, in fact everywhere flying insects as flies, gnats, midges, mosquitoes, wasps... may contaminate food products and annoy customers and staff.

BIO-INSECTES offers a complete and economic protection 24 hours per day without attention. The insects are attracted by means of special U.V. lamps toward an electrified grid. They are instantly killed and collected in a built in tray, easy to empty and to clean. A good choice of number and model of BIO-INSECTES assures a complete elimination of flying insects.
All built in stainless steel and anti-corrosion plastic material.



BIO-INSECTES 2000



BIO-INSECTES 2500