

INDUSTRIAL REVIEW — AUS DER INDUSTRIE

CANNING FACTORY, STANDARD TYPE No. K—II

By
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Review of developments

In the course of these last fifteen years the production of vegetable preserves exhibited a rapid development all over the world. The growing intensity of agricultural production, the accessibility of areas hitherto closed on account of lacking transportation facilities or for any other reasons considerably increased both quantity and range of raw materials available now for the canning industry.

On the other hand the increasing living standards and a series of factors arising from the way of living in modern times promoted a vigorous increase of consumption. These trends could be only met by the industry of vegetable preserves through the extension of the present production installations and by the establishment of new equipments. Moreover in some domains where the conditions of agricultural production rendered it possible, more or less successful attempts were made to extend the canning season.

One of the ways and means of extending working capacity, to modernize and enlarge existing plants, is very successful on areas provided with a well developed network of communications, particularly where there are still significant reserves for the intensification of crop production. The political developments in the second half of the XX. century, however, made accessible many such areas where the network of transports and communications is still primitive but the production of raw materials for the canning industry could be organized on a large scale. The necessity of establishing entirely new canneries arose mainly in these areas.

Hungarian industry recognizing the above outlined position, on the evidence of traditions and results accumulated during several decades of development of the canning industry in this country, has evolved in recent years quite a series of new types of canning factories.

In this work the leading idea was that technical installations of rather high value but not too complicated must be brought into existence in industrially still underdeveloped regions. It was also taken into account that for such investments there is hardly any staff of specialists available with proper training for the work of planning and construction, and that the new plant must be provided with all accessory equipment required for continuous operation that can not be found in the vicinity. Taking into consideration also the aspects of up-to-date serial production we decided to develop a whole series of the types of complete canneries.

When evolving the types of these factories, several points of view must be given thought to. Besides constructing units of different size on account of the daily production volume due allowance had to be made to the choice of raw material available. Each type of cannery had to be provided with the aggregates suited to the realization of the basic and general operations of the canning industry, such as cooking pans, condensing units and sterilizing aggregates. The preparatory works units — exactly on account of the diversity of the choice of raw materials — had to be designed in several variants.

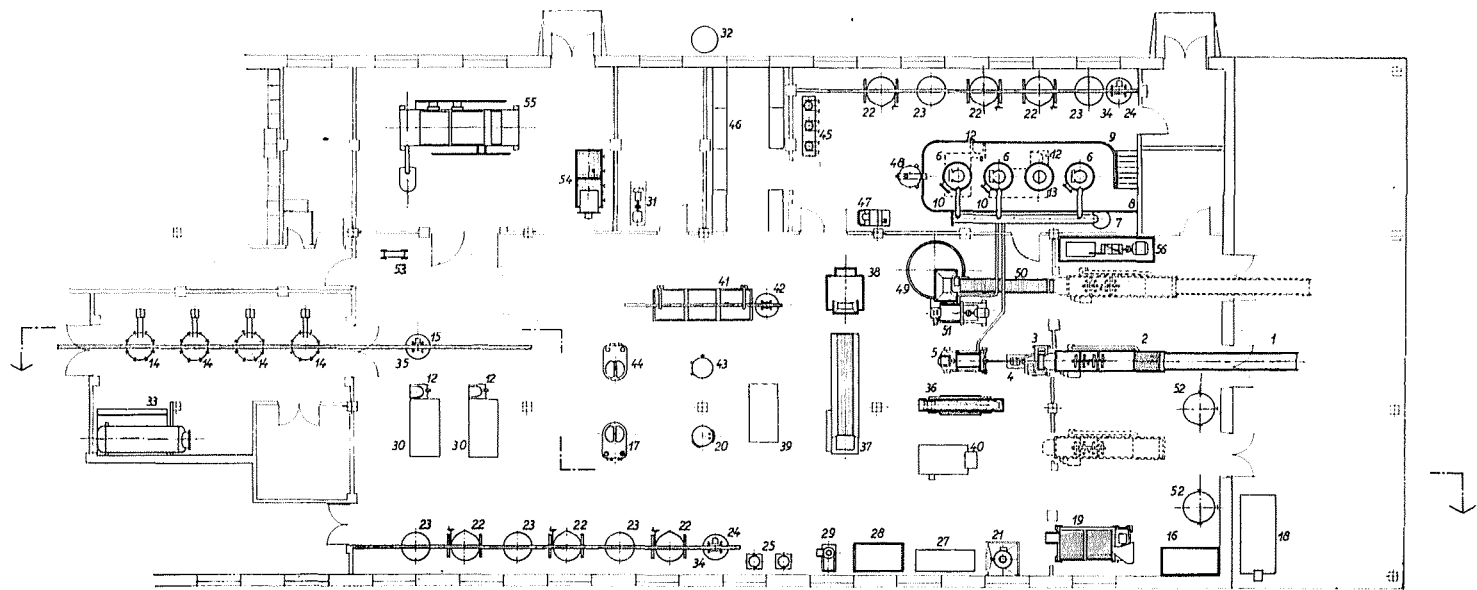


Fig. 1

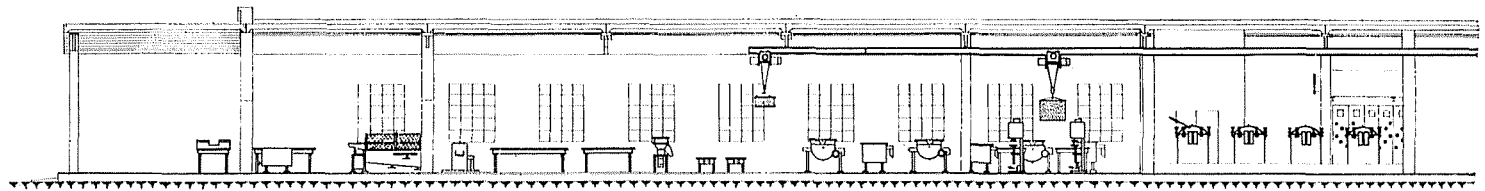


Fig. 2

Technological layout

1. Picking belt
2. Washer with ventilator
3. Tomato pulper
4. Crushed tomato pump
5. Triturating machine
6. Concentrator
7. Semibarometric condensator
8. Water pump
9. Control platform
10. Filling table
11. Quick balance
12. Jar sealing machine
13. Collecting pan
14. Autoclave
15. Sterilizing basket
16. Operator's table
17. Slicing and stump boring machine
18. Oblique operator's table
19. Drum washer
20. Vegetable cutter
21. Vegetable peeler
22. Tilttable steam boiling kettle
23. Cooling tank
24. Blanching basket
25. Onion frying stool
26. Frying pan
27. Operator's table
28. Onion picking table
29. Slicing machine
30. Operator's table
31. Air compressor
32. Air receiver
33. Switchboard
34. Electric trolley
35. Electric trolley
36. Morello and cherry shredder
37. Morello and cherry grader
38. Morello and cherry stoner
39. Operator's table
40. Apricot halving machine
41. Alkaline scourer
42. Electric trolley
43. Apple splitting machine
44. Apple slicer
45. Steam cooking pan battery
46. Syrup penetration frame
47. Syrup pump
48. Syrup tank

49. Fruit damping vat
50. Gooseneck elevator
51. Triturating machine
52. Hand operated washer
53. Cover numerator
54. Hand operated jar washer
55. Automatical jar washer
56. Vacuum pump

Although our present factory types do not include yet machine equipments for the processing of all vegetable raw material to be found anywhere on earth that may enter into consideration, they are designed according to such principles that with special additions they are well suited to meet any demands arising in practice, as circumstances may require.

In planning for the Hungarian type-canneries a rational but not exaggerated mechanization and automatization was aimed at. Therefore, all heavy physical labour is performed by machines. Up-to-date regulating techniques were employed in many cases for the realization of individual operation, but mechanization was not carried through by all means in such operations where this would have led to machine equipments difficult to handle and not safe enough in operation. It is characteristic of the series of our type-canneries that a completeness is aimed at.

The production of important series made it possible to carry out the individual constituents, machines, aggregates as well as the total factory equipment including its dispositional plan according to type designs. These type designs refer not only to the fundamental technical equipment but also to the installations for power supply, maintenance and control analyses. Fixation of the arrangement in space as determined by the type design made it possible to include in the framework of the delivery of the complete factory the armatures of electric current distribution, of the water and steam network and to a certain extent even of sewage disposal. In the order determined by the type design also all electric illuminators, laboratory equipment, initial set for laboratory tests

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etc. can form the object of delivery. In elaborating the type design special care was bestowed on the observance of the principles of modern workshop hygiene. Therefore materials worked up or to be processed can only get into touch with parts made of acid-proof steel or equivalent structural matters.

The above outlined completeness offers extraordinary advantages to the investor. In former cases the investor of a complete factory was generally compelled to apply to different firms in various countries, who in the overwhelming majority of cases were in the position to offer only a single machine or at best a production line. The elaboration of the machine engineering and technological designs of the new factory to be established was a special affair, particularly in countries where special engineering bureaus were not sufficiently available. In default of such bureaus and of designs elaborated by them almost unsurmountable obstacles arose when auxiliary equipments, armatures, accessories had to be fixed and procured.

In connection with the type canneries introduced by ourselves the problems referred to find an outright solution. Since prior to delivery a detailed project documentation of our type factories is submitted, including all sanitary and other installations, the investor has only to care for the architectural and static plans to be carried out. This can be easily realized on the basis of the plan documentation by an architectural design bureau operating in the country involved, even if the latter does not dispose of any special knowledge of the canning industry.

In the course of delivery the investor obtains all main and auxiliary investment except for the steam, water and sewer pipe material and the outer and inner conduits connecting the objects of electric installation. This pipe and electric conduit material is generally available in every country, but should any difficulty arise in local supply, arrangements can be made to deliver also these in addition to the type equipment. On special request also specialists can be made available for a shorter or longer period to

help in the work of assembling and starting up. With the application of the networks outlined above it became possible to deliver factories ready for use, thus the realization of new works in this branch of industry could be substantially promoted.

Hungarian industry has exported from 1957 to the end of 1961 115 complete canneries of the three types from which in the following the smallest and most universal unit type K II is presented, which has been designed by the workers of the design bureau of the Ministry of Food (Design Institute of the Food Industry, Budapest, IX. Zsi! utca 3—5) "ÉLITI".

Longitudinal section

Description of the Canning Factory Type No. II

The Canning Factory Type No. II has been developed according to the principles outlined above. Its production target is 2 to 3 million jars of preserves in a year with one shift daily. The bulk of the goods produced is fruit and vegetable preserves filled in 5/8 litre units (C K O 83—2. 56—.) from which the output of the factory is about 7000 daily in one shift.

When calculating the output of the cannery, however, the possibility of two or three shifts daily as well as the shifting of the production time in some products must be reckoned with, since the cannery according to the production schedule usual in Hungary is able to produce about 2000 tons in a year.

The yearly raw material requirements of the cannery are about 826 tons according to the following specification:

1. Strawberries, plums, cherries, morellos and apples 304 tons
2. Vegetables 522 tons

The vegetable requirements are distributed as follows:

Tomato	356 tons
Red beet	45 tons
Cabbage	73 tons
Carrots	4 tons
Cucumber	25 tons
Onion	19 tons

The amount of finished product is:

1. Prepared food from vegetables 400,000 jars
2. Vegetables, natural and pickled
300,000 jars
3. Tomato concentrates (purée) 300,000 jars
4. Canned fruit, jams and pickled fruit
800,000 jars
5. Marmalade 200,000 jars

The final output of the cannery is determined as against what has been said above partly by the number of the shifts and partly by the period of processing of the individual raw materials.

The building of the plant includes the fruit and vegetable cannery, the social service establishments and a temporary store room for finished goods. According to necessity the building can be further enlarged towards the store room. In this area of enlargement also a green pea processing line can be built in without special difficulties.

Since the factory is meant to be a type cannery, the designers must reckon with the establishment of the work as an independent enterprise and also with the possibility to build it besides an already operating factory as a separate new plant. Taking these conditions into consideration the plant described in the present paper can be established also as a separate unit, namely the cannery, the boiler house and a transformer building separately. The dimensions of the store rooms for finished goods can not be fixed without due allowance for local conditions, therefore the present description does not comprise the layout of such store rooms. The cannery can be completed with a factory of pickles of adequate size that can be placed in the premises of the cannery according to a separate type design.

In view of the conditions of the production of raw material that depend on the varying weather of the year and of the possibilities of the location of the factory as well as of the area from which the raw material would come in, the equipment of the cannery can be made use of with a certain elasticity.

All ways in the factory area must be stony roads of good quality with provisions for appropriate drainage.

For the storage of jars and tins special store rooms are needed which have to be erected either as ferro-concrete boxes or — when the jars come in cases — as glass transport sheds.

Water installation must be provided for either from a source of water supply already existing or from driven wells. The sewage must be drained off through a competently built sewerage. The own water supply of the cannery must be assured according to local conditions either

- a) from surface water sources, lakes or rivers
or
- b) from underground sources, digged or bored wells.

The water requirement of the cannery is about 104 cu. m. in a day with a one shift operation. Before utilizing the water it must be analyzed for sanitary reasons as to bacteriological impurities. If the water is harder than 15 German degrees of hardness both the feed water used in the boiler house and the water used in the cannery for scalding must be softened.

The water of the condensator can be retained in a separate canalization network and if it seems economically efficient to establish a recooling plant the water after suitable cooling can be refed into the water system feeding the condensator. If it is not economical to build a water recooling plant, it might possibly be used to fill a smaller factory bathing-pool.

The hot water obtained from the autoclaves should be used again for the economy of energy consumption. The system of canalization must be designed in each case on the spot according to local soil conditions. For the drainage of the outlet water of the vegetable plant in each case a sand trap must be built in.

The electric power requirements of the factory are about 180 KW, the maximum steam requirements 1800 kg./hour. These power requirements can be provided for

either from already existing adequate equipments or from local sources of power supply. For the realization of the technological manufacturing process in each shift 36 persons are needed on the average of the year as direct producers. The proportion between men and women depends on local conditions and on the prevailing organization of labour.

Efficient organization of works makes it necessary to establish one-way circulation of vehicles around the main building.

On one front side of the building the raw material to be processed is received while on the other front side the finished goods are handed out.

Store rooms are also this side of the building. Dressing room, dining room, business offices and laboratory are located in the main building. The location of the required number of lavatories is centralized, with direct aeration and good lighting.

The building can be constructed with precast ferro-concrete columns, the roof with ferro-concrete panels. They are built next to column grids of a 6 × 6 m netted arrangement with 36 sq. m. middle ribbed ferro-concrete panels. These constructional solutions are presented in Fig. 1. There is full possibility of course for some departure from this, while maintaining the principles of arrangement.

Floor covering of the factory building is asphalt, for the rest the floors of the social rooms are covered with tiles.

Inner walls of the factory buildings and of the rooms where there are water installations have to be provided with glazed slabs.

A general review in connection with the cannery

The cannery includes all processing and auxiliary plants necessary for production as well as store rooms for finished goods corresponding to one month's production, bureaus, dressing rooms and lavatories for the workers of the factory.

Buildings for winter and summer storage of raw material are not included. For these purposes suitable store rooms must be built outside the plant. These accessory buildings always depend on the location of the plant.

If the factory is located next to a works-unit already existing there are other requirements to fulfil concerning the establishment of the auxiliary buildings than in a place where no buildings exist as yet.

The water supply must be settled in each case separately; there are no dispositions for that in the type design. The connecting conduit is conducted at a 1 m distance from the wall face of the building and it must be joined there to the pressure tube supplying the water needed.

The type design does not include the sewage disposal and the outer canalization either. At a 1 m distance from the wall of the building the local sewerage system that must be constructed by adaptation has to be connected with the spout designed in the plan.

Handling and cleaning of the sewage must be cared for in accordance with local conditions.

Along with the observance of the above general conditions the designers of the cannery had to give due consideration to the requirements of economic efficiency in the degree of mechanization of the plant of comparatively small output. Thus in the Canning Factory type No. II only such production lines could be taken into account the intricacy of which is in a sound proportion to the given output, including sufficiently the advantages brought about by mechanization.

For the elimination of hard physical labour and to make conveyance between the machines less expensive belt conveyors, elevators, pulp pumps, electric trolleys and other transport conveyances are made use of.

In all cases when material handling could be carried out conveniently and inexpensively by manual labour, hand cars and barrows were used.

The technology of processing

In the cannery K. II the following manufacturing process can be carried out:

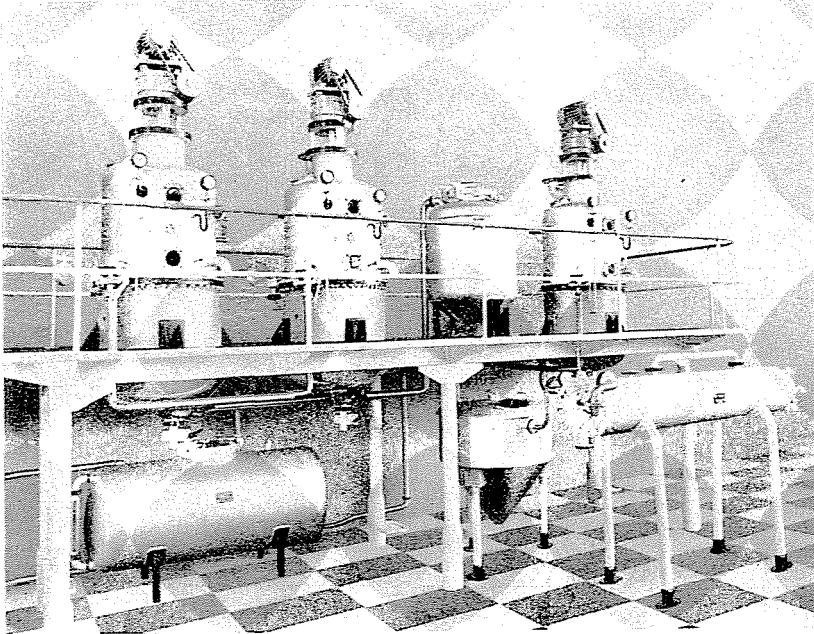
a) *Production of tomato purée*

The tomato purée production line is suited for the condensation of 1000 kg raw tomato per hour.

In the process the following devices are involved:

conveyor belt
ventilation washer
tomato crusher
crushed pulp pump
two-stage tritulating machine

damaged or rotten parts are removed by the workers with manual work. The sorted tomato gets from the belt into the ventilation washer where under the action of an intensive motion of water brought about by the air blown in, the tomato is cleaned from the impurities. The washed tomato is transported then further by a wire elevator while after-rinsing



1. Condensing battery

- Type 1. 01. spherical vacuum pan 300 litre
25. 03. handling platform
14. 01. conical receptacle

300 litre spherical vacuum pans with agitator mounted on iron trestle
semi barometrical condensator for the spherical vacuum pans
water ring vacuum pump
condensator water pump
conical collecting pan
filling machine
jar sealing machine.

The raw tomato is poured from the case on the picking belt conveyor where the

is carried out with fresh water through shower roses. From the washer the tomato gets into the comb crusher and subsequently with the aid of the crushing pump into the two-stage tritulating machine. In view of the small output in the K. II type cannery the tomato juice is won with the cold procedure.

The skin and seed recovered from the tritulating machine is collected in boxes. The tomato juice obtained from the tritulating machine can be sucked into 3 spherical

vacuum pans 300 litre each the heating surface of which is 1.4 sq.m. each with a separate mixer for every unit.

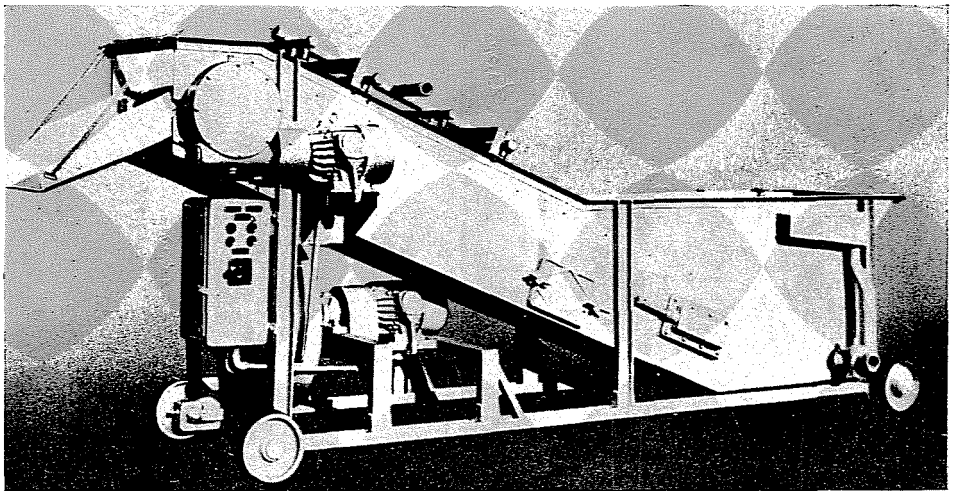
Condensation of the tomato juice is carried out in the vacuum-pans periodically to the desired dry matter content, the performance of the line being adjusted so that by means of the 3 spherical vacuum pans the 1000 kg per hour tomato juice with an initial dry matter content of 5 per cent can be processed into a purée of 28 to 30 per cent dry matter

into the warehouse where delivery is taken and part of the goods are observed; subsequently it is cleaned and provided with etiquettes, stored and transported.

b) *Processing of vegetables*

The vegetable processing plant is suited for the processing of about 500 kg raw material per hour.

In the process the following machines are involved:



2. Ventilator washer. 6. 01

content. The continuous processing is promoted by a 400 litre collecting tank with mantle heating connected with the spherical vacuum pans and mounted on the same frame. From the spherical vacuum pans the adequately condensed material can be pumped over by means of vacuum into the collecting tank wherefrom the filling into jars takes place with the aid of a filling machine. The filled jars or tins are closed with a semiautomatic closing machine. To prevent deterioration the closed half-litre jars are placed into autoclave baskets and conveyed by electric trolleys into the sterilizing autoclaves. Here the tomato purée is sterilized in open autoclaves in conformity with the technological prescriptions. The sterilized goods then come

drum washer
peeling machine
cube cutting machine
slicing machine
onion cleaning table
onion slicing machine
electric frying stool
tilting steam duplicators
cooling vats
blanching baskets
electric trolley for the transportation of
blanching baskets
operator's table
sealing machine
sterilizing basket
sterilizing autoclave
control board for the autoclaves

air compressor
air receiver

With the above machine units red beets, carrots, onion, potato and cabbage are processed for the various canned foods, but also other kinds of vegetables may be processed and canned in smaller quantities with manual cleaning and preparation.

1. *The preparation process of red beets and carrots is the following :*

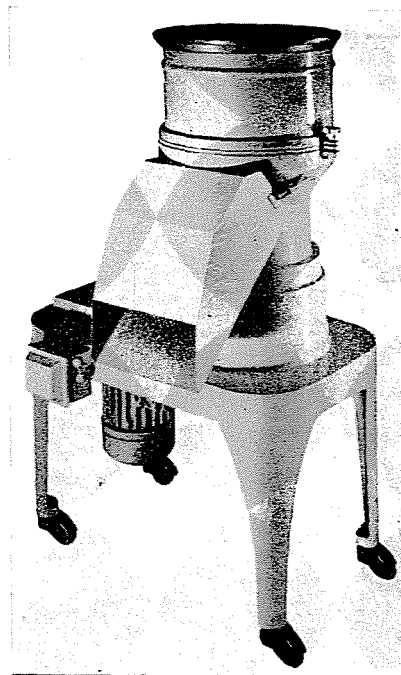
The raw material received is poured after weighing into the drum washer where with intensive agitation the earthy impurities sticking to the skin are soaked off and subsequently with continuous exchange of water the loosened impurities are removed by the turning of the goods and the friction thus brought about.

The cleaned raw material gets from the drum washer on the peeler where the skin is removed in rotating by friction. The removed skin is then washed off the raw material with the aid of a water jet introduced into the machine. The cleaned red beets and carrots are recovered in aluminium boxes while the impurities or skin remainders possibly not cleaned off by the machine are removed manually. Before slicing and cutting in cubes red beets and carrots have to be scalded; for this purpose 3 steam boiling kettles 150 litre each and for the cooling of the scalded material 2 cooling vats are applied. To facilitate conveyance the raw material to be scalded are placed in baskets and these with the aid of electric trolleys conducted above the steam cooking pans and cooling vat conveyed into the boiling and cooling vessel. The blanched raw material can be according to wishes either sliced on the slicing machine or cut into cubes in the cube cutting machine.

2. *Onions*

For the processing of preserved food the onions must be cleaned, sliced, fried and finally mixed to the raw material. Cleaning

and sorting is carried out with manual work, if possible in the open shed where the raw material is delivered. The cleaned and washed onions are sliced with the slicing machines and the onion slices fried on the electric frying stool.



3. Onion slicing machine. Type 2. 05

3. *Potato*

Processing and preparation of potatoes is carried out with the same technology as that of red beets and carrots with the exception that no blanching is necessary before cutting in cubes and slicing.

4. *Cabbage*

For the processing of cabbage the raw material must be cleaned by manual work on the working table. The cleaned cabbage is then freed from its stump with the stump borer and then cut in slices with the slicing machine. After slicing the cabbage is used either for the manufacturing of canned food or for pickles.

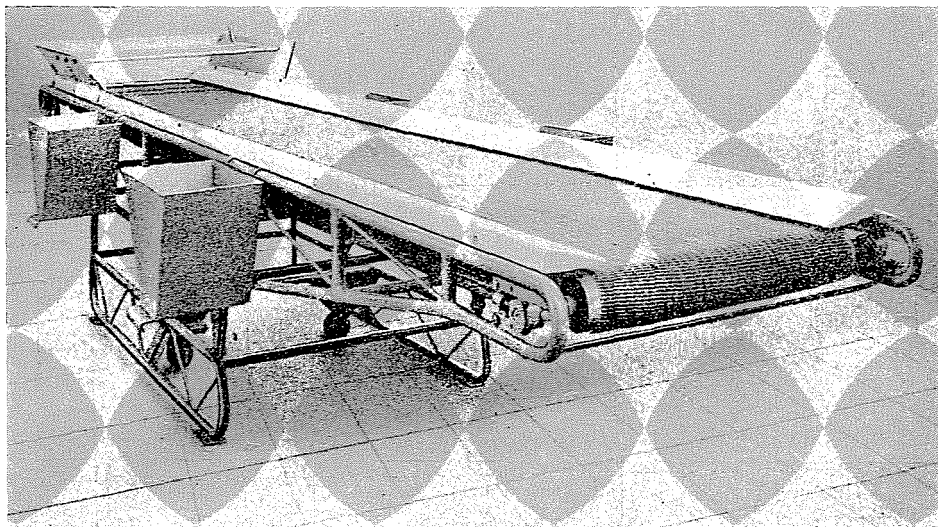
c) *Production of canned fruit*

This unit is suited for the processing of about 400 kg raw material per hour. In the type canning factory canned cherries, morellos, plums, apples and pears, peaches and apricots can be produced with machines.

The processing of other fruit is also possible if they are prepared manually or with special machines established additionally to be able to be processed further with the machinery of the canning factory.

steam boiling kettle group,
syrup processing vessel,
syrup storing tank,
syrup pump,
filling table,
tiltable quick balance,
sealing machine,
sterilizing basket,
sterilizing autoclave.

The machine units enumerated are used for the various kinds of canned fruit, in process-



4. Picking belt. Type 12. 051

In the process the following machines are involved:

picking conveyor belt,
ventilation washer,
morello shredder,
morello grader,
morello stoner,
apricot halving machine,
alkaline scourer,
apple slicer,
apple splitting machine
tiltable steam cooking pan,
cooling vat,
blanching basket,

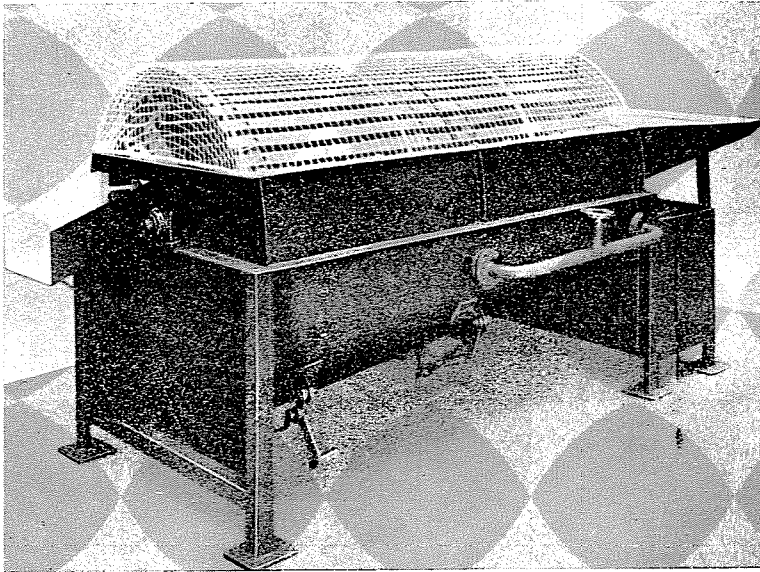
ing morellos, cherries, plums, apples, pears, peaches, apricots, etc. In the processing of berries and in manufacturing canned fruit from these, mainly manual work prevails so no mechanized manufacturing process is described here for these goods.

The manufacturing of canned cherries and morellos

The raw material received is weighed and subsequently examined on the conveyor belt where the damaged fruit is removed. The sound fruit is conveyed by the belt in the ventilation washer where it is washed in the

water agitated by air. On the tail conveyor of the washer a band for after-rinsing is mounted. Washing is followed by another picking subsequently the faultless fruit gets from the sorting belt on the shredder. On this machine the stalks are removed with the aid of rapidly rotating rubber rolls. The fruit freed of the stalks is recovered in boxes and poured on the grader. This machine is e-

each following containing continuously hot syrup of an ever higher sugar content. When this process is finished the jars are manually filled from the baskets and then the sugar solution from the syrup container poured over. Subsequently the jars are sealed with a semiautomatic sealing machine, placed into autoclave baskets and sterilized in autoclaves. The sterilized goods are conveyed further by



5. Drum washer. Type 3. 2. 6. 02

quipped with wires so that according to the previously established distance of these wires from each other the cherries and morellos are sorted by size in four different receptacles. This is the machine where ultimately the sorting of morellos and cherries is carried out, for possible later stoning, also to fruit size corresponding to the categories of the stoning machine since the perforated plate of the latter can be adjusted according to the size of the fruit.

The fruit the size of which is suited to the production of canned fruit is poured into blanching baskets where the sugar syrup penetrates into the fruit by diffusion. The pans are placed under an electric trolley

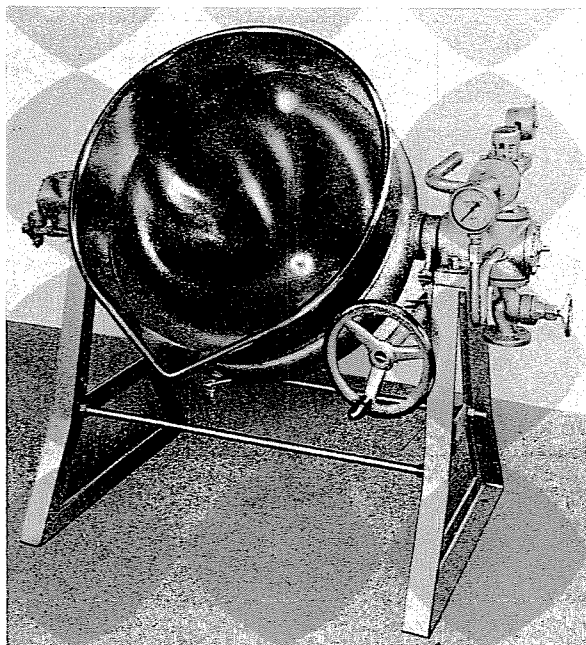
the electric trolley into the warehouse where delivery is taken. For the storage of the sugar syrup a container is established wherefrom the sugar solution reaches the duplicators through a pipe system.

Production of canned plums

The production process by and large coincides with what has been said about the processing of canned morellos and cherries with the exception that no size grader and stoner are used here. On the other hand much more attention must be bestowed on the penetration of the sugar syrup into the fruit by diffusion because this is the operation

apt to prevent the skin of the canned plums from cracking, provided that the related technological prescriptions are observed. It is most suitable for the purpose in view to enrich the solution several times with sugar and to prepare the final solution from the syrup saturated with the aromatic matters obtained in the last vessel.

After grading, the raw material is chemically peeled by means of alkalis. The raw material is placed in baskets which with the aid of a conveyor are first lowered into a hot alkali bath where the skin of the fruit cracks and separates from the flesh in pieces. The thus prepared raw material is immersed together with the basket in a water bath intensely



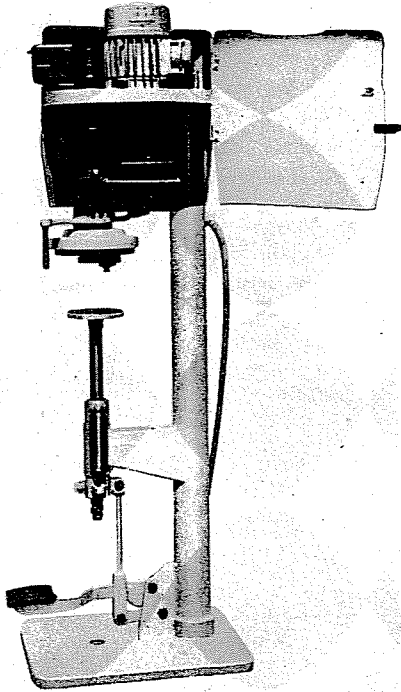
6. Steam cooking pan. Type 4. 01

Both for cherries and morellos as for plums it is important to strictly exclude any raw material infested by worms.

Production of canned apples and pears

Apples and pears weighed and delivered in cases are preliminarily picked on the conveyor belt, whereupon the sound raw material gets from the conveyor belt into the washer. This is followed by a second picking. After the second sorting the apples are graded according to size on the wire grader. From the second picking belt the pears are graded according to estimate by the eye.

agitated by the compressed air introduced; this movement of the water washes down the fruit skin cracked and peeling off during the previous alkaline treatment. To neutralize the effect of the base the fruit in the basket is subsequently immersed in a third vessel filled with a weakly acid fluid where the effect of the acid prevents the possible browning of the fruit. To remove the acid after neutralization the fruit is plunged again with the basket into a tank with water in constant movement. Subsequently the apples or pears might be possibly after-cleaned manually, an operation performed by the workers on tables covered with plastics.

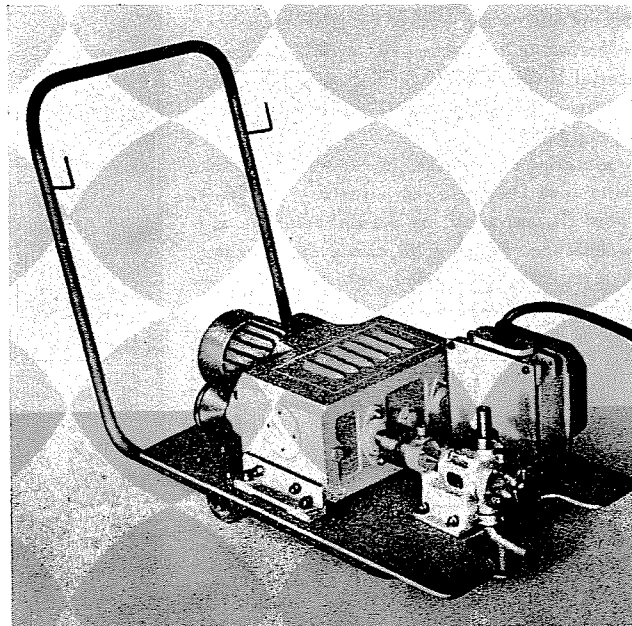


7. Semiautomatic sealing machine. Type 17. 01

Subsequently the apples, according to wishes, are either freed from the stumps on the splitting machine and radially sliced or with a disc slicer provided with stump borer. With pears these operations are performed not by machines but manually, with knives of special suitable shape. The raw material cut into slices is penetrated by diffusion with sugar syrup while in baskets in the steam cooking pans as described for the processing of cherry and morello, subsequently filled manually into jars on working tables, poured over with the solution and closed with semi-automatic sealing machines. The jars are then placed into autoclave baskets and sterilized in open autoclaves. Finally the sterilized finished goods are sorted in the warehouse.

Production of canned apricots and peaches

The processing of canned apricots and peaches up to the phase of the alkalic peeling coincides with the technology of apple and pear preserves. In the production of canned apricots after the alkalic peeling the raw



8. Travelling syrup pump. Type 13. 02

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material gets on the apricot halving machine where also the stone is removed from the halved fruits. In halving, however, great care should be bestowed on the proper ripeness of the goods for canning purposes, since with over-ripe fruit the machine does not yield an impeccable cutting surface. From the peaches the stones are taken out after peeling on the working table with hand. After halving and coring the sugar is enriched with the above described method. Hereafter the fruit on the tables is put in jars and after having poured in the solution sealed with the sealing machines. Sterilizing is carried out as described above in autoclaves.

Production of canned fruit from strawberries and other kinds of berries

Berries are generally very susceptible to all kinds of mechanical influences. Therefore, to protect the consistency of the fruit, in this type cannery processing of berries is carried out with manual work. Sorting out and removal of the peduncles is performed either on the slowly moving picking belt or on working tables. Strawberries generally need to be washed and for this purpose hand operated washing basins are available. These washers are perforated baskets in which the raw material is rinsed and washed off with water strongly agitated by condensed air. After washing it is expedient to re-examine the raw material to avoid faulty and rotten fruit getting into the jars; subsequently the fruit is filled in manually, as a rule with the aid of a balance. Pouring on the syrup, sealing and sterilizing is carried out according to the method already described.

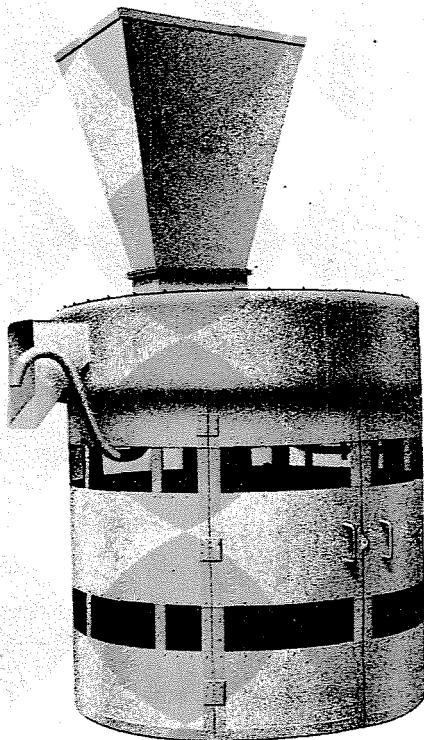
d) *Production of jam*

Various kinds of jams can be produced in the K. II type cannery from cherries, morelos, plums and strawberries. The equipment of the type cannery dealt with in the present paper is suited also for the production of jams from other raw materials. Of course the mechanization of the cannery is adapted to the processing of fruits common in Central

Europe whereas for the processing of fruit not known here with machines the equipment of the cannery must be completed in each case with special machines or the preparation must be carried out with manual work.

Production of strawberry jam

Generally those fruits are used for the production of jam that are not suited for canned fruit on account of their small size or any possible defect when the raw material



9. Disc steamer for fruit. Type 18. 07

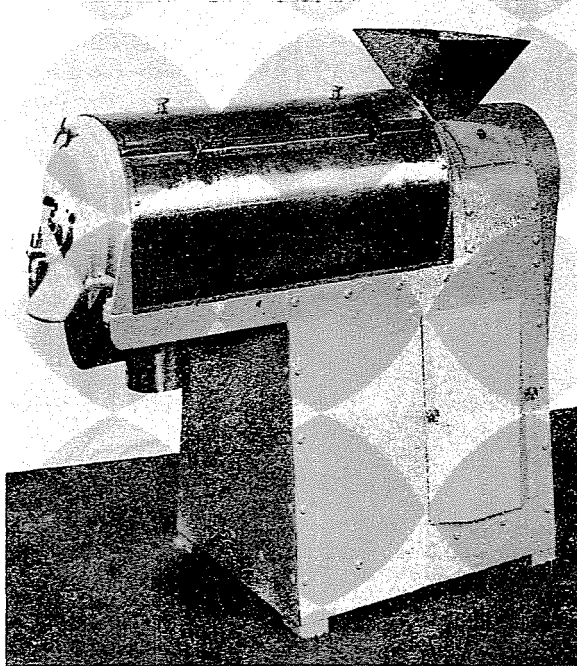
is otherwise sound. So the production technology in the present description generally begins with sorting. Also in the production of strawberry jam the worker simultaneously with the manual removal of peduncles sorts out such raw material the size of which is not

suiting for canned fruit; subsequently the fruit is washed in washing baskets with the aid of manual washers and then boiled in steam boiling kettles. From the tiltable steam boiling kettles the basic material of the jam cooked with a proportionate amount of sugar is collected in storing vessels and weighed into glasses on the working tables with the aid of balances. The jars are sealed

adding the proper amount of sugar with constant agitation. When this operation is finished the jars are filled, sealed and sterilized according to what has been said above.

Production of jam from apples

The apple delivered into the cannery is sorted out on the belt conveyor and washed



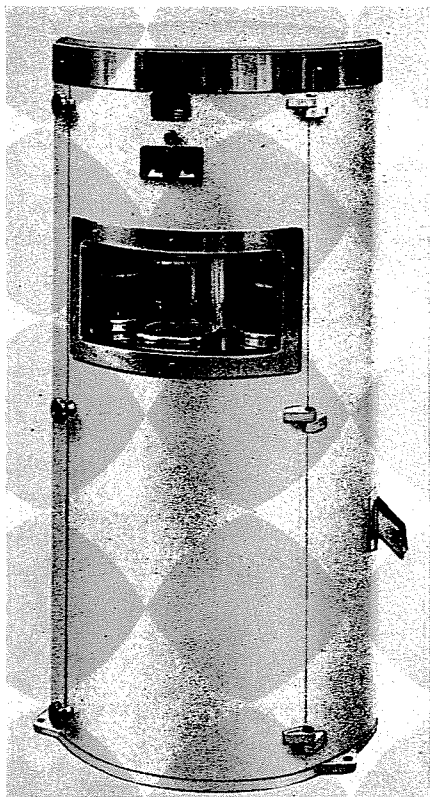
10. Triturating machine, one stage. Type 9. 01

by semiautomatic closing machines, sterilized in autoclaves and then conveyed in the store rooms.

Production of jam from cherries and morellos

The raw material is sorted and washed similarly, as in the production of canned fruit; this is followed by the removal of peduncles and by grading. The fruit not suited for the production of canned fruit is treated with the stoning machine and then boiled in the tiltable steam cooking pans,

in the ventilation washers. From the washer the goods arrive with the aid of a fruit conveying gooseneck elevator into the disc fruit steaming chamber where it is blanched in the steam space. The blanched apple then comes into the trituration machine. From the collecting tank of the trituration machine it is sucked into spherical vacuum pans where with the addition of the appropriate amount of sugar and constant stirring under vacuum the condensation and cooking of the jam is carried out. From the spherical vacuum pane the decoction is pumped over into a collecting



11. Apple splitting machine. Type 2. 03

tank also with the aid of vacuum and then the material is filled in jars with a rotary filling machine. The filled bottles are sealed with the sealing machine and then sterilized according to the method described above in autoclaves, wherefrom it arrives in the warehouse.

e) *Production of "Varenie" (Russian candied fruit in syrup) from various fruits*

1. *Manufacturing process of apples and pears*

The rawmaterial received gets on the picking belt where the defect or faulty material is selected with manual work. From

the sorting belt the fruit arrives into the ventilation washer. After washing the skin is removed with alkali method. Subsequently to neutralization the peeled fruit is cut into pieces by the splitting or by the slicing machine provided with stump borer if required by the technological process. If it is the other way round, the fruit, after grading by size is further processed without being cut into pieces. After slicing the fruit is filled into blanching baskets and penetrated by diffusion in the pans filled up with sugar syrup. Subsequently the fruit is placed into 10 litre vessels where the saturation with sugar is continued in the concentrated sugar syrup for several days. After 4 or 5 days the fruit already saturated with sugar is filled from the vessels either into barrels or in jars of great volume. Finally the barrels and jars are sealed and transferred into the warehouse. No sterilization takes place as a rule, because the sugar content of the finished products is as high as 60 to 65 Brix degrees.

2. *Manufacturing process of cherries or morellos*

For morellos and cherries the procedure inclusive of the removal of stones is identical



12. Apple slicer. Type 2. 01

with the technology used in the processing of canned fruit. After coring the fruit is filled in blanching baskets and thereupon the penetration by diffusion with sugar syrup is carried out similarly as described for apples and pears.

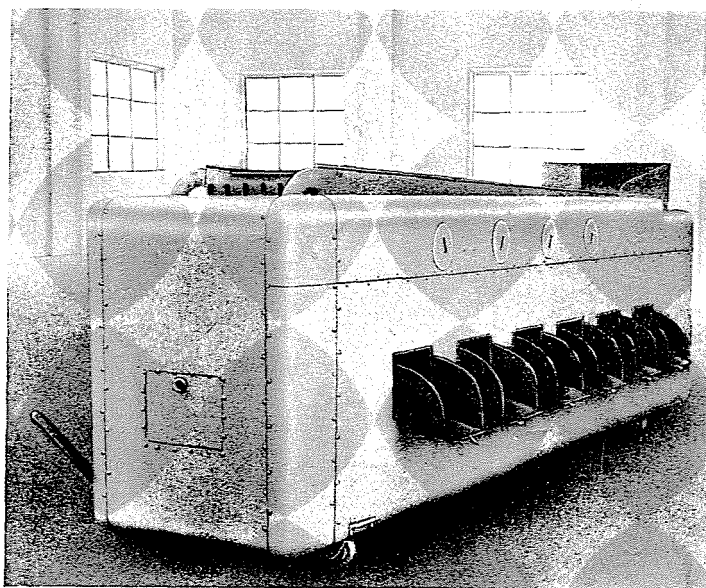
3. The process of the production of "Varenie" from peaches

The fruit delivered into the cannery is sorted out by manual work on the picking belt and then washed in the ventilation

4. Processing from melons

The fruit delivered in the cannery is weighed, then cleaned on working tables and the seeds are removed. After cleaning the fruit is sliced either with the machine or with manual labour. The sliced raw material is filled in storing vessels where the operation of penetrating by diffusion with sugar syrup is performed. The technology of this process is same as already described.

It appears from what has been said above that the K. II type cannery can be utilized



13. Morello grading machine. Type 8. 01

washer. Washing is followed by a grading according to size which — since only small quantities are involved — is accomplished with manual work. After sorting out the peaches are peeled according to the alkali method and after neutralization stoning is carried out manually. The stoned and halved peaches are filled into blanching baskets whereupon the penetration by diffusion with sugar syrup ensues, the technology of which is the same as described before.

for a great variety of purposes realized by the production lines and technology respectively described according to the desirable output.

f) Sterilization

At the end of the manufacturing process autoclaves under pressure provided with an electric trolley course were established for post sterilization. Temperature and pressure

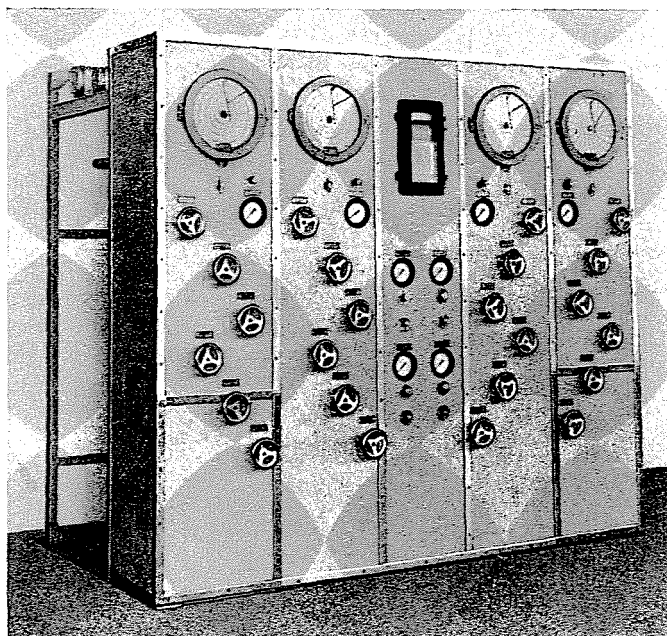


required for the autoclaves as well as the water supply needed can be controlled from a central board and so all works, except for filling in and lifting can be easily accomplished by one man from one place. Recording instruments are disposed on this central board and it can be continuously controlled with the aid of a four colour recording punctograph whether in each autoclave time

of the fact that no technological error occurred in sterilization.

g) *General aspects*

The designers when planning for the enterprise have largely kept the technological continuity in view and as it appears from Fig. 3, it succeeded in avoiding intersections as



14. Autoclave control board for 4 autoclaves. Type 11.03

and temperature of sterilization were observed in conformity with the technological prescriptions. For each autoclave a circular diagram recording manometer is built into the board so as to record the pressure. The construction of the conduit board and the piping of the autoclaves enables all up to date variants of sterilization so e.g. utilization of air back pressure, cooling under pressure (from above or below) can be realized. The condensed air both for the control board and for each apparatus using condensed air is supplied by an air compressor. In case of complaint the record sheets retained may serve as a proof

far as possible. In the various wings and floors of the plant, the vegetable processing line, the fruit processing line, the tomato washing and condensing room as well as the locality where the penetration by diffusion with sugar syrup of jam and Varenie takes place are situated next to each other by the longitudinal axis of the building. The jar washing room is placed in the lateral aisle of the building and its entrance is also found at this side wall.

In these localities a machine suited for the washing of 1200 $\frac{5}{8}$ litre jars hourly is placed operating according to the soaking band

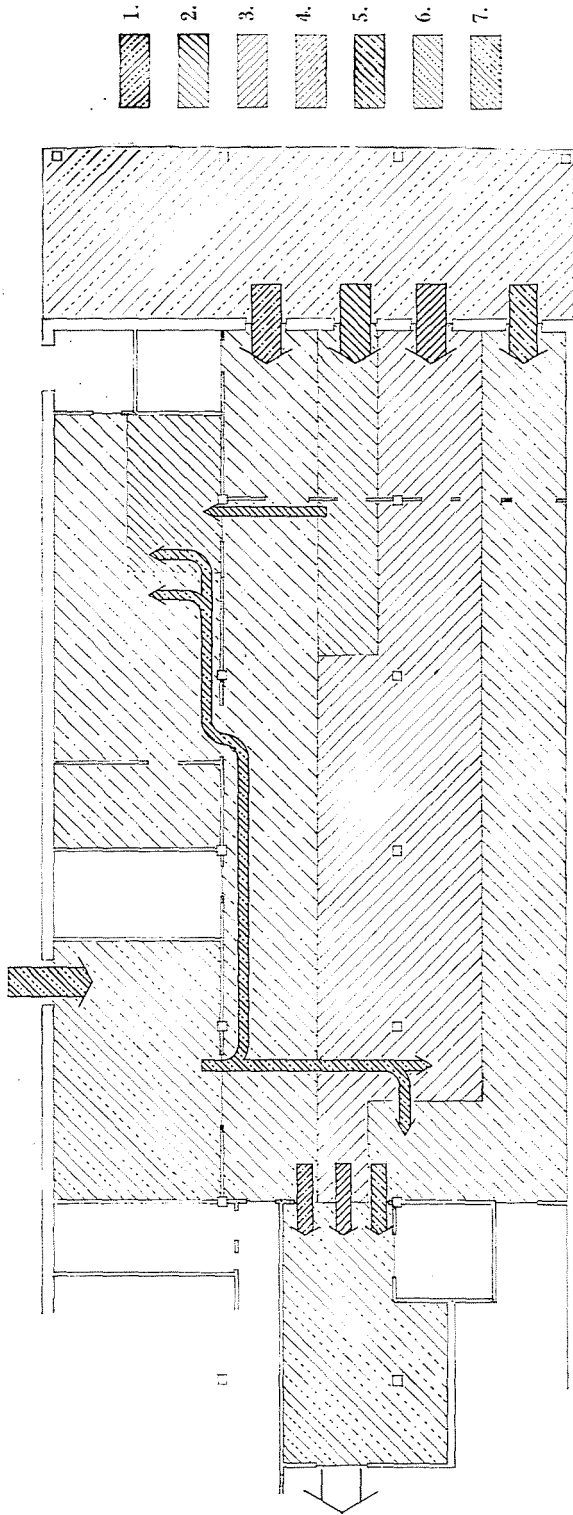
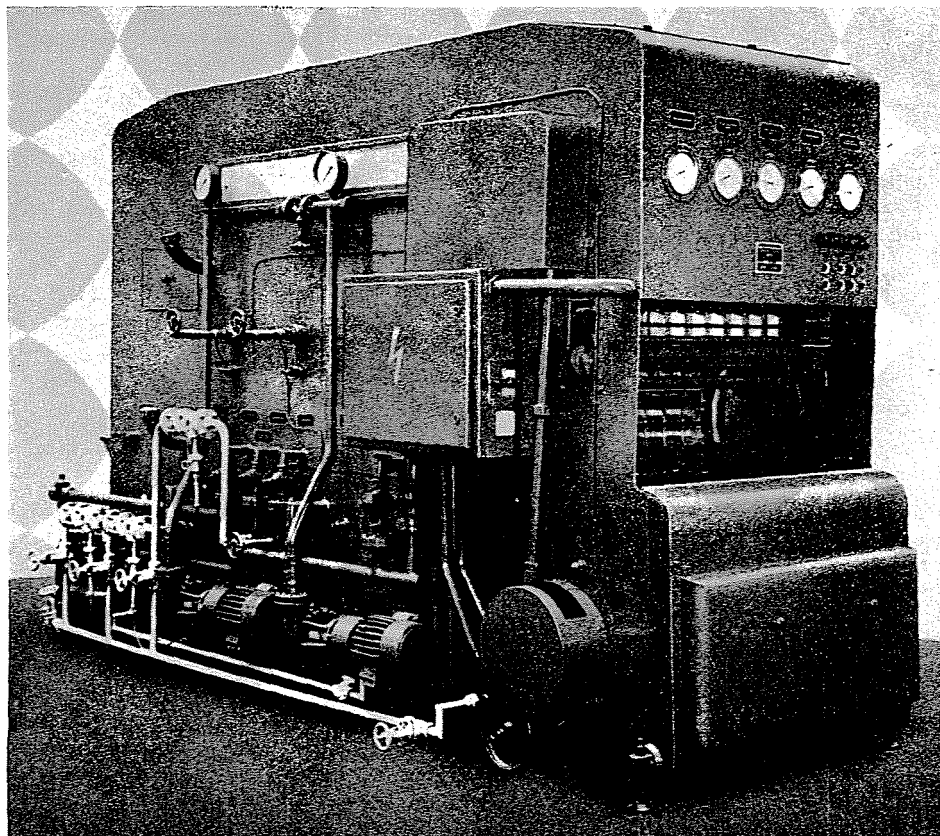


Fig. 3

1. Preparing room; 2. Tomato processing; 3. Canned fruit processing; 4. Jam processing; 5. Vegetable processing; 6. Jar washing room; 7. Sterilizing room



15. Jar washing machine. Type 23. 01

system. Two rotating brush soaking and washing vats are established here for the larger jars.

From both washers to the filling place the jars are conveyed on lorries. On account of the quantity of the jars the intersection arising by necessity in this transportation is negligible.

When considering the location of machines it was most important to realize the appropriate connections and to obtain the best lighting for all machines and working places.

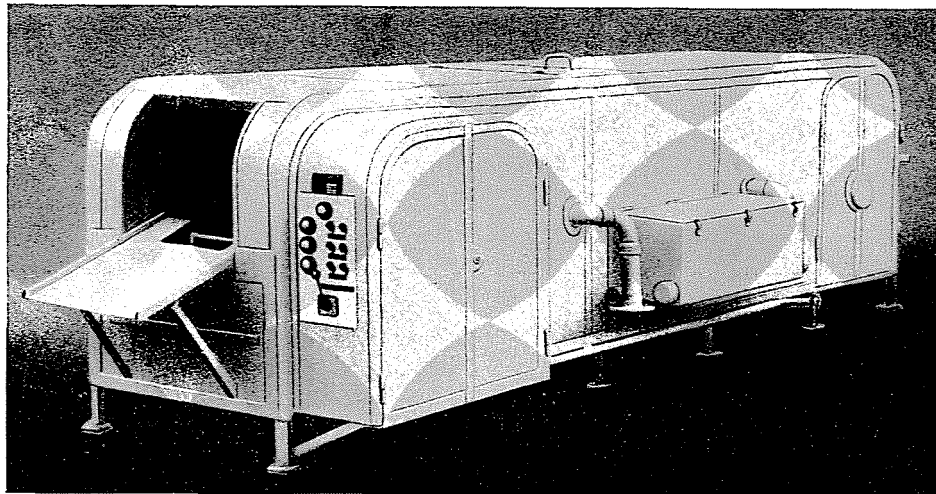
The biggest part of the technological equipment of the cannery has been located in the main building. Brining of cucumbers and souring of cabbage and also the cartwright, a

workshop and a small laundry had to be located in an auxiliary plant.

The boiler house should be located in conformity to the nature of the enterprise according to the plan of the settlement for which KOMPLEX submits appropriate suggestions to the customer to suit all requirements. The prevailing direction of the wind must be particularly reckoned with when locating this building to avoid vitiation of the air by soot and smoke in the cannery.

h) Description of the maintenance shop

For minor reparations and methodical preventive maintenance of the machines a



16. Case washing machine (without pumps). Type 23. 03

small but up-to-date workshop is established which is delivered with machine and tool equipment appropriate to the requirements. This unit includes the following machines:

An engine lathe for the turning and repair of parts that must be carried out on the spot. With this engine lathe 24 different metric threads, 40 British (Whitworth) threads, 13 modular and 40 DP turns can be produced.

A drill press suited to boring until a 40 to 50 mm depth and a hole-breadth of $1\frac{1}{2}$ " to $1\frac{3}{4}$ ". A transportable welding generator with which the necessary welding can be carried out either in the repair shop or on the spot.

A transverse planing machine, suited to shape plane and profiled surfaces in a straight direction until 550 mm length.

A grinding machine, built together with a motor, mounted on a cantilever with two series of abrasive grinding and stick discs to carry out coarse and fine polishing.

Various file benches.

Precision borer to be mounted on a table.

Gang mill.

All these machines have direct electric drive thus reducing also in this domain manual labour to the minimum.

In a separate locality a whole manual forge is placed with a smith's hearth and table, the blast of which is supplied by a foot ventilator.

The lighting of the workshop is realized by windows of adequate size. Two-leafed doors facilitate the transportation of machines and materials.

i) *The equipment of the laboratory*

The cannery includes also a laboratory where the necessary chemical and microbiological tests of the raw materials and products can be carried out.

The principal fittings are the following:

Basic equipment for the realization of chemical analyses: burettes, beakers, pipettes and vessels for chemicals.

Table refractometer

Viscosimeter

Binocular microscope

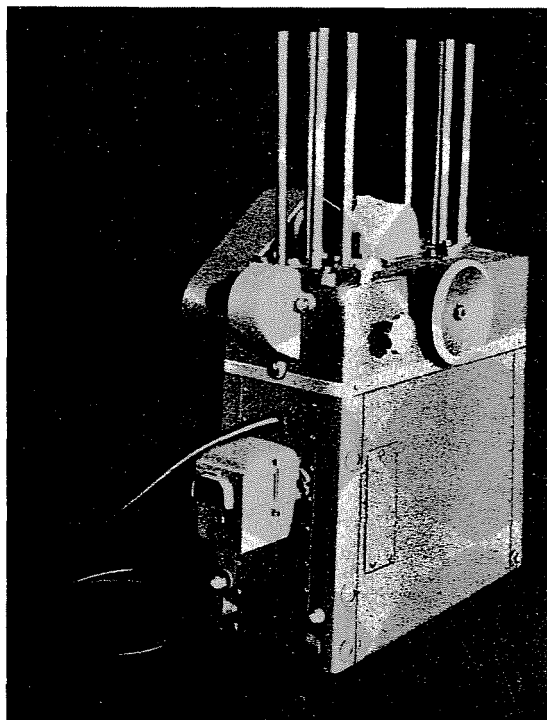
Black point examining equipment

Thermostat 130° C temperature

Exsiccator

Laboratory autoclave

Laboratory vacuum pump for 2 cu. m/h. aspirated air



17. Cover numerator. Type 20. 03

Power supply

The electric power requirements of the K.II type cannery can be supplied either from a high-tension network or from a Diesel generator as requested.

I. The case of the transformer solution

The supply of the cannery can be realized by a branching from the existing 20 KW. 10 KV or 6 KV overhead line. 2 transformers of 100 kVA rated output provide for the power requirement of the cannery. The output of the transformers has been chosen with the view that with low simultaneous loading one and with high simultaneous loading two operating transformers assure optimum efficiency.

It is most suitable for the purpose in view to build the transformer house at the place indicated in the general plan, but by all

means at the boundary of the area. Building on the site indicated is accounted for by the circumstance that the entrance of the transformer chambers is directed almost to the north, so natural air cooling seems to be warranted.

The station is built in two storeys. The high-tension overhead line arrives at the first floor and here are placed the circuit breakers assuring the protection of the transformers at the primary side. On the ground floor separate chambers are built for the transformers. The room including the low-tension central distributor and that for the kilowatt-hour meters is also on the ground floor. The two storeys are connected by stairs, where also the circuit breakers can be transported up and down.

The design of transformer chambers enables the cooling of the transformers to be brought about by natural air current. It

was necessary to raise the floor level of the transformer chambers partly so as to facilitate transportation and partly for the possibility to shape the lower inflow opening in order that the air flowing in below passing amidst the radiating ribs of the transformer could leave the chamber opposite to the entrance through a flue established on the ceiling.

To meet the requirements as to fire protection below the transformer chambers there is a sump which assures the collection of the oil flowing off wherefrom it can be easily recuperated and on the other hand, collecting the oil flowing off on fire proof graved layer limits the spreading of fire and the burning of the oil respectively. if a fire should break out.

The first floor is divided into three parts. At the middle part the overhead line arrives and joins the battery bar through a three pole isolating switch with an earthing device. The two other parts include the circuit breakers of the transformers at the primary side which are branching from the battery bar. The three parts are separated from each other by walls.

Measurement. Measurement is carried out at the secondary side separately so as to establish current consumption in lighting and in power transmission. Kilowatt-hour meters are found in a separate room.

Low tension distributor. The low tension distributor is in a separate locality behind the transformer chamber in the ground floor.

The distributor is of the detached iron plate box type. It consists of four cells.

Feeding	1 cell
Power transfer branching	2 cells
Lighting	1 cell

The feeding cell for each transformer. An isolating switch, a current breaker and 6 current reducers are placed in. From the current reducers 3 for each transformer are reserved for the kilowatt-hour meters to apply the tariff. The other 3 current reducers for each transformer are needed for the power meter instruments and KW indicators on the front of the cell.

For each of the two power transfer cells two, a total of four branchings are assured. The branchings, knife switch current reducers are constructed for underground cable connection through a high-capacity safety fuse by which the individual parts of the plant can be connected. On the front of the cells for each branching an ampere-meter indicates the degree of loading.

The summary and summarized measurement and protection respectively of the branchings providing for lighting when any of the transformers is operated, is placed in the lighting cell. So are also six parting branchings. The branchings through chamber switches and fuses of the system "D" are also suitable for underground cable connection. The built in current reducers are needed partly for the kilowatt-hour meter to apply the tariff and partly for the ampere-meters placed on the front of the cell. The four cells of the distributor form one which is arranged so in the locality that the possibility of control and operation from behind is assured. On the front side the cells are entirely closed, only the recording instruments and handles are seen. A wire-net door prevents all who are not admitted, from entering the space behind the cells.

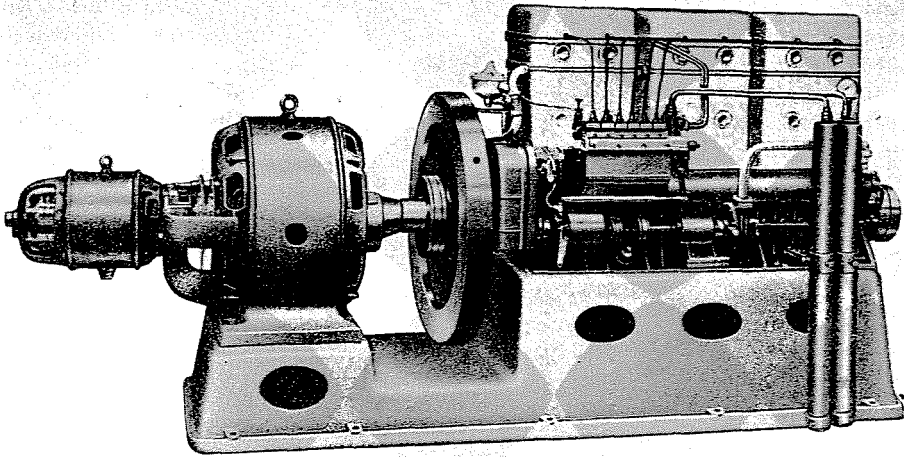
All localities of the transformer station where a fire might arise from electricity are provided each with a chemical fire engine.

II. In the case of using Diesel motor generators

Capacity and voltage. 2 Diesel-driven generators are built in, each with a rated capacity of about 113 kVA. The voltage transmitted by the aggregators is $3 \times 380/220$ V.

General description. In case of an aggregate operated plant a locality of about 48 sq.m. area is built next to the boiler room, where the machine units consisting of two parts are built in. Also the central power transfer and light distribution board of the cannery is established here.

The machine unit consists of a Diesel engine system Ganz-Jendrassik and a generator connected on a common axis with the direct current exciter dynamo. For the Diesel



18. Diesel aggregate. Type 5. 12

engine each machine is provided with a cooling water container and a fuel tank. The capacity of the accumulator is chosen so that it can cope with the start of both engines one after the other. For the filling of the accumulator a charging set of appropriate capacity is designed.

The output of the aggregators is chosen so that when the simultaneous loading is low only one engine needs to operate whereas when the simultaneous loading is high both engines are needed.

Protection. The electric protection of the aggregator is placed on the central distributing board.

Low-tension distributor. The distributor is of the detached iron-plate box type. It consists of four cells.

Feeding	1 cell
Power transfer branching	2 cells
Lighting	1 cell

In the feeding cell the air break switches assuring the electric protection of the aggregators are placed with an isolating switch each and the required current transformers for the measuring and recording instruments. Also the resistances controlling the current of the direct-current excitation of the generators are placed in the cell.

On the front side of the cell the recording instruments and those needed for synchronization, signal lamps and synchronizing plug are built in. The synchronizing equipment is needed for the operation of the two engines in parallel connection. In each of the two power transfer cells two branchings, a total of four, are provided for.

The branchings, knife switch current reducers are designed for underground cable connection through a high-capacity safety fuse by which the individual parts of the plant can be connected. On the front of the cells an ampere-meter for each branching indicates the degree of loading.

The summary and summarized measurement and protection respectively of the branchings providing for light when any of the aggregators is operated, is placed in the lighting cell.

For the purpose of protection a dry circuit-breaker with termoswitch and quick-break cutout and six further departing branchings are built in in this cell. The branchings, in order to assure disconnecting, are through chamber switches and fuses of the system "D" also suited for underground cable connection. For the space lighting a branching is provided for in which instead of the chamber

switched remote control magnetic contactor is built in. Ampere-meters recording the phasis loading and a manometer with change-over switch are mounted on the wall face of the cell. The four cells of the distributor form one unit which is arranged so in the locality that possibility of control and operation from behind is assured.

Heating

Central heating. The building consists of two parts, one of which is the wing for the plant, the other for offices and social service. Both parts are provided with central heating installation; according to the steam requirements, a steam heating with 3 atm. working pressure is designed for the plant-wing and 0.1 for the wing of offices and social service.

According to the design work standards upon the assumption of -19° C exterior temperature and interior temperatures indicated in the plans, northern detached site and a strong wind the following losses of heat must be reckoned with:

Bureau wing	76,800 cal./h.	154 kg/h. steam
Plant wing	167,500 cal./h.	335 kg/h. steam
Damp dispersion		52 kg/h. steam
Total:		541 kg/h. steam

In the plant wing the fin- and tube radiators are provided with a separate high pressure basic conduit while the thermoventilators are connected with the basic steam conduits of the industrial steam supply. Disconnecting of these is carried out by cut off the individual steam valves or for shorter periods by putting the electromotors out of action.

Part of the thermoventilators serve only for the heating of the interior air space, with inner air intake. The thermoventilators designed for the jarwasher and for the autoclave chamber are also suited to exterior air intake and beyond the heating of the locality also to damp dispersion, depending on adjustment.

Industrial steam supply. From the devices listed in the technological specification the following need steam supply:

- 3 spherical vacuum pans with mixer
- 7 tiltable steam cooking pans
- 1 alkaline scourer
- 3 tiltable cooking pans, 10 litre each
- 1 syrup mixing tank
- 1 disc steamer
- 4 sterilizing autoclaves
- 1 jar-washing machine
- 1 box washer
- 2 hand-operated jar washers

The steam requirement of the devices listed — according to the technological specification — were 1670 kg/hour in the case of absolute simultaneity, but the actual maximum simultaneous consumption would hardly surpass 1000 kg/hour. For the operation of these devices saturated steam of 3 atm. pressure is used. For each device one steam valve and one thermostatic speed valve are provided for.

The 3 atm. high-pressure steam conduit system will be of upper distribution with one collecting conduit branching off from the basic conduits for each group of devices. At the rise of the basic conduits and at the end points condensing vessels provided with automatic air intake and de-aerating valves are employed. The condensing conduits are generally conducted above the floor, along the line of the steam conduits towards the condensing storage tank. The condensating conduits connecting the thermoventilators are elevated.

The conduit system for the industrial steam supply and also for the steam supply of the thermoventilators will be connected towards the left and right wings of the building with two basic conduits that can be separately closed and some sections can be even disconnected with the aid of the designed valves in view of the periodical operation of the plant.

Heat centre. From the steam transmission line leading to the heat centre the following groups of consumption have to be supplied with steam:

Central heating of bureau and plant wing	541 kg/hour steam
Industrial steam consumers	1670
Steam requirement of boiler (1600 l)	160
Total:	<u>2371 kg/hour steam</u>

The maximum simultaneous value of heating and industrial steam requirements to be expected may be estimated at about 1800 kg/hour.

The arriving transmission line is unwatered through a condensing vessel and then conducted through a 5/3 atm. ratio steam pressure reducer provided with a needle valve by-pass pipe to a 3 atm. pressure steam distributor unwatered by a speed valve. From here the basic conduit of the boiler two industrial and one spare pipe end and low pressure steam heating departs, provided each with a steam valve.

The steam distributor is also provided with a pressure gauge and a safety valve.

The condensing basic conduits arriving from the steam consumers are connected with the condensation collecting tank placed in a condensing shaft of proper depth. The tank designed for 2000 l is equipped with waterlevel indicator, charging and draining cock, leak and fume tube. The leak tube has to be connected with the canalization while the fume tube should be conducted outdoors.

The recuperative conduit is conducted parallel with the steam transmission conduits into the boiler house with elevation.

1. Water supply

The water quality assumed or necessary respectively in the aqueduct of the establishment is standard drinking water of about 13—15 (German) degrees of hardness. Minimum pressure of the aqueduct needed is 15 to 20 m water column.

Water supply and sewage disposal

A.) Water requirement of the main building:

1. For industrial consumption	25 m ³ /hour max.
2. In the localities of social services	0.40 m ³ /hour max.
B) Water requirements of the boiler house:	
1. Industrial consumption	8 m ³ /hour max.
2. In the localities of social services	<u>0.25 m³/hour max.</u>
Total water requirement	33.65 m ³ /hour max.

The delivery pressure conduits to the individual devices are connected without exception with loose binding elements. To some technological devices hose joints are made. At the places where water is taken with hoses a cast iron discharge must be constructed which is also a means for keeping the floor clean. Part of the discharge equipment is mounted on exterior walls, the rest on pillars broadened at the base. The junctions of the discharge pressure drain conduit must be mounted freely.

For dewatering the floors, cast iron sinks are placed above the shaft, arranged according to plans.

Equipment established in the main building:

12 cast iron sink basins
2 133 × 135 mm cast iron catch basins
37 210 × 210 mm cast iron catch basins
2 wall hydrants
2 hot water producing and storing tanks
1 semi-rotary pump (for draining the condensing shaft).

The outlet of the return flow arising at the drum washer can be realized through a sand catcher shaft the inner formation of which is identical with that of the other canalization shafts but the discharge tube is connected not at the bottom but at a height of 20 cm above the base.

The feeding conduits are conducted to the individual devices through the instrument panel mounted in the autoclave locality. The hot water conduit can be joined to the storage water heater in the heating centre. The 10 cu. m/h. 40°C temperature water arising at the

semi barometric condensator can be led from the pressure stub of the pump provided with technological installation to the fitting shaft outside the building wherefrom by proper adjustment of the valve it can be conducted into the recooling basin or into the sewage network. In the heating centre of the main building a 1600 litre storage water heater is placed in an arrangement fixed by the plan. This equipment supplies the hot water of about 65°C temperature needed for the lavatory and shower bath.

B) Boiler house

Central heating

The building envisaged consists of two parts; the lower wing where the social services and the workshops are located and the boiler room wing. To this wing is attached — according to the corresponding variant of the type design the engine room of the Diesel aggregate. This first wing is provided with a low pressure (0.15 at.) central heating equipment namely the localities of the social services with cast iron radiators with 500 mm joint screw distance and the workshops with cast iron fin and tube radiators. At the dimensioning conditions described in the review of the main building the steam requirement of the central heating is the following:

Central heating	47 020 kcal/hour
about 6 per cent loss	
total	50 000 „ „
	100 kg/hour steam.

The Moscow 150 type or fin-and-tube radiators respectively are as to execution and equipment identical with those applied in the main factory building. Hot water can be obtained from the feeding water tank instead of the boiler.

The heating installation has an overhead distribution, the two rows of localities opposite to each other obtain separate basic conduits. The condensation conduit is conducted generally above the floor but in the boiler house it should be placed in a floor canal.

Return water translifting

To collect the return water arriving from the central heating a condensation collecting tank is envisaged the volume of which, 315 litres, takes also account of future consumers and which has to be placed in the sunk basin. This tank is mounted and the pumps connected with it are operated the same as for the equipment applied in the heat centre of the main building. Detailed data appear from the respective items of the list. The combined pressure conduit leads from the pressure side junction of the pumps to the overhead boiler feeding tank.

The boiler plant (Fig. 4)

The boiler plant to be built in should meet the following steam requirements:

A) Main building central heating and industrial steam supply	3128 kg/hour steam
B) Central heating of the boiler room building	100 kg/hour steam

Rated steam requirement total 3228 kg/hour steam

In consequence of the given conditions of the plant however, only about 2700 kg/hour maximum steam requirement can be reckoned with. For the production of this quantity of steam — according to the prescriptions of the program design — two boilers with 1500 kg/hour steam output were designed according to the following description:

Technical data of the 1.5 ton/hour performance steam boiler with oblique water-tubes system "Marabu".

Working pressure	6 atm
Performance	1500 kg/hour steam produced
Heating surface	about 73 sq. m.
Grate surface	about 3.4 sq. m.
Fuel	coal of the calorific power of 3000 to 6000 kcal/kg, containing no more than 50 per cent dust of 0 to 5 mm dia.

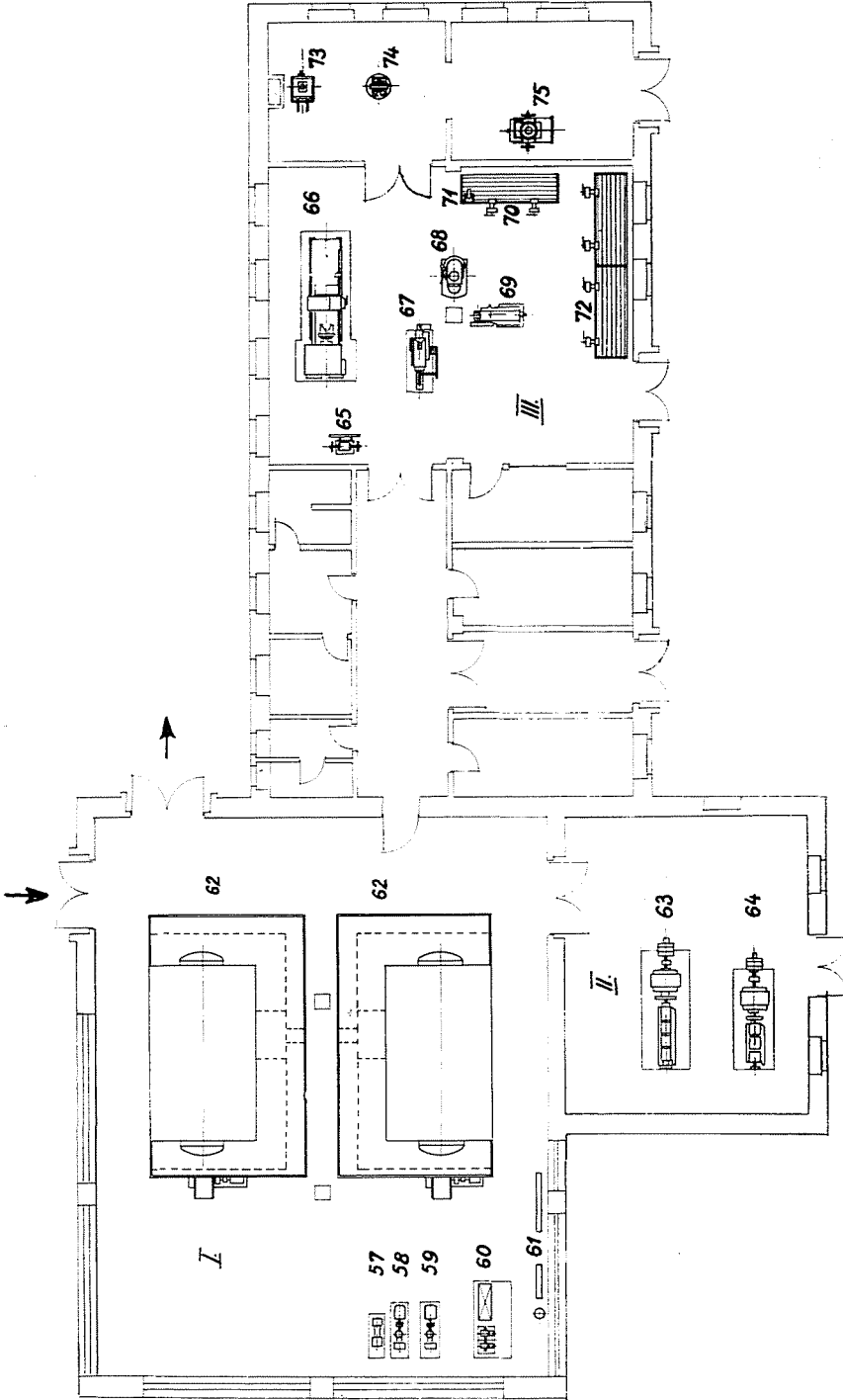


Fig. 4. Mechanization of the boiler house. (List of items see page XXIX)

The boiler is made according to the usual scheme with a longitudinal boiler drum. To ensure a large water space the boiler drum has a comparatively great diameter (1250 mm). The heating surface of the boiler consists of tubes with 102 mm exterior diameter which at both ends are pressed into welded chambers constructed from one piece.

Opposite to each tube end a pipe seal cover with inner closing is applied after the removal of which the boiler tubes can be easily cleaned and the boiler stone can be removed according to necessity with a sealing tool. The obliquely mounted boiler bank is connected with the boiler drum each by a row of tubes. Four columns serve to suspend the boiler, on the supporting cross arms of which the boiler drum is suspended with shackle bolts. The cross arms joining the columns provide for the suitable stiffening of the boiler wall.

A flat grate furnace makes the use of coals of the most varied quality possible. The

grate is dimensioned so amply that even with a coal of 3000 kcal/kg calorific power the rated performance of the boiler can be obtained. In order to reach the appropriate performance of the grate and to be able to use also coals with a higher proportion of dust the grate is provided with air blast.

By choosing adequately small interstices of the grate the uniform air distribution is assured even with a varying dust content.

For the transportation of the combustion air under pressure there is a fan placed behind the boiler. In view of the great dimensions of the grate a furnace door is applied so that all parts are accessible. In the case of coals of lower quality to be used possibly two firemen should be employed for the boiler heating. For a thorough mixing of the gases with air from the branching of the ventilator air is conveyed into the furnace. The boiler is well provided with "coarse" fittings such as furnace doors, mandooors into the flues of the boiler, butterfly dampers and hand-operated soot pipe. In each tunnel there is a series of blow-off openings through which the pipes can be reached with the apparatus so the flue dust deposits can be removed from all pipes. The device is operated with the steam of the boiler.

The following fine fittings belong to the boiler: main steam valve, auxiliary steam valve, blow-off steam valve, feeding valve, mud nozzle, safety valve, water-level indicators and manometers.

The dimensions of the boiler house where the two boilers are placed are calculated to enable to build in into the space seen on the drawing also bigger boilers of another type, possibly provided with feeding water preheater and even a flue ventilator. Here can be placed also the water softener if such is necessary.

Auxiliary equipment of the boiler and distributor

The main steam conduits arriving from the boilers are joined with a high pressure distributor with which also the steam conduit

I. Boiler room

- 57 DKK—111 pump
- 58 MT—12 V pump
- 59 MT—12 V pump
- 60 Boiler feeding pump
- 61 Steam-pressure reducer
- 62 Steam boiler

II. Diesel room

- 63 Diesel aggregate I.
- 64 Diesel aggregate II.

III. Repair and maintenance shop

- 65 Grinding machine
- 66 Engine lathe
- 67 Transverse planing machine
- 68 Column drill
- 69 Framed saw
- 70 File bench and vices
- 71 Precision borer
- 72 File bench and vices
- 73 Forge
- 74 Smith's anvil
- 75 Welding dynamo

of the Worthington pump, the steam transmission conduit of the main building of the plant and the distributor of the local low pressure steam heating are connected. The equipment of the high pressure distributor consists of pressure gauge, thermometer, water drain condense vessel and the necessary isolation. Towards the low pressure (0.15 atm) steam distributor, serving the purposes of central heating, a steam pressure reducer is joined which is provided with a needle valve by-pass. On the low pressure distributor a pressure gauge and a drain loop are mounted while a safety stand-pipe of 50 mm inner diameter and 1800 mm length are adjusted to its bottom plate. In the high pressure branchings steam valves, whereas in the low pressure branchings slide valves are inserted.

The recuperating conduit arriving from the main building of the plant and from the local drain sink is joined with the 4000 litre volume boiler feeding water tank placed at a height of 6.25 meter a ferro-concrete socle. This volume is equal with the 2 or 3 hour reserve of the whole plant. The feeding tank is equipped with filling and outlet cocks, water-level indicator, thermometer, syphon overflow and fume pipe leading outdoors. The feeding water arrives from the feeding tank at the feeding pumps to be placed below with an overflow; two of the pumps are of the same output and centrifugal system while another is steam operated and of Worthington-duplex system. The feeding pumps are connected with a common collecting conduit both on the pression and suction sides; in their joint a separate back-pressure valve and manometer will be mounted. The elevated feed line leads to the boilers but subsequently to the branchings further valves are inserted in a height easier to reach.

The draining of the condensation shaft depends on the prevailing local conditions and on the depth of the canalization. The overflow of the boiler feeding tank or its outlet provided with a separate valve can be also connected with the canal system. The location of the mud hole for the boilers will be indicated on the plan.

Recapitulation

concerning the Canning Factory type No. II

1. *Production*

A plant suited for the canning of fruit and vegetables.

2. *Output*

7000 ⁵/₈ litre units in one shift daily, 2000 tons in a year in one shift daily (based on 200 to 300 days of production).

3. *Raw material requirement*

The raw material needed for the production of the above goods is;

fruit	about 300 tons
vegetables	about 520 ..
Total:	about 820 tons.

4. *Requirement of jars*

For the above production 3,200,000 ⁵/₈ litre units yearly.

5. *Man power per shift*

36 persons in the average of the year.

6. *Power requirement*

Industrial water (drinking water quality, maximum)	15 (German) degrees of hardness	34 cu. m/hour
Electric power		180 kW
Steam requirement (average of the plant)	(central heating)	1800 kg/hour 550 kg/hour
Steam pressure in the plant		3 atm
Water pressure in the plant		4 atm
Industrial current		220/380 V. 50 cycles

7. *Architectural data of the main plant building*

Floor area	1296 sq.m.
Average height	5 m
Built-in volume	6480 cu.m.

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8. Architectural data of the boiler house

Floor areas	523 sq.m.
Height I—II	8 m
Height III	4 m
Built-in volume I—II	2284 cu.m
Built-in volume III	968 cu.m.
Total	3252 cu.m.

In the above description the technological and installation objectives of the K. II type cannery and their technical solution was briefly surveyed.

The Canning Factory type No. II can be completed according to requirements with

green pea canning
tomato purée processing
fruit juice preserving and
cucumber picking lines.

The basic output figures given in this summary for the individual objects can be increased according to requirements.

Upon request KOMPLEX Hungarian Trading Co. for Factory Equipment will not fail to submit offer also for the above complementary lines.

A more complete review of the Canning Factory type No. II. includes technological and main mechanical specification; therefore the list of machines involved in the delivery is given below.

Specification of the Canning Factory Type No. K—II

3. Technological machinery installations

3.1 Tomato processing unit

3.1 12.051 Conveyor picking belt with 600 mm wide strap of metal wire and perlon thread with about 0.7 HP electromotor type VZ 213a, revolution number $n = 960/\text{min}$. With worm gear type CH 9, C—96 manufactured by Hungarian Wheel Works (Fogaskerékgyár), with water rinsing section, water discharge plate, tubular frame with adjustable sloping and rollers, manufactured according to the general arrangement drawing

No. 0—2017 of the Machine Factory in Kiskunfélegyháza, with switch type VKT 333, 5 running metres of cable.

abt. 280 kg 1 unit

3.1 6.01 Ventilator washer capacity 2 to 3 tons/hour 0.5 m belt width, built in belt mechanism and high pressure ventilator, mounted on wheels with switchboard, one electromotor VZ 221/6 about 1 kW 960 r.p.m. and one electromotor VZ 221/2 of 28 kW 2880 r.p.m., rubber cable, based on the Soviet washer KMT, manufactured according to the general arrangement drawing ÉLITI (Design Institute of the Food Industry) No. 21—01—20.

abt. 1048 kg

3.1 2.08 Tomato crusher and crushing tank for the crushing of 1500 to 2000 kg/hour washed tomato, with acid proof casing, toothed roll, changeable toothed insert ball bearings, driving V-belt pulleys and V-belts, acid-proof plate hopper, VZ 223/8 type electromotor, of about 1.3 HP with 700 r.p.m. The volume of the tank is 250 litre.

about 320 kg

3.1 13.01 Pump for crushed tomato manufactured according to the general arrangement drawing of the Láng Machine Factory in Budapest, with a VZ 221/6 type 1.35 HP 940 r.p.m. electromotor.

3.1 9.02 two-stage tomato tritulating machine with two tritulating sieves one with 5 to 3 mm dia the other with 1.2 mm size, the parts coming in contact with the juice made of stainless steel, with a VZ 233/4 type 1440 r.p.m. 7.6 HP electromotor, 350 litre juice collecting tank, the parts coming in contact with the juice made of acid-proof steel. Manufactured according to the general arrangement drawing of the Láng Machine Factory.

abt. 613 kg

3.1 1.01 Spherical vacuum pan with 300 litre useful capacity, for the evaporation of 300 to 350 kg/hour vapour, with steam

heating, about 1.8 sq. m. heating surface, cooling space dimensioned for 5 atm pressure, boiling space dimensioned for 1 atm. pressure. Parts coming in direct contact with the juice made of acid-proof steel and provided with a stirring device driven by a 2.8 kW 2880 r.p.m. VZ 221/2 type electromotor, with the aid of a driving gear, type 41.55—0.3 manufactured by the Toothed-Wheel Factory in Budapest. The spherical vacuum pan with inspection holes and casement lights, fittings, all instruments, material, gate valve, placed on socles delivered according to the assembly drawing of the Láng Machine Factory.

abt. 870 kg 2 units.

- 3.1 19.01 Semibarometric condenser to condense abt. 1000 kg/hour vapour, of 45 to 50° C temperature with built-in baffle plates, supporting socles connections made entirely of steel, welded, with drop separating plate, complete, according to the assembly drawing of the Láng Machine Factory.

abt. 600 kg

- 3.1 Centrifugal condensed water pump, type FK 80/125/II, of the Ganz Factory in Budapest, with foundation plate, shaft coupling, VZ 233/4 abt. 5.6 kW 1440 r.p.m. electromotor, complete.

abt. 480 kg

- 3.1 13.04 water ring rotation vacuum pump, type EV 65/200/II with 250 cu.m/hour induced air capacity at a 92 per cent, vacuum, with a FOK 89/4 type, abt. 25 HP 1450 r.p.m. electromotor, common foundation plate and shaft coupling, complete.

abt. 380 kg

- 3.1 Iron construction service platform for the spherical vacuum pans, made of steel profile elements, prefabricated, adjusted, for the vacuum and collecting pans, with 2000 mm high gangway construction,

stairs, railings, covered with corrugated plate. Manufactured according to the assembly drawing of the Láng Machine Factory.

abt. 1630 kg

- 3.1 Pippings of the condensing stations. 1 set

- 3.1 21.01 Tipping type quick balance with 20 kg measuring limit, manufactured by the Balance Factory, in Hódmezővásárhely.

abt. 40 kg

- 3.1 17.01 Semi automatic jar sealing machine lower table with pedal, with built-in electromotor type VZP 211/4, 0.6 kW 1340 r.p.m. Manufactured according to the drawing No. C 173 of the Machine Factory of the Food Industry (Élelmiszeripari Gépgyár).

abt. 200 kg

- 3.1 14.01 Conical collecting pan, the parte coming in contact with the juice made of acid-proof steel, with heating jacket 400 litre total volume, with manhole, connections, lighting, observing holes, according to the assembly drawing of the Láng Machine Factory.

- 3.1 11.01 Sterilizing autoclave, vertical, 3 atm working pressure, cover provided with counterweight, closing clamps, cold water inlet on the cover, with overflow, with steam, water and compressed air inlet connections on the bottom, with safety valve on the side, dia. 1000 × 1300 mm overall dimensions, with 8 basket lifting hooks, according to drawing No. C 123 of the Machine Factory of the Food Industry.

abt. 700 kg

- 3.1 11.01. 1. Sterilizing basket for the autoclave pos. No. 2.0—3.1 11.01, semi-high, made of perforated steel plate, according to assembly drawing No. C 149 of the Machine Factory of the Food Industry. Basket phosphated.

abt. 48 kg/unit; 4 units

- 3.2 *Vegetable line*
- 3.2 Slicing and stump boring machine, output abt. 500 kg/hour when processing cabbage, with stainless steel tube set and catch plate for cabbage according to drawing No. C. 172 of the Machine Factory of the Food Industry, with built-in electromotor type VZP 214/4 1.3 kW, 1405 r.p.m., complete.
abt. 265 kg
- 3.2 Drum washer with lathes, maximum capacity 2000 kg/hour, overall dimensions 2,575 × 1,100 × 1,200 mm, with section steel frame, mild steel vat, electromotor type VZ 221/4, 1.7 kW, 1420 r.p.m. and drive gear No. 41.6.502 B 60, according to drawing No. CA 1,168 of the Chemical Machine Factory.
abt. 700 kg
- 3.2 2.04 Vegetable cutting machine for cube cutting, output abt. 300 kg/h, with electromotor type VH 233/6 abt. 3.6 kW, 960 r.p.m. electromotor.
abt. 120 kg
- 3.2 15.01 Potato peeling machine, output 300 kg/h, with built-in VZP 211/2 0.6 kW 1400 r.p.m. electromotor, according to the type drawing of the Machine Factory of the Food Industry.
abt. 117 kg
- 3.2 4.01 Tilting type 150 litre steam cooking kettle, working pressure 3 atm, with worm gear, steel cup made of acid-proof material, with welded supports, according to drawing No. 0—2015 of the Machine Factory in Kiskunfélegyháza.
abt. 207 kg/unit 3 units
- 3.2 Cooling vat. Overall dimensions: dia 800 × 660 mm, welded from steel plates with inlet for water and compressed air; according to drawing No. 153/4—314 T—25/M. of the ÉLITI.
abt. 72 kg/unit 3 units
- 3.2 Blanching basket, dia. 740 × 350 mm, made of ground but not polished acid-proof steel, according to drawing No. 0—2011 of the Machine Factory in Kiskunfélegyháza.
abt. 16 kg/unit 9 units
- 3.2 10.01 Onion frying electric cooker for 4 kW performance, manufactured by the Elekthermax ÜV, article group No. 415, overall dimensions: 560 × 560 × 500 mm.
abt. 38 kg/unit 2 units
- 3.2 Onion frying pan, of acid-proof steel, volume 10 litre, according to the drawing No. K 298 of the Machine Factory of the Food Industry.
abt. 2.25 kg/unit 8 units
- 3.2 2.05 Universal slicing machine for cutting onions, with 1.3 kW VZP 214/4 type 1395 r.p.m. built-in electromotor, protected against dropping water, on planet wheel iron frame, output abt. 400 kg per hour.
abt. 105 kg
- 3.2 11.01 Sterilizing autoclave, identical with items No. 3.1.11.01 of the specification.
abt. 700 kg/unit 2 units
- 3.2 11.01 1 Sterilizing basket, identical with the item 3.1—11.01. 1 of the specification
abt. 48 kg/unit 8 units
- 3.2 20.06 Two-cylinder, two-stage air compressor with star arrangement, air-cooled, type DVLHK 7 5/II; for 33 cu.m. per hour induced air capacity. With MR 7/6 type 8 kW 960 r.p.m. 660/380 V electromotor, foundation plate, elastic shaft coupling, suction filter, pressure gauge, flywheel, oil level indicator and intermediate cooler.
abt. 410 kg
- 3.2 14.07. 800 litre vertical air tank for 6 atm pressure, made of steel plate, with socles,

- connection, 1" safety valve and water discharge cock.
 abt. 234 kg 1 unit
- 3.2 Switchboard for the central control of the 4 autoclaves, comprising all shut-off and control fittings of the conducts of the 4 autoclaves; for each autoclave one circular dial pressure recording instrument, one pressure gauge, one four-colour recording punctograph, with two low tension fluorescent lamp armatures, 40 W rectifier for the instruments and adjusting resistances, built-in steel plate casing, sensing bulbs, distributors and other fittings, stop valves. Conducts by the quantities mounted on the switchboard, according to the drawing No. 21-01-14/KO-01 of the ÉLITI. Also to be delivered 4 units of 1/2 "normal" stop valves to be built in according to the drawing of the respective technological layout.
 abt. 1565 kg 1 set
- 3.2 Semi automatic can sealing machine, KEVS 250 type of the GDR (manufactured by WMW), output 1000 to 1200 per hour.
 1 unit
- 3.2 Two-motor electric trolley, carrying capacity 500 kg, type of the Factory for Transportation Equipments, with current collecting rollers.
 abt. 180 kg 1 unit
- 3.2 The same, carrying capacity 1000 kg
 abt. 264 kg
- 3.3 *Fruit processing line*
- 3.3 12.05 750 mm wide picking belt with strap, made of perlon thread, for the rest identical with item No. 3.1-12.051 of the specification.
 abt. 310 kg
- 3.3 6.01 ventilator washer, identical with No. 3.1-6.01 of the specification.
 abt. 1048 kg
- 3.3 15.09 Morello and cherry stalk removing machine according to the design of ÉLITI, with a VZ 223/6 type 1.7 kW 940 r.p.m. electromotor.
 abt. 390 kg
- 3.3 8.01 Morello and cherry grading machine according to the design of ÉLITI with type VZ 213/4 1 kW 1400 r.p.m. electromotor.
 abt. 1565 kg
- 3.3 15.07 Morello and cherry stone removing machine with stainless steel hopper, according to the design of ÉLITI, with type VZ 214/4 1.3 kW 1405 r.p.m. electromotor, standard fittings.
 abt. 1090 kg
- 3.3 15.02 Apricot halving and stone removing machine with belt construction, made of stainless steel with band elements, with pushing-out knife-device, with built-in 1 kW VZ 213/4 type 1400 r.p.m. electromotor, according to the drawing of the Machine Factory of the Food Industry.
 abt. 515 kg
- 3.3 15.03 Alkali peeling machine, with 1000 × 2400 × 600 mm ground area, 3 partition vat system, steam heated alkali bath, cold water rinsing and acid neutralizing bath, connections, iron structure pedestals; the tank of the acid bath is made of stainless steel. With overhead crane-way for the lifting and forwarding of the baskets where a No. 3.3 electric trolley is running.
 abt. 860 kg 1 set
- 3.3 Two-motor electric trolley with 500 kg carrying capacity. Type: Factory for Transportation Equipments (Szállító Berendezések Gyára), with 6 m trailing cable, 42 V operating voltage.
 abt. 200 kg

- 3.3 Apple splitting machine to cut the apple into 4 to 12 slices, output abt. 300 kg/h, with stainless steel knives, completely closed, according to drawing No. C 166 of the Machine Factory of the Food Industry (Élelmezési Gépgyár), with built-in abt. 06 kW VZ 213 type 900 r.p.m. electromotor.
abt. 420 kg
- 3.3 2.01 Apple slicing and coring machine, output abt. 200 kg/h., with stainless steel feeding tube, according to drawing No. C 172 of the Machine Factory of the Food Industry, with built-in 1.3 kW type VZP 214/4 1405 r.p.m. electromotor.
abt. 260 kg
- 3.3 4.01 Tiltable steam cooking pan, identical with item No. 3.2 4.01 of the Specification.
abt. 207 kg/unit 3 units
- 3.3 Cooling vat, identical with item No. 3.2 of the specification.
abt. 16 kg/unit 12 units
- 3.3 4.02 Tiltable steam cooking kettle battery, each with three 20 litre duplicators, for 3 atm. working pressure, from acid-proof steel, hand tilting, according to drawing No. 21—01—20/III. of the ÉLITI (Designing Institute of the Food Industry).
abt. 171 kg 1 set
- 3.3 Two-motor electric trolley, identical with the item 3.2 of the specification.
abt. 180 kg
- 3.3 Tank for the penetration by diffusion with sugar syrup, made of acid-proof steel plate, volume 10 litre, according to the drawing of the Machine Factory of the Food Industry.
abt. 2.3 kg/unit 225 units
- 3.3 25 litre storing tank, made of acid-proof steel plate, according to the drawing of the Machine Factory of the Food Industry.
abt. 63 kg/unit 25 units
- 3.3 Raising platform truck with manual weight lifting, with fixing device, carrying capacity 500 kg, with epicycloidal rubber wheels.
abt. 200 kg/unit 6 units
- 3.3 13.02 Syrup pump, abt. 20 litre per min. output, tooth-wheeled, parts coming in contact with the juice made of stainless steel, with built-in 0.75 kW VZ 212/4 type 900 r.p.m. 42 V electromotor, with shaft coupling placed on movable stool, with motor protector and starting push button. According to drawing No. 21—01—20/6 of the ÉLITI.
abt. 423 kg
- 3.3 14.04 Syrup tank with 300 litre useful volume, cylindrical body, conical bottom, with electric drive propeller mixer, operated through a mechanical stirring machine by a 0.35 kW VZP 211/6 type 900 r.p.m. electromotor, with tubular frame iron structure pedestal, for steam heating; the parts coming in contact with juice are made of acid-proof steel. According to drawing No. 21—01—20/VII. of ÉLITI.
- 3.3 Semi automatic can sealing machine, KEVS—250 type of the GDR (manufactured by the MWM factory). Identical with the item No 3.2 of the specification.
- 3.3 18.07 Disc system fruit steaming apparatus, with 1900 mm dia steaming drum, ratchet gear, mounted on iron frame, for steam heating, direct temperature regulator; the parts coming in contact with the material are made of stainless steel. With 1 kW VZ 221/6 type 940 r.p.m. electromotor.
abt. 1665 kg
- 3.3 12.02 Goose-neck elevator for transportation of fruit, with 3400 mm lifting height, with baskets suitable for fruit

transport with directly built up 0.75 kW 900 r.p.m. electromotor type VZP 214/6, with speed reducer and tightening device. According to drawing No. C 168 of the Machine Factory of the Food Industry.

abt. 430 kg 1 unit

- 3.3 9.01 One-stage triturating machine, according to the drawing of the KÖVAC, with 1.5, 3 and 5 mm mesh size sieve lining; the parts coming in contact with the juice are made of stainless steel: with spiral spring beaters, with 7.5 kW type 900 r.p.m. electromotor type FOK 68/6. With separate set of sieves mesh size 1.5 mm dia.

abt. 320 kg/unit 2 units

Stainless steel tank, open, 800 × 650 × 350 mm, made of 2 mm thick steel plate, with outlet connection of 76 × 2 dia.

abt. 20 kg/unit 2 units

- 3.3 1.01 Spherical vacuum pan, identical with item No. 3.1—1.01 of the Specification.

abt. 870 kg

- 3.3 21.01 Quick dial balance, identical with item No. 3.1 21.01 of the Specification

abt. 40 kg

- 3.3 11.01 Sterilizing autoclave, identical with item No. 3.1 11.01 of the Specification.

abt. 700 kg

- 3.3 1.01. 1 Sterilizing basket, identical with item No. 3.1 11.01.1 of the Specification.

abt. 48 kg 4 units

- 3.3 6.03 Hand-operated fruit washer 1000 × 600 mm, made of rolled steel plate welded. According to the drawing No. V 638 of the Machine Factory Kiskunfélegyháza.

abt. 97 kg/unit 2 units

- 3.3 Fruit washing basket for the hand operated fruit washer No. 3.3 6.03, volume 50 litres, with two handles, made of perforated aluminium plate, according to the drawing No. V 638 of the Machine Factory in Kiskunfélegyháza.

abt. 11.2 kg/unit 8 units

- 3.5 *Supplementary machines and equipments*

- 3.5 20.03 Cover numerator for numbering lids and covers with 0.6 kW type VZ 213/6 type 900 r.p.m. electromotor, with automatic feeding with one set of unchiseled rough numbering tools for each machine according to drawing No. 21—01—20/17 of ÉLITI.

abt. 174 kg

- 3.5 23.02 Two-partitioned hand-operated jar washing vat lined with wood lathing with steam heating, syphon, overflow, mounted electromotor driven rotating brushes and with 0.35 kW type VZPT 21.1/6 900 r.p.m. electromotor on iron frame.

abt. 370 kg

- 3.5 23.02 Case washing machine for the washing of 200 fruit cases per hour, built in steel plate casing, with two washing sections, circulation pumps, spray heads, speed reducer, with one 0.35 kW, two 7.5 kW type VZ 234/4 1465 r.p.m. and one 0.35 kW type VZ 211/6 electromotor according to design No. 21—01—20/13 of ÉLITI.

abt. 1719 kg

- 3.5 23.01 Automatical jar washing machine to wash 1200 0.5 litre jars per hour (Soviet type KMU—001). According to the drawing No. 21—01—20/12 of the ÉLITI. With one 10 kW type VZ 234/2 2950 r.p.m., two 1.7 kW type VZ 213/2 2870 r.p.m. and one 1 kW type VZ 213/4 1400 r.p.m. electromotors.

abt. 4800 kg

- 3.5 Conveyor belt for jars, straight, according to drawing No. 5041 of ÉLITI, with

0.18 kW type VZ 211/8 670 r.p.m. electro-motor and speed reducer to the item No. 3.5 23.01.

abt. 180 kg

3.8 *Specification of the machines of the maintenance shop*

3.8 Lathe, type MVE 280, 280 mm centre height, 2000 mm distance between centres, shaft revolution 12—600 per min., with completely closed driving box, oil pump, oil level indicator, mounted on cast iron frame, with clamping disc, obliquely toothed wheels, to assure safe and noiseless running. With completely closed electric switch hut, with the necessary protecting equipment and control lamps. In advancing 18, in back motion 9, in down drive 28 speeds longitudinally and in cross direction. With two directly mounted motors of 11 and 1.2 kW respectively for 380/660 V voltage. With all fittings, cooling pump, switches (separate standard fittings).

abt. 3800 kg

3.8 FOF 32 column drill, in steel 32 mm, in cast iron 40 mm, in light metal 50 mm drilling diameter. With strongly dimensioned cast iron base and column drill chest fixed on supports hand or motor operated, also with worm gear. Automatically adjusted drill feed, 12 spindle speeds and 4 feeds. With drill motor and oil pump mounted on the top of the drill chest, driven with electric motor and feed gear box. Voltage of the equipment 380 or 24 V respectively; the driving motor is a Dalander type pole-changing engine, output 2.3 HP, 1440/2760 r.p.m. pump motor 0.12 kW 1440 r.p.m. Tension in the lamp of the working place 24 V, with max. 60 W lamp.

abt. 750 kg

3.8 Welding dynamo DSG 92/12 mounted on iron frame, with 2 iron wheels, transportable, with connecting rubber cable starter switch, 200 to 500 V 50 per. 15

kW A. C. motor mounted in completely closed cast iron casing. The machine can be also operated with belt pulley or V-belt drive in case of need.

abt. 485 kg

3.8 Transverse planing machine type GH 560, for machining in straight direction of plane and profile surfaces up to a length of 550 mm. The tool is clamped by the ram, with link drive mechanism for the motion of the knife, with a horizontally movable table provided with T-shaped notches. The table can be displaced vertically by 320 mm, the ram vertically adjusted by 140 mm. 8 cutting speeds. The number of strokes is 17 to 169 per minute. The frame is cast together with the base board. Automatic stroke length indicator with 60 to 550 mm stroke, 380 V tension three phase 50 per. 4.8 PH motor built on the casing; with press button distant-control protective switch.

abt. 1765 kg

3.8 Grinding machine type CSK C 4/4 with ball bearings to fix two abrasive grinding wheels with motor connection, with protection against splinters, cast iron frame 465×380 ground area, with 380 V, 50 per. 3-phase 1500 r.p.m. 1.5 HP short circuit motor.

abt. 123 kg

3.8 Grinding and polishing bodies, smooth discs, for general workshop use, Hungarian Standard MNOSZ 4510. Shallow plate shaped discs for tools, Hungarian Standard MNOSZ 4511.

2 units

Concave disc shape discs for miller, Hungarian Standard MNOSZ 4512.

2 units

Bilaterally edged discs for miller and reamers, MNOSZ 4513

2 units

Cylindrical cup wheels for surface grinding MNOSZ 4514

4 units

Bilaterally conically sunk discs for gauges MNOSZ 4516.

2 units

Unilaterally sunk discs for grinding borers, knives, tools. MNOSZ 4517.

abt. 31.16 kg 2 units from each

- 3.8 Frame type sawing machine mark KF 250, for cutting individual material or smaller amount of units; maximum cutting dia. 250 mm, number of cuts per minute 50 to 94. The arm of the machine in which the saw frame is movably embedded, can be operated hydraulically by a lever. After cutting the arm is automatically set right in its position. The circulation of the coolant is operated by a motor pump. The machine has two speeds according to the two numbers of cuts referred to. Adjustment of the clamping vice is done with a square threaded spindle, with the aid of a removable crank.

The motor built on directly is of 380/220 V tension 50 periods, 3 phases, 1440 r.p.m. 2.5 HP. A material holding frame forms a separate accessory.

abt. 800 kg

- 3.8 Precision drilling machine mark FT 10, table column type with electromotor 380/220 V, 3 phases, 50 periods, 0.5 HP for V-belt drive, 3 phase, ballbearings cast iron socles. Boring dia limits in steel 10 mm, in cast iron 15 mm, boring depth 75 mm, table clamping plate: 220×220 mm, spindle r. p. m. 730—1400—2600.
- abt. 90 kg

- 3.8 Vice benches MNOSZ 8985, with a 2500×800 mm table plate, height 800 mm; the first two boards, socle, reveals, drawer and bonds are made of steamed

beach wood, the rest of pine or fir, the drawer with plywood bottom.

abt. 130 kg/unit 3 units

- 3.8 Bench vice, MNOSZ 2090. Made of forged iron, with spindle, spindle drive arm, to be screwed on table, complete.

abt. 16 kg/unit 4 units

- 3.8 Precision vice, MNOSZ 11177, made of forged iron, with spindle, spindle drive arm, to be screwed on table, complete.

abt. 1.5 kg/unit 2 units

- 3.8 Forge-hearth MNOSZ 1305. Covering plate, ventilator casing cast, also cranks: frame welded and partly riveted. Painted with black enamel paint, except for the cover plate; the water basin welded.

abt. 67 kg 1 unit

- 3.8 100 kg smith's anvil mark MNOSZ 11300 and 1301, anvil plate and horn worked, hardened and ground.

abt. 100 kg 1 unit

- 3.8 Hand cart for the transport of the Dissous gas welding equipment, mounted on tubular frame, provided with wheels, with oblique holders for containers, hoses and stands for the pistols.

abt. 77 kg 1 unit

4. Laboratory equipment

- 4.1 Basic and auxiliary outfit to carry out chemical analyses, such as beakers, burets, pipets, cups etc.

1 set

- 4.2 Table refractometer system Zeis—Abbe.

abt. 5 kg 1 unit

- 4.3 Microscope of the Gamma works, binocular, with Howard chamber equipment, for magnifying 100—1800×.

abt. 10 kg 1 unit

- 4.4 600×500×400 mm thermostat. Manufactured by the Factory of Laboratory

- Equipment, max. 70° C temperature, 220 V working tension. MNOSZ "Labor 112"
 abt. 110 kg 1 unit
- 4.5 Laboratory autoclave, working pressure max. 2.5 atm. 380 V electric heating, 40×60 cm useful space.
 abt. 180 kg
- 4.6 Vacuum pump (rotary air pump) "Labor 23" with 1000 W motor, 550 r. p. m., 2 cu. m. per hour induced air. Final vacuum 0.05 Torr.
 abt. 38 kg
- 4.7 Ic-3 type laboratory centrifuge, with 0.25 HP electromotor, for 4 samples, 3000 r. p. m. max. speed, swinging suspension design. Manufactured by the Zugló Machine Factory in Budapest.
 abt. 35 kg
- 4.8 Electric exsiccator "Labor 123" 350×250×250 mm, 40—220° C heating temperature ranges, output abt. 600 W, with 1° C precision thermometer, for 380 V voltage.
 abt 22 kg
- 4.9 Kiln type Ca 1, 200×300×100 mm working space, output 2.2 kW, with thermocouple thermometer, for 1° C precision.
 abt. 82 kg
- 4.10 Laboratory type analytic balance with air brake, "Labor 413" MNOSZ 5004 for 200 g max. precision 0.1 mg.
 abt. 20 kg
- 4.11 Weight set for the laboratory type analytic balance "Labor 4612" MNOSZ 5005.
 1 set
- 4.12 Air-brake counterbalance "Labor 427" for max. 1000 g, of 10 g precision, with weight set.
 abt. 15 kg
- 4.13 Areometer set 0.5
 abt. 2 kg 1 set
- 4.14 Psychrometer system August, to determine air humidity. "Labor 563" for temperatures ranging from -10 to +50° C.
 abt. 0.5 kg
- 4.15 Universal vibrator "Labor 211", stroke length 120—150 mm, with 250 W 75—200 r. p. m. motor.
 abt. 31 kg
- 5.12 *Power supply. Diesel aggregate current supply*
- 5.12 Diesel generating aggregate type VI. ImD 160 ÷ FHg 202/6 with the necessary starting and auxiliary equipment, without switchboard, for 380/220 V, output 113 kVA.
 abt. 5420 kg/unit 2 units
- 5.12 *Secondary distribution board* (Diesel power station building). Steel plate distribution board with angle bar frame, 4 fields, 2200×1000×700 mm each, with the necessary slots for instruments and drive, and reinforcing angle bars to hold the device, stainless undercoat and pea-green lacquer sheathing, with the following fittings for each field:
- Field No. 1. Power transfer :*
- WM III type 400 A isolating switch with outrigger gear 2 units
- AL I type reductor 200/5 A I. class 2 units
 A meter 142×142 mm □ inlet casing, 0.200 A, 1.50.0 2 units
- NKI high-capacity shaft-fuse 400/200 A, 6 units
- SK 25 type series clamps, 4 units
 4 m 6×10 mm aluminium rails
 12 m 30×8 mm aluminium rails
 4×120 sq. m cable terminals, 2 units
- Field No. 2. FHG 272/6 type kVA generator feeding :*
- WM III type 400 A isolating switch with outrigger gear
 MK III 401 type switch 140—200 A

XL

AL 1. type reductor, 200/5 A I. class, 3 units
A. meter 142×142 dia. inlet casing 0—200 A.
1.5 class

3 units

Direct-current W 142×142 dia. sunk casing
0—150 V 1.5 class

HN type kilowatt-hour meter 3×5 A
“Transtat” type quick voltage adjuster

D. C. regulating exciter type WR III
Cast iron cable terminal 4×150 sq. m. 1 kV
Cable terminal 4×62 sq. mm 1 kV

Field No. 3. FHg 17.5/6 type 85 kV generator feeding:

WM III 400 A isolating switch with outrigger gear

MP 201 type switch adjusted to 140—200 A
AL 1 type reductor, 200/5 A I. class, 3 units
DC Volt meter, 142×142 inlet casing 0—150 V. 1.5 0

Double Volt meter, 142×142 inlet casing
0—450 V. 1.5 0

Double per. meter 142×142 inlet casing —
1.5 0

“0” meter 142×142 inlet casing — 1.5 0
172×172 mm kW meter 0—120 kW 1.5 0

HN 4 type kilowatt-hour meter 3×5 A
“Transtat” type quick voltage adjuster

WR 3 type D. C. exciter regulator
ILB type signal glass with 220 V 10 W
electric bulb

Synchronizing plug

Cast iron cable terminal 4×150 sq. mm.
1 kW

Cast iron cable terminal 4×62 sq. mm.
1 kW

Field No. 4. Lighting and power transmission:

WM III. 400 A isolating switch with outrigger gear

AL 1. type reductor 100/5 A 1.0
NKI 200/100 A high-capacity fuse, 3 units
K 917 III—2 type magnetic contactor

DM II. 25/10 A chamber-type switcher, 18
units

MP 101 type switch with outrigger gear
Ampere meter 142×142, inlet casing 0—100
A 1.5 0

ILB type signal lamp 220 V. 10 W, 3 units

Cast iron cable terminals 4×6 sq. mm
1 kW 5 units

Cast iron cable terminal 4×120 sq. mm
1 kW

SK 25 type series switches, 27 units

TA type post insulators 1 kW 16 units

14 m 6×10 mm aluminium rails

30 m 3×8 mm aluminium rails

With assembly of the 4 fields and the necessary interior wiring, packed in boxes for exportation

abt. 1200 kg

6.2 Specification of machines and fittings for thermal equipment

A) Main plant building

6.2 Motor pump type D 412. Self priming system, 60 litre/min, for the transport of 80° C water to a height of about 28 m to be employed as condense lifting pump, 1425 r. p. m. with 1.8 HP requirement, 2.3 HP motor, shaft coupling, cast iron base plate, short circuit armature electromotor, type VZ 221/4, 2.3 HP. 1425 r. p. m., 380 V, 50 per., closed design

abt. 109 kg/unit 2 units

6.2 Centrifugal ventilator type SV—5.50 mm water column stat. resistance, 9500 cu. m. per hour air transport at 1440 r. p. m., with “Füred” mantle, shaft-coupling, short circuit armature electromotor, type VZ 231/4 5 HP 1440 r. p. m. 380 V, 50 per.

abt. 442 kg

6.2 Centrifugal ventilator, type SV—7, 60 mm water column stat. resistance, 11100 cu. m./h. air transport; at 960 r. p. m. with “Baja” mantle, shaft-coupling, short circuit armature 5 HP motor, type VZ 233/6 960 r. p. m. 380 V, 50 per.

abt. 792 kg

6.2 Centrifugal ventilator type SV—5, 32 mm water column stat. resistance, 5600 cu. m./h. air transport, at 960

r. p. m. with "Baja" mantle, shaft-coupling short-circuit armature electromotor, VZ 222/6 type 1.75 HP 960 r. p. m., 380 V, 50 per.

abt. 411 kg

- 6.2 Centrifugal ventilator AE—1 type at 12 mm water column stat. resistance with 680 cu. m./h. air transport. 1440 r. p. m. with "Füred" casing, directly built together with a short-circuit armature electromotor type VT 123/4 0.48 HP 1440 r. p. m. 380 V, 50 per.

abt. 72 kg

- 6.2 Axial helical fan, type AV 31.5 with 1000 cu. m./h. air transport, at 1440 r. p. m. directly built together with a short-circuit armature electromotor type VT 121/4 0.25 HP, 380 V, 50 per.

abt. 29 kg

- 6.2 Axial helical fan, type AV 40 with 2000 cu. m./h. air transport at 1440 r. p. m. directly built together with a short-circuit armature electromotor type VT 122/4 0.34 HP, 380 V, 50 per.

abt. 35 kg

- 6.2 Hot air generator, lamellar air radiator, with 5 pipe series, a total of about 35 sq. m. heating surface, 1100 × 600 mm, end plate size, at 5 atm. saturated steam heating medium to heat about 140,000 kg/hour air from -20°C to $+60^{\circ}\text{C}$, divided into a 3 pipe series and a 2 pipe series part, with separate steam and condense connections, built into an angle bar frame.

abt. 292 kg

- 6.2 Steam pressure reducer, type Mammoth, auxiliary control design, Nominal Pressure 16 cast iron casing, 3.0/0.1 atm. 30/65 Na.

abt. 23 kg

(and other fittings).

A) Boiler-room building

- 6.2 Motor pump. MT-12 V type centrifugal system, to transport 100 l/min 80°C water at a distance of about 85 m, as a boiler feeding pump, with 2880 r. p. m. 4 HP power requirement shaft coupling, cast iron base plate, short-circuit armature electromotor, VH 223/2 type 6.1 HP 2880 r. p. m. 380 V, 50 per. protected design.

abt. 165 kg/unit 2 units

- 6.2 Motor pump DKK 111 type. Self priming system, to transport 5 litre/min. 60°C water a height of about 16 m, to be employed as a condense lifting pump, 1425 r. p. m. with 0.21 HP power requirement, with shaft coupling, cast iron base plate, short circuit armature electromotor type VZ 211/4 0.8 HP 1425 r. p. m. 380 V 50 per., closed design.

abt. 39 kg/unit 2 units

- 6.2 Worthington-duplex boiler feeding pump MÁVAG. MDB 80 × 5080 type, to be operated with 5 atm. saturated steam, to transport 50 litre/min. 80°C hot water, to about 80 m manometric total lifting height, complete.

abt. 90 kg

- 6.2 Steam pressure reducer type Mammoth, with auxiliary control Nominal pressure 16 cast iron casing, straight closing valve. 6/0, atm. 25/50 NA.

abt. 22 kg

(and other fittings).

- 6.2 Steam boiler manufactured by VGR output 1.5 ton/hour 6 atm., with about 75 sq. m. heating surface, about 3.5 sq. m. grate surface, according to the technical description with drum, piping, grate mechanism, with the required coarse fittings, firing doors, manholes and butterfly dampers, steam-operated sootblowing apparatus, VS—5 type under blast fan and the following fittings:

XLII

Coarse fittings :

- 1 set of fire tools
- 2 tube cleaning doors
- 4 walling manholes
- 1 air regulator chimney valve
- 1 butterfly damper adjusting device
- 1 blowing off conduit to the water level indicator
- 34 flame trap flue partition castings
- 4 soot pipe doors
- 1 set of steam soot blow-off device, the required amount of fireclay, pipe interval and covering bricks

Fine fittings :

- 1 double safety valve, complete with counter weight
- 2 water table indicators, 500 mm
- 1 pressure gauge dia. 340 mm
- 1 pressure gauge tap 1/2 mm
- 1 by-pass valve (main steam) NA 125
- 1 feeding valve NA 40
- 1 oblique blow-off valve "Nyíl" NA 32
- 1 by-pass valve NA 32
- 1 by-pass valve NA 15
- 1 back-pressure valve NE 40

The complete boiler with supporting structure stair, but without walling material.

(The right to alterate the technical dates mentioned above are reserved for Komplex, Hungary.

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