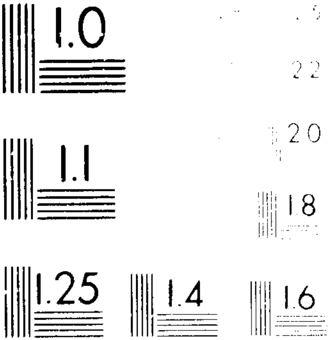

1.0
2.5
2.2
2.0
1.1
1.8
1.25
1.4
1.6

UNIDO/UNDP

ASSISTANCE TO THE DEVELOPMENT OF SMALL INDUSTRY IN INDONESIA

(PROJECT DP/INS/73/078)

[redacted]

EPARTEMEN PERINDUSTRIAN

REKTORAT JENDERAL INDUSTRI KECIL

[redacted]

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

(ASSISTANCE TO THE DEVELOPMENT OF SMALL INDUSTRIES)

DP/INS/78/078

PROJECT ADDRESS:
DIRECTOR – GENERAL SMALL INDUSTRIES
JALAN SURABAYA [illegible] 20
JAKARTA PUSAT
TELEPHONE 349725

PLEASE REPLY TO:
C/O UNDP
POST BOX 2338
JAKARTA
TELEPHONE 32 308
CABLE UNDEVPRO JAKARTA
TELEX UNDEVPRO [illegible] 44178

REFERENCE:

Bjørn Eidsvig:

Indonesia. PLAN FOR A PILOT PLANT

FOR

TAHU PRODUCTION

Report No. 77.
November 1984.

PLAN FOR A PILOT PLANT FOR TAHU PRODUCTION.

Page:

Content:

PILOT PLANT FOR TAHU PRODUCTION.

1. Introduction.

This plan for establishing of a pilot plant for production of Tahu is made on request from the Director of Food Industries of DGSI, Mr Trebin.
It comprises designs of machinery and equipment, description of the production and the equipment, as well as investment specifications.

The costing of building, equipment and installations has not been made, and should be based on quotations from suppliers. It may be necessary to involve more than one supplier and to collect competative quotations.

The costing of the production is also not done and will be a matter of recording through practical operation and testing after erecting the plant in order to establish the degree of saving that can be achieved in the different sectors. (We can here only refere to our Tahu report of June 1984). Also may it become necessary after trial operations to do adjustments of equipment and procedures. We expect that both DGSI and the Food Institute in Bogor will be fully involved in these operations.

When the pilot plant has been fully tested, adjusted, costings recorded and compared with the general prevailing situation in the Tahu industry, final conclusions should be drawn.

The designs, description, findings, and recommendations as comprised in this plan and in our report of June 1984, should then be worked together with the final costings and conclusions and published.

The final information material should be made available to all present and potential Tahu manufacturers, to existing and potential suppliers of production equipment and to the sundry promotion and financing organizations.

Expecting that it further will be followed up with explanations and encouragement via field officers, financers and cooperatives, major improvements should be possible to achieve in the Tahu Industry in Indonesia in general.

As described in our Tahu Report of June 1984, several alternative methods can be considered used within the different sectors of the production. We have for this plant made particular selections among these alternatives.

Dependant on capacity, location and other circumstances, different alternatives may however be beneficial for different conditions. We however recommend, rather to consider and possibly test such solutions after recording the operation results of the pilot plant.

Such alternatives may under reference to the former report include :

- Pasteurisation in stead of cooling of Tahu for sales
- Direct use of the ampas (e.g. for oncom production) in stead of drying.
- Soymilk recovery from the ampas in a small continuous centrifugal machine, or in a thin layer, multilayer handpress.
- Open sundrying or indirect sunheated drying of ampas.

2. Description of Production and Equipment.

2.1 Beans sifting and storage.

Contrary to current practices, beans must be screened before soaking. The beans in the trade contain huge ammounts of pollutions; soil and dust, sand and stones, straw, husk, etc. This must be prevented to go into the soaking and the further processing. Hence, water and time will be saved during soaking and one will be more sure to get a clean product.

A woven metal screen in stainless steel is prefered, having a mesh opening as big as possible, but small enough to prevent the beans from going through, 3 - 4 mm mesh may be used. The screen to be arranged in a simple wooden machine with a feeding bin and a dust collector as specified in fig. 1.

As soon as beans arrive to the factory in bags, they should be screened and transferred to the storage bins, fig. 2.
When the storage will only be in a screened form in the bins, no further beans stock is needed, and beans are always ready for soaking. The space requirement will be limited, no mess will created and rodents will not be attracted.

The beans from the bags to be filled into the skin of the screen, the feed control set to a suitable opening, the vibrator to be started, and screened beans to be collected at the screen outlet in the basket. Full baskets to be emptied into the storage bins. The one bin to be filled while the other is being used, always preventing mixing of the different supplies of beans.

The beans should for a proper cleaning not be run too quickly through the screening machine. It might be necessary to adjust the slanting angle and the degree of vibration for a best possible screening effect. Still a capacity beyond 500 kg/h may be anticipated.

The 2 storage bins as specified, built from water resistant plywood, will have a capacity of 3 m^3, totally for a weeks production, whereas, customarily the manufacturers normally collect beans about twice a week. Any conditioned storage is not considered because of the short storage time.

2.2 Soaking.

Controlled soaking time and temperature is important for the final Tahu yield, and for this is it useful to have an organized arrangement of soaking tubs. Possibility to trap out stones, float off other pollutions, do continuous washing, and drain off soaking waters are important. A practical arrangement, saving space and easening the flow of beans to the grinder also improves the situation.

In fig. 3 is shown the arrangement of soaking tubs with 3 - 4 tubs on each side at the grinder. Each tub has over-flow, stone trap, water drainage and a common beans channel to the grinder. Ideal soaking temperature is about 30°C with 6 hours soaking, to reach an optimum of about 120 % water absorbtion. Expecting about 1,5 soakings per day, a net soaking volume for 400 kg beans will be about 1[illegible] liter, equivalent to 8 tubs of 150 liter each as specified in fig. 4. Beans charges of 36 kg may be used.
The tubs are specified made from 0,5 mm stainless steel sheets, but may also, to save cost, be made from 1 mm mild steel, tinned inside and painted outside.

2.3 Grinding.

The fineness, eveness, temperature and water mixing ratio during grinding are all of importance for the yield of Tahu. As soon as grinding of a batch has started, it must be completed as quickly as possible, and thereafter cooked immediately to prevent decrease in yield, that may be quite high if any delay occur. For this reason the cooking batches should also be kept small.

The grinding must be as fine and even as possible. The horizontal stone disc grinders are suitable, but it is very important that the grinders are well maintained to enable an even and smooth running, possible to adjust the distance between the grinding discs to a a minimum.

As long as a griding temperature beyond 80°C can not be kept, the temperature should be held as low as possible, using chilled water. The lower the temperature, the better the yield and the lower the bacteria growth.

The adding of water during the grinding must be continuous in a ratio between water and beans of about 2.4 : 1. Even adding is important, and correct amount can be checked in the receiving bucket where the product should form an hip, about 1" high. The water tap over the grinder must be permanent, and it must have an easy adjusting handle with an arrow pointing at a number scale to enable improved control of the water flow.

The grinder to be arranged as shown in fig. 3 to enable flow of beans from the soaking tubs to the feeding funnel. The grinder should be mounted high enough to enable collecting the product in a bucket under the outlet.

When soaking charges of 30 kg beans are used, these may during grinding be separated into e.g. 4 charges of 8 kg beans, or [illegible] kg paste each.

2.4 Cooking.

The product from the grinder must be cooked quickly to prevent loss of yield. The 60 liter from the grinder to be further diluted to a 80 liter slurry in the cooker, heated quickly and then cooked for [illegible] - 13 minutes.

During the heating up period considerable heat is consumed while the heat requirment during cooking is quite limited. One should heat up as quickly as possible, and than during the cooking, limit the boiling as much as possible. It hence is necessary to change both the fuel consumption and the air intent during each cooking cycle.

The cooking pans should be constructed for 80 liter and have an as large outside heating surface as possible and the burner room should be constructed to allow a high circulation speed of the combustion gases, with possibility of regulating the air intake and evacuate the smoke at a lowest possible temperature, closing it off when not in use. The liquid surface should be as small and possible, and the vessel provided with a lid.

With a gross cyclus time for the cookers of [illegible] min, having [illegible] charges per day, 5 cookers will be in operation for 4 [illegible] hours per day.

The constructions of the cookers is shown in a cross sections in fig. 5 and in horizontal section in fig. 6.
80 liter in a pan with 450 mm diameter fills [illegible] mm [illegible] with the outside heating surface. The [illegible] chamber to be [illegible] with [illegible] mm diameter. The burner inlet and the smoke outlet being arranged tangentially, will give a circulation around the pan [illegible] gases for maximum heat transfere.

A parafine burner of traditional construction to be used, connecting to a parafine control valve, that must have a pointer arm and a scale for easier control of correct opening for heating up and for boiling. Normally one will have 2 opening stages to be marked on the scale, a large opening for heating up, and a small opening for maintaining the boiling.

Also the air intake must have a damper to control the volume of the air intake. Also this damper must have 2 stages, most open for heating, and less for maintaining boiling.

It is very important for the energy economy that the air intake volume is correct. If air is too little, not all the parafine will burn, but develop soot that deposits on the outside of the pans and hinder heat transfere to the slurry.
(Black smoke can be seen over the chimney).

If air supply is too much, which is very often the case, much extra energy goes for heating the air. That heat is lost.
Hence; allow only so much air that small traces of black smoke almost occur on the top of chimney. That is an easy check, and must be cheecked for the normal air opening for both stages of heating intensity.

The burner to be arranged as specified on the middle height of the cooking pan. A flame shield or under section of the pan is necessary to protect against overheating of the most intence heating zone of the flame. Combustion gases must have the chance to rotate on the inside of the flame shield. The accurate position and size/shape of the plate must be experienced during trial operations, first cooking plane water.

The smoke outlet (in the bottom of the combustion chamber where the coldest gases will move) to have a damper that, as shown in fig. 6, serves two adjacent combustion chambers. When the heating is on, the damper to be open, otherwise closed. When both sides are used simultaniously, the damper to be left in mid position to allow emission from both.

The cooking pan to be made from 2 mm mild steel, tinned on inside and untreated on the outside. The lid made in a thinner material to be fully tinned.
The cooking pan to have a bottom outlet as specified in fig. 5, consisting of a 2" steel pipe, planed an tinned on the inside, leading through the brick wall for tapping of cooked slurry into a bucket

If the slurry is allowed to fill the pipe during the cooking, it will probably over-heat and clog up on the pipe inside.

Insulation or an open water jacket could to some extent prevent this, but we will rather recommend to leave the bottom pipe empty during heating. This can be done, as shown in the drawing, through a plug valve pipe that for the upper part fits closely into the outlet pipe. The end of the plug pipe is closed in plane with the bottom of the pan. When turning it 180°, a hole in the side of the pipe will match the bottom hole in the pan and slurry will drain.

A turning handle on the outside of the plug pipe will hence control the tapping of the slurry. After emptying, the pipe can be pulled out for cleaning.

The combustion chamber to be built from bricks, lined [illegible] on all surfaces by 1" and 2" foamglas plates, available ex [illegible] (Lhatec Industrial PTE Ltd.) at S $ [illegible],- - [illegible],- per m².

The roof of the combustion chamber to be plastered [illegible] support [illegible] as shown in fig. 5. The pan also to have a flange as shown, to enable easy resting on the roof brickwork, and avoiding smoke emission into the room. It should be possible to lift out the pan for weekly cleaning of soot in the combustion chamber

2.5 Water heating.

Hot water is required as spewater for the cookers and for washing, cleaning etc, 2 - 2,500 liter per day. It is not practical to use the cooking pans for this, but to have a separate, elevated water heater, tapping the water where required.

Using the water heater as specified in fig. 7, built for water heating by the smoke outlet from the cooking pans, the rest smoke heat from the cookers will be sufficient for the water heating. The water heater has a vertical drum containing 130 liter water, outside insulated, and with [illegible] smoke pipes passing through, connecting [illegible] common smoke pipe.

The water heater to be hung closely under the roof, as specified in fig. 8, with connecting smoke pipes from each of the cookers. No dampers are required in the smoke pipes, since these are provided within the cookers themselves.

The tank is designed to be kept full all time, controlled only by the outlet taps, connecting the outlet pipe to some 20cm from the top of the tank. A float valve on the top with outlet at bottom level ensures that the tank is always kept full. An open overflow is required for safety reasons.

2.6 Sieving.

Sieving as currently done is practical and sufficiently efficient. The use of the wooden tubs and especially the large bamboo sieve frame however, is not acceptable from an hygienic point of view. Soy-milk rests deposit in between the layers of the bamboo in the sieve frame, ferments and rots and infests the soymilk.

Therefore a sieve frame in stainless steel is specified in fig. 7. and a soymilk container in tinned steel in fig. 11. The sieve frame to be placed on top of the container with a covering large sieve cloth. The slurry on the sieve cloth to be moved to and from for a best possible drainage.

After draining, about 10 liter water to be mixed into the remains for a best possible recovery of dissolved matters in the soymilk. For this, either to be sure that the water is practically bacteria free, or to use boiled water.

2.7 Recooking and resieving.

The remains after the first sieving to be poured back into the cooker, now [illegible] or 3 batches together, again diluted to 80 liter, and recooked for another 5 - 10 minutes.

Accurately how many of the original batches to be joined together, and how many minutes to recook, to be determined by measuring the yield of different alternatives.

After second recooking to repeat the sieving out of soymilk, and to rewash once or twice with additional water added into the slurry, after draining as much soymilk as possible.

2.8 Adding of coagulant.

It is important for the shelflife of the product that the coagulating soymilk is fairly bacteria free. But if the coagulant is full of bacteria to be mixed in, that is of course not possible. The coagulant should therefore be mixed with boiling water in a clean tank with bottom outlet. No collection from the top should be permitted.

A tank as specified in fig. 11, fastened on the wall, with a bottom tapping outlet, with a lid, and if made from mild steel, to be tinned inside. The tank should be big enough [illegible] water for the day's requirement of coagulant.

2.9 Scooping whey and cruds

When, after adding the coagulant, the curds have deposited on the bottom of the tank and the whey floats above, the whey first to be scooped off over the sink-down filter-frame as at the present, whereafter the curd to be scooped into the mould boxes.

A sink down frame as presently used, platted from bamboo is not hygienic, and smaller pieces of curd always have a tendency of passing through the course platting.

Therefore a sink down frame as specified in fig. 12, with more easy to clean and a bit finer woven stainless steel mesh bottom, will be better. The scoop to be used should as the present be a shallow one that will not cause any stiring of the curd.

2.10 Moulding of Tahu.

Moulding to be done in filter cloth in wooden mould boxes as at the present. The mould boxes however must be made for easy sanitation, cleaning and cooking daily. They should therefore not have any platted bamboo bottom, but rather straight easy to clean hard wood, the whole box well planed and smoothened with well sinked joints as specified in fig. 13.

2.11 Cutting and cooling of Tahu.

After the Tahu sets firmly in the mould boxes, the Tahu flakes to be taken out, cut to size, and cooled before packaging.
When cold packaging of Tahu, the pieces that are still quite warm after the moulding must be cooled to a low temperature as quickly as possible before packaging. That can best be done in a cooling tank with circulating ice water.

A cooling rack with loose aluminium shelves is specified in fig. 14 and the cooling tank in fig. 15.
As soon as the Tahu is ready moulded and firm, the moulding box - the opened, the cloth folded aside and an aluminium shelf from the cooling rack to be placed upside down on top of the moulding frame. The pack can now be turned upside down and the box and the cloth removed. Thereafter, the Tahu lying already on the shelf, to be cut with knife into pieces as required, and the shelf can be placed straight into the cooling rack.

6 shelves fit in the rack, and the rack can be lifted down into the cooling tank. The tank takes 8 racks of 6 shelves each, each shelve 6 kg Tahu, or totally 288 kg Tahu in the tank.
That allows for about 7 cooling cycles per day, or about 1 hour of cooling time before removing and packaging.

That will, expecting a start temperature of 40°C, give a final temperature in the Tahu of about [illegible]°C before packaging.
The tank to be made as specified in fig. 15 from [illegible] mm mild steel, tinned inside, and insulated outside with 100 mm foam polystyrene.
The top cover to be made as a sandwich with [illegible]0 mm foam polystyrene, covered on both sides and edges with 1 mm PVC sheets, the covers to be moving in aluminium sliding lists.
A circulation propeller must be arranged as indicated.
The water in the cooling tank to be cooled by adding ice flakes.
[illegible] kg tahu/day x 40°C cooling = 70.000 kcal/day, or including losses, [illegible].000 kcal/day which require [illegible] kg ice.
Ice may be added up from the ice flake bin as required, always to keep some unmelted ice floating in the tank.
If installing a fresh evaporator in the tank as indicated to be connected to the cooling system parallel the flake ice machine, only small quantities of ice may be required.

[illegible] Packaging.

After the cooling down of the Tahu, it must immediately be packed with ice water in the tins to be used as before, and [illegible] tins to be placed in an insulated transport container as specified.

The transport container, insulated with 50 mm hard polyurethane, can be made by a simple small scale metal industry using a simple wooden mould as specified in fig. 17.

When the tahu of [illegible]°C is packed in ice water containing [illegible] kg of ice, the temperature will, with an outside temperature of 30°C, thereafter increase to such temperatures after such time:

Tahu temperature	Total time to reach this temperature:
0°C(all ice melted)	[illegible] hours
2°C	9 hours
4°C	14 hours
8°C	[illegible]0 hours
12°C	30 hours
1[illegible]°C	4[illegible] hours
20°C	64 hours

Hence, the tahu may be stored for extra [illegible] days before going bad. Kept in the transport container, the Tahu may then be sold through normal shops without adding further ice.

[illegible].13 Ampas Pressing.

The ampas may be used for several different purposes, and the further processing is generally not a part of the normal Tahu manufacture.

However to become possible to store and easy to transport, the ampas may be dried within the tahu production. For utilizing the rest soymilk and to bring the water content down from about 600 % to about 150 - 200 %, it is necessary firstly to press the ampas.

A hand roller press for the purpose is shown in fig. 18 to 21. Ampas from each filter charge is fed into the roller silo immediately. The press has an upper transport belt from rubber, and a lower one from felt, covered with fine woven filtration textile on the outside. The gap between the rollers is tapered down along the movement from 10 mm to 0. The gap is adjustmentable.

The ampas thereafter passes between the 2 press rollers under a fairly high pressure before finally being scraped off the belt by spring loaded doctor knives.

The soymilk to be collected in a tray under the lower belt, drained and passed back into the soymilk for coagulation.
If a layer of finally 1 mm ampas on the press roller proves practical, 8 kg beans charge may hence require about [illegible]00 revolutions or ca 7 min pressing, and the press must operate for about 4 hours per day, extracting about 400 liter of soymilk.

As a prototype the press may be built according to fig. 18 - 21. Adjustments may however be required after further testing.

2.14 Ampas Drying.

The moisture content of the ampas from the pressing, about [illegible] must be brought down to 10 - 15 % for storage and for sundry processing alternatives.

If one do not have the opportunity of outside sundrying, spreading the ampas thinly on rack shelves, a dryer must be built. The energy consumption for the evaporation is fairly high, about 100.000 kcal per day. Using fuel, that may correspond to some [illegible] kg oil per day, which is not economical.

Using a drying principle with heat pumps as specified in fig. [illegible], the energy demand will be very much reduced.
The dryer has a freon system with compressor, condensator and evaporator. It has a fan that circulates the air in a closed circuit from the ampas via the evaporator and condensator, back through the ampas again.

The cool wet air coming from the ampas will be further cooled over the evaporator, where the moisture condensates and gives the evaporation heat back into the freon system.
The air passes thereafter over the condensator where it will become hot and dry before recirculated through the ampas again.

The air conditions at the various stages in the dryer may change as follows:

	Final Tempera-ture.	Air mois-ture. %	Air mois-ture. kg/kg	Heat content dry air, kcal/kg	Heat require-ment for eva-poration, kcal/kg	Heat fro[m] condensa-tion, kcal/kg
Air cooled through the evaporator	8°C	100	0.0065	1,8	-	5.1
Air heated through the condenser	50°C	10	0.0065	[illegible]	5.1	-
Air absorbed mois-ture in the [illegible]	25°C	80	[illegible]	5,8	-	-

With an energy ratio of probably 1 : [illegible] between compressor motor and transport heat, and with 24 hours drying time, a compressor motor of 3/4 KW may be required.

Using a stationery bin for the drying ampas as proposed, the ampas must firstly be well pressed and the circulation fan must have sufficient pressure. Also will it be necessary to do releatively frequent stiring of the ampas.
Mechanical movement of the ampas will however create extra costs that should be sought avoided.

According to the table above an air volume of 20[illegible] m^3/h from the fan will be sufficient, and ducts of [illegible] x [illegible] mm will give an air speed of 1,25 m/sek.

The dried ampas will form lumps, dependent on the intensity of the stiring.
If the ampas will be sold as a component for annual feed, re-grinding of the ampas can however be done more economical by the feed mill and any milling equipment is therefore not included.

3. Investments.

3.1 Building.

A building or a room to give space for the production, according to the lay-out fig. 23, at least 10 x 12 mm is required.

Additional space is required for possible water pumping, engine, electricity generator, office, toilet, wardrobe and showers, and possibly also outside space for ampas drying and for a water tower.

The building should be concreted, preferably with glazed tiles on floor and the lower portion of the walls or be well painted with glossy washable paint, the surfaces being easy to wash and flush with water on a daily basis.

A room height preferably more than 3 m and at least 4,5 m over the water heater position is required, and the building should be adequately arranged with doors, windows and ventilation. Drainage must be adequate, road connection reasonable, and a whey tank should be possible to arrange under the ground.

The building may be purchased, built for the purpose, or rented on a long term basis.

3.2 Machinery and equipment

1 Beans sifting machine, built from wood, as specified in fig. 1. Rp.

1 Beans storage bin, with 2 compartments, built from wood as specified in fig. 2. Rp.

1 Soaking installation with 8 tubs, made from 1mm mild steel sheets, tinned, on legs, equipped with over-flow drainage, valve, stone trap, flow channel to the grinder, and working platform in the front as specified in fig. 3 and 4. Rp.

2	Spare sets of grinding stones and possibly one complete spare grinding machine	Rp.
5	Cooking pans as specified in fig. 5 and 6 with pans in 2 mm tinned mild steel, lids in 0,5 mm stainless steel, hanging flange, special bottom outlet valve,	Rp.
1	Cooking oven for the 5 cooking pans, made from brick work as specified in fig. 5 and 6, lined with 20 mm glass foam insulation, 5 pan chambers, 3 smoke outlets, with dampers, 5 burner chambers with flame protectors, plastered, and outside covered with glazed tiles or high gloss paint.	Rp.
5	Burners for Petroleum, of traditional construction, but equipped with volume control valves with pointer and scale with pipe connection to a common petroleum tank for 5 kg/cm², 100 liter volume, equipped with manometer and hand operated air pressure pump	Rp.
1	Water heater 130 liter, welded from 2 mm mild steel and outside insulated with 25 mm, glas-wool, covered with a galvanized mantle as specified in fig. 7	Rp.
1	Smoke pipe installation with connections for the water heater, leading over the roof with a rain-water protecting sheet, and hanging of the water heater. 200 mm Ø x 1 mm mild steel sheets, as specified in fig. 8	Rp.
1	Sieveframe for filtering of soymilk slurry, 1200 mm Ø 0,5 mm stainless steel, as specified in fig. 9	Rp.
5	Soymilk containers, 325 liter, with legs, from 2 mm mild steel, tinned, as specified in fig. 10.	Rp.
1	Coagulant solution tank, 200 liter, 2 mm mild steel, tinned for wall erection as specified in fig. 11.	Rp.
1	Sink down filter frame, 550 Ø in woven stainless steel mesh, 10 per 1", with handles, as specified in fig. 12.	Rp.
1	Underground whey tank, 3000 liter, concreted, connected from drainage grove under the soymilk containers via rubber plugs and to drainage in the ground. With handpump connecting from bottom back-stroke valve, and to transport tank hose connection outside the wall, installed in elevated manhole. The tank inside painted as specified in fig. 24.	Rp.
25	Moulding frames with lid, 450 x 450 x 55 mm, sinked together from plane, smoothened wood as specified	Rp.

10	Rack frames for cooling of Tahu, welded in aluminium, each with 6 aluminium shelves 1 x 480 x 480 mm, as specified in fig. 14	Rp.
1	Cooling tank for 8 tahu cooling frames as specified above, according to fig. 15. From 2 mm mild steel, tinned inside, outside insulated with 100 mm foam polystyrene, mantelled. Equipped with water circulation motor driven propeller and laminated sliding cover	Rp.
1	Iceflake machine with ¼ Hp compressor, condensator coil, and evaporator in flake ice freezing drum. Capacity 1.000 kg/24 hours	Rp.
1	Bin for ice flakes, 1 m^3, from 0,5 mm galvanized iron sheets, insulated with 100 mm foam polystyrene, with bottom outlet door, erected on 1,0 m high pipe legs, and for fitting of the ice flake machine [illegible]	Rp.
[illegible]	Cooling and transport containers for each 2 tons of Tahu, with outside 0,3 mm tinplate cover, inside insulated with 50 mm hard polyurethane, directly moulded 50 kg/m^3, with lid and closing rubber straps, specified in fig. 16 and 17.	Rp.
1	Roller press for ampas as specified in fig. 18, 19, 20, and 21, with 2 cogwheel connected spring loaded press rollers, textile/felt draining belt, rubber press belt, feeding silo collection tray for soymilk and doctor knives for pressed ampas collection. With wall bracket	Rp.
1	Bin for collecting ampas from the press, 50 liter, in wood	Rp.
1	Ampas drier with 300 kg ampas magazine in drum over perforated bottom, with freon condensator/evaporator/compressor unit, fan aircirculation, air filter, lid and bottom outlet as specified in fig. [illegible]	Rp.
	Utensils including buckets ladles, sieving cloth, moulding cloth, knives, hosepipes etc.	Rp.
1	Platform scale, 50 kg	Rp.

3.3 Instalation:

Water installation for 10 m^3/day, with overhead storage tank, filter, borehole and pump, alternatively connection to the municipal water supply.
With connection to two 3/4" taps with hosepipe over the two soaking tub batteries, a ½" tap with volume control over the grinder, a common 3/4" tap with hose-pipe near the cookers, a 3/4" tap over the cooling tank, direct 3/4" connection to the water heater and ½" to the ice flake machine. Hot water tap at the cooker installation Rp.

Connection to outside drainage system from a grove under the soymilk containers and the whey tank as specified in fig. 14.
Similar connection from a grove under the soaking tubs as specified in fig. 3. The rest of the floor area to be sloping towards these groves Rp.

Covering with glazed tiles or painting with resistant high gloss paint for floor and walls to 1,. m over floor level Rp.

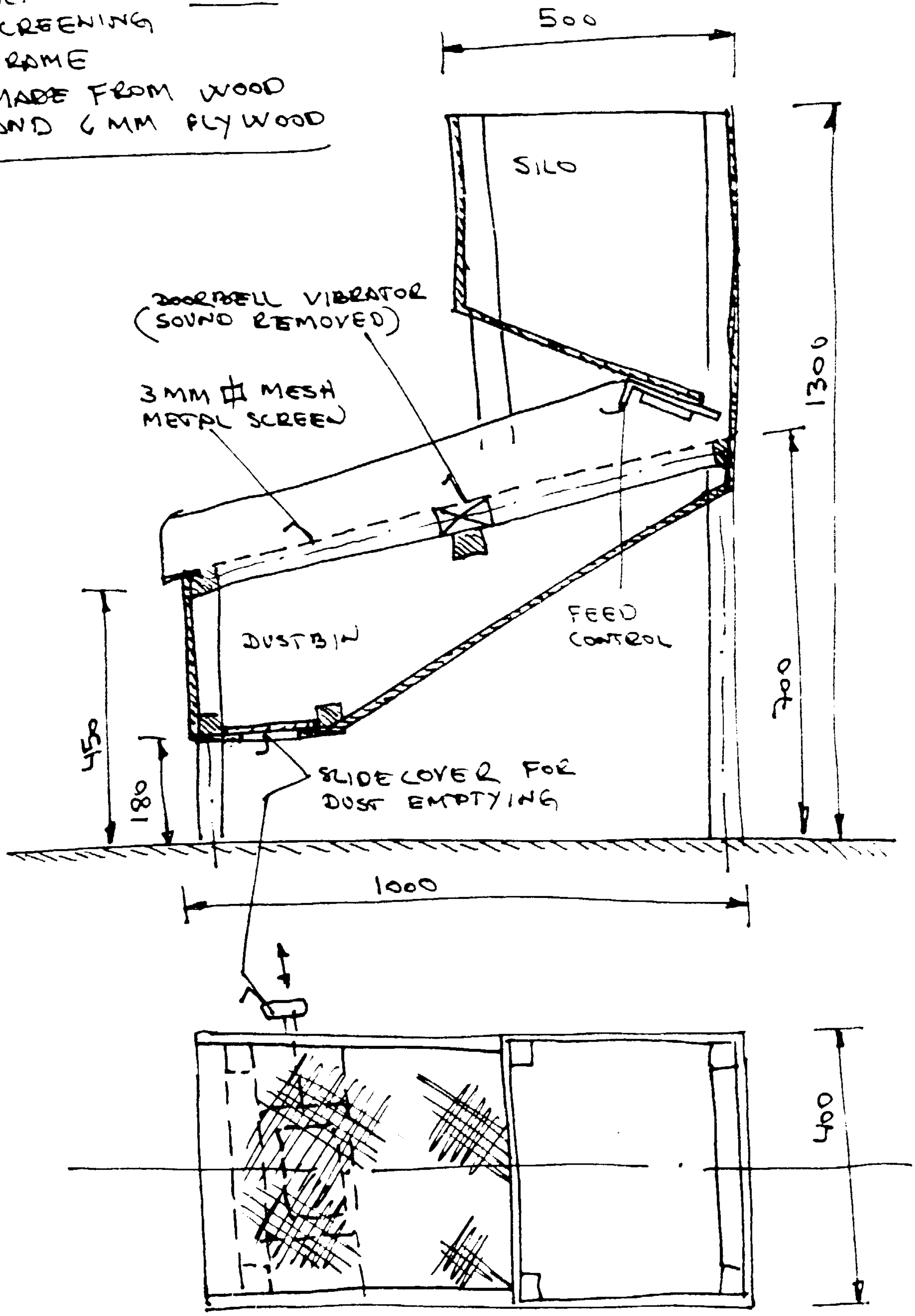
Electrical installation, total 2 KW, with connection to:

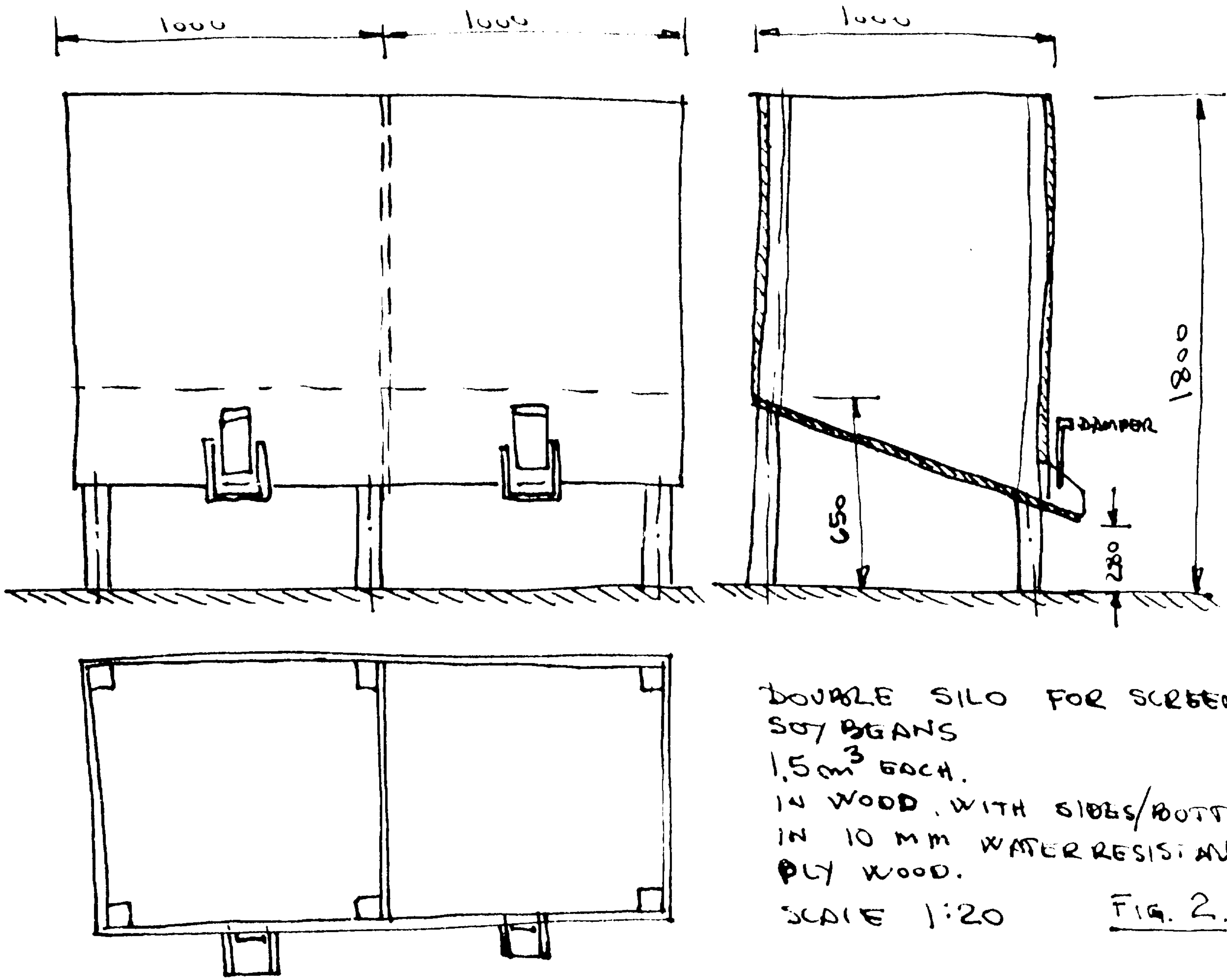
- grinding machine,
- iceflake machine with freon compressor
- water circulation in Tahu cooling tank
- ampas dryer compressor and fan
- general lighting of the factory Rp.

Electrical connection to PLN supply; alternatively installation of diesel engine driven electricity generating set, .. KW Rp.

BEANS SCREENING FRAME MADE FROM WOOD AND 6 MM PLYWOOD

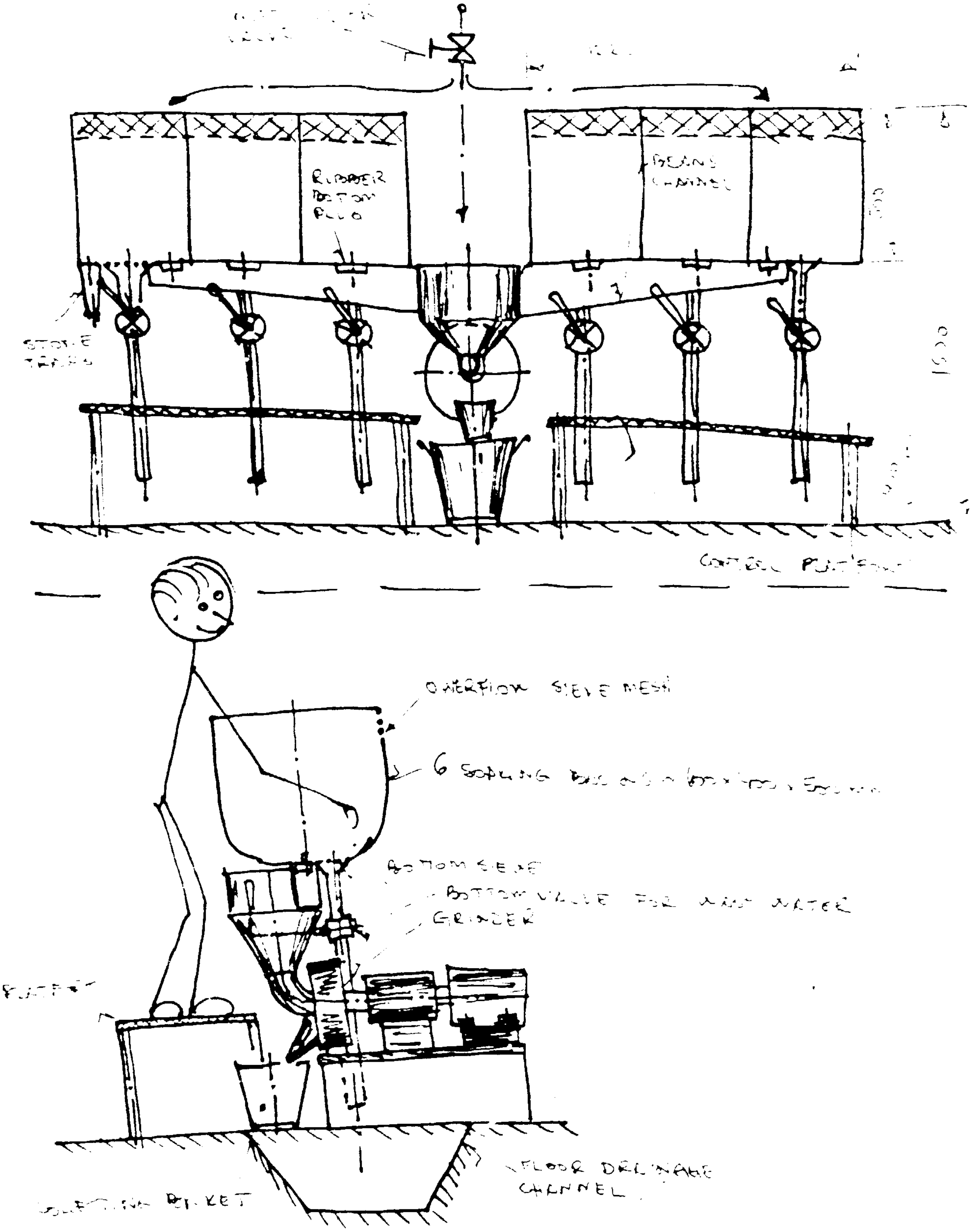
FIG. 1





DOUBLE SILO FOR SCREENED SOY BEANS
1,5 m^3 EACH.
IN WOOD, WITH SIDES/BOTTOM IN 10 MM WATER RESISTANT PLY WOOD.
SCALE 1:20

FIG. 2.



BEANS SOAKING ARRANGEMENT FIG. 3.

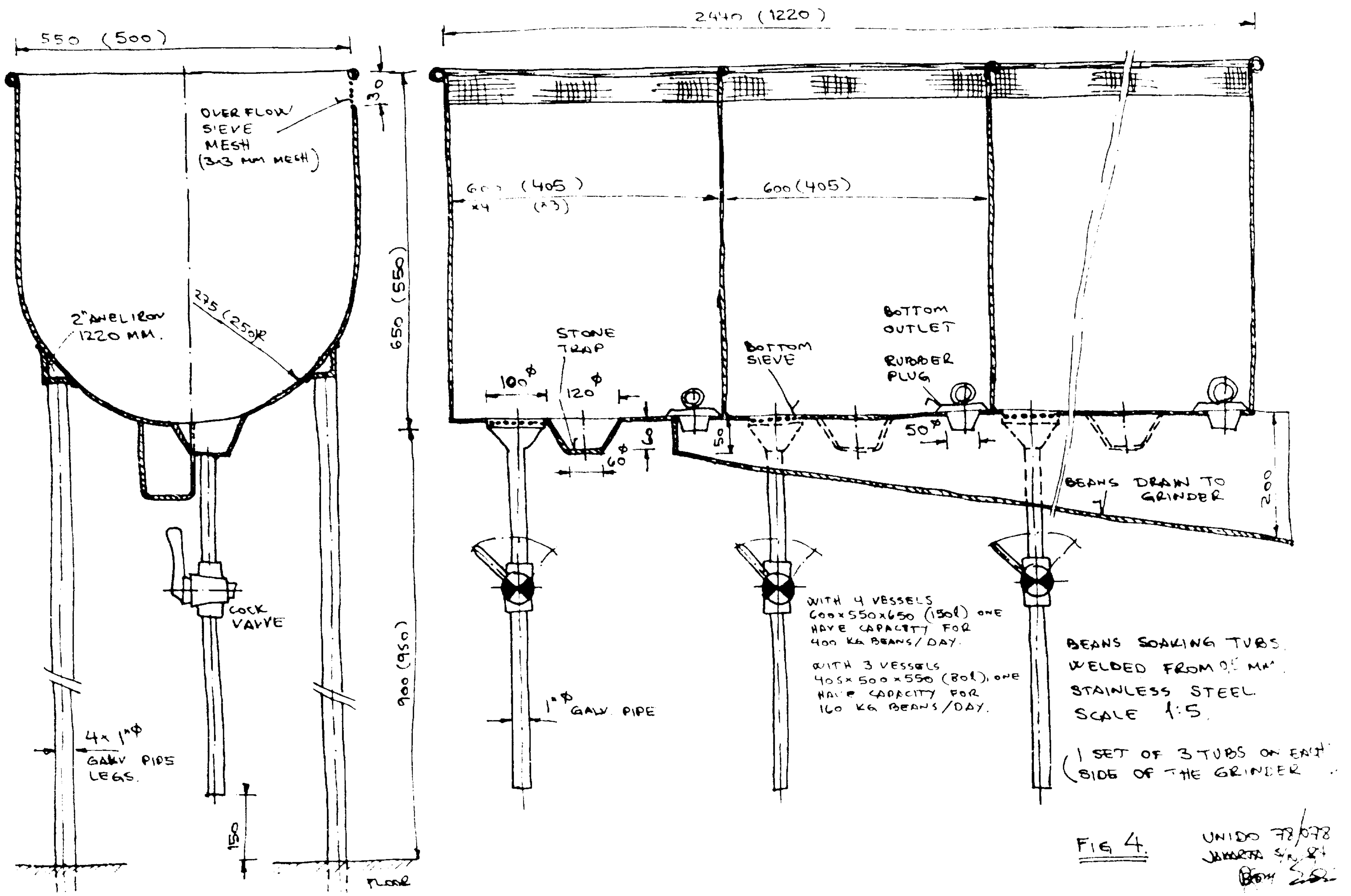

550 (500)
30
OVERFLOW SIEVE MESH (3x3 MM MESH)
2" ANGLE IRON 1220 MM.
275 (250)R
650 (550)
900 (950)
COCK VALVE
4 x 1"Φ GALV PIPE LEGS.
150
FLOOR
2440 (1220)
600 (405) x4 (x3)
600 (405)
STONE TRAP
100Φ
120Φ
60Φ
30
50
BOTTOM SIEVE
BOTTOM OUTLET
RUBBER PLUG
50Φ
BEANS DRAIN TO GRINDER
200
1"Φ GALV. PIPE
WITH 4 VESSELS 600x550x650 (150l) ONE HAVE CAPACITY FOR 400 KG BEANS/DAY.
WITH 3 VESSELS 405x500x550 (80l), ONE HAVE CAPACITY FOR 160 KG BEANS/DAY.
BEANS SOAKING TUBS
WELDED FROM 0.5 MM STAINLESS STEEL
SCALE 1:5.
(1 SET OF 3 TUBS ON EACH SIDE OF THE GRINDER
UNIDO 78/078
JAKARTA

Fig 4.

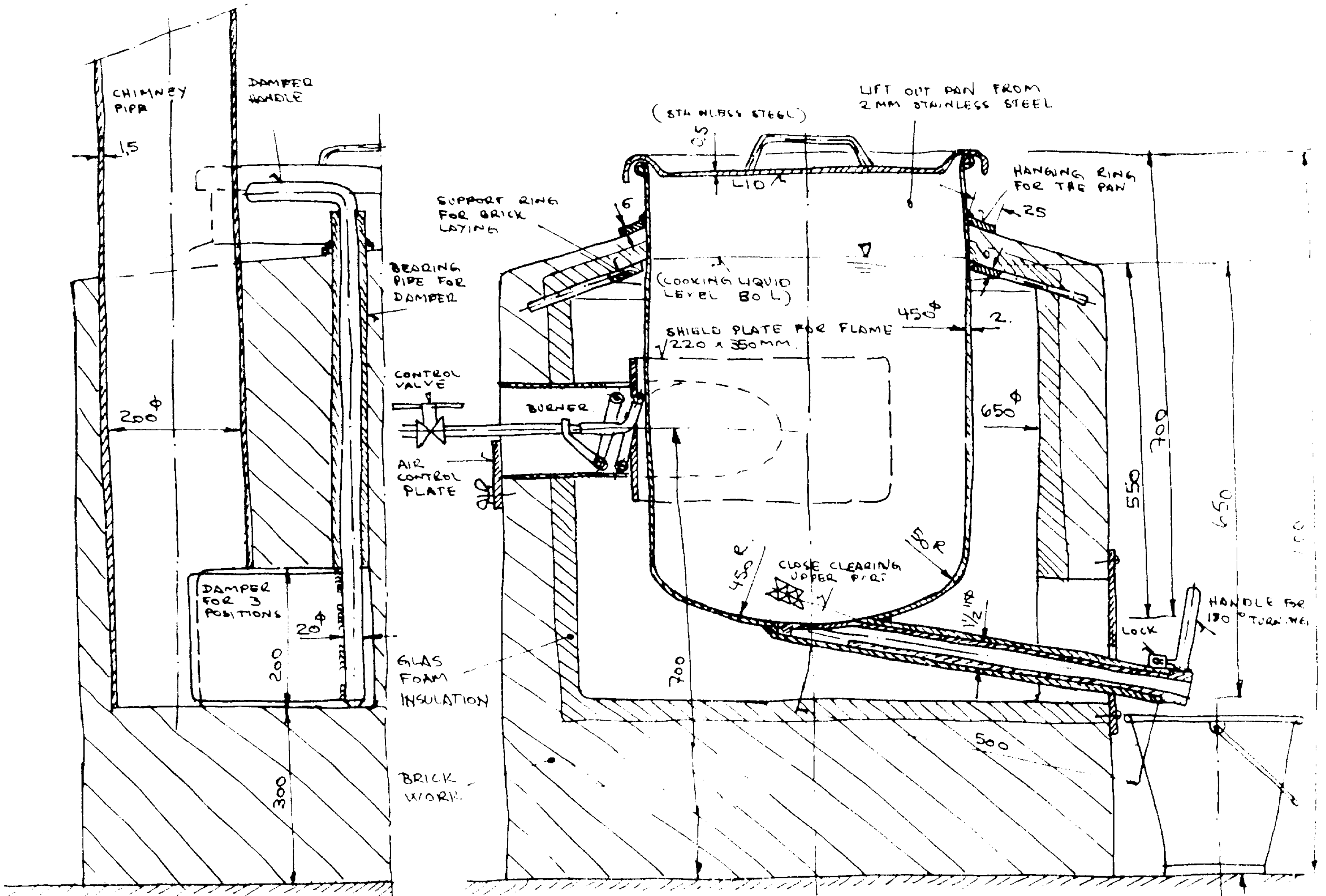


FIG 5 BATTERY OF COOKING PANS FOR SOY MILK.
SCALE 1:5 CROSS SECTION

UNIDO 78/078
Jakarta 6/10.84

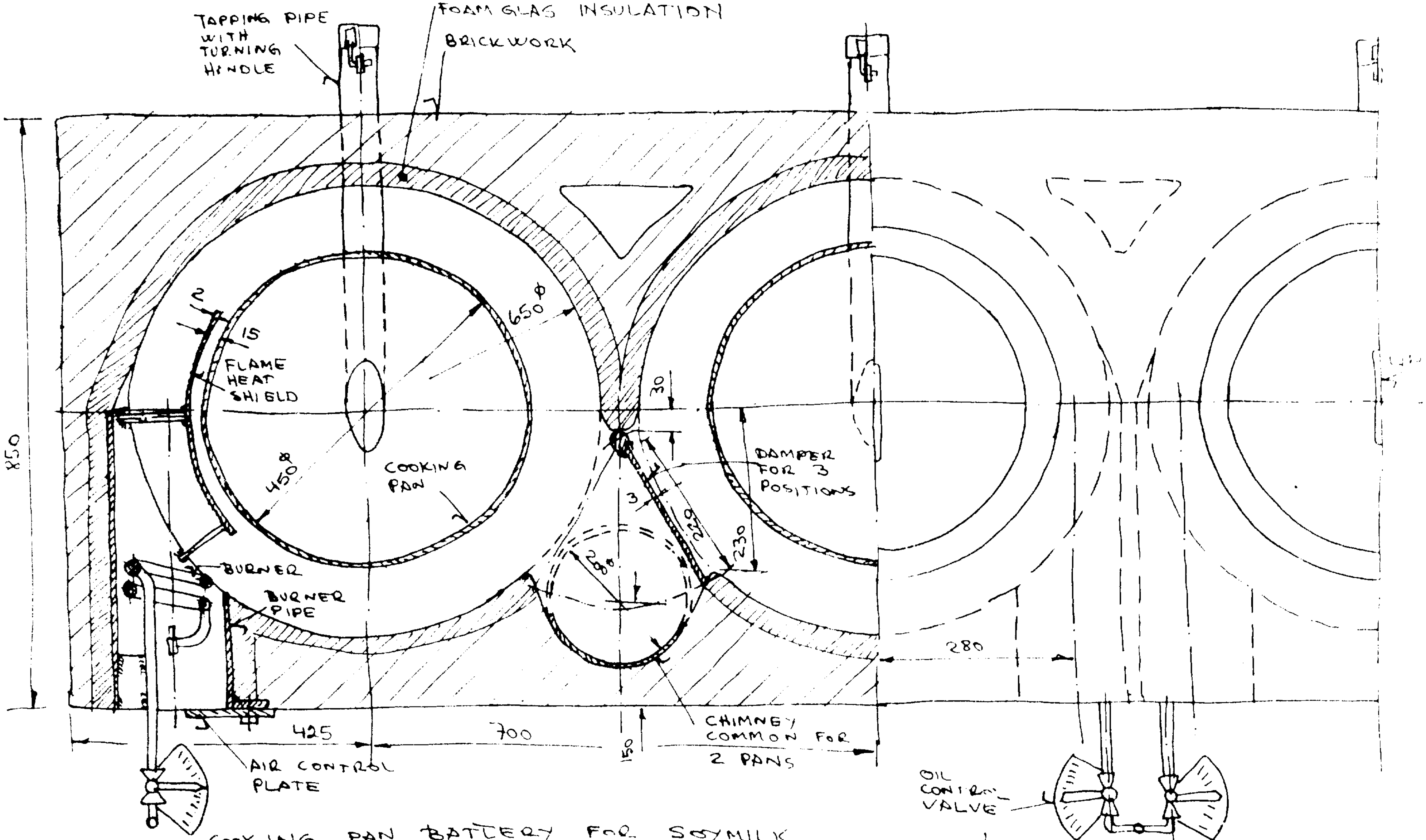
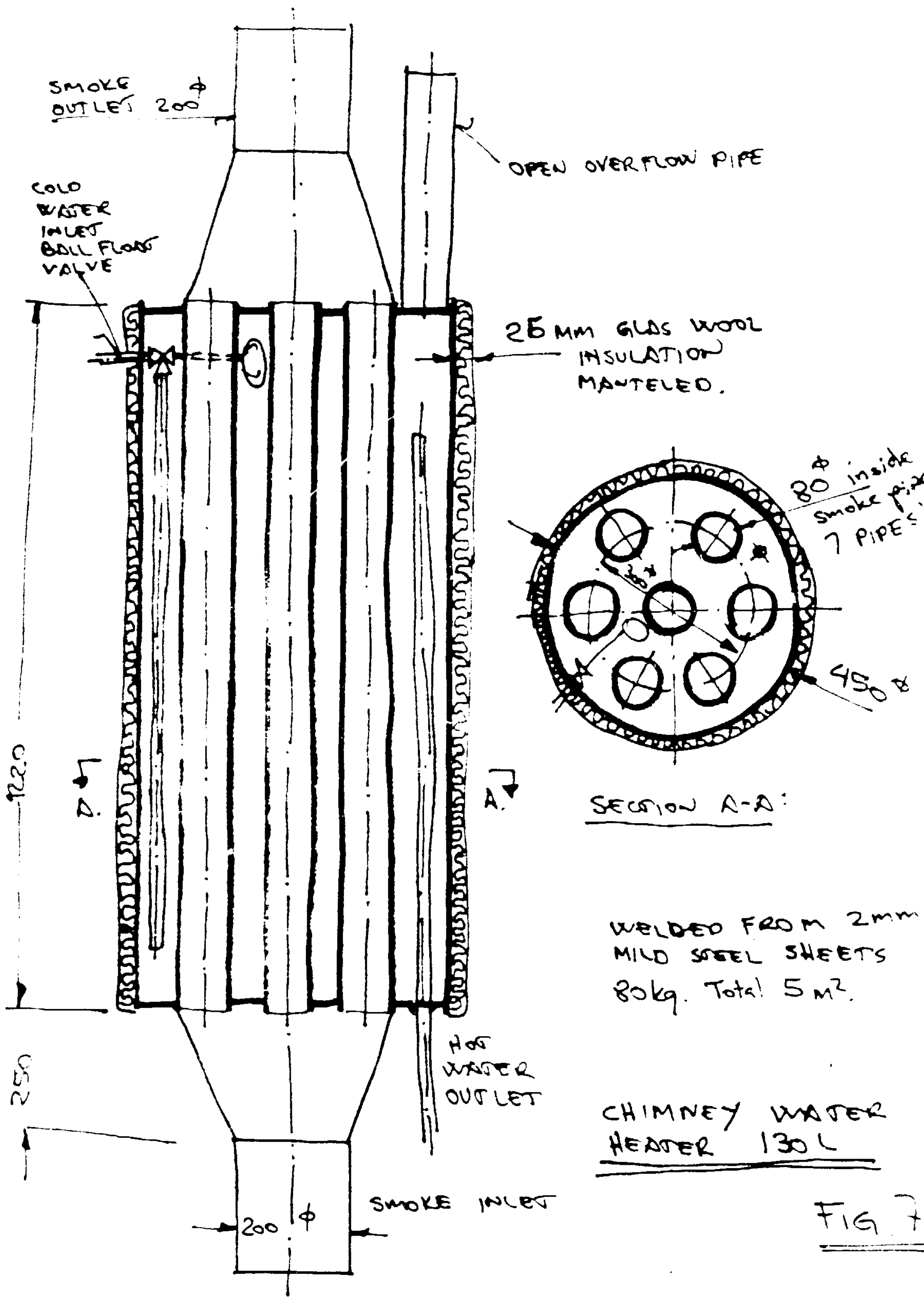


FIG 6

COOKING PAN BATTERY FOR SOYMILK
HORISONTAL SECTION 1:5.

UNIDO INS 78/078
JAKARTA 6/10 84



CHIMNEY WATER HEATER 130 L

FIG 7

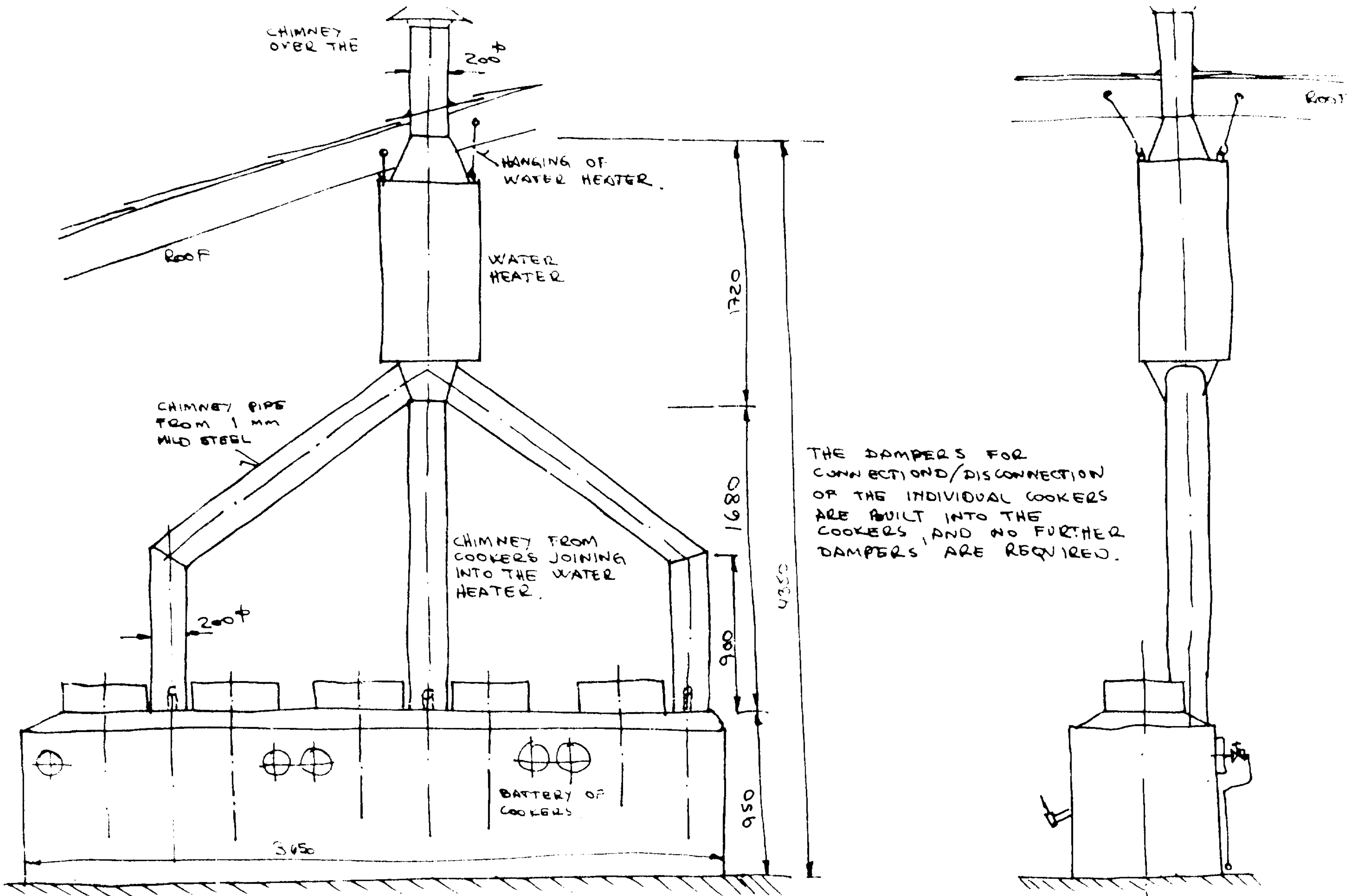


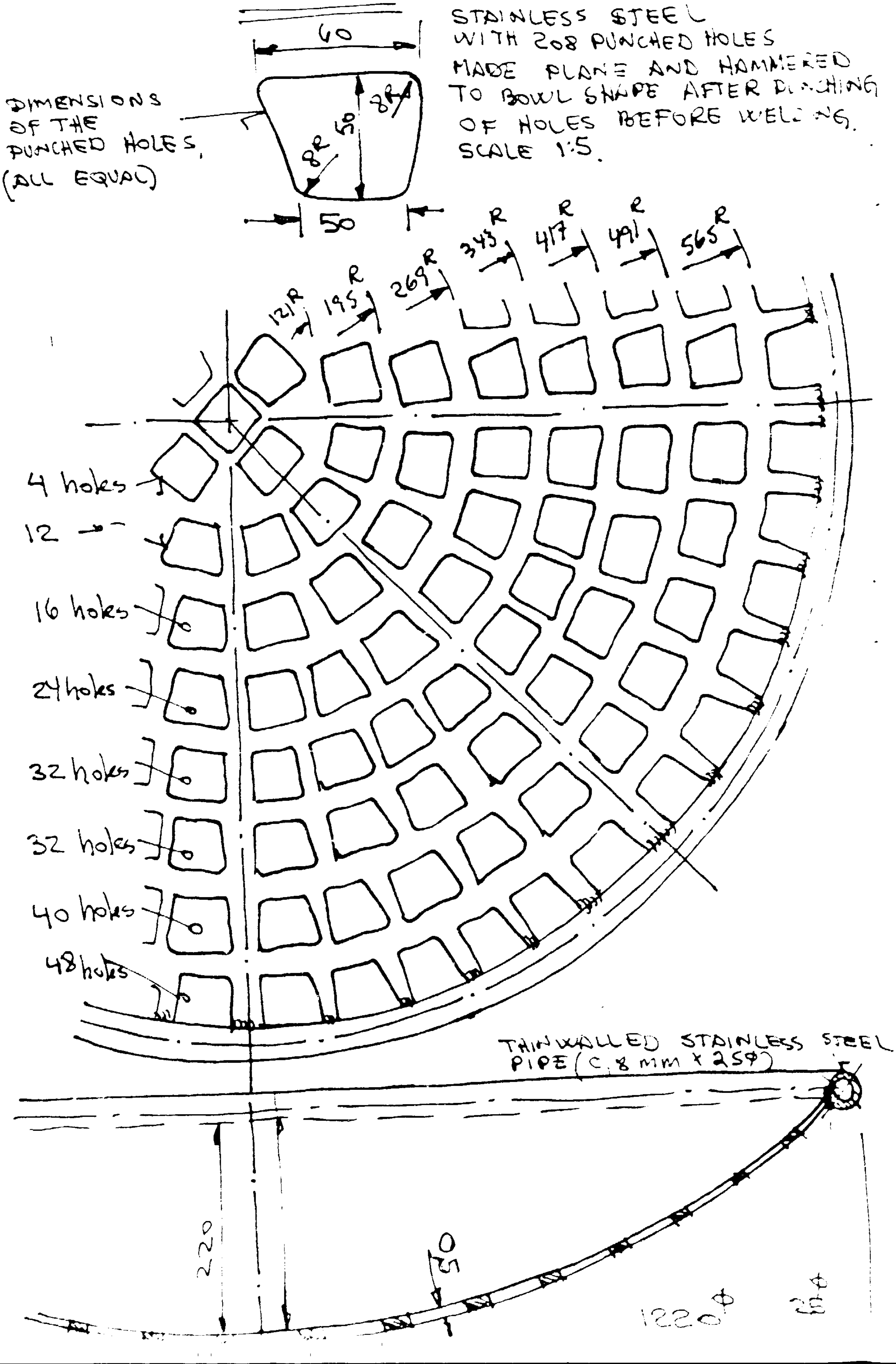
FIG 8.

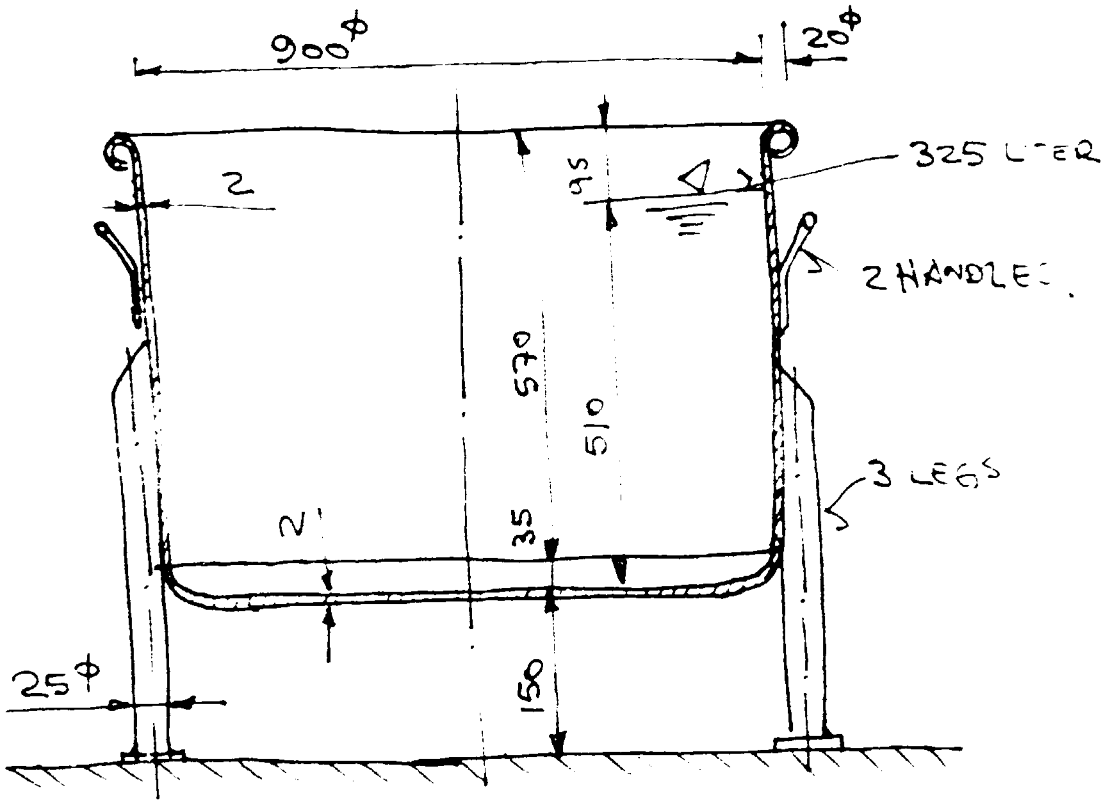
CONNECTION ARRANGEMENT FOR THE WATER HEATER TO UTILIZE THE EXCESS HEAT FROM THE COOKERS.

UNIDO INS 78/028

FIG. 9

SIEVE FRAME IN STAINLESS STEEL WITH 208 PUNCHED HOLES MADE PLANE AND HAMMERED TO BOWL SHAPE AFTER PUNCHING OF HOLES BEFORE WELDING. SCALE 1:5.





THE CONTAINERS TO BE WELDED FROM MILD STEEL AND THEREAFTER TINNED ON THE INSIDE AND PAINTED OUTSIDE.

FIG. 10. SOY MILK CONTAINER FOR COAGULATION

SCALE 1:10 UNIDO WS 78/578 8/10.84

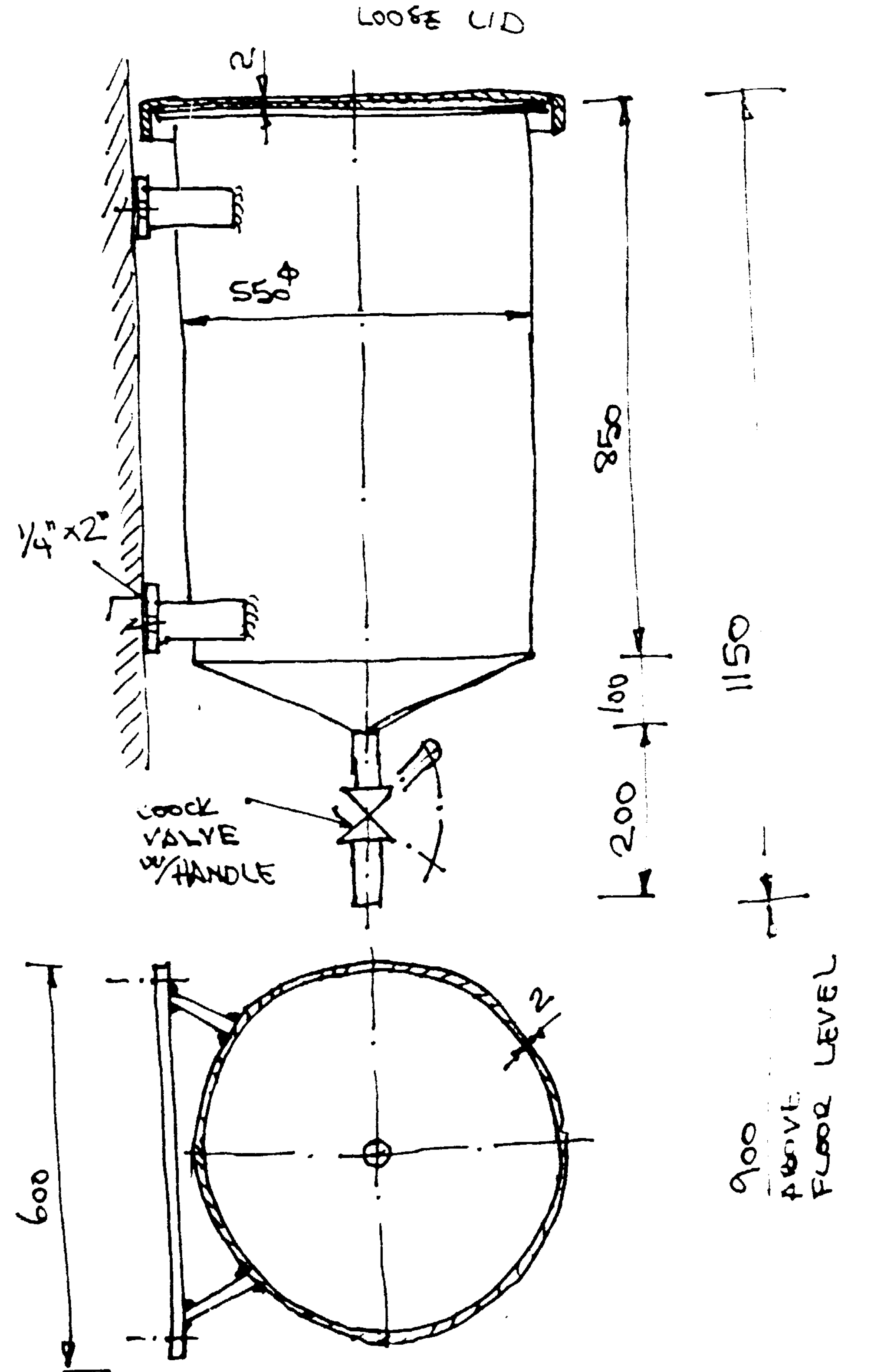
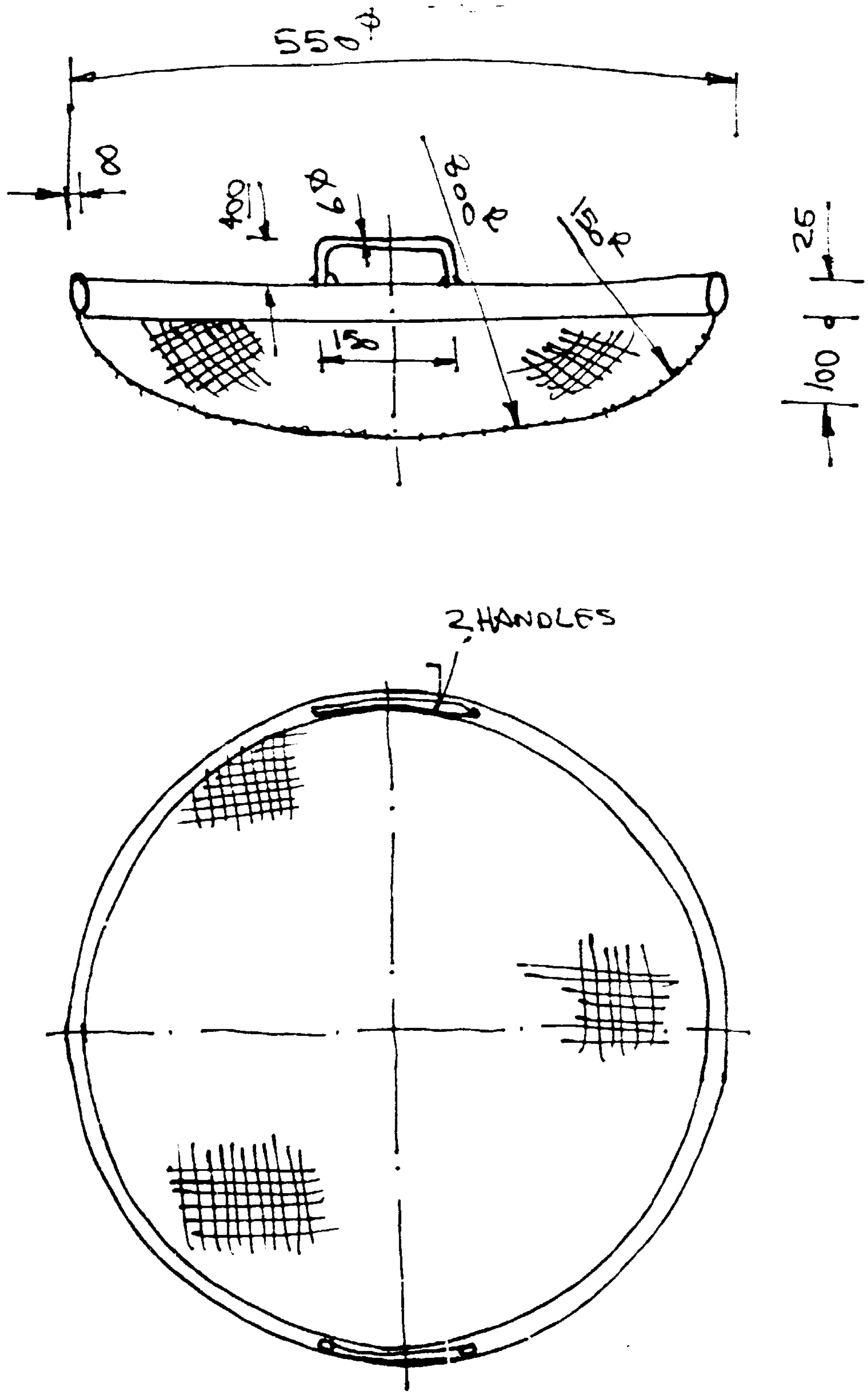


FIG. 11

DAY COAGULANT SOLUTION HOLDING TANK. 200 L.

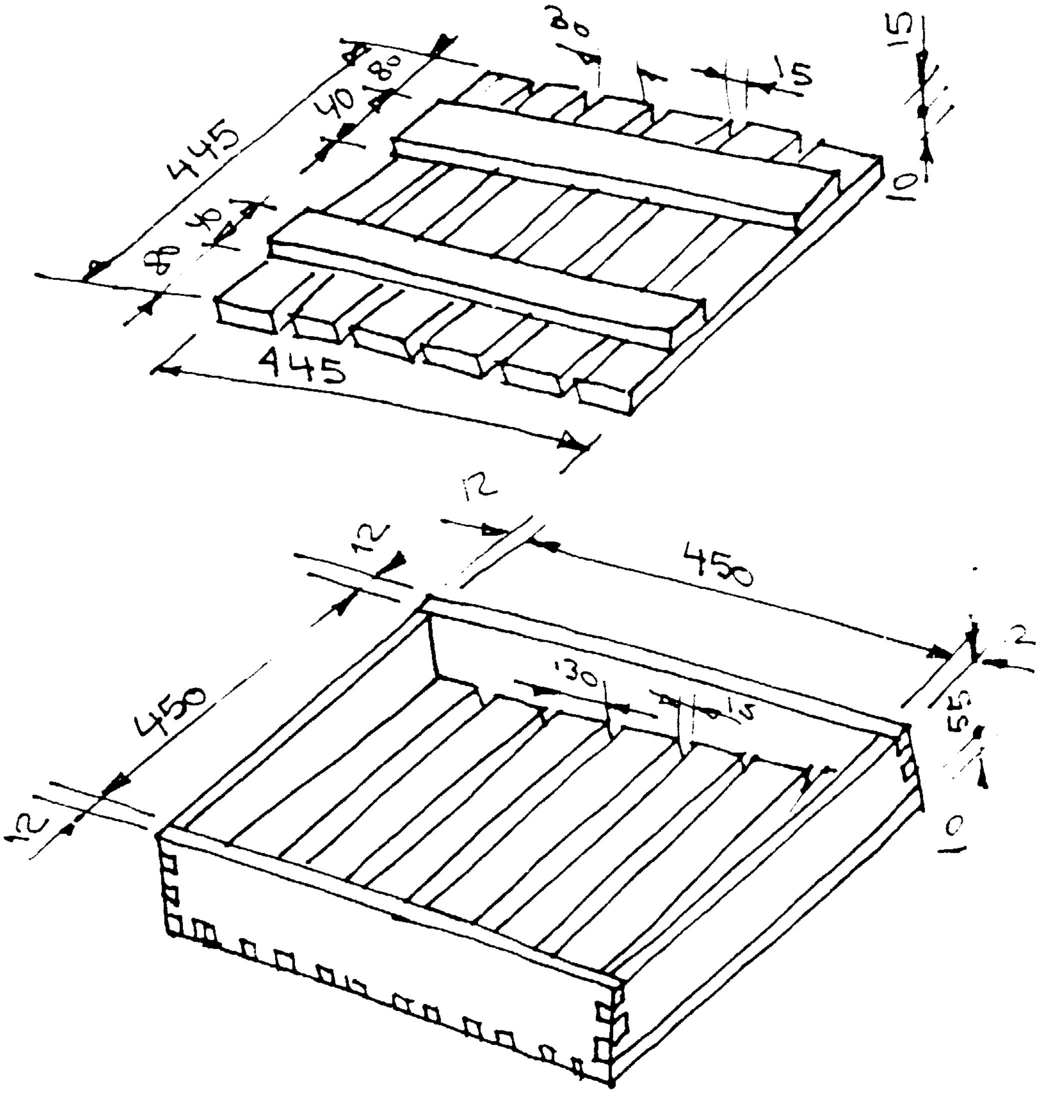
SCALE : 1:10
UNIDO MS 78/078
8/10.84

WELDED FROM MILD STEEL
TINNED INSIDE, PAINTED OUTSIDE



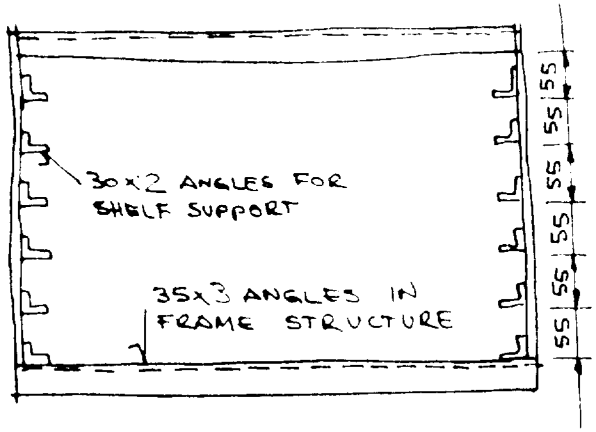
STAINLESS STEEL WOVEN, 10 TREADS PER 1", CUT AND SHADED TO BOWL FORM BEFORE WELDED TO FLAT PRESSED STAINLESS STEEL THINWALLED PIPE (20⌀x0.6mm)

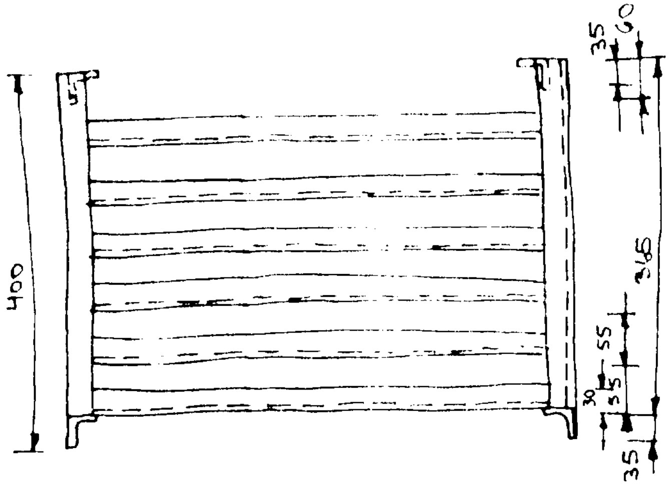
FIG.12 SINK DOWN FILTERFRAME FOR SCOPING OFF OF WHEY FROM THE COAGULANT.

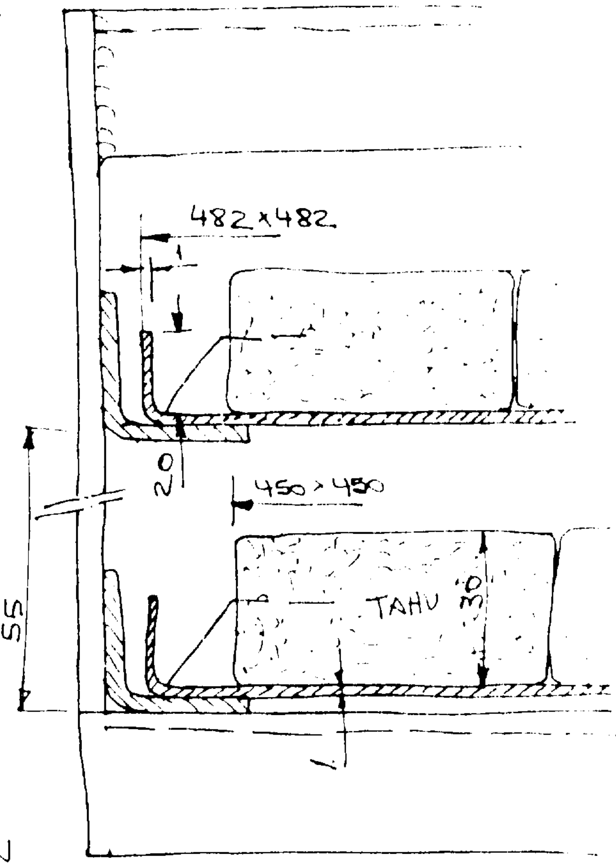


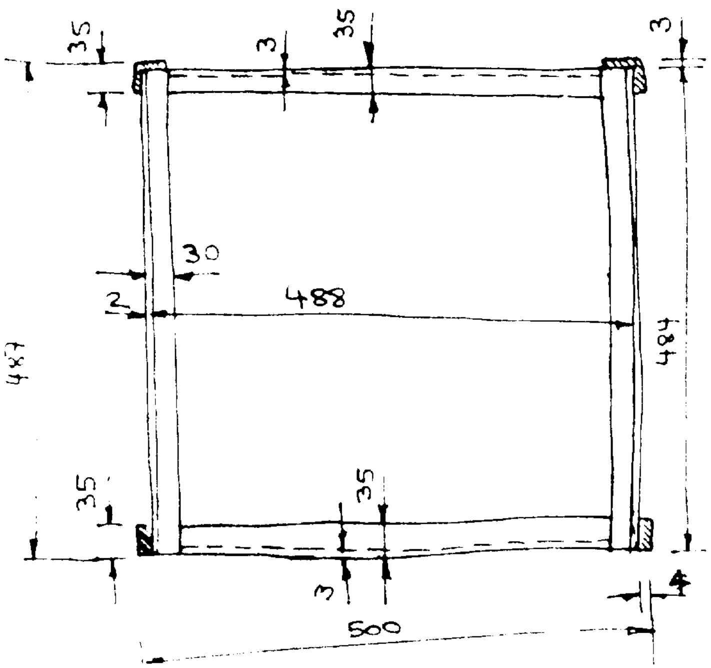
TAHU MOULDING FRAME WITH PRESS LID MOUNTED TOGETHER FROM HARD WOOL.

FIG. 13.









THE RACK TO BE WELDED TOGETHER FROM ALUMINIUM ANGLES TO BE FOLDED UP FROM PLATE STRIPS.

EACH RACK HAS 6 LOOSE ALUMINIUM SHELVES THAT CAN BE SLIDED INTO POSITION CARRYING EACH 1 SHELVE OF TAHU 45x45x3 CM.

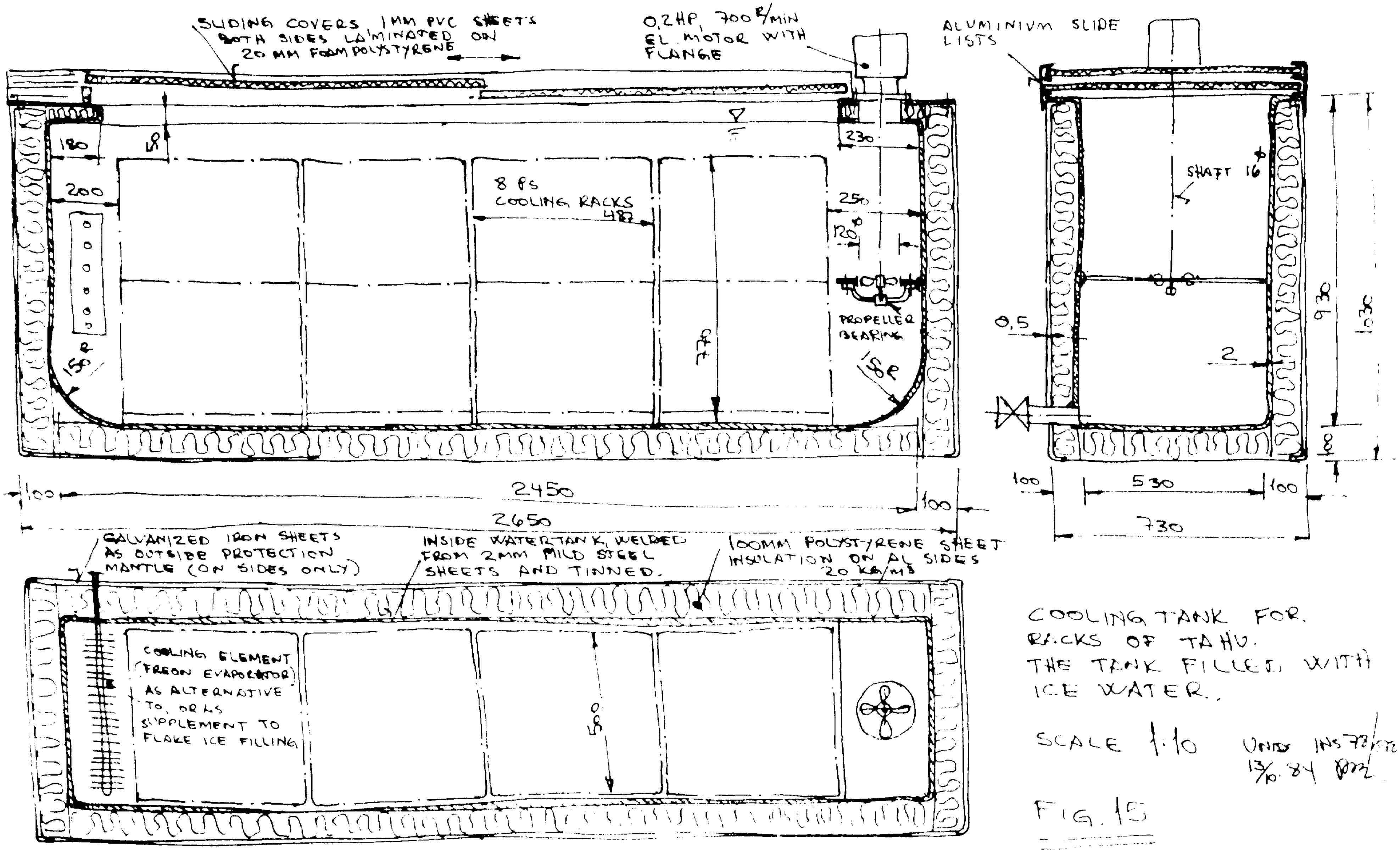
FRAMES TO BE STACKED ON TOP OF EACH OTHER.

Fig 14

RACK FOR COOLING OF TAHU ON LOOSE ALUMINIUM SHELVES

SCALE: 1:5

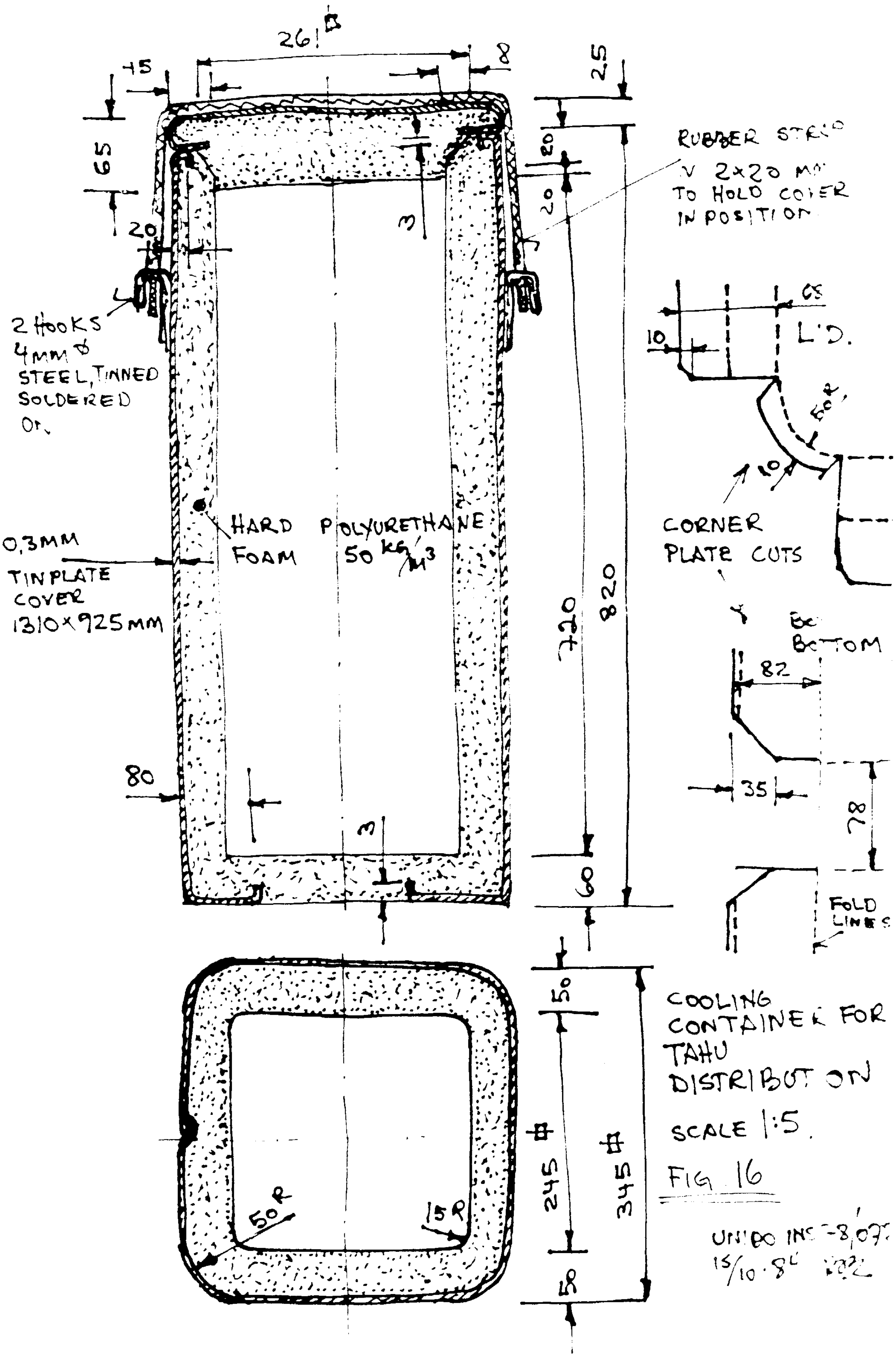
UNIDO   HS 78/... 13/... ...



COOLING TANK FOR RACKS OF TAHU.
THE TANK FILLED WITH ICE WATER.

SCALE 1:10

FIG. 15



COOLING CONTAINER FOR TAHU DISTRIBUTION

SCALE 1:5

FIG 16

UNIDO INS-8,073
15/10·82

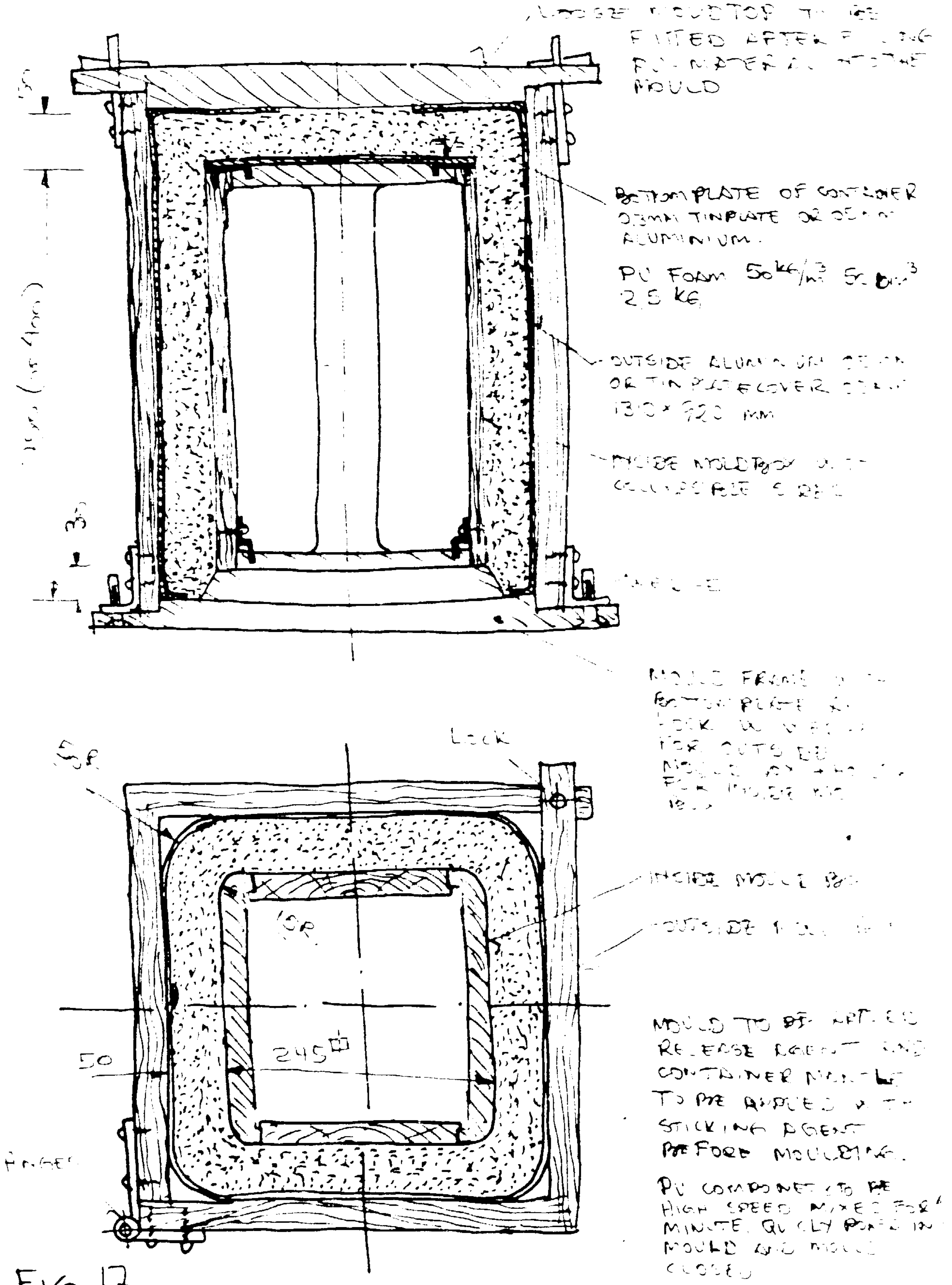


FIG 17

MOULDING OF FOAM POLYURETHANE INSULATION CONTAINER FOR TAHU

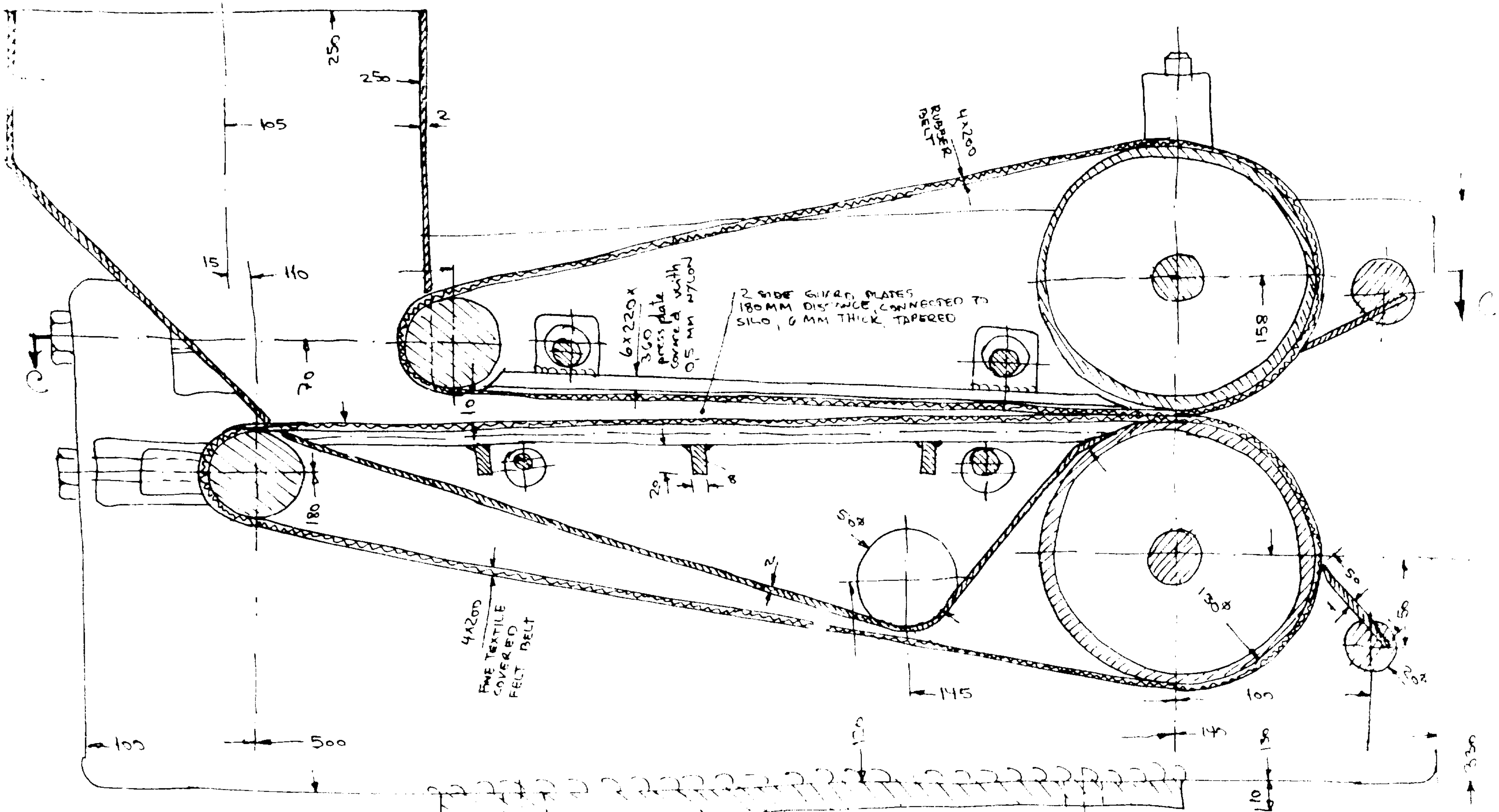


Fig 18

AMPAS PRESSING ROLLER
SECTION B-B

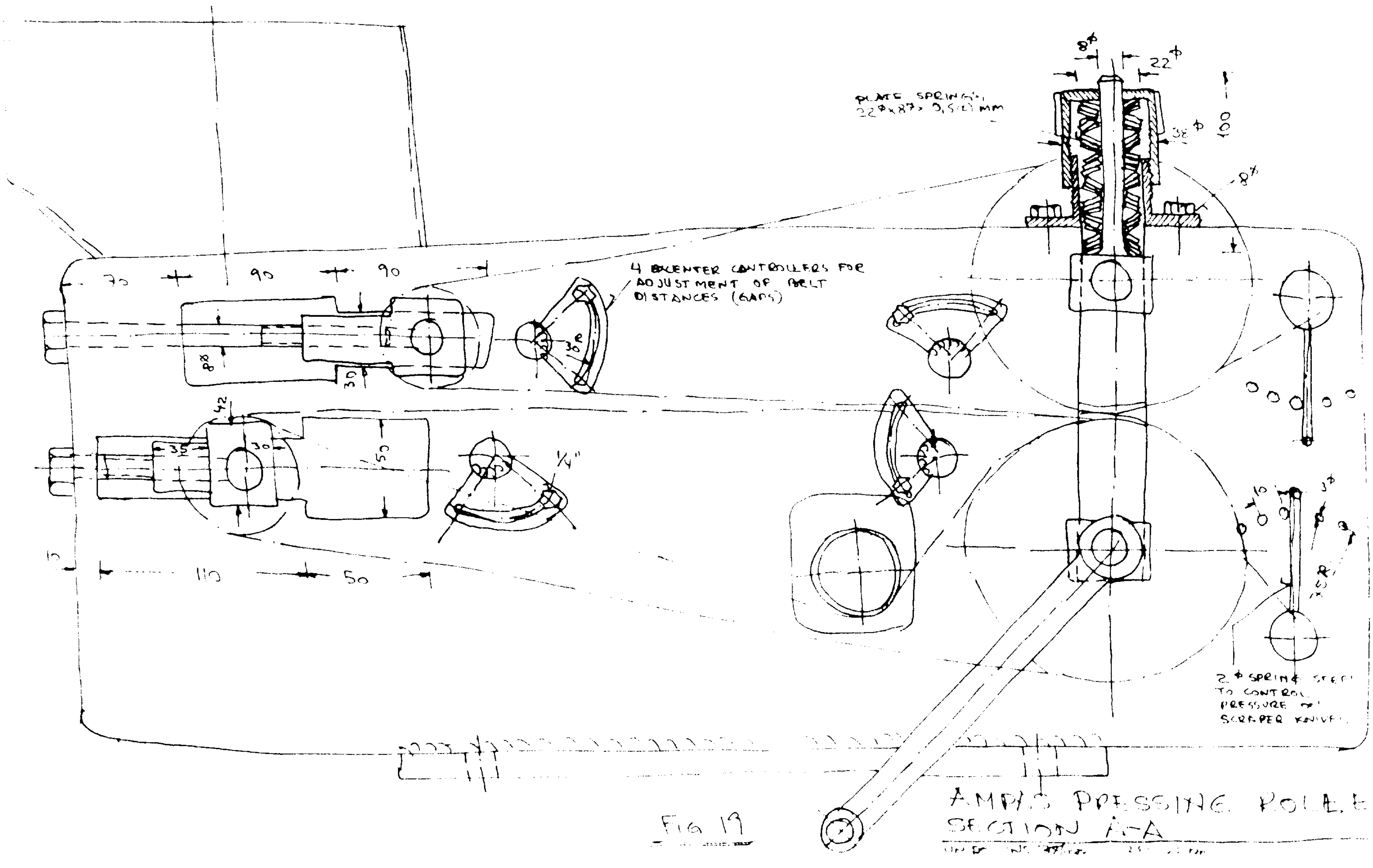


Fig 19

AMPYAS PRESSING ROLLER
SECTION A-A

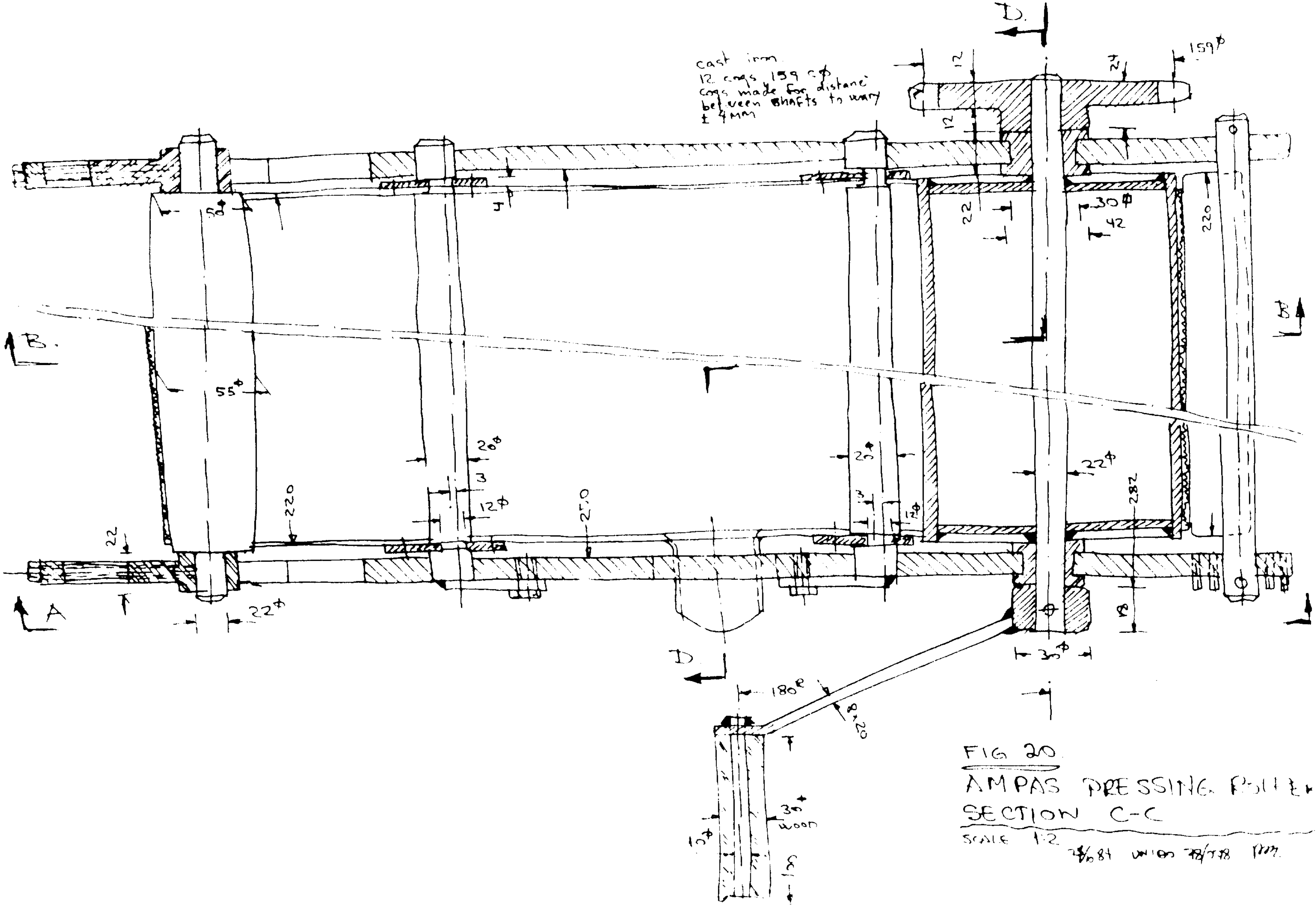


FIG 20
AMPAS PRESSING ROLLER
SECTION C-C
SCALE 1:2

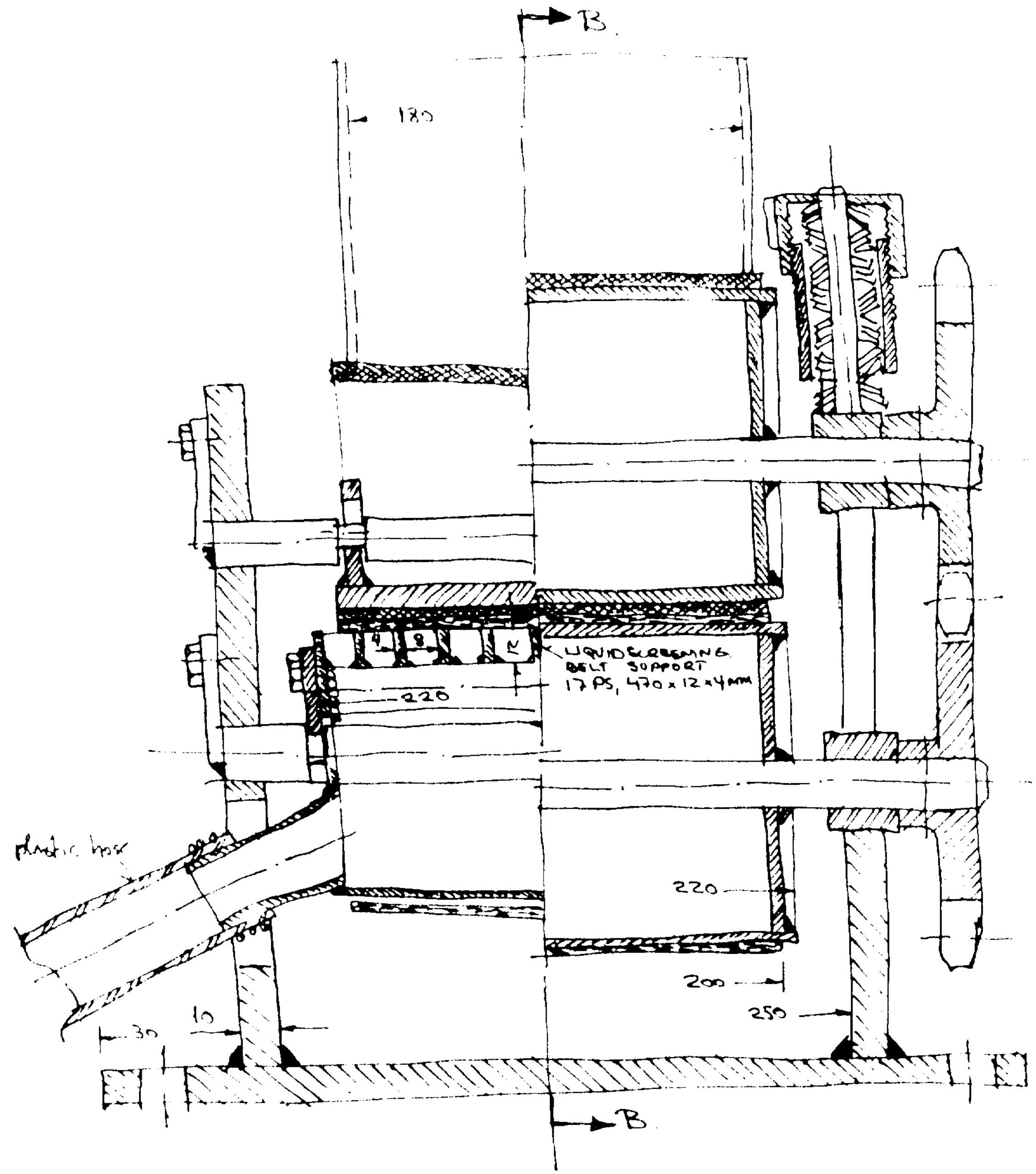
FIG 21

AMPAS PRESSING ROLLER

SECTION D-D

SCALE 1:2

UNIDO 28/598 2⅞ 81 PM



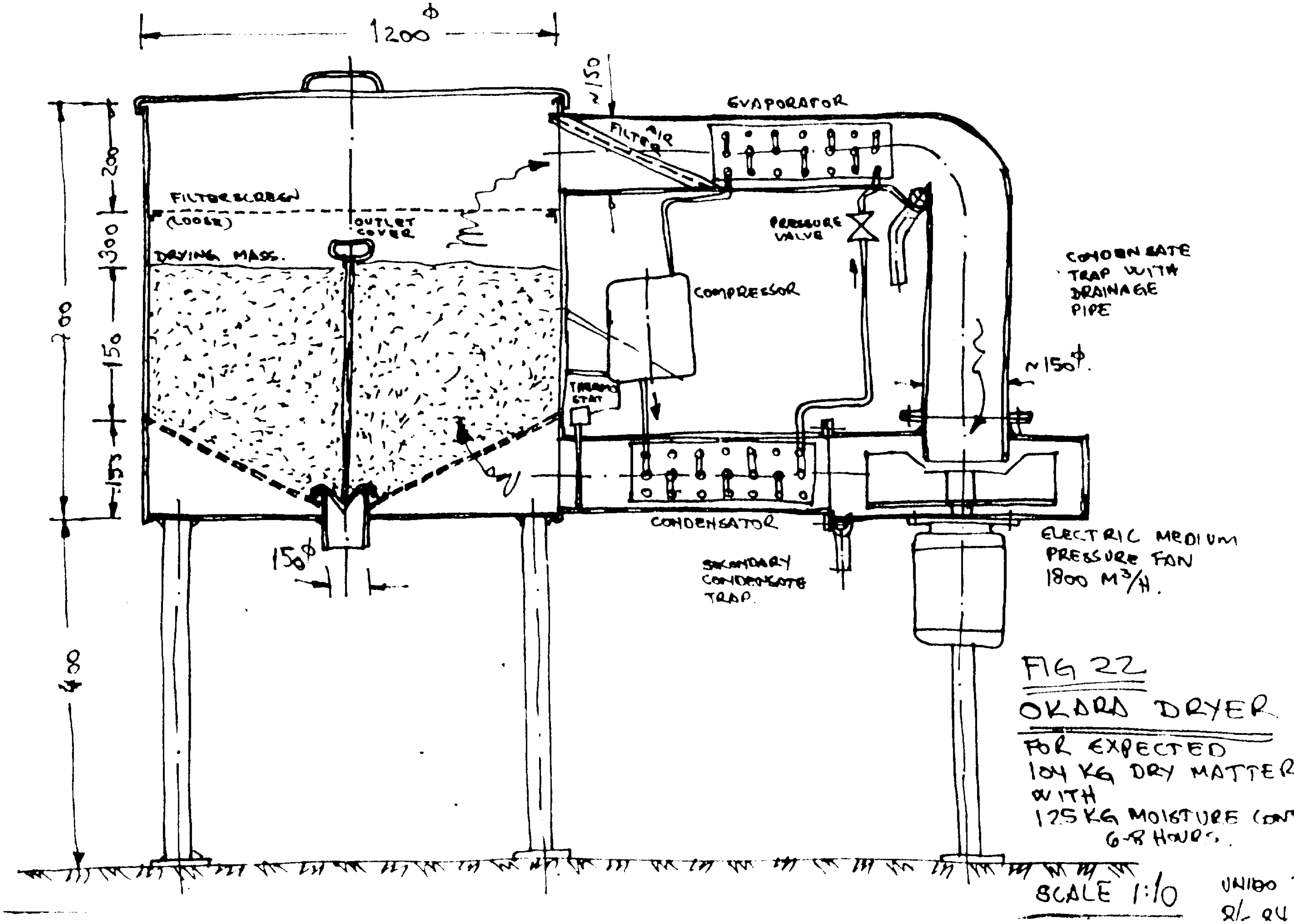


FIG 22

OKARA DRYER

FOR EXPECTED
104 KG DRY MATTER
WITH
125 KG MOISTURE CONTENT/
6-8 HOURS.

SCALE 1:10

UNIDO 78/078
21-04 1979

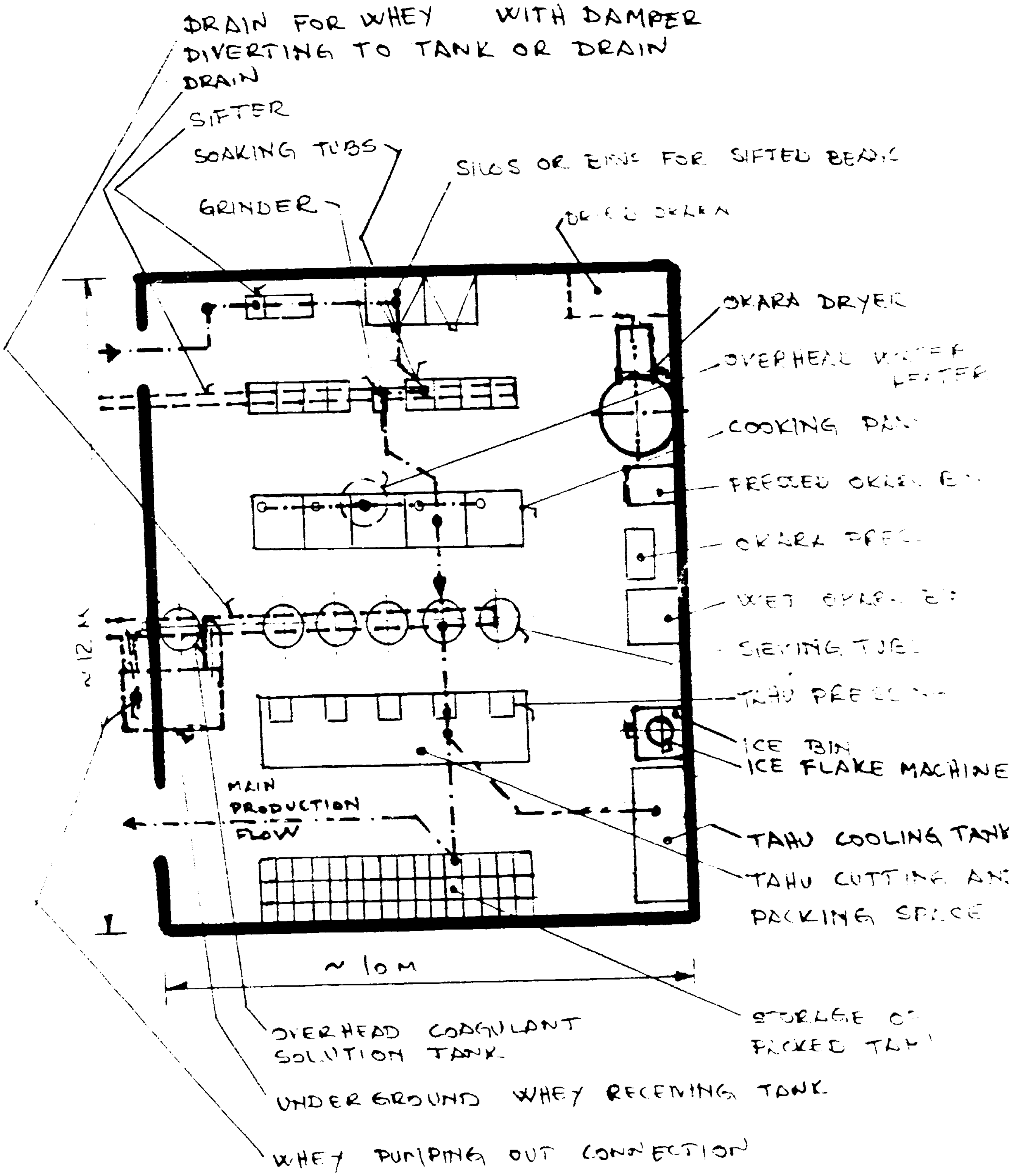


FIG. 23

LAY-OUT FOR TAHU PRODUCTION

FIG 24.

WHEY TANK ARRANGED IN THE GROUND CONCRETED.

THE GROOVE UNDER THE SOYMILK CONTAINERS HAVE OUTLET TO ALTERNATE DRAIN OR WHEY TANK THROUGH MOOVING THE RUBBER PLUG