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TECHNICAL CO-OPERATION PROJECT ON MAIZE DEVELOPMENT IN THAILAND: EXECUTION AND DESIGN INVESTIGATION REPORT

MARCH 1978

JAPAN INTERNATIONAL CO-OPERATION AGENCY

CONTENTS

Introduction

This report covers a technical investigation for installation and designing of corn seed control equipment under a consultant contract between the Japan International Co-operation Agency and Nippon Sharyo Seizo Kaisha, Ltd., as a part of "The Technical Co-operation Project on Maize Development in Thailand" which was started upon signing the minutes of the agreement on September 17, 1976.

The said report clarifies the relationship between the design of plant machinery to be granted from Japan and the design of seed control plant buildings to be constructed by the Thai Government. At the same time the report summarizes the results of field investigation and consultation with the persons concerned from the Thai Government in order to smoothly carry out the designing of building facilities and installation of plant machinery.

We would be happy if this report is fully utilized for the construction of seed control equipment and installation of machines and is helpful to the persons concerned with the said work.

Chief of Agricultural Development
Co-operation Division, Japan
International Co-operation Agency

1. OUTLINE OF INVESTIGATION

1-1 Purpose of Investigation

As a part of the Japan-Thailand Technical Co-operation Project on Maize Development, this investigation is related to the construction of a seed center (corn seed control plant) in the said project center. In order to clarify the relationship between the design of plant machinery to be granted from Japan and the design of buildings (seed control machines are housed) to be constructed by Thailand and to smoothly carry out the construction and designing of the buildings and installation of the plant as well, the investigation committee discussed the following points with the persons concerned with the Thai Government after on-the-spot investigation.

(1) Discussion about and amendment of a seed plant construction plan

(2) Design considerations for seed plant buildings (building materials, foundations, cross-sections, etc.)

(3) Type of power supplies for the center and requirements for water supply and improvement of land for the center

(4) Problems which can arise during plant installation (Type and quantity of auxiliary materials, number of laborers and construction machines required)

1-2 Members of Investigation Committee

The investigation committee was made up of the following members:

Leader	Minoru Kobayashi	Chief of the Technical Section, Plant Division, Nippon Sharyo Seizo Kaisha, Ltd.

Kazuo Oomomo	Technical Section, Plant Division, Nippon Sharyo Seizo Kaisha, Ltd.
Hiroshi Nishimura	Live-stock Development Section, Agricultural Development Co-operation Dept., Japan International Co-operation Agency

1-3 Investigation Schedule

The investigation committee left Tokyo on January 24, 1978 and returned to Japan on February 16. During their stay in Thailand for 24 days, the committee members followed the schedule almost as initially arranged.
The details are as shown in the daily work report. The following is the outline of the investigation schedule:

· January 24	Left Tokyo and arrived in Bangkok
· January 25	Paid a courtesy visit to the Japan Embassy, the Bangkok Office of the Japan. International Co-operation Agency, the Co-operation Promotion Department, and the Department of Agricultural Extension.
· January 26	Held a consultation with specialists dispatched for this project.
· January 27	Explained specifications for the seed plant brought from Japan at the Department of Agricultural Extension.
· January 28 ～ January 29	Made an inspection of the Prabuthabad Agricultural Experiment Station, the land for the Seed Center and the Phitsanulok Seed Center.

. January 30	Held an internal consultation among Japanese members (about the design of an ear corn sorting process).
. January 31	Held a consultation about and made a plan for the ear corn sorting process at the Department of Agricultural Extension.
. February 1	Held a consultation about the ear corn receiving method (type of receiving tank) at the Department of Agricultural Extension.
. February 2	Held a consultation about the alteration of the type of ear corn drying blower and materials, structure and foundation of plant buildings at the Department of Agricultural Extension.
. February 3	Discussed problems related to plant installation (electric machinery and appliances and the number of workers required) and confirmed the machines to be granted from Japan at the Department of Agricultural Extension.
. February 4	Arranged data.
. February 5	Arranged data.
. February 6	Made a list of auxiliary materials required for seed plant installation.
. February 7	Listened to an explanation about the type of electric power supply to the seed center and discussed the method for receiving and drying ear corn requested by the Thai side, at the Department of Agricultural Extension.

· February 8	Discussion continued from the previous day about the method for receiving and drying ear corn at the Department of Agricultural Extension.
· February 9	Discussed ear corn drying fuel, the use of a private generator during power failure and insulating material for a low-temperature seed storage house at the Department of Agricultural Extension.
· February 10	Explained to the Thai side the foundation of a truck scale and studied the ear corn storing process at the Department of Agricultural Extension.
· February 11	Arranged data.
· February 12	Arranged data.
· February 13	Discussed the allocation of work between Japan and Thailand in the ear corn receiving division and the time for the arrival of materials from Japan at the Department of Agricultural Extension.
· February 14	Studied dust collection for the corn sheller at the Department of Agricultural Extension. Held an internal consultation about the results of the current investigation on the Japanese side.
· February 15	Reported an outline of the results of investigation to the Japanese Embassy and the Bangkok Office of the Japan International Co-operation Agency and paid a farewell visit to the Co-operatives Promotion Department and the Department of Agricultural Extension. Made preparations for returning to Japan.

· February 16 Left Bangkok and arrived in Tokyo.

1-4 Contents of Investigation

The contents of this investigation are outlined as follows:

(1) Field investigation

(a) Travelling and transfer period: 3 days
- Tokyo - Bangkok (2 days)
- Transfer in Thailand (1 day)

(b) Courtesy visit, study, consultation, reporting, collection of data, mailing, etc. 19 days

(c) Field investigation, inspection
- Prabuthabad Agricultural Experiment Station and planned site for seed center
- Phitsanulok Seed Center

(2) Domestic investigation

(a) Arrangement of this report.

(b) Modification of plant design drawing

(c) Selection of the type of plant machinery

2. RESULTS OF INVESTIGATION

2-1 Summary

2-1-1 Alteration of the Truck-scale

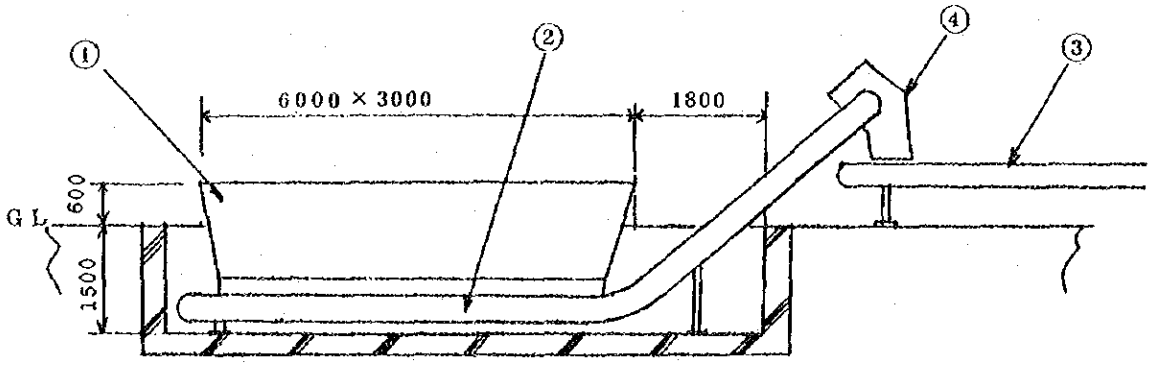
The truck which has been already granted is of "Isuzu SBR422" long-body type (movable load 4.5 tons). With a truck-scale of 5 or 10 tons, however, the wheel base extends beyond the scale stand. Provision, therefore, was made to use a 15-ton truck-scale.

2-1-2 Extension of the Ear Corn Sorting Process

It is necessary to receive and sort ear corn of good quality at the seed center. For this purpose, provision was made to extend the ear corn sorting process.
This process is done by the following machines:

(1) Receiving tank
(2) Drag chain conveyor
(3) Sorting belt conveyor
(4) Chute

Items (1), (2) and (4) are to be designed and manufactured in Thailand, and only the sorting belt conveyor (3) is to be granted from Japan.



Illustrated above is a design of the ear corn sorting process tentatively agreed upon by Thailand and Japan. The receiving tank (1), drag chain conveyor (2) and chute (4) are to be independently designed by the Thai side in accordance with site conditions, and a copy of their design is to be sent to the Japanese side as soon as it is available.

The receiving tank (1) is capable of storing about 4 tons of ear corn, and provision has been made to prevent bridging when discharging.

The ear corn is discharged by means of the drag chain conveyor (2) and sorting belt conveyor (3) through the chute (4) and is sorted by man-power.

2-1-3 Method of Carrying Ear Corn into the Receiving/Drying Bin

The ear corn is carried into the receiving/drying bin by a belt conveyor which can be manually transfered to distribute corn to different sections. According to the initial plan, a platform was to be installed by the side of the bin to carry the ear corn into each bin. However, installation of the platform required earth fill and a large amount of concrete as well, resulting in an increase in cost. Modification, therefore, was made as follows. A tilting-type belt conveyor is installed at the end of the sorting belt, and the ear corn is carried to the upper part of the bin. After that the ear corn is received by a belt conveyor (combination of fixed and movable types) on the bin and is finally poured into each bin.

2-1-4 Number of Receiving/Drying Bin Blowers

Two receiving/drying bin blowers (1 unit for drying 4 bins) are to be used for the following reasons:

(1) In Thailand, it is difficult to obtain a motor of 20 h.p. or more. In case of trouble, therefore, it is impossible to renew such a large motor immediately.

(2) When two motors are used, it is unlikely that both will break down simultaneously, thus reducing the chance of a loss of ear corn.

(3) The amount received per day varies. When the amount received is small, only one motor need be used, resulting in reduced operating costs.

2-1-5 Alteration of Fuel to be Used for Drying

The fuel to be used for drying is to be changed from kerosene to light oil.
In Thailand kerosene is expensive. If it is used as fuel the operating cost will increase, making it uneconomical. Accordingly, provision was made to use equipment that can work with light oil.

2-1-6 Daily Ear Corn Volume Received

The ear corn volume received is to be as indicated in the plant specifications (within 11.2 tons per day).
The ear corn must be dried immediately after harvesting. Otherwise the seed sprouting rate will be reduced. So, harvesting beyond the capacity of a drying bin should be avoided.
This plant is capable of receiving max. 11.2 tons of ear corn a day. In order to operate the plant efficiently, the persons concerned with the Thai Government are requested to carry out the following so that the daily volume received may be kept below 11.2 tons.

(1) The seed producing farmer should be trained and encouraged to plan the planting of corn so as to even out the corn volume received per day during the harvesting season.

(2) The inspector should visit each farmhouse, decide on the harvest time of each field and control the volume the seed center receives every day.

(3) For about 3 weeks in the harvest season, ear corn of 11.2 tons or more may be received even if what is described in (1) and (2) is carried out. In the farmhouse and seed center, therefore, a temporary ear corn storage house is to be installed.
In this case, in the seed center, ear corn of high water conetnt is put in the bin, and that of medium or low water content is put in the temporary storage house, so as to reduce temporary surplus supplied.

2-1-7 Alteration of the Type of Sheller

When corn shelled with a corn sheller is transferred by an air transport system, the seed is liable to be damaged giving sprouting trouble, owing to friction between kernels, collision with pipe walls, etc. To prevent this, a corn sheller equipped with a gravity conveyor system should be employed.
The corn sheller generally produces a large amount of dust and to solve this problem, a sheller of enclosed type is to be used.

2-1-8 Structure of Building

(1) Receiving/Drying Bin
On the yard side, louvers (about 50cm high) are to be installed under the eaves over the whole length, and the lower part is to be made up of concrete block walls. The other side is to be made up of pillars

and no wall is required, though it is necessary to make the roof overhang so that no rain blows into the interior.
It is better to use a tiled roof.

(2) Machine room
It will be sufficient if the machine room is of construction similar to the machine room in the Phitsanulok Seed Center and similar materials and machines are used.

(3) Low-temperature Warehouse

a. For ceiling and wall insulating materials, glass wool (50m/m thick) was presented for reference. If difficulty is encountered in obtaining it in Thailand, material (foaming polystyrol) having an insulating effect equivalent to the said glass wool may be used.

b. The floor should be constructed in such a way as to be kept free from water by placing a vinyl sheet between floor layers.

c. The duct should be kept warm to prevent dew condensation. Heat insulating material for this is to be granted from Japan.

d. The total weight of the duct is about 400kg and it is directly suspended from a beam. Hence, the beam should be strong enough to support it.
The method for insulating the duct and wall of the low-temperature warehouse which is employed in Japan is illustrated below for reference.

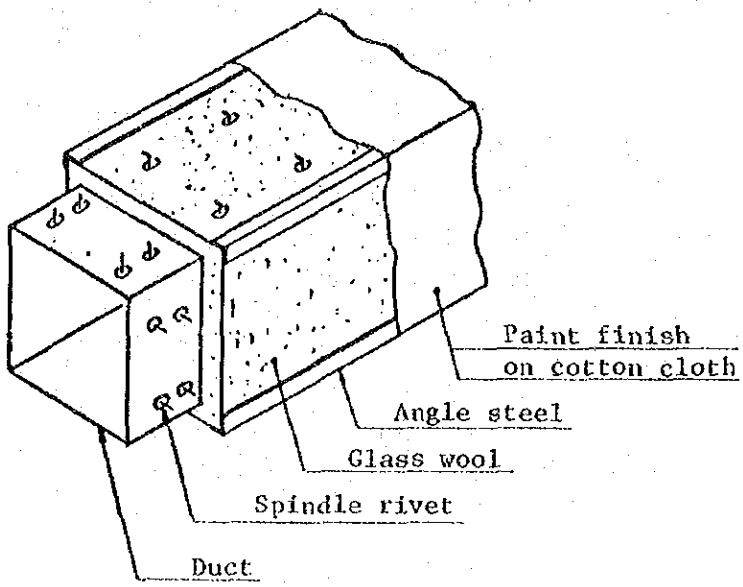
e. Duct
Spindle rivets are adhered to the duct, and then glass wool is attached to it. Angle steels are mounted at each corner. After that, each part is

wrapped with cotton cloth and finally finished with paint.

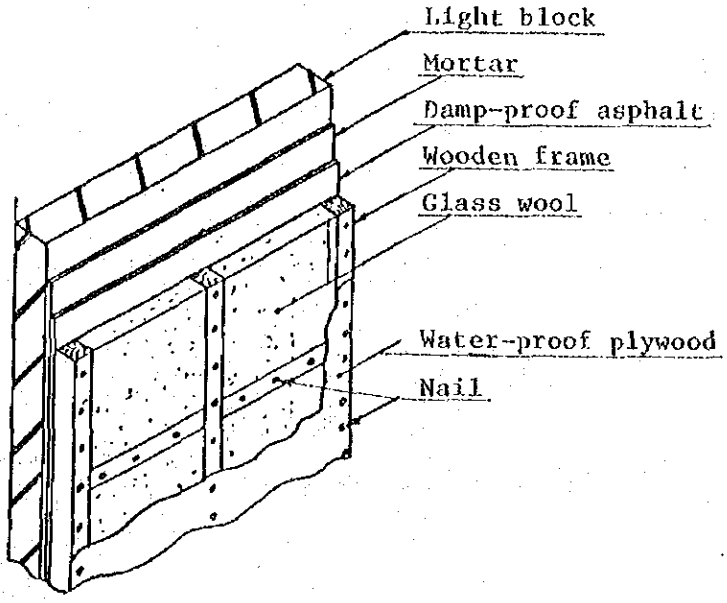
f. Wall

Mortar is applied to the inside of each block, and its upper part is coated with damp-proof asphalt. Wooden frames are mounted crosswise at a pitch of about 90cm and glass wool is adhered between each frame. Then water-proof plywood is attached for protection.

1. Duct



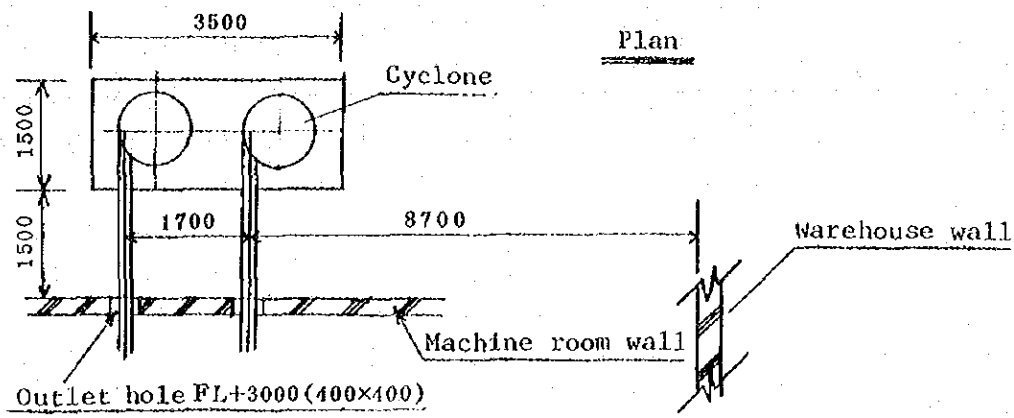
2. Wall

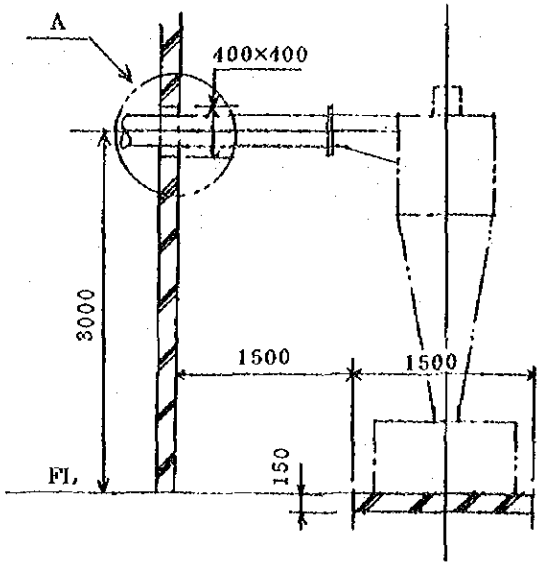


(4) A skylight should be mounted on the truck-scale. It is important to provide the foundation under the scale with a drainage port.

(5) Building Cross-section

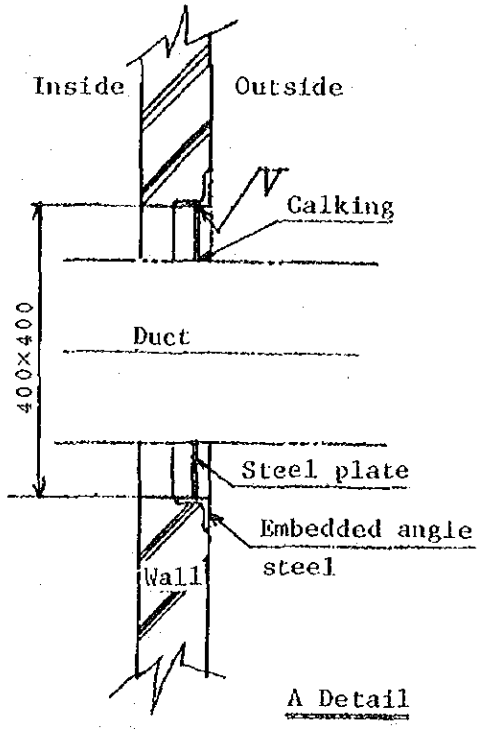
a. Dust collecting duct





Vertical view

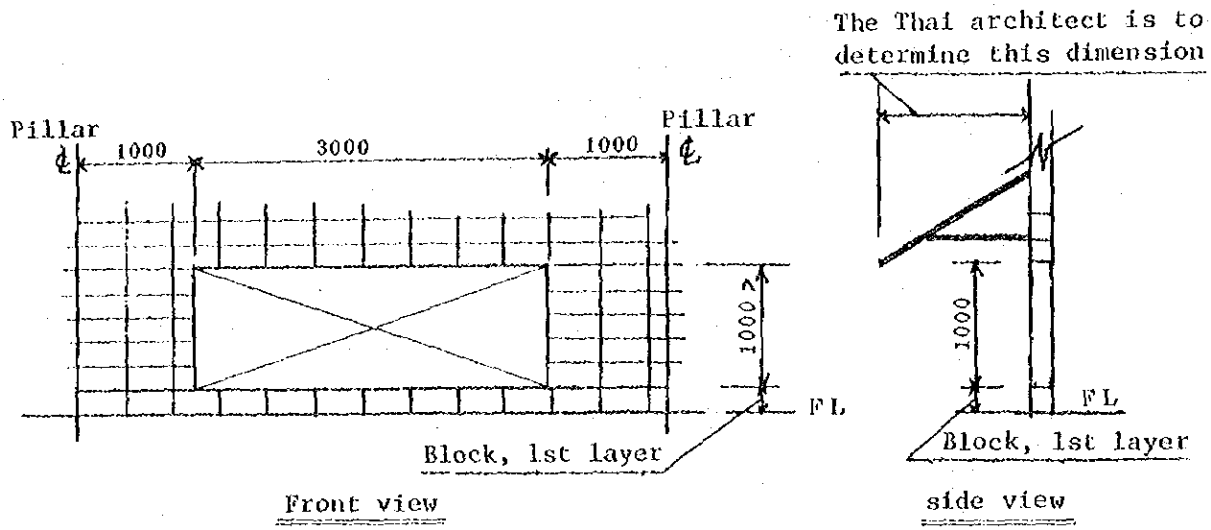
(Unit m/m)



A Detail

The ducts pass through the wall of the machine room in order to install 2 dust collecting cyclones outside to collect dust from the machine room. The ducts position and size were indicated. Also, the size of the foundation of each cyclone was indicated.
The outlet hole in the cross-section is a square hole of 400 × 400mm. Angle steel is embedded around the outside with drain steel welded to it. A hole suited to the duct diameter is cut in this steel plate. After that, the duct is passed through, and the seam is filled with a calking agent to prevent the intrusion of rain-water.

b. Yard belt conveyor



The ear corn dried in the yard is carried into the machine room by means of a belt conveyor and supplied to the corn sheller. In this case, it is necessary to pass the belt conveyor through the building wall. Hence, a preliminary

arrangement was made to provide the wall with an opening as shown. Blocks are built 1 layer from the floor level (FL), and an opening of 1,000mm vartically and 3,000mm horizontally is provided in the blocks. Furthermore, eaves are mounted to prevent the intrusion of rain-water into the building. The Thai architect is to determine the dimensions of and materials for these eaves.

2-1-9 Building of Site

Taking into consideration a possible flood in the rainy season, the site for seed center buildings, was to be banked about 1m. However, existing facilities are not built up at all, and no flood has occurred in the past. Accordingly, the Thai side is to determine whether or not building up should be done after inspection of the site by the engineer of the Public Works Department.

2-1-10 Basic design and weight of equipment required for construction work and method of fastening required for installation.

In this respect, the following suggestions were made to the Thai side:

(1) The weight of a receiving/drying bin should be 10.3 tons per unit, including its tare and contents.

(2) The weight of a drying bin for finishing should be 8.2 tons per unit, including its tare and contents.

(3) In the case of a flow tank, the load per supporting leg should be 1.2 tons.

(4) Bucket elevator foundation bolts and "hole-in anchor" bolts are to be supplied from the Japanese side.

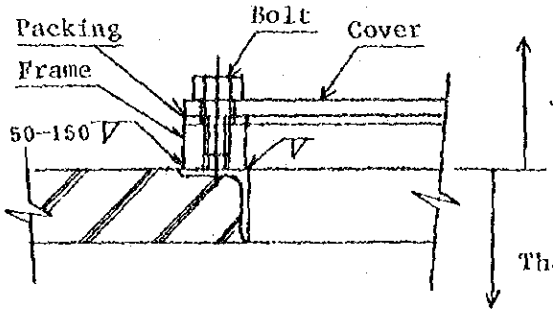
The Thai side is to provide concrete drills (10ø ∿ 20ø) for drilling anchor holes.

(5) The receiving/drying bin air duct outlet and section should be provided by the Thai side as shown in the drawing presented.

(6) The foundation bolts of the final drying bin should be built into the floor by boxing by the Thai side as shown in the drawing.

(7) Since 2 units of receiving/drying bins are used, the manhole mounting positions are also to be changed, and each manhole is to be installed outside the bins at both ends as shown in the drawing (section D-D').

(8) Range of the allocation of work between Japan and Thailand in the receiving/drying bin manhole section.



Items to be supplied from Japan

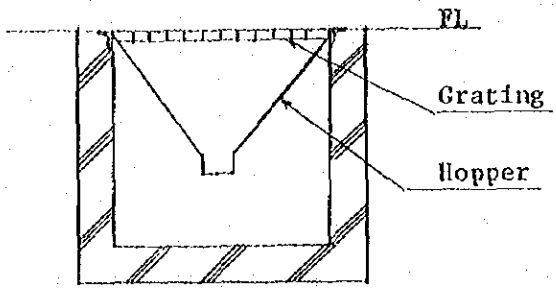
a Cover
b Frame
c Packing
d Bolt

On the Thai side, holes should be made in the blower duct as shown in the drawing presented, and angle steel should be imbedded to mount the parts supplied from Japan.

2-1-11 Check of Plant Machines Supplied from Japan

Plant machines are to be supplied from Japan. For the following items there was confirmation from the Thai side as to whether or not they are to be supplied from Japan

(1) The hopper is to be supplied from Japan and mounted in the pit.



(2) Grating for hopper mentioned above
To be supplied from Japan.

(3) Tank leg
To be supplied from Japan.

(4) Frames for No. 2, 4 and 5 Sorting Machines
To be supplied from Japan.

(5) Frame for No. 2 Precision Grader
To be supplied from Japan.
Depending on conditions in Thailand, it may happen that immature grains are produced in large quantities from the No. 2 grader. In the current plant, however, there is no provision for a conveyor to transfer immature grains from the No. 2 grader. If it is required at the time when the plant is put in operation, the Thai side should supply this conveyor.

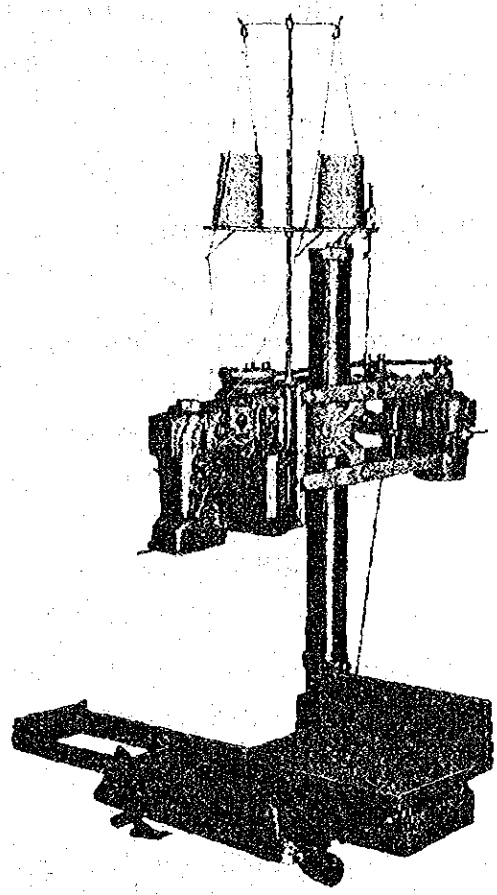
(6) Weighing tank and chute
To be supplied from Japan.

2-1-12 Sewing Machine, Parts List
There was a question from the Thai side as to the name of a sewing machine manufacturer, the type of a sewing machine and parts list (especially renewal parts).

(1) The sewing machine should be of Type DS-2-II made by the Newlong Company.
This sewing machine can be used to sew nut only thick but also thin paper bags.
Place a bag on the truck and apply the mouth of the paper to the sewing machine and work the pedal. Then, the sewing machine will sew the bag.

(2) The renewal parts list is to be presented to the Thai side after returning to Japan.

2-1-13 Data the investigation committee presented to the persons concerned with the Thai Government as to installation of the plant.



(1) Installation Manpower
In Japan, it takes 14 days for 5 skilled workers to install bins.
It takes 7 days for 5 skilled workers to install machines. This was reported to the Thai side for reference (refer to attached data 3-3-2).

(2) Auxiliary machines and materials (Thai Government supplied) that are considered to be required in construction works.

a. Angle steel for embedded metal fixtures and round steel for anchor use.

b. Flat steel and round steel for ladder use.

c. Wire ropes, roller logs and tools.

d. Mobile crane, fork lift, winch, electric welders and gas welders (For details, refer to attached data 3-5).

(3) Electric power required for construction work and operation of plant.

a. Electric power of 60KVA is required for construction work.

b. The following electric power is required to operate the plant:

Since 3-phase electric power requires 129KW, the receiving capacity should be 175KVA. Single-phase electric power and illumination require 9KW, hence the receiving capacity should be 15KVA.

2-1-14 Type of Electric Power Supply

A. The following questions were asked to the persons concerned with the Thai Government about the electric power supply at the planned site for the seed center:

(1) What phase is available, three-phase or single-phase? Or is it possible to use both of them?

(2) What frequency is available?

(3) What voltage is available?

The following answers were obtained:

a. Three-phase 50Hx, 400/230V
Maximum 400V, minimum 380V

b. Single-phase 50Hz, 220V
Maximum 230V, minimum 210V
Voltage variation is in the range of 5%, and single-phase is usually 220V.
Under the present circumstances, however, it seems that there is a considerable voltage change and motors overheat occasionally.

B. Supply of 60KVA Diesel Generator

In the event of no power being supplied to the seed center from outside owing to an unexpected accident (such as power failure) when ear corn and corn are being dried, it is feared that the ear corn and corn seed being dried will lose quality, though there is no problem if it is for a short time.
In order to prevent such a change in quality it is necessary to install a private generator for emergency use. This generator is to be supplied from Japan.
The low-temperature warehouse will be provided with complete insulation, and it is considered that no

effect will be suffered by the seed in the warehouse for about 3 days as long as the door is not opened. (This is the opinion of the person concerned with the Thai Government.)
This generator does not have sufficient capacity to meet the requirements of both the drying equipment and the low-temperature warehouse. In the event of a power failure, provision should be made to determine which equipment should take precedence.
In this case, connecting to the private generator can be easily accomplished by switch.

2-1-15 Shape of Yard Surface

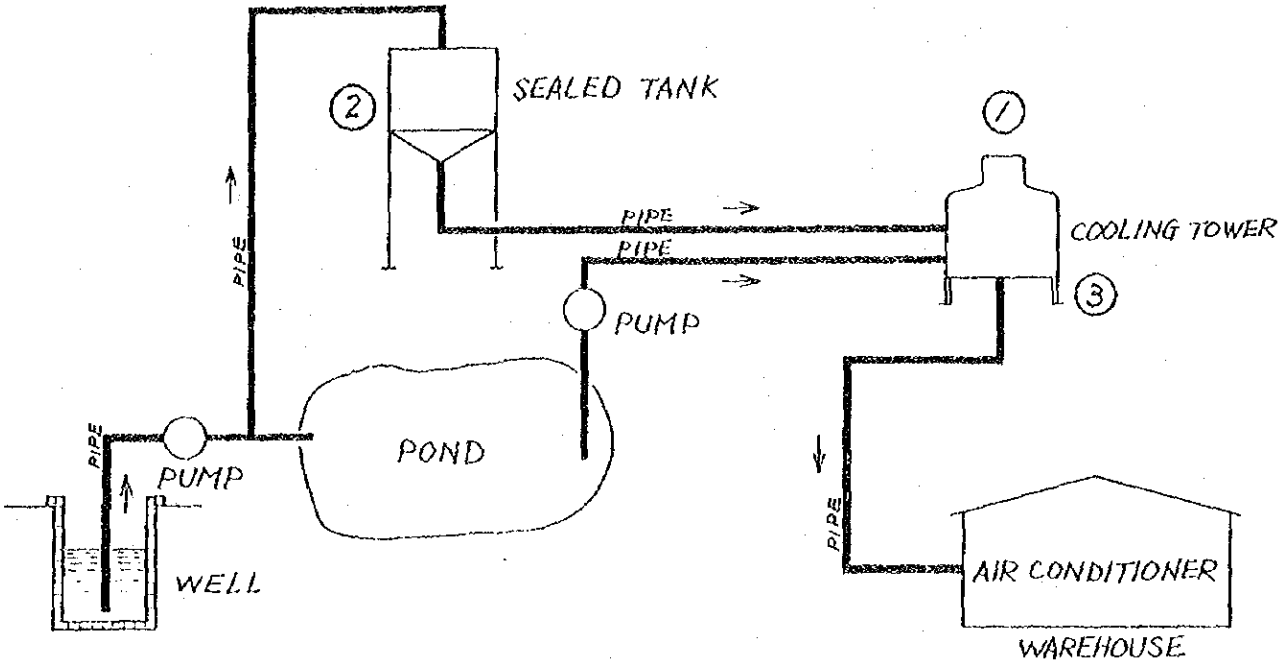
In the dry season, it seems that ear corn will be mainly dried in the yard with the object of saving light oil which is otherwise used to dry it. As for the shape of the yard surface, the idea of a specialist in this project was presented to the Thai side for reference when constructing the site.

2-1-16 Water

In the Prabuthabad Agricultural Experiment Station, there is a reservoir which is used for irrigation and supply of cooler water to the low-temperature warehouse.
If underground water is used as cooler water in the planned site, it seems that there is no problem as to the quality of the water, and the structure of the reservoir will also be adequate if the type used in this experiment station is employed.
However, because the reservoir is of the open type, weeds are liable to grow. Some weeds block cooling pipes or attach to the pipe wall, resulting in reduced thermal conductivity. When putting water in the cooling tower,

it will be necessary either to inject a sterilizer into the water which is in the tower or install a separate enclosed tank and supply the water directly to it from the well before the water pumped up from the well enters the reservoir thus isolating the tower from the pond, or to supply the water constantly in such a way as to overflow (9ℓ/min) from the cooling tower. (See following diagram.)

Alternative Methods for Preventing Weed Blockage of Pipes and Cooling Tower.



(1) Inject sterlizer into cooling tower

(2) Build separate sealed tank and by-pass pond by going directly from well to tank to tower

(3) Supply constant excess to cooling tower to cause continual overflow.

2-1-17 Arrangement of Seed Center

The whole arrangement of the seed center is to be studied by the Thai side with the co-operation of the Public Works Department, and a copy of the plan is to be sent to the Japanese side as soon as a decision is made.

2-1-18 Construction Plan on the Thai Side

(1) Design of building : March 1978 ∿ June 1978
In the beginning, two building and design engineers were available from the Department of Agricultural Extension. But these engineers were busy and could not devote time to the designing of a plant building. Hence the design engineer of the Public Works Department took charge of it, and the designing had to be started after March. It is assumed that it will take 4 months to design it.

(2) Bidding : July 1978 ∿ August 1978

(3) Construction of building: September 1978 ∿ March 1979
It is expected that bidding will take place between July and August. Construction of the building will be started in September and the building will be completed in March, next year. It is therefore desirable that the plant materials and equipment should arrive in Bangkok around March, 1979. This was reported to Mr. P. Wannapee, Chief of the Seed Division of the Department of Agricultural Extension, and his approval was obtained.
In the event of the construction of the building being started early, it was confirmed that the Japanese side would make arrangements to send the materials and equipment to Thailand as soon as possible.

When Mr. P. Wannapee visits Japan for inspection and training, the Japanese side is to confirm the progress of building construction on the Thai side. As soon as the designs of the building are available, 2 copies of them will be sent to the Japanese side. After studying the arrangement of plant machinery, amendments will be made in a copy of the design, which will then be returned to Thailand.
On the Thai side, construction work will be started on the basis of this drawing.

2-1-19 Others

A. Other Requirements made by Thailand for Japan

(1) Preparation and presentation of a renewal parts list and price list.

(2) Preparation and presentation of a list of motors (three-phase or single-phase) with names.

(3) Presentation of a power wiring diagram.

(4) Presentation of an English foundation diagram for the 15-ton truck-scale.

B. Requirements made by Japan for Thailand

(1) The use of either an osmosis-type or pumping-up type machine for draining of the truck-scale foundation should be determined on the Thai side.

(2) It will take 3 months to manufacture plant machinery in Japan.

C. Others

(1) A copy of the truck-scale installation and handling manual (in English) was presented.

(2) The fuel tank should be of outdoor ground level type and have a capacity of about 5Kℓ (to be manufactured in Thailand).

(3) It will be convenient if other service tanks (about 400ℓ are available to be manufactured in Thailand).

2-2 Consideration for Plant Installation and Operation

2-2-1 Position of Truck-scale

The investigation committee held a consultation with the persons concerned from the Thai Government about the whole arrangement of the seed center. Owing to circumstances on the Thai side, it was impossible to determine and make clear the final location of the truck-scale. It is, however, necessary to install the truck-scale in a place adequate for drainage in the neighborhood of the plant so that no obstacle prevents carrying in the ear corn.

2-2-2 Receiving of Ear Corn

As described in the summary, it is necessary to handle all equipment in accordance with the requirements of this plant so as to operate it most efficiently.
For instance, in case excess ear corn is received in the receiving/drying bin, it may be possible to absorb this excess if the next day's volume is below the required level, or make it impossible to receive any more ear corn at all. However, as the farmers demand a supply of ear corn from the seed center every day, such excess is not desirable. It is therefore necessary to adjust the input

volume in accordance with the requirements of the plant. In order to solve the problem of excess input the persons concerned with the Thai Government are strongly requested to guide the seed growing farmer to carry out planned planting and reduce peaking of supply during the harvest season. The Thai side is also requested to increase the number of seed inspectors, dispatch these inspectors to each farmhouse to determine the harvesting time of each field and control the amount of ear corn the center receives every day. However, even if such improvements are made, it is considered impossible to avoid temporary excess. As a countermeasure temporary storage houses should be built at farmhouses and at the seed center to store the ear corn of medium water content and low water content temporarily and only ear corn of high water content should be put in the receiving/drying bin immediately, thereby making it possible to prevent a change in quality of the ear corn owing to excess supply. Consequently it is necessary to install a temporary storage house and employ a system which will work according to the content of water in the ear corn.

The drying process is designed to operate 24 hours a day, while conveyance, sorting, packing and other divisions are designed to operate for 8 hours a day. When the content of water in the ear corn received is low, the processing volume can be increased by extending the operating time of divisions other than the dryign process. Thus, in seed growing operations, it is necessary to strike a balance between drying production and adjusted production processes.

2-2-3 Plant Control Panel

It is desirable for efficient operation to start and stop all the machines in the plant from a control panel. Taking into account the arrangement of each machine, it is impossible to watch all the machines from one control panel. Therefore provision has been made to employ two control panels. One of the control panels (refer to the plan diagram of the plant) is used to control the truck-scale, shelling, coarse sorting, finish drying, fine sorting, packing and low-temperature warehouse, while the remaining control panel is for receiving and receiving/drying bins.
A drag chain conveyor of hand switch type is to be used because it can be started or stopped while watching conditions in the receiving tank. From a stand-point of safe operation, the operator of each machine must be fully familiar with the function of each switch.

2-2-4 Sunlight Drying of Ear Corn

In this plant it is possible to dry the ear corn in the yard by sunlight and feed it directly into the corn sheller on a fine day, so as to save drying fuel.
Then when the shelled corn is carried in, it is possible to dry the corn directly in the final drying bin. It is, therefore, desirable to employ the equipment according to the material to be carried in.

2-2-5 Handling of Plant Machinery

Since this plant is made up of various machines, it is necessary to fully understand the handling of each machine with reference to the instruction manual of each machine.

2-2-6 Private Generator for Emergency Use

The private generator is intended for use as an emergency power source in the low-temperature warehouse in the case of a power failure. According to the Thai side, however, it is said that no damage is suffered by the seed in storage, as long as the door is not opened; even if a power failure continues for 2 or 3 days. On the other hand, in the event of a power failure occuring during drying, the ear corn will be heavily damaged. In this situation the generator will be needed for drying bin power supply.

Accordingly, the generator is mainly intended for the drying bin. However, if there is need for using the generator in the low-temperature warehouse, a change-over switch can easily be connected to the generator. The generator must be used as needed.

2-2-7 Others

This plant is designed for corn seed use. But by changing parts (sorting nets) in the sorting section, the plant can also be used for other grains.

2-3 DESIGN DRAWINGS

2-3-1 SPECIFICATION FOR CORN SEED CONDITIONING PLANT

Introduction

This plant is aimed at conditioning the corn seeds and supplying seeds of superior quality to the corn grower.

Nippon Sharyo Seizo Kaisha, Ltd. has developed a special seed plant which keeps seeds in good condition and is free from sprouting trouble. This is based on many years of research, experimentation and accomplishment in the sorting, conditioning and drying of grains.
We are confident that this plant will greatly contribute to improvement in the quality of corn seeds, rationalization of seed production and stable supply of seeds in your country.

1. Outline of Project

This plant is intended to condition corn seeds of superior quality. Besides mechanical devices, the plant is equipped with a corn sheller, finish/drying bin, temporary storage tank, conveyor, etc.

Processing Capacity

Ear corn (with an air content of 24%)	2 T/H
Shelled corn (with air content of 24%)	2 T/H ∿ 1 T/H

This plant offers the following features:

All the machines are arranged on a plane to assure easy access for operation and inspection.

2. Estimate Items

The following items are included in the estimate of this plant:

1. Truck-scale equipment
2. Corn shelling equipment
3. Receiving hopper equipment
4. Seed drying equipment
5. Tank equipment
6. Seed sorting equipment
7. Seed sterlizing equipment
8. Weighing and packing equipment
9. Conveying equipment
10. Dust collecting and discharging equipment
11. Centralized control panel
12. Communication chute and other accessories
13. Self-inspection equipment
14. Diesel generator for auxiliary power supply
15. Accessory tools
16. Installation manual

3. Items Excluded from Estimate

The following items are excluded from the estimate:

1. Plant building construction work
2. Geological survey cost
3. Foundation and pile-driving works
4. Machinery foundation and pit works
5. Special underground equipment excavations and excavation drainage
6. Plumbing work
7. Primary power supply and construction work expenses
8. Secondary power wiring and connection
9. Illumination work
10. Electric power and water for construction works

11. Field installation work and guidance
12. Guidance for test run

4. Equipment Specifications

1. Truck-scale Equipment

(1) Truck-scale 1 unit

Type	:	PCS Type (dial type with printing device)
Maximum weighing capacity	:	15,000kg
Minimum scale	:	10kg
Minimum printing unit	:	10kg
Platform size	:	2.44M × 5.45M
Accuracy (weighing. printing)	:	±1/1,000
Power source	:	AC 230V, 50Hz

This truck-scale indicates on a dial the weight measured with a pendulum cam and makes digital conversion mechanically with a step cam, to print and record the measured weight. It offers the most stable accuracy, permits automatic weighing and recording and is also free from artificial error. The truck-scale is the system with which a push-button printing system can be operated most easily and efficiently.

2. Corn Shelling Equipment 1 unit

Type	:	No. 22 Type
Capacity	:	1.5 T/H (shelled corn with water content of 25%) 2.0 T/H (ear corn with water content of 25%)
Motor	:	400V, 11.0KW

The ear corn is semi-dried up to 14% ∿ 16% water content and sorted into cobs and grains. The cobs are carried outside with a fan, while the grains are discharged into the lower part of the corn sheller, thus preventing damage to seeds:

3. Receiving Hopper Equipment

(1) Receiving hopper — 2 units

Type	:	Underground pyramid type
Construction	:	Steel-plated hopper
Dimensions	:	1.7M × 1.3 × 1.4M
Capacity	:	Approx. 960kg (shelled corn with water content of 25%)
Others	:	Flow adjusting gate Screen Anti-scattering plate

This hopper permits bringing in corn grains in the semi-dried state or finish-dried state from outside. Also, because of its large capacity (about 960kg), the hopper assures increased operating efficiency.
The discharge volume can be easily adjusted by means of a flow adjusting gate.

4. Seed Drying Equipment

(1) Finish drying bin — 2 units

Type	:	NISSHA Stocker
Construction	:	Steel-plated panel
Capacity	:	4,000kg × 2 units = 8,000kg (Shelled corn with water content of 25%)

Corn grains are dried by air while stationary thus preventing damage due to abrasion.
Also, the bin is equipped with an air discharge mechanism, to save labor when discharging.

(2) Drying blower

Type	:	Air wheel fan	1 unit
Airflow	:	230m³/min	
Static pressure	:	220mmAq	
Motor	:	15KW	1 unit

The air required for finish drying can be supplied by means of this blower.

(3) Heater 1 unit

Type	:	Type HP-250
Calory rating	:	95,000Kcal
Airflow	:	30m³/min
Air speed	:	8m/sec
Fuel consumption	:	10ℓ/hr
Fuel	:	Light oil
Temperature control	:	Thermostat type

The calory level required for drying corn grains can be supplied to the finish drying bin by means of this heater and blower.
Also, the heater offers outstanding safety and durability with very quiet combustion so that the operator can work without stress.

5. Tank Equipment

(1) Temporary storage tank 2 units

Type	:	Steel-plated square type
Capacity	:	4,000kg (shelled corn with water content of 25%)

This tank is for temporarily storing the corn grains dried in the finish drying bin before sorting them.
Also it is possible to lower the grain temperature, which has risen in the finish drying bin, by storing corn grains in this tank.

(2) Flow adjusting tank for No. 245 seed cleaner 1 unit

Type	:	Steel-plated square type
Capacity	:	120kg (shelled corn with water content of 25%)

This tank is aimed at supplying corn grains to the No. 245 seed cleaner at a uniform rate.

(3) Product tank 1 unit

Type	:	Steel-plated square type
Capacity	:	1,200kg (shelled corn with water content of 25%)

This tank is aimed at temporarily storing sorted and sterilized corn grains for weighing and packaging.

6. Seed Sorting Equipment

(1) Seed cleaner 1 unit

Type	:	No. 245 seed cleaner
Capacity	:	1.0 T/H (shelled corn with water content of 25%)
Motor	:	100V, 0.75KW

Accessories:

1.	Variable type quantitative feeder	1 set
2.	Variable type suction sorter	1 set
3.	Pulley type stepless speed change gear	1 set
4.	Thickness sorting cylinder	1 set
5.	Interchangeable thickness sorting cylinder	2 sets
6.	Trestle	1

The functions of this No. 245 seed cleaner may be broadly divided into three stages.

In the first stage large foreign elements are removed with a scalping reel. In the second stage light grains and dust, dirt, etc. are discharged outdoors by means of an aspirator. In the third stage, immature grains below standard are rejected and discharged by means of 2 thickness sorting cylinders.
The two thickness sorting cylinders can be changed, depending on the kind of corn.

(2) Precision grader 1 unit

Type	:	No. 2 Precision grader
Capacity	:	1.0 T/H (shelled corn with water content of 25%)
Motor	:	400V, 0.4KW 1 unit

Accessories:

1.	Thickness sorting cylinder	1 unit
2.	Interchangeable thickness sorting cylinder	2 sets
3.	Trestle	1 unit

The No. 2 precision grader is equipped with 2 thickness sorting cylinders. The semi-finish seeds that have passed through the No. 245 seed cleaner are fed into the No. 2 precision grader cylinder in which seeds are sorted into those within standard and those larger than standard.

7. Seed Sterlizing Equipment

(1) Seed cylinder 1 unit

Type	:	Type SS-1
Construction	:	Stainless steel
Capacity	:	1.0 T/H (shelled corn with water content of 25%)
Motor	:	400V, 0.4KW 2 units

Accessories:

Pre-mix tank	1 unit
Trestle	1 unit

The products sorted by the No. 2 precision grader are subjected to final treatment by seed sterlizing equipment.
The seed treater is equipped with a chemical pre-mi tank so that one or several kinds of mixed chemical can be sprayed on the seeds.
Also, it is possible to adjust the volume of chemicals sprayed automatically, according to the flow of seeds.

8. Weighing and Packing Equipment

(1) Balance scale 1 unit

Type : Type SH-50
Maximum weighing capacity: 30kg
Minimum weighing capacity: 3 kg

Accessories:

1.	Control panel	1 unit
	a. Voltmeter	
	b. Counter	
	c. Voltage adjustor	
2.	Platform weighing machine	1 unit
3.	Trestle	1 unit

This weighing machine is of automatic type and has the following functions. When the switch is turned on by hand or foot, the auto-shutter mounted at the discharge outlet of the product tank opens to discharge seeds from the tank onto the platform weighing machine. When the discharge volume approaches the predetermined weight, the limit switch mounted on the platform weighing machine

operates to half-close the auto-shutter and it stays like this until the pre-determined weight is reached. This takes only 4 or 5 seconds. When the discharge volume reaches the predetermined weight, the limit switch closes the auto-shutter. This ends the weighing process.
This weighing machine is equipped with a voltage adjuster, thus preventing weighing error owing to a change in voltage.

(2) Bag mouth sewing machine 1 unit

Type	:	Type B (DS-2 II)
Capacity	:	200 ∿ 300 bags/hr
Motor	:	Condenser motor, 230V, 0.2KW 1 unit

The seeds weighed with a balance scale are put in bags. The packing of these bags filled with seeds is finished by this bag-mouth sewing machine.

9. Conveying Equipment

(1) Corn sheller feed belt conveyor 1 unit

Type	:	V-trough type
Capacity	:	2 T/H (ear corn with water content of 25%)
Pulley motor	:	400V, 1.0KW 1 unit
Conveyor length	:	10.0M

This conveyor is used to carry the ear corn half-dried in the yard to the corn sheller.

(2) Corn sheller discharge belt conveyor 1 unit

Type	:	V-trough type
Capacity	:	1.5 T/H (shelled corn with water content of 25%)
Pulley motor	:	400V, 0.4KW 1 unit
Conveyor length	:	3.4M

This conveyor is used to carry the corn grains shelled in the corn sheller into the receiving hopper.

(3) Finish drying discharge belt conveyor 1 unit

Type	:	V-trough type
Capacity	:	2 T/H (shelled corn with water content of 25%)
Pulley motor	:	400V, 0.4KW 1 unit
Conveyor length	:	6.7M

This conveyor is used to carry the corn grains discharged from the finish drying bin up to the inlet of the temporary storage tank feed bucket elevator.

(4) Temporary storage tank discharge belt conveyor 1 unit

Type	:	V-trough type
Capacity	:	1 T/H (shelled corn with water content of 25%)
Pulley motor	:	400V, 1.0KW 1 unit
Conveyor length	:	8.0M

The corn grains discharged from the temporary storage tank are conveyed to one of the two receiving hoppers by forward or reverse rotation of the pulley motor.

(5) Finish drying bin feed bucket elevator 1 unit

Type	:	Steel-plated, centrifugal discharge scoop-bucket type spaced on belt
Bucket material	:	Nylon
Capacity	:	1.5 T/H (shelled corn with water content of 25%)
Motor	:	400V, 0.4KW 1 unit
Length	:	9.3M

The corn grains shelled by the corn sheller are conveyed to the receiving hopper by the corn sheller discharge belt conveyor. Then the corn grains discharged from the receiving hopper are fed into the finish drying bin by this bucket elevator.
A two-way change-over device is attached to the discharge outlet of the bucket elevator so that corn grains can be fed into either of the two finish drying bins.

(6) Temporary storage tank feed bucket elevator 1 unit

Type	:	Steel-plated, centrifugal discharge scoop-bucket type spaced on belt
Bucket material	:	Nylon
Capacity	:	2 T/H (shelled corn with water content of 25%)
Motor	:	400V, 0.4KW 1 unit
Length	:	7.5M

The corn grains conveyed by the finish drying bin discharge belt conveyor are fed into the temporary storage tank by this bucket elevator.
A two-way change-over device is attached to the discharge outlet of the bucket elevator so that corn grains can be fed into one of the two temporary storage tanks.

(7) No. 245 seed cleaner flow adjusting tank feed bucket elevator 1 unit

Type	:	Steel-plated, centrifugal discharge scoop-bucket type spaced on belt
Bucket material	:	Nylon
Capacity	:	1 T/H (shelled corn with water content of 25%)

Motor : 400V, 0.4KW 1 unit

Length : 8.4M

The corn grains conveyed to the receiving hopper by the temporary storage tank discharge belt conveyor are discharged out of the receiving hopper and then fed into the No. 245 seed cleaner flow adjusting tank by means of this bucket elevator.

(8) No. 2 Precision grader feed bucket elevator 1 unit

Type : Steel-plated, centrifugal discharge scoop-bucket type spaced on belt

Bucket material : Nylon

Capacity : 1 T/H (shelled corn with water content of 25%)

Motor : 400V, 0.4KW 1 unit

Length : 6.6M

The semi-finished products discharged from the No. 245 seed cleaner are fed into the No. 2 precision grader by means of this bucket elevator.

(9) Seed treater feed bucket elevator 1 unit

Type : Steel-plated, centrifugal discharge scoop-bucket type spaced on belt

Bucket material : Nylon

Capacity : 1 T/H (shelled corn with water content of 25%)

Motor : 400V, 0.4KW 1 unit

Length : 5.7M

The grains discharged from the No. 2 precision grader are fed into the seed treater by means of this bucket elevator.

Also, a two-way change-over device is attached to this bucket elevator so that connections from the No. 2 precision grader to other equipment can be made with ease in the future.

(10) Product tank feed bucket elevator 1 unit

Type	:	Steel-plated, centrifugal discharge scoop-bucket type spaced on belt
Bucket material	:	Nylon
Capacity	:	1 T/H (shelled corn with water content of 25%)
Motor	:	400V, 0.4KW 1 unit
Length	:	7.5M

The seeds sterilized by the seed treater are fed into the product tank by means of this bucket elevator.

10. Dust Collecting and Discharging Equipment

(1) No. 245 seed cleaner dust discharging equipment 1 set

Accessories: Dust collecting cyclone 1 set
Dust discharging duct 1 set

The dust discharged from the No. 245 seed cleaner is separated from the air by means of the dust collecting cyclone mounted outdoors.

(2) Machine room dust collecting equipment 1 set

Accessories:

Dust collecting motor cyclone 1 unit

Type	:	Type C-3
Airflow	:	75m^3/min
Static pressure	:	200mmAq
Motor	:	3.7KW 1 unit

Dust collecting duct: 1 unit

Dust collecting areas:

- Receiving hopper
- Bucket elevator head
- Corn sheller
- Belt conveyor drop outlet
- No. 245 Seed cleaner flow adjusting tank
- No. 2 Precision grader
- Seed treater
- Product tank

The motor cyclone mounted outdoors extracts dust from the dust generating source in the machine room. In the machine room, therefore, there is little loss of operating efficiency due to dust.

11. Centralized Control Panel 1 unit

All control switches are arranged in this control panel. All equipment, therefore, can easily be started and stopped at a distance even by one person.

12. Communication chute and other accessories 1 set

Communications from equipment to equipment can be easily made by chute, pipes (connected by clamps & elbows) and other accessories.

13. Self-inspection Equipment

(1) Corn crusher 1 unit

(2) Moisture meter 1 unit

Type : KETT PB-1K

The use of a corn crusher and moisture meter permits easy and accurate measurement of moisture at the site.

14. Diesel Generator for Auxiliary Power Supply 1 unit

Type	:	Type EDG 60
Frequency	:	50Hz
Power	:	60KVA, 48KW
Voltage	:	230V
Speed	:	1,500 rpm
Engine type	:	4-cycle water-cooled precombustion chamber type
Number of cylinders	:	6
Total displacement	:	7.01ℓ
Appropriate fuel	:	Light oil
Fuel consumption (at full load)	:	16ℓ/H
Fuel tank capacity	:	120ℓ

Control equipment: Generator control panel 1 set
Engine control panel 1 set

This generator uses no brushes, slip rings, etc., and the number of expendable parts has been greatly reduced. Also, the starting performance has been improved 5 to 10% over the conventional generator with brushes.
Moreover, the engine can be started with a single touch and constant-speed operation can be accomplished automatically, thus making it very easy to control the generator. In addition, the use of an automatic idling system has greatly increased the life of the engine.

15. Accessory Tools 1 set

Accessory tools: Monkey wrench, set wrench, screwdriver, hollow wrench, hammer, pincers, tool box

Simple repairs and adjustments of machines can be made with these tools.

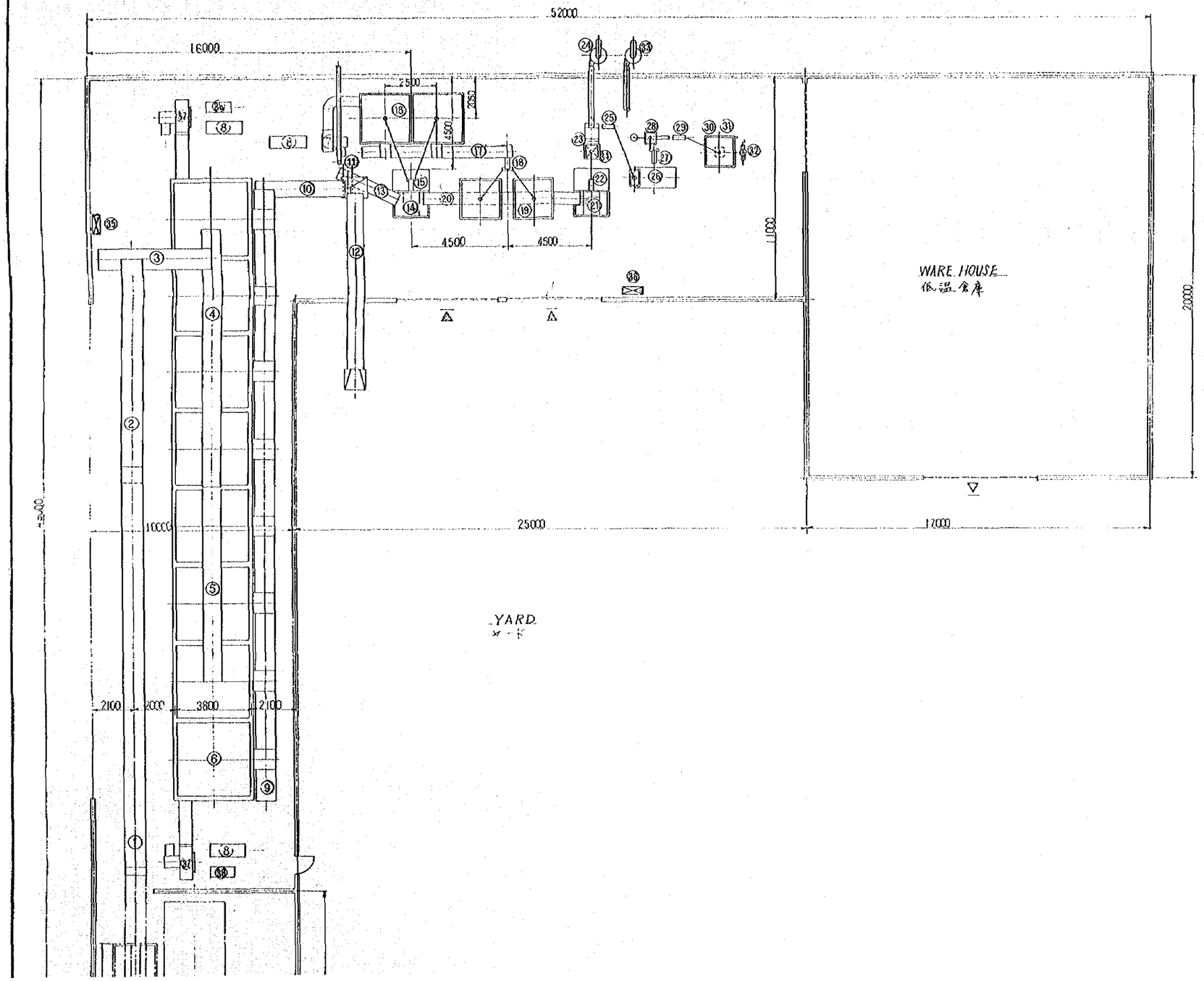
16. Installation Manual 1 set

Operating procedures are carefully and precisely described in this manual in order to carry out the actual installation of equipment smoothly.

2-3-2 DESIGN DRAWING FOR CORN SEED CONDITIONING PLANT

DRG. MEMBERS
（設計図書目次）

19	BINS(B) ビン(B) 《仕上乾燥ビン》	H--D-- 565	65
20	BELT-CONVEYOR FOR TANKS EXHAUST タンク排出用ベルトコンベヤ	H--C--2270	66
21	№245 SEED CLEANER №245 シードクリーナー	H--D-- 566	67
22	№2 PRECISION GRADER №2 プレサイジョングレーダー	H--E-- 141	68
23	SEED TREATER シードトリータ	H--D-- 567	69
24	RESERVOIR TANK 製品タンク	H--C--2260	70
25	BALANCE SCALE バランススケール	H--C--2271	71
26	SEWING MACHINE 袋口縫ミシン	H--C--2261	72
27	DUST COLLECTING CYCLONE 集塵用サイクロン(モーターサイクロン)	H--D-- 560	73
28	FLUX CONTROL TANK 流量調整タンク	H--D-- 561	74
29	FAN(B)《#6 SINGLE SUCTION AIRFOIL FAN》 乾燥用送風機(B)	H--D-- 562	75
30	FAN(B)《#6 SINGLE SUCTION AIRFOIL FAN》 乾燥用送風機(B)	H--D-- 563	76
31	HEATER(B) 温風機(B)	H--C--2273	77
32	CORN STORAGE ROOM EQIPMENT とうもろこし貯蔵庫空調装置	H--C--2116	78
33	ARRANGEMENT OF EQIPMENT 空調装置配置図	H--C--2206	79
34	PACAGED AIR CONDITIONER 低温パッケージ	H--E-- 140	80
35	DEFUMIDIFIER UNIT ASSEMBLY 除湿機	H--D-- 569	81
36	COOLING TOWER 冷却塔	H--D-- 568	82



NO.	NAME	QUANTITY	REMARK
	TRUCK SCALE	1	CAP 15TON (10KG MINIMUM)
①	SORTING B.C	1	3 1/2H 20.5M 0.75 KW
②	CLIMBING B.C (A)	1	〃 15.05M 1.5 KW
③	BELT-CONVEYOR FOR BINS(A) THROWING (A)	1	〃 5.3M 1.0
④	BELT-CONVEYOR FOR BINS(A) THROWING (D)	1	〃 13M 〃
⑤	BELT-CONVEYOR FOR BINS(A) THROWING (C)	1	〃 15.05M 1.5
⑥	BINS (A)	8	CAP 5.6 TON
⑦	FAN (A)	1	Q=130M³/MIN 15 KW P=200MMAQ
⑧	HEATER (A)	3	TYPE-HP-25C CAP 95000KCAL/H
⑨	BELT-CONVEYOR FOR BINS(A) EXHAUST	1	2 1/2H 30.05M 1.5 KW
⑩	CLIMBING B.C (B)	1	〃 5.3M 1.0 KW
⑪	CORN SHELLER	1	1.5 1/2H TYPE-H072.11 0.7 KW
⑫	BELT-CONVEYOR FOR CORN SHELLER THROWING	1	2 1/2H 10M 1.0 KW
⑬	BELT-CONVEYOR FOR CORN SHELLER EXHAUST	1	1.5 1/2H 3.4M 0.4 KW
⑭	INTAKE HOPPER	1	CAP 960 KG
⑮	BUCKET ELEVATOR FOR BINS(B) THROWING	1	1.5 1/2H 9.3M 0.4 KW
⑯	BINS (B)	2	CAP 4 TON
⑰	BELT-CONVEYOR FOR BINS(B) EXHAUST	1	2 1/2H 6.9M 0.4 KW
⑱	BUCKET ELEVATOR FOR TANKS THROWING	1	〃 1.5M 〃
⑲	TANKS	2	CAP 4 TON
⑳	BELT-CONVEYOR FOR TANKS EXHAUST	1	1 1/2H 8M 1.0 KW
㉑	INTAKE HOPPER	1	CAP 960 KG
㉒	BUCKET ELEVATOR FOR FLUX CONTROL TANK THROWING	1	1 1/2H 8.4M 0.4 KW
㉓	NO.2A5 SEED CLEANER	1	1 1/2H 0.75 KW
㉔	DUST COLLECTING CYCLONE	1	-
㉕	BUCKET ELEVATOR FOR NO.2 PRECISION GRADER THROWING	1	1 1/2H 6.6M 0.4 KW
㉖	NO.2 PRECISION GRADER	1	〃 0.4 KW
㉗	BUCKET ELEVATOR FOR SEED TREATER THROWING	1	〃 5.7M 0.4 KW
㉘	SEED TREATER	1	〃 TYPE-ST-1 0.4 KW×2
㉙	BUCKET ELEVATOR FOR RESERVOIR TANK THROWING	1	〃 7.5M 0.4 KW
㉚	RESERVOIR TANK	1	CAP 1200 KG
㉛	BALANCE SCALE	1	TYPE-SH-50 RANGE-30 KG
㉜	BAG CLOSER	1	TYPE-BCDS-2T 0.2 KW
㉝	DUST COLLECTING CYCLONE	1	MOTOR CYCLONE 3.7 KW TYPE-CS-15MM×4 700MMAQ
㉞	FLUX CONTROL TANK	1	CAP 120 KG
㉟	CONTROL PANEL (A)	1	VERTICAL TYPE
㊱	CONTROL PANEL (B)	1	〃
㊲	FANS (B)	2	Q=480M³/MIN 13 KW P=1000MMAQ
㊳	HEATER (B)	2	TYPE-IIIA-IIA CAP 380000KCAL/H

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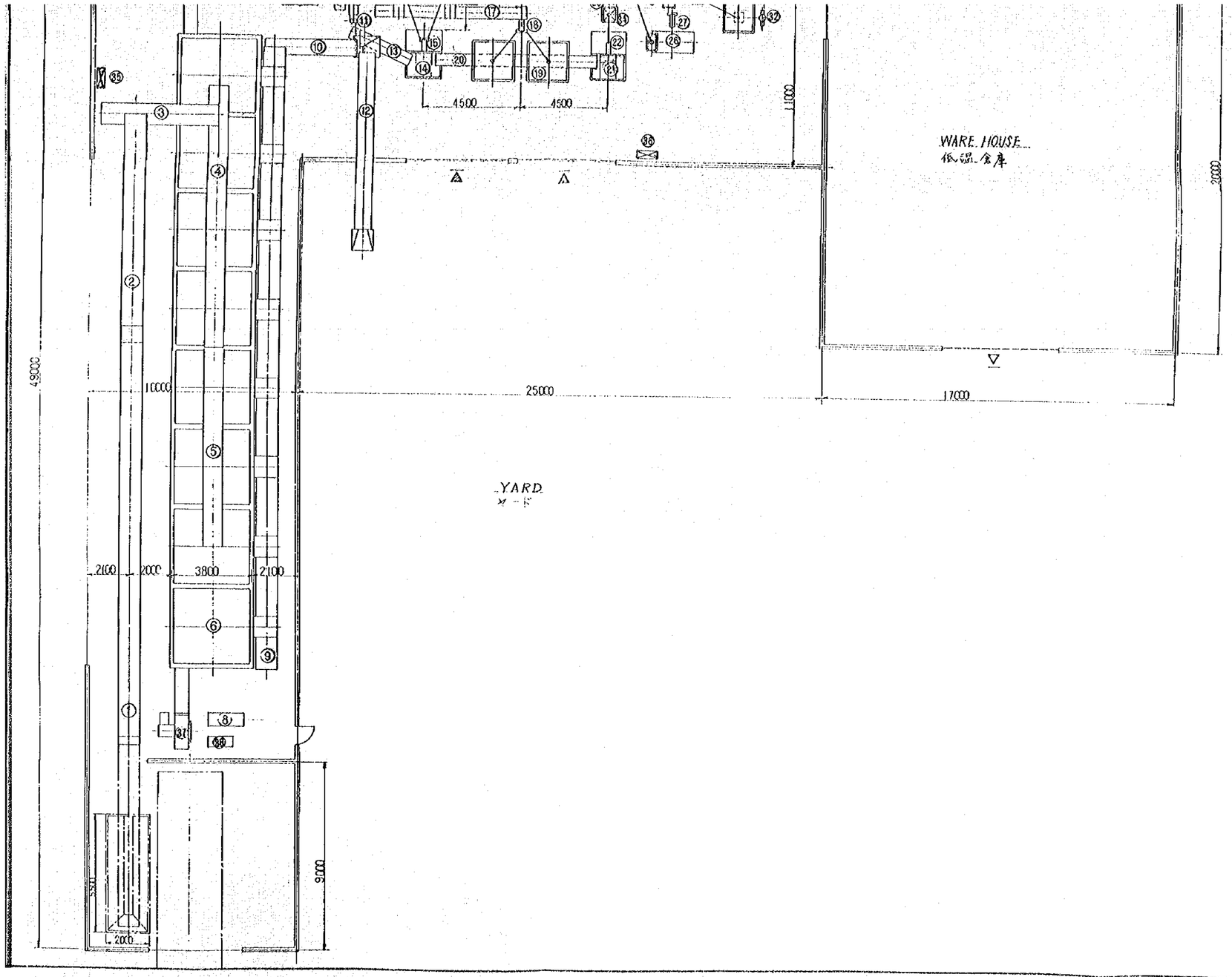
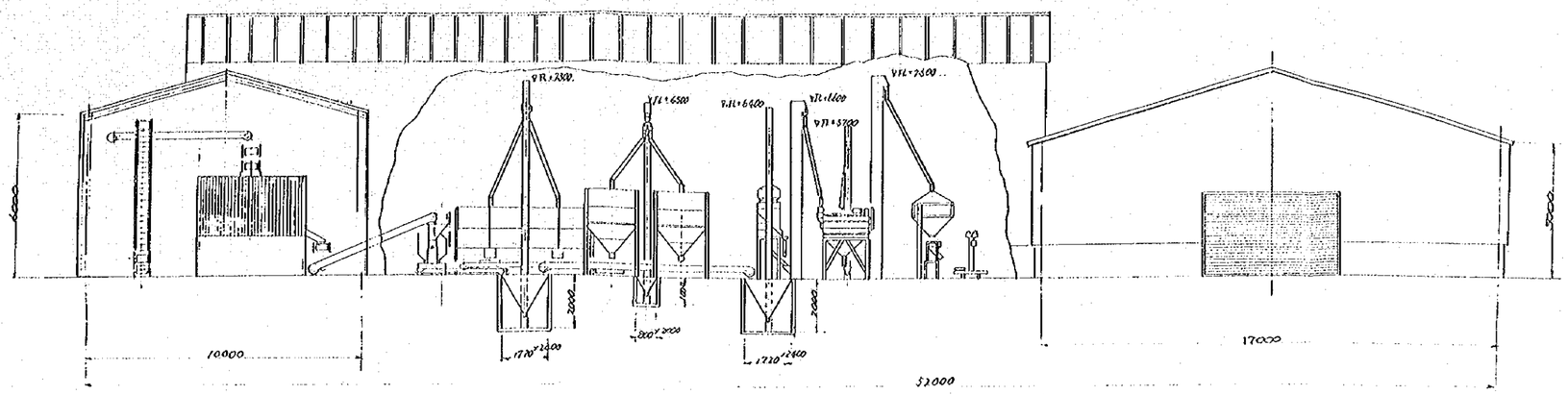


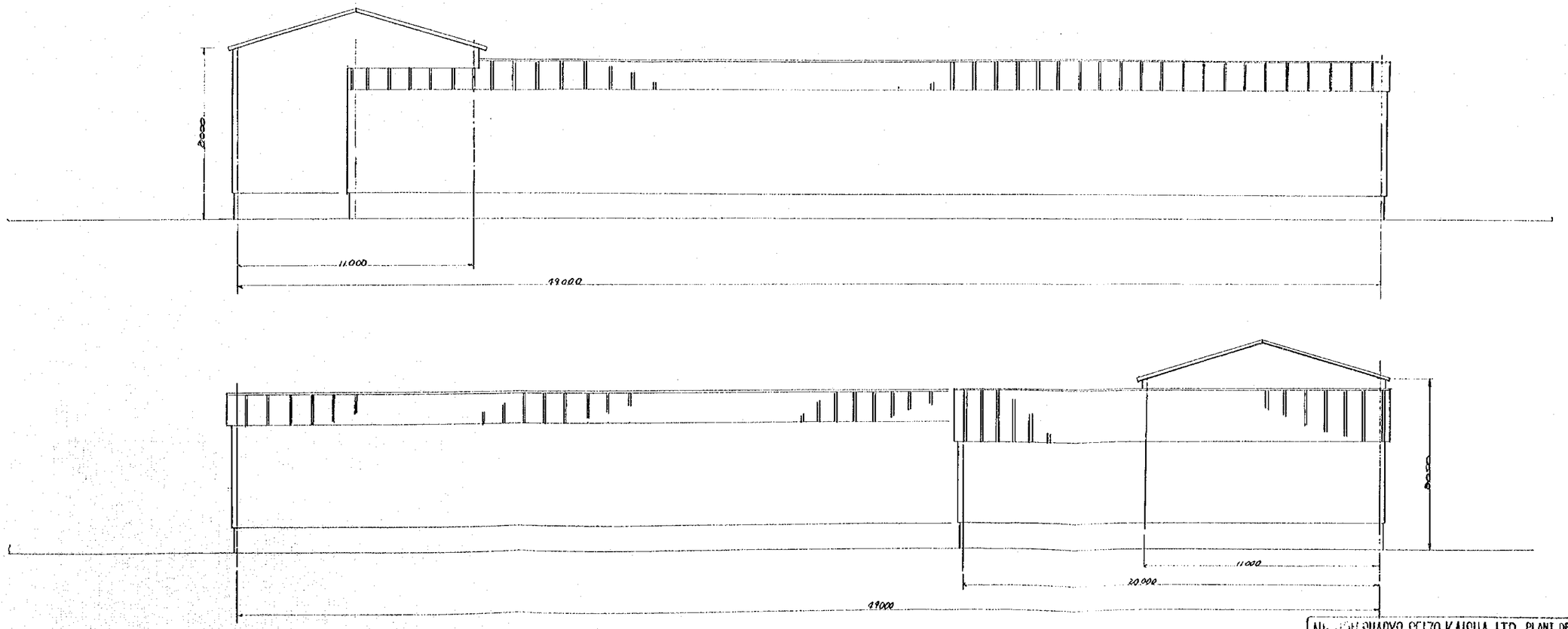
⑧	FAN (A)	1	P.760MM/AQ 15 KW
⑨	HEATER (A)	3	TYPE-HP-25C CAP 9500KCAL/H
⑩	BELT-CONVEYOR FOR BINS(A) EXHAUST	1	2 1/4 30.95M 1.5 KW
⑪	CLIMBING B.C (B)	1	" 5.3M 1.0 KW
⑫	CORN SHELLER	1	1.5 3/4 TYPE-No 72 1.0 KW
⑬	BELT-CONVEYOR FOR CORN SHELLER THROWING	1	2 1/4 10 M 1.0 KW
⑭	BELT-CONVEYOR FOR CORN SHELLER EXHAUST	1	1.5 1/4 3.1M 0.4 KW
⑮	INTAKE HOPPER	1	CAP. 142 KG
⑯	BUCKET ELEVATOR FOR BINS(B) THROWING	1	1.5 1/4 9.3M 0.4 KW
⑰	BINS (B)	2	CAP. 4 TON
⑱	BELT-CONVEYOR FOR BINS(B) EXHAUST	1	2 1/4 6.9 M 0.4 KW
⑲	BUCKET ELEVATOR FOR TANKS THROWING	1	" 7.5M "
⑳	TANKS	2	CAP. 4 TON
㉑	BELT-CONVEYOR FOR TANKS EXHAUST	1	1 1/4 8M 1.0 KW
㉒	INTAKE HOPPER	1	CAP. 960 KG
㉓	BUCKET ELEVATOR FOR FLUX CONTROL TANK THROWING	1	1 1/4 8.4M 0.4 KW
㉔	NO 2 S. SEED CLEANER	1	1 1/4 0.75 KW
㉕	DUST COLLECTING CYCLONE	1	-
㉖	BUCKET ELEVATOR FOR No 2 PRECISION GRADER THROWING	1	1 1/4 6.6 M 0.4 KW
㉗	NO 2 PRECISION GRADER	1	" 0.4 KW
㉘	BUCKET ELEVATOR FOR SEED TREATER THROWING	1	" 5.2M 0.4 KW
㉙	SEED TREATER	1	" TYPE-SS-1 0.4 KW×2
㉚	BUCKET ELEVATOR FOR RESERVOIR TANK THROWING	1	" 7.5 M 0.4 KW
㉛	RESERVOIR TANK	1	CAP. 1200 KG
㉜	BALANCE SCALE	1	TYPE-SH-50 RANGE-30 KG
㉝	BAG CLOSER	1	TYPE-B(DS-2) 0.2 KW
㉞	DUST COLLECTING CYCLONE	1	MOTOR CYCLONE 3.7 KW TYPE C-3 15M³/MIN 300mmAQ
㉟	FLUX CONTROL TANK	1	CAP. 120 KG
㊱	CONTROL PANEL (A)	1	VERTICAL TYPE
㊲	CONTROL PANEL (B)	1	"
㊳	FANS (B)	2	Q=180M³/MIN 15 KW P=760MMAQ
㊴	HEATER (B)	2	TYPE-HP-15 CAP 5200KCAL/H

NIPPON SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO

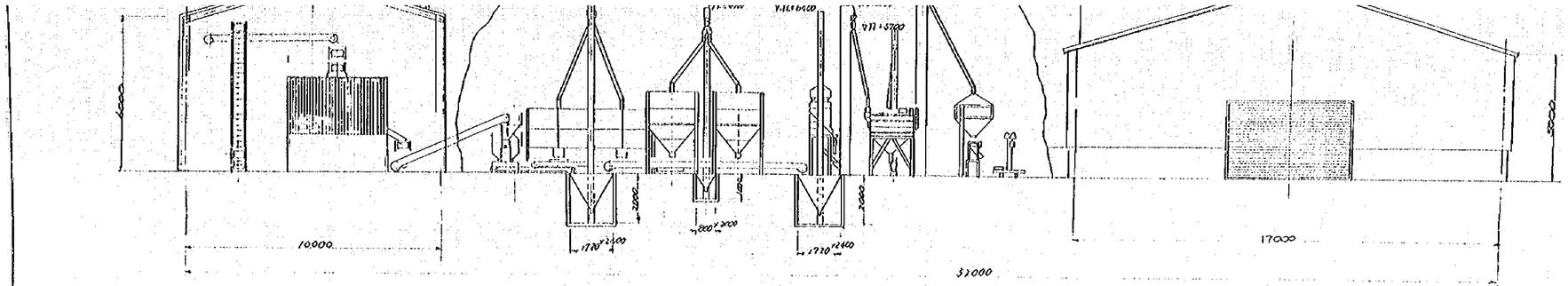
DROWN	K. OHMOMO	NOTE:- SEED PROCESSING PLANT (CORN) — PLAN —
CHECKED		
DSG. ENG.	K. OHMOMO	
PRIN. DSG. ENG.		DATE MAR 1976 SCALE 1/100
CHIEF ENG.		

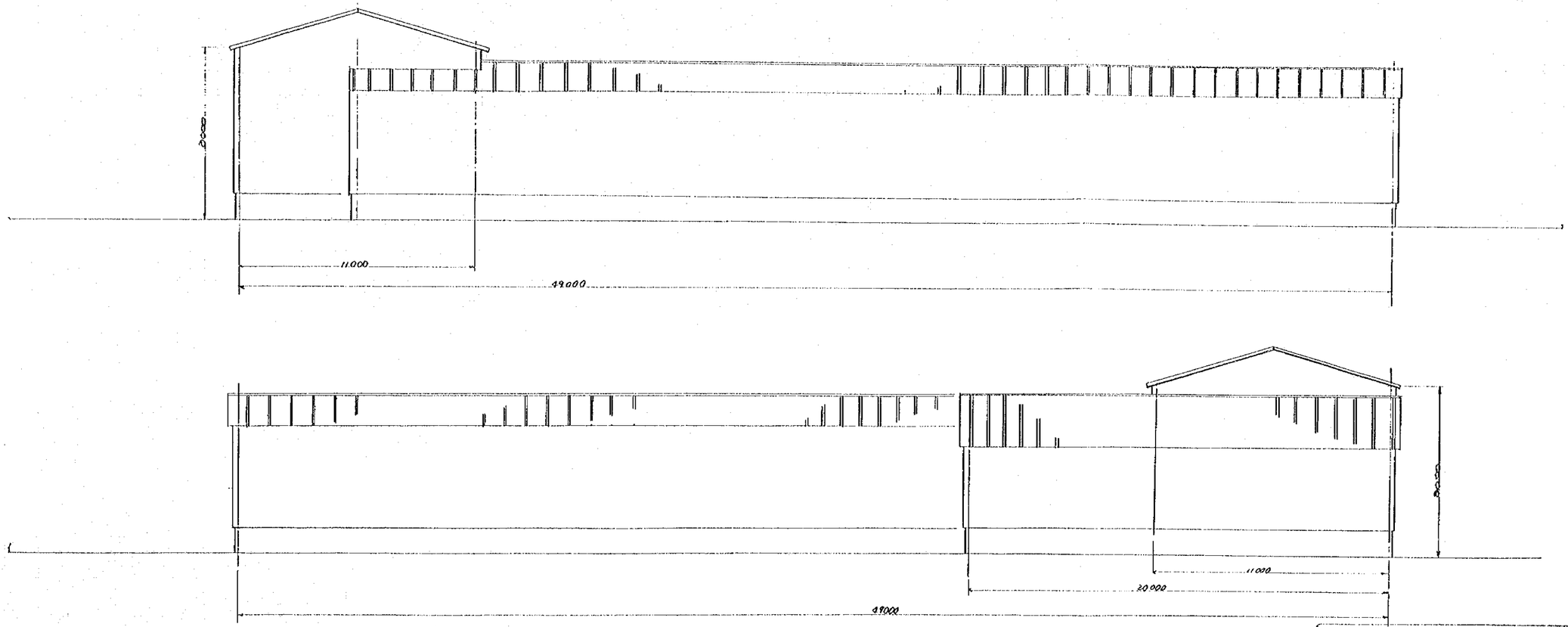
DRG. NO. H-B-952





NIHON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

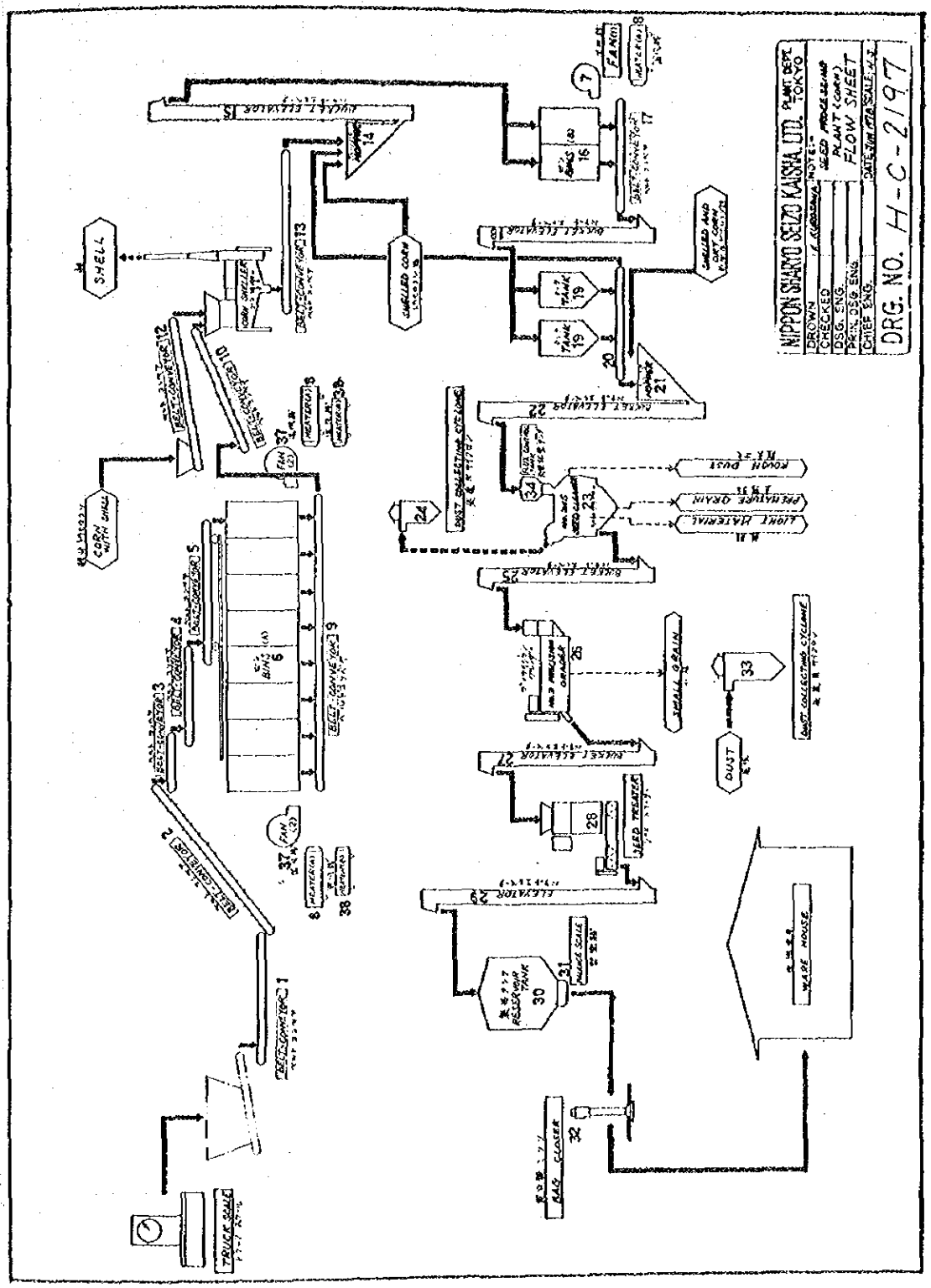


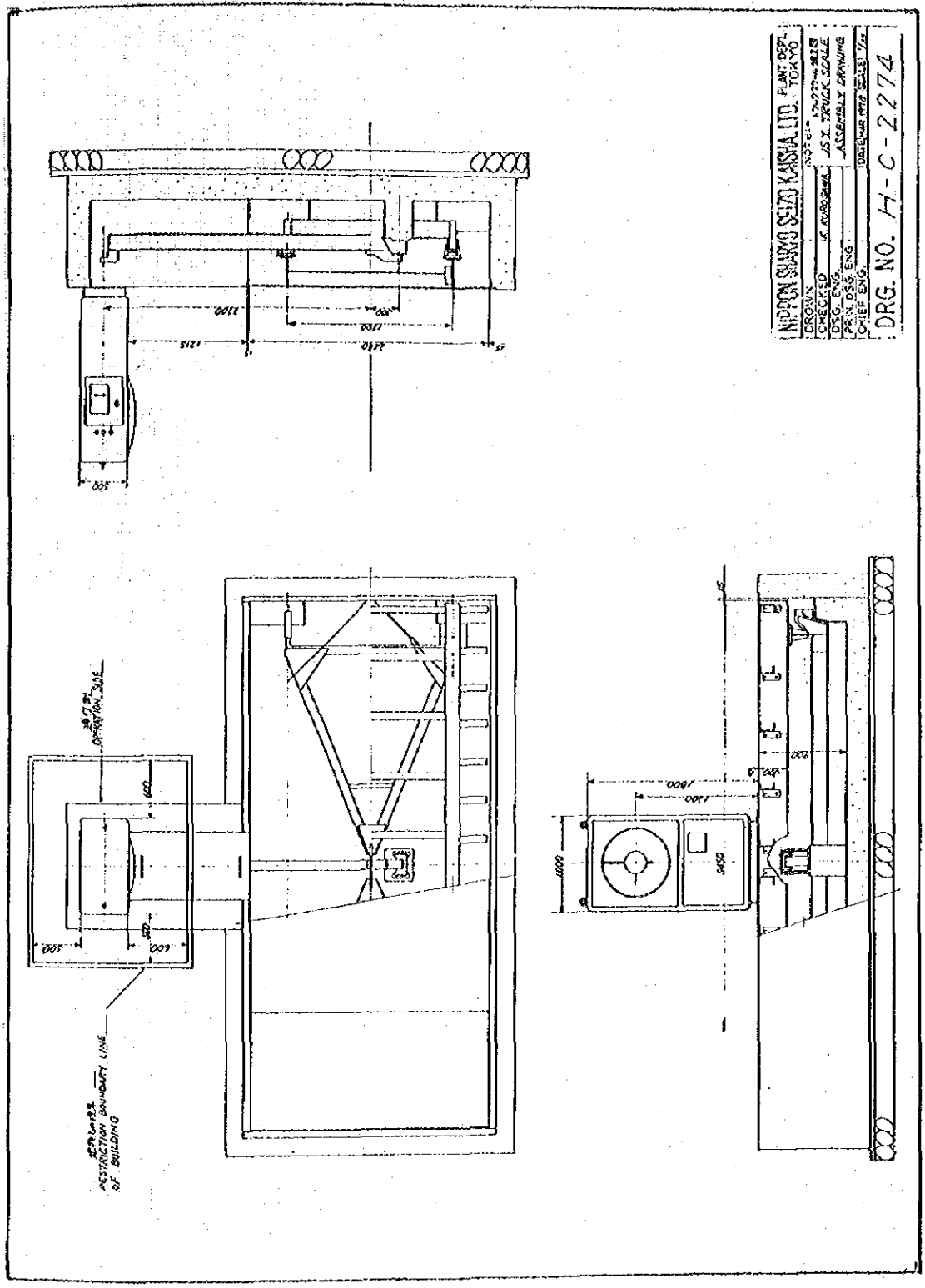


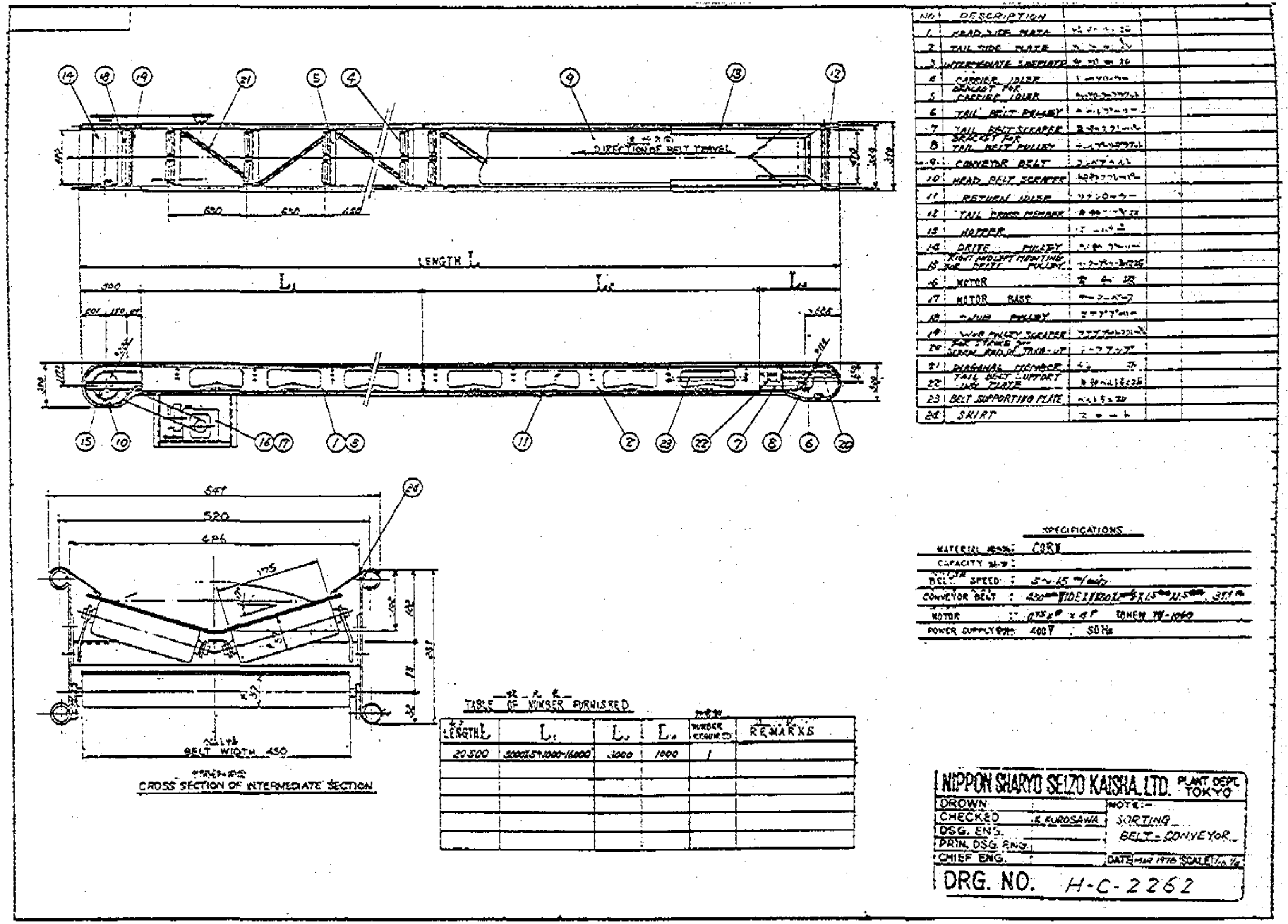
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN		NOTE:-
CHECKED	K. KUROSAWA	SEED PROCESSING PLANT (CORN)
DSG. ENG.		— ELEVATION —
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR 1978 SCALE 1/100

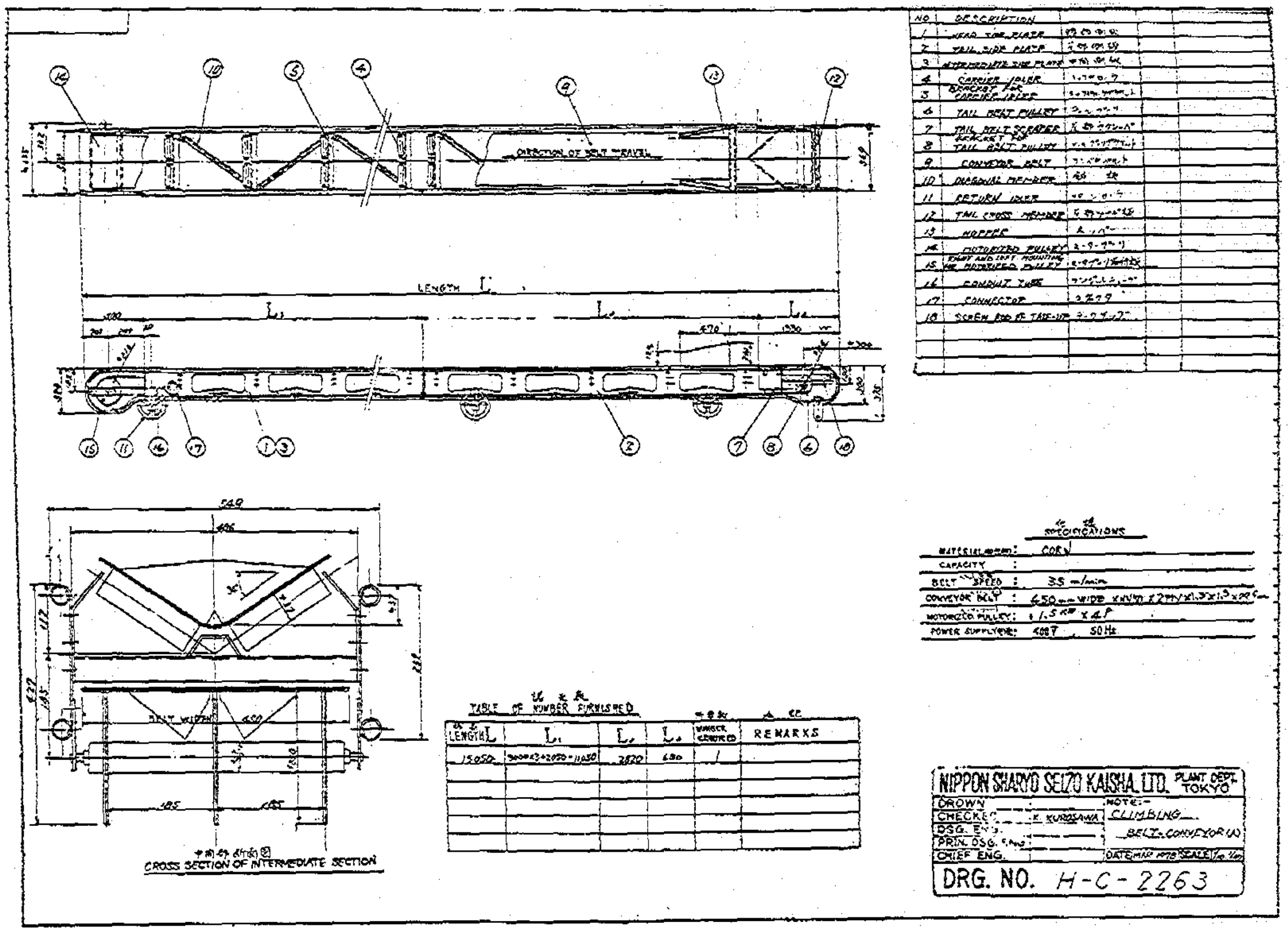
DRG. NO. H-B- 953

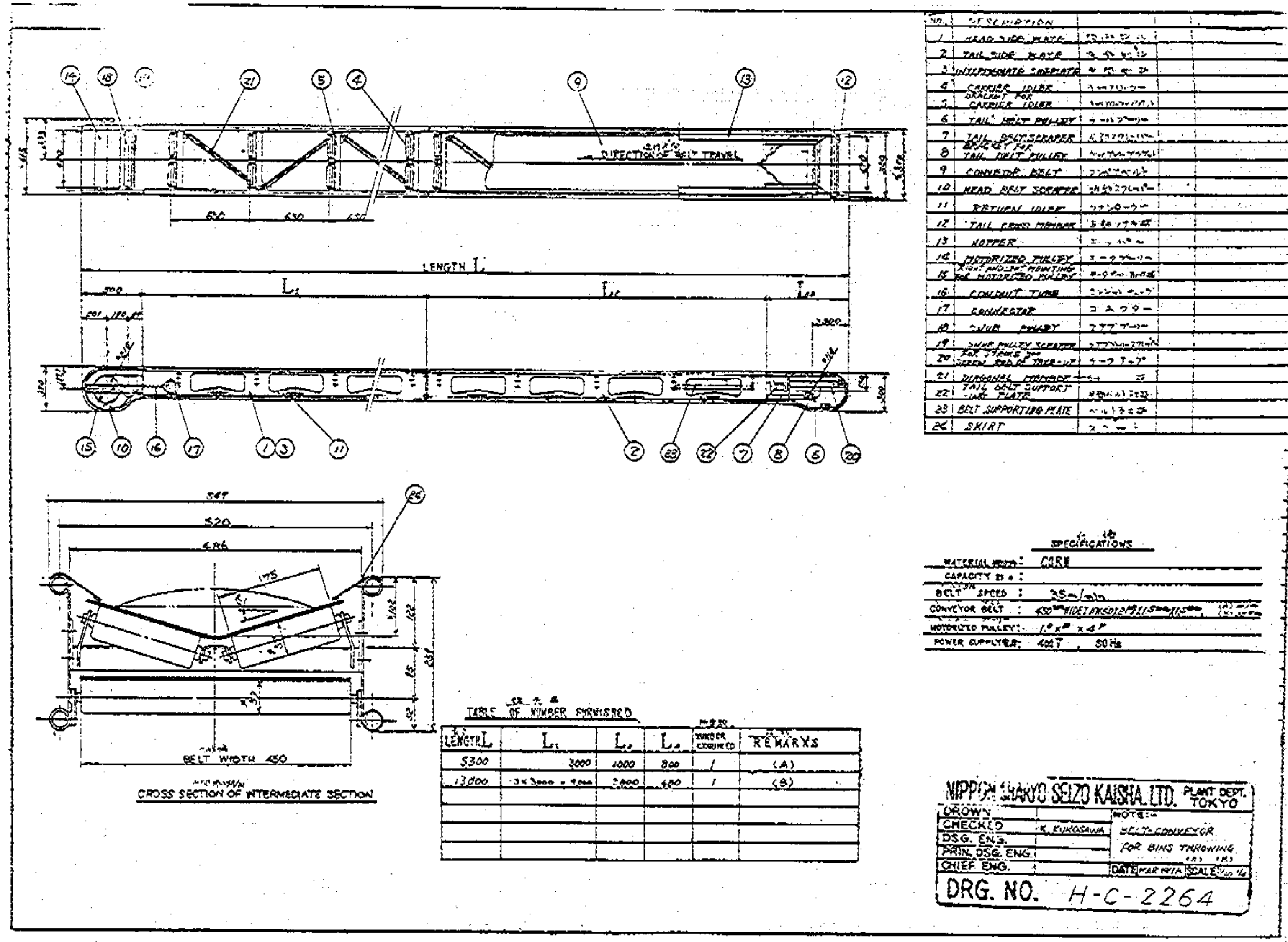

NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO
DRG. NO. H-C-2197
SEED PROCESSING PLANT (CORN) FLOW SHEET
SHELL
CORN WITH SHELL
TRUCK SCALE
BAG CLEANER
WEIGH HOUSE
DUST
SMALL GRAIN
LIGHT MATERIAL
PRELIMINARY GRAIN
ROUGH DUST
DUST COLLECTING CYCLONE
BUCKET ELEVATOR
BELT CONVEYOR
SCREW CONVEYOR
FAN
HEATER
RESERVOIR TANK
SEED TREATER


NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO
DRG. NO. H-C-2274
ASSEMBLY DRAWING
JS X TRUCK SCALE

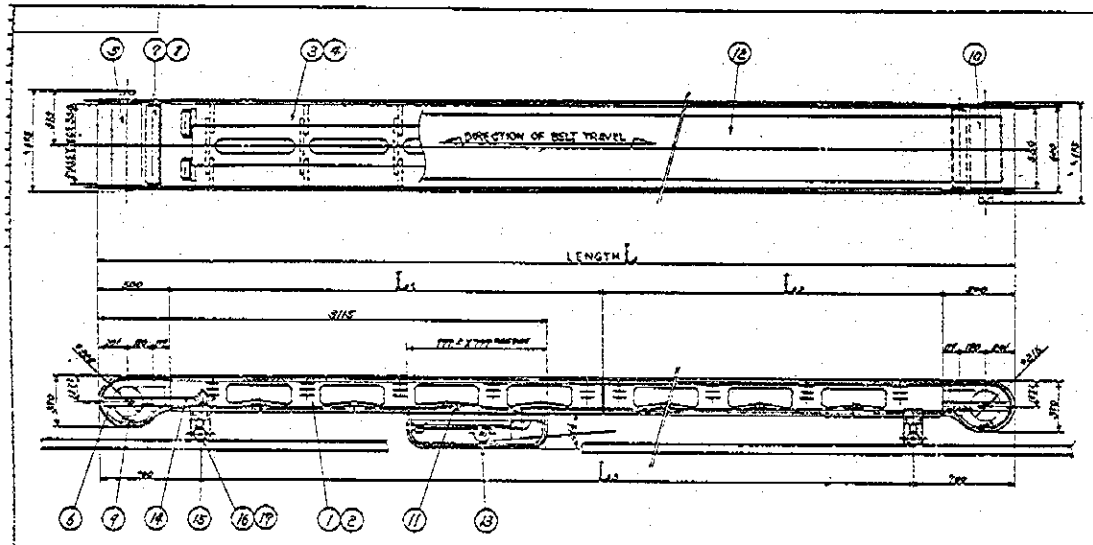


LENGTH L
DIRECTION OF BELT TRAVEL
CROSS SECTION OF INTERMEDIATE SECTION
BELT WIDTH 450
520
TABLE OF NUMBER FURNISHED
LENGTH L | L1 | L2 | L3 | NUMBER REQUIRED | REMARKS
20500 | 3000 | 3000 | 1000 | 1
NO. DESCRIPTION
1 HEAD SIDE PLATE
2 TAIL SIDE PLATE
3 INTERMEDIATE SIDEPLATE
4 CARRIER IDLER
5 BRACKET FOR CARRIER IDLER
6 TAIL BELT PULLEY
7 TAIL BELT SCRAPER
8 BRACKET FOR TAIL BELT PULLEY
9 CONVEYOR BELT
10 HEAD BELT SCRAPER
11 RETURN IDLER
12 TAIL CROSS MEMBER
13 HOPPER
14 DRIVE PULLEY
15 RIGHT AND LEFT MOUNTING FOR DRIVE PULLEY
16 MOTOR
17 MOTOR BASE
18 SNUB PULLEY
19 SNUB PULLEY SCRAPER
20 FOR STROKE SCREW ROD OF TAKE-UP
21 DIAGONAL MEMBER
22 TAIL BELT SUPPORTING PLATE
23 BELT SUPPORTING PLATE
24 SKIRT
SPECIFICATIONS
MATERIAL : CORN
CAPACITY :
BELT SPEED : 5~15 m/min
MOTOR :
POWER SUPPLY : 400V , 50Hz
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO
DROWN
CHECKED E.KUROSAWA
DSG. ENG.
PRIN. DSG. ENG.
CHIEF ENG.
NOTE:- SORTING BELT - CONVEYOR
DATE MAR 1976
DRG. NO. H-C-2262

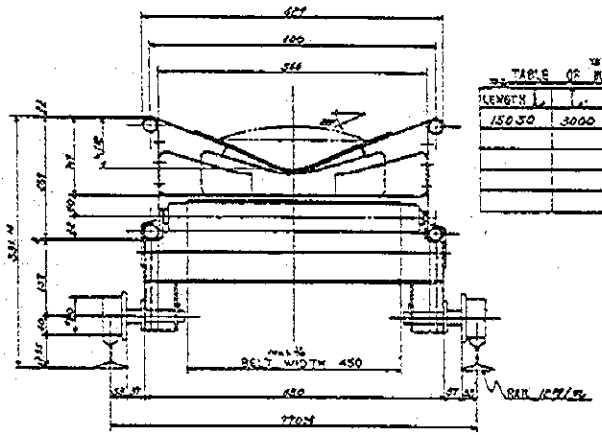

NO.
DESCRIPTION
1 HEAD SIDE PLATE
2 TAIL SIDE PLATE
3 INTERMEDIATE SIDE PLATE
4 CARRIER IDLER
5 BRACKET FOR CARRIER IDLER
6 TAIL BELT PULLEY
7 TAIL BELT SCRAPER
8 BRACKET FOR TAIL BELT PULLEY
9 CONVEYOR BELT
10 DIAGONAL MEMBER
11 RETURN IDLER
12 TAIL CROSS MEMBER
13 HOPPER
14 MOTORIZED PULLEY
15 RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY
16 CONDUIT TUBE
17 CONNECTOR
18 SCREW ROD OF TAKE-UP
DIRECTION OF BELT TRAVEL
LENGTH L
SPECIFICATIONS
MATERIAL: CORN
CAPACITY :
BELT SPEED : 35 m/min
CONVEYOR BELT : 650 mm WIDE
MOTORIZED PULLEY : 1.5 kW x 4P
POWER SUPPLY : 400V 50Hz
BELT WIDTH
CROSS SECTION OF INTERMEDIATE SECTION
TABLE OF NUMBER FURNISHED
LENGTH L
REMARKS
15050
2820
650
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO
DROWN
CHECKED
K. KUROSAWA
DSG. ENG.
PRIN. DSG.
CHIEF ENG.
NOTE:-
CLIMBING BELT CONVEYOR
DATE
SCALE
DRG. NO. H-C-2263



NO. DESCRIPTION
1 HEAD SIDE PLATE
2 TAIL SIDE PLATE
3 INTERMEDIATE SIDEPLATE
4 CARRIER IDLER
5 BRACKET FOR CARRIER IDLER
6 TAIL BELT PULLEY
7 TAIL BELT SCRAPER
8 BRACKET FOR TAIL BELT PULLEY
9 CONVEYOR BELT
10 HEAD BELT SCRAPER
11 RETURN IDLER
12 TAIL CROSS MEMBER
13 HOPPER
14 MOTORIZED PULLEY
15 RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY
16 CONDUIT TUBE
17 CONNECTOR
18 SNUB PULLEY
19 SNUB PULLEY SCRAPER
20 FOR STROKE 300 SCREW ROD OF TAKE-UP
21 DIAGONAL MEMBER
22 TAIL BELT SUPPORTING PLATE
23 BELT SUPPORTING PLATE
24 SKIRT
DIRECTION OF BELT TRAVEL
LENGTH L
CROSS SECTION OF INTERMEDIATE SECTION
BELT WIDTH 450
SPECIFICATIONS
MATERIAL: CORN
BELT SPEED: 35m/min
POWER SUPPLY: 400V, 50Hz
TABLE OF NUMBER FURNISHED
LENGTH L | L_1 | L_2 | L_3 | NUMBER REQUIRED | REMARKS
5300 | 3000 | 1000 | 800 | 1 | (A)
13000 | 3×3000 = 9000 | 2800 | 600 | 1 | (B)
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO
DRAWN
CHECKED K. KUROSAWA
DSG. ENG.
PRIN. DSG. ENG.
CHIEF ENG.
NOTE: BELT-CONVEYOR FOR BINS THROWING (A) (B)
DRG. NO. H-C-2264



NO	DESCRIPTION	
1	HEAD SIDE PLATE	
2	INTERMEDIATE SIDE PLATE	
3	HEAD END TAIL SIDE PLATE	
4	BELT SUPPORTING PLATE	
5	MOTORIZED PULLEY	
6	SNUB PULLEY MOTORIZED PULLEY	
7	SNUB PULLEY	
8	SNUB PULLEY SCRAPER	
9	HEAD BELT SCRAPER	
10	TAIL BELT PULLEY	
11	RETURN IDLER	
12	CONVEYOR BELT	
13	INTERMEDIATE TAKE-UP	
14	CONDUIT TUBE	
15	CONNECTOR	
16	WHEEL	
17	WHEEL BASE	



CROSS SECTION OF INTERMEDIATE SECTION

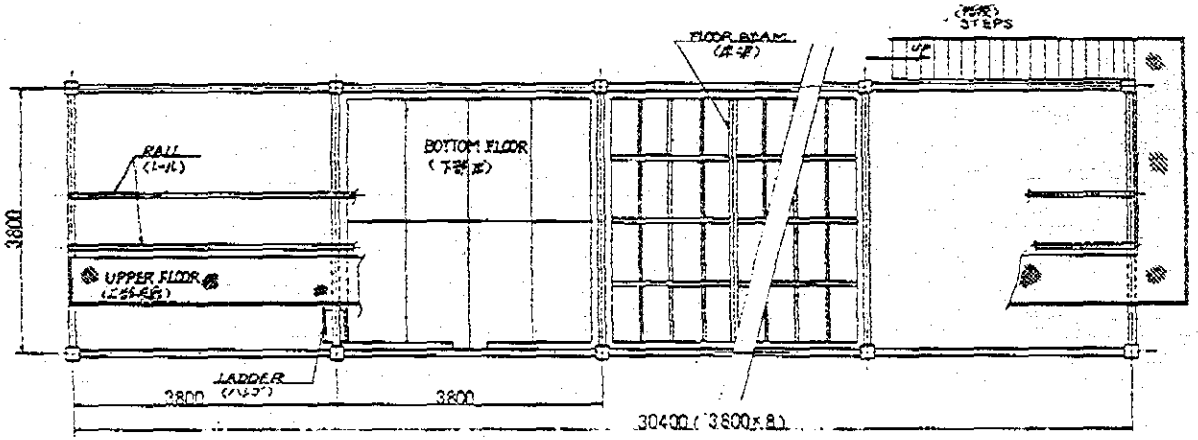
TABLE OF NUMBER FURNISHED

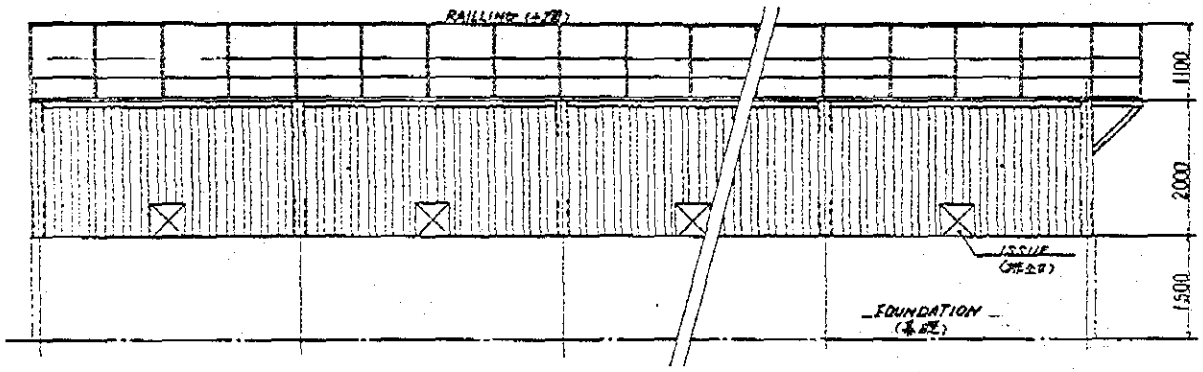
LENGTH L	L1	L2	L3	WHEEL REQUIRED	REMARKS
15030	3000	3000+3+1050=11050	4350+3=13650	/	

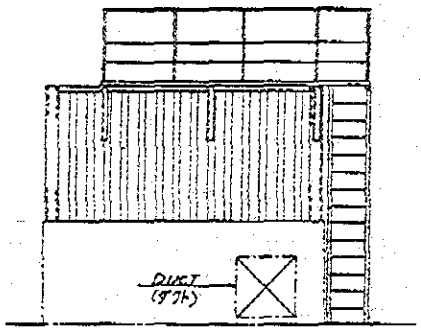
SPECIFICATIONS

MATERIAL	:	CORN
CAPACITY	:	
BELT SPEED	:	55
CONVEYOR BELT	:	450
MOTORIZED PULLEY	:	SUBBER LAGGING
POWER SUPPLY	:	400 , 50

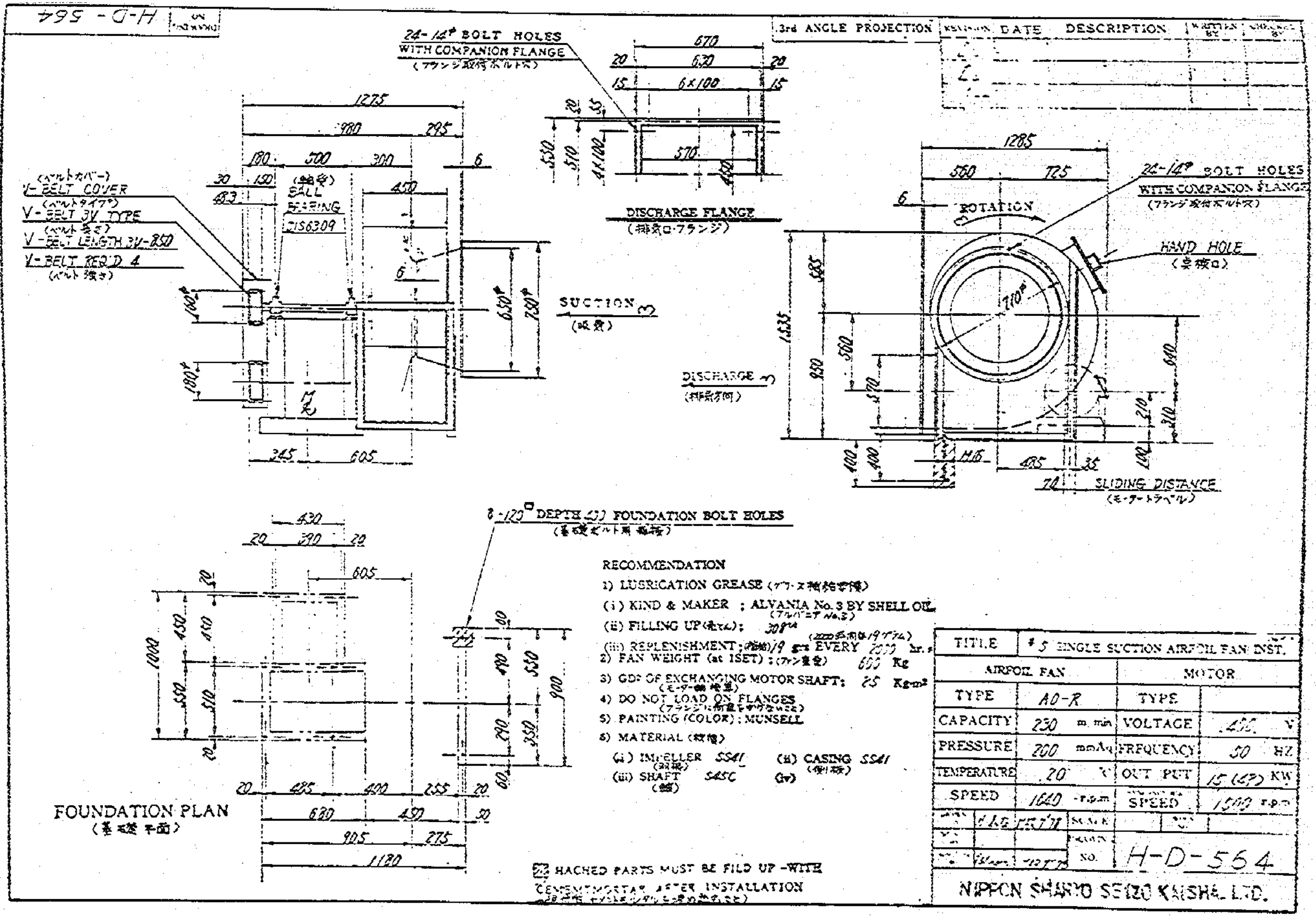
NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO		
DROWN		NOTE:- BELT-CONVEYOR FOR BINS THROWING (C)
CHECKED	K KUROSAWA	
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR 1974 SCALE 1/2
DRG. NO. H-C-2265		

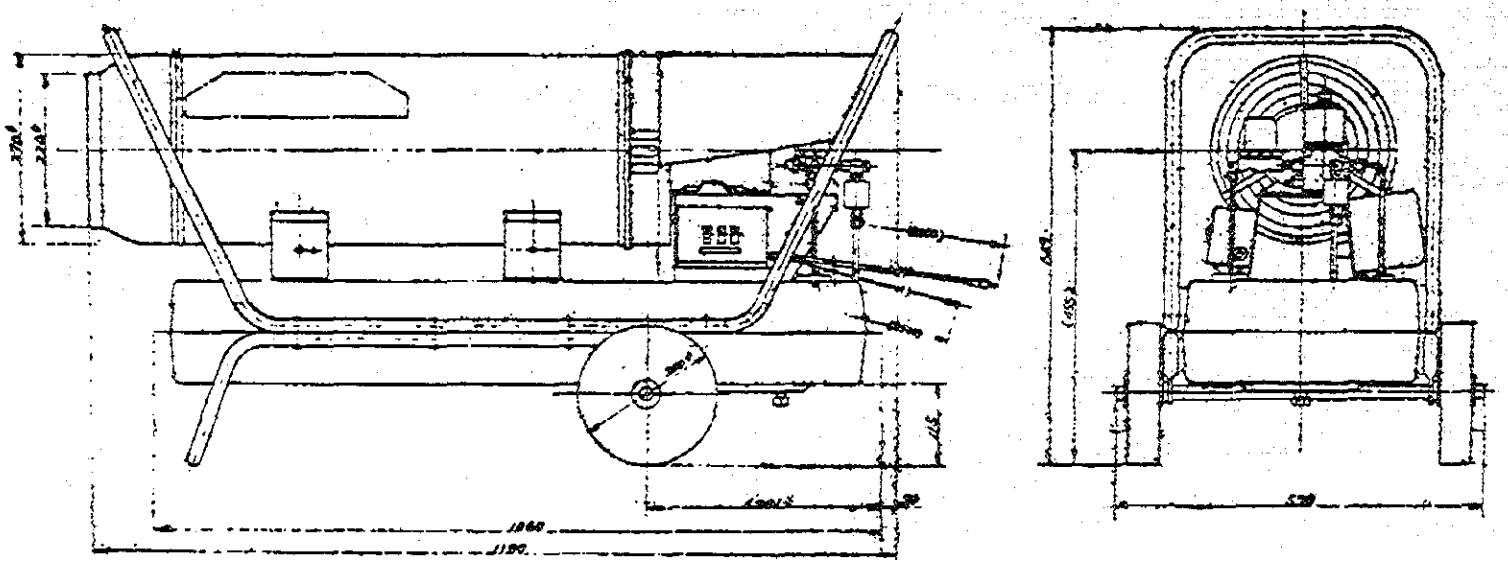






NIPPON CHARYO SEIZO KAISHA, LTD.		PLANT DEPT. TOKYO
DROWN	K. OHMORI	NOTE:-
CHECKED		B/NS(A)
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR-1958 SCALE 1/50
DRG. NO. H-C-2275		


H-D-564
24-14φ BOLT HOLES
WITH COMPANION FLANGE
(フランジ取付ボルト穴)
3rd ANGLE PROJECTION
DATE
DESCRIPTION
V-BELT COVER
(ベルトカバー)
V-BELT 3V TYPE
(ベルトタイプ)
V-BELT LENGTH 3V-850
(ベルト長さ)
V-BELT REQ'D 4
(ベルト本数)
BALL BEARING
JIS6309
SUCTION
(吸気)
DISCHARGE FLANGE
(排気口フランジ)
DISCHARGE
(排気方向)
ROTATION
HAND HOLE
(点検口)
SLIDING DISTANCE
(モータートラベル)
8-120□ DEPTH 450 FOUNDATION BOLT HOLES
(基礎ボルト用穴)
FOUNDATION PLAN
(基礎平面)
RECOMMENDATION
1) LUBRICATION GREASE
(i) KIND & MAKER ; ALVANIA No. 3 BY SHELL OIL
(ii) FILLING UP 308
(iii) REPLENISHMENT 19 grs EVERY 2000 hr.s
2) FAN WEIGHT (at 1SET) : (ファン重量) 600 Kg
3) GD² OF EXCHANGING MOTOR SHAFT: 25 Kg·m²
4) DO NOT LOAD ON FLANGES
5) PAINTING (COLOR) : MUNSELL
6) MATERIAL
(i) IMPELLER SS41
(ii) CASING SS41
(iii) SHAFT S45C
(iv)
HACHED PARTS MUST BE FILD UP -WITH
CEMENT MORTAR AFTER INSTALLATION
TITLE #5 SINGLE SUCTION AIRFOIL FAN INST.
AIRFOIL FAN
MOTOR
TYPE AO-R
TYPE
CAPACITY 230 m³/min
VOLTAGE 400 V
PRESSURE 200 mmAq
FREQUENCY 50 HZ
TEMPERATURE 20 °C
OUT PUT 15 (4P) KW
SPEED 1640 r.p.m
SPEED 1500 r.p.m
SCALE
NO. H-D-564
NIPPON SHARYO SEIZO KAISHA, LTD.



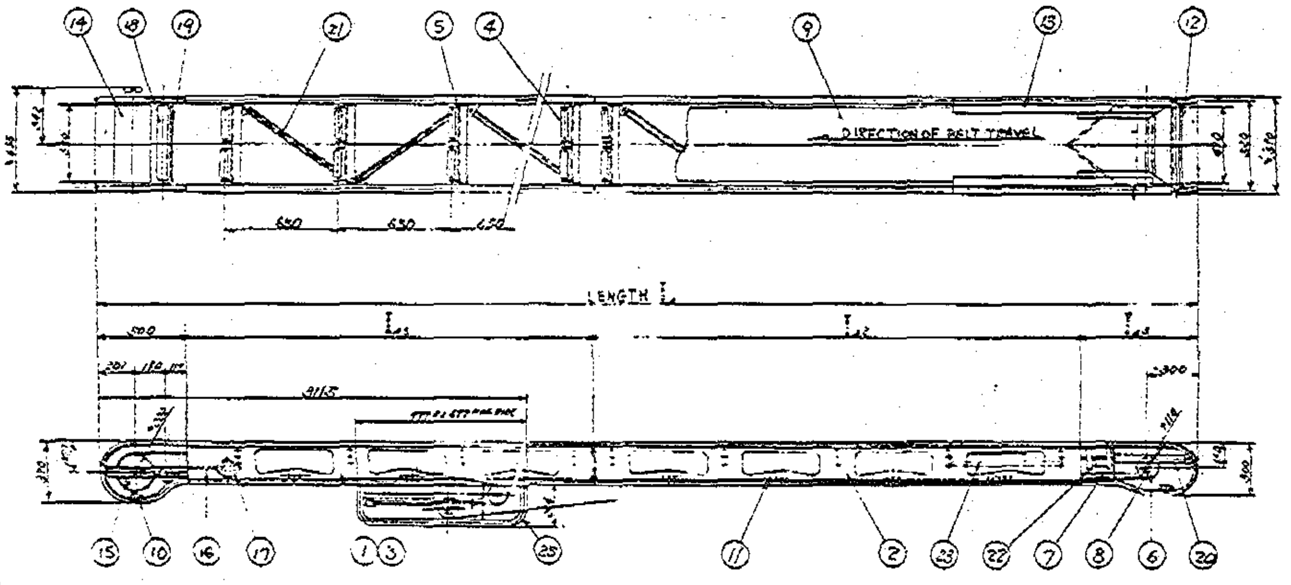
HPA-11A型 仕様	
電源	単相 230V 50 Hz
熱量	38000 kcal/hr
温風吹出量	14 m³/min
温風速度	5.1 m/sec (吹出口にて)
燃料タンク容量	48 L
燃料消費量	4 L/hr
モーター	単相 230V 65W
バーナー	油圧噴霧式 (約 7 kg/cm²)
燃料	軽油
点火装置	連続スパーク方式
外形寸法	高 647 × 巾 530 × 長 1190 mm
重量	50 kg
サーモスタット	取り付け可

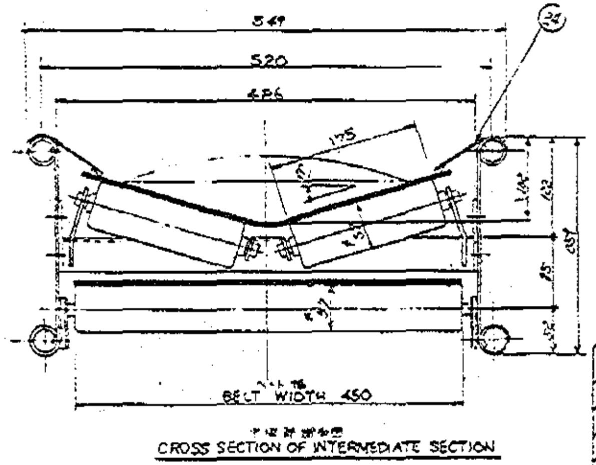
MODEL HPA-11A SPECIFICATION	
POWER REQUIREMENT	SINGLE-230V, 50 HZ
HEATING CAPACITY	38000 KCAL/HR
HOT AIR DELIVERY CAPACITY	14 M³/MIN.
HOT AIR SPEED	5.1 M/SEC. (AT OUTLET)
FUEL TANK CAPACITY	48 LITTERS
FUEL CONSUMPTION	4 LITTERS/HR.
MOTOR	SINGLE-PHASE 230V, 65W
BURNER	HIGH PRESSURE INJECTION (PRESSURE 7 KG/CM²)
FUEL	LIGHT OIL
IGNITION DEVICE	CONTINUOUS ELECTRICAL SPARK SYSTEM
EXTERIOR DIMENSIONS	HEIGHT 64.7CM, WIDTH 53.0CM LENGTH 118.0CM
WEIGHT	50 KG
THERMOSTAT	INSTALLATION POSSIBLE

NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN	NOTE:-
CHECKED K. KUROSAWA	HEATER (A) (HPA-11A)
DSG. ENG.	
PRIN. DSG. ENG.	
CHIEF ENG.	DATE MAR 1978 SCALE 1/5

DRG. NO. H-C-2272





CROSS SECTION OF INTERMEDIATE SECTION

NO	DESCRIPTION			
1	HEAD SIDE PLATE	頭部側板		
2	TAIL SIDE PLATE	尾部側板		
3	INTERMEDIATE SIDEPLATE	中間部側板		
4	CARRIER IDLER	キャリヤローラー		
5	BRACKET FOR CARRIER IDLER	キャリヤーブラケット		
6	TAIL BELT PULLEY	テールプーリー		
7	TAIL BELT SCRAPER	尾部スクレーパー		
8	BRACKET FOR TAIL BELT PULLEY	テールプーリーブラケット		
9	CONVEYOR BELT	コンベヤベルト		
10	HEAD BELT SCRAPER	頭部スクレーパー		
11	RETURN IDLER	リターンローラー		
12	TAIL CROSS MEMBER	尾部ツナギ材		
13	HOPPER	ホッパー		
14	MOTORIZED PULLEY	モータープーリー		
15	RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY	モータプーリ取付金具		
16	CONDUIT TUBE	コンジットチューブ		
17	CONNECTOR	コネクタ		
18	SNUB PULLEY	スナッププーリー		
19	SNUB PULLEY SCRAPER	スナッププーリースクレーパ		
20	FOR TAKE-UP SCREW ROD OF TAKE-UP	テークアップ		
21	DIAGONAL MEMBER	斜材		
22	TAIL BELT SUPPORTING PLATE	尾部ベルト支え板		
23	BELT SUPPORTING PLATE	ベルト支え板		
24	SKIRT	スカート		
25	INTERMEDIATE TAKE-UP	中間テークアップ		

仕様
SPECIFICATIONS

MATERIAL 運搬物 : CORN

CAPACITY 能力 :

BELT SPEED ベルト速度 : 35m/min

CONVEYOR BELT コンベヤベルト : 450mm WIDE × KN50 × 2P × 1.5mm × 1.5mm, 60.5m

MOTORIZED PULLEY モータープーリー : 1.5KW × 4P RUBBER LAGGING 3G

POWER SUPPLY 電源 : 400V, 50Hz

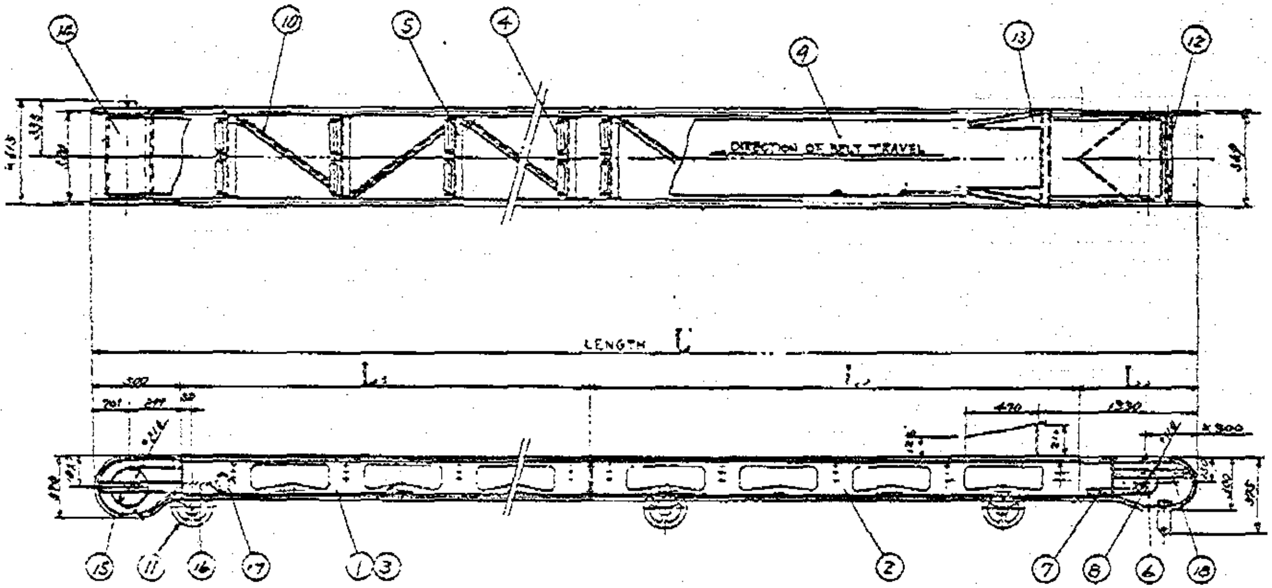
製作表
TABLE OF NUMBER FURNISHED

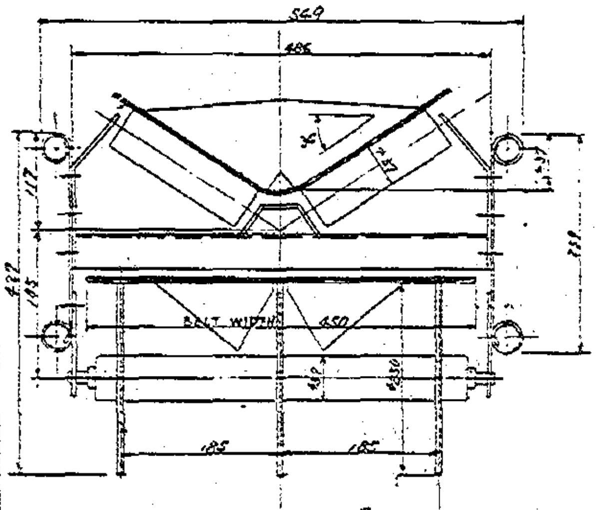
全長 LENGTH L	L₁	L₂	L₃	数量 NUMBER REQUIRED	記事 REMARKS
30050	3000×8+2050=26050	2920	680	1	

NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN		NOTE:-
CHECKED	K. KUROSAWA	BELT-CONVEYOR
DSG. ENG.		FOR BUNSUI EXHAUST
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR. 1978 SCALE 1/20 1/40

DRG. NO. H-C-2266





中間部断面図
CROSS SECTION OF INTERMEDIATE SECTION

NO	DESCRIPTION			
1	HEAD SIDE PLATE	頭部側板		
2	TAIL SIDE PLATE	尾部側板		
3	INTERMEDIATE SIDE PLATE	中間側板		
4	CARRIER IDLER	キャリアローラ		
5	BRACKET FOR CARRIER IDLER	キャリアブラケット		
6	TAIL BELT PULLEY	テールプーリ		
7	TAIL BELT SCRAPER	尾部スクレーパ		
8	BRACKET FOR TAIL BELT PULLEY	テールプーリブラケット		
9	CONVEYOR BELT	コンベヤベルト		
10	DIAGONAL MEMBER	斜材		
11	RETURN IDLER	リターンローラ		
12	TAIL CROSS MEMBER	尾部ツナギ板		
13	HOPPER	ホッパー		
14	MOTORIZED PULLEY	モータープーリ		
15	RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY	モータプーリ取付板		
16	CONDUIT TUBE	コンジットチューブ		
17	CONNECTOR	コネクタ		
18	SCREW ROD OF TAKE-UP	テークアップ		

仕様
SPECIFICATIONS

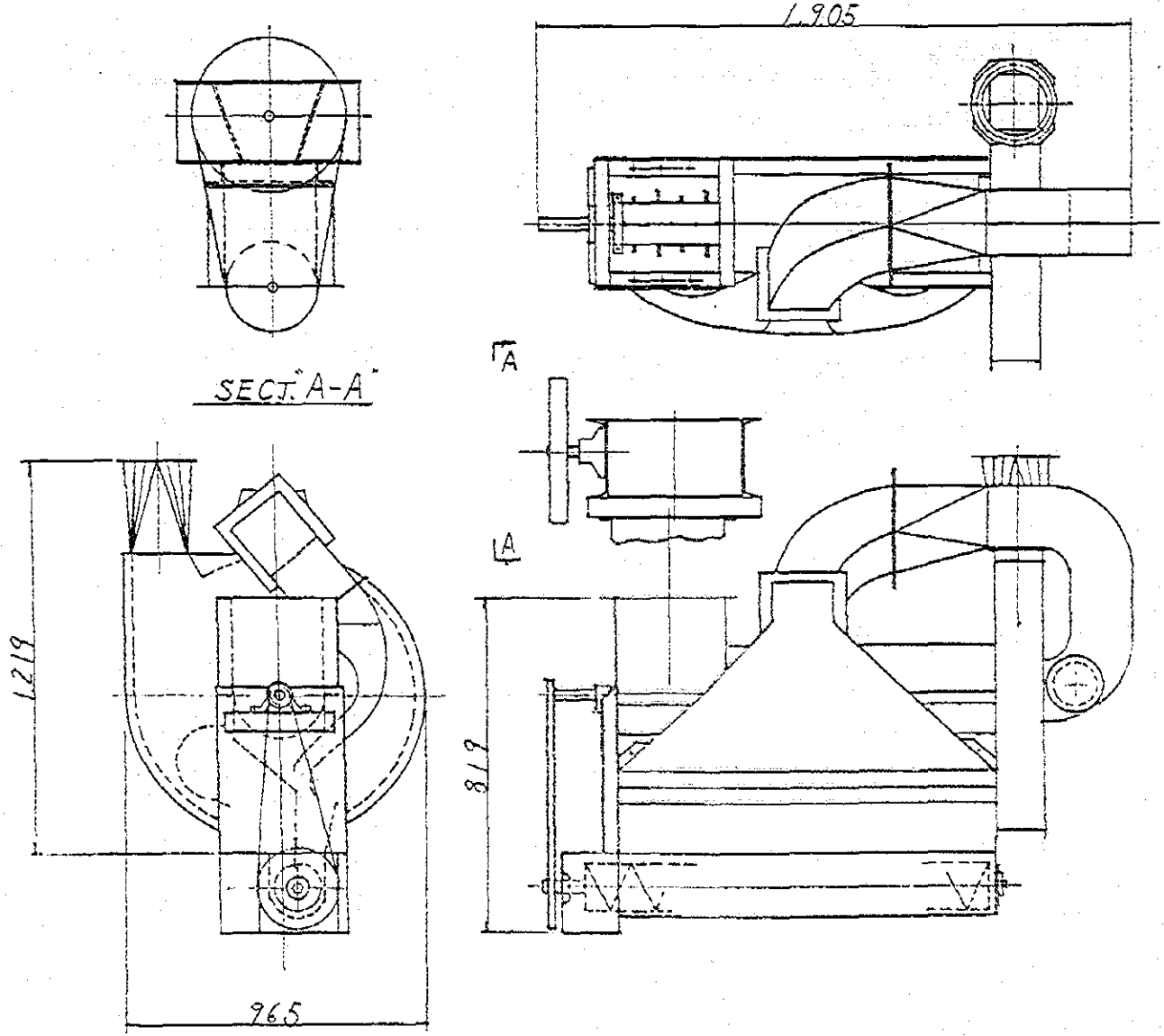
MATERIAL	CORN
CAPACITY :	
BELT SPEED :	35 m/min
CONVEYOR BELT :	450 mm WIDE xNN50 x2PLY x1.5 x 1.5 x 10.1 m
MOTORIZED PULLEY :	1.5 kW x 4 P
POWER SUPPLY :	400 V . 50 Hz

諸元表
TABLE OF NUMBER FURNISHED

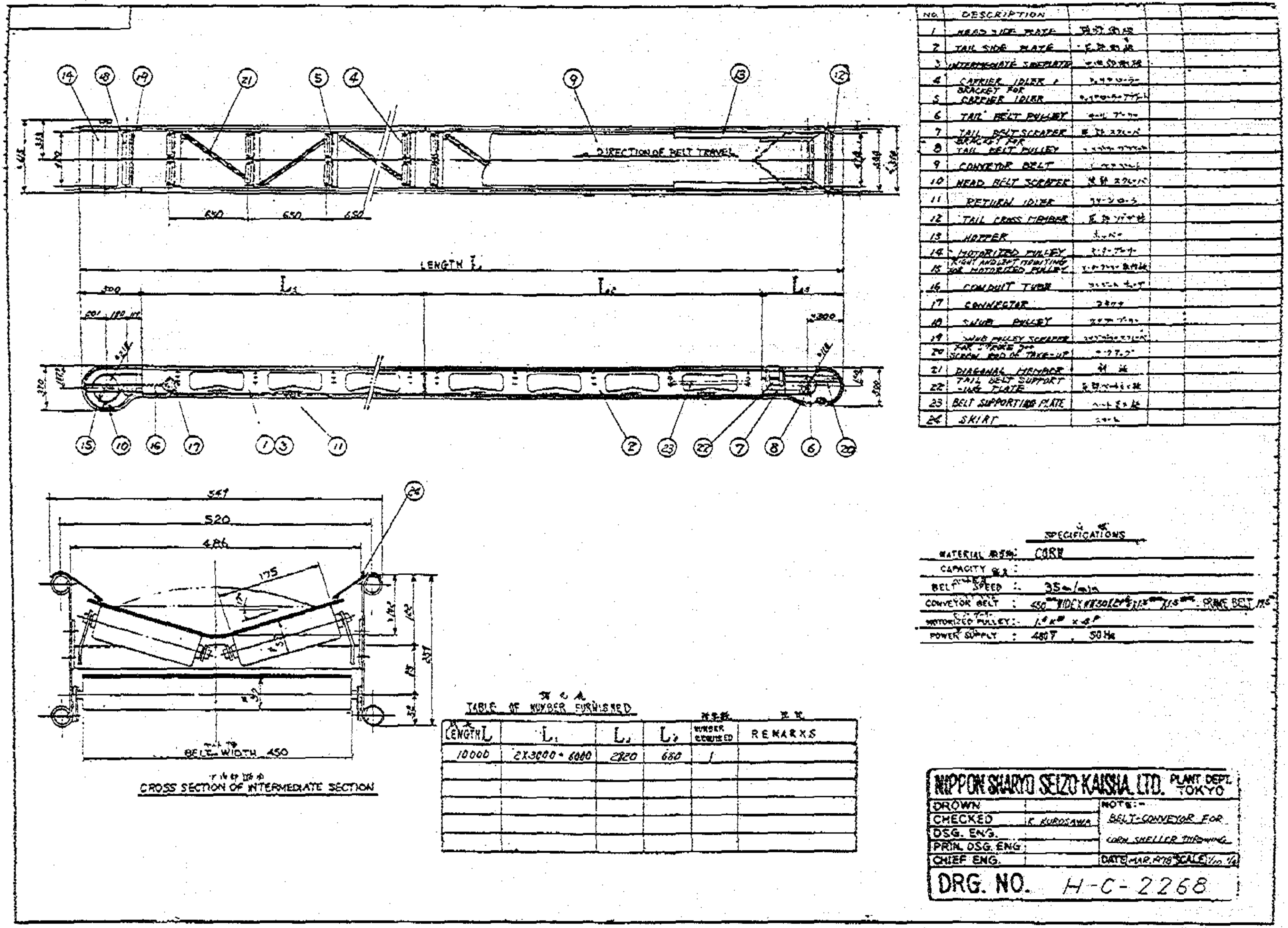
全長 LENGTH L	L_1	L_2	L_3	所要数 NUMBER REQUIRED	備考 REMARKS
5300	3000	1000	800	1	

NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO		
DROWN		NOTE:-
CHECKED	K. KUROSAWA	CLIMBING
DSG. ENG.		BELT-CONVEYOR (B)
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR. 1978 SCALE 1/10 1/4

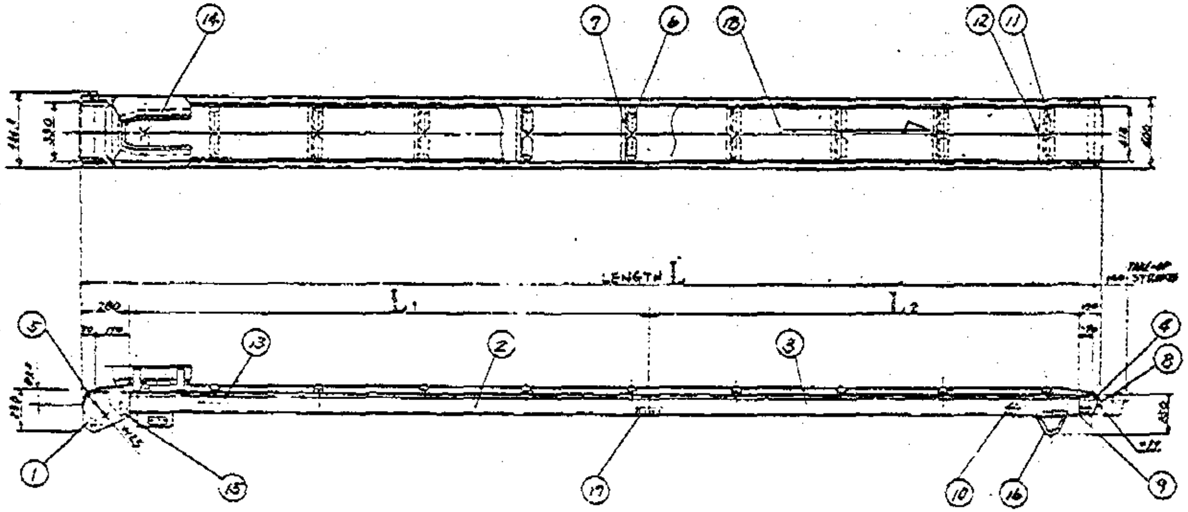
DRG. NO. H-C-2267

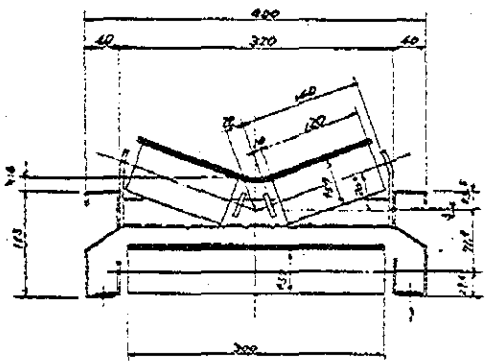


NIPPON SHARYO SEIZO KAISHA, LTD. [illegible] DEPT. TOKYO	
DROWN	NOTE:-
CHECKED K. KIMOSHIMA	NO. 22 CORN
DSG. ENG.	SHELLER
PRIN. DSG. ENG.	
CHIEF ENG.	DATE [illegible] SCALE 1/6
DRG. NO. H-E-142	



NO. DESCRIPTION
1 HEAD SIDE PLATE
2 TAIL SIDE PLATE
3 INTERMEDIATE SIDEPLATE
4 CARRIER IDLER
5 BRACKET FOR CARRIER IDLER
6 TAIL BELT PULLEY
7 TAIL BELT SCRAPER
8 BRACKET FOR TAIL BELT PULLEY
9 CONVEYOR BELT
10 HEAD BELT SCRAPER
11 RETURN IDLER
12 TAIL CROSS MEMBER
13 HOPPER
14 MOTORIZED PULLEY
15 RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY
16 CONDUIT TUBE
17 CONNECTOR
18 SNUB PULLEY
19 SNUB PULLEY SCRAPER
20 SCREW ROD OF TAKE-UP
21 DIAGONAL MEMBER
22 TAIL BELT SUPPORTING PLATE
23 BELT SUPPORTING PLATE
24 SKIRT
DIRECTION OF BELT TRAVEL
LENGTH L
CROSS SECTION OF INTERMEDIATE SECTION
BELT WIDTH 450
SPECIFICATIONS
MATERIAL: CORN
CAPACITY:
BELT SPEED: 35m/min
CONVEYOR BELT: 450 WIDE
MOTORIZED PULLEY:
POWER SUPPLY: 400V, 50Hz
TABLE OF NUMBER FURNISHED
LENGTH L | L1 | L2 | L3 | NUMBER REQUIRED | REMARKS
10000 | 2X3000=6000 | 2820 | 680 | 1 |
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO
DROWN
CHECKED K. KUROSAWA
DSG. ENG.
PRIN. DSG. ENG.
CHIEF ENG.
NOTE:- BELT-CONVEYOR FOR CORN SHELLER THROWING
DATE MAR. 1978 SCALE 1/10
DRG. NO. H-C-2268





CROSS SECTION OF INTERMEDIATE SECTION

NO	DESCRIPTION
1	DRIVE PULLEY PLATE
2	INTERMEDIATE SIDE PLATE
3	TAKE-UP SIDE PLATE
4	TAKE-UP
5	MOTORIZED PULLEY
6	CARRIER IDLER
7	BRACKET FOR CARRIER IDLER
8	HEAD BELT PULLEY
9	BELT SCRAPER (A)
10	RETURN IDLER
11	HEAD AND TAIL CARRIER IDLER
12	BRACKET FOR HEAD AND TAIL CARRIER IDLER
13	BELT SCRAPER (B)
14	HOPPER
15	SNUB PULLEY
16	FROOTYPE STAND
17	JOINT PLATE
18	CONVEYOR BELT

TABLE OF NUMBER FURNISHED

LENGTH L	L1	L2	BELT LENGTH	NUMBER REQUIRED	REMARKS
6900	3000+2500~3500	1000	13.9 m	1 set	FOR BINS(B) EXHAUST
3400	———	3000	6.9 m	1 set	FOR CORN SHELLER EXHAUST

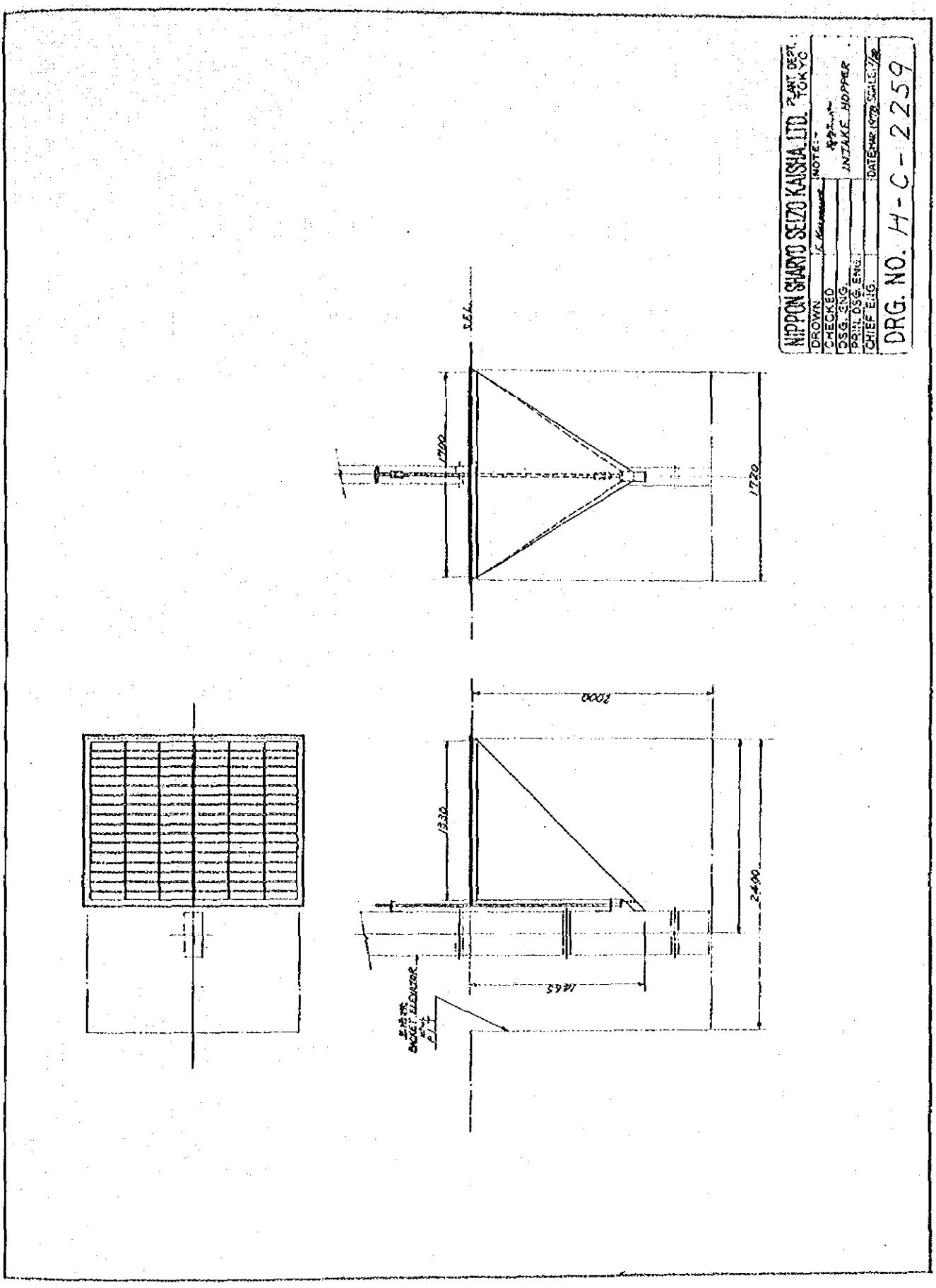
SPECIFICATIONS

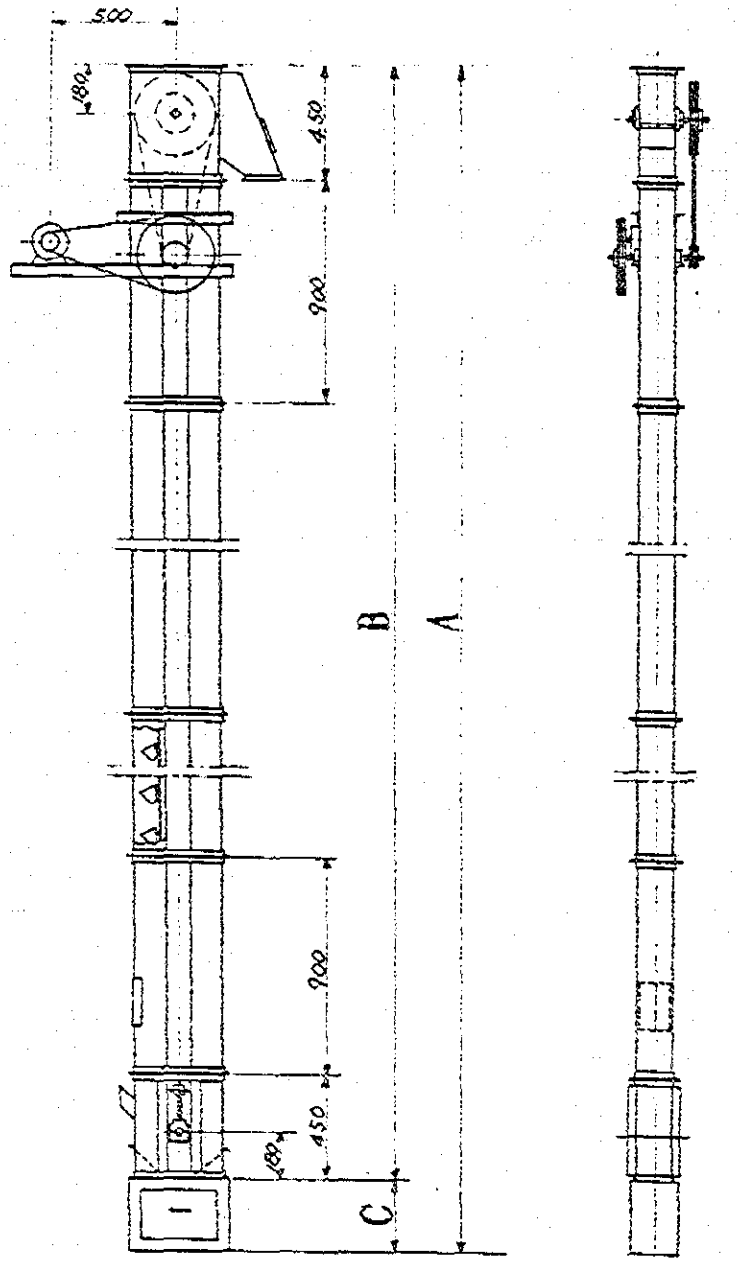
MATERIAL	CORN
CAPACITY	
BELT SPEED	30 m/min
CONVEYOR BELT	300 mm WIDE × NESOX 2 PLY × 1.5 mm × 1.3 mm
MOTORIZED PULLEY	0.4 KW × 4 P
POWER SUPPLY	400 V, 50 HZ

NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN		NOTE:- BELT CONVEYOR FOR CORN SHELLER EXHAUST AND BINS(B) EXHAUST
CHECKED	K. KUROSAWA	
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR 1978 SCALE 1/10 1/4

DRG. NO. H-C-2269


NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO
NOTE:-
DROWN
CHECKED
DSG. ENG
PRIN. DSG. ENG.
CHIEF ENG.
DATE MAR. 1978 SCALE: 1/25
INTAKE HOPPER
DRG. NO. H-C-2259
SEE
1720
1000
1330
2400
1465



PLAN NO.	A	B	C
15	9,300	9,000	300
18	7,500	7,200	300
22	8,400	8,100	300
25	6,600	6,300	300
27	5,700	5,400	300
29	7,500	7,200	300

NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN: K. Kuroiwa

CHECKED

DSG. ENG.

PRIN. DSG. ENG.

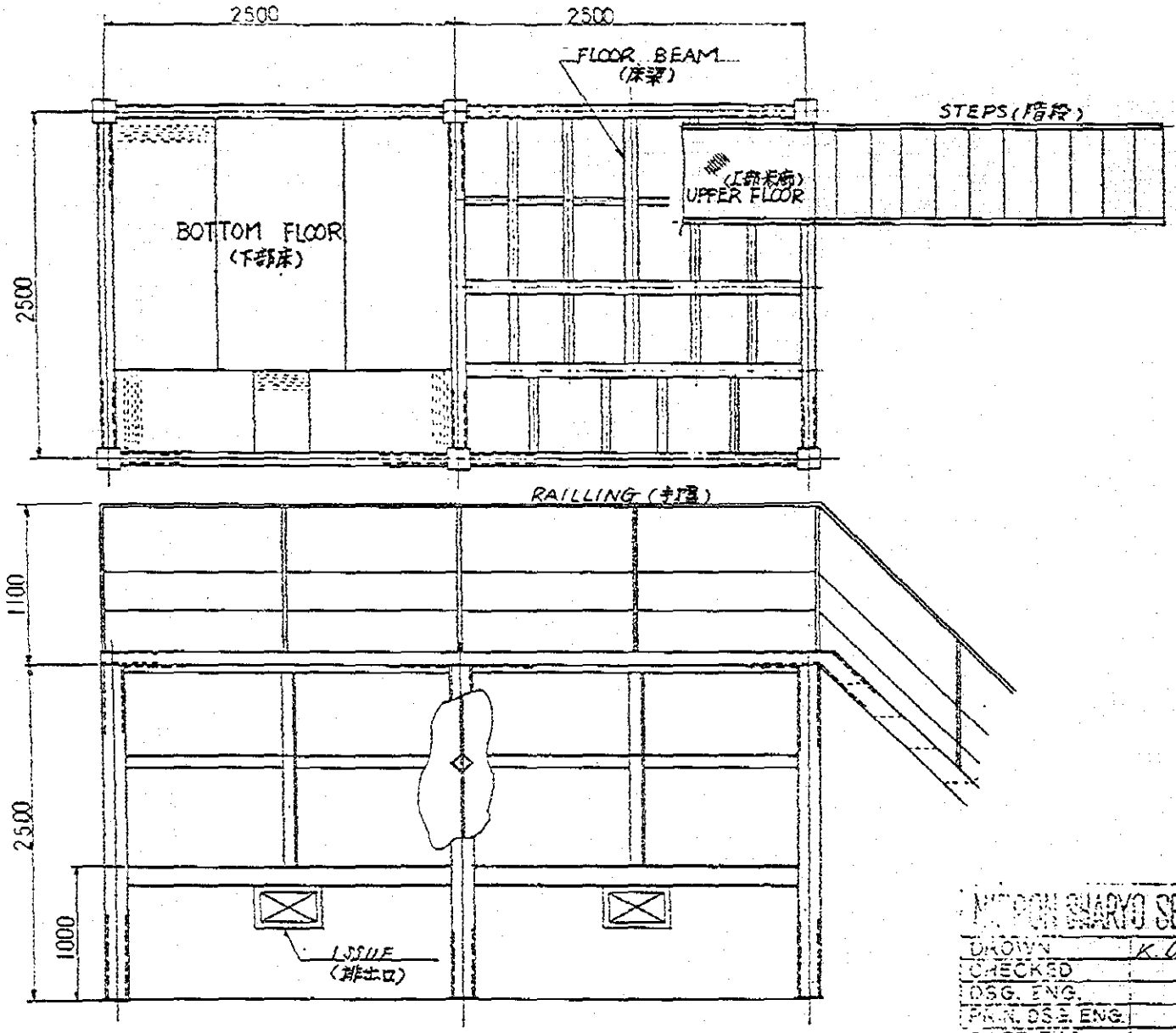
CHIEF ENG.

NOTE:-

BUCKET ELEVATOR (バケットエレベーター)

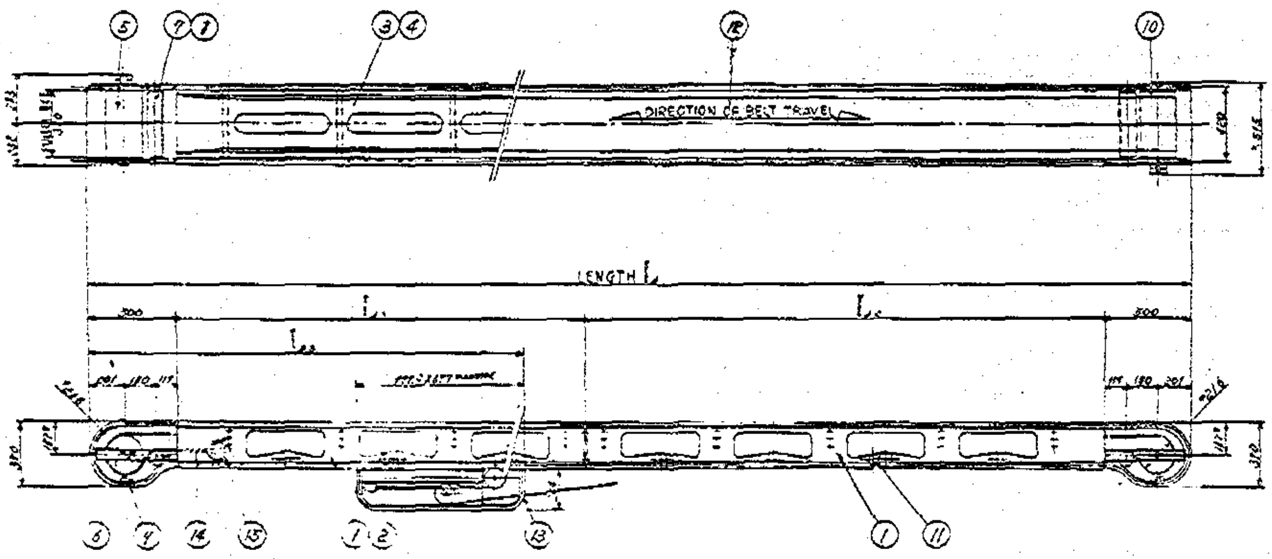
DATE MAR. 1978 SCALE: 1/20

DRG. NO. H-D-559

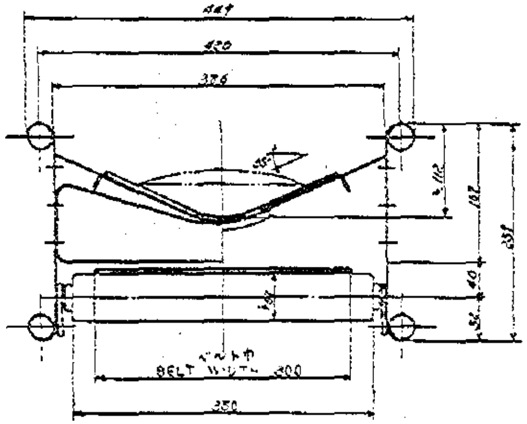


NITTOKU SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO		
DROWN	K. OHMORI	NOTE:-
CHECKED		BINS(B)
DSG. ENG.		
PROJ. DSG. ENG.		
CHIEF ENG.		DATE MAR-1978 SCALE 1/30

DRG. NO. H-D-565



NO	DESCRIPTION			
1	RIGHT AND LEFT HEAD SIDE PLATE	頭部側板		
2	RIGHT AND LEFT INTERMEDIATE SIDE PLATE	中間部側板		
3	HEAD AND TAIL SIDE BELT SUPPORTING PLATE	頭尾部ベルト受板		
4	INTERMEDIATE SIDE BELT SUPPORTING PLATE	中間部ベルト受板		
5	MOTORIZED PULLEY	モーター プーリ		
6	RIGHT AND LEFT MOUNTING FOR MOTORIZED PULLEY	モーター取付座		
7	SNUB PULLEY	スナッブプーリ		
8	SNUB PULLEY SCRAPER	スナッブプーリスクレーパ		
9	HEAD BELT SCRAPER	頭部スクレーパ		
10	TAIL BELT PULLEY	テールプーリ		
11	RETURN IDLER	リターンローラ		
12	CONVEYOR BELT	コンベヤベルト		
13	INTERMEDIATE TAKE-UP	中間テークアップ		
14	CONDUIT TUBE	コンジットチューブ		
15	CONNECTOR	コネクタ		



中間部断面図
CROSS SECTION OF INTERMEDIATE SECTION

仕様
SPECIFICATIONS

MATERIAL:	CORN
CAPACITY 能力:	
BELT SPEED:	35 m/min
CONVEYOR BELT:	300 mm WIDE × NN50 × 2 PLY × 1.5 mm/1.5 mm, 17 mm
MOTORIZED PULLEY:	1.0 kW × 4 P
POWER SUPPLY 電源:	400 V, 50 Hz

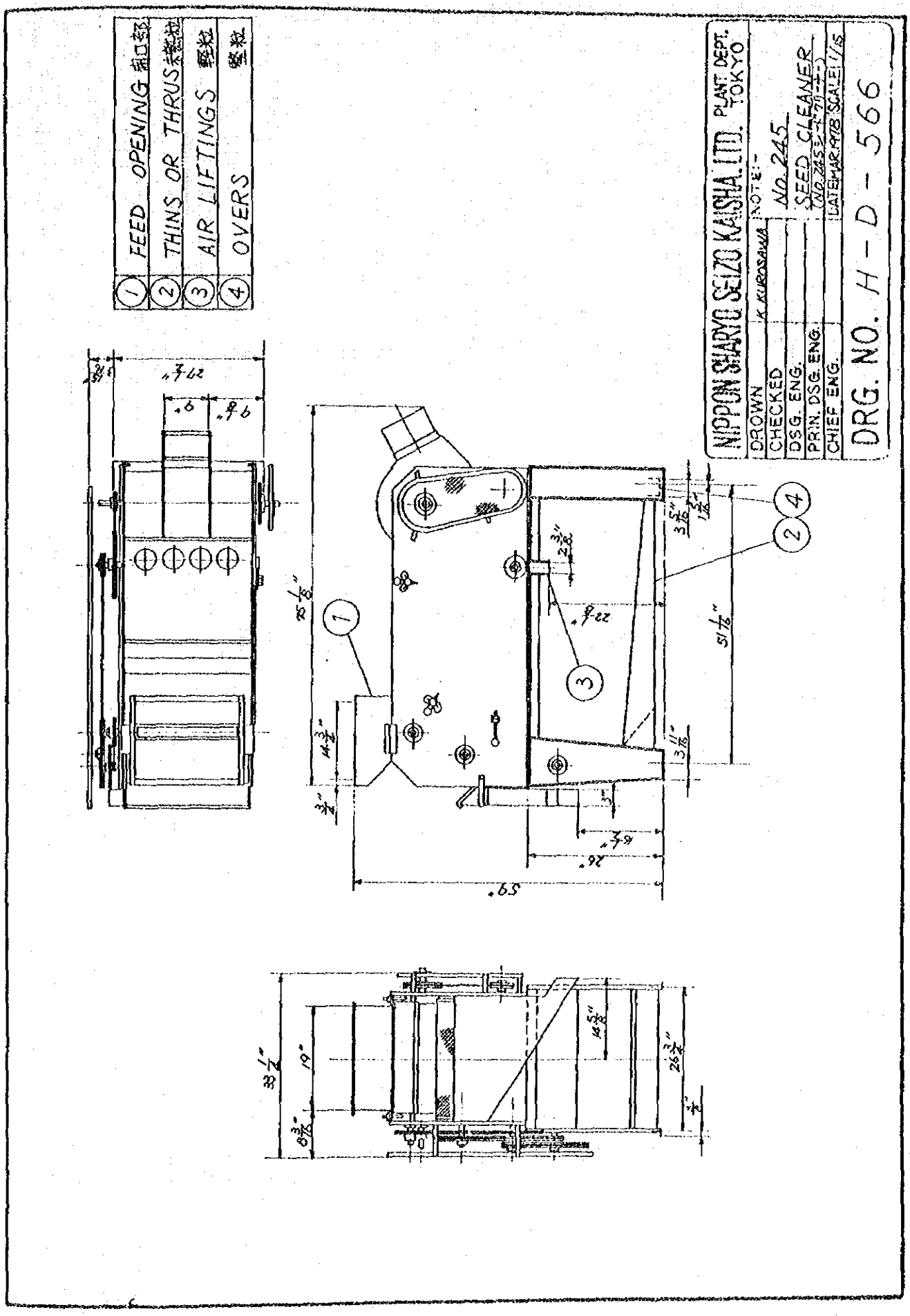
TABLE OF NUMBER FURNISHED 注文表

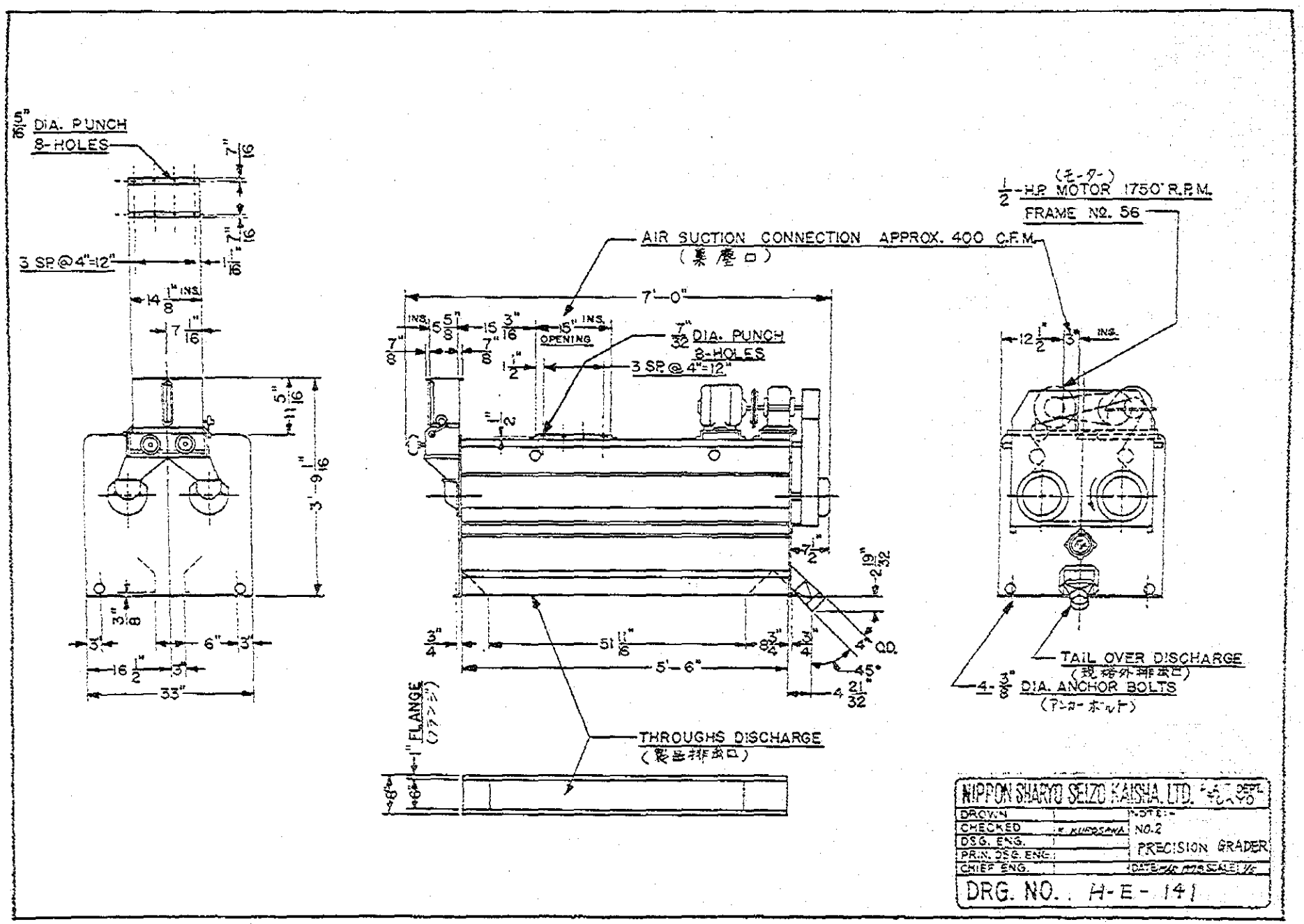
LENGTH 全長 L	L1	L2	L3	NUMBER REQUIRED 所要数	REMARKS 注記
3000	3000+1000+4000	3000	3115	1	

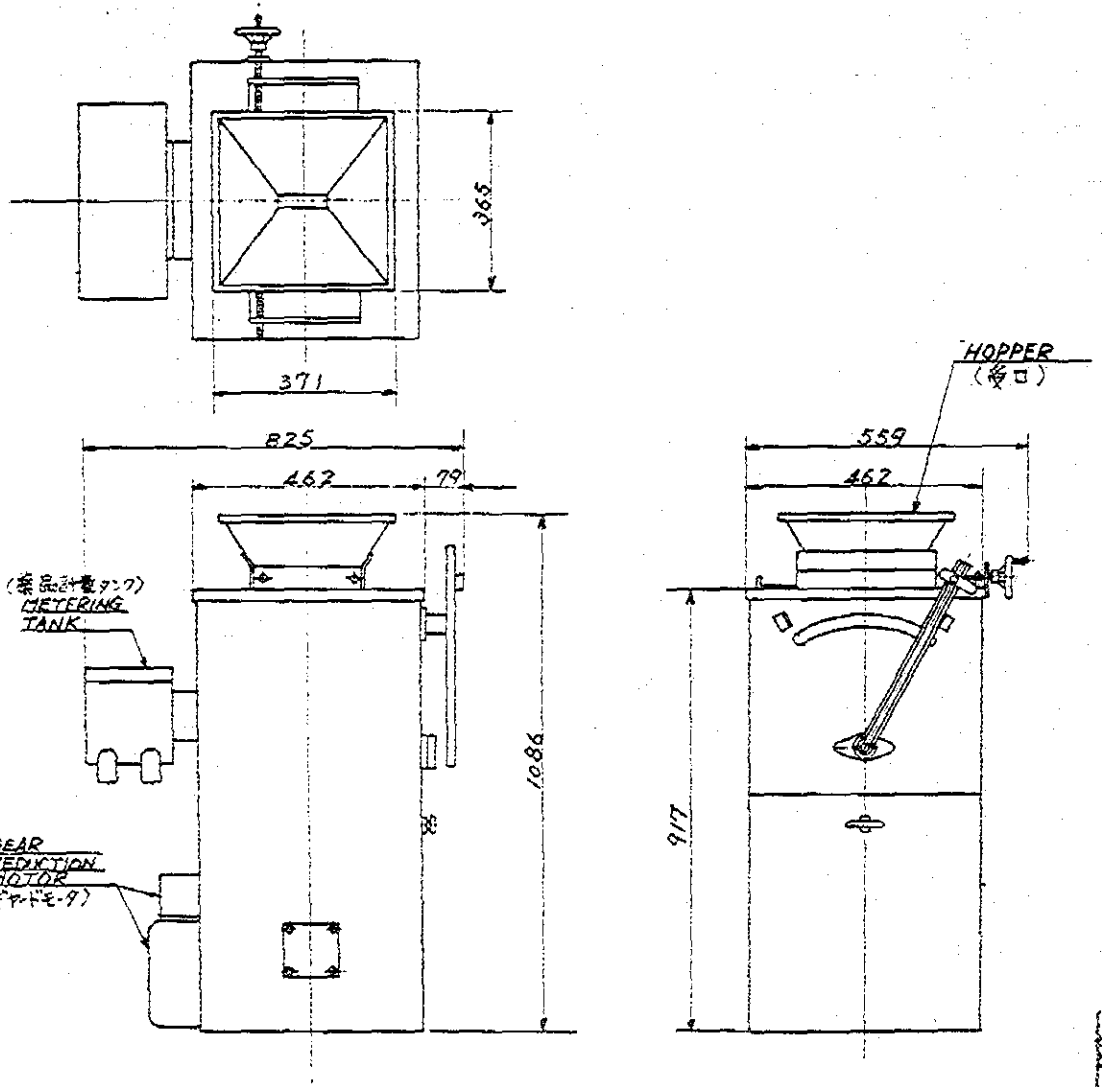
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DROWN		NOTE:-
CHECKED	K. KUROSAWA	BELT-CONVEYOR
DSG. ENG.		FOR TANKS EXHAUST
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR 1976 SCALE 1/5, 1/2

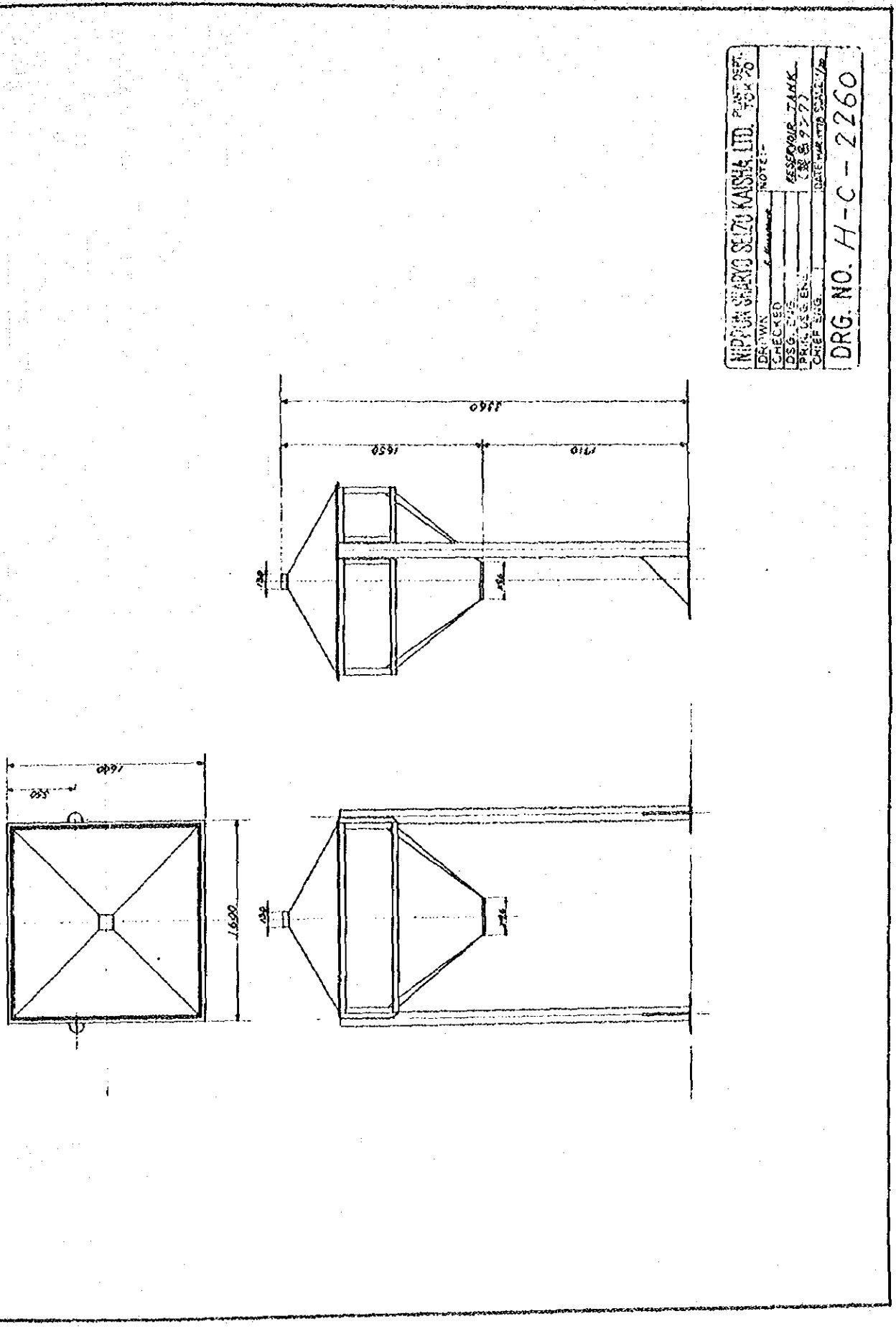
DRG. NO. H-C-2270


1 FEED OPENING 給口部
2 THINS OR THRUS 未整粒
3 AIR LIFTINGS 軽粒
4 OVERS 整粒
NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO
DROWN K. KUROSAWA
CHECKED
DSG. ENG.
PRIN. DSG. ENG.
CHIEF ENG.
NOTE:-
NO. 245
SEED CLEANER
(NO. 245 SEED CLEANER)
DRG. NO. H - D - 566
DATE MAR. 4TH '68 SCALE 1/15


5/16" DIA. PUNCH
8-HOLES
7/16"
7/16"
7/16"
3 SP. @ 4"=12"
1/16"
14 1/8" INS.
7 1/16"
5 11/16"
3'-9 1/16"
3 1/8"
3"
6"
3"
16 1/2"
33"
AIR SUCTION CONNECTION APPROX. 400 C.F.M.
(集塵口)
7'-0"
7/8" INS.
5 5/8"
15 3/16"
15" INS.
OPENING
7/8"
7/32" DIA. PUNCH
8-HOLES
1 1/2"
3 SP. @ 4"=12"
1 1/2"
7 1/2"
6 21/32"
2-
4" O.D.
45°
3/4"
51 11/16"
8 3/4"
4 21/32
5'-6"
1" FLANGE
(フランジ)
THROUGHS DISCHARGE
(製品排出口)
1/2-H.P. MOTOR 1750 R.P.M.
(モーター)
FRAME NO. 56
12 1/2"
3" INS.
TAIL OVER DISCHARGE
(規格外排出口)
4-3/8" DIA. ANCHOR BOLTS
(アンカーボルト)
NIPPON SHARYO SEIZO KAISHA, LTD.
DROWN
CHECKED
DSG. ENG.
PRIN. DSG. ENG.
CHIEF ENG.
NOTE:-
NO.2
PRECISION GRADER
DRG. NO. H-E-141

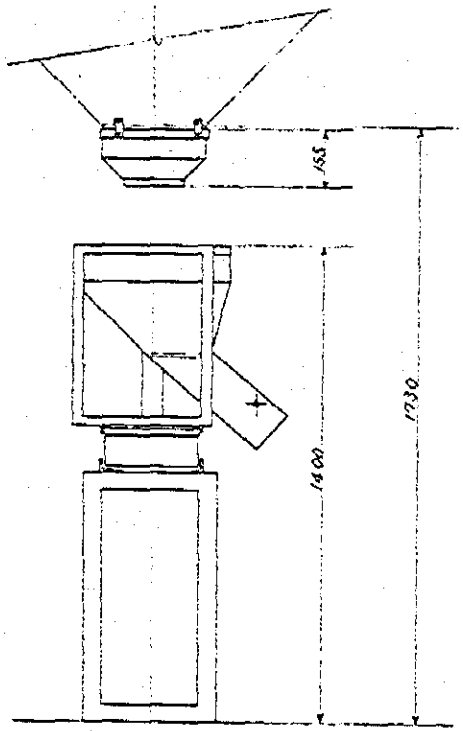


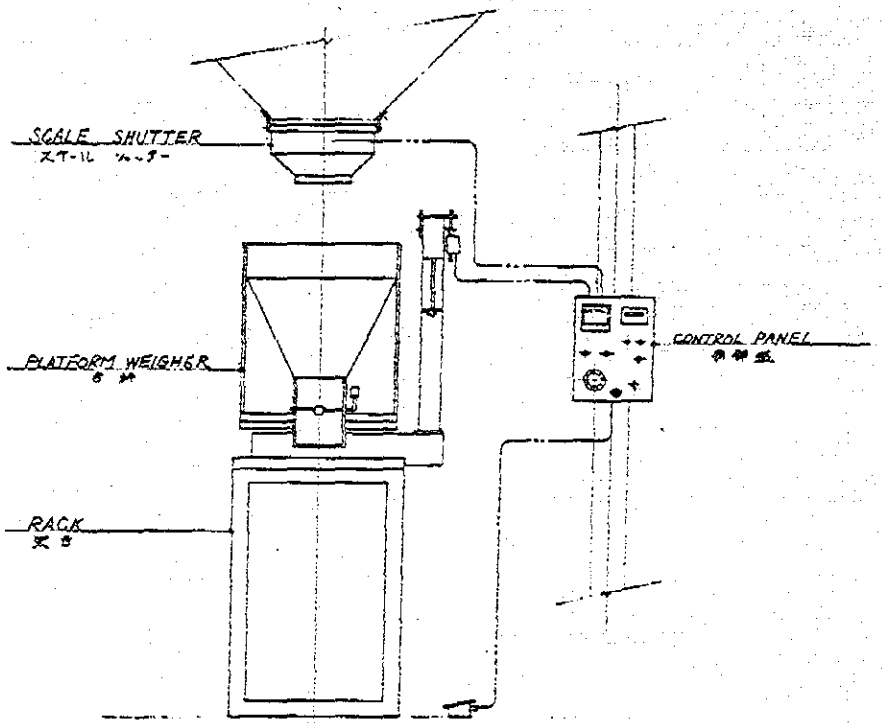
NIPPON SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO		
DROWN	K. KUROSAWA	NOTE:-
CHECKED		SEED TREATER
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR. 1978 SCALE 1/10
DRG. NO. H-D-567		


NIPPON SANSO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO
DRAWN
CHECKED
DSG
PROJECT ENG.
CHIEF ENG.
NOTE:-
RESERVOIR TANK
DRG. NO. H-C-2260

仕　様	
計量容量	30 kg
能　力	2 回/分
精　度	± 1/1000
電　圧	AC 230V
消費電力	200 W
周波数	50 Hz

SPECIFICATION	
WEIGHING RANGE	30 KG
CAPACITY	MAX 2 TIMES/MIN
ACCURACY	± 1/1000
VOLTAGE	AC 230 V
OUTPUT	200 W
FREQ.	50 HZ





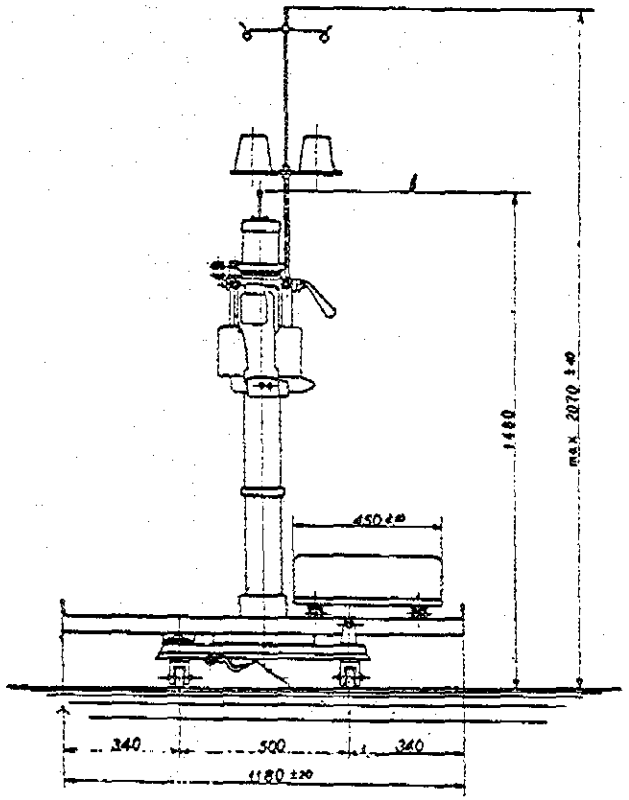
NIPPON CHEMICO SCALE MANUFACTURING CO. LTD. PLANT DEPT. TOKYO

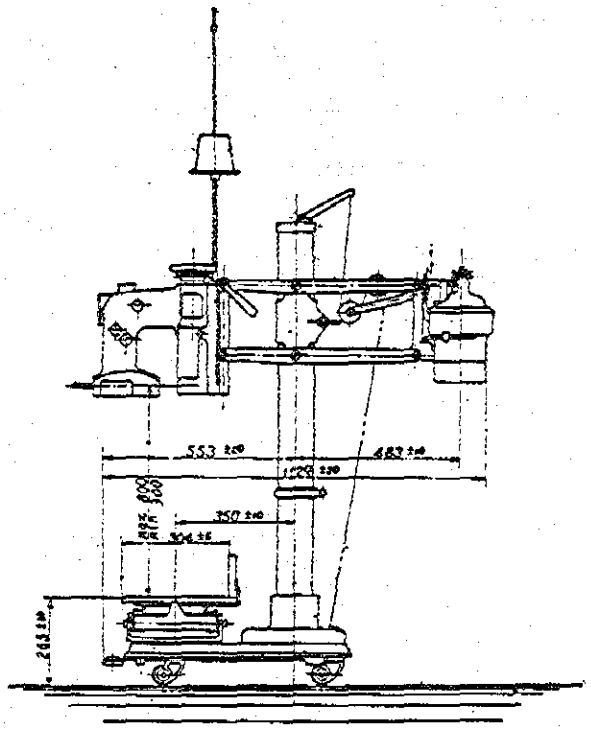
DRAWN	K. KUROSAWA
CHECKED	
DESIGNED	
PLANT ENG.	
CHIEF ENG.	

BALANCE SCALE (SH-50)

DATE MAR 1978 SCALE 1/10

DRG. NO. H-C-2271





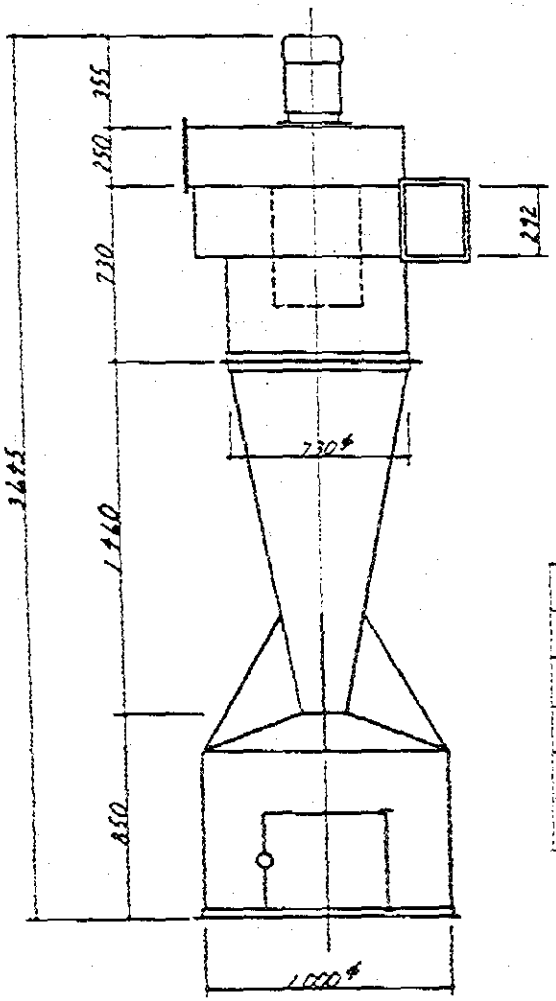
SPECIFICATION

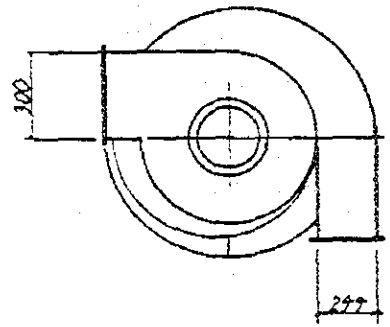
Sewing Head	DS-2H
Capacity	200 ~ 300 Stitch/Minute
Clutch Motor	0.2 KW (Single Phase)
Revolution of Sewing Head	680 r.p.m (50 c/s)
Net Weight	160 Kgs
Stitch Range	7 ~ 11 m/m
Thread Cut	Automatic
Sewing Height	Max. 800 m/m (±20 m/m)

NIPPON SEWING MACHINE SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DRAWN	NOTE — SEWING MACHINE (TYPE : BLDS-2K))
CHECKED K. KUROSAWA	
DSG. ENG.	
PRIN. DSG. ENG.	
CHIEF ENG.	DATE MAR 1970 SCALE 1/10

DRG. NO. H-C-2261





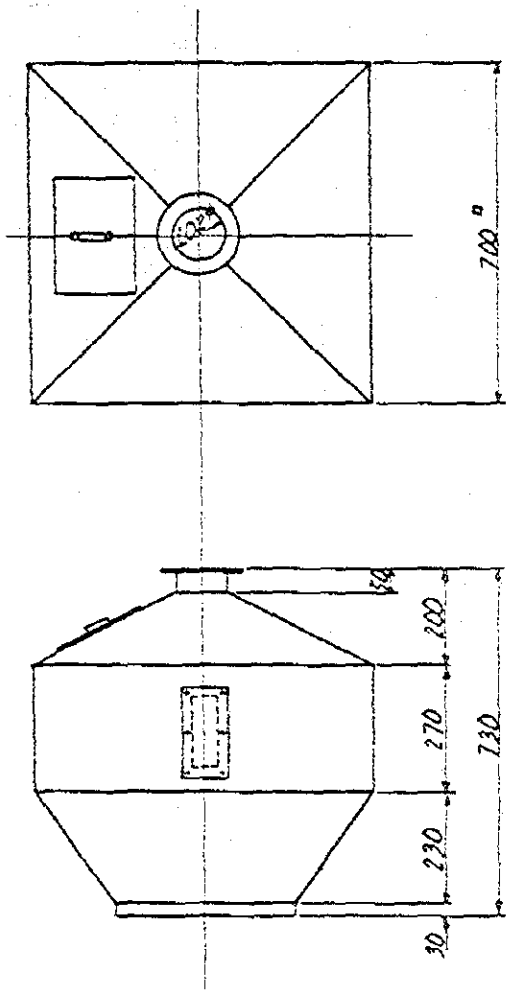
SPECIFICATION

風　量	CAPOCITY	75 m³/min
靜　圧	PRESSURE	200 mm Ag(20℃)
周波数	FREQUENCY	50 Hz
電　圧	VOLTAGE	400 V
出　力	OUT PUT	3.7 KW
極　数	POLE	4

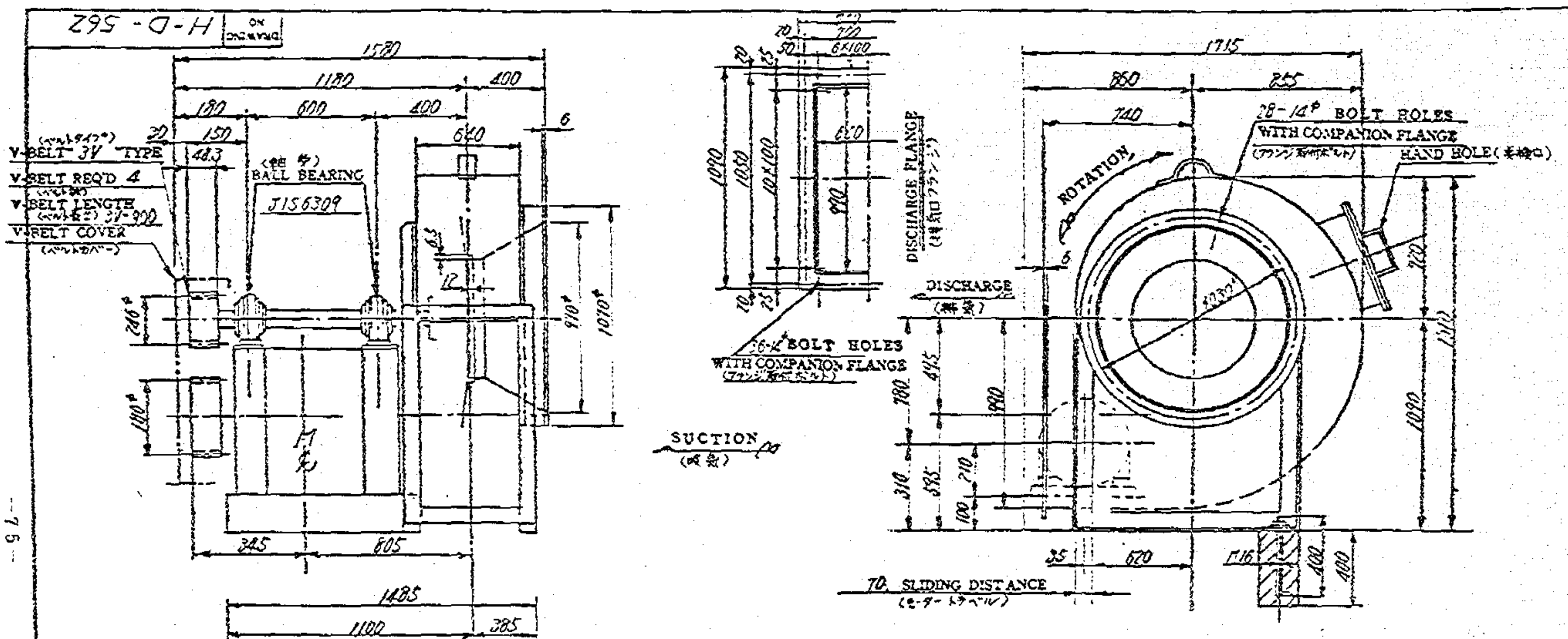
NIPPON SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO

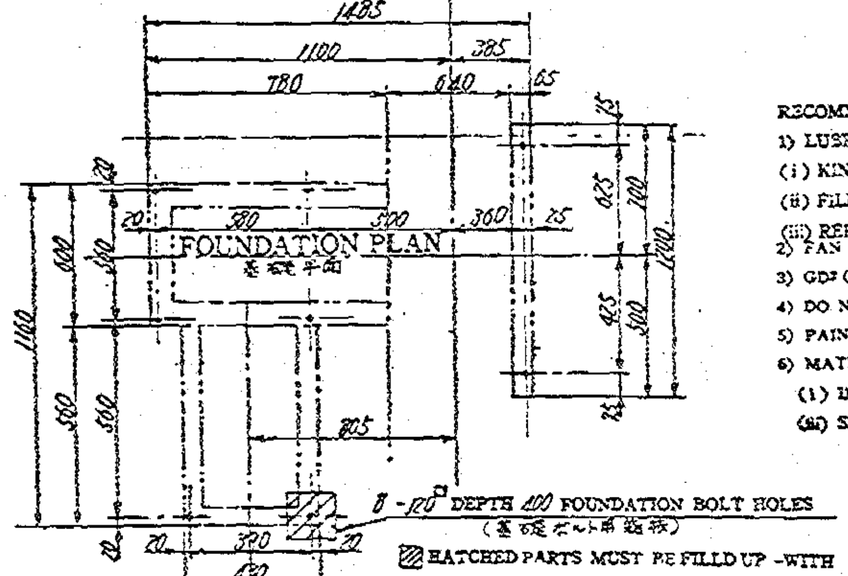
DROWN		NOTE:-
CHECKED	K. KUROSAWA	DUST COLLECTING CYCLONE
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE 1976 Mar. SCALE 1/20

DRG. NO. H-D-560



NIPPON CHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO		
DROWN		NOTE:—
CHECKED	K. KUROSAWA	FLUX CONTROL TANK (定量調整タンク)
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR 1978 SCALE: 1/10
DRG. NO. H-D-561		





RECOMMENDATION (注記)

1) LUBRICATION GREASE (グリース補給要領)

(i) KIND & MAKER : ALVANIA No.3 BY SHELL OIL (アルバニアNo.3)

(ii) FILLING UP(充てん) : 30gr

(iii) REPLENISHMENT (補給) 19 grs EVERY 2000 hr.s (2000時間毎に19グラム)

2) FAN WEIGHT (at 1SET) : (ファン重量) 800 Kg

3) GD² OF EXCHANGING MOTOR SHAFT: 20 Kgm² (モーター軸換算)

4) DO NOT LOAD ON FLANGES (フランジに荷重をかけないこと)

5) PAINTING (COLOR) : MUNSELL

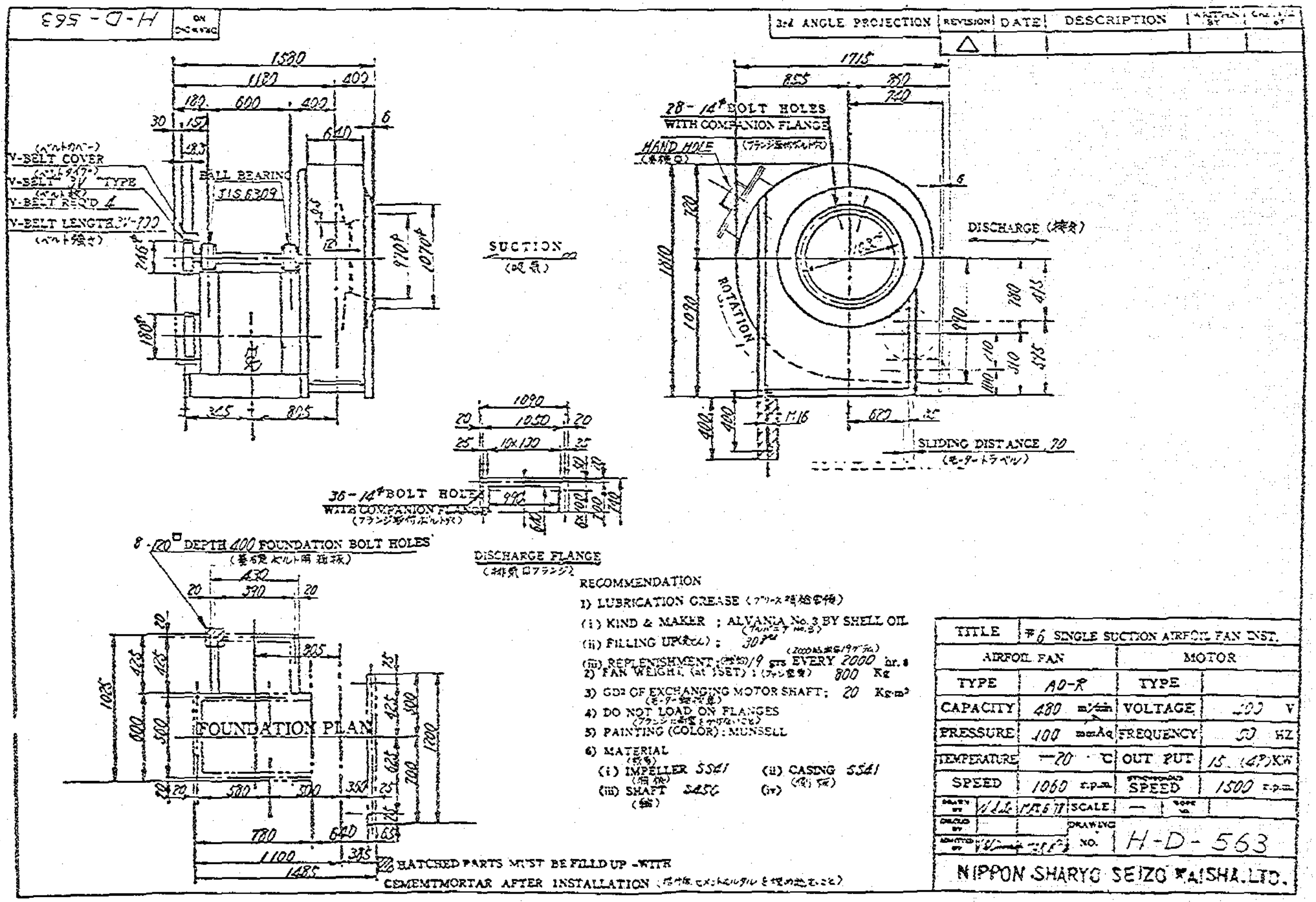
6) MATERIAL (材質)

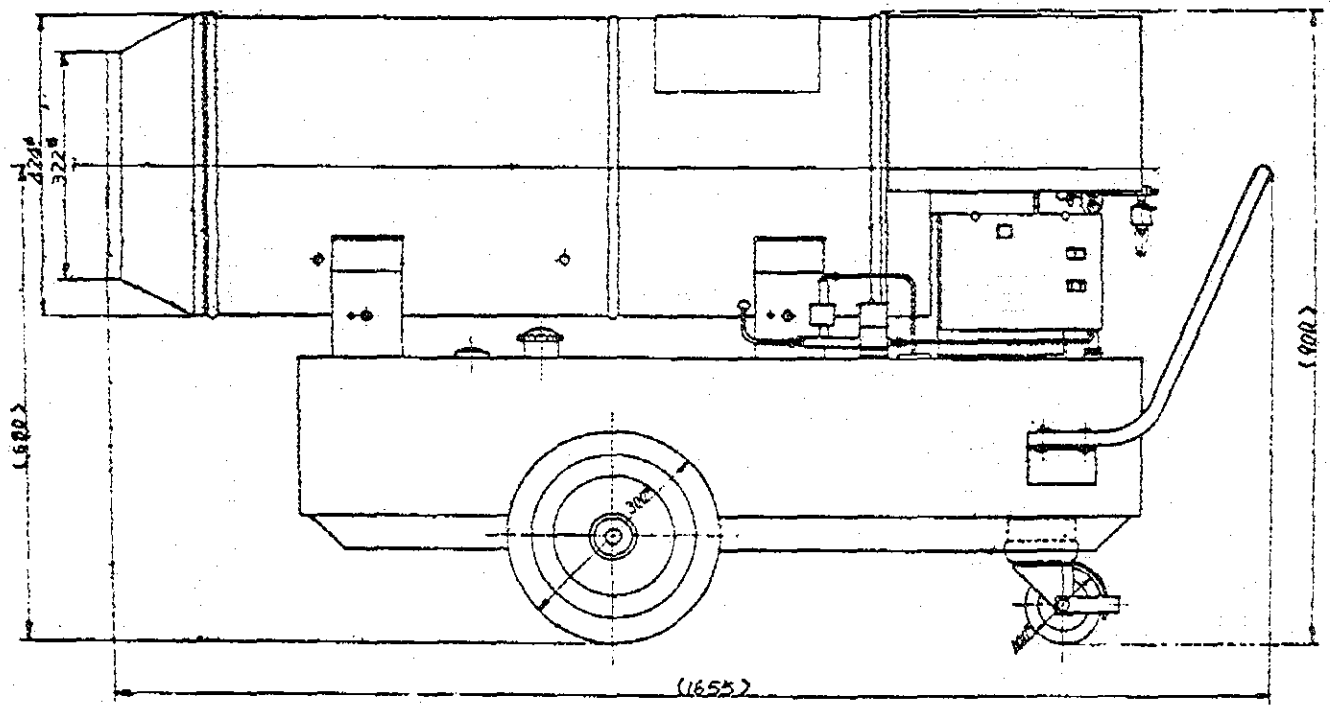
(i) IMPELLER (羽根車) SS41 (ii) CASING (胴体) SS41

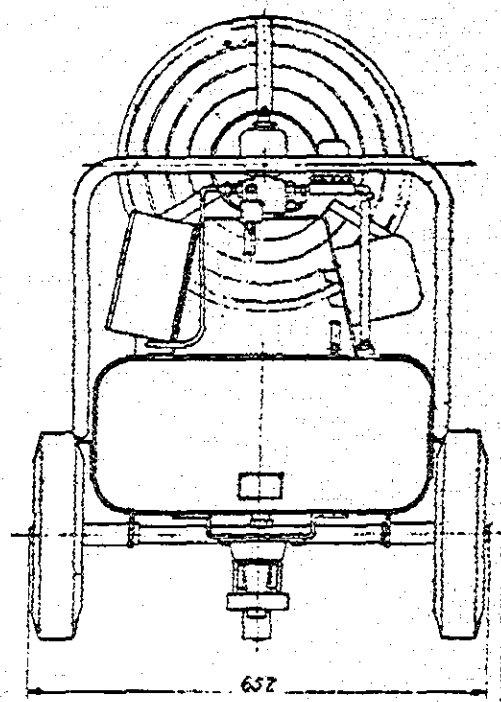
(iii) SHAFT (軸) S45C (iv)

▨ HATCHED PARTS MUST BE FILLED UP WITH CEMENTMORTAR AFTER INSTALLATION (斜線部はセメントモルタルを埋め込むこと)

TITLE	#6 SINGLE SUCTION AIRFOIL FAN INST.				
AIRFOIL FAN			MOTOR		
TYPE	AO-K		TYPE		
CAPACITY	480	m³/min	VOLTAGE	400	V
PRESSURE	100	mmAq	FREQUENCY	50	HZ
TEMPERATURE	20	°C	OUT PUT	15 (4P)	KW
SPEED	1060	r.p.m.	SYNCHRONOUS SPEED	1500	r.p.m.
DRAWN BY	W. Li	SCALE	—	WORK NO.	
CHECKED BY		DRAWING NO.	H-D-562		
APPROVED BY					
NIPPON SHARYO SEIZO KAISHA, LTD.					


H-D-563
3rd ANGLE PROJECTION
REVISION DATE DESCRIPTION
V-BELT COVER
V-BELT 3V TYPE
V-BELT REQ'D 4
V-BELT LENGTH 3V-770
BALL BEARING JIS 6309
SUCTION
(吸気)
28-14φ BOLT HOLES
WITH COMPANION FLANGE
(フランジ添付ボルト穴)
HAND HOLE
ROTATION
DISCHARGE (排気)
SLIDING DISTANCE 70
(モーター トラベル)
36-14φ BOLT HOLES
WITH COMPANION FLANGE
(フランジ添付ボルト穴)
DISCHARGE FLANGE
(排気口フランジ)
8-120□ DEPTH 400 FOUNDATION BOLT HOLES
FOUNDATION PLAN
RECOMMENDATION
1) LUBRICATION GREASE (グリース補給要領)
(i) KIND & MAKER ; ALVANIA No.3 BY SHELL OIL
(ii) FILLING UP ; 30 grs
(iii) REPLENISHMENT ; 19 grs EVERY 2000 hr.s
2) FAN WEIGHT (at 1SET) ; 800 Kg
3) GD² OF EXCHANGING MOTOR SHAFT ; 20 Kg·m²
4) DO NOT LOAD ON FLANGES
5) PAINTING (COLOR) : MUNSELL
6) MATERIAL
(i) IMPELLER SS41
(ii) CASING SS41
(iii) SHAFT S45C
(iv)
HATCHED PARTS MUST BE FILLED UP WITH CEMENT MORTAR AFTER INSTALLATION
TITLE #6 SINGLE SUCTION AIRFOIL FAN INST.
AIRFOIL FAN
TYPE AD-R
CAPACITY 480 m³/min
PRESSURE 100 mmAq
TEMPERATURE 20 °C
SPEED 1060 r.p.m.
MOTOR
TYPE
VOLTAGE 200 V
FREQUENCY 50 HZ
OUT PUT 15 (4P) KW
SPEED 1500 r.p.m.
SCALE
DRAWING NO. H-D-563
NIPPON SHARYO SEIZO KAISHA, LTD.





HP-25C 型 仕様	
電源	単相 230V 50Hz
暖房能力	95000 kcal/hr
温風吐出量	40 m³/min
温風速度	8.0 m/sec (吹出口)
燃料タンク容量	98 l
燃料消費量	10 l/hr
モーター	単相 230V 250W
バーナー	油圧噴霧式 (圧力 7 kg/cm²)
燃料	軽油
点火装置	連続スパーク式
外形寸法	高 900 × 幅 662 × 奥 1655 mm
重量	110 kg
サーモスタット	取り付け可

MODEL HP-25C SPECIFICATION	
POWER REQUIREMENT	SINGLE-230V, 50 HZ
HEATING CAPACITY	95000 KCAL/HR.
HOT AIR DELIVERY CAPACITY	40 M³/MIN
HOT AIR SPEED	8.0 M/SEC (AT OUTLET)
FUEL TANK CAPACITY	98 LITTERS
FUEL CONSUMPTION	10 LITTERS/HR.
MOTOR	SINGLE-PHASE 230V, 250W
BURNER	HIGH PRESSURE INJECTION (PRESSURE 7 KG/CM²)
FUEL	LIGHT OIL
IGNITION DEVICE	CONTINUOUS ELECTRICAL SPARK SYSTEM
EXTERIOR DIMENSIONS	HEIGHT 90.0 CM WIDTH 65.2 CM LENGTH 165.5 CM
WEIGHT	110 KG
THERMOSTAT	INSTALLATION POSSIBLE

NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO

DRGWN. NOTE:-

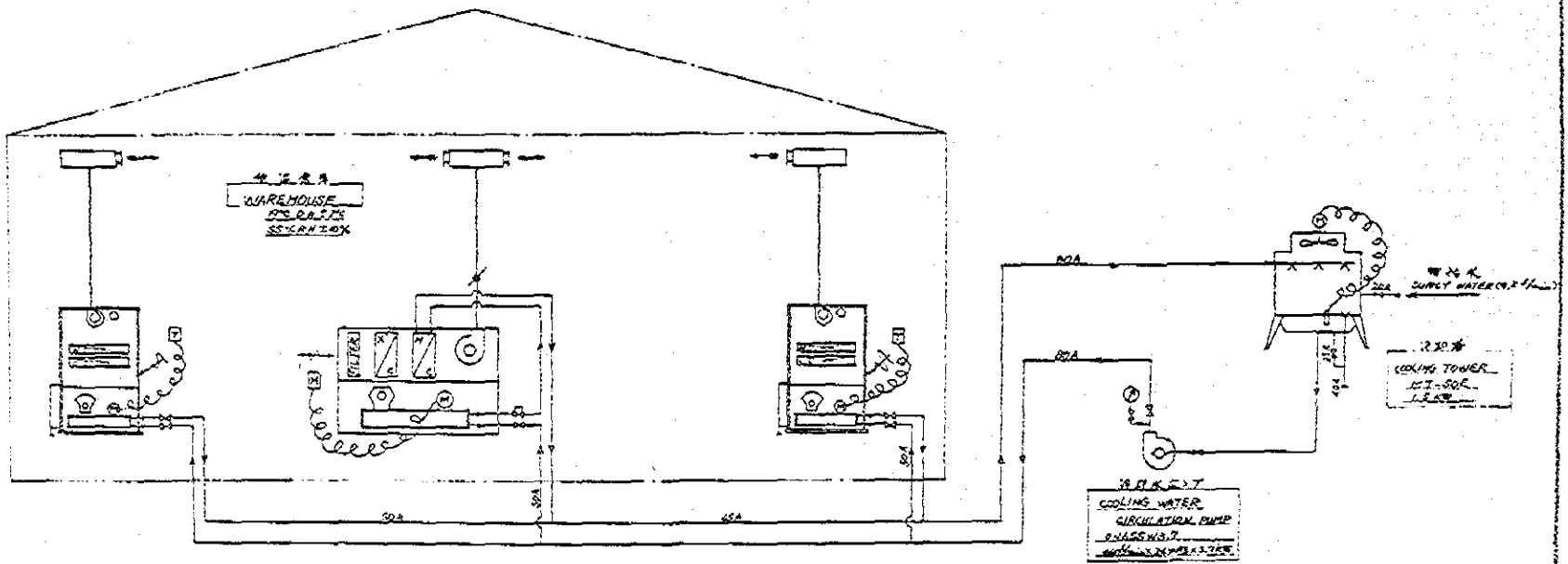
CHECKED K. KUROSAWA HEATER (B)

DSG. ENG. (HP-25C)

PRIN. DSG. ENG.

CHIEF ENG. DATE MAR. 1978 SCALE 1/5

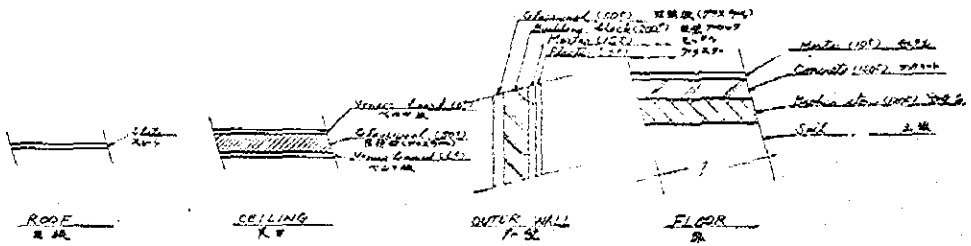
DRG. NO. H-C-2273



PACKAGED AIR CONDITIONER	
Model DP-108C	
Cap. 31000 kcal/hr	
Refrigerator 7.5 HP	
Blower	

DEHUMIDIFIER	
Model RE-120	
Cap. 11 kg/hr	
Refrigerator 1.5 KW	
Blower	

PACKAGED AIR CONDITIONER	
Model DP-108C	
Cap. 31000 kcal/hr	
Refrigerator 7.5 HP	
Blower	



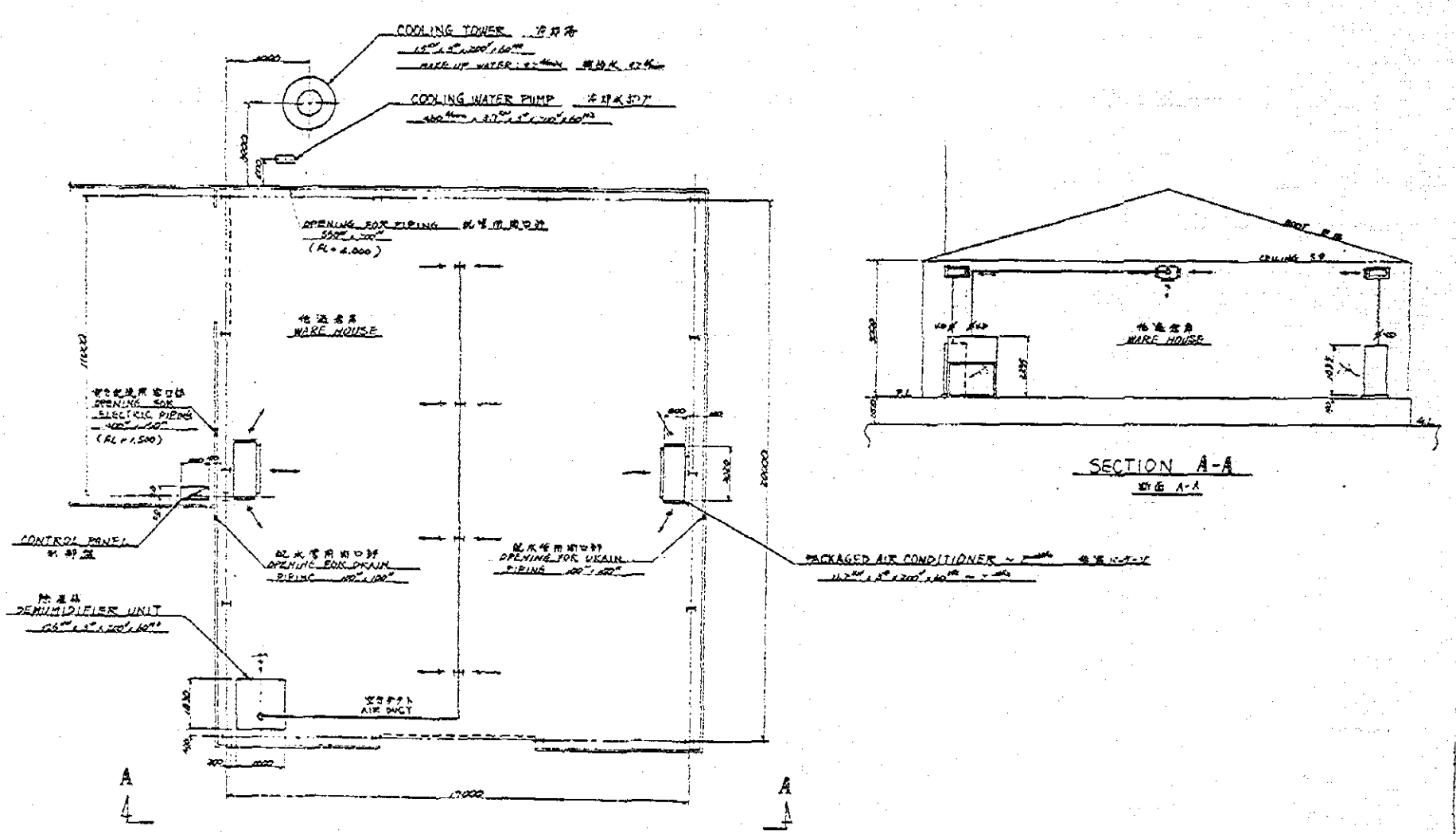
NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO

DRAWN	NOTE:-
CHECKED	K. KUROSAWA
DSG. ENG.	
PRIN. DSG. ENG.	
CHIEF ENG.	

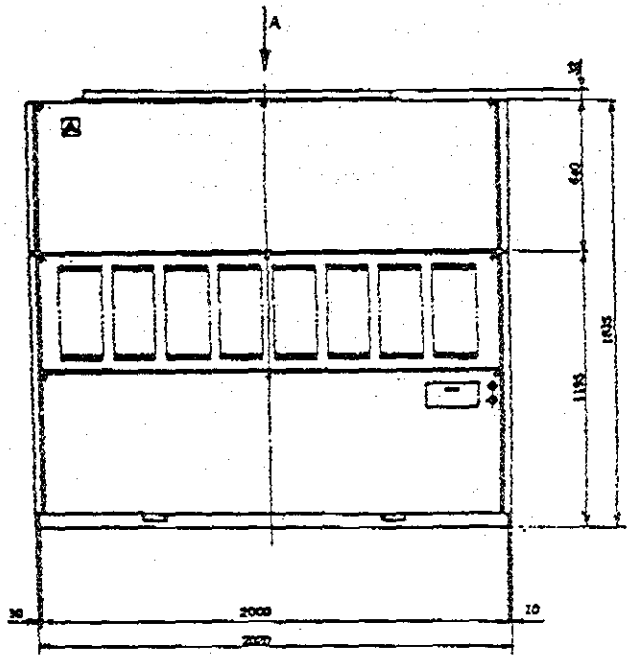
CORN STORAGE ROOM EQUIPMENT

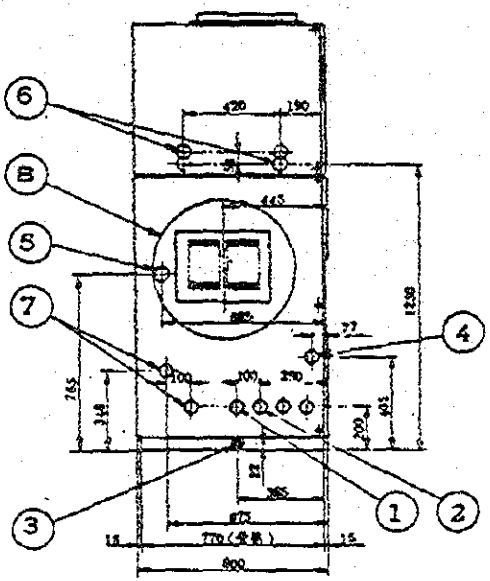
DATE JUL. 1971 SCALE 1:50

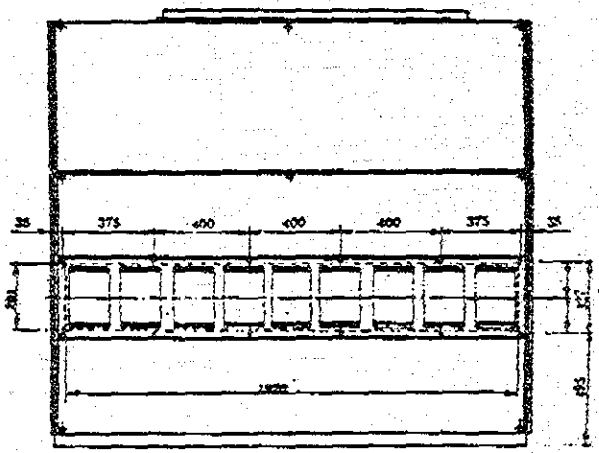
DRG. NO. H-C-2116

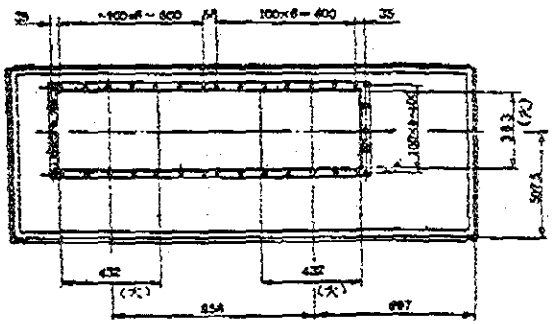


NIPPON SHARYO SEIZO KAISHA, LTD. PLANT DEPT. TOKYO	
DRG'N	TITLE: ARRANGEMENT OF EQUIPMENT
CHECKED	
DES'G. SUP.	
CHIEF ENG.	SCALE 1/100
DRG. NO. H-C-2206	

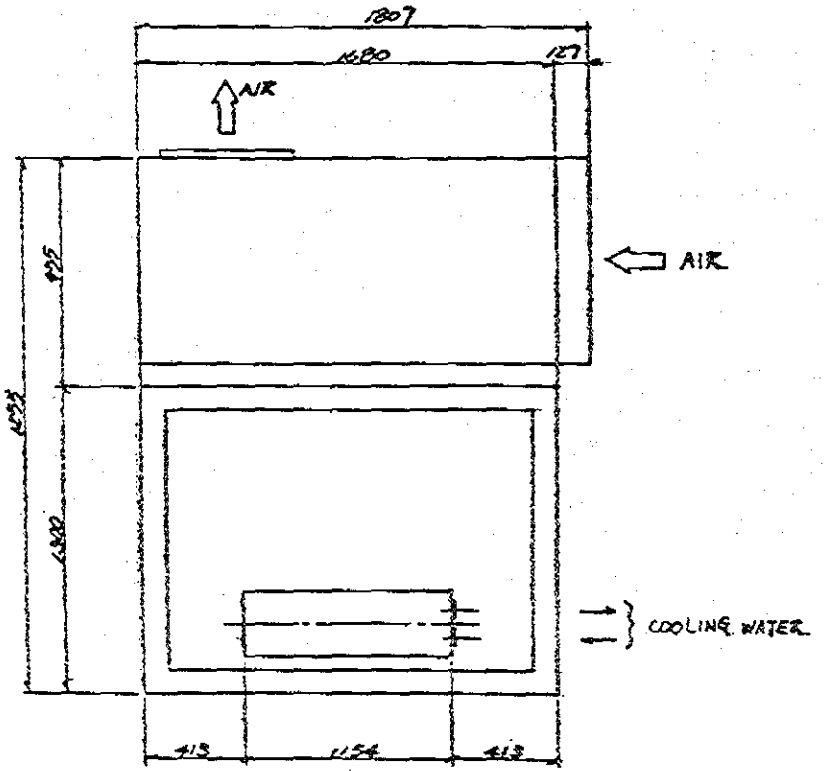


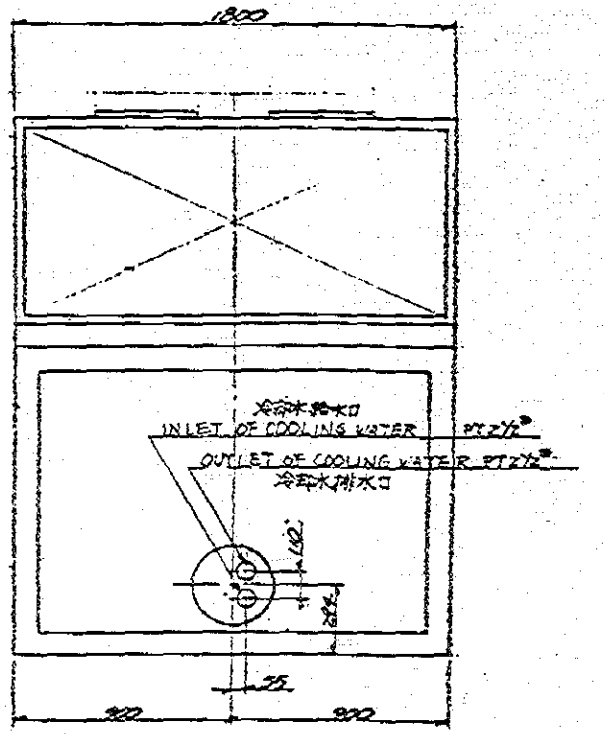






NIPPON SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO		
DROWN		NOTE:-
CHECKED	K. OHMOMO	PACAGED AIR CONDITIONER
DSG ENG		
PRIN. DSG. ENG		
CHIEF ENG.		E MAR-1978 SCALE
DRG. NO. H-E—140		

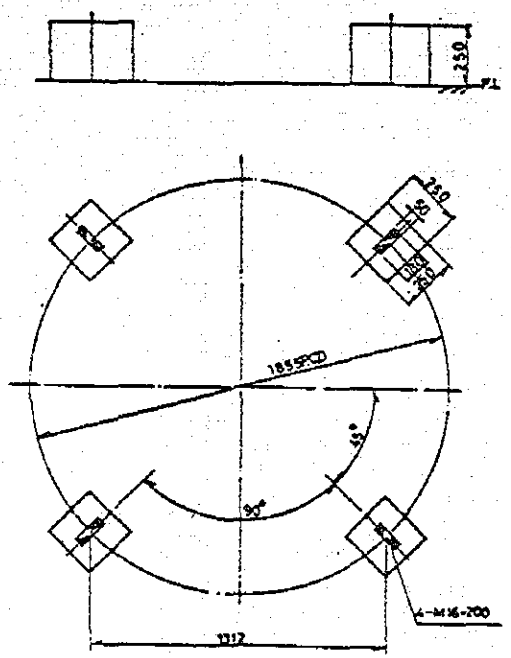


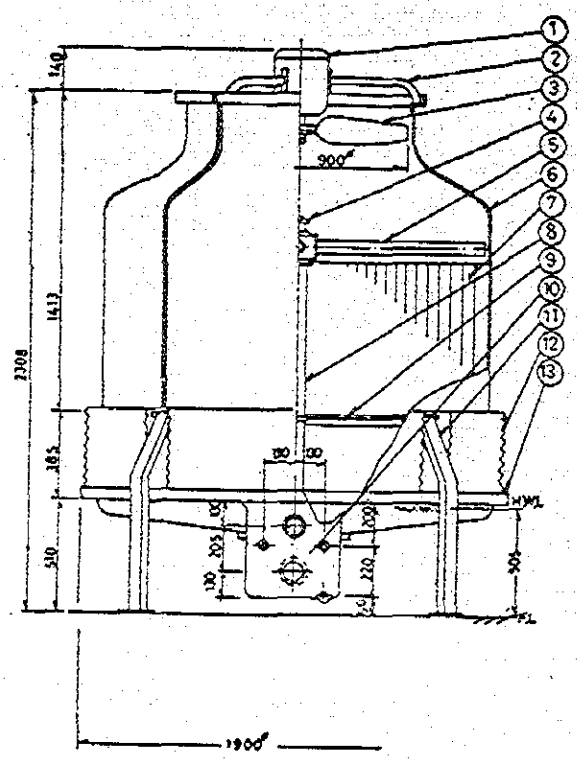


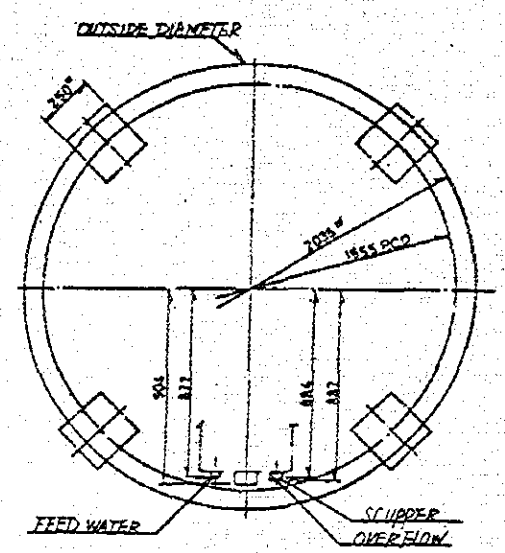
NIPPON SHARYO SEIZO KAISHA. LTD. PLANT DEPT. TOKYO	
DROWN	NOTE:-
CHECKED K. OHMOMO	DEFUMIDEIER UNIT
DSG. ENG.	ASSEMBLY
PRIN. DSG. ENG.	
CHIEF ENG.	DATE MAR-16-'78 SCALE 1/20

DRG. NO. H—D—569

NO	NAME		QUAN-TITY
1	MOTOR	モーター	1
2	STAY	ステー	1
3	FAN	ファン	1
4	SPRINKLER HEAD	スプリンクラーヘッド	1
5	VALVE	弁	1
6	BODY	本体	1
7	FILLERS	充填材	1
8	PIPE	パイプ	1
9	SUPPORT	支え	1
10	STRAINER	ストレイナー	1
11	SUPPORT	架台	1
12	LOUVRE	ルーバー	1
13	WATER TANK	水槽	1







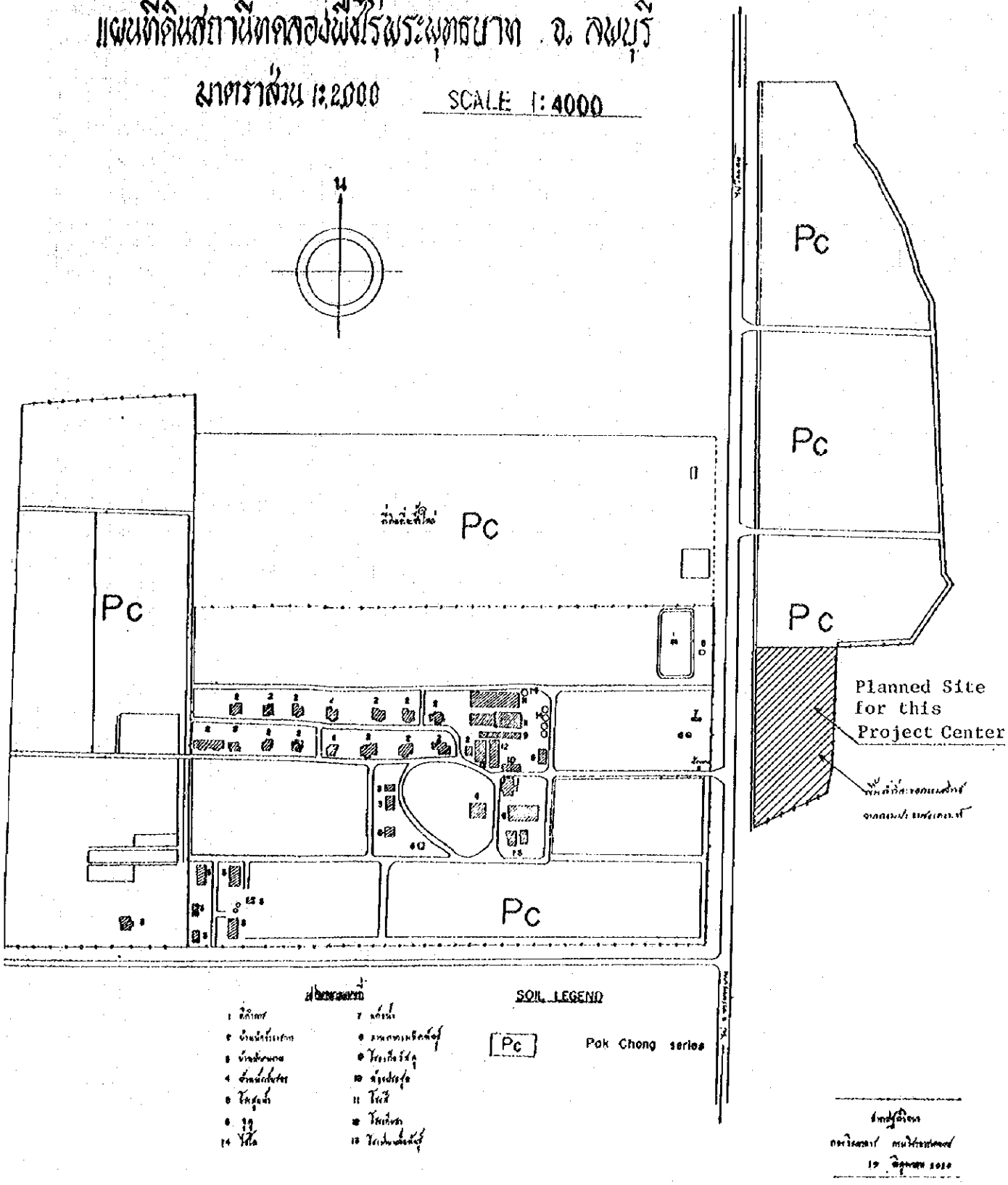
NIPPON SHARYO SEIZO KAISHA LTD. PLANT DEPT. TOKYO

DROWN		NOTE:-
CHECKED	K.OHMOMO	COOLING TOWER
DSG. ENG.		
PRIN. DSG. ENG.		
CHIEF ENG.		DATE MAR-1978 SCALE

DRG. NO. H-D-568

3. ATTACHED DATA

3-1 Planned Site for this Project Center



3-2 Meteorological Data for the Planned Site for this Project Center

Test Place - PRABUTHABAD SEED CENTER

(1) Rainfall (m/m)

Year	Classified by month / Classification Division	Jan.	Feb.	Mar.	Apr.	May.	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1968	Monthly rainfall	—	12.4	19.8	63.0	191.3	301.0	144.3	181.6	141.8	62.9	42.2	—
	Average rainfall per month	—	0.4	0.6	1.8	5.5	10.0	4.9	5.8	4.7	2.0	1.4	—
	Days of rainfall	—	2	1	5	12	14	13	12	12	7	1	—
1969	Ditto	8.4	—	88.0	16.4	91.0	151.6	302.9	88.9	299.8	204.2	16.9	0.8
		0.3	—	2.8	0.5	2.9	5.0	9.7	2.8	9.9	6.5	0.5	0.2
		2	—	2	2	6	13	16	7	10	6	2	1
1970	Ditto	—	10.0	147.0	52.6	189.9	310.4	256.3	186.9	266.0	63.6	3.5	58.9
		—	0.3	4.7	1.7	6.1	10.0	8.2	6.0	8.8	2.5	0.1	1.9
		—	3	5	5	9	20	17	16	16	11	1	4
1971	Ditto	—	22.4	92.2	66.6	121.4	219.8	98.3	293.1	89.0	140.9	6.5	4.9
		—	0.8	2.3	2.2	3.9	9.2	3.1	8.8	2.9	4.5	0.2	0.1
		—	3	3	5	8	13	14	19	10	8	1	1
1972	Ditto	—	—	55.8	113.6	45.0	129.8	196.6	93.2	402.0	180.8	65.6	6.2
		—	—	1.8	3.7	1.4	4.3	6.3	2.0	20.4	5.8	2.1	0.2
		—	—	3	6	4	11	8	8	17	12	6	1
1973	Ditto	—	—	5.0	0.2	111.9	123.3	145.8	156.6	409.9	41.8	13.3	—
		—	—	0.2	0.02	3.6	4.2	4.7	5.5	13.6	1.3	0.4	—
		—	—	1	1	11	11	12	11	15	7	2	—
1974	Ditto	—	—	46.1	228.2	394.4	185.8	130.7	211.0	164.1	191.9	41.4	51.3
		—	—	1.5	7.6	12.7	6.2	4.2	6.8	5.4	6.1	1.4	1.6
		—	—	5	10	13	7	8	11	12	13	5	2
1975	Ditto	122.1	28.7	—	110.7	290.2	105.5	186.1	251.1	359.0	253.9	68.7	31.3
		3.9	0.8	—	3.6	9.3	3.5	6.2	8.3	11.9	8.1	2.2	1.0
		4	2	—	4	11	10	9	12	13	10	4	2
1976	Ditto	—	4.5	13.2	71.2	140.0	178.6	142.6	299.8	195.7	192.9	20.0	—
		—	0.2	0.4	2.6	4.5	5.9	4.6	9.7	6.5	5.6	0.6	—
		—	1	1	4	13	9	13	20	13	9	2	—
1977	Ditto	—	6.2	65.2	24.4	153.5	81.1	130.8	192.2	241.1	59.4	66.3	39.5
		—	0.2	2.2	6.8	4.9	2.9	4.2	6.3	8.0	1.9	2.2	1.2
		—	1	2	5	11	8	13	11	16	6	1	1

(2) Average relative humidity per month

Year	Jan.	Feb.	Mar.	Apr.	May.	June.	July	Aug.	Sept.	Oct.	Nov.	Dec.
1968	79	82	83	83	83	82	84	83	86	83	81	78
1969	81	85	86	84	84	87	88	85	82	80	79	73
1970	76	68	79	73	79	80	82	84	86	80	69	73
1971	68	70	79	80	82	80	86	85	85	89	78	74
1972	72	79	82	73	82	82	84	80	89	87	81	81
1973	82	74	89	88	81	81	89	91	89	79	77	81
1974	72	83	79	84	86	86	85	89	85	87	84	80
1975	83	86	81	83	84	84	89	90	86	80	73	80
1976	73	81	80	80	94	89	89	89	89	87	84	84
1977	68	77	76	74	78	76	81	84	85	76	74	76

3 - 3 The list of needed laborers and constraction machines in installation of the seed processing plant

Prepared by Japanese seed plant design team, 31, January, 1978

When we install the same seed processing plant in Japan as plant which we are going to send in Thailand, we need the numbers of laborer shown in table 1 and construction machines and electrisity shown in talbe 2.

This electrisity is required for the use of welding machines.

Please use this data for your information when you install the seed processing plant in the building.

Table 1. Needed laborers

Division	Needed numbers of laborer
Bins	5 men x 14 days 70 men. day
Machines	5 men x 7 days 35 men. day
Total	105 men. day

(Remarks) 1. This 5 men should be skilled laborers.
2. One installation instructor does not included in this 5 men.

3 - 4 THE LIST OF NEEDED ELECTRIC POWER FOR THE SEED PROCESSING PLANT

Prepared by Japanese seed plant design team, 6th, February, 1978

The necessary electric power for the seed processing plant is as following table 1, table 2.

But, as there is the possibility that more machines will be installed in the building to power up the performance of the plant (for multi-purpose), it is wise to increase the total electric power to 150 KW in three phase, to 15 KW in single phase respectively, by considering the spare electric power.

Table 1. The needed electric power in three phase

Ear drying equipment (Blower,20 HP x 2)	37KW(18.5KW x 2)
Shelling equipment (Corn-sheller,Motor)	7.5KW
Corn drying equipment (Blower,Motor)	15KW
Seed cleaning equipment (Seed-cleaner, Seed-separator,Motor)	2.25KW
Seed dressing equipment (Sterilizer for seed,Motor)	0.4KW
Bagging and scale equipment (Bag closer, Motor)	0.2KW
Conveying equipment (Belt conveyer, Motor-pulley)	17.8KW
Dust collecting equipment	4.4KW(2.2KW x 2)
(Sub total)	84.55KW
Packaged air conditioner (Refrigerator, Blower)	22.4KW
Dihumidifier (Refrigerator,Blower)	17.2KW
Cooling tower (Air blower)	1.5KW
Cooling water circulation (Motor)	3.7KW
(Sub total)	44.8KW
Total	129KW

Table 2. The needed electric power in single phase

Drying with ventilation (heater x 2)	1KW(0.5KW x 2)
Ventilation-drying (Heater)	0.5KW
Bagging and scaling equipment (Automatic weigher)	0.4KW
Voluntary test-equipment	0.1KW
Illumination (In room)	5KW
Illumination (Yard)	2KW
Total	9KW

3 - 5 The necessary materials and tools in installation of the plant

Prepared by Japanese seed plant design team,
13th, February, 1978

(1) Supplementary materials and tools

Item	Standard	Q'ty	Remarks
Angle steel(L type)	50mm × 50mm × 4mm	24.2m	for Pits 2.5m × 4 1.8m × 4 2.1m × 2 1.4m × 2
Angle steel(L type)	65mm × 65mm × 6mm	16.2m	for the truck scale foundation 5.5m × 2 2.6m × 2
Angle steel(L type)	100mm × 100mm × 7mm	27.2m	for Bins 1.7m×2×8
Angle steel(L type)	50mm × 50mm × 6mm	15.2m	for Manholes. 3.8m × 4
Flat steel bar	50mm × 6mm	6.8m	for Pit ladder 2.2m × 2 1.2m × 2
Steel bar	19mmø	7m	for Pit ladder 0.35m×20
Anchor	19mmø L: 0.27m	30	for Pits
Anchor	16mmø L: 0.25m	12	for truck scale
Anchor	6mmø L: 0.1 m	80	for Mancholes
Anchor	6mmø L: 0.1 m	160	for Bins
Wire attachment	12mmø	5	for suspension
Wire rope	12mmø	3	10m × 2.30m × 1
Shackle	for 12mm wire rope	13	
Thimble	for 12mm wire rope	5	
Pulley block	for 12mm wire rope	5	
Winch	for 1.5 ton	1	Electromotive
Wood log	100mmø L: 1.2m	5	
Hook	for 12mm wire rope	2	
Tools (Pipe wrench, Adjustable wrench, Set sapnners, Spanner, Plier, Screw driver (+, -, each large, medium, small), Pench, Double offset box wrench and other common tools)			
Fork lift	2 ton	1	

(2) Machines

Item	Standard	Q'ty	Remarks
Wrecker	16 ∿ 20 tons	1	
Welding machine	15 KVA each	3	
Gas welding machine	for cutting the steel	1	
Temporary electric power for the construction work	60 KVA	1	

3 - 6 On the number of the illumination lamp for the seed processing plant

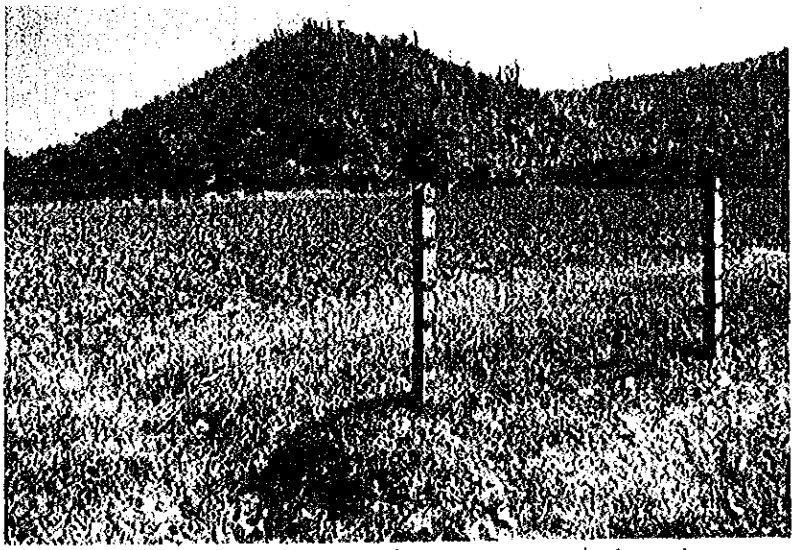
Prepared by Japanese seed plant design team,
7th, February, 1978

1. Same seed processing plant (included warehouse) consumes about 5 KW electric power for the illumination in Japan. Therefore, if we estimate the number of the illuminator for your information, the needed numbers is as followings.

   1.1 If you use the fluorescent light(40W) as the illuminator, this number is 125. (5000 ÷ 40 = 125)

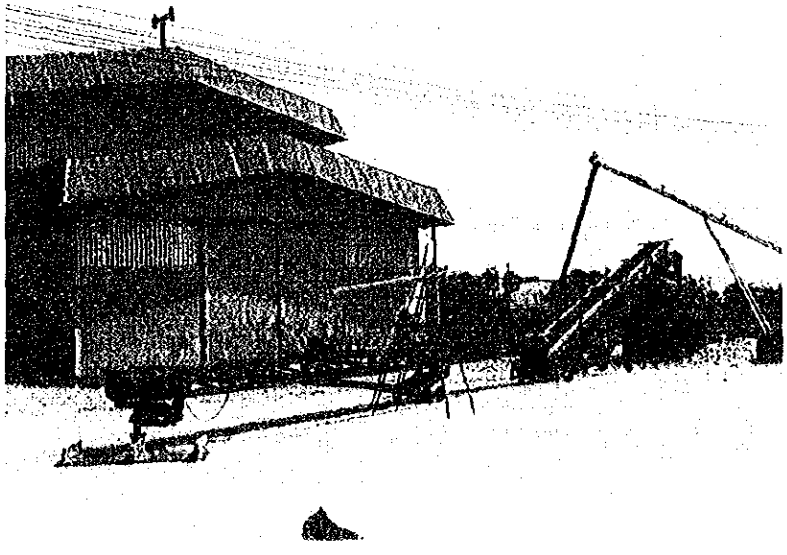
2. When you light up the yard which you dry earcorn in dry season, it is better to install the 4 mercury-vapor lamps (with long pole) on the four corners of the yard. (500 W each)

Planned site for the present project center
(View from east side)



Planned site for the present project center
(View from west side)

Artificial pond of prabuthabab Agricultural Experimental Station



Sorting Belt Division of phitsanulok Seed Center