

SHRI A.M.M. MURUGAPPA CHETTIAR
RESEARCH CENTRE

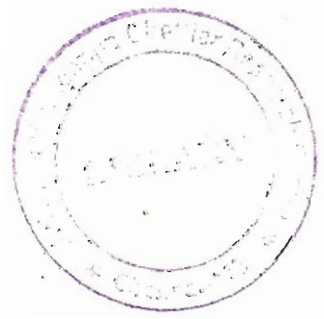
ALGAL DIVISION: THARAMANI, MADRAS-600 042, INDIA

PERIODICAL TECHNICAL NOTES - No. 3, MARCH 1978

Regd. Office: 11/12 North Beach Road, Madras-600 001

* SOLAR DRIERS (SPECIAL NUMBER) *

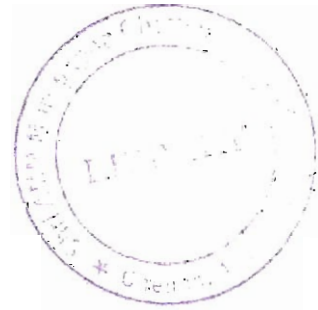
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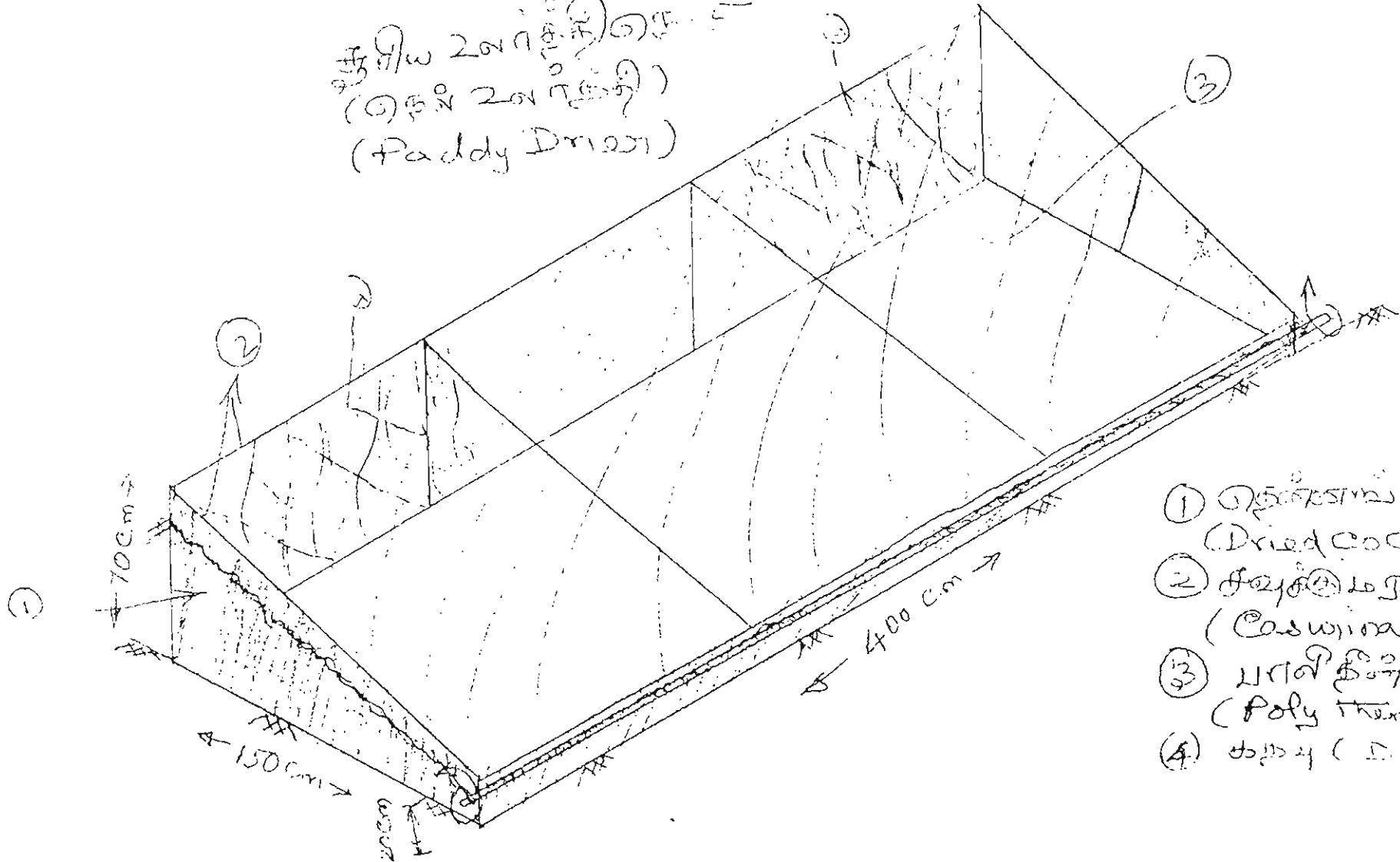
MATERIALS DRIED IN OUR DRIERS SUCCESSFULLY:

- 1. Algal biomass : 2 to 3 hours
 - 2. Brine soaked okra : 4 hours
 - 3. Red chillies : 4 hours
 - 4. Potato chips (in brine) : 6 hours
 - 5. Harvested paddy : 2 hours
 - 6. Parboiled paddy : 3 hours
 - 7. Fish : 3 to 4 hours
 - 8. Snake gourd chips : 3 hours
- All of these retained taste and flavour.

* * *

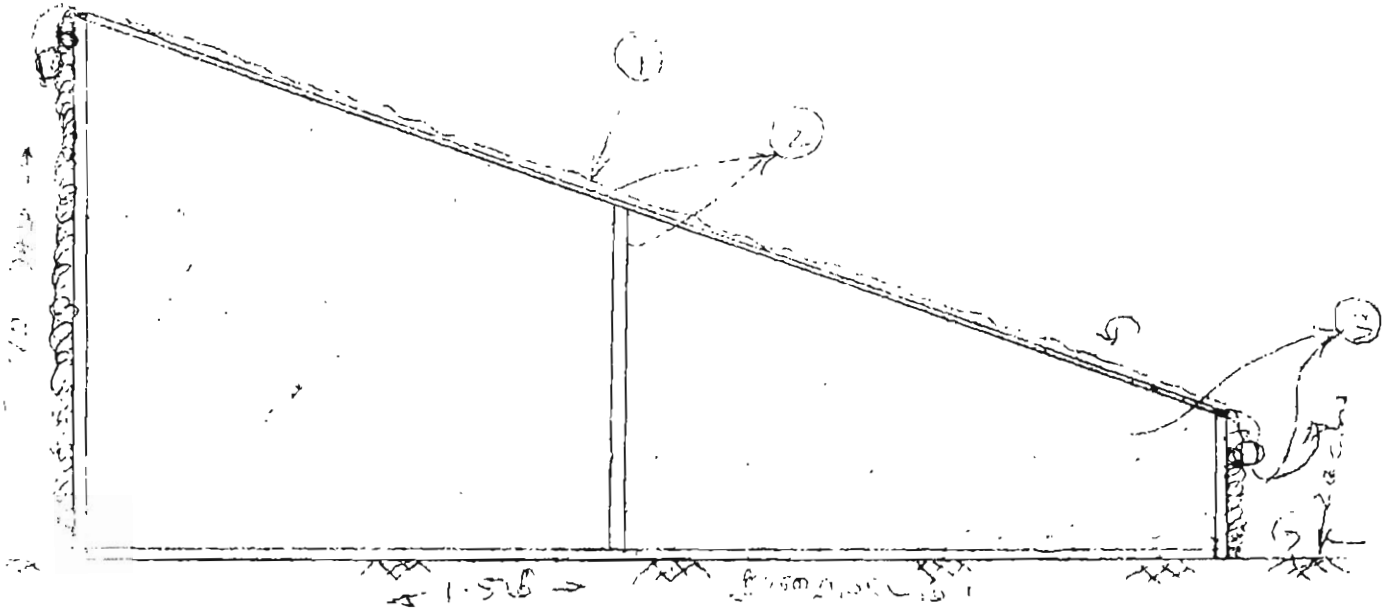


பருவ 2011 (பருவ)
 (பருவ 2011)
 (Paddy Drier)



- ① தலையாலை காய்க்கப்பட்டது (Dried coconut leaves)
- ② காசி மரக்கிழங்குகள் (Casuarina poles)
- ③ பாலிதீன் ஷீட் (Polythene sheet)
- ④ கதவு (Door)

(1) 2m x 5m
 (Paddy field)



(2) 2m x 5m x 5m (Paddy field)

- ① 1.5m x 5m (Polythene sheet)
- ② 2m x 5m x 5m (Casuarina Poles)
- ③ 2m x 5m x 5m (Thatched)

COST DETAILS:-

1. Material Cost:

S. No.	Details of material	Quantity	Rate	Unit	Total
			Rs.P		Rs. P
1.	Casuarina, Bamboo	40 Kg	6 00	25 Kgs	10 00
2.	3" Nails	$\frac{1}{4}$ Kg	3 40	1 Kg	0 85
3.	1" Nails	-	-	-	0 25
4.	Polythene paper	4 M	8 00	1 M	32 00
5.	To make the platform	-	-	-	15 00
6.	Gunny bags	-	-	-	10 00
					<u>68 10</u>

2. Labour cost:

To make the main structure with casuarina poles and fasten the gunny bag linings all around the sides. To fix the polythene sheet with facilities to wind it up and to erect the platform inside the drier.

2 persons for 3 days (Rs. 6.00/person/day) = Rs. 36/-

<u>Total cost:</u>	Rs. P
1. Material cost	: 68 10
2. Labour cost	: 36 00
Total Rs.	<u>104 10</u> Say Rs. 105/-

In this construction, as casuarina and gunny bags can be easily procured from the home front, also as the labour needed is of unskilled nature, it is expected to bring down the cost to Rs. 50/-

Cost of construction/Sq.m of this drier = Rs. 17.25

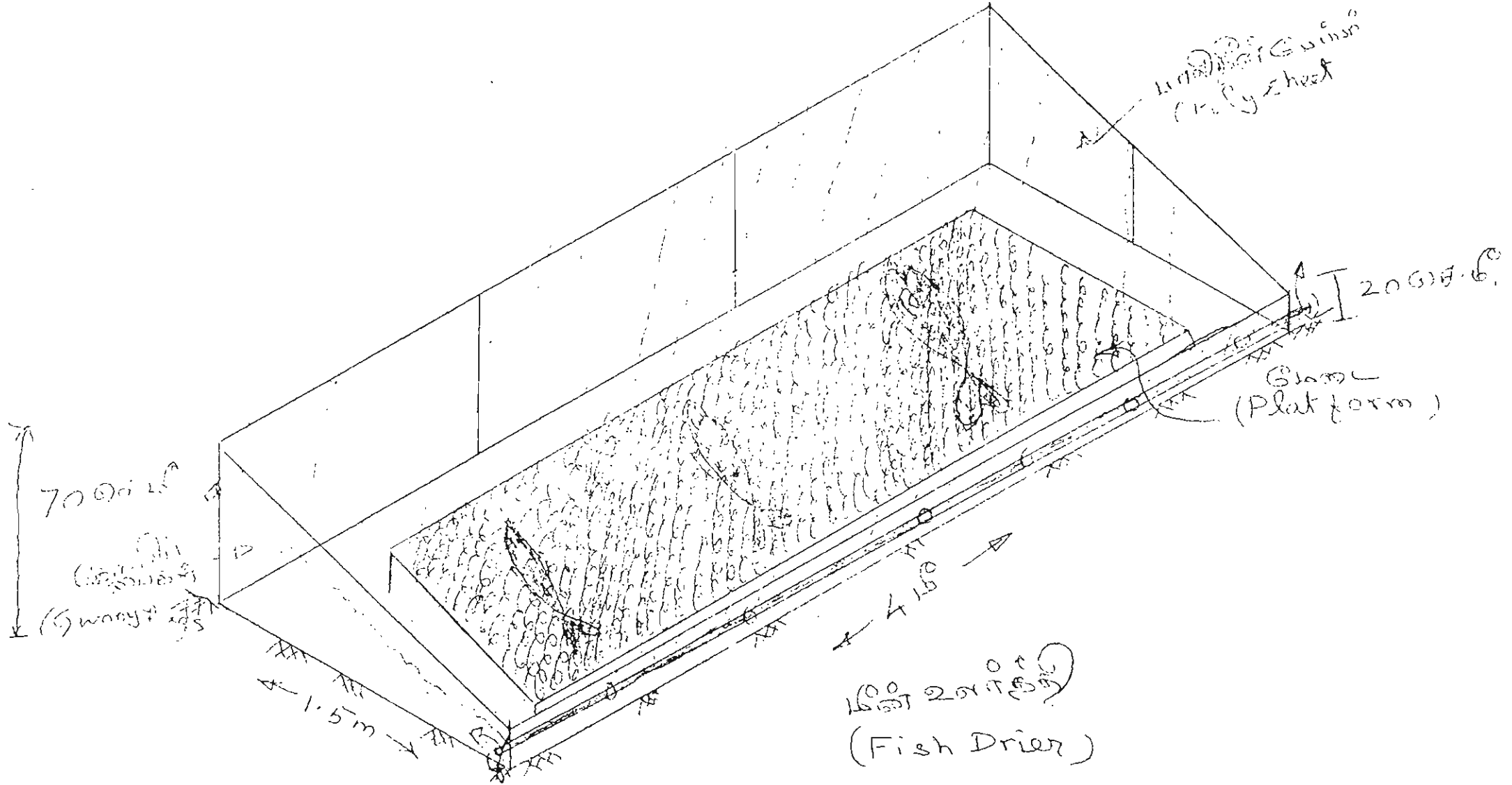
SOLAR DRIER NO.5 Fig. 4
(Paddy drier)

At the Injambakkam Village, another drier for paddy drying is put up. Its drying efficiency is almost that of the fishdrier. This drier reaches temperature between 42°C to 54°C.

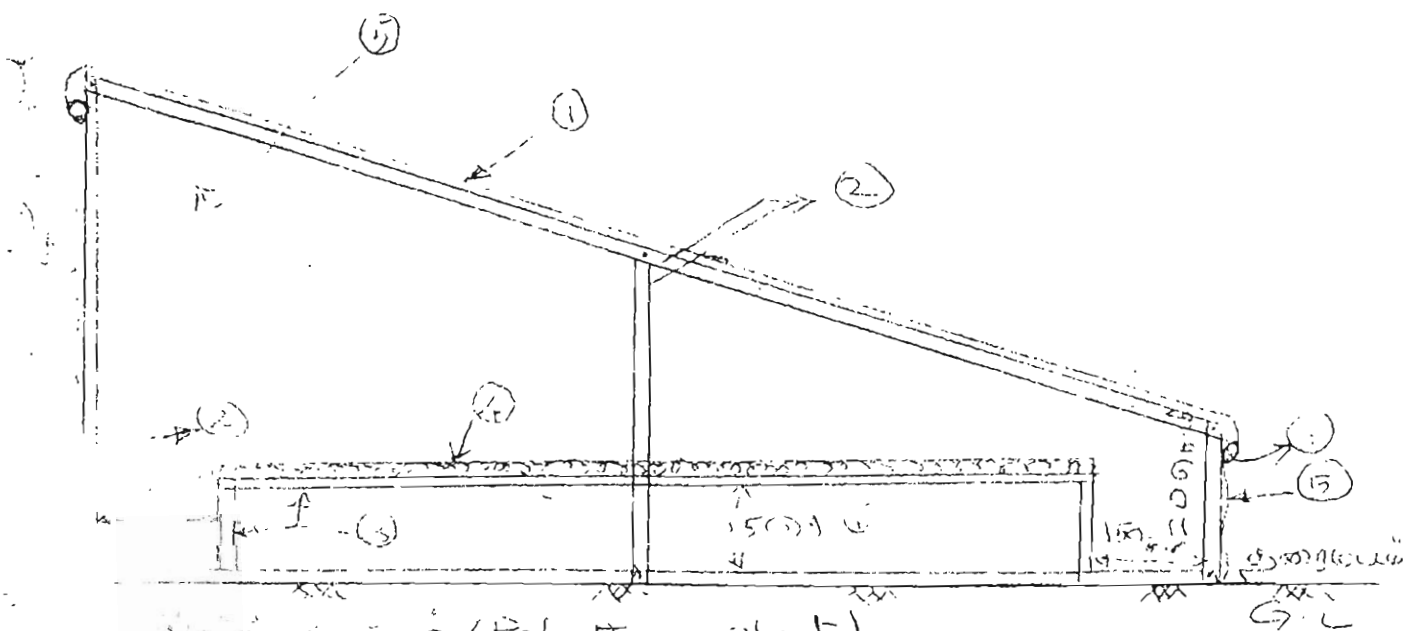
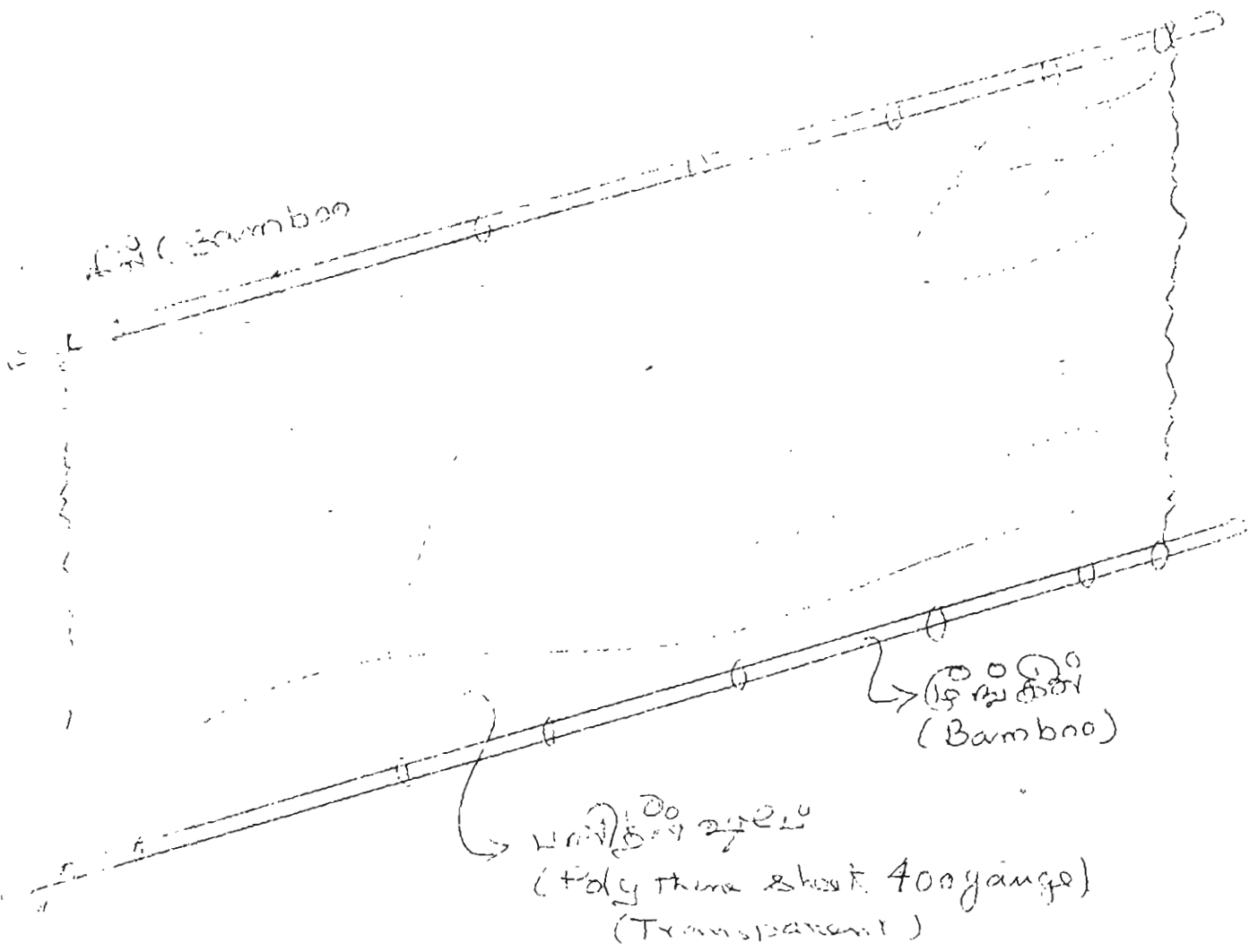
• The method of construction of this drier is similar to that of the fish drier. Unlike the fish drier, just the mud floor coated with cowdung will be sufficient and no need for a raised platform.

Moreover the side walls of this driers are made with thatches and two doors are provided at the sides to load and unload the charges and also to turn the same while drying.

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3 (2)



1. Polythene sheet

2. Bamboo

3. Bamboo

4. Dried coconut leaves

5. Gummy bags

(Handwritten text in Tamil script)

Handwritten text in Tamil script

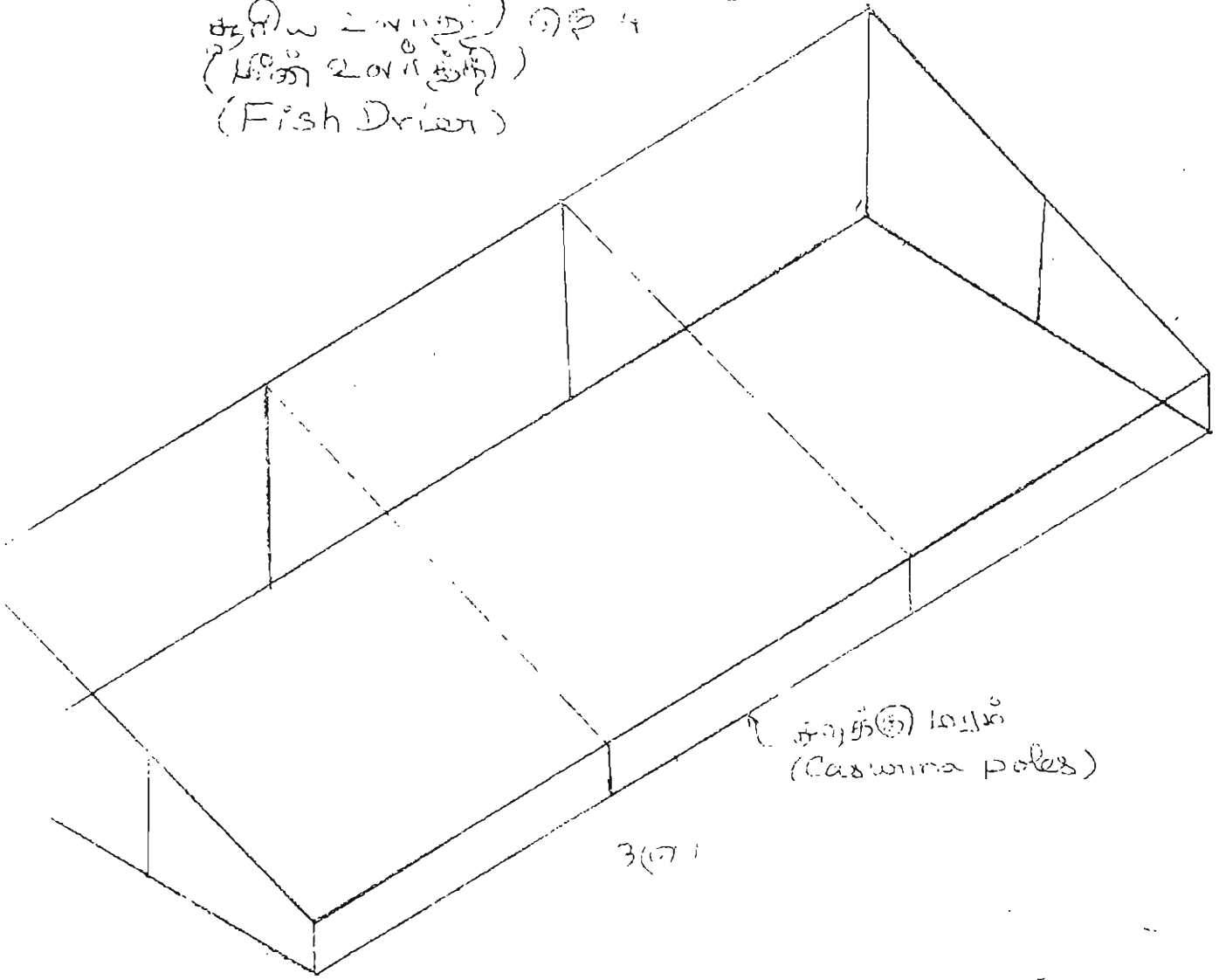
Handwritten text in Tamil script

Scale

1 cm = 10 cm

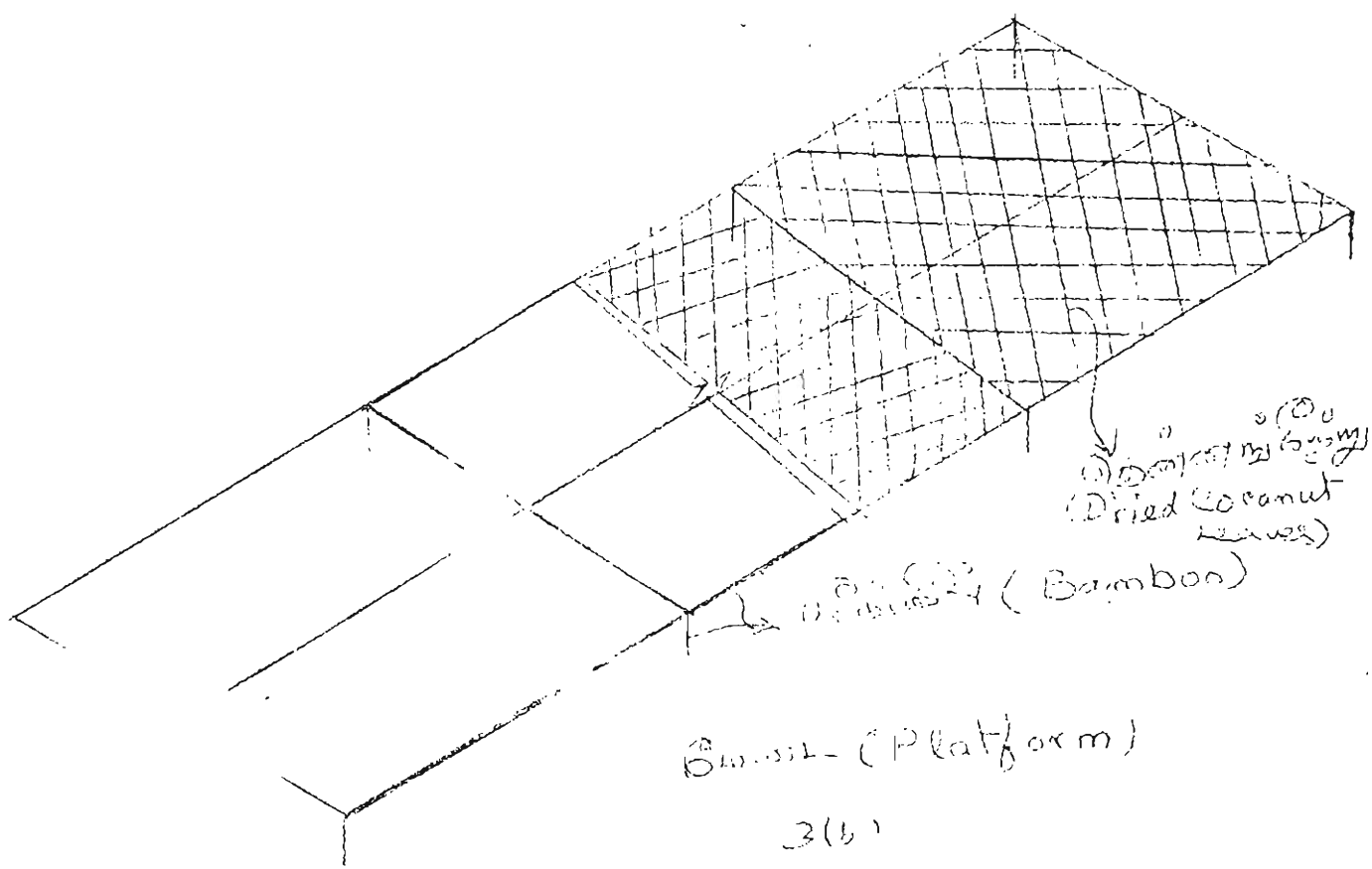
காய்ப்புறம் (காய்ப்புறம்)
 (காய்ப்புறம் 2011 (காய்ப்புறம்))
 (Fish Drier)

3(a)



காய்ப்புறம் (காய்ப்புறம்)
 (Casuarina poles)

3(a)



காய்ப்புறம் (காய்ப்புறம்)
 (Dried Coconut
 Leaves)

காய்ப்புறம் (காய்ப்புறம்)
 (Bamboo)

காய்ப்புறம் (காய்ப்புறம்)
 (Platform)

3(b)

Total cost:

Rs.

i) Material cost : 202 00

ii) Labour cost : 102 00

Total Rs. 364 00

Say Rs. 365.00

SOLAR DRIER NO. 4

(Fish drier) Figure - 3)

The aforesaid solar driers reached the maximum temperature ordinarily between 75°C to 85°C. These three driers are used for drying vegetables, chillies etc.

In these driers when fish drying was attempted, the fish got cooked rather than drying due to intense heat. So as to have the proper drying effect, with suitable modifications a tent drier has been made. This drier reached the temperature between 45°C to 55°C and the cost of construction is also considerably lessened.

The polythene sheet used in the solar drier so far have been found to get damaged due to improper handling, heavy wind and as such there was no facility to prevent it. In this drier the design has been suitably altered such that the polythene sheet can be wound up and kept safe when not in use. This drier has been put to use in the village Injambakkam near Madras.

Its uses:

1) Ordinarily when fish drying takes 2 days, with this drier the same could be dried within 2 to 3½ hours.

2) In this process as there is no access for the fly and mosquito and as the fishes are not strewn directly on the sand good hygiene is maintained.

3) As the fishes while drying are well enclosed by the drier, crow and eagle menace is eliminated and consequently the labour needed for scaring away the birds is saved.

First, using casuarina poles the structure as shown in the figure 3 (a) is made. Then all around the sides, gunny bag linings make the side wall.

Inside the drier, a horizontal bamboo platform is erected about 15 cm above ground level. Over this platform coconut thatches are spread and upon this the fishes are strewn for drying. Fig. 3(B)

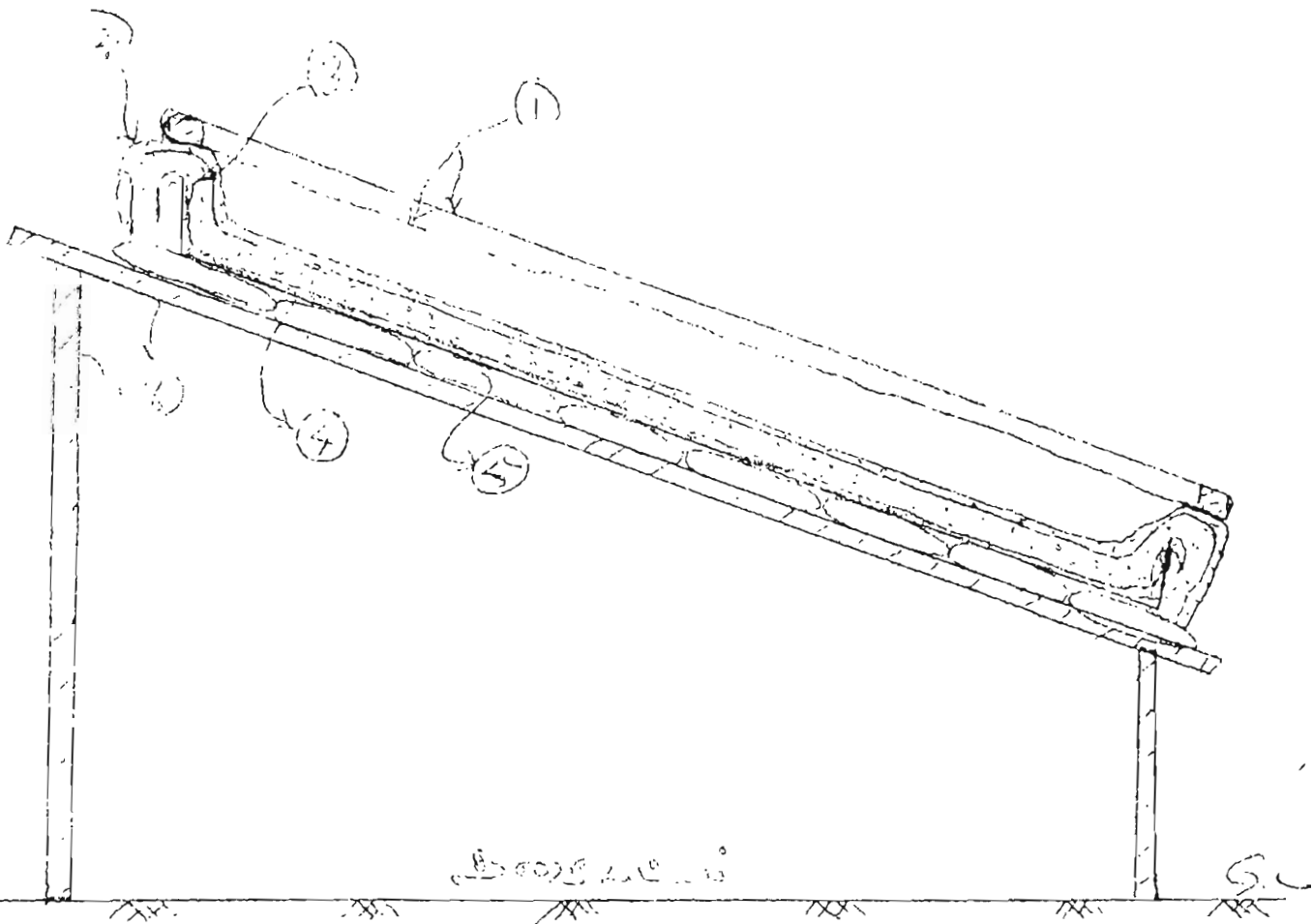
When not in use the polythene sheet can be wound up from lower to top ridge and kept safe there - The bamboo at the either edges of the polythene sheet help us in doing this.

Total Cost of this driers = Rs. 105/-

The overall dimensions of the driers: 4 m x 1.5 m

Contd....

ಹಿರಿ/ವಿಶೇಷ ಅಭಿವಿಧಾನ (A. 3.)
 (SOLAR DRIER No. 3.)



- 1) ಪಾಲಿಥೀನ್ ಶೀಟು (Polythene Sheet 700 gauge)
 - 2) ಕಾಂಕ್ರೀಟ್ ಅಥವಾ (Cement mortar 1:6) (10cm x 2cm)
 - 3) ಹಿರಿಯ ಮಣ್ಣು, ಮರಳು, ಕಾಂಕ್ರೀಟ್ (15:10:1) (4cm x 1cm)
 - 4) ಕಾಂಕ್ರೀಟ್ ಅಥವಾ ಸ್ಪ್ಲಿಟ್ ಬಾಂಬೂ
 - 5) ಹಿರಿಯ ಮಣ್ಣು, ಮರಳು, ಕಾಂಕ್ರೀಟ್ (15:10:1) (4cm x 1cm)
 - 6) ಹಿರಿಯ ಮಣ್ಣು, ಮರಳು, ಕಾಂಕ್ರೀಟ್ (15:10:1) (4cm x 1cm)
- ಕಾಂಕ್ರೀಟ್ ಪೋಲಿ
 ಉದ್ದ (ಉದ್ದ/ಉದ್ದ) = (345 x 160 cms)
 ಅಗಲ (ಅಗಲ/ಅಗಲ) = (315 x 125 x 15 cms)

Not to Scale.

After three or four days, mortar (cement & sand 1:6) is plastered to 1 cm thick all over the tray and also around the outside of it. After three days the tray is painted black. Finally, transparent polythene sheet with its wooden frame work is fixed on as has been done to driers No. 1 & No.2 so as to complete this drier, This drier is made in site.

Total cost = Rs. 365/-

Overall dimensions: 3.56 M x 1.62 M x 0.18 M

Cost details are shown in the table given below.

Cost of making the drier/Sq.m = Rs. 64/-

COST DETAILS:

Material Cost:-

S. No.	Details of material	Quantity	Rate Rs.P.	Unit	Total Rs. P.
1.	Casuarina	50 Kgs	6 00	25 Kg	12 00
2.	Bamboo & Bamboo platch	-	-	-	10 00
3.	Nails	-	-	-	1 50
4.	Bamboo mat	10 Nos.	4 50	1 No.	45 00
5.	Saw dust	12 Nos.	-	-	37 00
6.	Gunny bags	24 Nos.	1 00	1 No.	24 00
7.	Red soil	15 cft.	-	-	9 50
8.	River sand	30 cft.	-	-	39 00
9.	Black paint	-	-	-	12 00
10.	Polythene paper	8 M	8 00	1 M	64 00
11.	Wooden plank	-	-	-	8 00
					262 00

2. Labour Cost:

S. No.	Details of material	Days	Wages/person/day Rs. P.	total Rs. P
1.	To erect the sloping platform with: 2 mon	2	6 00	24 00
2.	i) To fill the gunny bags with saw dust ii) To fold the bamboo mat and tie it with bamboo platches: 2mon	1	6 00	12 00
3.	Red soil:sand:cement(15:10:1) to plaster this mortar mason:1	2	15 00	30 00
4.	Cement:sand (1:6) to plaster this mortar mason: 1	2	15 00	30 00
5.	To black paint the tray	-	-	6 00
				102 00

COST DETAILS:

i. Material Cost:-

S. No.	Details of material	Quantity	Rate	Unit	Total
			Rs. P.		Rs. P.
1.	Cement	25.00 Kg	20 00	50 Kg	10 00
2.	Sand	-	-	-	2 00
3.	Bamboo mat	1 No.	4 50	1 No.	4 50
4.	Bamboo Platch	-	-	-	1 00
5.	Casuarina	-	-	-	10 00
6.	Polythene paper	1½ m	8 00	1 m	12 00
7.	Gunny bags	4 Nos.	1 00	1 No.	4 00
8.	Saw dust	-	-	-	4 00
9.	Nails	-	-	-	10 00
					<u>57 50</u>

ii) Labour Cost:

Total wages for mason and mazdoors : Rs. 30.00

Total Cost: Rs. P.

i) Material cost : 57 50

ii) Labour cost : 30 00

Total 87 50

Say Rs. 90.00

SOLAR DRIER NO.3 (Fig. 2)

While drier No. 2 is shifted to the sloping platform there is a risk of breakage due to its bulk and heaviness. Apart from that, to further reduce the cost of making, this type was attempted. This is more or less similar to that of No. 2.

A sloping platform is erected at 15° from North to South; gunny bags filled with saw dust are spread over this platform. Bamboo mat is folded to form a 'tray' and its profile is stabilized with bamboo platches. Upon this mat, the mortar of red soil, sand and cement (15:10:1) is plastered to the thickness of 3 to 4 cms.

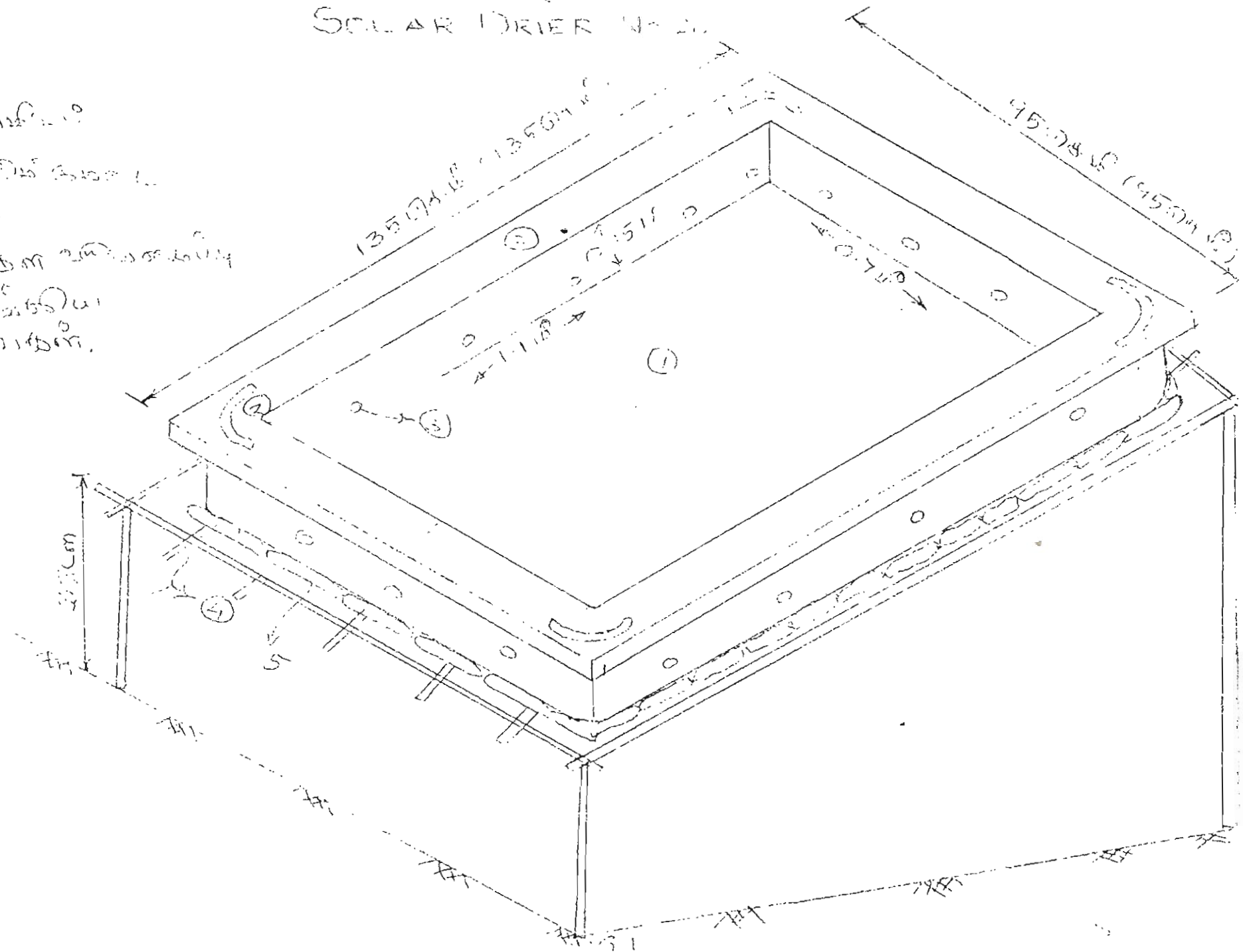
SOLAR DRYER UNIT

- ① கார். சீக்கர் உயிர்த்துறியும்
- ② மூலத்துண்டுகள் ஆர்த்துறியும்
- ③ கார். சீக்கர் தூண்டும்
- ④ கார். சீக்கர் கார். சீக்கர் உயிர்த்துறியும்
- ⑤ கார். சீக்கர் தூண்டும்

வகை: உயர்

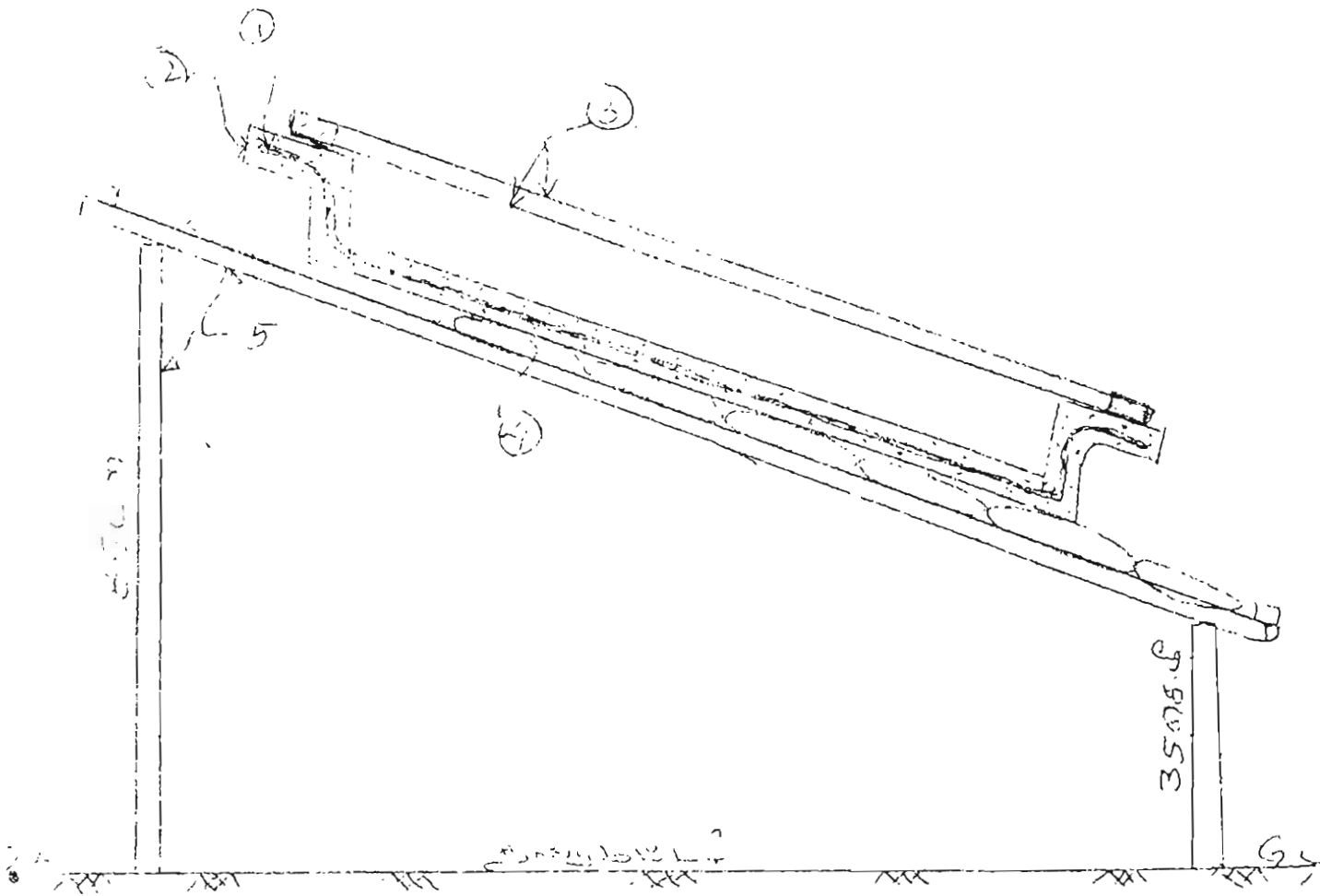
5.1.11

10 cm



(2)

ಶೃಂಗೀಲ ೨ನೇ (೨) (SOLAR DRYER No 2)



- ① ಬಾಂಬೂ ಮತ್ತು ಸ್ಪಲಿಟ್ ಬಾಂಬೂ
(Bamboo mat & Split bamboo)
- ② ೧೨ ಮಿಮೀ. ಕಾಂಕ್ರೀಟ್
(Concrete mortar (1:3))
- ③ ಉದ್ದೇಶಿತ ಚುಕ್ಕು
(Polythene sheet (700 gauge))
- ④ ಲ್ಯಾಂಗ್ಸ್ಟಾನ್ - ಸಿಮೆಂಟ್ ಪುಡಿ (ಸಾಸು) ಗ್ಯಾಜೆಟ್
(Sawdust in gunny bags).
- ⑤ ಕೋವುಡು ರೋಲರ್ಸ್
(Coconut rollers)

ಶೃಂಗೀಲ ೨ನೇ - ೧ನೇ ಕಿಟಿಂಗ್ = 135 x 95 cms
(Dimensions) - Outer dimension = 135 x 95 cms.
2ನೇ ಕಿಟಿಂಗ್ = 110 x 70 x 15 cms.
Inner dimension

Net weight

SOLAR DRIER NO. 1

With "chicken mesh", cement, sand and polythene paper (transparent) a solar drier was made for drying algae and other vegetables. The total cost of making was Rs. 225/-. The overall dimensions : 1.9 m x 1.3 m x 0.15 m.

As the complete details of this drier had been already reported in the Technical Report No. 1, they are not repeated here. At present, this drier is used for drying paddy, chillies etc. Cost of making/Sq. m = Rs. 92/-.

SOLAR DRIER NO.2 (Fig. 1)

As chicken mesh & iron rods are costlier, with bamboo mat, bamboo platches, cement and sand, this drier was built. The drying efficiency of this is equivalent to that of drier No. 1. More over the cost of making is considerably low.

Using casuarina poles, a sloping platform is erected as shown in the figure, the inclination being 15° from North to South. Over the platform, gunny bags filled with saw dust are spread to act as thermal insulation.

The bamboo mat folded to the required size and the form is stabilized using bamboo platches. On to this upper surface, cement and sand mortar is plastered to a thickness of 2 cms. Curing is done often to harden it. After 5 or 6 days this is turned very carefully upside down and as before, cement sand mortar is plastered and cured for hardening. After five days, this finished "tray" is shifted to the sloping platform and placed over the saw dust bags spread already. The interior of the tray is completely painted black to absorb solar irradiation.

For the entry of cool air into and for the escape of the warm air from the solar drier, air holes are provided as shown in the figure, while cement mortar is plastered.

Transparent polythene paper (700 gauge) is used as in drier No. 1. The total cost for making per unit is Rs. 90/-. The overall dimensions : 1.1 m x 0.7 m. The cost details are shown in the table given below. The cost of making this drier/Sq.m is Rs. 70/-.

Contd....

Solar Driers (Special Number, Translated from the Tamil).

Foreword: The research centre has taken up projects pertaining to rural development so that low cost technology appropriate to the local materials and skill is made possible. The inventions, innovations and suggestions of this centre are periodically published as Technical Reports.

This technical report - third in this series - is a special number dealing exclusively with solar driers, giving details about the design, fabrication, cost and details of use of the solar driers.

As a move to help village people understand and appreciate the uses of solar driers, two driers have been installed at Injambakkam, a village about 30 km from the centre. One is for drying of agricultural produce and the other is for fish drying. The managers of Injambakkam, having seen the uses of these driers themselves, they are continuing to use them.

Various types of driers have been successfully tried and their data obtained were already published and some of the devices have been just demonstrated to the people. In the research work done so far about driers is satisfactory, the staff will continue to work in future, unless there is something entirely novel to report.

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