

Development of an apparatus for humane Method of Killing Frogs for Frogleg Processing Industry

S. Ayyappan Pillai

Central Institute of Fisheries Technology, Cochin

THE paper describes the development of an apparatus which can be used to give electric shock to the frogs so that they can be killed without pain during the stunned period.

Frozen frogleg is a very valuable foreign exchange earner for India. They are exported in large quantities to Western Europe and U. S. A. They have been providing employment to a large number of persons of the weaker section of the society engaged in trapping of frogs. The frogs are caught from water logged paddy fields, canals and ponds at night employing torch light and put into gunny bags and transported to cutting centres. At the cutting centres the frogs are washed in potable water followed by washing in chlorinated water. The method adopted for butchering is by cutting the hind legs of the live frogs. But after the legs are cut off the remaining part of the frogs used to jump and cry which is very pitiable so there had been protests from environmentalists and animal welfare activities.

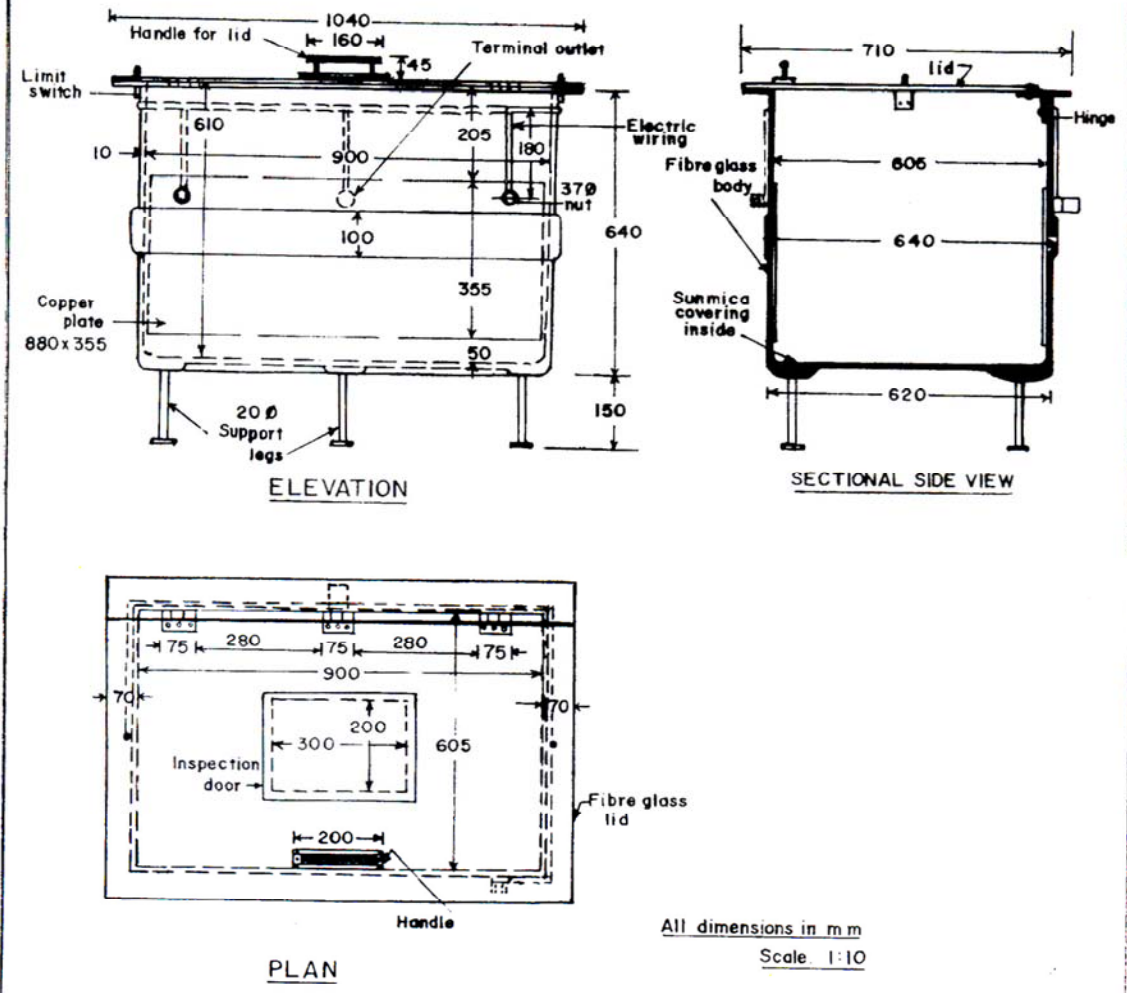
A simple method had been worked out for easy handling of live frogs for cutting purpose as well as for preventing bacterial contamination of cut legs. The

method adopted is to dip the live frogs in 10% sodium chloride solution for 10 minutes before being butchered. The frogs get paralysed so that cutting of the legs become easy and painless. This treatment has also been found to remove the contaminating organisms from the skin surface with the result that the finished products are almost completely free from pathogens like *E. coli*.

The above method had been practised for quite some time. However it is reported that there are instances where the frogs dipped in the brine regain consciousness after removal and during cutting of their legs they struggle a lot. Hence the necessity is felt to develop a foolproof method of humane method of killing frogs.

The College of Fisheries, Mangalore, developed a method in which electric shock is given to the frogs kept in a plastic box filled with 0.1% brine². The prototype was demonstrated at the Central Institute of Fisheries Technology, Cochin during May 1985 and a scientific evaluation was made by the scientists of CIFT, MPEDA and Seafood exporters. It was felt that the electrical stunning method demonstrated was satisfactory.

Fig.1 FROG ELECTROCUTION BOX



C I F T
COCHIN - 29

But, the prototype needed further modifications particularly in respect of safety precautions. Since the prototype can handle 100 — 200 frogs only in each operation and the industry is handling 10,000 to 30,000 frogs approximately per day, the equipment has to be redesigned

in such a way to handle 400 — 500 frogs in each batch. For this purpose MPEDA had authorised CIFT, Cochin and College of Fisheries, Mangalore to jointly do the research work and finalise the same within a month with the financial assistance from MPEDA.

As there are no changes in the basic design parameters such as the supply voltage and duration of stunning, the development of the bigger prototype to stun 500 frogs per batch was taken over by CIPT.

The plastic box has been replaced with fibreglass which is lighter, more durable and with better insulation properties. The box (Fig. 1) measuring 900x605x610mm. height can hold 500 frogs

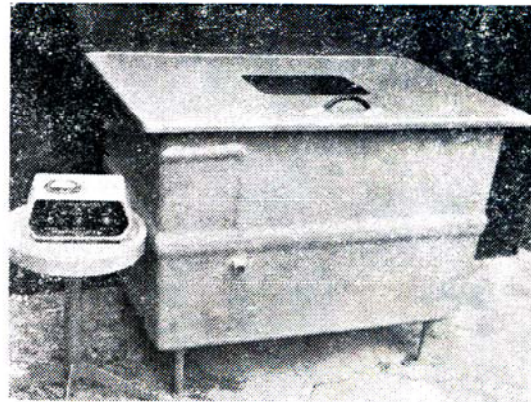


Timer unit (Fig. 2)

at a time. Two copper sheets have been fixed on the opposite sides to serve the purpose of electrodes. Electric connections to these electrodes have been given through two limit switches fixed on the top edges on the two sides of the box. The connections are made in such a way that electrical connections to the electrodes will be made only when the lid is closed. When the lid is opened the limit switches will disconnect the electrodes from the supply automatically. In order to ensure complete safety, two limit switches are provided one for the phase and the other for the neutral of the power supply so that even when the phase and neutral of the supply voltage are interchanged, the possibility of electric shock

to the operator is avoided. The lid also made of fibreglass has a transparent plastic window at the centre for inspection. For draining the water, a drain outlet has been provided with a flexible PVC tube.

The period of stunning has been standardised for 3 minutes. In order to disconnect the power supply after the prescribed period of 3 minutes, an electronic timer has been designed by the Electronics & Instrumentation Division of the Institute. The timer (Fig. 2) consists of an electronic relay circuit. It has two indicating lamps, one to indicate the power supply to the timer unit (POWER ON) and the other to indicate the power supply to the box (LOAD ON). There are two push button switches, one to trigger the timer circuit (PUSH TO ON) and the other to switch on the manual switch (MANUAL ON). Once the PUSH ON switch has been



Timer unit and the box connected and ready for operation (Fig. 3)

triggered the timer circuit will be energised and the power supply to the box is connected. After 3 minutes, the timer will switch off the power supply to the box automatically. Whenever any trouble

occurs with the electronic relay circuit, stunning can still be done manually by pushing the MANUAL ON switch and holding the switch pressed for 3 minutes. Once the finger is taken off the switch the power supply to the box will be cut off.

At the top of the timer unit an ammeter has been provided which is used for determining the concentration of the brine as well as to measure the stunning current passing through the frogs. Fig. 3 shows the box and the timer unit connected ready for the operation.

OPERATION OF THE APPARATUS

Connect the terminals of the box to the timer unit and the timer input terminals to a power supply mains of 15 Amps 3 pin plug socket with switch, the supply being 230 volt AC single phase. Pour about 150 litres of potable water which will occupy almost half the volume of the box. Dissolve 150 gm. of common salt and after closing the lid of the box switch on the power supply to the time unit and press the MANUAL ON switch and measure the ammeter reading. If the ammeter reading is between 6 and 8 amps, the concentration of salt solution is sufficient. If the ammeter reading is less than 6 amps add a few quantity of salt till the reading reaches the above range. If the ammeter reads more than 8 amps it indicates that the salt content is more. In such case some solution may be drained off and fresh water may be added to adjust the concentration to the required level. In locations where tube well water with saltish content is used, no addition of salt will be required, instead the water will have to be diluted with fresh water to achieve the correct concentration.

Once the concentration is decided as stated above, the apparatus is ready for the stunning operation.

Now live frogs can be loaded to the box and after closing the lid, power supply to the timer unit is switched on and then press once the PUSH ON switch. It can be seen that as soon as the button is pressed all the frogs will be stunned instantaneously with a jerk. The ammeter reading may be noted carefully. A current of 6 to 8 amps reading is quite normal and in any case the current should not exceed 10 amps and after 3 minutes the ammeter reading will come to zero and simultaneously the LOAD ON indicator lamp will go off. Now the power supply may be switched off and the lid may be lifted and butchering of the stunned frogs can be done.

It is to be noted that the lid should not be lifted before the timer switching off the relay indicating the LOAD ON indicator going off and the ammeter reading coming to zero. If the lid is lifted in between the supply will be broken due to the operation of limit switches fixed on the box as a protective measure.

After conducting several experiments it has been observed that majority of the frogs will not get killed, they are stunned only and they start reviving after 10 to 15 minutes. Hence it is essential that butchering will have to be carried out before they revive to effect painless death. If the butchering delays beyond 10 minutes it is essential to stun them once again for another 3 minute duration.

Eventhough every effort is taken to give maximum safety to the operator, the following precautions should be taken while operating the equipment.

1. The apparatus should be placed as far as possible in a dry place.
2. A wooden platform covered with rubber sheet should be placed in front of the apparatus for the operator to stand on as an additional safety measure.
3. The operator should wear gum boots and rubber gloves.
4. The timer should be placed not far away from the box at a convenient height and at a dry place and care should be taken to prevent water falling over it.
5. The limit switches on the box will cut off power supply to the electrodes as soon as the lid is open. However, it is advisable to open the lid only after the power supply to the timer unit is switched off as an additional safety measure.
6. Keep the box clean and dry and check the operation of the limit switches periodically for smooth and trouble-free operation.

The apparatus has been fabricated at M/s. Krishna Plastics, Dewans Road,

Ernakulam, Cochin-682029 and the workmanship is quite good. The cost of the apparatus including the timer unit will come to Rs. 3850/- excluding taxes.

The author wishes to thank Shri Nair, Director, CIFT, Cochin for the encouragement and Shri S. N. Rao, Director, MPEDA, Cochin for the encouragement and financial assistance for developing the apparatus. Thanks are also due to Dr. T. K. Sivasdas, Scientist-in-charge, Electronics and Instrumentation Division and his assistants for developing the electronic timer.

REFERENCES

1. Gopalakrishna Iyer, T. S. and Choudhury D. R. —
Advantage of salt treatment in frog legs processing. *Science and Culture*, 34(7), 1968, 299-301.
2. Hiremath, G. C. and Narayana Bhat K. A. —
New technology on painless killing of frogs for production of frozen frog legs - Report 2- Electrical method-report submitted to the Marine Products Export Development Authority, Cochin. ○