

## SINDEWAHE DOUBLE FURNACE

By M. A. BALAKRISHNAN, L.A.G.

*Agricultural Demonstrator, Gudiyattam*

The sugar-cane cultivators of our Presidency mostly adopt the practice of converting the juice into jaggery by means of boiling. Various types of furnaces are in use for this purpose. The ordinary country furnace is one of them. It is a big circular pit with slightly curved sides. In this, facilities for feeding the fuel and for the inlet and exit of air are so poorly provided that much heat is wasted. For manufacturing jaggery from an acre of cane, the ryot has to spend about Rs. 50 worth of fuel, in addition to using the whole of his megass and trash. This is a costly and tedious process, and takes about three weeks to finish the work.

The introduction of the Sindewahe furnace by the Agricultural Department found favour with the ryots and this is the type now in common use by a large number of the sugar-cane cultivators. Its construction and use have been dealt with in detail in the Villagers' Calendar for the year 1923-24. Apart from the savings in the item of fuel, the time required for making jaggery is comparatively less. It takes about 12 days per acre and hence the popularity of this type of furnace.

A slight addition to the present Sindewahe furnace would still minimise the number of days to 7 or 8 for making jaggery from an acre of cane. The process of constructing a second furnace is quite simple. The additional or upper furnace is constructed 1 ft. 10 in. away from and 6 inches above the lower one. From the lower furnace and 3 inches from its bottom a flue (hot air passage) 6 inches high rises and opens into the upper furnace. In front of the opening of this upper furnace and 1 ft. 9 in. away from it 5 bricks are placed equidistant from one another in vertical positions like a honey-comb and these bricks are supported behind with half bricks as props and mud plastered to keep them in position. This serves as a baffle to arrest the rush of hot air issuing from the lower furnace.

To start with, both the pans are provided with juice. The exhaust hot gas from the boiling or lower furnace passes through the flue into the upper furnace. There it spreads out and imparts its heat to the storage pan and finally passes out through the chimney. When the first charge in the boiling pan is over the hot juice in the storage pan is made to empty itself to the boiling pan by means of the syphon and the storage pan gets replenished with fresh juice.

The height of the chimney is 10 feet and its diameter 10 inches. A small pit 6 inches deep is provided at the bottom of the chimney to collect any charcoal residue that might be blown out through the hot-air passage. Either brick-in-mud or iron-plate chimney is in common use for the Sindewahe furnace. The former is not easily transportable and is washed off during rains, while the latter gets perforated and rusted after a few years' use. Instead of these, 5 earthenware pipes each 2 feet long by 10 inches diameter have been placed one over the other to serve the purpose of a chimney.

Trials conducted at the Agricultural Research station, Palur and in the lands of the ryots at Gudiyattam taluk of the North Arcot district had

shown that in the case of a single Sindewahe furnace it took on an average about 34 minutes to boil down 100 lbs. of juice and about 23 minutes for the same quantity in a double Sindewahe furnace. In other words, a charge which usually took about  $1\frac{1}{4}$  to  $1\frac{3}{4}$  hours had been finished within an hour or  $1\frac{1}{4}$  hours with this type of furnace.

(1) It is thus seen that there is a saving in time of over 30 per cent by getting the juice heated previous to boiling.

(2) There is practically no investment for this type of furnace construction, because the additional purchase of a second pan, provides for an interchangeability of the two pans in both the furnaces and thus ensures the durability of the pans in the long run.

(3) As regards earthenware pipes as chimney, it has the following advantages :

(a) It is very cheap. It costs only Rs. 0-15-0 for all the five pipes as against Rs. 8 for the iron chimney and about Rs. 2-8-0 for the brick-in-mud one.

(b) Neither does it rust like the iron chimney nor does it become difficult of transportation ; nor is it washed off during rains like the brick-in-mud one.

(c) It can last a very long time provided it is securely kept and carefully handled.

(d) Any village potter would easily make such pipes.

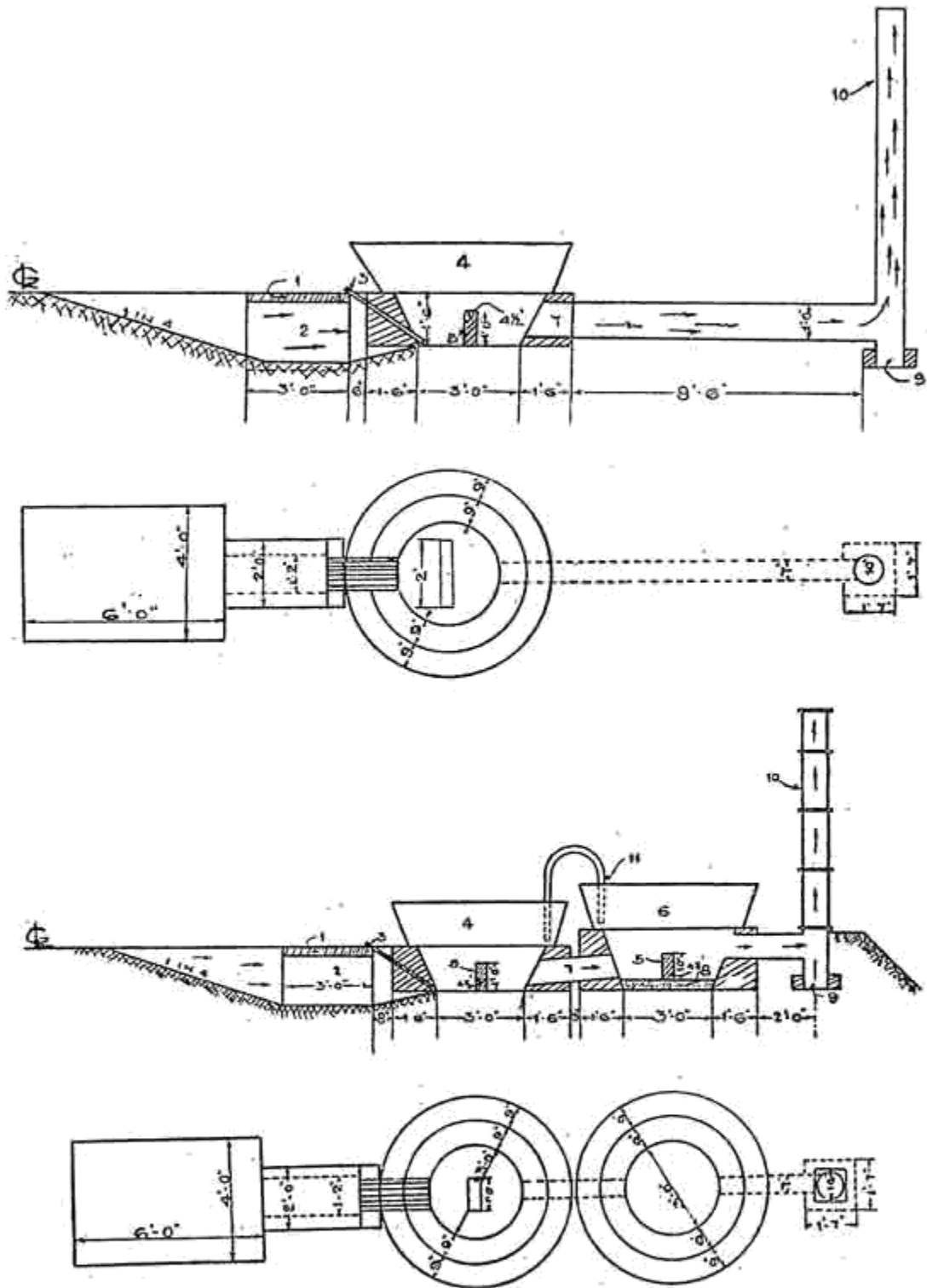
(4) Needless it is to add that a ryot who has to attend to various other agricultural operations like planting fresh areas of canes, irrigating newly-planted and standing crops etc., will find his pressure of work considerably reduced.

This type of double furnace is specially recommended for landlords who have to deal with canes over large areas. Besides, two or three small ryots can co-operate together and, at a trifling cost, add another furnace and save much time and worry.

For details please see in the plans attached and to the photo showing the working.

[For the benefit of our readers who may not have access to the Villagers' Calendar 1923-24, we reproduce below the details of construction and advantages in the use of the Sindewahe furnace referred to in the article. Ed. M.A.J.]

*Construction*—Select a level piece of ground conveniently situated near the cane fields. The size of the furnace depends on the size of the boiling pan in use in the tract. For a pan of 7 feet in diameter, dig a circular pit  $6\frac{1}{2}$  feet in diameter,  $1\frac{1}{2}$  feet in depth with sloping sides so that the space at bottom of the pit is  $4\frac{3}{4}$  feet in diameter. In this pit construct a wall of mud or of brick-in-mud, one foot high and 4 inches broad, leaving a space of half a foot on either side to serve as a passage for smoke and hot gases to escape through. This wall also serves to prevent the flame from being drawn by the draught of air into the outlet and thus to spread it out within the furnace. The top of this partition wall when constructed will be 6 inches below the bottom of the boiling pan. The outlet for smoke and hot gases is to be constructed on the side of the mud wall opposite to the feeding hole and in a line with it. The position for fixing the iron grating into the feeding hole will be mentioned later on. The size of the smoke outlet should be 15 inches deep and 7 inches wide. This opening should be continued to a distance of some 8 to 10 feet where a chimney  $\frac{3}{4}$  to 1 foot in diameter and about 8 feet high should be constructed and should be smoke-tight and continue with the air outlet. The outlet and the opening should face the direction from which the wind



### SINDEWAHE FURNACE

Above—Single furnace. Below—Double furnace. 1. Stone slab. 2. Air passage. 3. Grate. 4. Boiling pan. 5. Baffle wall. 6. Storage pan. 7. Flue. 8. Earth filling. 9. Residue pit. 10. Earthenware pipe chimney. 11. Siphon.

generally blows. The chimney may either be of sheet iron, brick-in-mud, earthenware or mud. Sheet iron chimneys are convenient in case the furnaces are not permanent and are only constructed for one season. The cost of such a chimney is estimated at Rs. 16.

The iron grating over which the fuel is fed and through which the draught of air necessary for the complete combustion of fuel is supplied, is made of  $\frac{1}{4}$  inch round iron bars each 20 inches in length fixed up  $\frac{1}{4}$  inch apart to two pieces of 1 inch broad flat iron. The size of the grating, when made, should be 14 inches broad and 20 inches long. The cost of this grating at present prices, is estimated at about Rs. 6. This grating should be fixed in a slanting position, its bottom touching the lower rim of the furnace and the upper edge fixed at a point 8 inches away from the top rim of the furnace and 3 inches below the ground level. This leaves an opening 14 inches wide, and 7 inches between the pan and the top of the grating.

*Advantages.*—The advantages which this furnace possesses over other furnaces are:—

(1) A considerable saving is effected in the matter of fuel. All the boiling can be done on the megass (the refuse of sugarcane after the extraction of juice) alone. In Coimbatore district, the ryots have to spend as much as Rs. 50 per year in having to purchase fuel to supplement the megass for each acre of cane dealt with and this will be a clear saving to the ryot.

At the end of the crushing season if the Sindewahe furnace is adopted there would be even a balance of the megass left over. This and the whole of the trash should therefore be available for use as manure. It is reckoned that the trash left over in an acre of cane-field is equivalent to 30 cart-loads of cattle manure in its manurial value and the ryot can therefore use all the trash to supply the bulky organic manure, supplementing the same, if necessary, by other concentrated manures like oil-cakes, etc.

(2) The construction of the furnace is quite simple; the iron grating can be made by the village blacksmith, at a cost of about Rs. 6.

(3) The feeding of the furnace is not at all laborious and can be attended to by a boy. The megass does not require to be bundled up; the feeding has only to be done by handfuls at a time. The person attending to the feeding does not feel the heat so much as in the case of other furnaces and does the feeding quite at ease.

(4) The burning of the fuel being steady, the combustion being complete and the distribution of the heat being more uniform, a larger number of boilings can be done in a day, at least 25 per cent more.

(5) As a result of even boiling, the collection of the scum is easy and the juice attains the proper consistency by degrees. A better control over the boiling juice is possible and thus over the colour of the jaggery. Burning and charring of jaggery is impossible with this furnace.

(6) Lifting of the pan is easier with this furnace as the heat of the furnace is always controllable.

## THE ANNUAL COLLEGE DAY AND CONFERENCE

The Annual College Day and Conference held under the auspices of the M.A.S. Union will be held this year in December instead of July. The exact dates will be fixed in consultation with the Director of Agriculture and announced in due course.

The elections of Office-bearers will take place at the General Body Meeting to be held in December, and Nominations will, therefore, be accepted up to the 1st of December 1931.

K. M. THOMAS,  
Secretary.