M.R.O. 14—13,000—27-9-24

MADRAS RECORD OFFICE.

Government of Madras.

Revenue **DEPARTMENT.**

G.O. No. 1982 Press Mis.

242.823

Dated 26-10-1864.

Not to be folded or roughly handled

Proceedings of the Madras Government, Revenue Department, 26th October 1864.

No. 342. Read the following Proceedings of the Madras Government, in the Public Works Department :—

Ordering that the Memorandum on the best mode of preparing charcoal by Dr. Cleghorn, be printed and circulated. } (Here enter 12th October 1864, No. 2,929.)

No. 343. ORDER THEREON, 26th October 1864, No. 1,982.

Forests, No. 19.

Dr. Cleghorn's Memorandum will be sent to Collectors and Forest Officers, but the Government observe that it is in all essential respects a re-print of a paper circulated to them as far back as September 1860, and to be found at page 283 of Dr. Cleghorn's "Forests and Gardens of South *India*."

(True Extract.)

(Signed) J. D. SIM,
Secretary to Government.

To the Board of Revenue.
" Officiating Conservator of Forests.
" Public Works Deptt.

Exd. S. T. Augustin.

INSTRUCTIONS

FOR THE

PREPARATION OF CHARCOAL.

ISSUED FOR THE GUIDANCE OF OFFICERS IN THE PUBLIC WORKS DEPARTMENT.

TO MAKE CHARCOAL.

THE best sized wood for this purpose is of the form understood as billets. An ordinary kiln for smelting measures 18 feet in diameter, and requires about 25,000 billets, cut as nearly as possible of the same length. Procure a pole about 25 feet long and 6 to 8 inches thick, straight and of uniform thickness. Provide yourself with four forked sticks of the shape of *Fig.* 1. Erect the pole perpendicularly on the spot where the kiln is to be made and place the four forked sticks round it, arranging pieces of wood from fork to fork and across, to make a hollow space in the centre of the kiln, of about 18 square inches, as in *Fig.* 2, for containing combustible matter. Provide the person stacking the billets with a yard measure, and with one end of the measure against the pole, let him sit at the other end and place the billets in an almost perpendicular position against the cross pieces, and as close together as possible, each cooly stacking right and left to join his neighbour's work on either side. Thus he goes on stacking until he has come to the end of his measure; all having done the same, a perfect circle will be the result. After having filled up with brushwood or old charcoal all interstices there may be from crooked or large billets, each cooly pulls out his measure to another yard in length and proceeds as before. Having done this the third time, the kiln will measure 18 feet in diameter. The coolies then mount the first layer of billets and commence stacking from the pole, until they come to the end of the second layer, making an allowance for the curve, and so on a third and fourth layer, until the kiln is completed, as shown in *Fig.* 3. Cover in the whole kiln with turf, 3 to 5 inches thick, turning the grass side inwards, commencing from the bottom; after which throw a small quantity of loose earth over the turf, beating it down with the back of a spade; if turf is not procurable, put a compact layer of earth over leaves and brushwood, moistened with water.

Fig. 1.



Fig. 2.

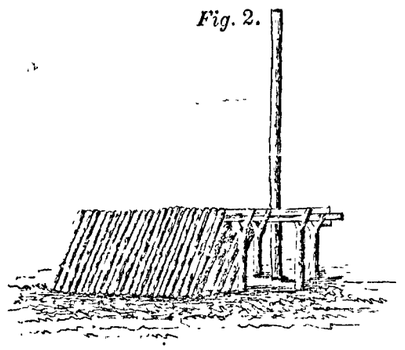
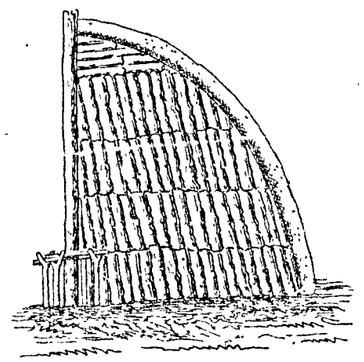
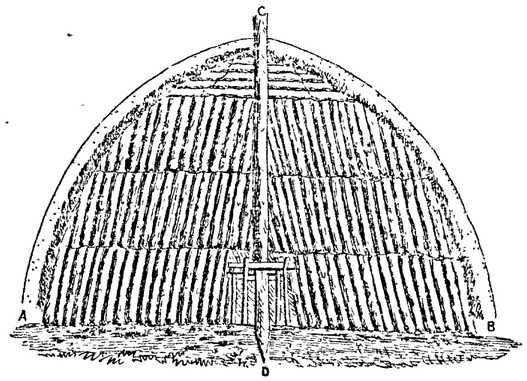


Fig. 3.



Section of one-half of the Kiln.

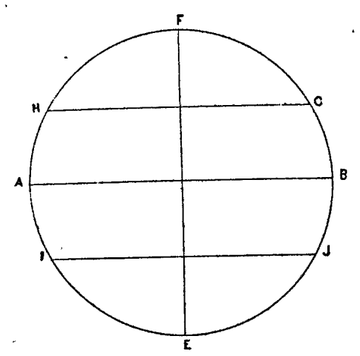
Fig, 4.



Vertical Section of Kiln.

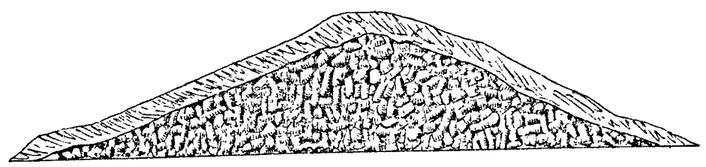
After the whole kiln has been covered in, let one or two men ascend and pull out the pole, leaving an empty space from top to bottom. From the top, drop in a ladle full of ignited charcoal, and immediately this is done, open out one turf at the bottom of the kiln, say at A. This will cause a draught of air in the direction of ADC, *Fig*. 4, and in a few minutes, dense smoke will be seen ascending at C, and vapour condensing on the coating, after which flame s will burst forth. Let this continue for 5 or 10 minutes, till it is clear that the billets in the centre of the kiln are on fire, when a man must be sent up with a large turf to close the opening at C, over which he should sprinkle earth to keep in all flame, and secure uniform combustion in all parts of the kiln. *From this moment no flame must be allowed to escape from any part of the kiln.* When the opening at C has been closed, one at B should be made. The billets in the direction of DA and DB will then ignite faster than any other, and when smoke is seen escaping between every turf in the direction of AC and BC the openings at A and B must bo closed and fresh ones made, say at E and F ; these will be closed in their turn and others made at G, H, I, and J, *Fig*. 5. Shortly after this, smoke will be seen to issue uniformly from every crevice, when all air holes at the bottom must be closed. After the

Fig. 5.



Horizontal Section of Kiln.

Fig. 6.



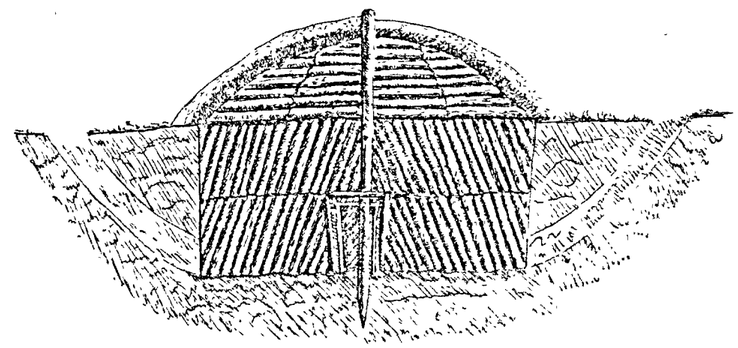
charring is complete, the whole kiln will fall in at the end of 2 or 3 days, according to size, and assume something of the shape in *Fig*. 6.

Earth must then be thrown on with shovels to *extinguish all smoke,* and at the end of 36 hours, the charcoal may be raked out. A few buckets of water should be in readiness, if required, to put out the sparks of fire which may remain.

Great care must be taken to stop every fissure in the casing, and if from bad management the heap settles, and the casing falls in at any part, the cavity must be filled up with green wood kept ready for the purpose, and the covering replaced. As soon as the dense smoke ceases, and the wood burns with a light transparent smoke, the whole must be closed in and watched, lest any fissures appear.

In burning in pits, vent-holes are made in the sides, and the covering of sods being of smaller extent, is easily formed and the wood is more conveniently packed, as shown in *Fig*. 7 ; the logs in the middle of the lower course should be dry with a few chips and refuse charcoal from former kilns among them.

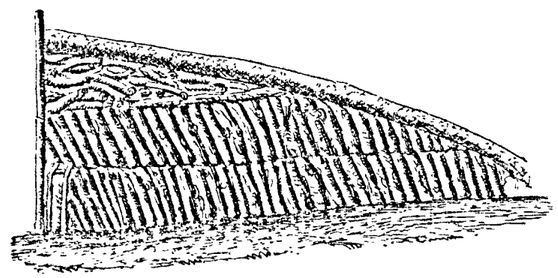
Fig. 7.



Section of a Charcoal Pit.

Sometimes, it may be convenient to form a kiln by digging out the side of a hill, (*Fig*. 8), but in all cases the system is the same. If the process is properly conducted, the bulk of charred wood is not greatly reduced.

Fig. 8.



In climates, where vegetation is rapid, it is not necessary to cut down trees for charcoal, but merely to lop off lower branches ; refuse wood should be used in the manufacture, and dry wood is superior to wet, as it splits more easily and saves labor. On dry forest land, a crop of wood sufficient for charcoal can be obtained every fifth or sixth year, and on marshy land, every third year.

Some woods are better suited for the purpose than others. Hard woods, with a close grain, make the best charcoal ; in England, oak, elm, beech, and ash, are generally used. The following abound in many parts of India, and amongst others have been found suitable for the manufacture :—

Sál, *Vatica robusta*,
Sissoo, *Dalbergia sissoo*,
Kikar, *Acacia arabica*,
Kheir, *Acacia catechu*,
Teuk, *Tectona grandis*,
Nim, *Azadirachta indica*,
Sandun, *Oojeinia Dalbergioides*,
Lohira, *Tecoma undulata*,
Box, *Buxus sempervirens*,
Oak, *Quercus incana*.

Soft woods with an open grain and quick growth are not so well adapted for making furnace charcoal: white and resinous woods are seldom used. The comparative value of Indian hard woods in charcoal making is an interesting subject of inquiry, and careful experiments to determine the best sorts of timber for special purposes are required; the proportionate produce from 1,000 parts of several kinds is given by Brande, as follows:—

Ebony, ...	300	Box, ...	202
Satin wood, ...	207	Fir, ...	181

The Beypore Iron Company, I believe, find the loppings and thinnings of the teak plantations in Malabar specially adapted for smelting purposes, and in a short time the prunings of sissoo, &c., in the canal plantations of the Punjab and North West Provinces may be equally valuable. The utilising of thinnings and of refuse timber is urged upon all forest officers.

The economic preparation of charcoal at the different hill stations is most important, and the best mode of initiating it, is to collect the charcoal burners and to give them practical instruction by firing a small kiln in their presence. The out-turn of slow charring is so much larger than that obtained by their rude process in open pits that they will generally be found to adopt the principle of a closed kiln. In several experiments in the Himalaya, where the common hoary oak (*Quercus incana*) was used, one-third more in bulk was obtained than by the common method, and the charcoal was in larger pieces, heavier, and well charred. Wicker baskets, being elastic, do not break the charcoal and are generally used for transport.

H. CLEGHORN,
Conservator of Forests.

Rec'd 27 Oct 64

Proceedings of the Madras Government, Public Works Department, 12th October 1864.

No. 186. Read the following Circular from Colonel R. STRACHEY, R. E., Secretary to the Government of India, Public Works Department, to the Secretary to the Government of Madras, dated Simla, 13th September 1864, No. 12:—

SIR,

The Governor General in Council considering that information as to the best mode of preparing charcoal would be found useful by Officers of the Public Works and Forest Departments, has directed that the accompanying Memorandum on the subject prepared by Dr. Cleghorn, should be circulated to all Public Works and Forest Officers, six copies are forwarded herewith.

No. 187. ORDER THEREON, 12th October 1864, No. 2,929.

Ordered that the Memorandum received with this letter be printed and circulated to the Officers of the Public Works and Forest Departments.

(True Extract.)

Colonel, R. E.,
Secretary to Government.

To the Revenue Department, with 40 copies of the Memorandum.
„ Superintending Engineers, with 10 do. do.
„ Public, &c., Departments, with 10 do. do.
„ Consulting Engineer, with 2 do. do.

Exd. S. T. Augustin.

Nº 1982.

Dr Cleghorn's Memorandum to be sent to Colonial Secretary, and the Government observations thereon to be called for, respecting a proposal of a person named Lockett to manufacture Charcoal for Steam purposes

Journal at page 283 of Dr Cleghorn's Letter to Secretary

Nº 1982. 1862.

Nos 342 + 343

Plan 1864 - Cleghorn
Prop. of Govt Engr Octr
Nº 2760.

Proceedings of the Madras Govt in the Public Works Department

Dated 12th Octr 1864.
Received 21st " "
E-1 Nº 2929.

Ordering that the Memorandum on the best mode of preparing Charcoal by Dr Cleghorn, be printed & circulated.

Nº 1982-26 Octr

Written Order