A SMALL OIL-MILL FOR THE TREATMENT OF COPRA.

In reply to a great many inquiries the following information has been obtained of two small oil-mills capable of extracting the oil from 6-7 cwt. of copra per hour (1,000 tons per year) and of a small oil refinery. These plants are unit plants of the smallest capacity advocated on a commercial basis.

The information was kindly supplied by Messrs. Rose, Downs and Thompson, Limited, Old Foundry, Hull.

Hydraulic Plant.

Copra is very rich in oil, the average oil content of good dry copra being approximately 65 per cent. and it is therefore customary to press this material twice. In large mills, this second pressing follows in additional machinery immediately after the first pressing, so that the copra proceeds immediately from the first to the second pressing. For the mill about to be described, it would not be an economical proposition to have this double form of mill for the first and second pressings as too much plant would be involved in comparison with the amount of work done. The method of working would be first to press the copra for its first pressing, allowing the cakes or residue, which still contain an appreciable percentage of oil, to accumulate for a few days until there are sufficient to justify going over to the second pressing. When this is to be done the supply of copra to the mill would be stopped. The first pressing cakes would then be broken up to meal and the process carried out in exactly the same way as for the first pressing. In this manner the maximum yield of oil is obtained, copra containing 65 per cent. oil yielding about 61 per cent.

The process will now be briefly outlined.

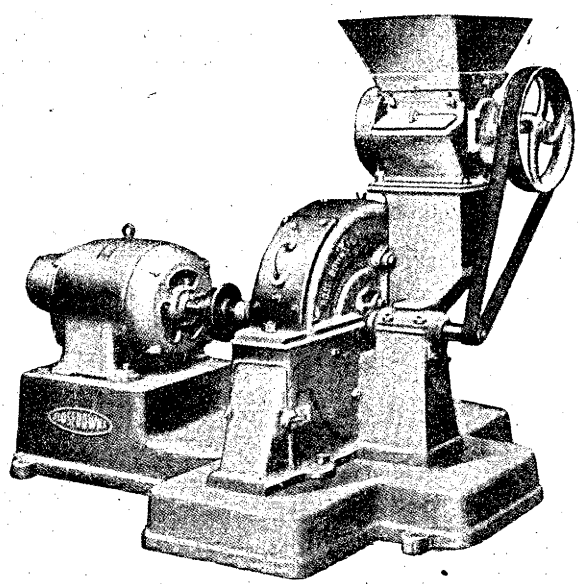


Figure I.

The copra is first fed to the disintegrator by means of the main feed elevator. The disintegrator fitted with a copra crusher feed is illustrated in Figure I. This illustration, however, shows an electrically driven machine whereas the machine quoted for later is belt-driven and would take its power from the main shaft of the mill.

The disintegrated copra would then be transferred to the feed hopper of a set of rolls by means of another elevator. These rolls, known as Anglo-American rolls, are employed for the grinding of the material into a meal prior to passing to the press. They are illustrated in Figure II.

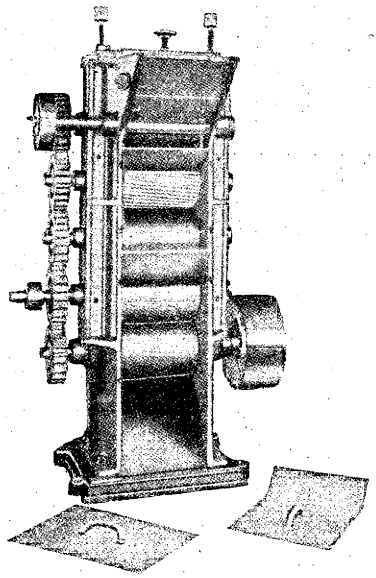


Figure II.

The rolled meal would then fall into another elevator and be lifted automatically to a kettle over the press. The purpose of this kettle is to cook and temper the meal before passing it to the pressing box of the press. With the temperatures which exist in New Guinea, this kettle could probably be dispensed with. A kettle and press are illustrated in Figure III. The press quoted for later is slightly larger than this.

After the meal has been pressed and the oil extracted, the oil would at once be pumped through a filter press for clarification purposes.

Figure IV. illustrates the type of filter which would be used. This filter is of the recessed plate type and has a steam-driven feed pump mounted on the head. As the oil flows away from the presses, it accumulates in a cistern from whence it is pumped away to oil-storage tanks.

Under normal conditions, when pressing copra the first time the weight would be reduced approximately 50 per cent. In other words, each ton of copra by the first pressing would produce approximately ½ ton of first-pressing oil and ½ ton of cakes which would contain an appreciable amount of oil and would therefore need to be pressed a second time. When the second pressing of these cakes is to be carried out, they are broken into meal. This would be done in the disintegrator,

the cakes which are somewhat soft being first broken by hand and the pieces fed to the elevator which serves the disintegrator. The process would then be the same as for the first pressing.

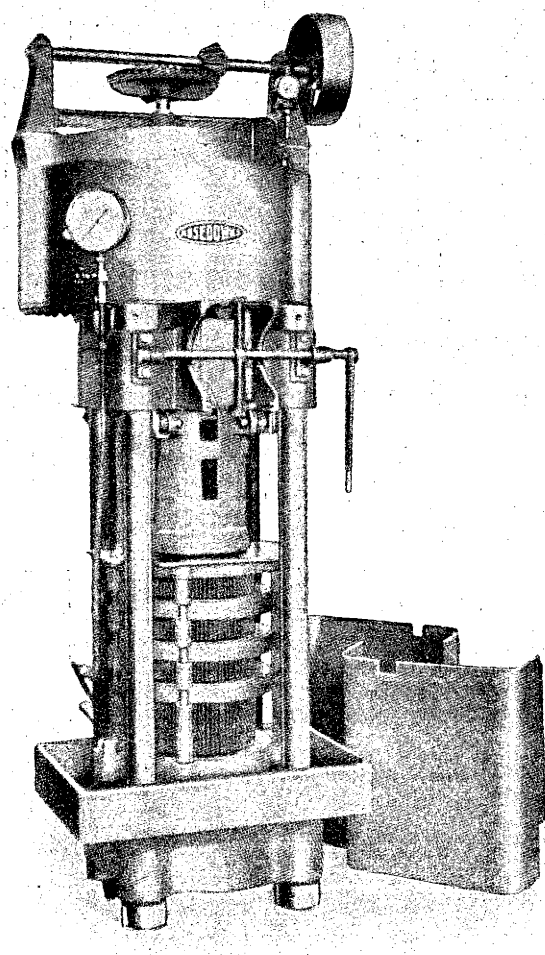


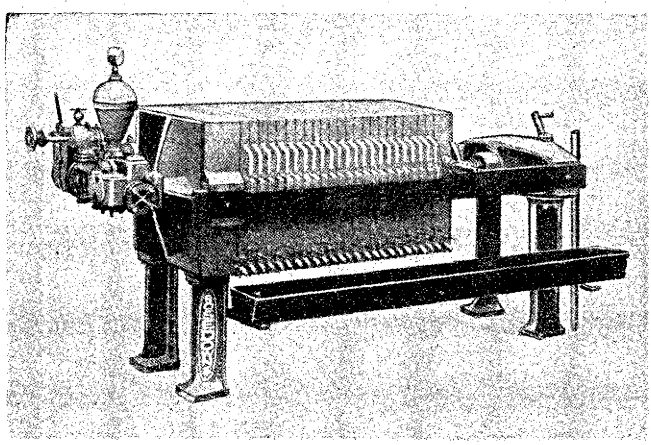
Figure III.

The approximate freight weight of the above plant would be 32¾ tons, all pieces and packages being under 2 tons dead weight. The power required to drive it would be 41 b.h.p. and the process steam 100 lb. per hour at 45 lb. per square inch.

Expeller Plant.

As an alternative to the hydraulic process referred to above, oil may be extracted by means of an automatic expelling process and generally speaking, it may be said that the yield of oil from copra would be the same as that resulting from the treatment of the material under hydraulic pressure. The expeller quoted

for later is illustrated in Figure V. The preparation of the copra is carried out in the same manner for the expeller as for the press with the exception that the copra meal produced by the disintegrator would be quite suitable for the first pressing of the material in the expeller, so that, from the disintegrator this somewhat coarser meal goes straight to the kettle over the expeller and does not pass through



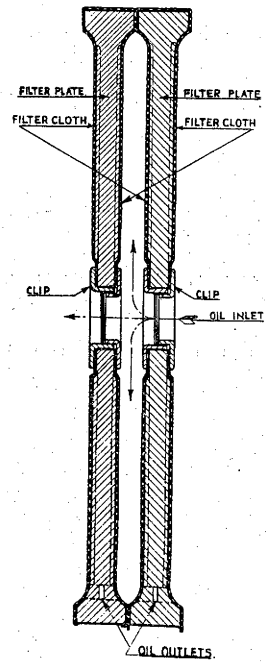


Diagram of two Recessed-type Plates

Figure IV.

a set of rolls. The copra is therefore fed by means of a main feed elevator to the disintegrator, and would then pass to the kettle over the expeller, where the meal would be thoroughly cooked and automatically pass to the pressing chamber of the expeller.

The yield of oil from this first pressing would be practically the same whether pressed by an expeller or an hydraulic press and the flakes or residue from the expeller, which would still contain an appreciable quantity of oil would be allowed to accumulate for a few days and then be re-treated.

The first-pressing oil from the expeller would pass to a settling tank, where by gravity the foots and the meal which usually come away from an expeller are settled out, this settling tank forming a suction feed tank for the pump which serves the filter and the oil would be filtered in the same way as described for the hydraulic mill.

When treating the expeller flake or cake for the second pressing, the process would be slightly different in that it would first be broken to a meal in the disintegrator and would then pass through a set of rolls, it being necessary to grind the meal down to as fine a degree as possible.

The approximate weight of the above plant would be 18½ tons with one heavy lift 72 cwt. and the balance in packages each under 2 tons dead weight. The power required to drive it would be 39 b.h.p. and the process steam, 100 lb. per hour at 60 lb. per square inch.

Although the "Premier" mill works out somewhat more expensively than the single expeller mill, it will be noted that the capacity of this mill is slightly in excess of that for the expeller mill.

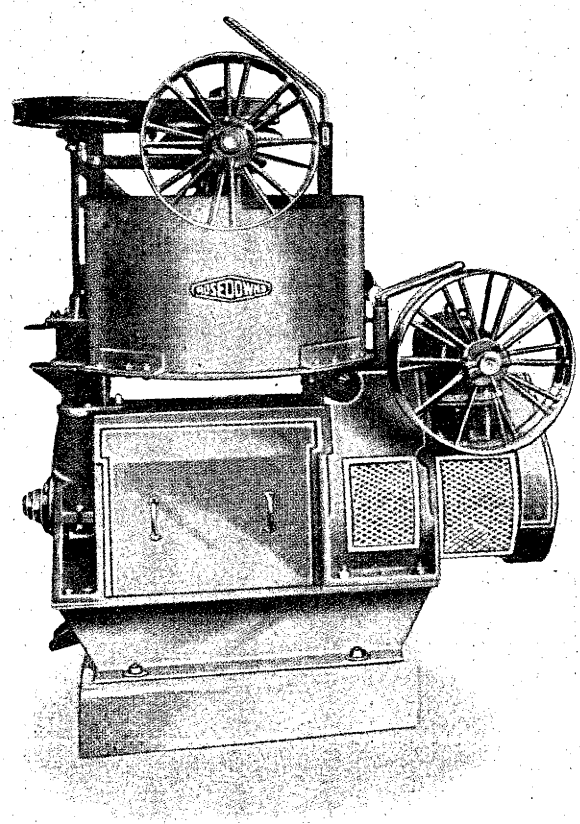


Figure V.

Oil Refinery.

If the oil is to be used for edible purposes, it would be necessary to refine it very thoroughly for it would contain impurities and free fatty acids which must be eliminated. The process would consist of three stages, neutralizing, bleaching, and finally deodorizing. The smallest oil refinery, specially adapted for the treatment of coco-nut oil, which is made by Rose, Downs and Thompson Limited, is quoted for below. This refinery has a capacity of 2½ tons per 24 hours.

The approximate freight weight of this plant is 33 tons, all pieces and packages being under 2 tons dead weight. The driving power required is 6–8 B.H.P.; the maximum steam consumption 800 lb. per hour at 100 lb. per square inch and the maximum water consumption 1,200 gallons per hour at 80° F. Figures VI. and VII. illustrate a small modern refinery.

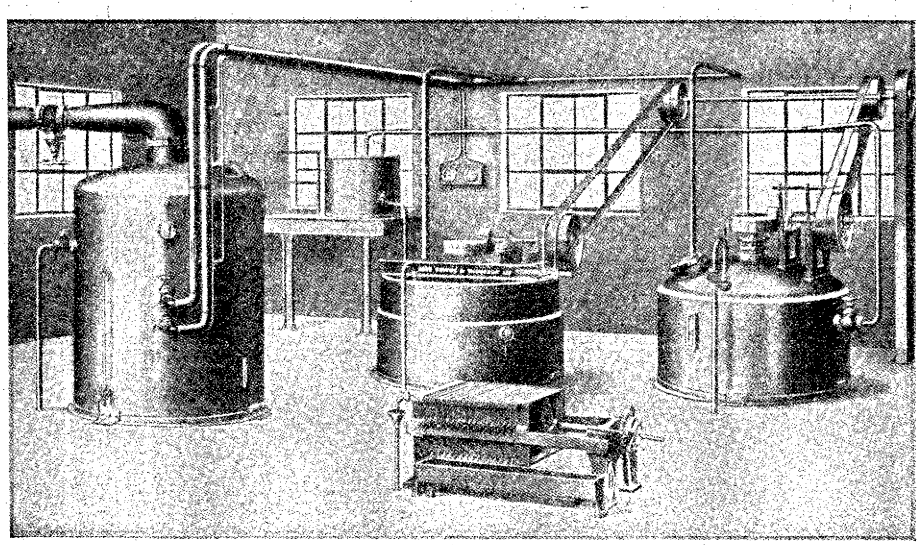


Figure VI.

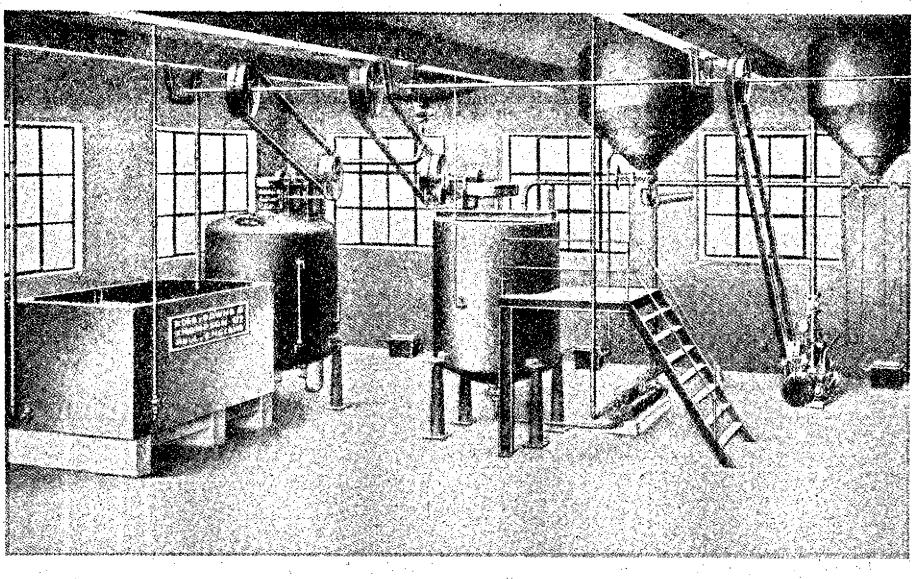


Figure VII.

Quotations.

The following quotations do not include power plant. The prices quoted are those which were current a few months ago, but the manufacturers reserve the right to charge prices ruling at the date of despatch.

ONE "ROSEDOWNS" N.P. SERIES "PREMIER" OIL MILLING INSTALLATION FOR THE TREATMENT OF DRIED COPRA, CAPACITY 6 TO 7 CWTS. PER HOUR WHEN PRESSING ONCE. SUITABLY EQUIPPED FOR SECOND PRESSING.

	£	s.	d.
One main feed elevator delivering to the disintegrator; for this and all other elevators in the mill we include chain, buckets, sprockets, &c., but exclude wooden trunking	38	0	0
One disintegrator with copra crusher feed, code word "Yerez", for the preliminary breaking down of the material, having a grinding chamber 17 inches diameter. To be equipped with screens of the most suitable size, and one spare set of beaters, and three spare sets of screens	76	0	0
One set of elevators, as described above, delivering from disintegrator to rolls	38	0	0
One set of five-high Anglo-American rolls, code word "Yefye", for the final grinding of the meal for the second pressing. The roller bodies to be of best chilled iron 12 inches diameter by 15 inches long, the rolls being suitably fluted. Complete with feed hopper, feed roll, driving gear, &c.	268	0	0
One set of elevators, as described above, delivering from the rolls to the kettle	38	0	0
One "Premier" pressing unit, code word "Ydune". To consist of—One seed heating kettle constructed of steel, internal dimensions 3 ft. 6 in. diameter by 34 feet deep, complete with steam and water fittings, stirrer, &c. This kettle to stand upon—One "Rosedowns" "Premier" cage press, having in the presshead our latest device for withdrawing charges of meal from the kettle, measuring same and delivering to the pressbox underneath. This pressbox or cage to be built up on our latest system of serrated steel staves held in position by massive steel rings, internal dimensions 18 inches diameter by 5 feet long. To have massive steel cylinder fitted with ram 14⅝ inches diameter and suitable for a working pressure of 3 tons per square inch. Complete with steel pressplates, hydraulic pressure gauge, steam traps to kettle, cover over cages, &c.	775	0	0
One set of hydraulic pressure pumps, code word "Yeiru", for serving the above press, having low-pressure pump 2¾ inches diameter, and two high-pressure pumps ¾ inch diameter, all 4-in. stroke. To be equipped with supplementary cistern for holding the pressure fluid, and to be complete in respect with safety valves, driving gear, &c.	220	0	0
One hydraulic stop valve No. 161, to work in conjunction with the above press	25	0	0
One oil filter, code word "Yfsav", the filter having 24 chambers each 19 inches square, giving a total filtering area of 108 square feet. The filter to be constructed of our recessed plate type, each chamber being equipped with gunmetal outlet cock. The belt-driven pump to be complete with fast and loose pulleys, relief valve, pressure gauge, &c. The filter to be equipped with quick opening and closing gear; iron trough for filtered oil. The filter also to have two complete sets of filter cloths	142	0	0
One oil pump and cistern for collecting the filtered oil and delivering to storage	23	0	0
All the requisite gearing for the above installation, for transmitting power to the various machines, in accordance with plans that we would prepare, including polished steel shafting, pulleys, bearings, brackets, &c. (exclusive of driving belts which can be obtained locally). Including the oil piping connecting the press to the filter, but exclusive of steam piping	180	0	0
All the necessary spare parts and accessories for the above machinery, comprising pure woollen presscloth, repairing yarn for same, spare hydraulic leathers for press, pumps, and stop, &c.	88	0	0
	1,911	0	0
Packing and delivery f.o.b.	143	0	0
Total net price	2,054	0	0

ONE "ROSEDOWNS" OIL MILLING INSTALLATION FOR THE TREATMENT OF 5 TO 6 CWTS. PER HOUR OF DRIED COPRA, FIRST PRESSING, BUT EQUIPPED WITH PLANT FOR DOUBLE PRESSING.

	£	s.	d.
One main feed elevator delivering to the disintegrator. For this and all other elevators in the mill we include chain, buckets, sprockets, &c., but exclude wooden trunking	38	0	0
One disintegrator with copra crusher feed, code word "Yerez", as previously described	76	0	0
One set of elevators, as described above, delivering from the disintegrator to expeller for first pressing	38	0	0
One "Rosedowns" "Maxoil" continuous automatic oil expeller, belt-driven, code word "Exmax". This expeller to have a single kettle of our latest design, complete with compressing feed worm, speed reduction gear, automatic adjustment to cone, fast and loose pulleys, oil strainer in base, &c. ..	543	0	0
One steel settling tank with internal fittings for clarifying the oil	25	0	0
One oil filter, code word "Yfsav", as previously described	142	0	0
One oil pump and cistern for collecting the filtered oil and delivering to storage	23	0	0
One set of five-high Anglo-American rolls, code word "Yefye", as previously described for breaking down the first-pressing flakes	268	0	0
All the requisite gearing for the above installation, for transmitting power to the various machines, in accordance with plans that we would prepare, including polished steel shafting, pulleys, bearings, brackets, &c. (exclusive of driving belts which can be obtained locally). Including the oil piping from expeller to the filter, but excluding steam pipes from the boiler to the expeller kettle	172	0	0
An equipment of needful spare parts for the expeller, including pressure worms, pressure cone, packing worms, &c.	50	0	0
	1,375	0	0
Packing and delivery f.o.b.	103	0	0
	£1,478	0	0

ONE "ROSEDOWNS" OIL REFINING PLANT WITH DEODORIZING APPARATUS FOR THE TREATMENT OF 2½ TONS OF COCO-NUT OIL PER 24 HOURS, PRODUCING THE HIGHEST GRADE OF EDIBLE OIL.

	£	s.	d.
One soda neutralizing tank, steam-jacketed, constructed of mild steel plates and arranged for mechanical agitation. Complete with control valves, gland cock and swivel for the oil, cock for the residue, &c.			
One caustic soda tank, constructed of cast iron, and fitted with outlet cock.			
One open top earth bleaching tank, constructed of mild steel plates and arranged with agitating gear. Complete with coil and control valve, outlet cock, &c.			
One filter press of the flush plate and distance frame pattern with drain tap on each plate. Complete with tray and set of cloths and cuffs.			
One steam-driven horizontal duplex pump for working in connexion with the filter press. Complete with usual equipment of lubricator, drain cocks, &c.			
One clean oil tank, constructed of mild steel plates and provided with coil and control valve. Tank knocked down for shipment to save freight.			
One steam-driven horizontal duplex pump for crude oil. Complete with usual equipment of lubricator, drain cocks, &c.			
One deodorizing vessel, constructed of mild steel plates and fitted with dry and perforated coils, control valves, vacuum gauge, thermometer, oil gauge fittings, &c. Vessel tinned all over internally with pure tin.			
One barometric condenser, constructed of cast iron, with domed top and coned bottom, and fitted with baffle plates. With suitable arrangements for vapour and water inlets and outlets.			
One vacuum cooling vessel, constructed of mild steel plates and provided with agitating gear. Fitted with coil and cold-water control valve, gland cock for oil outlet, vacuum gauge, thermometer, oil gauge fittings, &c. Vessel tinned all over internally with pure tin.			

	£ s. d.
One oil-fired superheater for raising to the desired temperature the steam for the deodorizing vessel. Complete with burners, and all fittings, but exclusive of chimney.	
One belt-driven dry vacuum pump for maintaining the desired vacuum on the deodorizing plant. Complete with fast and loose pulleys and belt-striking gear.	
One oil barrelling tank, constructed of mild steel plates and provided with coil and control valves. Tank knocked down for shipment to save freight.	
Pipes, valves, and fittings for the refining plant above specified, comprising steam, water, oil and other piping, but not including any mains to the plant or piping away from the plant.	
Driving gear for the refining plant above specified, comprising the shafting, pulleys, pedestals, &c., but not including belting or motive power.	
Total net price	£1,709 0 0

R.C.H.

DRIVING POSTS OR PILING WITH DYNAMITE.*

On many occasions it is essential to put a piling or post in water or wet ground where a pile-driver is not available, particularly when just a few piling are to be driven, which would not warrant bringing in a heavy piece of equipment.

A method has been worked out whereby the force of dynamite can be used to transmit a blow which is somewhat similar to the dropping of a pile-driver hammer. The pile is stood upright in the location desired, and braced in place—usually with rope. The head of the pile should be sawed off square, and the procedure is to put a heavy plate of steel on top of the pile. To give the best results, the plate should be 1 inch to 1½ inches thick. One stick of dynamite is placed on top of the plate, and covered with mud, after the stick has been properly primed with a blasting cap and fuse or an electric blasting cap. When the charge is exploded the force is transmitted to the plate, which in turn transmits it to the pile. The pile is driven into the ground sometimes as much as 14 inches, if the ground is soft. The procedure is then repeated until 1 inch penetration per explosion is obtained.

If the top of the pile is not square, or if there are some flaws in the wood near the top, a brooming or split effect usually takes place. Hence it is advisable to have about 4 feet extra length, which can be sawed off after complete penetration is obtained.

While this procedure is not an economical one, provided a pile-driver is available, it does provide a new method for putting individual piles or heavy posts in the ground in a very solid compact manner.

The Engineering Division of the United States Forest Service completed some comparative tests between dynamite and a pile-driver for this work.

Piles of a standard size were put down with dynamite shots until the penetration was equal.

Various loads of dynamite were used and results indicated that in general one stick of 50 per cent. Straight N.G. Dynamite weighing ½ lb. was the maximum load to use.

* Reprinted from *Agricultural News Letter*, Vol. 8, No. 3, p. 47.