# DEPARTMENTAL NOTES

## THE BALING OF STRAW

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IN the Jaffna Peninsula, there is a large demand for straw chiefly for feeding the numerous bullocks of the Hillikere or Mysore breed maintained there for the main purpose of transport but also for work on the irrigation devices of the double mhote and the Persian wheel used on wells. As the supply of straw produced locally from both paddy and millets is quite insufficient to meet this demand an extensive trade in paddy straw has developed from the northern parts of the mainland, chiefly the area under the Karachchi Irrigation Scheme. Straw in Jaffna is sold by weight and in view of the fact that the transport of this commodity both by rail and by road is based on a charge per vehicle and not by weight it should be profitable to transport the maximum weight in a vehicle. For this purpose the straw needs compression into bales and in order to demonstrate the advantages of baling to the farmers of the Karachchi Scheme a mechanical straw baler was obtained in 1935 for use at the Paranthan Paddy Seed Station, the type being a McCormick-Deering Motor Hay Press imported from the International Harvester Company, Chicago, at a cost of Rs. 2,121·23 delivered in Colombo. It presses the straw into compact bales which are easy to handle and transport.

The machine is primarily used for baling the straw produced at the Paddy Seed Station both for the Jaffna market as well as for supplying the requirements of the cattle at the Jaffna Experiment Station, where no paddy nor millets have been

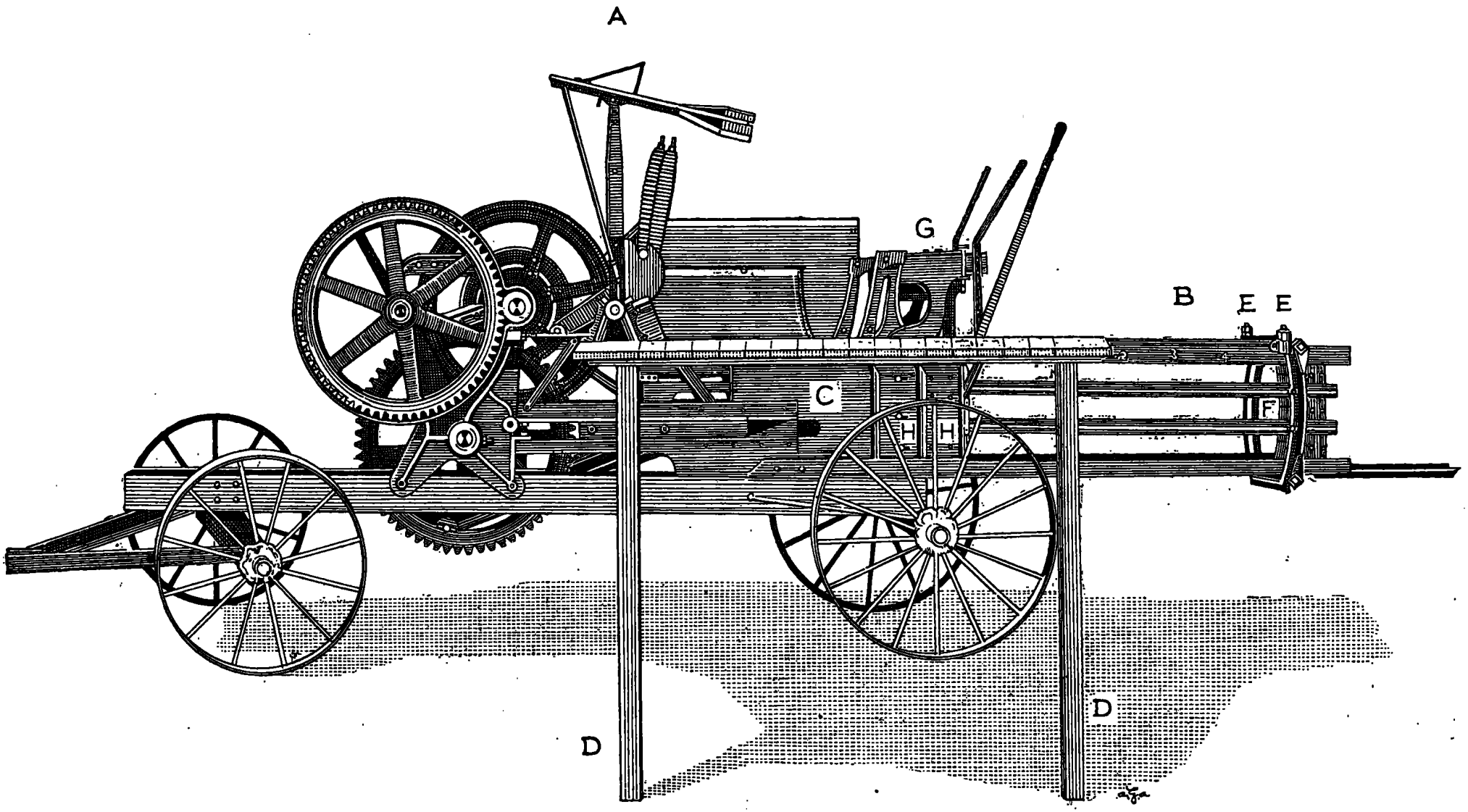


Fig. 1

grown. Straw from outside farms is also baled at a charge of 7 cents per bale.

The baler is operated by a 6 H.P. kerosene engine and produces rectangular bales with end dimensions of approximately 16 × 18 inches, while the length can be varied as required. With a length of about 22 inches a bale weighs approximately ½ cwt. The engine and baler are fitted on a chassis with four wheels so as to make the machine portable but as its total weight is over 2 tons it cannot be conveyed along paths across paddy fields and on village roads unless they are made suitable for taking this load. The machine is for this reason housed in a shed in the Paddy Station and is worked there.

The process of baling is carried out by pressure exerted in a horizontal direction. As soon as the engine is worked and is connected with the baler by means of the belting placed over the fly wheel, loose straw which has been heaped on to the feed table attached to one side of the baler and supported on two legs (DD in fig. I) is pushed in large quantities at a time by a man standing on the feed table, into the feeding chamber (C). By means of an arm or plunger (A) which works up and down and has a serrated end, the straw is thrust further into the chamber. It is then pushed forwards into the baling chamber (H) by a tucker or piston working horizontally on rollers between the two chambers. From the baling chamber, the completed bale passes out by gradual movements towards the open compartment (B) where it is tied by hand with wire which is threaded through while the bale moves along and drops out at the exit (F). The horizontal movement of the tucker causes compression of the straw within the baling chamber by the resistance offered to the outward passage of the bales within the open compartment. The pressure exerted on the straw can be increased or decreased by moving two nuts EE at the exit, causing a corresponding decrease or increase in the size of the compartment. By decreasing its size towards the end and thus increasing the pressure required to force the bales out, bales of greater weight can be made. The movements of the plunger and tucker alternate, the latte pushing the straw towards the exit each time a quantity is thrust into the feeding chamber by the plunger. The two parts work quite smoothly being fitted with springs and rollers.

When a bale is being formed in the baling chamber, the one ahead of it in the direction of the exit is already made but is being tied with wire by two men standing on either side of the compartment at this point while in front of this is another already tied and passing on while a third is partly out at the exit. While the baler is working all the bales including the one in the process of formation are being subject to a gradual push towards the exit by the action of the tucker and they fall out in succession at short intervals.

The length of each bale can be adjusted by fixing the position of a bell which is attached to the side of the open compartment. When the bell strikes it gives the signal that a bale has been made according to the desired length. As the bale moves on after it has been tied, the tongue of the bell comes in contact with the wire round this bale and as it approaches the corner of the two sides of the bale, it becomes raised by the stretched wire and in doing so with the onward movement of the bale, it slips over releasing the wire and striking against the face of the bell as it falls back. As soon as the bell strikes, no more straw is fed until the wooden block in front of the bale which has dropped from the exit falls out and is placed in the block setter G which is lifted up to enable the plunger as it moves downwards to release the block and allow it to fall into position in the feeding chamber, the block setter being then placed back as before. When the block is in position in the feeding chamber, straw is again fed into the chamber for making a new bale, while at this stage another bale with its block in front falls out and as soon as the bell rings, the same operation is repeated.

In front of each bale within the compartment is a block and the presence of a block on either side of a bale passing through the compartment facilitates the tying of this bale within the compartment as there are three sets of grooves on either side of each block, an end view of which is shown in fig II. Through the grooves wires are threaded from either side by the two men. A piece of wire called a tie sufficient for binding a

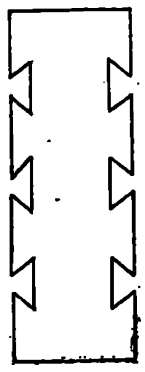

Fig. II

bale once round is passed through the grooves and loosely knotted. A bale may be tied in three places through the three grooves but usually two places suffice and this effects a saving in the cost of the wire. When the bale drops out at the exit the pressure on it is released and it expands quickly but sufficiently to cause the wire to remain firmly bound.

The bale tie maker is a separate equipment which allows wires of different lengths to be cut. It also takes the kinks out of a wire.

It has been found necessary for the work to be carried out expeditiously to employ five men to operate the baler. Two of them are responsible for heaping the straw continuously on to the feed table, another stands on the feed table and pushes large lots of straw into the feeding chamber, while two are employed—one on either side of the open compartment—to thread the tie wires through the grooves in the blocks and tie the bales as they pass through the compartment. One of these two men periodically attends to the engine while it is running but this does not take much time.

For a full working period of about 8 hours, about 10 tons of straw can be baled producing about 400 bales at an average rate of about 50 bales per hour, the weight of a bale being about $\frac{1}{2}$ cwt. The cost of baling amounts to about 5 cents per bale.

In a railway wagon, about 122 bales weighing about 3 tons can be loaded whereas with unbaled straw, which has to be made into loose bundles called *kaththais* weighing about 5 lb. each, just over $1\frac{1}{2}$ tons can be stacked.

A statement is given in table I of the costs incurred in sending baled and unbaled straw and the return on each when straw is valued at 1 cent per lb. in Jaffna.

TABLE I

STATEMENT OF COSTS OF BALED AND UNBALED STRAW PER WAGON LOAD FROM PARANTHAN TO JAFFNA RAILWAY STATIONS AND INCOME

| | | Rs. | cts. |
|---|---|---|---|
| **A.** | **Baled Straw.—** | | |
| | **Costs.** | | |
| 1. | Baling 122 bales for a wagon load at 5 cents per bale .. .. .. .. | 6 | 10 |
| 2. | Transport of 122 bales from the Paddy Station to the Paranthan Railway Station in 4 carts at Re. 1·00 per cart .. .. | 4 | 00 |
| 3. | Loading and unloading charges at the Paddy Station and Railway Station—2 men at 75 cents each .. .. .. | 1 | 50 |
| 4. | Rail freight .. .. .. .. | 10 | 03 |
| | Total .. | 21 | 63 |
| | **Income.** | | |
| | Value of 122 bales or about 6,832 lb. at 1 cent per lb. .. .. .. .. .. | 68 | 32 |
| | Cost of baling and transport .. .. | 21 | 63 |
| | Profit .. | 46 | 69 |
| **B.** | **Unbaled Straw.—** | | |
| | **Costs.** | | |
| 1. | Making 750 kaththais for a wagon load at 75 cents per 100 kaththais .. .. | 5 | 62 |
| 2. | Transport of 750 kaththais from the Paddy Station to the Paranthan Railway Station in 2 carts at Re. 1·00 per cart .. | 2 | 00 |
| 3. | Unloading and loading charges at the Railway Station (a fixed charge for the kaththais) | 2 | 00 |
| 4. | Rail freight .. .. .. .. | 10 | 03 |
| | Total .. | 19 | 65 |
| | **Income.** | | |
| | Value of 750 kaththais or about 3,750 lb. at 1 cent per lb. .. .. .. .. .. | 37 | 50 |
| | Cost of making into kaththais and transport .. | 19 | 65 |
| | Profit .. | 17 | 85 |