An Improved Hand-Moulding Table for Building Bricks

By

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Introduction

Over the past several years the building brick industry is facing an acute shortage of skilled moulders. This shortage has partly resulted from the increasd employment opportunities that have now become available with the general industrial growth in the country including the agricultural sector. A large section of brick kiln labour of all categories are being attracted away from their traditional vocation with the result that kiln owners are now obliged to engage unskilled moulders in large numbers at high wages. This has resulted in gradual deterioration of the quality of moulding so that at present the kiln owner is obliged to accept as a 'brick' any lump of clay that has roughly been given the shape resembling a 'brick'. Bricks produced in most kilns show wide dimensional variation, the surfaces are pitted, edges & corners are mostly broken or irregular. Bricks are not properly compacted and hence remain poor in mechanical strength even after burning.

R & D Project at CBRI

In view of the situation stated above a project was taken up at CBRI to design and develop a hand moulding table that would enable bricks of accurate shape and size to the moulded by any brick moulder of average skill.

An assembly drawing of the moulding table showing its principal features is shown in Fig. 1. The table essentially consists of a wooden table (1) to which a Metallic/wooden mould (2) is fixed. The mould is provided with a moveable bottom plate (MS) centrally attached to a vertical ejector shaft (4). The top edges of the mould project about 5 mm above the table top. A frog is fixed to the base plate of the mould. Above the base plate, a false bottom plate (MS) with its centre cut out to accomodate the frog, is loosely fitted. This plate is supported on four corner bolt heads, the height of which is adjustable so that the loose plate can be correctly levelled. A gap of about 10 mm is provided between the two base plates.

The vertical shaft (4) is actuated by a foot operated lever mechanism so that when the pedal (5) is pressed down, the base plate is pushed up level with the top edge of the mould. On releasing the pedal the base plate drops down to rest on the the four corner blocks, the position of which is also adjustable.

The total linear shrinkage of the clay to be used must be predetermined to fix the dimensions of the mould box and the depth of the loose base plate from the top edge of the mould.

Operation

For the purpose of moulding, the clay is mixed with water and kneaded in the same manner as in the conventional process except that the consistency of the mud is maintained marginally stiffer than the mud generally used for ground moulding. The mud should be well pugged so as to leave as few hard lumps of clay as possible. To achieve better preparation, the clay mass should be wetted with sufficient quantity of water pugged and left to stand at least for a day. Before moulding, the clay is

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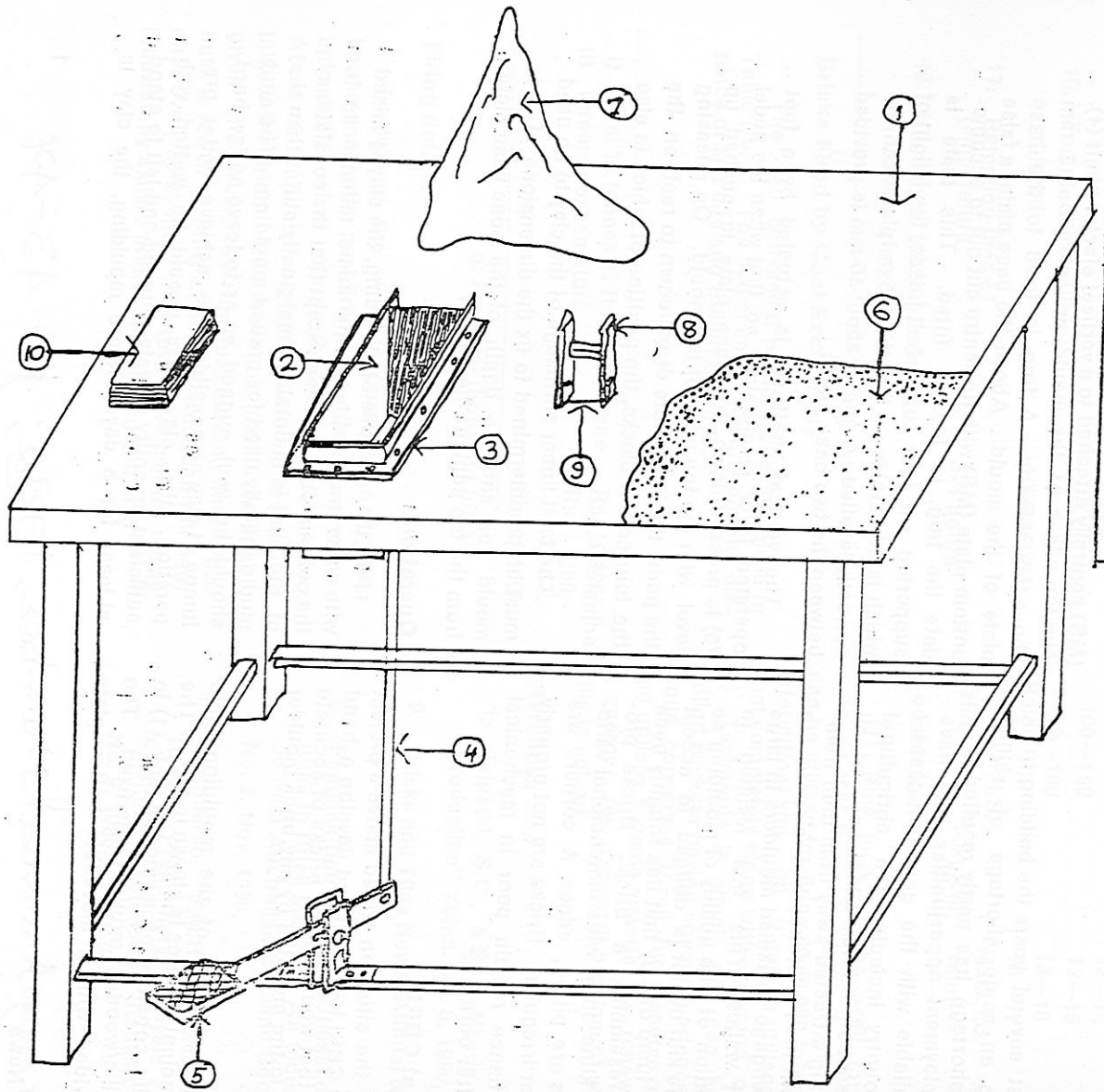

S N	LEGENDS
1	MOULDING TABLE
2	MOULDING BOX
3	FLANGE
4	EJECTOR
5	FOOT PEDAL
6	CLOT MOULDING SAND
7	PUGGED CLAY
8	CUTTER FRAME
9	CUTTING WIRE
10	WOODEN PLATES

IMPROVED HAND MOULDING TABLE

C.B.R.I ROORKEE

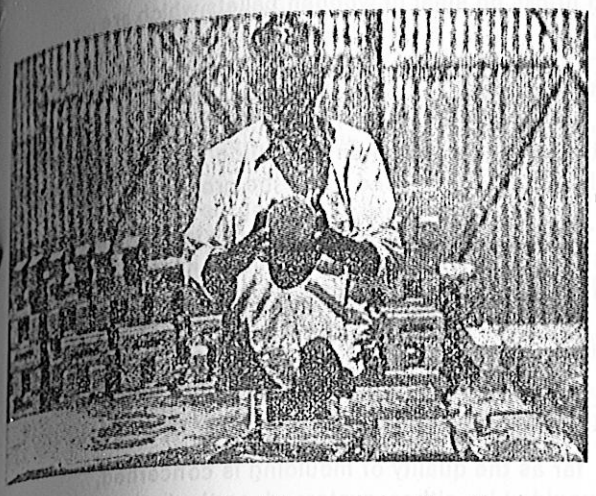

Fig. 2 Clot Being Thrown into Mould.

kneaded once again and then supplied to the mauld-ing table.

At the moulding table a quantity of clay is rolled into a clot slightly larger in volume than the mould. The clot is then rolled over fine sand and thrown with same force into the mould (Fig. 2). The surplus clay is cut off by a wire bow (8, 9) and removed. The exposed face of the brick is sprinkled over with sand and a wooden pallet (10) is placed over it. The brick is then ejected by pressing down the pedel and is lifted off the frog by holding it

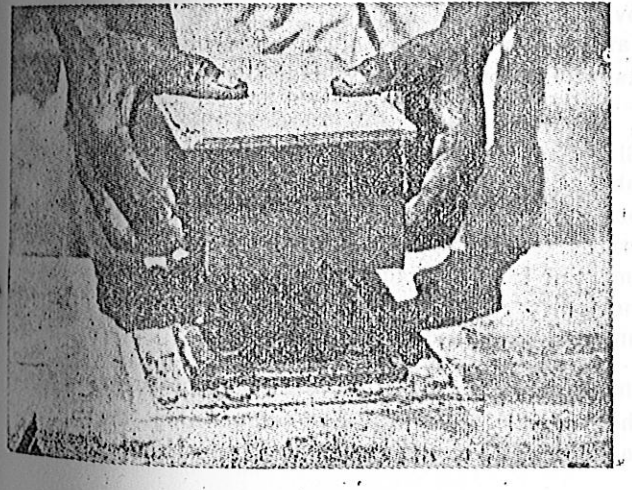

Fig. 3 Removing Brick from Mould

between the false bottom plate and the top wooden pallet (Fig. 3). The Pedal is then released and the base plate drops down to sit in the orig'nal position.

The moulded brick is then turned on side and the bottom plate adhering to it is pulled out and returned to the mould box. Another wooden pallet is then placed on the top face of the brick which is then carried away to the drying ground where it is

Fig. 4 Placing Brick on Edge for Drying

placed on edge to dry (Fig. 4). Bricks are carried to the drying ground either singly or several at a time which may be carried on wooden/metallic trays which are returned to the mulding table after transfering the bricks to the gr. und.

As soon as the loose bottom plate is returned to the mould box, it is ready to receive another clot. While sand moulding has been generally satisfactory, with some stickly clays it may be necessary

to wipe the inner side of the mould with an olly rag after moulding 4 or 5 bricks. Waste engine oil, neem oil etc. can be used as a lubricant.

A second table of similar design was used to produce modular bricks of the size 19x9x9 cm. This table was also used to make facing tiles measuring 19x9x2.5 (cm).

Field Trials

After completion of the laboratory studies, the table was taken to a local brick field where it was used for moulding bricks on a commercial scale. One moulder and two labourers were engaged for digging and preparation of clay and moulding of bricks. Extended trials were conducted after training the moulder in operating the table. It was observed during trials that a rate of production of 1500 bricks per day could be obtained. All the bricks were turned out with sharp edges and corners with no variation in dimensions. The quality of moulding was distinctly superior to the conventional ground moulded bricks. Bricks were not touched by hand till leather hard and as they were placed on edge, they were observed to dry faster than ground moulded bricks placed flat on the ground. Table moulded bricks were also observed to suffer less damage during transport to the kiln and loading.

Discussions

The field trials have helped to establish the distinct superiority of the table moulded bricks compared to ground moulding. The output from a table is only slightly lower than conventional moulding i.e. 1500 against 2000/ day. However, it can be reasonably hoped that with practice, a moulder with two helpers will be able to equal the production of ground moulders.

In most of the brick kilns in the northern and eastern states, ground moulding in which the moulder keeps on shifting his position, is widely practised. However, in a majority of kilns in M.P., Gujarat, Maharashtra and elsewhere, prepared clay is supplied to the moulder and the moulder does not change his position. He places the freshly moulded bricks on steel or wooden pallets which are then carried away to the manually drying ground where the brick is placed on edge for drying. Thus, this system appears closer to the system developed in CBRI, the major difference being that the moulder would be working in a standing position and mould the bricks on a table instead of on the ground.

A system of 'table' moulding also exists in some of the Southern States. In these brick kilns, the moulder stands waist-deep in a pit and the ground in level with his waist serves as his 'table'. Bricks moulded on this table in steel or wooden moulds are released on pallets for manual transport to the drying ground.

So far as the quality of moulding is concerned, bricks moulded in either system described above are not in any way better than ground moulded bricks although in some areas, notably in Tamil Nadu and Karnataka 'Table' moulded bricks appear to command a higher price than ground moulded bricks.

Conclusions

The improved hand-moulding table developed in CBRI provides the moulder with an inexpensive yet efficient tool to produce well shaped & dimensionally accurate bricks. Uniformly shaped bricks have a direct bearing on improving the uniformity of setting in kilns which in turn results in greater uniformity in burning & better utilization of fuel. Improved dimensional accuracy of burnt bricks facilitate accuracy in masonry constructions and results in considerable saving in mortar consumption.

Since any 'Mazdoor' can be trained to operate the table skilfully within 2 to 3 weeks, it will hardly be necessary for the kiln owner to depend on labour contractors for the supply of skilled moulders. This system may also help to eliminate the practice of advance payment of wages to all moulders at the beginning of each season.

Introduction of the improved table also opens up the possibility of radically reorganizing the present system of moulding the bricks near the clay

pits located far away from the kiln which involves transportation of dry bricks over long distances. The clay pits are also widely scattered making supervision of clay preparation and moulding process extremely difficult.

In the reorganized system, the moulding table and the drying ground can be located close to kiln. This would involve transportation of dry bricks. It is easier and less expensive to convey clay from far flung pits to a centralised clay preparation area and supplying the prepared clay to moulders than collecting and transporting dry bricks from moulding grounds scattered all over the brick field.

The proposed system also makes technically feasible to introduce a low powered pug mill (20-25 H.P.) to prepare sufficient clay to produce 30,000 or more green bricks per day. The pug mill can be located centrally and 30 or 40 moulding tables can be arranged in an ordered pattern close to the machine. Small wheel barrows can be used to supply prepared clay to the moulders. Regular availability of prepared clay would ensure superior quality of table moulded bricks comparable to those made in mechanised plants.

Acknowledgement

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