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MOULDING APPARATUS

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FIG. 1

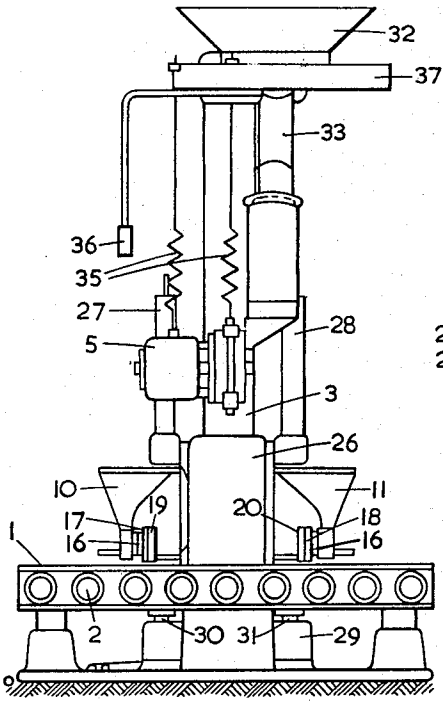
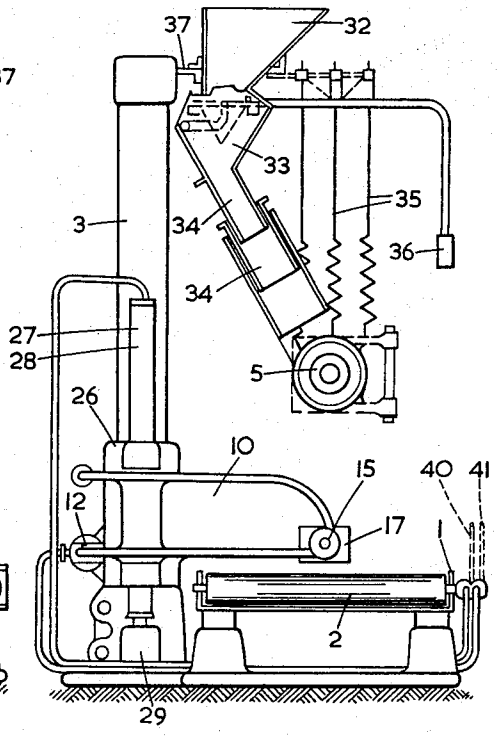


FIG. 2



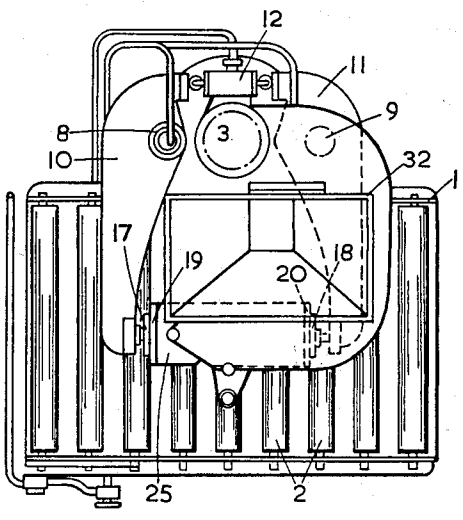


FIG. 3

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MOULDING APPARATUS

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For the production of casting-moulds, many kinds of moulding apparatus are known which, inter alia, are provided with turnover devices for the moulds or moulding-boxes, which are secured on a turnover plate.

In contrast thereto, the present invention relates to moulding apparatus, in which known moulding boxes of any size and of any shape may be used and turned-over without a turnover plate or the like having to be provided. The operation need thus not be adapted to apparatus of a particular kind, but the moulding boxes available may be rammed and turned-over by means of the moulding apparatus of the invention.

The essential feature of the invention is that the moulding apparatus is provided with a holding device which engages the moulding-boxes laterally and enables the moulding-boxes to be turned about a horizontal axis, for which purpose it may be raised. The holding device is provided with two claws, at least one of which is movable towards the other and which grip the moulding box by frictional engagement. The bearing pressure required for this purpose may be exerted by a spring, a weight or the like, or advantageously by power-operated cylinders wih pneumatic, hydraulic, or like pressure means.

By means of the holding device accordng to the invention, it is even possible to grip and turn-over moulding-boxes which are not provided with any retaining members or the like by which they can be suspended or turned-over, and one single holding device can grip boxes of widely different widths, lengths and sections. It is thus possible to treat with the one moulding apparatus at least a very large proportion of the boxes available in a foundry.

The holding-claws may be mounted on brackets or like supports, or they may be mounted in movable frames. The range of dimensions of the moulding-boxes that can be gripped, is particularly large when the holding-claws are provided on tong-like movable arms, the arms for holding the box by means of claws being closed to a greater or lesser extent according to the size of the moulding-box.

In all cases it will be necessary to mount the actual gripping claws so as to be rotatable about a horizontal axis. In some cases it may be sufficient if one of the claws only is movable axially to a considerable extent, though the mobility of both claws affords the advantage that the moulding-box may be brought into alignment with the ramming or feed-device by means of the claws or the arms supporting it.

According to the invention furthermore, the claws are each provided with a flexible pressure device, such as a rubber plate, with which they engage the outer wall of the moulding-boxes. The moulding-boxes are thus held substantially by frictional engagement. The resiliency of the gripping plate may be increased by having it supported on counter-springs or the like.

By using the resilient gripping plate, it is possible to grip moulding-boxes the outer walls of which may be of any shape or height. The gripping plate clings closely to the surface or outer face of the moulding-box, so that sufficient friction is created between the moulding-box and the plates, no matter whether it is a cast moulding-box, or a steel box formed with ridges, grooves, reinforcing ribs or the like.

If considered necessary in individual cases, the gripping plate may be bounded at the top and/or at the bottom by supporting surfaces which, when heavy moulding boxes, or boxes difficult to hold are used, or when there are strong vibrations during moulding, will hold the box at its bottom edge should the frictional engagement for any particular reason be insufficient.

Instead of rotatable claws, it is in certain cases possible to use stationary gauge-points, provided that the moulding boxes are formed with corresponding recesses.

The turnover device according to the invention is of great advantage both in the mechanical hand-moulding of moulding-boxes of very different types and sizes, and also for moulding series-produced articles.

The charging of the moulds is preferably effected by means of slinging machines, known as "slingers," which throw the sand at high speed into the moulds. The turnover device renders it also possible for the moulding-sand to be rammed-in or fed in any other manner and, if necessary to be consolidated.

One construction of apparatus according to the invention is diagrammatically illustrated by way of example in the accompanying drawings, in which:

Figure 1 is a front elevation,

Figure 2 is a corresponding side elevation, and,

Figure 3 is a corresponding plan.

To the rear of the work-table 1 on which are mounted rollers 2, there is provided an upright column 3 supporting the holding or turnover device for the moulding-boxes, and a slinging device 5 for the moulding-sand. The holding-device consists of two tong-arms 10 and 11 which are rotatable about the axes 8 and 9 respectively, and which can be swung in the horizontal plane in one direction by a pressure-cylinder 12, the return movement in the opposite direction being effected by means of springs or the like. The pressure-cylinder 12 may be a pressure-cylinder having two pistons, the movement of the tong-arms being determined according to the resistance, or two cylinders may be provided and then each arm is moved separately but in synchronism. Instead of the pressure-cylinder 12 it is also possible to use a mechanical actuating device, operated for example, by means of spindles and the like, or to use electro-magnetically acting means. At the forward ends of the tong-arms 10, 11 there are mounted in bearings 15, 16 and rotatable about their own axes, claws 17, 18, the forward ends of which are each provided with gripping plates 19, 20 respectively consisting of rubber. The moulding-box 25 passed on to the roll-out table and resting on a supporting board, is gripped laterally by these plates as soon as the pressure-cylinder 12 is supplied with pressure means. The moulding-box is then securely held between the gripping plates and may be fed with sand by means of the slinger 5.

When a moulding-box is completely filled, it is at first raised by means of the holding device. For this purpose, the tongs device consisting of the arms 10, 11 and the pressure cylinder 12, are mounted in a yoke 26 and may be raised and lowered as a unit on the column 3. The yoke 26 is provided with pressure-cylinders 27, 28 in which are mounted plungers 30, 31 which are securely supported in the base 29.

When the cylinders 27, 28 are supplied with pressure means, they are raised and take along with them the yoke 26 together with the tong arms 10, 11 and the moulding-box gripped thereby. The cylinders 27, 28 are at the same time formed as axes of rotation for the

tong-arms **10, 11.** Besides being moved up and down the holding device may also be provided to be rotatable about a horizontal axis.

As the gripping plates **19, 20** and the claws **17, 18** respectively, are mounted so as to be rotatable about the axes **15** and **16**, the moulding box, when raised, may be turned-over without any difficulty. When the top part moulding box cope is filled, the moulder may lift and turn it over by means of the holding device and then place it on to the previously filled bottom part moulding box drag. During operation, the moulding boxes may be pushed backward and forward on the roll-out table as desired, so that hand-moulding is considerably facilitated and accelerated.

Hand levers **40, 41**, or press-buttons, controlling the movements of the tong arms, are advantageously provided at the front part of the roll-out table, so that they are within easy reach of the moulder. It is also possible to operate with pedals.

When the mould is finished, it may be conveyed further along the roller-bed, so that the boxes may be continuously filled.

The completion of the operation is accelerated by using the slinger **5**. The moulding sand is fed to the slinger through a funnel **32**, which is charged by means of an elevator, a conveyor-belt, or by means of the discharge device of a superposed bunker. From the funnel **32** the sand is passed through the swivel-control **33** into the telescopic guide-chute **34**, through which the sand is passed into the actual slinger **5**, which is, for example, suspended on springs **35**, so as to be easily movable, and may thus be moved without difficulty over the whole area of the moulding-box. **36** is a handle by means of which it is possible to swivel the slinging device **5** with its accessories about the column **3**. The whole slinging device, together with the feed-device, the springs, and the handle **36**, are mounted on a swivel arm **37**, which is rotatable in a horizontal plane around the column **3**, so that it may be swung into and out of position without difficulty.

We claim:

1. In the production of casting moulds, means for turning over the moulding boxes comprising a pair of gripping arms each mounted at one end thereof for a swivelling movement in a horizontal plane, bearings having axes extending horizontally from the other end of said arms, gripping claw members rotatably mounted in said bearings for frictional engagement only with the vertical walls of said moulding boxes, and means for swivelling said arms toward each other to effect positive engagement of said claw members with said walls.

2. In the production of casting moulds, means for turning over the moulding boxes comprising a pair of gripping arms each mounted at one end thereof on a pillar for a swivelling movement in a horizontal plane and for a limited vertical movement, bearings having axes extending horizontally from the other end of said arms, gripping claw members rotatably mounted in said bearings for frictional engagement only with the vertical walls of said moulding boxes, and means for swivelling said arms toward each other to effect positive engagement of said claw members with said walls.

3. In the production of casting moulds, means for turning over the moulding boxes comprising a pair of gripping arms each mounted at one end thereof on a pillar for a swivelling movement in a horizontal plane and for a limited vertical movement, bearings having axes extending horizontally from the other end of said arms, gripping claw members rotatably mounted in said bearings for frictional engagement only with the vertical walls of said moulding boxes, friction linings on said gripping claws, and means for swivelling said arms toward each other to effect positive friction engagement of said claw members with said walls.

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