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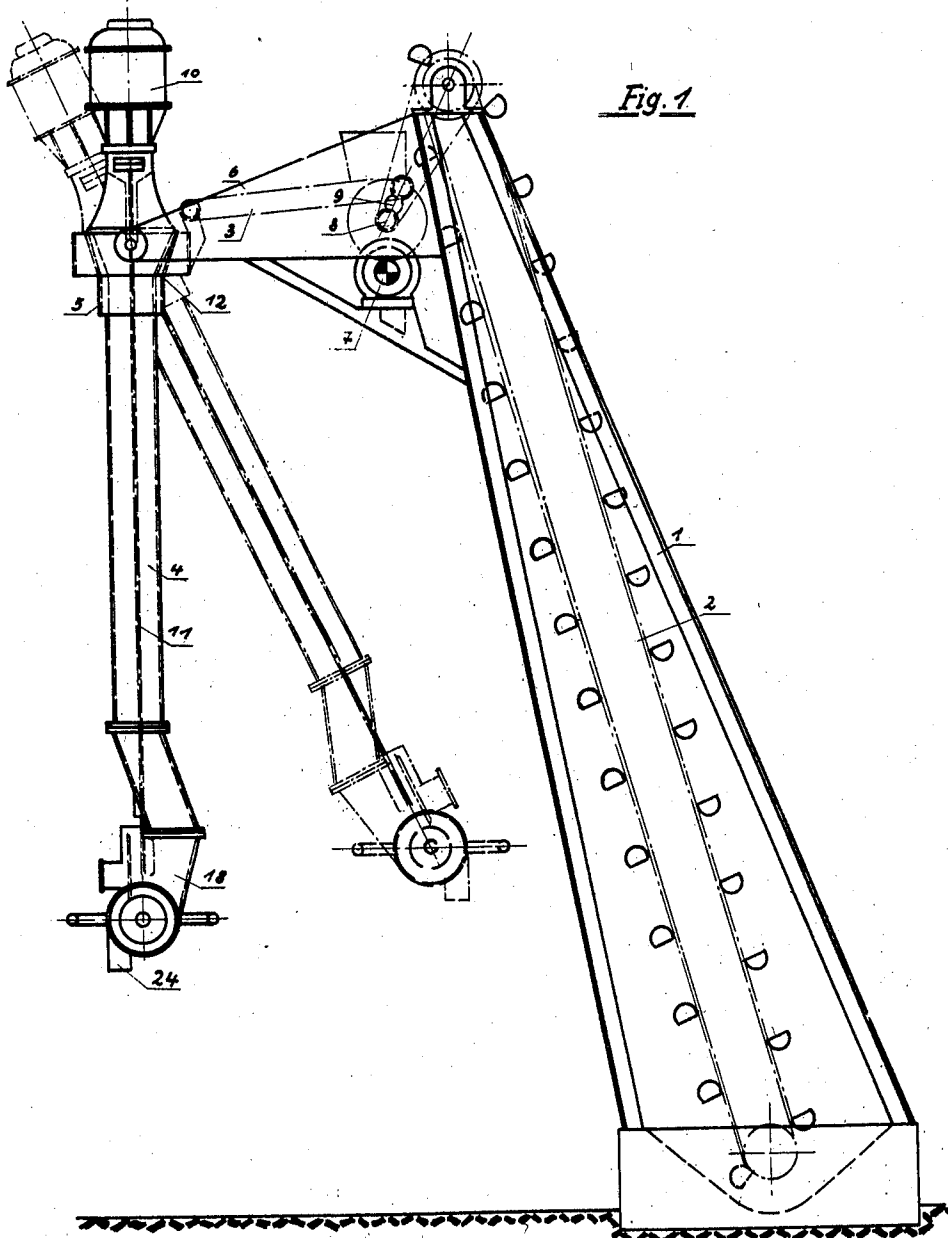
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B. BERGHAUS

SAND THROWER FOR FOUNDRIES

Filed Nov. 21, 1925

4 Sheets-Sheet 1



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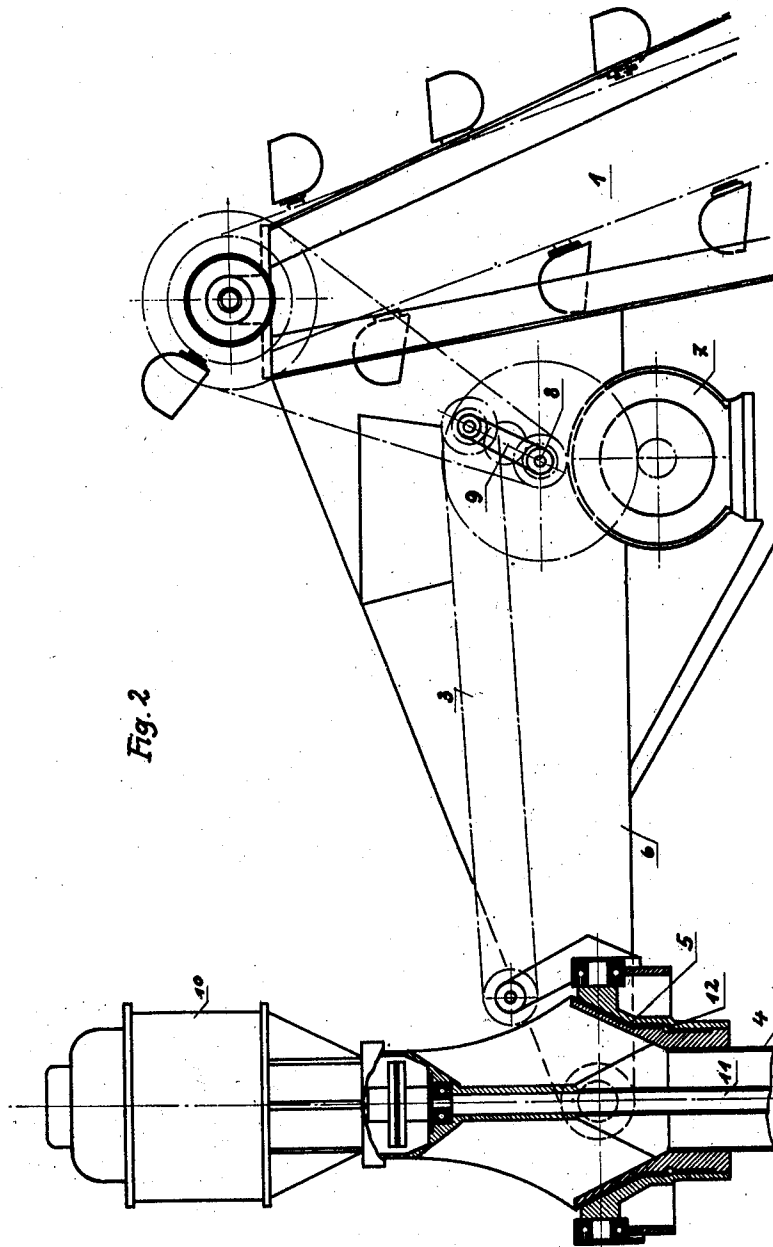
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4 Sheets-Sheet 2



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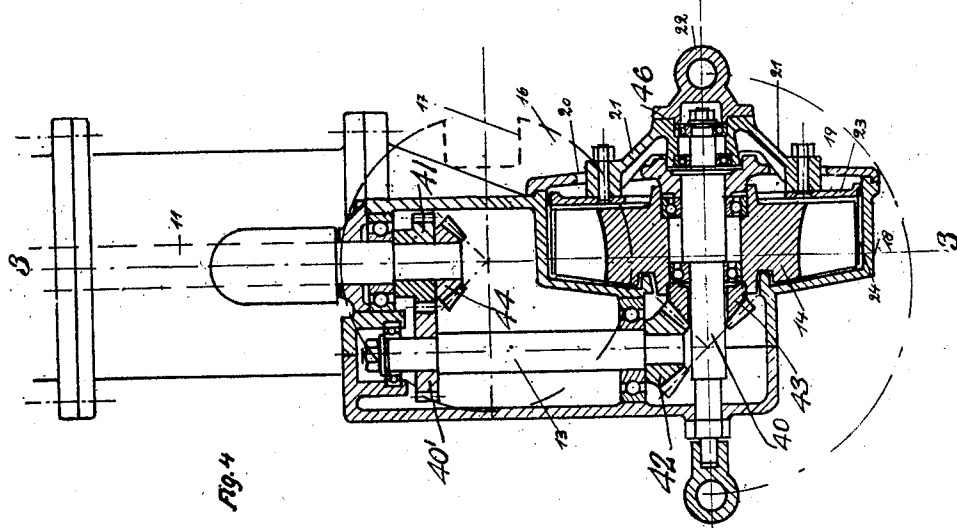
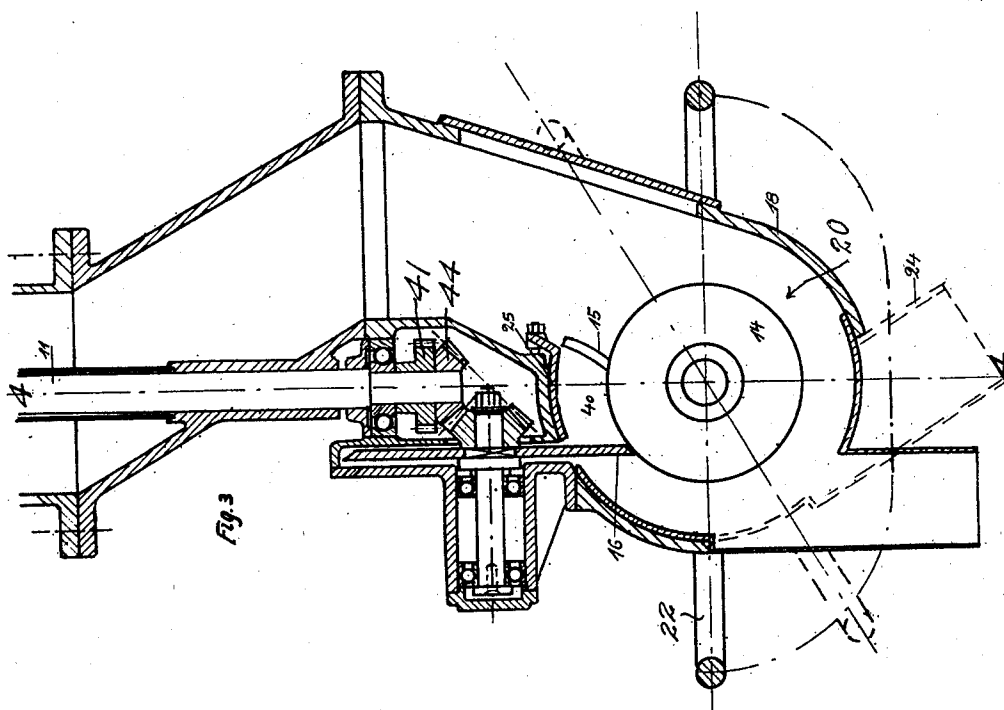
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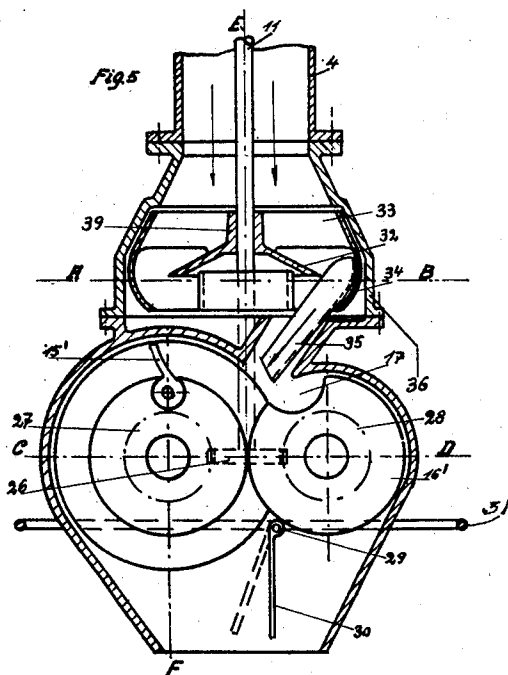
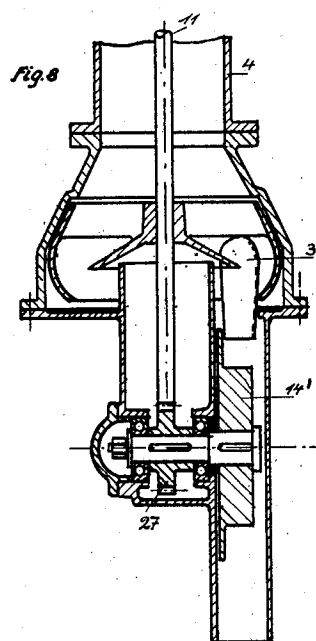
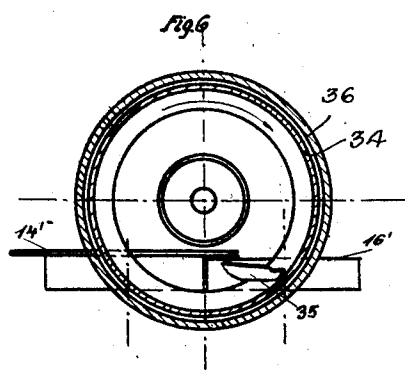
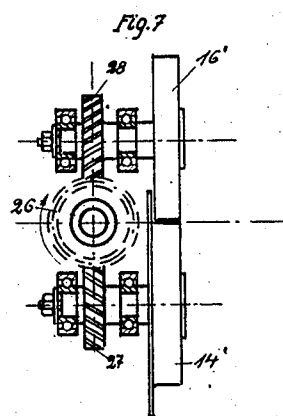
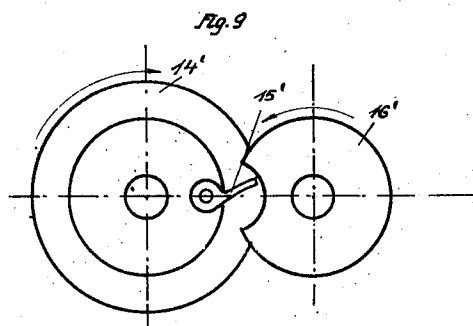
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

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SAND THROWER FOR FOUNDRIES.

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This invention has reference to sand-throwing means to be used for the filling of the moulds in foundries, and it is intended to devise means of facilitating the operation of the devices of the kind referred to and to more thoroughly compact and condense the packing or moulding material. For the charging of the moulding boxes or flasks with sand or equivalent material throwing heads have been suggested in the previous art, which were either conducted by rocking or tilting arms in a horizontal plane above any suitable point to be provided with the moulding material or which were adapted to be telescopically reciprocated and to be simultaneously rotated on a central point. With these machines it was necessary to move very considerable weights, so that the operation of these machines was very difficult.

In order to overcome these and other drawbacks of the previous art, the invention is based upon entirely different principles. In accordance with this invention, the throwing head is suspended from a connecting member, constituting or containing the feeding tube in such a manner that the throwing head is adapted to be rocked on all sides like a pendulum and to move over a large surface the size of which corresponds to the length of this pendulum, the head being suspended in such a manner that the counter-weight thereof is formed by the operating motor. The throwing head with its connecting member may be stationarily disposed below a sand feeding member or it may be movably mounted on a foundation, a base or on a carriage, so that the head becomes adapted for use at every point of the foundry. The jib may be so constructed, as to serve as sand-raising means and may be rotatably or swingingly mounted in such a manner as to allow of being lowered to the necessary depth when working upon large pieces of moulding disposed in the ground.

My invention also relates to the construction of the throwing head itself. In the previous art throwing heads have been disclosed comprising a throwing wheel or disc with revolving finger, which latter, as ordinarily constructed, assumed the shape of a rearwardly curved plate. The condensation of the sand was effected in this machine be-

tween this plate and the curved wall of the casing of the throwing device as a result of acceleration.

Among other important features my invention provides means of effecting the compacting or condensation of the sand, as distinguished from the previous art, at the front side of a movable stowing or impacting surface, separate from the throwing wheel, so as to obtain a substantially close space between the impacting surface, the finger and the cylindrical walls of the outer casing and an interior solid disc. By this means the advantage is produced of a more efficient compacting of the moulding material, independently of the velocity of revolution, while in contradistinction thereto in the previous device an extraordinarily great velocity of the throwing wheel and of the finger is necessary, which in turn requires special counterweights. The arrangement according to this invention therefore presents the advantage of greater simplicity and reliability and safety of operation. The stowing or impacting surface in a preferred embodiment may assume the shape of a rotatable disc provided with a recess or a slot through which the throwing finger or flap is adapted to be moved.

While, on the other hand, in the previous devices of the kind referred to the density of the sand had to be regulated by changing the number of revolutions of the motor and consequently also those of the throwing head by employing a head of larger or smaller size or by similar means, the density of the sand in accordance with this invention is varied by enlarging or reducing the size of the condensing space in front of the stowing or impacting disc by simple and easily manipulated means.

The invention in its further aspects has reference to an improved construction and greater adaptability of the throwing head by causing the movable stowing or impacting surface in one of the preferred exemplifications to be rotated in front of the throwing surface on an axis coextensive with the axis of the throwing wheel and with equal velocity and in such a manner that the peripheries of the throwing wheel and of the impacting wheel are caused to revolve upon each other. By this means, among other im-

portant features, the advantage is produced that the stowing or impacting member does not interfere with the operation, but is caused to admit the sand without interference with the throwing finger or flap which may move through a recess or aperture thereof.

The invention will be more fully described with reference to the accompanying drawings showing by way of exemplification several forms of embodiment of the principles of my invention.

In Fig. 1 a sand-throwing moulding machine according to this invention is shown in side-view. Fig. 2 is a side view of the upper part of the machine with some parts in section, particularly illustrating the feeding of the sand and the motor. Figs. 3 and 4 are different sections through the throwing head and on an enlarged scale and respectively on the lines 3—3 and 4—4. Fig. 5 is a sectional view through a modified construction of the throwing head. Fig. 6 is a section on the line A—B of Fig. 5. Fig. 7 is a partial section on the line C—D of Fig. 5 and Fig. 8 is a section on the line F of Fig. 5. Fig. 9 is a detail showing an elevation of the throwing and stowing or impacting wheel.

In the form of construction as shown particularly in Figs. 1—4 the sand is delivered by means of an elevator 2 or the like mounted on a support 1 onto an apron 3 adapted to carry the sand to the chute or to the depending delivery tube 4. This tube 4 is suspended in a cross joint 5 on a lateral arm or jib 6 of the post or support 1. The elevator 2 is driven by sprocket chains or by equivalent means from the motor 7 and the conveying apron 3 is operated by the same motor from the shaft 8 by means of intermediate gear wheels and in such a manner that in the lateral oscillation of the depending tube 4 the fork or block of guide pulleys 9 is rotated on the shaft 8 for a distance to correspond to the oscillation of the tube 4. The stationarily mounted conveying apron 3 in view of this arrangement remains always under uniform tension.

Above the depending tube 4 and upon a bracket or the like the motor 10 for the operation of the driving shaft 11 mounted in the interior of the depending tube 4 is arranged. The said tube 4 with the motor 10 connected at its upper end and the throwing head connected to its lower end is disposed by means of ball bearings in the cross joint 5 (Figure 2) in such a manner as to allow of any suitable degree of rotation on its axis. At the lower end of the depending tube 4 the shaft 11, as appears from Figs. 3 and 4, projects from the laterally directed bottom portion of the depending tube 4 and is operatively connected to a pair of gear wheels 40, 41 and to the shaft 13 operated thereby which in its turn by means of a pair of bevel gears

42, 43 is adapted to operate the throwing disc or throwing wheel 14. Upon this disc 14 the throwing finger 15 is mounted (Figure 4).

From the shaft 11 and by means of another pair of bevel gear wheels 44, 45 or the like a stowing or impacting disc 16 is moved which is disposed at right angle to the axis of the throwing disc 14. This disc or wheel 16 is provided with a slot or recess 17 through which the throwing finger or flap 15 is adapted to pass, inasmuch as both discs 14 and 16 are positively operatively connected. The finger 15 is set at an angle with relation to the stowing or impacting disc 16, which angle depends on and is made to conform to the formation of the walls of the recess and of the disc 16. The outer casing 18 of the throwing head is provided with slots 19 and 20. Through these slots the arms 21 are adapted to pass which in a similar manner as the throwing disc 14 are mounted by means of ball bearings 46 on the stationary shaft 40, so as to be easily rotated thereon. These arms 21 carry a yoke 22 encompassing the throwing head and serving as a handle for the manipulation of the head. To the arms 21 and in the interior of the throwing head a plate 23 is connected to which the interior casing 24 of the throwing head is rigidly secured. This interior casing 24 carries the discharging spout or chute proper. By moving the yoke 22 the discharging spout of the head may be adjusted in position relatively to the arms 21 and the plate 23 and in any suitable position required. The stowing or impacting space contained between the stowing disc 16 and the finger 15 may be enlarged or reduced by the adjustment of a plate or staple 25 of substantially inversely roof shaped configuration the upwardly inclined leg of which in the preferred construction, shown by way of illustration is substantially parallel to the inclined lower portion of the wall of the feeding tube. The lower part of the feeding tube where it is connected to the head constitutes an inclined guide directing the material onto the plates or discs 14, 16.

The mode of operation of this form of construction of the device is substantially as follows:—

The moulding sand or the like has been fed through the depending tube 4 into the throwing head where it is outwardly deflected by the solid disc 14 and in such a manner that the flap or finger 15 may become engaged with the sand before it has a chance to reach the discharging opening. The greater portion of the sand, however, is thrown by the disc 14 against the impacting or stowing disc 16 by the revolution of the disc 14 and before the sand has reached the finger 15. The finger or flap 15 in its rotating movement is brought so near to the stowing disc 16 that the sand is compressed in the condensing space. Inasmuch, however, as the disc 16

has also been rotated in the meantime, the slot or recess 17 has at last been moved in front of the finger 15, so that the finger is able to pass through the slot 17 with the condensed sand and then to eject the cake thus produced from the discharging member of the interior casing 14.

If the entire throwing device would only be moved in the cross joint 5 by means of the yoke 22, the discharging opening 24 would not be vertically disposed above and with relation to the mould to be charged, but under an angle thereto corresponding to the inclination of the depending tube, as appears from Fig. 1. In view thereof, the depending tube 4 is journaled at 5 in the ball bearing 12 (Fig. 2) in such a manner that it may be rotated on its own axis and by this means it becomes possible to always keep the shaft 40 of the throwing head in a horizontal plane. As a result of being able to rotate the interior casing 24 on the shaft 40 the stream of sand may be directed so as to arrive directly in the mould and to drop into it vertically or at an angle thereto.

The stowing disc 16 may be replaced by stowing or impacting slides or plates adapted to be rocked or oscillated at the proper time.

In the modified construction according to Figs. 5 to 9, the shaft 11 is also disposed in the interior of the depending tube 4 and projects therefrom. By means of the gear wheels 26, 27, 28 it drives the throwing disc 14' and the stowing or impacting disc 16'. The throwing disc 14' carries the flap or throwing finger 15' which is adapted to pass through the recess 17' of the throwing disc 16' (compare Fig. 9). Below the two discs 14' and 16' the disc 30 is rotatably mounted upon the shaft 29 and is connected to the ring 31 constituting a handle, so that the disc 30 upon the turning of the ring 31 on the axis 29 is also turned, and by this means the direction of discharge of the sand is changed.

Above the throwing and stowing discs 14' and 16' and within the same casing 36 a round or cam-like body is mounted upon the driving shaft 11 and is provided with a roof-like plate 32 which is connected by means of the helically shaped ribs 33 to the outer ring-wall or annulus 34 of substantially bell-shape and constructed in such a manner that the lower inner edge of the member 34 is disposed substantially vertically below the outer edge of the disc or plate 32, so that upon the rotation of the device the sand is prevented by centrifugal action from dropping down. Through the lower ring-shaped opening between the members 32 and 34 a scraping chute or gutter 35 projects into the bell-shaped member 34, which gutter is disposed in the casing 36 and conducts and feeds the sand in front of the stowing wheel 16'.

The mode of operation of this modified construction is substantially as follows:—

Through the depending tube 4 the sand is fed to the distributing plate 32 and by centrifugal action it is thrown off therefrom against the annulus 34 to which it adheres as a result of the centrifugal action. The scraping gutter 35 which projects through the slot and within close proximity of the member 34 scrapes the sand off from the wall of the member 34 and conducts it into the cavity above the point of engagement of the throwing disc 14' with the stowing or impacting disc 16'. Inasmuch as both discs or wheels are rotated in opposite directions, so that they revolve upon each other, similar to the action of gear wheels, the sand becomes stowed and accumulated in this cavity and is prevented from escaping through the ejecting opening at and around the plate 30 in view of the fact that with the high number of revolutions the centrifugal force keeps the sand from being squeezed through between the wheels. In a similar manner foreign bodies, such as for instance small pieces of iron are prevented from being caught by the smooth surfaces of the rollers. Now, inasmuch as the throwing wheel 16' and the stowing wheel 14' are moved by positive operating means with relation to each other, the recess 17' has just arrived within the vicinity of the nib of the wheels when the throwing finger 15' has also been moved within proximity thereof. This finger during its rotation has forced the sand in front thereof against the impacting surface 16', thereby compacts and compresses the sand and then forces it through the recess 17' and causes it to be discharged by the plate 30. By turning the ring 31 on the shaft 29 the position of the plate 30 may be changed and the direction of discharge for the escaping sand may be altered.

Instead of a throwing disc 14' with a flap or slapping finger or wing 15', I may use a disc similar to the impacting or stowing disc 16', so that with this modification there would be two cooperating wheels similar to the impacting disc 16 with but one recess 17' and without the slapping finger. The wall of the casing 36 would then have to conform and to be disposed adjacent to the periphery of this recessed wheel, as shown in the drawing (Fig. 9) with reference to the wheel 16'.

The invention is not restricted to the particular form of construction and parts thereof and to the modifications herein shown and described merely by way of exemplification of its broad principles, but it may find expression in other embodiments, without deviating from the spirit and scope of the invention, as defined in the claims hereunto appended.

I claim:—

1. In a device of the kind described, an oscillatable head, driving means operatively connected thereto and adapted to compensate the weight of the head, feeding means on the

head and sand compressing means, mounted on the head, and discharging means on the head for the compressed sand.

2. In a device of the kind described, an oscillatable head, driving means operatively connected thereto and balancing the head, feeding means on the head and sand compressing means mounted on the head, discharging means on the head for the compressed material, and means for rotating and adjusting the discharging means.

3. In a device of the kind described, an oscillatable head, a downwardly offset feeding tube connected to the head, an operating shaft axially disposed in the feeding tube and projecting through the offset portion thereof, driving means for said operating shaft, cooperating movable sand throwing and slapping and impacting means on said head operatively connected to the shaft, discharging means on the head, means for rotating the tube around the shaft and rocking means for the tube and the head.

4. In a device of the kind described, an oscillatable head, an upright support for said head, means for oscillatingly mounting the head on the support, and a motor engine on said means balancing the head, an axially rotatable feeding tube on said head and operatively connected to the motor engine, an endless flexible feeding carrier on the support and cooperating with the feeding tube and driving connection between said carrier and the engine, rockably disposed tensioning and guiding means on said driving connection, and adapted to follow the oscillations of the head and of the feeding tube, sand-condensing means on the head operatively connected to the engine, and adjustable discharging means on the head.

5. In a device of the kind described, an oscillatable tubular carrier, a support for said carrier, driving means connected to the carrier, a casing on said carrier, a rotatable, cross-sectionally circular, sand-receiving member on said casing, a substantially radial, longitudinally depressed section on said member, and a rockable slapping member, engageable during its rocking movement with said depressed section, and discharging means on the casing.

6. In a device of the kind described, an oscillatable, tubular carrier, a support for said carrier, driving means and feeding means connected to the carrier, a rotatable, cross-sectionally circular, sand-receiving member on said carrier, a substantially radially and longitudinally extending recessed section on said member, a slapping member, rotatable at right angle to the sand receiving member and engageable with the recessed section, and adjustable discharging means below said members, and feeding means on the carrier, above said members, and driving means for said members.

7. In a device of the kind described in combination, an oscillatable, tubular, balanced carrier, a support for said carrier, a casing connected to the lower end of the carrier, a rotatable, cross-sectionally circular, sand receiving member in said casing, a substantially radially and longitudinally disposed recessed section on said member, a slapping member, rotatable at right angle to the sand receiving member and engageable with the recessed section thereof, separate driving means for said members, and a prime mover on the carrier, operatively connected to said driving means, and discharging means on the casing.

8. In a device of the kind described in combination, an oscillatable, tubular, balanced carrier, a support for said carrier, a rotatable, cross-sectionally circular, sand-receiving member, transversely disposed below said carrier, a casing surrounding the receiving member, and a substantially angular communicating tube connected to the casing and the carrier, a substantially radially and longitudinally recessed rotatable disk adjacent the receiving member and at right angle thereto, a projecting slapping member on the sand receiving member, engageable with the recessed portion of the rotatable disk, and discharging means on the casing.

9. In a device of the kind described in combination, an oscillatable, tubular, balanced carrier, a support for said carrier, a rotatable member, transversely disposed below said carrier, a casing surrounding said member, and a substantially angular communicating tube connecting the casing to the carrier, a substantially radially and longitudinally recessed rotatable disk, rotatable at right angle to the rotation of said member, a substantially radially projecting portion on the member, engaging the recessed part of the disk, during the rotation thereof, driving means on the carrier, operatively connected to the rotatable member and to the disk, and adjustable discharging means on the casing.

10. In a device of the kind described, an oscillatable head, a pair of cooperating, rotating, adjacently disposed discs on said head, a substantially radially and longitudinally extending section on one of said discs, peripherally projecting throwing and slapping means on the other disc, engageable and disengageable with the recessed section, feeding means above the unrecessed disc, substantially inversely roof-shaped partitioning means on the head intermediate the feeding means and the discs, and adapted to control the free space between the discs and the feeding means and operating means for the discs and discharging means on said head.

11. In a device of the kind described, an oscillatable head, a pair of cooperating oppositely rotating adjacently disposed plates on said head, a substantially radially and

longitudinally extending section on one of said plates, feeding means on the head and adapted to deliver moulding material onto and between the plates, inclined guiding means for the material on said feeding means above the plates, separate operating means for each of the plates, adjacent the feeding means, and vertically and rotatably adjustable discharging means on the head.

12. In a device of the kind described, an oscillatable head, a pair of cooperating adjacently disposed discs on said head, a substantially radially and longitudinally extending section on one of said discs, a feeding tube connected to the head and adapted to deliver moulding material onto and between the discs, inclined guiding means for the material at the bottom portion of the feeding tube, a driving shaft on said feeding tube, operatively connected to each of the discs, and substantially vertically adjustable discharging means on the head.

13. In a device of the kind described, an oscillatable head, a rotatable impacting disc on said head, a substantially radially and longitudinally disposed section on said disc, throwing and slapping means on the head cooperating with the disc and adapted to

project moulding material through the recessed portion thereof, feeding means on the head adapted to admit material between the disc and the throwing and slapping means and discharging means on the head.

14. In a device of the kind described, an oscillatable disc, a pair of cooperating adjacently disposed discs on said head, a substantially radially and longitudinally disposed section on one of said discs, a feeding tube on said head adapted to deliver moulding material onto and between the discs, driving means on said feeding tube and operatively connected to the discs and adapted to rotate the same with equal angular velocity and discharging means on the head.

15. In a device of the kind described, an oscillatable axially rotatable feeding tube, driving and feeding means connected to said tube, an operating shaft in the interior of the tube, a head at the lower end of the tube, movable compressing means for moulding material on said head operatively connected to the operating shaft, discharging means on said head and means to turn the discharging means on a horizontal axis and relatively to the head and the feeding tube.

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