

April 21, 1925.

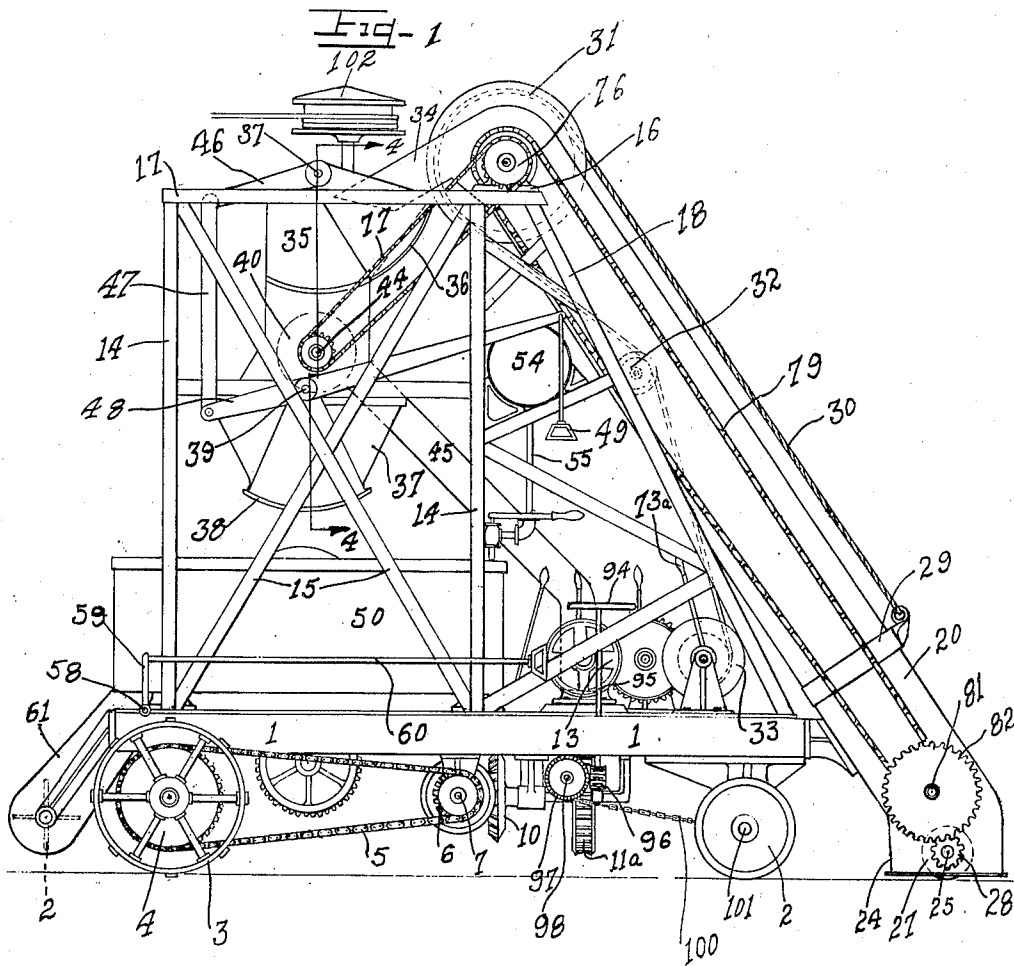
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CONTINUOUS FOUNDRY SAND MULLING MACHINE

Filed Nov. 12, 1923

4 Sheets-Sheet 1



WITNESSES
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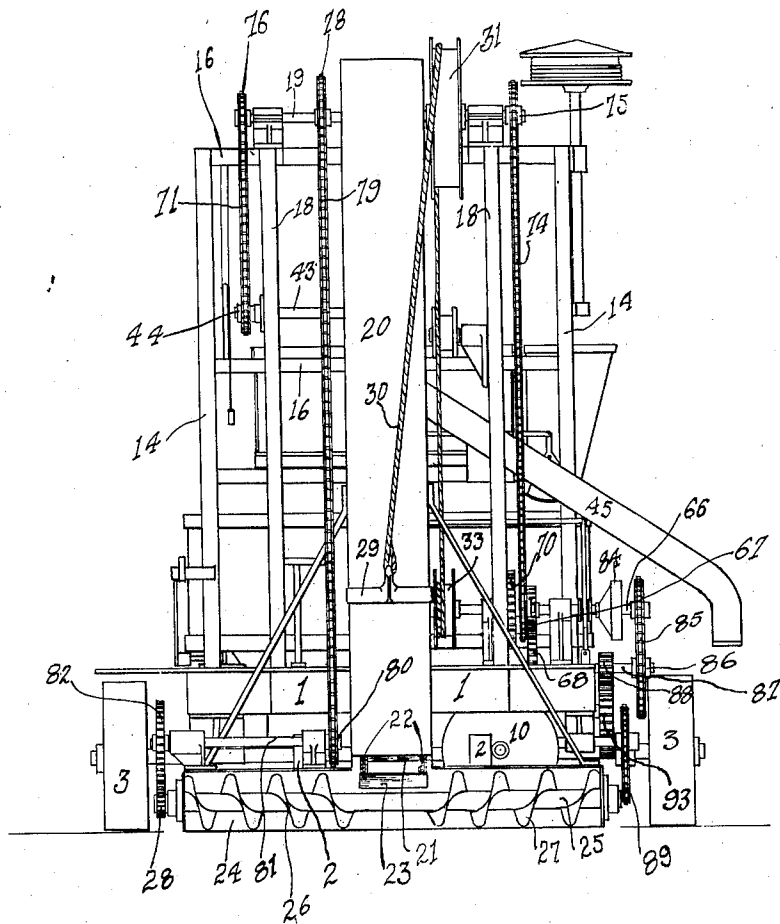
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4 Sheets-Sheet 2

Fig. 2



Witnesses

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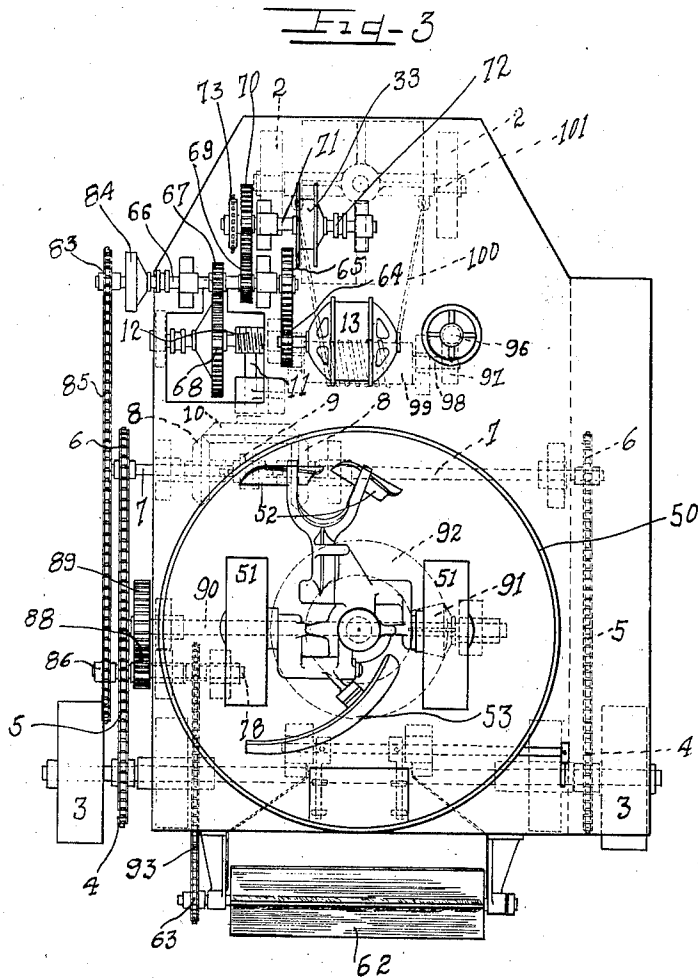
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4 Sheets-Sheet 3



Witnesses

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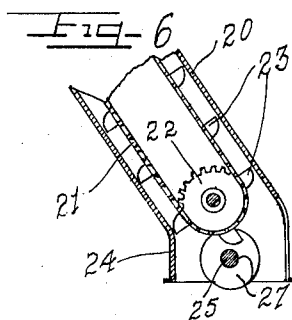
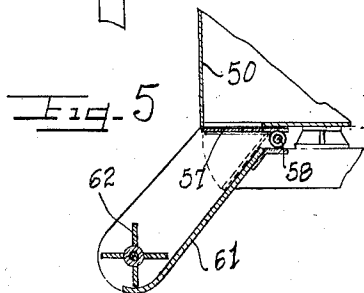
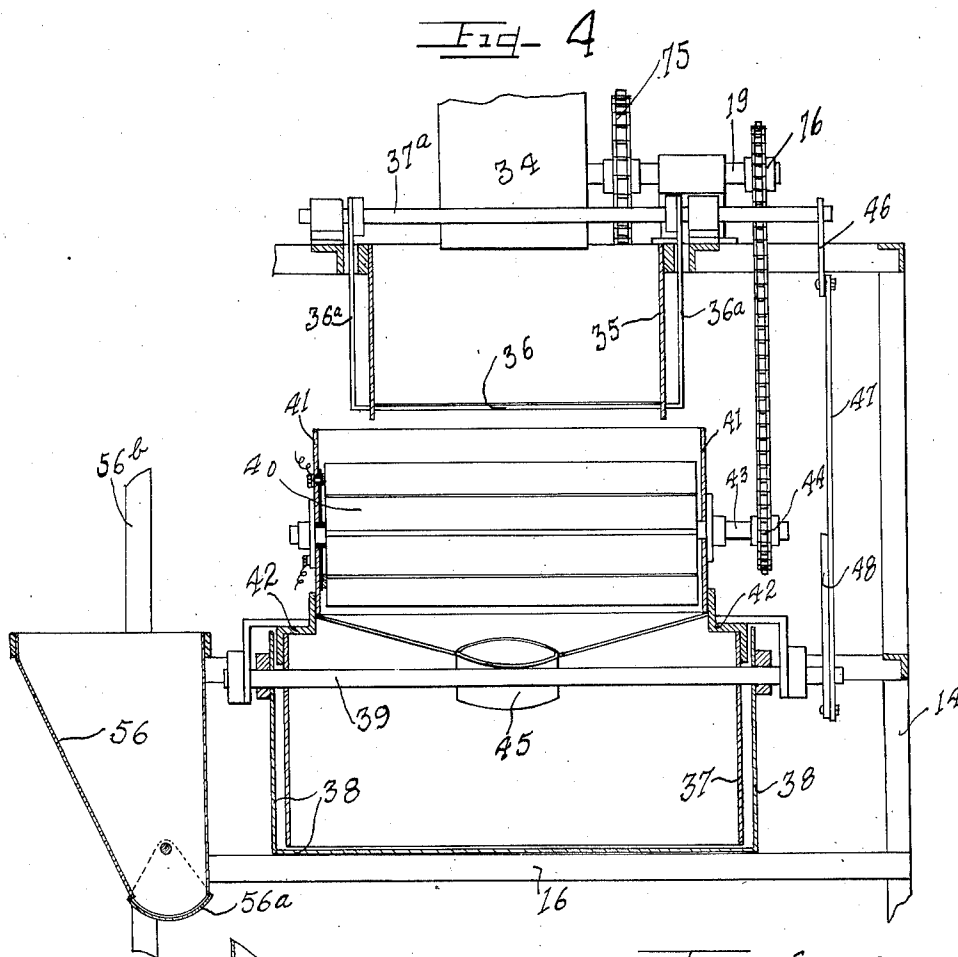
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CONTINUOUS FOUNDRY SAND MULLING MACHINE

Filed Nov. 12, 1923

4 Sheets-Sheet 4



WITNESSES

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UNITED STATES PATENT OFFICE.

HERBERT S. SIMPSON, OF CHICAGO, ILLINOIS.

CONTINUOUS FOUNDRY-SAND-MULLING MACHINE.

Application filed November 12, 1923. Serial No. 674,134.

To all whom it may concern:

Be it known that I, HERBERT S. SIMPSON, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Continuous Foundry-Sand-Mulling Machines; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, and to the numerals of reference marked thereon, which form a part of this specification.

This invention relates to a portable or self-propelled mulling machine especially adapted for foundry work.

In foundry practice, it is customary to deposit the moulding sand in the form of windrows. This sand should be purified and mulled before use. Heretofore, it had to be handled a number of times in purifying and mulling the same, consequently much time and labor was consumed in the preparation of the moulding sand. This invention is designed to overcome this objection in the provision of a machine capable of moving over the windrows of sand gathering and hoisting the same for purification purposes and passing the same into a mulling apparatus from which it escaped ready for use. This invention also comprises means or apparatus for properly tempering the sand during the mulling operation.

The invention comprises the novel mechanism and combinations hereinafter described and more particularly pointed out and defined in the appended claims.

In the accompanying drawings which illustrate a preferred embodiment of this invention and in which similar reference numerals refer to similar features in the different views:

On the drawings:

Figure 1 is a side elevational view of the portable mulling machine.

Figure 2 is a front elevational view of the same.

Figure 3 is a top plan view of the machine with parts omitted.

Figure 4 is a fragmentary sectional view upon the line 4-4 of Figure 1, showing parts in elevation.

Figures 5 and 6 are respectively detail sec-

tional views of the discharge and feeding mechanisms of the machine.

As shown on the drawings:

The illustrated mulling machine comprises a propelled structure in the form of a truck 1 supported on wheels 2 and 3. Sprocket wheels 4 are secured upon the axle that supports the rear wheels and sprocket chains 5 are trained over said sprocket wheels 4 and also over sprocket wheels 6, secured upon a transverse shaft 7 which is journaled upon the truck body. A pair of bevel gears 8 (Fig. 3) are loosely mounted upon the shaft 7 and are adapted to be alternately connected therewith through a clutch 9 whereby the drive may be reversed. A pinion 10 in mesh with the bevel gears 8 is secured upon a shaft 11 journaled upon the truck. A worm gear 11^a (Fig. 1) upon the shaft 11 meshes with a worm 12 which is operatively associated with the shaft of an electric motor 13 supported upon the truck. The machine may hence be driven forward or backward by the motor through these described connections and accordingly may be termed a propelled structure.

A pair of vertical standards 14 rise from opposite sides of the truck. These standards are suitably braced by diagonal struts 15 and their upper ends are connected by horizontal transverse members 16 and longitudinal members 17 to provide a supporting frame work. The longitudinal side members 17 extend beyond the front standards 14 and are connected by a transverse brace 16 to which a pair of inclined standards 18 are secured which are braced by suitable struts from transverse members connecting the front standards 14. A shaft 19 is journaled in suitable bearings upon this frame and an inclined closed chute 20 having an enlarged or expanded mouth, is pivotally supported thereon and extends downwardly and forwardly. A sand conveyor travels in said chute. In the form illustrated this sand conveyor comprises an endless member 21 having sprocket chains upon its lateral margins which are trained over sprocket wheels 22 mounted upon a shaft extending transversely of the expanded mouth of the chute and over similar sprocket wheels (not shown) mounted upon shaft 19 within the chute 20. This endless member has trans-

versely extending buckets 23 or the like for elevating the sand. The expanded mouth of the chute is directed at an angle so as to be normal to the ground over which it moves and it consists of a broad scraper 24 that is broad enough to encompass a windrow of sand as shown in Figure 2. The rear end of this scraper portion of the chute is closed but the front end is open so that the sand can enter into the scraper as it moves over the ground. Mechanism for gathering or conveying the said centrally of the mouth of the chute so the same may be raised by the conveyor 21 has been provided. In the present embodiment of this invention, this mechanism consists of a shaft 25 journaled in the ends of the scraper portion of the chute and having right and left handed spirals 26 and 27 which are spaced apart at their inner ends, a distance equal substantially to the width of the chute 20. One end of the shaft 25 extends beyond the scraper 24 for attachment of a gear 28 whereby the shaft may be rotated. It will be obvious that as the machine is propelled over a windrow of sand, it will be gathered in the scraper portion of the chute and the rotation of the spiral conveyor will convey the sand from both ends of the scraper toward the center where it will be picked up by the sand elevating conveyor and conveyed through the chute 20.

Near the lower end of the chute 20 there is a band 29 that is attached thereto. A cable 30 is attached to the band and extends over a pulley 31 secured upon the shaft 19. From the pulley 31 the cable 30 is suitably guided over a guide pulley 32 (Fig. 1) and thence over a reel 33 which is driven from the motor 13. By winding the cable 30 upon the reel 33, the lower end of the chute 20 may be swung upwardly away from the floor, the shaft 19 acting as a pivot during such operation.

The upper end of the chute 20 terminates in a spout 34 into which the sand drops as the buckets on the sand elevating conveyor start to descend. The spout 34 leads into a charging or receiving hopper 35 suitably supported by the afore-described frame work. This hopper has a discharge opening which is regulated by a valve 36 that slides over said opening. The valve 36 has upwardly extending arms or portions 36^a (Fig. 4) that are secured upon a transverse rod 37^a.

Below the hopper 35 there is a discharging hopper 37 which likewise has an opening in the bottom which is regulated by a valve 38 similar to the valve 36. The valve 38 is secured upon a transverse rod 39.

Mechanism for removing or separating the impurities from the sand, such as iron, slag or other matter is located between the two hoppers so that the sand will come in contact with the same when descending from

the upper hopper, the lower hopper receiving the purified sand. In the present embodiment of this invention, this mechanism consists of a magnetic roll 40 having blades which may be suitably electrified. It is shown as supported by suitable brackets 41 secured at their lower ends to short Z-bars 42 attached to the upper ends of the hopper 37. The axle 43 of this magnetic roll extends through one of the brackets 41 for the attachment of an operating sprocket wheel 44. A chute 45 leads downwardly from the roll 40 for carrying off the impurities. The impurities will adhere to the magnetic roll, and as the roll revolves, the blades will become de-energized, when they are in position to drop the impurities into the chute 45.

A lever 46 is secured at one end on the rod 37^a and is connected at its other end to the upper end of a link 47. The lower end of the link 47 is connected to a lever 48 secured intermediate its end to the rod 39. The free end of the lever 48 is provided with a suspended operating handle 49. Operation of lever 49 will simultaneously open one valve and close the other.

Mulling apparatus has been provided for receiving the sand from the lower hopper 37. This apparatus comprises a cylindrical container or pan 50 in which a pair of mullers 51 revolve. The mullers 51 are journaled upon a rotating spider which also has attached thereto the usual plows 52 and 53. The mulling apparatus is well known and needs no further description.

A water tank 54 (Fig. 1) may be suitably supported above the mulling apparatus for supplying water to the sand in the mulling apparatus for properly tempering the same by means of a pipe 55 having any well known valve for controlling the flow of water. It will accordingly be evident that the moistening of the sand may be readily regulated for obtaining the required temper. Additional sand may be supplied to the mulling apparatus for obtaining the proper bonded strength of the batch in the container from an auxiliary sand reservoir 56 shown in Fig. 4 and which is suitably supported upon the side of the machine and provided with a suitable valve 56^a for discharging the sand into the mulling machine and which may be operated by a lever 56^b. A discharge valve 57 (Fig. 5) is located in the bottom of the container 50 and is pivotally mounted upon a rod 58 which extends through the container. A crank arm (Fig. 1) is secured upon the rod 58 and an operating link 60 is secured to the crank arm, whereby the valve 57 may be opened or closed. A discharge chute 61 extends from the container 50 in registry with the valve 57 and a form of paddle wheel 62 is rotatable in the chute 61 for spreading and aerating the sand as it is discharged. This paddle

wheel is secured upon a shaft journaled in the walls of the chute, and one end of said shaft extends through the wall of the chute for the attachment of a sprocket gear 63 5 whereby the wheel may be rotated.

The various operating parts above described are driven from the motive power that propelled the truck, and which have been previously described. The operative 10 connection between the motive power and the said various operating parts will now be set forth.

In referring to Fig. 3 it will be observed that the motor shaft has a gear 64 secured 15 thereon which meshes with a gear 65 upon a shaft 66 journaled in suitable bearings upon the truck. A gear 67 is secured upon this shaft and meshes with a gear 68 upon the worm shaft 12 for propelling the machine. A third gear 69 is secured upon the shaft 66 and meshes with a gear 70 secured 20 upon a shaft 71 journaled in suitable bearings upon the truck. The forementioned reel 33 is loosely mounted upon the shaft 71 and is adapted to be operatively connected 25 with the shaft at suitable times by means of a clutch 72 controlled by a lever 73 shown in Figure 1. A sprocket gear 73 is secured upon the outer end of shaft 71, and a sprocket chain 74 (Fig. 2) trained over said sprocket 73 and over a sprocket gear 75 30 upon the shaft 19 forms the driving connection for the latter shaft.

A sprocket gear 76 upon the shaft 19 is 35 connected by a sprocket chain 77 with the sprocket gear 44 upon the shaft 43 that drives the magnetic roll. Another sprocket gear 78 (Fig. 2) upon the shaft 19 is connected by a sprocket chain 79 with a sprocket gear 80 upon a short shaft 81 40 journaled in suitable bearings secured upon the scraper portion of the chute 20. A gear 82 secured upon said shaft 81 meshes with the aforementioned pinion 28 for rotating the spiral sand conveyor.

A sprocket gear 83 is mounted upon the end of shaft 66 and controlled by a clutch 84. A sprocket chain 85 connects the sprocket 83 with a sprocket gear 86 secured 50 upon a short shaft 87 journaled in suitable bearings beneath the mulling apparatus. A gear 88 upon this shaft meshes with a gear 89 upon a transverse shaft 90 journaled in suitable bearings beneath the mulling 55 apparatus and provided with a bevel gear 91 (Fig. 3) that meshes with a bevel gear 92 upon the shaft that supports the mullers. The shaft 87 is also connected by a sprocket chain 93 with the aforementioned sprocket 60 gear 63 upon the paddle wheel 62 as shown in Fig. 3.

In order to steer the machine in its travel, a simple form of steering mechanism has been illustrated in Figure 3. As will be 65 observed, a steering wheel 94 is secured

upon a shaft 95 which extends below the platform of the truck. A worm 96 upon the lower end of shaft 95 meshes with a worm wheel 97 upon a drum shaft 98 upon which a drum 99 is secured, a cable 100 is 70 wound upon the drum; the ends of the cable being connected to the front axle 101 of the machine. It is obvious that as the drum is rotated in one direction or the other a pull 75 will be imparted upon one end of the cable while the other end will unwind so that the front axle may be turned for steering purposes. It will of course be understood that any other form of steering mechanism may be used. The present mechanism being 80 merely illustrative for showing some means for steering the machine.

In Figure 1, there is shown an automatic reel 102 upon which the feed wires are 85 wound for supplying electrical energy to the motor; the connections with the motor not being shown since the manner of effecting such connections is well known, nor is the motor switch illustrated for the same 90 reason.

In operation, the driver or operator will start the motor for propelling the machine. The gears 64, 65, 67, 68 will be set in motion for driving the shaft 11 which through the worm 12 and worm gear 11^a imparts rotation 95 to the shaft 11 which in turn operates the shaft 7 and the sprocket gearing 5 for propelling the machine. At the same time, the gear 69 will drive gear 70 for rotating shaft 71 which through the sprocket gearing 74 drives the shaft 19 for operating the spiral conveyor, the separating roll 40 and the sand elevating conveyor 21. The driver 100 may then run and operate the machine as any automotive vehicle and bring the same so that it will face the end of a windrow of sand. The chute 20 which may be in elevated position while the machine is traveling idly may be readily lowered at the 105 proper time by throwing out the clutch 72. Assuming that the machine has been properly positioned and set, as it advances, the scraper portion of the chute will gather and push the sand along in front of it, causing an accumulation thereof within the 115 scraper. The rotating spiral conveyor will gather the sand under the elevating sand conveyor 21 which will elevate the same and drop it into the hopper 35 which should be open so that the sand may fall therethrough 120 and come in contact with the rotating separating roll 40 for purifying the sand of iron, slag or the like and remove such impurities through the chute 45. The purified sand will then drop into the discharging 125 hopper 37. When a batch or sufficient quantity of sand has collected in the hopper 37, the lever 48 may be operated for closing the valve 36 upon the upper hopper and opening the valve 38 of the lower hopper, 130

allowing the sand to drop into the mulling apparatus which may be set in motion any suitable time by throwing in the clutch 84. When the sand has all been discharged from the lower hopper the lever 48 may be operated for opening the upper hopper and closing the lower hopper. Water from the tank 54 may then be allowed to flow into the mulling apparatus. The mullers and plows will mix and temper the sand which may be discharged from the mulling apparatus by opening the valve 57. The machine is continually advancing very slowly during such operation and a fresh charge of sand is passing through the upper hopper purified by the roll 40 and being collected in the lower hopper. When the mulled sand has been discharged from the mulling apparatus, the valve 57 may be closed and the lever 48 operated again to close the valve 36 of the upper hopper and opening the valve 38 of the lower hopper so that a fresh charge of sand may descend into the mulling apparatus. The process is continuous as one batch of sand is being mulled, another batch is being elevated, purified and collected. The discharged sand from the mulling apparatus is spread behind the machine and is ready for use.

From the foregoing it will be appreciated that much time and labor is saved in preparing the sand for moulding purposes in foundry work and that a great deal of slow hand labor is obviated.

I am aware that numerous details of construction may be varied through a wide range without departing from the principles of this invention, and I therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

I claim as my invention—

1. In a machine of the class described, comprising a continuously propelled structure having an inclined chute, a sand conveyor traveling in said chute, a receiving hopper at the upper end of said chute, sand purifying mechanism below said hopper, a discharge hopper below said purifying mechanism, simultaneously operated valves for alternately opening and closing said hoppers, a mulling apparatus below said discharge hopper, means for operating said apparatus, and means for discharging sand therefrom.

2. In a machine of the class described comprising a propelled structure, the combination with a mulling apparatus, of means for elevating sand above said apparatus, a pair of spaced hoppers for successively receiving said sand, means between said hoppers for removing impurities from said sand, and means for alternately opening and closing said hoppers.

3. A machine of the class described com-

prising a propelled structure, an upwardly inclined chute at the front end of said structure, a right and left hand spiral conveyor located in the mouth of said chute, a sand conveyor traveling in said chute, a receiving hopper, a discharging hopper, means for simultaneously opening one hopper and closing the other hopper, and a mulling apparatus for periodically receiving a charge of sand from the discharging hopper.

4. A mulling machine comprising a propelled structure, a mulling apparatus supported on said structure, and operated by the propelling force, means for elevating sand and discharging it in batches to said apparatus and an auxiliary sand container carried by said structure for discharging sand into said mulling apparatus.

5. The combination with a propelled structure, of a mulling apparatus carried thereby and driven by the propelling force thereof, an elevating sand conveyor for supplying sand to said muller and means for controlling the sand in relation to the mulling apparatus.

6. The combination with a moving structure embodying a propelling force, of means for gathering sand during the operative movements of said structure, mulling apparatus carried by said structure and operated by said propelling force, a conveyor for elevating the gathered sand, and means for collecting said elevated sand and periodically discharging it into said mulling apparatus.

7. In a sand mulling machine, a propelled truck, means for propelling the same, an inclined chute pivoted upon said truck, means for elevating and lowering said chute with respect to its pivotal support, sand mulling apparatus carried by said truck, a sand elevating conveyor moving in said chute and means for receiving said elevated sand and periodically discharging it into said mulling apparatus.

8. In a sand mulling apparatus, a propelled truck, sand mulling apparatus carried by said truck, an inclined chute provided with an expanded mouth pivoted upon said truck, said expanded mouth acting as a scraper upon the ground, an elevating sand conveyor supported so as to travel in said chute, a transversely extending sand conveyor in said expanded mouth for gathering the sand under said sand conveyor, a receiving hopper and a discharging hopper for receiving the elevated sand and periodically discharging the same to said mulling apparatus.

9. In a sand mulling machine, a propelled truck, sand mulling apparatus carried by said truck and driven by the propelling force, sand gathering and elevating means carried by said truck and operable during the movements thereof, mechanism for re-

moving impurities from the elevated sand, and a discharge hopper for receiving the purified sand and periodically discharging it into said mulling apparatus, said apparatus having a discharge gate for discharging the mulled sand.

10. In a sand mulling machine, a propelled truck, mulling apparatus carried by said truck and driven by the propelling force, mechanism carried by said truck and adapted for moving over the ground for accumulating sand, a conveyor for elevating the accumulated sand, means for controlling the elevated sand and periodically discharging a batch into said mulling apparatus and discharge mechanism in connection with said mulling apparatus for discharging the mulled sand.

11. In a sand mulling machine, mechanism for gathering and elevating sand, mulling apparatus for receiving and mulling the sand and means for discharging and aerating the mulled sand.

12. In a sand mulling machine, mechanism for gathering and elevating sand, means for purifying the sand, mulling apparatus for receiving and mulling the sand and discharge mechanism involving means for aerating the sand.

In testimony whereof I have hereunto subscribed my name in the presence of two subscribing witnesses.

HERBERT S. SIMPSON.

Witnesses:

CARLTON HILL.

OSCAR HARTMANN.