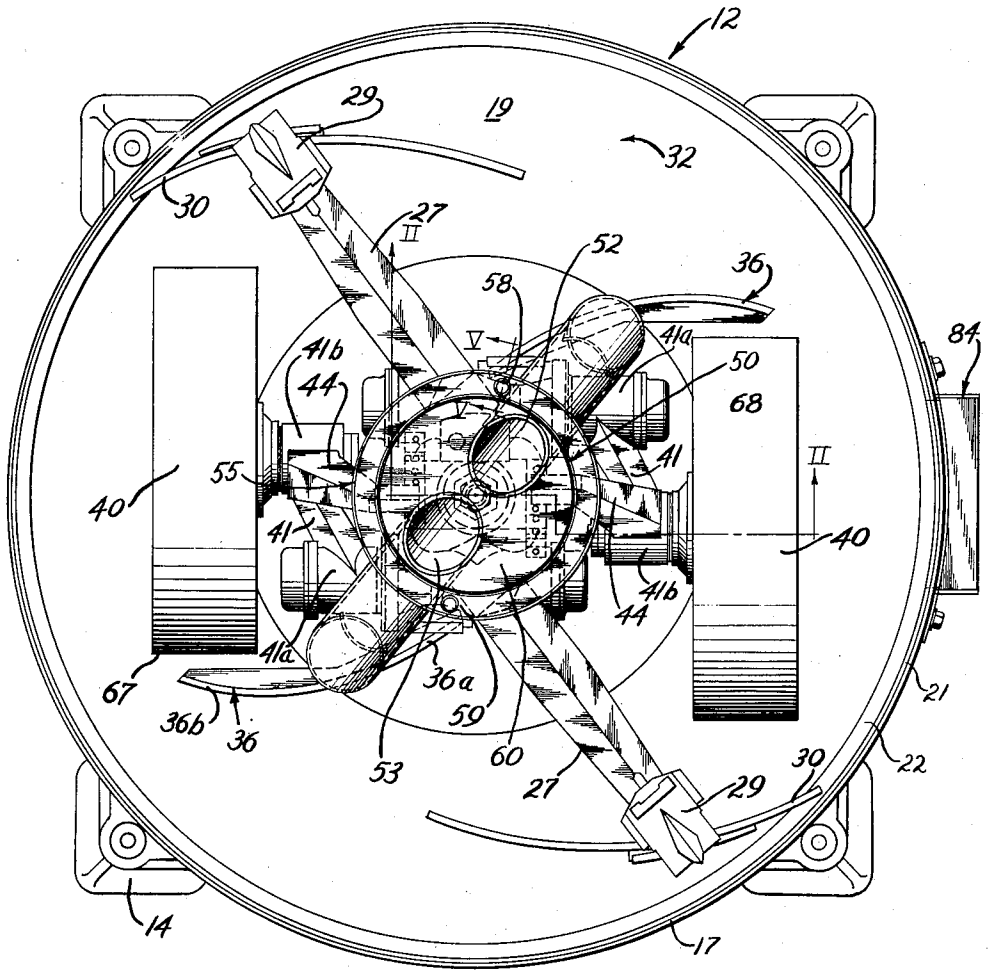
Aug. 14, 1956 R. L. McILVAINE 2,758,824

CONTINUOUSLY CHARGING MIXER

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Fig. 1



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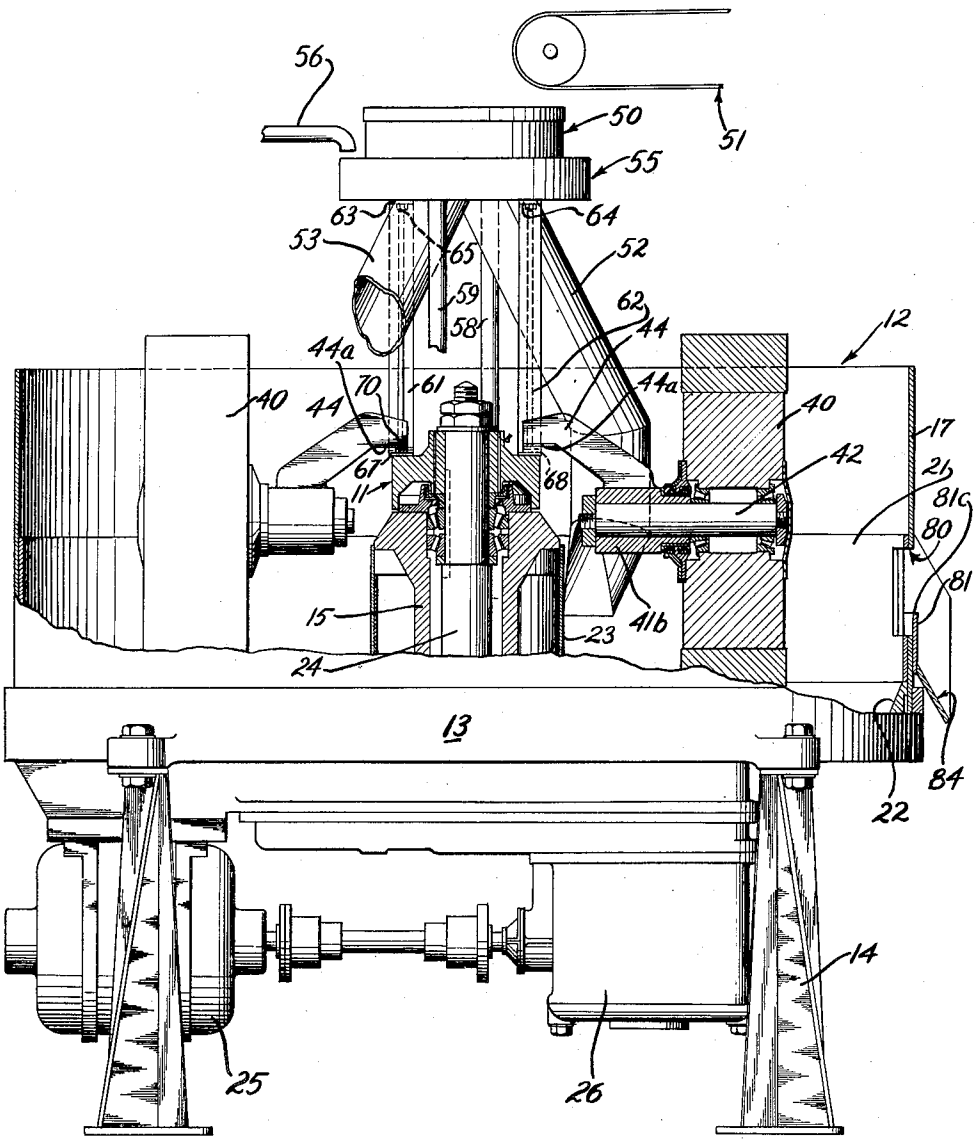
By Hill, Sherman, Meroni, Gross & Simpson Attys.

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Fig. 2.



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Fig. 3

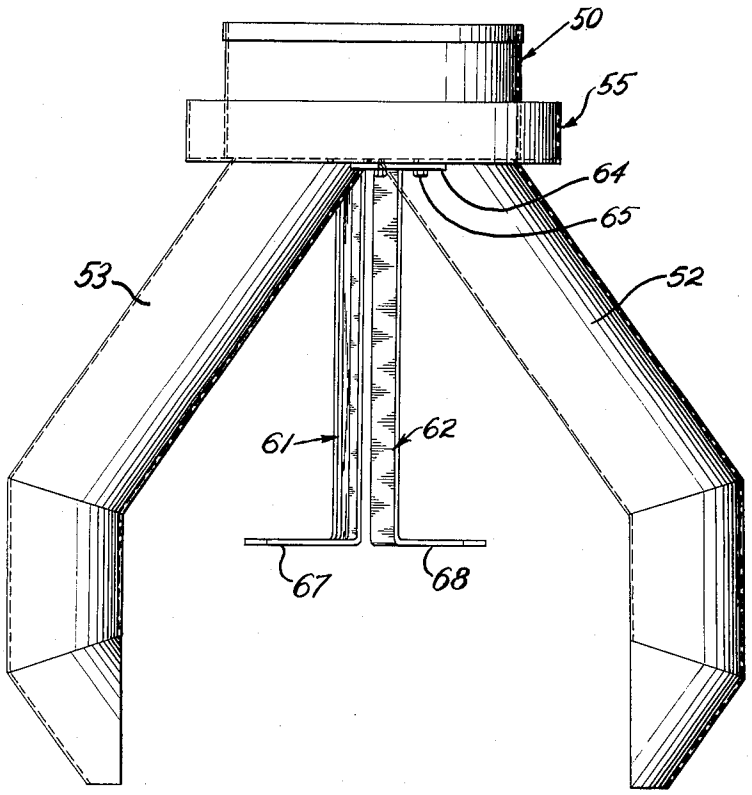


Fig. 4

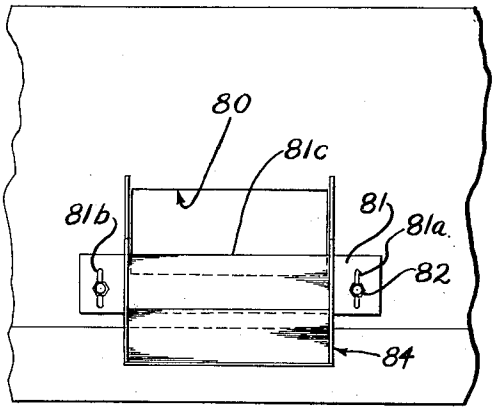
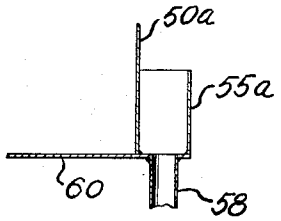


Fig. 5



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2,758,824

CONTINUOUSLY CHARGING MIXER

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Application August 31, 1953, Serial No. 377,315

3 Claims. (Cl. 259—23)

This invention relates to a method and means for mulling granular material and particularly to a continuously charging muller.

The present invention is particularly adapted for use in forms of foundry practice, such as large automotive castings moldings systems, where conditions are such that the sand reaching the muller is practically uniform in temperature and moisture content. According to the present invention the muller is continuously charged with sand preferably in the above condition and at the same time the muller is operated to discharge a generally equal amount of sand.

The present invention differs, however, from conventional "continuous mixing" processes. In the conventional so-called "continuous mixers," such as pug mills, increments of material pass through the machine and are worked upon as they pass along. Therefore, the material leaving the machine has the same range of variation in physical properties as the material entering the machine. In the procedure of the present invention, however, the material entering the muller is immediately mixed with other material which is well along in the mixing and mulling process. Therefore, the properties of the entire batch are averaged.

The degree of averaging, as well as the degree of work performed on the material is determined by the ratio of the flow of material through the machine to the amount of material in the machine at a given time. In one installation according to the present invention, the machine is loaded with 5,000 lbs. of sand and the flow through the machine is approximately 2000 pounds per minute. There is thus obtained the equivalent of 2½ minutes of mulling.

It is an important object of the present invention to provide a novel method and means for mulling granular material wherein no time is lost in loading or discharging the mixer.

A further object of the present invention is to provide a novel method and means for mulling granular material which is adapted to be arranged for automatic operation.

It is another object of the present invention to provide a method and means for mulling granular material wherein large batch measuring and receiver hoppers are not required, thus reducing head room and cost.

It is still another object of the present invention to provide a novel method and means for mulling granular material whereby greater hourly capacity is achieved for a given size machine.

According to the present invention a batch of sand is established in a mulling chamber and new material is fed into the chamber in such a way as to be mixed and averaged with the batch. Preferably the new material is introduced in a continuous stream into the chamber, and material in an averaged condition may be continuously discharged from the chamber.

Other and further objects, features and advantages of the present invention will be apparent from the following detailed description of a preferred embodiment of the invention taken in conjunction with the accompanying drawings, in which:

Figure 1 is a plan view of a mulling machine constructed in accordance with the present invention;

Figure 2 is a side elevational view of the structure of Figure 1, with certain parts broken away and in section, taken along the line II—II of Figure 1;

Figure 3 is an elevational view of the chute which is mounted on the crosshead for introducing sand behind the inside plow of the muller and for introducing slurry on top of the sand;

Figure 4 is a fragmentary side elevational view of the adjustable discharge port for the muller of Figure 1; and

Figure 5 is a fragmentary cross sectional view taken substantially along the line V—V of Figure 1 and illustrating the manner in which the slurry pipes are connected with the slurry funnel.

As shown on the drawings:

Referring particularly to Figures 1 and 2, a mulling machine is illustrated which is particularly adapted for carrying out the method of the present invention and which embodies certain novel features of the present invention. The mulling machine, generally designated by the reference numeral **12**, comprises a base **13** supported on legs **14** and carrying a substantially cylindrical bearing support member **15**. A cylindrical shell **17** and a wear plate **19** (Figure 1) define the side and bottom walls of the mulling chamber. Arranged to fit snugly inside of the lower portion of the shell **17** are a cylindrical wear plate **21** and an arc-shaped corner member **22** disposed between the bottom wear plate **19** and the cylindrical wear plate **21**. A generally cylindrical turret sleeve **23** surrounds the bearing support member **15** and fits snugly within the central aperture in the wear plate **19**.

Rotation of the mulling apparatus is carried out through a drive shaft **24** journaled in bearings in the support member **15**, and driven at its lower end by an electric motor **25** through a gear drive **26**. At its upper end the drive shaft **24** is secured in a crosshead or turret **11**, for rotating the same. Arms **27** extend outwardly from the turret **11** to support scraper holders **29** at the lower ends of which plow members **30** are secured for rotation with the turret by means of the shaft **24**. The mulling apparatus is designed to rotate in the direction indicated by the arrow **32** in Figure 1, so that the outer plows scrape material from the side and bottom walls of the crib and direct it inwardly toward the center of the crib. The height of the scraper blades decreases progressively, so that as the material moves inwardly it is toppled over the inner ends of the blades.

Similarly, the turret **11** has means for supporting curved inner plow blades **36** which are arranged at their innermost end **36***a* to scrape material from the turret sleeve **23** and are curved to urge to the material outwardly. The blades of the plows are of a height at their outermost portion **36***b* to permit material to topple thereover as the turret rotates, thus providing a second zone in which the material is in a loose, tumbled condition.

Oppositely disposed in the crib of the machine and arranged to rotate with the turret **11** is a pair of conventional muller wheels **40**. The muller wheels are rotatably mounted on axles **42** which are carried in sleeves **41***b* at the outer ends of support arms **41**. The support arms have sleeves **41***a* at their inner ends pivotally carried by the turret **11**, and have inwardly projecting limit arms **44** which are designed to limit the downward pivoting of the muller wheels.

In accordance with the present invention, dry sand is fed in a continuous stream to the chute **50** by means of a continuously operating conveyor **51**. From the chute

50 sand flows through the conduits 52 and 53 and is deposited just behind the inside plows 36, as will be seen from Figure 1. The clay slurry bonding material is delivered to an outer annular trough 55 by means of a pipe 56 and flows through pipes 58 and 59 to be deposited on top of the dry sand. It will be understood that the slurry may likewise be continuously delivered through the pipe 56, and the rate of delivery may be proportioned to the rate of delivery of sand by means of the conveyor 51, either manually or automatically. The details of the construction of the chute 50 and trough 55 are illustrated in Figure 5, the bottom plate 60 serving for both chute 50 and trough 55, with a first annular plate 50*a* defining the chute side wall and a second annular plate 55*a* defining the outer wall of the trough.

Referring to Figure 2, it will be observed that the chute 50 and trough 55 are carried axially of the turret 11 and are supported by means of a pair of mounting bars 61 and 62 which have right-angle attachment flanges 63 and 64 at the upper ends secured to diametrically opposite portions of the bottom wall 60 of the material delivery chute 50 by means of bolts such as 65. At the lower ends of the support bars 61 and 62 are right angle flanges 67 and 68 extending inwardly from the lower margins of the bars to underlie the respective limit arms 44 of the muller wheels. The flanges 67 and 68 are secured to the turret 11 by means of bolts such as 70. The abutment faces of 44*a* of the limit arms 44 therefore abut the foot flanges 67 and 68 or any shim plates built up on top thereof which may be secured to the turret 11 by means of the same bolts as secure flanges 67 and 68.

The material in the mixer is maintained at a level which is approximately 10% of the diameter of the basin above the wear plate 19. Thus, for example, with the muller basin having an inside diameter of 9 ft. 3 inches, the material would reach a height above the wear plate of approximately one foot. For discharging material from the basin, a discharge opening 80 is provided in the side wall whose height above the wear plate 19 is controlled by means of an adjustable plate 81 which, as indicated in Figure 4, has a pair of vertical slots 81*a* and 81*b* receiving bolts 82 for vertical adjustment of the position of the plate 81. The top edge 81*c* is preferably just above the level of the material in the muller so that as the plows pass the opening 80, part of the sand is swept through the opening and thus discharged to a conveyor belt or the like (not shown) below the discharge chute 84.

The operation of the machine will now be readily apparent. Dry sand is fed in a continuous stream to the chute 50 by means of the continuously operating conveyor means 51. This sand flows through the conduits 52 and 53 and is deposited just behind the inside plows 36 of the muller. At the same time the clay bonding material is introduced as a slurry from pipe 56 into the trough 55 and from the trough through the pipes 58 and 59 to be deposited on top of the dry sand.

Thus, a windrow of dry sand is constantly deposited on the wear plate 19 of the mixer just behind the inside plows 36 and inside of the track of the muller wheels 40. The clay bonding material is deposited on top of this dry sand. As the moving elements of the mixer revolve, the outside plows 30 sweep partially prepared sand over on top of the windrow of dry sand on which the clay slurry has been deposited. Thereafter, the inside plows sweep

the mixture out into the muller track where it is kneaded and mulled. The sand is constantly divided by the plows and remixed with other parts of the batch and the incoming sand works its way from the center of the mixer to the outside circumference and from the bottom of the mixer to the top of the mass of sand. As the sand reaches the top, the moving elements of the mixer sweep part of the sand through the discharge opening 80 as they travel thereby to discharge the material to a conveyor belt or the like below.

By the above procedure, material entering the muller is immediately mixed with other material which is well along in the mixing and mulling process, and as a result the properties of the entire batch are averaged. The degree of averaging as well as the degree of work performed on the material is determined by the ratio of the flow of the material through the machine to the amount of material in the machine.

It will be understood that modifications with variations may be effected without departing from the scope of the novel concepts of the present invention.

I claim as my invention:

1. A mulling machine comprising a mulling basin, cross-head means rotatable in said basin, muller wheels, means carried by said cross-head means mounting said muller wheels for pivotal movement in a vertical plane, limit arms carried by said mounting means and overlying said cross-head means to limit downward pivoting of said muller wheels, and a material supply chute disposed above said cross-head means and having mounting legs with offset flanges at the lower ends thereof secured to said cross-head means and underlying said limit arms.

2. An attachment for a mulling machine comprising a circular bottom plate, concentric annular plate members secured edgewise on said bottom plate to define an inner chute and an outer trough, conduit means communicating with said chute and depending therefrom, further conduit means communicating with said trough and depending therefrom, and mounting legs secured to said bottom plate and depending therefrom for attachment to the cross-head of the mulling machine.

3. An attachment adapted to be mounted upon the cross-head of a mulling machine comprising a bottom plate member, spaced members secured to said plate for defining a chute and a trough, conduit means communicating with said chute and depending therefrom, additional conduit means communicating with said trough and depending therefrom, and mounting legs secured to said bottom plate and depending therefrom for attachment to said crosshead.

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