Sept. 24, 1929. G. F. ROYER 1,729,361

APPARATUS FOR PREPARING MOLDERS SAND

Filed May 12, 1928 2 Sheets-Sheet 1

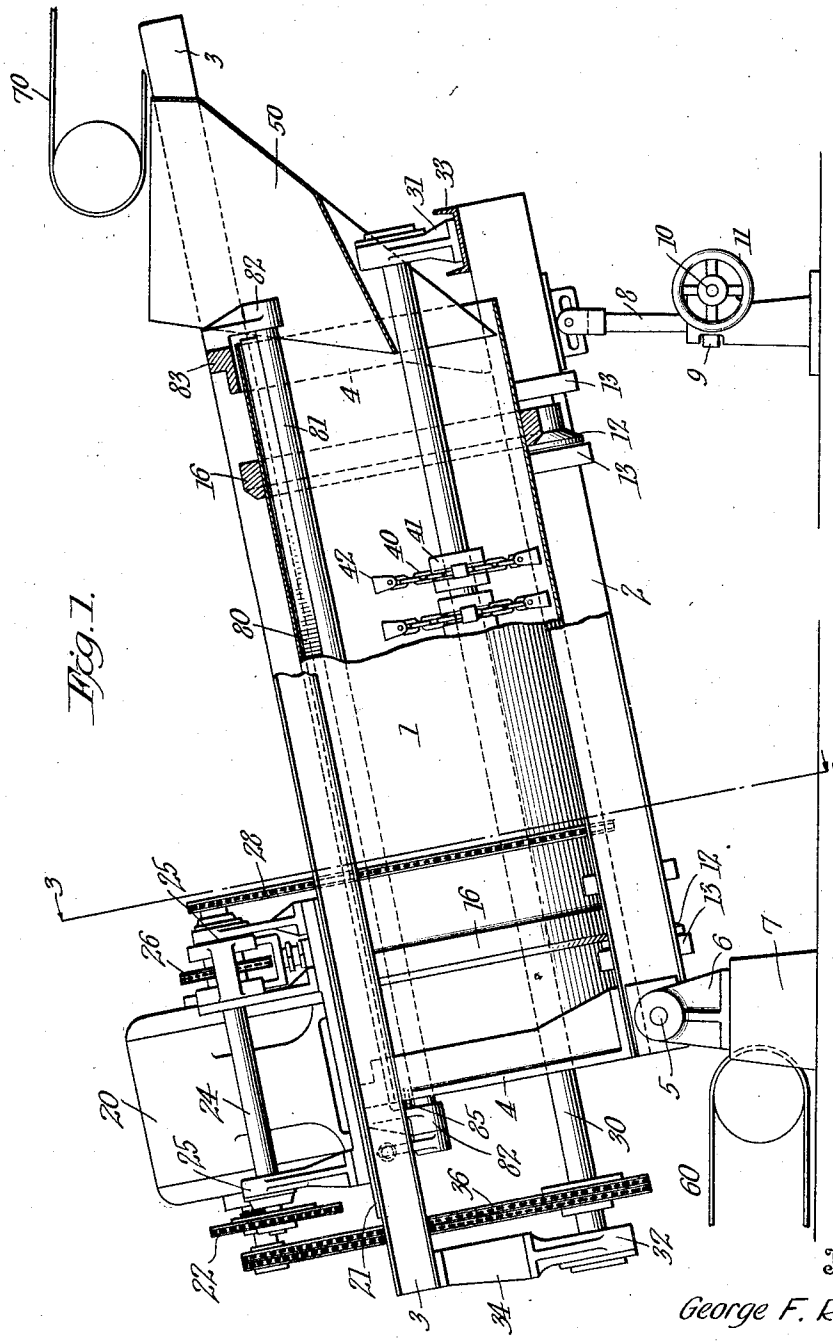


Fig. 1.

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Fig. 2.

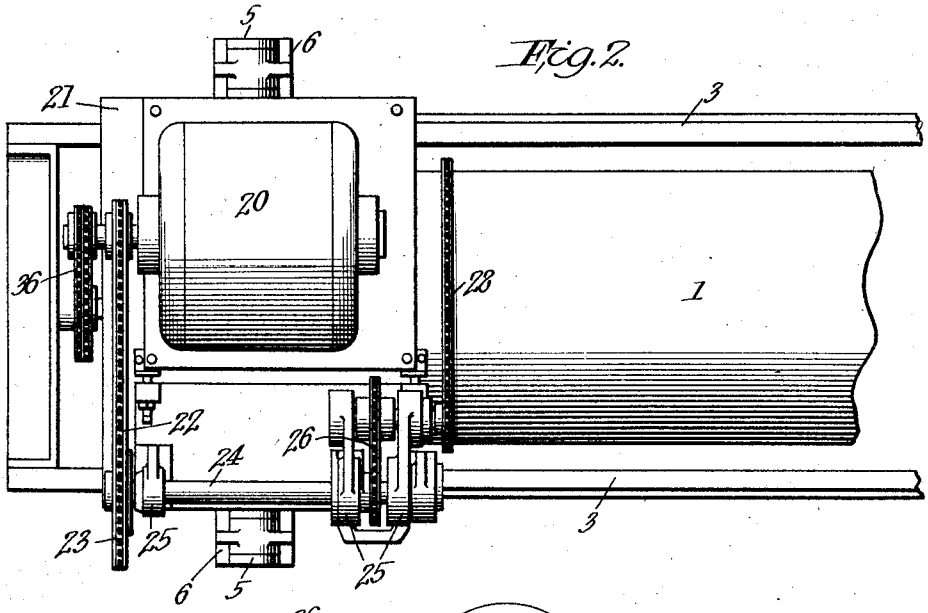
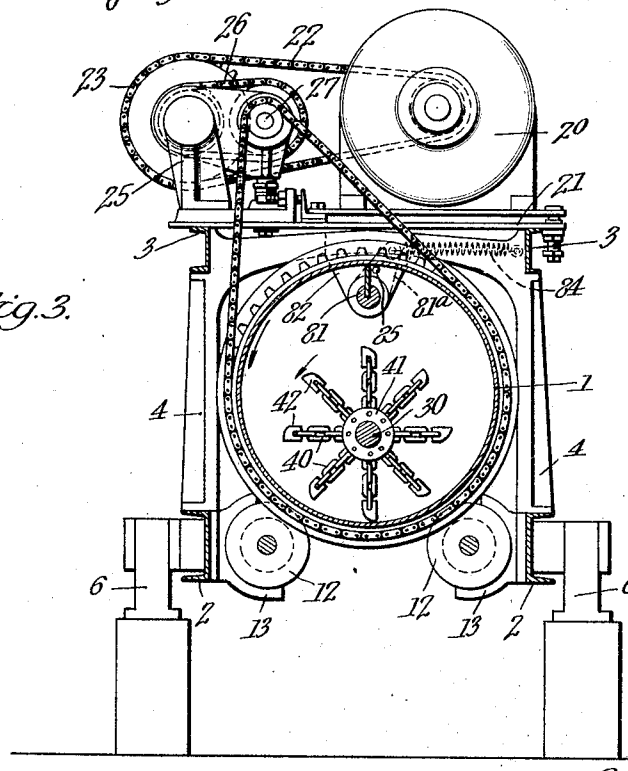


Fig. 3.



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UNITED STATES PATENT OFFICE

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APPARATUS FOR PREPARING MOLDER'S SAND

Application filed May 12, 1928. Serial No. 277,263.

The present invention relates to an apparatus for preparing molding sand or the material from which molds commonly employed for shaping fluid metal are composed. Such material, while commonly termed "sand", necessarily includes other substances than silicon granules, such additional substances being employed to provide the bond or connection between the silicon granules, that is necessary to enable the material to be given the desired form and retain the same while the body of fluid metal therein is solidifying.

Such "sand" is composed of a suitable mixture of silicon granules of various sizes and other ingredients, such as clay or loam, and in some instances, certain oils, commonly known as core oils, flour paste or other plastic substance which will provide the necessary binder for retaining the silicon granules in the desired relation. The subject matter of the present case is an improvement upon that of an earlier application (Serial No. 18,618) and the object of the invention is to provide a means whereby the component parts of such a mixture can be thoroughly blended and coated as the materials pass in a continual stream through the casing or drum in which the mixing and blending operations are carried on.

In the drawings,

Figure 1 is an elevation and partial section of an apparatus embodying the invention.

Figure 2 is a plan of a portion of Figure 1.

Figure 3 is a vertical transverse section substantially on the line 3—3 of Figure 1.

Referring to the drawings, in the several views of which like parts are designated by the same reference character, 1 indicates an elongated drum or casing to which the material to be treated is supplied at one end and having a discharge opening at its other end.

As shown, this drum or casing is mounted in a frame comprising bottom angle iron frame members 2, and parallel upper angle iron frame members 3 which are connected by uprights 4 and by suitable transversely extending frame members.

The supporting frame and parts carried thereby are preferably mounted to rock about trunnions 5 supported in bearings 6 on ground pedestals 7, and maintained in a slightly longitudinally inclined position by elevating screws 8 positioned at opposite sides of the supporting frame adjacent the opposite end.

Each of said screws 8 is provided with a worm wheel 9 with which engages a worm on a shaft 10 that extends transversely beneath the supporting frame, and is provided at its ends with hand wheels 11, by rotating which the screws 8 may be adjusted to vary the inclination of the supporting frame and drum 1, and retain these parts in any desired inclined position.

As shown, the casing or drum 1 rests upon supporting rolls 12 journalled in bearings 13 secured to and extending inward from the lower longitudinal frame members 2.

As shown, there are two sets of such supporting rolls 12, and the drum 1 is provided with two rings or collars 16 which rest on said rolls and support the drum 1 on the frame, so that it can be freely rotated, but will be held against movement longitudinally of the supporting frame.

A motor 20 is mounted upon a base plate 21 which rests on and is connected with the top frame members 3, and this motor is suitably connected, as hereinafter described, with means for positively rotating the drum 1, and also the material agitating means within the drum.

As shown, a sprocket on the shaft of the motor is connected by a chain 22 with a sprocket 23 on a shaft 24 supported in bearings 25 rising from the base plate 21.

A second sprocket on the shaft 24 is connected by a chain 26 with a sprocket on a shaft 27 also mounted in bearings on the base plate 21, and a sprocket on the outer end of this shaft is connected, through a chain 28, with a sprocket surrounding and suitably secured to the drum 1, so that the motor will positively rotate the drum 1 about its longitudinal axis, the supporting rollers 12 permitting of such rotation with a minimum amount of power.

A shaft 30 supported in bearings 31, 32 extends longitudinally through the drum 1, and is provided within the drum with suitable

means for agitating material supplied to the drum and passing therethrough.

As shown, the bearings 31 for the shaft 30 is mounted on an angle iron cross bar 33 secured to the bottom frame members 2, while the bearing 32 is supported by an arm 34 depending from a cross bar connecting the top frame side pieces 3.

The shaft 30 is positively rotated by a sprocket chain 36 connecting a sprocket on the shaft of motor 20 with a sprocket on the shaft 30.

The material agitating means, before referred to, may be of various forms, the one illustrated comprising a plurality of relatively short chains 40, each secured at one end to collars 41 on the shaft 30 and having their other ends connected to comb-like members 42. The flexible members 40 are of such length that, when radially extended by centrifugal force from the shaft, they will not contact with the adjacent surface of the drum, but will exert a beating and combing action upon the mixture of silicon granules, clay, etc. within the drum, and owing to the shaft being, as before described, out of alignment with the axis of the drum, the particles that are carried upward by the action of the beating members will mix or commingle in the space above the shaft and beyond the path of travel of said chains, such particles repeatedly falling again into the path of the beaters. By the arrangement of parts described, the material introduced to the drum 1 through the hopper 50 will be fed longitudinally through the drum and the granular particles thoroughly mixed and coated with the clay and core oil or other coating substance.

The thoroughly blended and properly coated mixture will be discharged from the lower end of the drum 1, and, as shown, will fall upon a conveyor 60, by which it may be transported to any convenient point.

As shown, the materials to be treated may be supplied to the hopper 50 by a suitable conveyor 70.

The material treated is of such nature that it will tend to adhere to the inner surface of the rotating drum and to prevent the same from becoming caked on such drum surface, a scraping blade 80 is provided. This blade is carried by a rock shaft 81 which extends longitudinally through the drum 1 above the path of travel of the material agitating devices on the shaft 30, and is supported in bearings 82 that depend from and are supported by transverse bars connecting the upper side pieces 3 of the drum supporting frame.

A spring 84 connecting an arm 81^a at one end of the rock shaft 81, with the frame acts to hold the blade 80 in operative relation to the drum surface, such movement being limited by a stop pin 85 on one of the bearings 82. This arrangement permits the blade to yield and the shaft 81 to rock slightly in case a particle of material should be so firmly affixed to the drum as not to be removed by the scraper blade as the drum rotates. The spring will, however, immediately return the blade to operative position after any such fixed particle or mass has passed the scraping edge.

The operation and advantages of the invention will, it is believed, be readily appreciated from the foregoing description, and the drawings, but the operation will be briefly recapitulated as follows.

The motor being in operation the drum and shaft will be rotated at different speeds and the materials to be treated being supplied through the hopper 50 will be gradually moved toward the outlet and receiving conveyor 60. During their travel through the drum, the material will be thoroughly agitated by the flexible agitating means on the shaft, so that the particles thereof will be thoroughly blended and mixed and properly coated with the bonding substance.

In Figure 1 of the drawing, the parts are shown in the relations occupied when the shaft and drum are being rotated, the chains 40 being extended their maximum distance by centrifugal force. The said chains are of such length that the members at the free ends thereof will just clear or be out of contact with the lower surface of the drum, so that the agitators will revolve in the free or loose material, thus avoiding wear from contact with the drum, and effecting a thorough agitation and mixing of the material. As the particles are carried upward into the space above the shaft 30, they will be thoroughly mixed and by the action of gravity will fall repeatedly into the paths of the flexible agitators as the material moves longitudinally of the drum from the hopper 50 to the discharge outlet. The scraper 80 effectually prevents the material from becoming caked on the inner surface of the drum, and the particles dislodged therefrom will fall into the path of the agitators, as before described.

The material can be supplied in a continuous stream and the angle of the drum can be varied and the speed of the rotating parts so regulated and proportioned that a very thorough mixing and blending of the ingredients or molder's sand is effected.

It will be understood, of course, that in the drawings many of the parts are shown more or less diagrammatically, and except where specifically described in the appended claims, the invention is not intended to be limited to the exact details shown. The material can, of course, be supplied to the hopper 50 by other means than that conventionally shown, and other delivery means than the conveyor 60 can be provided.

I claim:—

1. In an apparatus for the purpose described, the combination of an elongated drum mounted in a slightly longitudinally inclined position, a shaft within and extending longitudinally of the drum out of alignment with the drum axis, a series of relatively closely arranged agitating members extending radially from the shaft and adapted as the shaft rotates to effect a stirring, rubbing action on particles of material supported by the drum, the radial distance between the shaft and top wall of the drum being considerably greater than the length of the agitating members, to provide above the shaft a space in which particles carried upward by the action of the agitating members may commingle, means in said space for intercepting movement therethrough of particles of material adhering to the drum and causing such particles to return into the paths of the agitating members, and means for rotating the shaft.

2. In an apparatus for the purpose described, the combination of a drum mounted to rotate about a substantially horizontal axis, a shaft extending through the drum in parallelism, but out of alignment, with said axis, material agitating members on the shaft within the drum, means for rotating the drum, means for rotating the shaft, and scraper like means cooperating with the inner surface of the drum for removing from said surface particles of the material being treated that are carried on said surface beyond the path of travel of the agitating members and permitting them to fall into said path.

3. In an apparatus for the purpose described, the combination of an elongated drum mounted to rotate about its longitudinal, substantially horizontal, axis, means for rotating the drum, a shaft within and extending longitudinally of the drum in planes below those of the drum axis, means projecting from the shaft for agitating material supported by the drum, and acting to carry particles of such material upward above the shaft, said particles being repeatedly returned into the paths of the agitating means, and means for rotating the shaft.

4. In an apparatus for the purpose described, the combination of an elongated drum arranged in a slightly inclined position, and adapted to rotate about its longitudinal axis, a shaft within and extending longitudinally of the drum out of alignment with the drum axis, means for rotating the drum, means for rotating the shaft, flexible material agitating means extending radially from the shaft and adapted to exert a stirring, rubbing and disintegrating action on materials supported by the drum as the shaft rotates, the radial distance between the shaft and top of the drum being greater than the length of the flexible agitating means, to provide above the shaft a space in which particles carried upward by the action of the agitating members may commingle for the purpose described.

5. In an apparatus for the purpose described, the combination of an elongated drum mounted to rotate about a longitudinal, slightly inclined, axis, a shaft within and extending longitudinally of the drum, below said axis of the drum, material agitating members attached at one end to the shaft, and projecting radially therefrom, means for rotating the drum, means for rotating the shaft, and means for preventing the material being treated from becoming fixed to the inner surface of the drum.

6. In an apparatus for the purpose described, the combination of an elongated drum adapted to be bodily adjusted about a substantially horizontal axis adjacent one end, and adapted to rotate about its longitudinal axis, means for rotating said drum, a shaft extending longitudinally within the drum, flexible means mounted on the shaft adapted to exert a disintegrating rubbing action on material within the drum as the shaft is rotated, and means for rotating the shaft.

7. In an apparatus for the purpose described, the combination of a supporting frame, an elongated drum carried by said frame and adapted to rotate about an inclined longitudinal axis, a shaft extending longitudinally through the drum out of alignment with said axis, means on the shaft for agitating material within the drum, means for rotating the drum, means for rotating the shaft, and means for adjusting the frame to vary the inclination of the drum.

8. In an apparatus for the purpose described, the combination of a supporting frame adapted to rock about a substantially horizontal axis adjacent one end, an elongated drum mounted in said frame to rotate about its longitudinal, substantially horizontal, axis, means for adjusting the frame to cause the drum to assume a longitudinally inclined position, a shaft extending longitudinally through the drum below the axis of the drum, means on the shaft for agitating material within the drum, means for rotating the drum, and means for rotating the shaft at a different speed than the drum.

9. In an apparatus for the purpose described, the combination of an elongated drum, means for rotating the drum about its longitudinal, substanially horizontal, axis, a shaft within the drum below the longitudinal axis of the drum, means for rotating the shaft, means on the shaft for agitating material within the drum, a rock shaft supported independently of the drum and shaft and positioned in the drum above the path of travel of the agitating means,

and a scraper on said shaft for removing from the inner surface of the drum particles of material carried by the rotation of the drum above the path of travel of the agitating means.

10. In an apparatus for the purpose described, the combination of an elongated drum, means for rotating the drum about its longitudinal axis, a shaft extending through the drum below the longitudinal axis thereof, means for rotating the shaft, means on the shaft for agitating material within the drum, a rock shaft supported independently of the drum and shaft and positioned in the drum above the path of travel of the agitating means, a scraper on said shaft for removing from the inner surface of the drum particles of material carried above the path of travel of the agitating means by the rotation of the drum, and means connected with the rock shaft for yieldingly holding the scraper in operative position.

11. In an apparatus for the purpose described, the combination of an elongated drum, means for rotating the drum about its longitudinal axis, a shaft within the drum below the longitudinal axis thereof, means for rotating the shaft, means on the shaft for agitating material supported by the drum, a rock shaft supported independently of the drum and shaft and positioned in the drum above the path of travel of the agitating means, a scraper on said shaft for removing from the inner surface of the drum particles of material carried above the path of travel of the agitating means by the rotation of the drum, means connected with the rock shaft acting to constantly turn the rock shaft in one direction but permitting it to turn in the opposite direction and an abutment cooperating with said means for normally holding the scraper in operative relation to the drum.

12. In an apparatus for the purpose described, the combination of a supporting frame, an elongated drum mounted in said frame to rotate about a longitudinal axis, a shaft extending through the drum and supported in bearings in the frame beyond the ends of the drum, means on the shaft for agitating material within the drum, a motor on the frame adapted to rotate both the shaft and drum, and a scraper within the drum supported by the frame and adapted to scrape from the inner surface of the drum material adhering thereto at points about the path of travel of the agitating means.

In testimony whereof I have hereunto set my hand.

GEORGE F. ROYER.