Dec. 15, 1931. H. A. MULVANY 1,836,272

METHOD AND APPARATUS FOR PROJECTING COMMINUTED MATERIALS

Filed Nov. 16, 1927 2 Sheets-Sheet 1

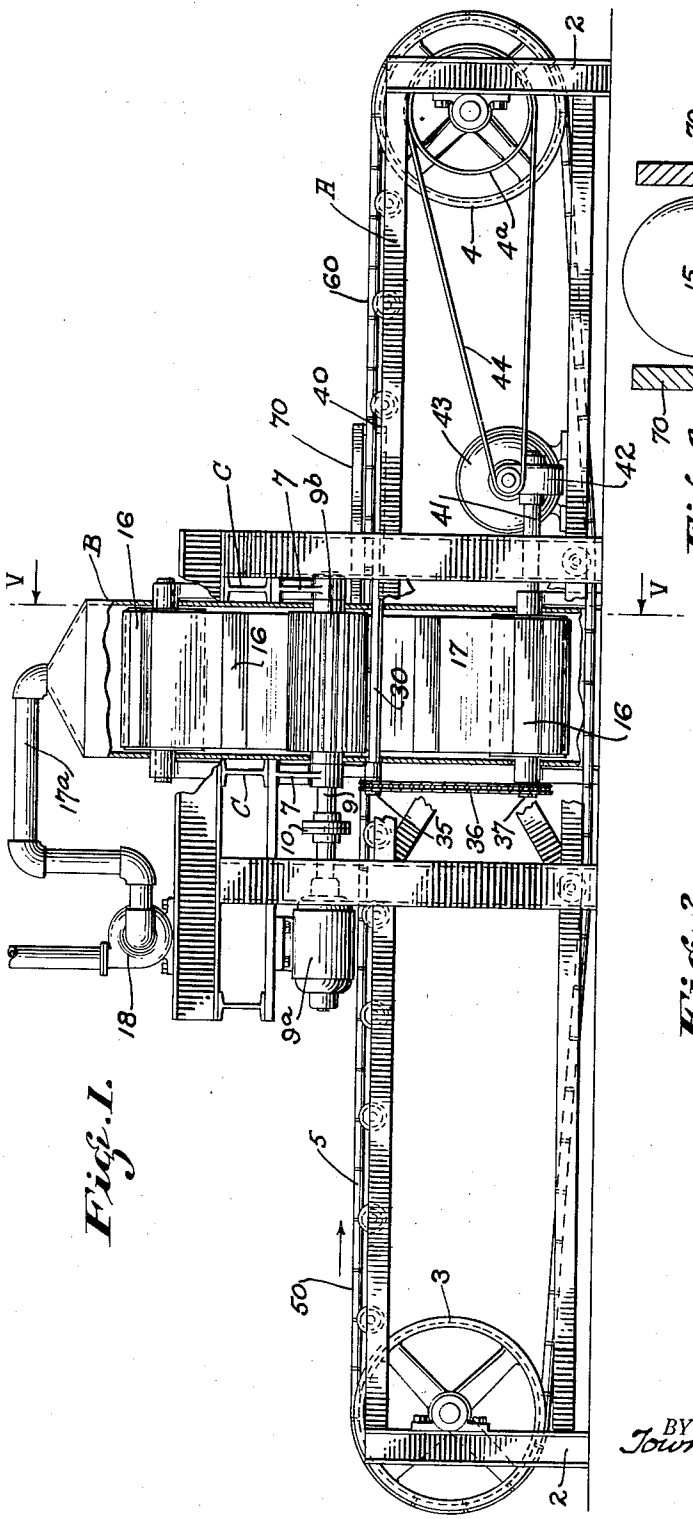


Fig. 1.

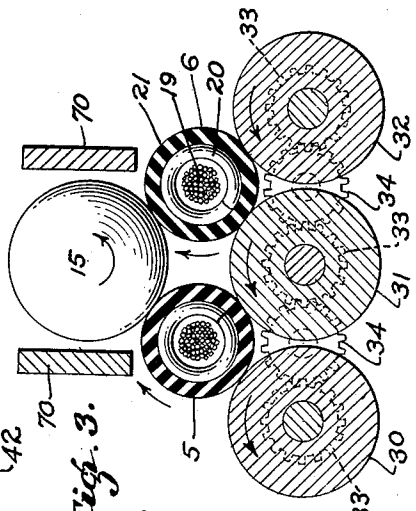


Fig. 3.

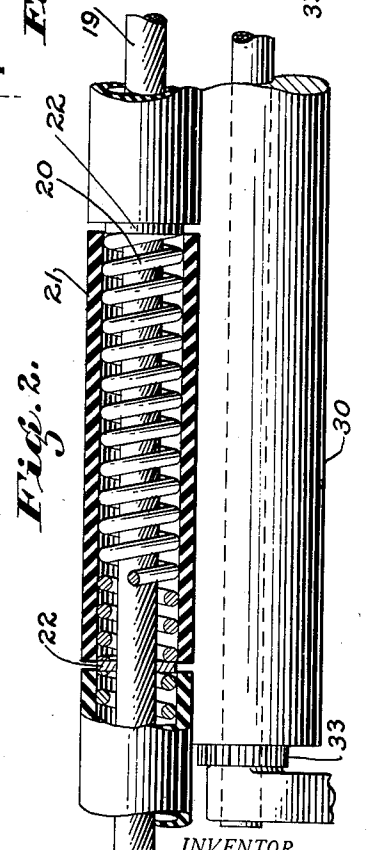


Fig. 2.

INVENTOR.
Harry A. Mulvany.
BY
Townsend, Loftus & Abbett
ATTORNEYS.

Dec. 15, 1931. H. A. MULVANY 1,836,272

METHOD AND APPARATUS FOR PROJECTING COMMINUTED MATERIALS

Filed Nov. 16, 1927 2 Sheets-Sheet 2

Fig. 5.

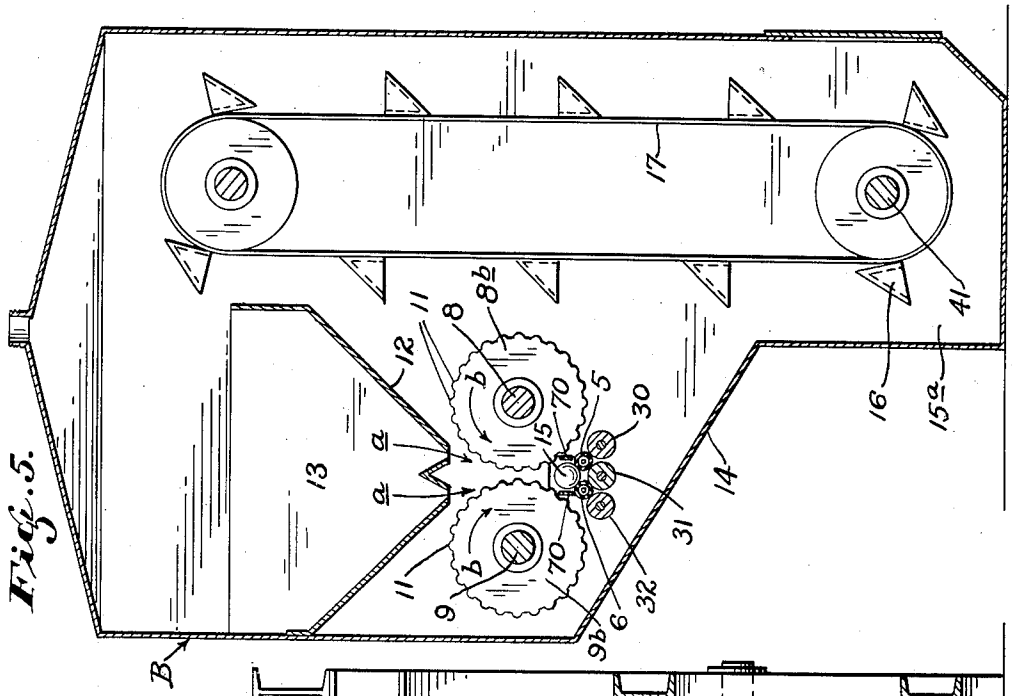
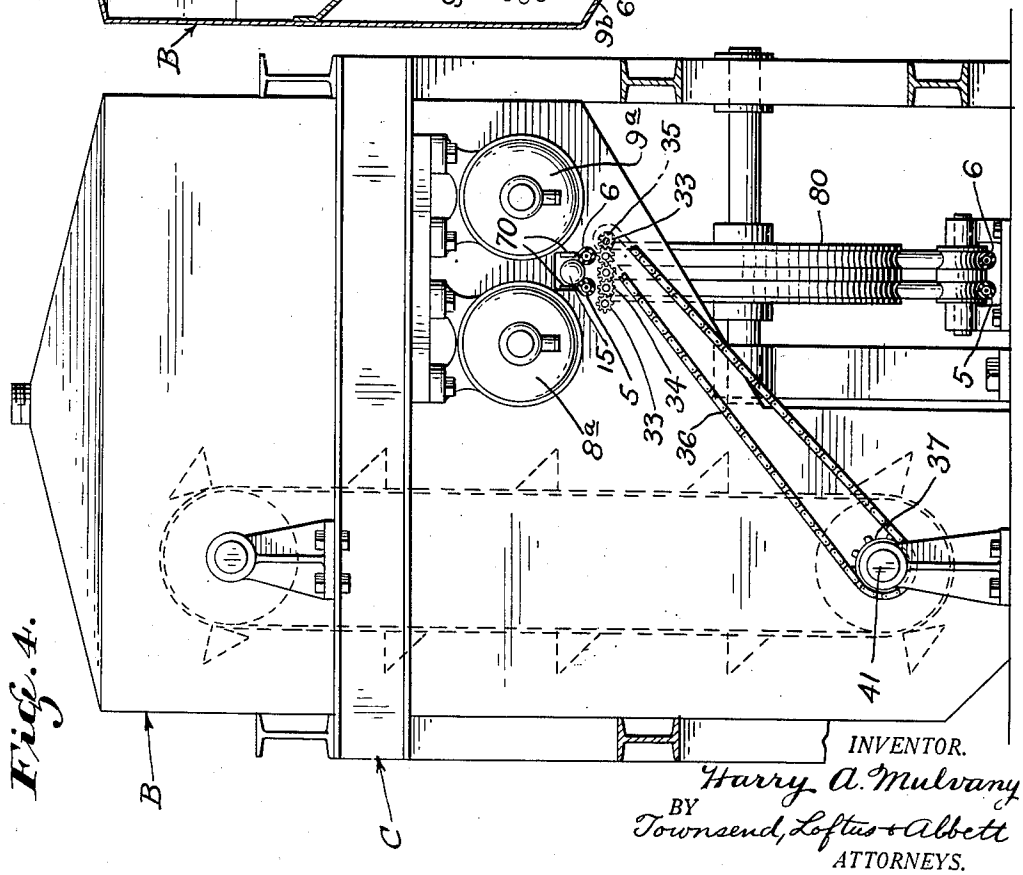


Fig. 4.



INVENTOR.
Harry A. Mulvany
BY
Townsend, Loftus & Abbett
ATTORNEYS.

Patented Dec. 15, 1931 1,836,272

UNITED STATES PATENT OFFICE

HARRY A. MULVANY, OF BERKELEY, CALIFORNIA

METHOD AND APPARATUS FOR PROJECTING COMMINUTED MATERIALS

Application filed November 16, 1927. Serial No. 233,726.

This invention relates to a method and apparatus for projecting comminuted materials such as sand, ground abrasive materials, etc.

Sand and other materials are extensively employed as abrasives for cleaning the stone facing of buildings; in the metal arts for cleaning or smoothing metal castings and other metal objects; in the glass and other industries for imparting a dull surface to numerous articles; and more recently its use has also been applied to food products, such as the dry cleaning of eggs by a sand blast.

In any instance, the cleaning, smoothing or dulling effect obtained is due to the abrasive action of the sand or other material employed, and the result obtained is caused either by projecting the abrasive with high velocity against the object to be treated, as by an air blast, or by forcibly rubbing the abrasive against the surface to be treated.

The most common method employed is the sand blast method. This, however, has numerous objections such as large, costly and cumbersome apparatus which requires trained and skilled operators, the horsepower consumed per square foot of area treated is excessive (the air friction and back pressure accounting for a large part of the power loss), atmospheric conditions in the immediate vicinity are not desirable due to the dust liberated, etc.

The object of the present invention is to generally improve and simplify the sand blasting method by providing means for projecting the sand or other material employed at high velocity against an object to be treated by centrifugal or impelling action and without the use of air; and further to provide a novel form of conveyor whereby the objects to be treated may be supported and rotated while subjected to the abrasive action of the sand or other material. The apparatus employed is shown by way of illustration in the accompanying drawings in which:

Fig. 1 is a side elevation of the apparatus, said side elevation being shown partly in section,

Fig. 2 is an enlarged detail sectional view of the conveyor and the rollers supporting the same,

Fig. 3 is an enlarged cross-section of the conveyor, the rollers supporting the same and the guides whereby the objects to be treated are maintained on the conveyor,

Fig. 4 is an enlarged end view of the apparatus shown in Fig. 1,

Fig. 5 is an enlarged cross-section taken on line V—V, Fig. 1.

Referring to the drawings in detail and particularly Figs. 1 and 5, A indicates a horizontally disposed frame supported at opposite ends by standards or uprights such as indicated at 2. Journaled on the uprights of the frame are pulleys 3 and 4 and supported by the pulleys is a pair of endless conveyor cables 5 and 6 which will hereinafter be described. Disposed substantially centrally of the frame is a housing generally indicated at B. Arranged at opposite sides thereof are frame members C and secured thereto are bearing members 7 in which are journalled shafts 8 and 9. Separate driving motors are employed for the shafts 8 and 9 as indicated at 8*a* and 9*a*, and these motors are coupled to the shafts 8 and 9 by flexible couplings or the like as indicated at 10. Secured on the shafts 8 and 9 are elongated rollers 8*b* and 9*b*. These rollers may be constructed of any suitable material but their faces are preferably covered with rubber and a corrugated finish is desirable as indicated at 11. These rollers rotate at a high speed and sand or a like material is delivered between the rollers in the direction of arrows *a* from one or more openings formed in the bottom portion 12 of a hopper 13. The rollers rotate in the direction of arrows *b* or towards each other and the sand is thus engaged by the corrugations or the surface of the rollers and as such is projected at high velocity downwardly between the rollers. The objects to be cleaned, for instance eggs or the like indicated at 15, are placed on the conveyors 5 and 6 and as such are subjected to the abrasive action of the sand as it is projected against the eggs under high velocity. The sand or other material employed after serving its purpose, collects on an inclined bottom section 14 formed in

the housing B from where it is delivered to a lower chamber 15*a*. The sand is here picked up by the buckets 16 of an endless conveyor 17 and as such is redeposited in the hopper 13 for re-use. The upper end of the housing is connected through a pipe 17*a* with the suction side of a blower 18 and any dust which is formed is thus automatically and continuously carried away from the housing.

The endless conveyors 5 and 6 are best illustrated in Figs. 2 and 3 and as they are both identical in construction, the description of one will suffice. The conveyor consists of an endless steel cable 19. Surrounding the endless cable is a plurality of comparatively short sections of helical spring wire 20 and covering each helical section is a rubber sleeve or tube 21. Any number of sections may be employed so as to provide sufficient resiliency when the conveyor is passing around the pulleys 3 and 4, and each section is separated by a washer or the like indicated at 22. The cable 19 serves two functions, first that of a support, and secondary, that of a bearing member, i. e., each helical spring 20 with its rubber covering 21 is rotated about the cable at the time that the eggs pass under the projected sand and for a short period thereafter as it is desirable to inspect the eggs after they leave the sander or in other words pass from under the rollers 8*b* and 9*b* by which the sand is projected against the eggs. Another reason for rotating the eggs is to insure perfect cleaning of the entire surface, for instance if they should remain in a stationary position while resting on the conveyor and passing under the rollers 8*b* and 9*b*, only the top surface of each egg would be clean but if they are rotated about their longitudinal axes while subjected to the abrasive action of the sand, the entire surface will be cleaned. It is, accordingly, more or less essential to rotate the eggs several revolutions about their axes while the abrasive material is being projected thereon. The cable 19 as previously stated serves as a bearing and a support, while the helical springs 20 serve as bearing bushings and a support for the rubber sleeves or coverings 21, i. e., the spiral springs are comparatively free with relation to the cable and as such may rotate about the same. The period of rotation is only necessary while the eggs pass under the rolls 8*b* and 9*b* and for a short time thereafter and this rotation is imparted to each section during this period by means of a plurality of rollers generally indicated at 30, 31 and 32. These rollers are secured on shafts as shown in Fig. 3 and one end of each shaft is provided with a gear as shown at 33. These gears intermesh with the intermediate gears 34 and the outermost shaft is provided with a sprocket gear 35 (see Fig. 1) which is driven by a chain 36 from a driving sprocket 37. With this drive the rollers 30, 31 and 32 will rotate in the same direction as indicated by the arrows and the rubber sleeve sections 21 will also rotate in the same direction as indicated by the arrows but in a direction opposite to the rollers 30, 31 and 32; as the eggs or other objects to be sanded are supported by the conveyors 5 and 6 which are surrounded by the sectional rubber tube or sleeve sections 21 it is obvious that each egg will rotate in the direction of the arrow (see Fig 3), this being important as it insures a thorough cleaning of the entire egg surface. The rollers 30, 31 and 32 extend to the point indicated at 40 (see Fig. 1) and the eggs may thus be thoroughly inspected before they are removed from the machine. The sprocket 37 is secured on a shaft 41. This is driven through a suitable gear reduction 42 which in turn is driven by a motor 43. This motor is also provided with a belt drive 44 and motion is thus imparted to the conveyor members 5 and 6 as the belt drives a pulley 4*a* which cooperates with the pulley 4. The shaft 41 extends completely through the housing and as such also forms the drive shaft of the elevator 17 shown in Fig. 5. There are three driving motors employed, the motor shown at 43 serving the function of driving the endless conveyors 5 and 6, the sand elevator 17, and the rollers 30, 31 and 32, as these are driven from the shaft 41 through the sprocket chain drive indicated at 36. The other motors are indicated at 8*a* and 9*a*. These are directly coupled to the shafts 8 and 9 and the shafts and sand projecting rollers are thus driven independently of any other driving mechanism so that a high speed may be insured and the proper velocity transmitted to the sand or other abrasive employed. The eggs or other objects to be cleaned are placed on the conveyors at the point indicated at 50 in any suitable manner. They are sanded while passing under the rollers 8 and 9, and, as previously stated, rotated about their longitudinal axes during this period and they continue to rotate until they reach the point 40, being thereafter removed at the point 60 in any suitable manner. Guide bars such as shown at 70 extend from end to end of the housing so as to guide the eggs and prevent accidental removal while they are being subjected to the abrasive action of the sand, in fact these guide bars are preferably extended to the point 40 so that breakage of individual eggs by rolling off the conveyor members 5 and 6 may be entirely avoided. This danger is entirely eliminated after rotation of the eggs stops and it is for this reason that the guide members terminate at the point 40. The pulleys 3 and 4 may be individual pulleys or they may be double-groove pulleys as shown at 80 (see Fig. 4).

By constructing a sanding machine as described it is possible to project sand at practically any velocity desired without the use of an air blast or the like. This is desirable as

it reduces dust conditions; it reduces the horse-power required per square foot of area treated or cleaned; it simplifies the mechanism and materially reduces the size and space occupied. The mechanism is simple and skilled operators can accordingly be entirely dispensed with.

While certain features of the present invention are more or less specifically described, I wish it understood that various changes may be resorted to within the scope of the appended claims; similarly, that the materials and finishes of the several parts employed may be such as the manufacturer may decide or varying conditions or uses may demand.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:—

1. An apparatus for projecting a comminuted material, comprising a pair of parallelly arranged elongated interspaced rollers, said rollers presenting a corrugated resilient surface with the corrugations running longitudinally of the rollers and the corrugations being shallow, means for rotating the rolls at a high speed in directions opposite to each other so that the surface of the rolls will move towards each other on one side and away from each other on the opposite side, and means for delivering the material to be projected on the side where the roller surfaces move towards each other so that the material will be engaged by the surfaces and corrugations of the rolls and projected at the point where the surfaces and corrugations of the rolls rotate away from each other.

2. An apparatus for projecting comminuted material comprising a pair of parallelly arranged closely spaced rotors, closely spaced resilient projections formed on the surface of each roller and extending from end to end thereof, means for rotating the rotors at a high speed in a direction towards each other on one side, and means for delivering the comminuted material to be projected at a point between the rotors where it will be engaged by the projections on both rotors and projected at a point where the rotors rotate away from each other.

3. An apparatus for projecting comminuted material comprising a pair of parallelly arranged closely spaced rotors, closely spaced resilient projections formed on the surface of each roller and extending from end to end thereof said projections being radial and projecting only a short distance from the surface of the rollers, means for rotating the rotors at a high speed in a direction towards each other on one side, means for delivering the comminuted material to be projected at a point between the rotors where it will be engaged by the projections on both rotors and projected at a point where the rotors rotate away from each other, and means whereby objects to be treated will be moved through the area where the comminuted material is being projected under high velocity.

HARRY A. MULVANY.