Feb. 19, 1929. 1,702,759

S. BARBER

PROCESS AND APPARATUS FOR TUMBLING

Filed Dec. 24, 1924 3 Sheets-Sheet 1

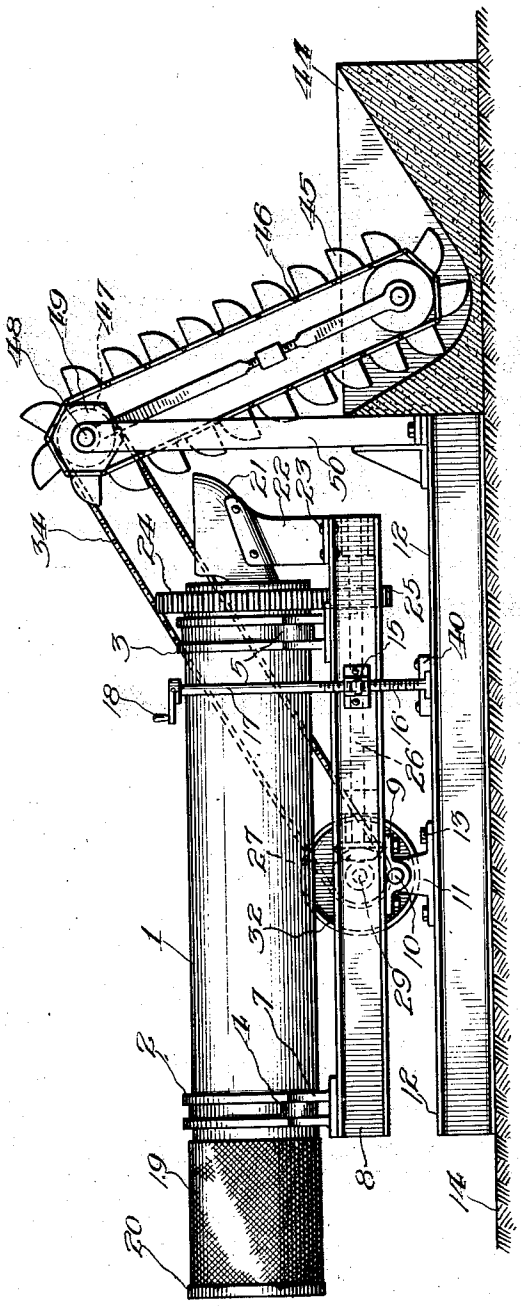


Fig. 1.

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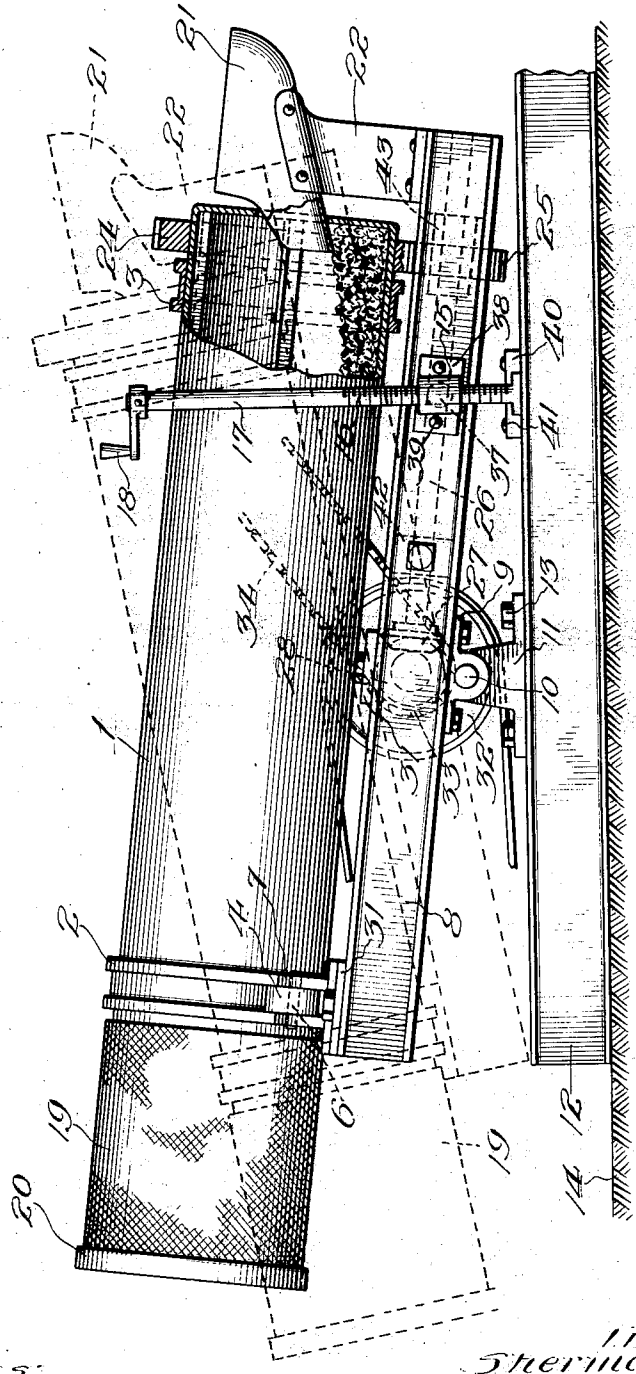


Fig. 2.

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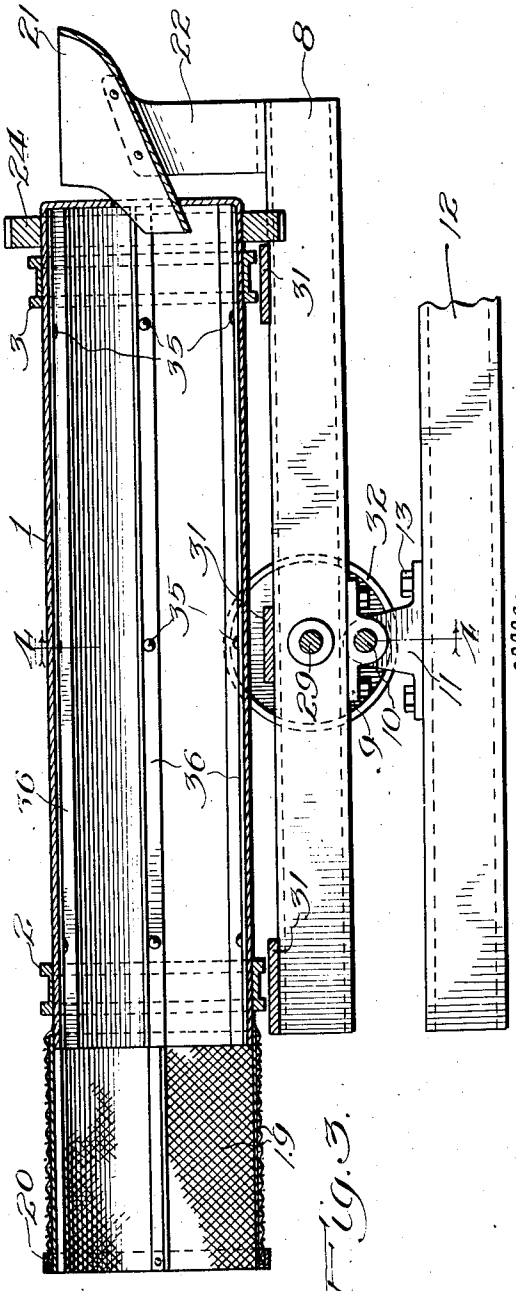


Fig. 5.

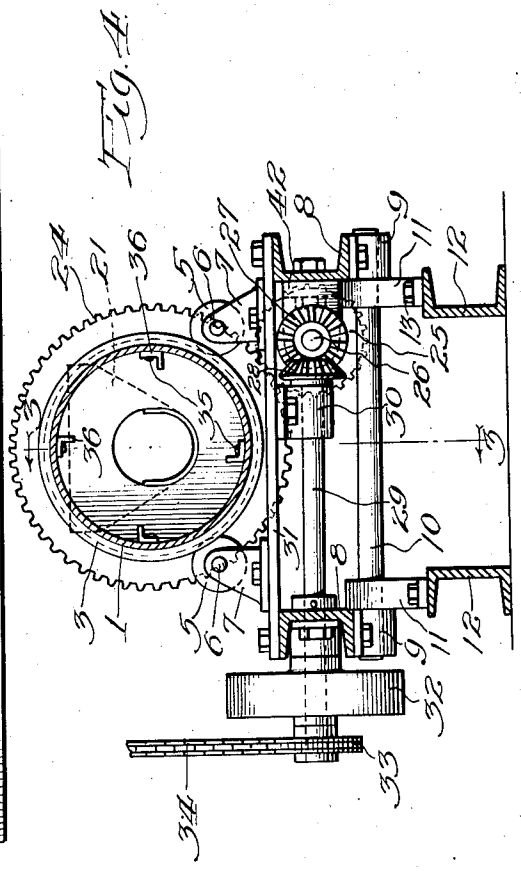


Fig. 4.

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Patented Feb. 19, 1929. 1,702,759

UNITED STATES PATENT OFFICE.

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PROCESS AND APPARATUS FOR TUMBLING.

Application filed December 24, 1924. Serial No. 757,920.

This invention relates to improvements in process and apparatus for tumbling and refers more particularly to process and apparatus designed for ready tumbling of metal articles for the purpose of burnishing or removing any foreign particles which may have become incorporated therewith in the casting of same, and for the purpose of subjecting said articles to a pronounced agitation and tumbling action to remove burrs or uncut, rough or sharp edges. The invention is characterized by the fact that it can be operated either as a batch or as a continuous process, depending upon the character of the materials worked upon and the speed with which it is necessary to agitate them.

Briefly describing the fundamental features of the present invention, there is provided a tumbling barrel, having on one end thereof a hopper and on the other an integrally connected screen. This tumbler is supported on a pivotally mounted structure and by means of a tilting mechanism can be tilted to any desired angle from the horizontal both upward and downward. Material is adapted to be introduced into the hopper either continuously or in batches, and said tumbler is adapted to be rotated. The interior of the tumbler is preferably provided with a plurality of longitudinally extending angle irons attached to the interior of the shell functioning to carry the material upwardly for a distance, say just beyond a quarter rotation, after which the materials will fall by the force of gravity to the bottom of the tumbler, this operation being continuously repeated during the rotation of the tumbler.

In the drawings, Fig. 1 is a side elevational view of the tumbler illustrating one method of introducing materials to the hopper. Fig. 2 is an enlarged side elevational view of the tumbler, illustrating two positions of tilting from the horizontal. Fig. 3 is a longitudinal cross sectional view taken on lines 3—3 of Fig. 4. Fig. 4 is a cross sectional view taken on lines 4—4 of Fig. 3.

Referring in detail to the drawings, 1 designates as a whole a tumbler, which may comprise an elongated, cylindrical solid metal drum, which is provided exteriorly adjacent both ends with the circumferentially extending bands or guides 2 and 3, the arrangement being such that there are a set of two of each of these bands adjacent each end of the tumbler 1. The bands 2 and 3 form a track for the rollers 4 and 5, which are anchored by means of the pins 6 in the brackets 7. These brackets are fixedly mounted on the supporting structure 8, which in the present instance takes the form of longitudinally extending channel irons beneath the tumbling drum 1. Substantially centrally of their length, the channel irons are provided with a bracket 9, in which is mounted the shaft 10. Below the bracket 9 is a similar bracket 11 fixedly attached to the base 12 of the supporting structure by the bolts 13 or any other suitable form of securing members. In the present instance, the supporting base 12 takes the form of channel irons similar to the channel irons 8, said base 12 adapted to be supported or rest upon the floor 14.

Adjacent the receiving end of the tumbler, the channel iron 8 is provided with the bracket 15 interiorly screw-threaded to register with the screw threads 16 of the stem 17, which is provided at its upper end with the handle 18. The screw 17 is the mechanism utilized for tilting the tumbler, the operation of which will be hereinafter described. The tumbler 1 is provided at its discharge end with the perforated cylindrical extension 19, which preferably takes the form of a metal screen of suitable mesh, said screen being provided at its outer end with the retaining band 20. Adjacent the receiving end, the tumbler is provided with the hopper 21, supported by the upwardly extending bracket 22, which latter is secured by means of bolts, rivets, etc. 23 to the supporting channel iron 8.

Adjacent the receiving end and extending circumferentially around the periphery of the tumbling drum 1 is an enlarged gear 24 adapted to mesh with a pinion 25 mounted on shaft 26. Also keyed to this shaft is a bevel gear 27 adapted to mesh with a similar bevel gear 28 mounted on shaft 29. This shaft is provided with a suitable journal 30 fixedly connected to the cross piece 31, which cross piece 31 extends transversely of the tumbler and substantially midway of its length. There are provided similar cross braces 31 at each end below the drum on which the brackets 7 supporting the rollers are mounted. Preferably, the discharge throat of the hopper extends partly into the interior of the tumbling drum, as shown clearly in Fig. 3.

The shaft 29 has keyed thereto a pulley wheel 32 and also a sprocket 33 adapted to drive sprocket chain 34.

Extending longitudinally within and attached to the interior surface of the tumbling drum 1 by means of rivets, bolts or other suitable devices 35 are the angle irons 36. In the present instance, (see Fig. 4) four of these angle irons are shown distributed uniformly about the interior surface of the drum. The tilting screw 17 must of necessity be provided with compensating swivel mechanism for the purpose of preventing binding when the tumbler is tilted upwardly or downwardly. The bracket 15 is internally screw-threaded and on one exterior face thereof is provided with the small trunnion 37 adapted to register with the recessed plate 38 fastened to the channel iron 8 by means of rivets, bolts, etc. 39. The function of the arrangement just described is to compensate for the change of radius of the tumbler as it is tilted from the horizontal, the bracket or nut 15 adjusting itself very readily. The lower extremity of the screw 17 is anchored in the plate 40, secured by rivets, bolts, etc. 41 to the base 12, it being understood that the screw 17 is capable of free rotation therein.

The shaft 26 is provided with suitable journals 42 and 43.

Describing now a batch operation, assume that the interior of the tumbler 1 has been cleaned and all foreign matter from a previous operation discharged. The tumbler is then tilted at a desired angle upwardly from the horizontal in order that the receiving or hopper end of the tumbler is on a lower plane than the discharge end. A pre-determined amount of material to be worked upon may be introduced into the hopper 21, which material may for instance be metal stampings, having rough or sharp, badly cut edges exhibiting burrs, which may or may not contain a coating of lubricant, the use of which is well known in stamping operations, or small castings with sand particles imbedded into the surface thereof, mixed with a suitable abrasive or absorbent compound or material, such as saw-dust, brick-dust, carborundum and the like. After a pre-determined amount has been introduced to the interior, the pulley wheel 32 is rotated for instance by a motor having a connecting pulley belt, which rotates the shaft 29 and bevel gear 28, transmitting rotation to the bevel gear 27, shaft 26, pinion 25 and circumferentially extending gear 24. The speed of rotation of the tumbler can be regulated as desired. After a brief period of rotation, during which time the screen end of the tumbler is elevated upwardly on an angle from the horizontal, it may be advisable to introduce an additional charge of materials which are to be worked upon. The rotation is then continued for a pre-determined time, for instance twelve to fifteen minutes, after which, while the tumbler is still rotating, the tilting screw 17 is rotated to lower the screen end of the tumbler below the horizontal to cause a discharge thereof from the screen end. The particles of the abrasive or absorbent compound, as well as the minute particles of scale and imperfectly formed, undersized slugs of material, will drop through the meshes of the screen, thereby automatically separating from the perfect pieces of metal. These perfect pieces of metal are then discharged at the extreme discharge end of the screen, which of course is open, and may be collected in any suitable form of collecting means. During the rotation of the tumbler, the angle irons 36 have served to carry the material up to a point where it drops off, thus resulting in a pronounced agitation.

Describing now a continuous operation, the materials to be worked upon, mixed with the abrasive or absorbent compound, are dumped into a pit 44, from which they are carried upwardly in the buckets 45 attached to the traveling conveyor 46, which may take the form of a series of flat connected links riding over the hexagonal drum 47 mounted on shaft 48. Keyed on the shaft 48, for instance intermediate its length or externally of the drum 47, is a sprocket wheel 49 adapted to mesh with the sprocket chain 34, which receives its rotating motion from the shaft 29 and sprocket 33, as heretofore described. The entire endless conveyor may be supported in the upright support 50, which itself is supported on the channel iron 12. The endless conveyor itself is of standard construction and requires no further detailed explanation, as the particular construction of conveyor forms no part of the present invention. The buckets 45 discharge continuously into the hopper 21 and thence into the interior of the drum 1, said drum being continuously rotated. The angle of inclination of the screen end of the drum 1 during a continuous operation is usually slightly above the horizontal, but not at enough of an angle to interfere with the continuous introduction of the material to be worked upon. The finished material will gradually work toward the discharge end of the tumbler and be discharged and separated automatically in the same way as in a batch operation.

The process and apparatus involved in the present invention is very flexible in operation and the angle of inclination may be readily adjusted to treat materials which require very little working, as well as materials which require extensive treating, and including the entire range between the two. In operation, the invention has been found to produce very satisfactory results, and the automatic separation of the finished product from imperfect parts and absorbent and abrasive material has been found very practical.

Where in certain cases it is desirable to separate metal particles of certain size, for

example, sorting, the screen 19 may be relatively longer than the tumbler for the purpose of automatic separation.

I claim as my invention:

1. In an apparatus for tumbling articles, the combination with a rotatable tumbling drum having charging inlet, of a screen fixedly connected to the discharge end of said drum, means for rotating said drum and screen as a unit, a movable, pivotally mounted support for the drum, mounted on a stationary support, and means for tilting said pivotally mounted support to tilt the drum, charging inlet, screen and pivotally mounted support as a unit including means for fixedly securing the structure in any tilted position and preventing accidental displacement.

2. In an apparatus for tumbling articles, the combination with a rotatable tumbling means mounted on a pivotally mounted tiltable support, of a material charging and discharging means connected to said tumbling means, means for tilting the tiltable support to any angle above or below the horizontal, said tumbling means and charging and discharging means tilting with said support as a unit, and means for rotating said drum and discharge means as a unit.

3. In an apparatus for tumbling articles, a foundation structure including a base and a supply means, a pivot support on the base, a frame pivotally mounted on the support, a tumbler rotatably mounted on the frame, a separating screen fixed on the discharge end of said tumbler, a hopper fixed on the frame and continuously projecting into the receiving end of the tumbler, means for pivoting the frame, a perpendicular support on the base, a charging conveyor on said perpendicular support and dipping into the supply means to feed the material to be treated from said means to the tumbler, and means for driving said tumbler and charging conveyor simultaneously.

SHERMAN BARBER.