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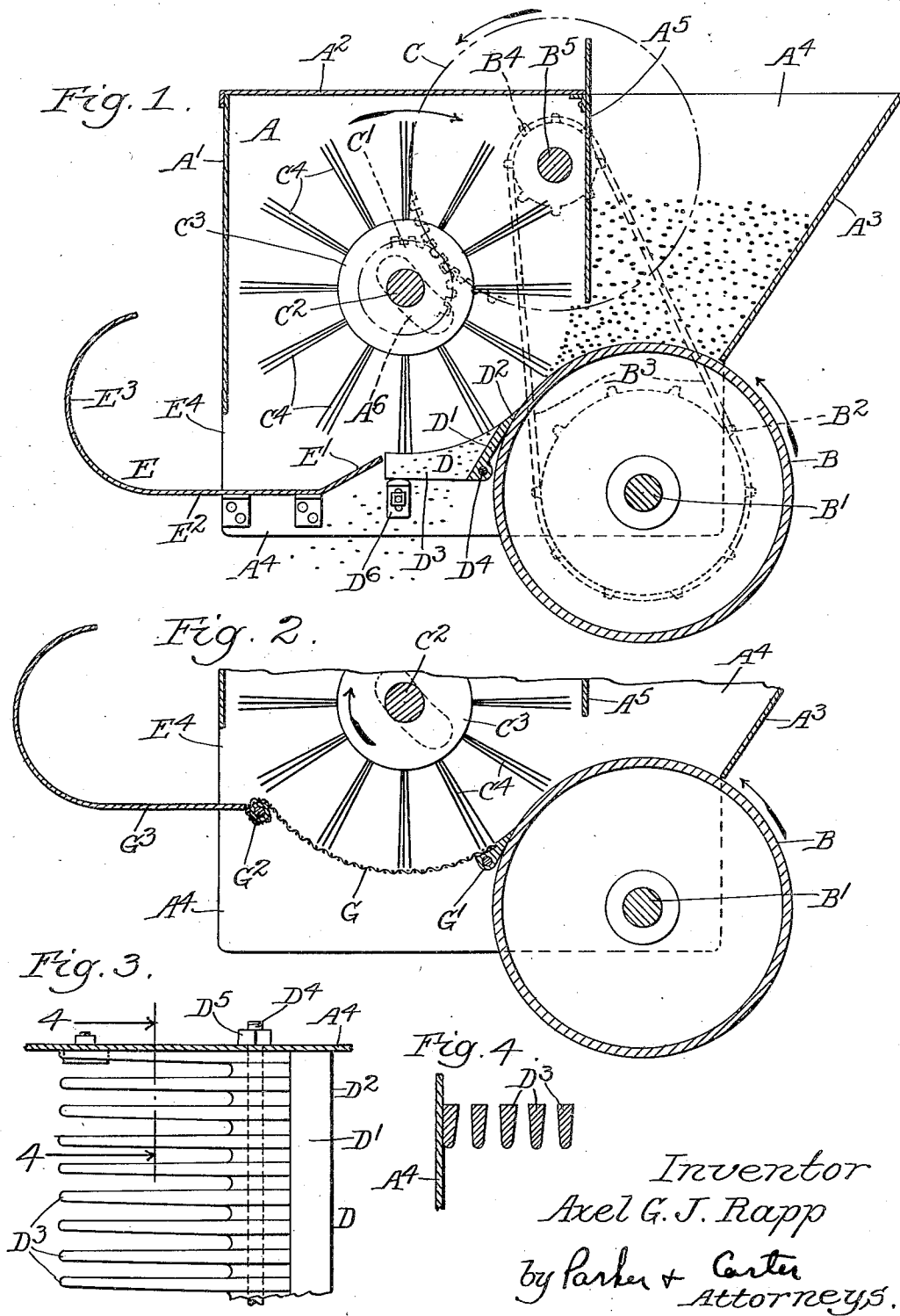
1,634,385

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SAND SEPARATOR

Filed March 15. 1926

2 Sheets-Sheet 1



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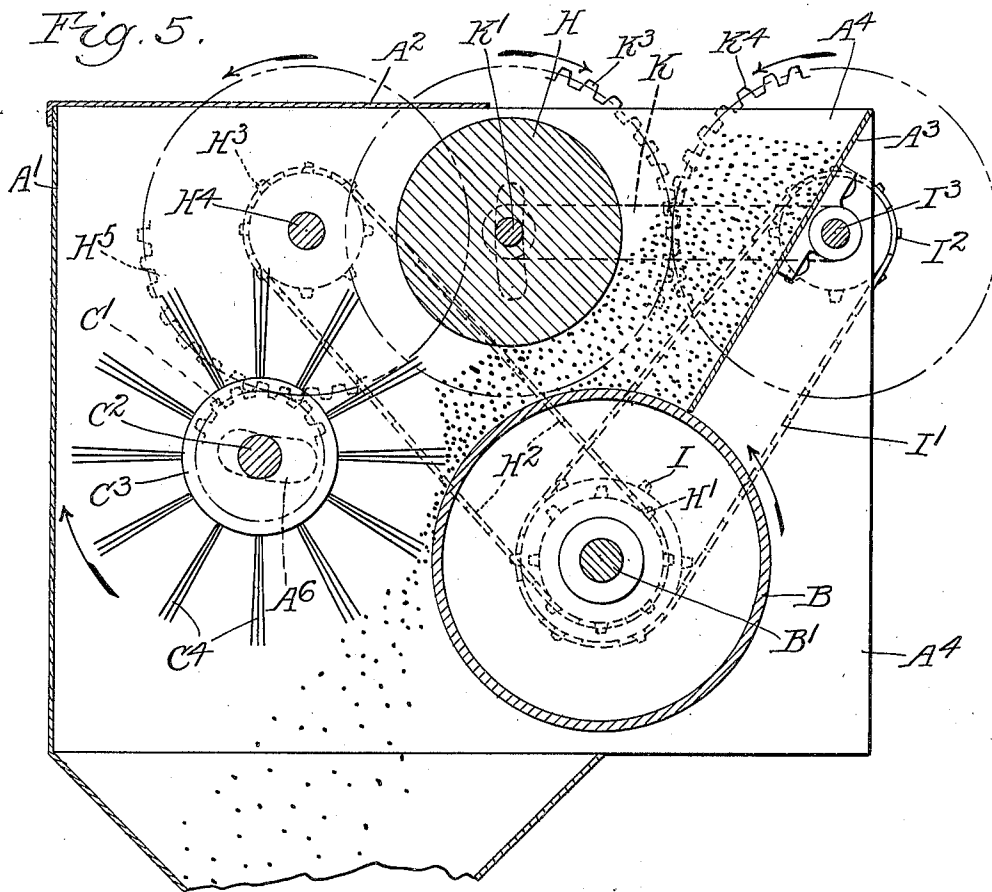
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Fig. 5.



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UNITED STATES PATENT OFFICE.

AXEL G. J. RAPP, OF CHICAGO, ILLINOIS.

SAND SEPARATOR.

Application filed March 15, 1926. Serial No. 94,708.

My invention relates to a sand beater or separator and the process carried out thereby and has for a particular purpose to separate a volume or flow of sand or other granular or pulverized or otherwise finely divided material. One object is the treatment of such material after it has become partly compacted or compressed or lumped, my apparatus and process serving to effect a complete separation of the individual particles and to deliver the material entirely free from lumps or minor aggregations. Another object is the provision of combined beating or separating and screening means. Another object is to effect the separation and removal of particles of excess size or of lumps or aggregations which are not amenable to beating. Other objects will appear from time to time in the course of the specification and claims.

I illustrate my invention more or less diagrammatically in the accompanying drawings wherein:

Figure 1 is a section through one example of my invention;

Figure 2 is a similar section of a variant form of my device;

Figure 3 is a detail plan view on an enlarged scale of separating or screening means shown in Figure 1;

Figure 4 is a section on the line 4—4 of Figure 3; and

Figure 5 is a section through a third form of my device.

Like parts are indicated by like symbols throughout the specification and drawings.

A generally indicates any suitable housing with the end wall A¹, the top closure A², the hopper end A³, the side walls A⁴ and the intermediate hopper wall A⁵.

B is any suitable drum or roller mounted on the driving shaft B¹. Mounted on the shaft B¹ is the sprocket B² about which passes the drive chain B³ extending about the smaller sprocket B⁴ on the driven shaft B⁵.

C is a gear on said shaft B⁵ in mesh with a pinion C¹ on the brush or beater shaft C². It will be understood that the shaft B¹ may be driven from any suitable power source not herein shown, the details of which form no part of the present invention. C³ is any suitable brush body or beater mounted on the shaft C² and provided with a plurality of outwardly extending beating members or bristles C⁴ of any suitable metal or material.

The shaft C² extends through arcuate slots

A⁶ in the side walls A⁴ to permit adjustment of the shaft as the brush or beating member wears.

D generally indicates a comb or screen body having the forward plate D¹ with the relatively sharp edge D² closely adjacent the outer surface of the drum B. The comb is provided with a plurality of teeth D³ associated with the forward plate D¹, the entire assemblage being connected for example by the bolt or rod D⁴ and the nut D⁵. The outer end of the teeth being supported on the adjustable brackets D⁶ which are slotted to take up wear on the edge D².

E generally indicates any suitable refuse receiving member comprising the upwardly inclined portion E¹ terminating adjacent the ends of the teeth D³ and slightly below their upper level. E² is a generally horizontal portion terminating in the upwardly recurved portion E³ exterior of the housing. The wall A¹ is cut away as at E⁴ to permit the passage therethrough of the material discharged across the comb and upon the receiving member.

Referring to Figure 2, in place of the comb illustrated in Figure 1 I employ an arcuate screening member G secured along one face to the member G¹ closely adjacent the surface of the drum B. The opposite edge is secured to the transverse member G² at the inner edge of the collect member G³.

Referring to Figure 2, in place of the comb therein disclosed I omit the inner hopper wall A⁵ and substitute therefor a roller H yieldingly opposed to the drum B. In the variant form the driving shaft B¹ is provided with a sprocket H¹ about which passes a chain H² which in turn passes about the sprocket H³ on the driven shaft H⁴. The gear H⁵ on such shaft meshes with the pinion C¹ on the brush or beater shaft C².

Mounted on the shaft B¹ is an additional sprocket I about which passes the chain I¹ which in turn passes about the sprocket I² on the driven shaft I³. Mounted about said shaft or pivoted concentric with it is the arm or arms K at the opposite end of which rotates the roller H. It is driven through the gear K³ in mesh with the gear K⁴ on the shaft I³.

It will be realized that whereas I have illustrated a practical and operative device that nevertheless many changes might be made in the size, shape, number and disposition

tion of parts without departing from the spirit of my invention and I therefore wish my drawings and description to be taken as in a broad sense illustrative or diagrammatic rather than as limiting me to my specific description.

The use and operation of my invention are as follows:

I provide a means for and method of breaking up finely divided material which has become compacted or lumped and which it is desired to return to its original finely divided uncompact condition. A practical application of my invention is to the re-conditioning of foundry sand, for example of sand which has been used in molding and which has in the course of its use become compacted or hardened or bonded into lumps. However I do not wish to be limited to any specific application or use since it will be realized that my method and apparatus are adaptable to a variety of uses.

In the operation of the form of my invention shown in Figure 1 the material operated upon may be poured into the hopper formed in part by the walls A³ and A⁵, the hopper being closed at the bottom by the roll B. The roll is rotated in counter-clockwise direction at a relatively low rate and conveys the sand to the left toward the beater member. I do not wish to be limited to any particular speed of revolution but in practice the roll or drum B might rotate at the rate of 10 R. P. M. whereas the beater might be rotated at from 400 to 1000 R. P. M. As the roll relatively slowly conveys the amount of material toward the beater the rapidly moving end of the individual beater members flick against the advancing sand mass and break up and scatter the lumps and reduce the material to its original finely divided condition. The particles thus swept or beaten from the surface of the advancing mass pass between the fingers D³ of the comb D and are received in any suitable manner for storage, conveying or use. The oversize particles or the lumps, if any, which resist treatment, or such large masses of metal or foreign material as may be in the mass pass over the comb and are swept by the beater members into the member E, the outer edge of which E³ forms an exterior receiving pocket which may be embedded at intervals.

Referring to Figure 2 I illustrate a variation of my device particularly adaptable to unscreened material. In the place of a comb I employ an arcuate screen member G through which the finely or separated material passes, while the member G³ receives the over-size.

Referring to Figure 5 I employ in the place of the interior hopper wall A⁵ a weighted roll or drum H which more or less grinds or compacts the material being

treated. If desired the peripheral speed of rotation of the roll H may be identical with that of the roll B. However, in order to obtain a rolling or grinding action in the place of a direct compacting action, the speed of the two drums may be varied. The weighted drum, rotated upon a pivot arm or arms, conforms to the material passing therebeneath. In the form of the device shown in Figure 5 I do not indicate a comb or screen and it will be realized that in this form, as in the forms of the preceding drawings, either a comb or a screen or any other suitable separating means may be employed, or, under some circumstances, for example with the treatment of pre-screened material, screening or separating means may be eliminated and the material may be discharged directly by the beater through the open bottom of the housing.

I claim:

1. A material separating mechanism including a beating member, feeding means for feeding the material to be separated into the path of movement of such beater, and separating means, positioned in the line of discharge of the material delivered by such beating member, adapted to separate out the oversize and discharge means, adapted to permit the discharge from the beating zone of such oversize material.

2. A material separating mechanism comprising a rotary beater and means for driving it, a feed roll the diameter of which is substantially as great as the diameter of the beater, and means for delivering material to the upper surface of said feed roll, and means for rotating said feed roll to bring such material into the zone of rotation of such beater, the axis of the feed roll being substantially below that of the beater, the effective zone of the beater overlying the upper conveying surface of the roll.

3. A material separating mechanism comprising a rotary beater and means for driving it, the beater including a plurality of relatively stiff bristles, and means for moving generally continuously and progressively into the path of said bristles a body of the material to be separated.

4. In a mechanism for separating particles of finely divided material, a beater and means for rotating it, said beater comprising a plurality of beater elements of relatively small cross section, means for moving into the path of said beater a generally continuous and slow moving mass of the material to be separated, the forward face of said mass being directly exposed to said beater as the material is advanced.

5. In a mechanism for separating particles of finely divided material, a beater, and means for rotating it, means for moving into the path of said beater a generally continuous and slow moving mass of the material to

be separated, the forward face of said mass being directly exposed to said beater as the material is advanced.

6. In a mechanism for separating particles of finely divided material, a beater and means for rotating it about a horizontal axis, a material receiving hopper adjacent said beater, a feed roller closing the bottom of said hopper, and extending closely adjacent the path of said beater, and means for rotating said roller at a relatively slow rate of rotation, in relation to the rate of rotation of the beater.

7. In a mechanism for separating particles of finely divided material, a beater and means for rotating it about a horizontal axis, a material receiving hopper adjacent said beater, a feed roller closing the bottom of said hopper, and extending closely adjacent the path of said beater, and means for rotating said roller at a relatively slow rate of rotation, in relation to the rate of rotation of the beater, the beater partially overlying the feed roller.

8. In a mechanism for separating particles of finely divided material, a beater and means for rotating it about a horizontal axis, a material receiving hopper adjacent said beater, a feeding means closing the bottom of said hopper and extending closely adjacent the path of said beater, and means for moving said feeding means forwardly toward said beater at a relatively low rate in relation to the rate of movement of the beater.

9. The method of separating particles of finely divided material, which includes maintaining a relatively compacted mass of such material, conveying such material forwardly into a beating zone and flicking off from the surface of the forwardly advancing mass the individual particles to be separated.

10. The method of separating particles of finely divided material, which includes maintaining a relatively compacted mass of such material, conveying such material forwardly into a beating zone and flicking off from the surface of the forwardly advancing mass the individual particles to be separated, and screening the oversize from the discharge so effected.

11. A material separating mechanism including a hopper, a closed surfaced conveying member adapted to close the bottom of said hopper, a rotary beater, positioned to overlie said conveying member and provided with a plurality of beating members of relatively small cross-section, said hopper being provided with a discharge opening adapted to permit the escape of material being fed by said feeding conveyor, the beater member being positioned adjacent said discharge

opening, and means for actuating said conveying member to convey the material received thereon toward and through the discharge opening and into the path described by the beating member.

12. A material separating mechanism including a hopper, a closed surfaced roll member adapted to close the bottom of said hopper, a rotary beater positioned to overlie a portion of said roll and provided with a plurality of beating members of relatively small cross-section, said hopper being provided with a discharge opening adapted to permit the escape of material being fed by said roll, the beating member being positioned adjacent said discharge opening, and means for rotating said roll to convey the material supported thereon through said aperture and into the path of rotation of the beating members.

13. A material separating mechanism including a hopper, a closed surfaced roll member adapted to close the bottom of said hopper, and to support the material in said hopper, a second roll member adapted to overlie said roll and to direct pressure against the material fed thereto, a rotary beater positioned adjacent said rolls and provided with a plurality of beating members of relatively small cross-section, the beating member being positioned adjacent the area of discharge from between said rolls, and means for rotating said supporting roll and said beater member in opposition.

14. A material separating mechanism including a material conveying closed surfaced roll, and a beater member, the diameter of the conveying roll being sufficiently great to permit the support upon said roll of a relatively large mass of finely divided material, means for rotating said beater and means for rotating said roll to bring the material supported thereupon into the path of said beater.

15. A material separating mechanism including a material conveying closed surfaced roll, and a beater member, the diameter of the conveying roll being sufficiently great to permit the support upon said roll of a relatively large mass of finely divided material, means for rotating said beater and means for rotating said roll to bring the material supported thereupon into the path of said beater, and means for supplying to and maintaining upon the upper surface of said roll a relatively compacted mass of finely divided material.

Signed at Chicago county of Cook and State of Illinois, this 12th day of March, 1926.

AXEL G. J. RAPP.