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2,567,472

MEANS FOR CONDITIONING GRANULAR AND LIKE MATERIALS

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2 Sheets-Sheet 1

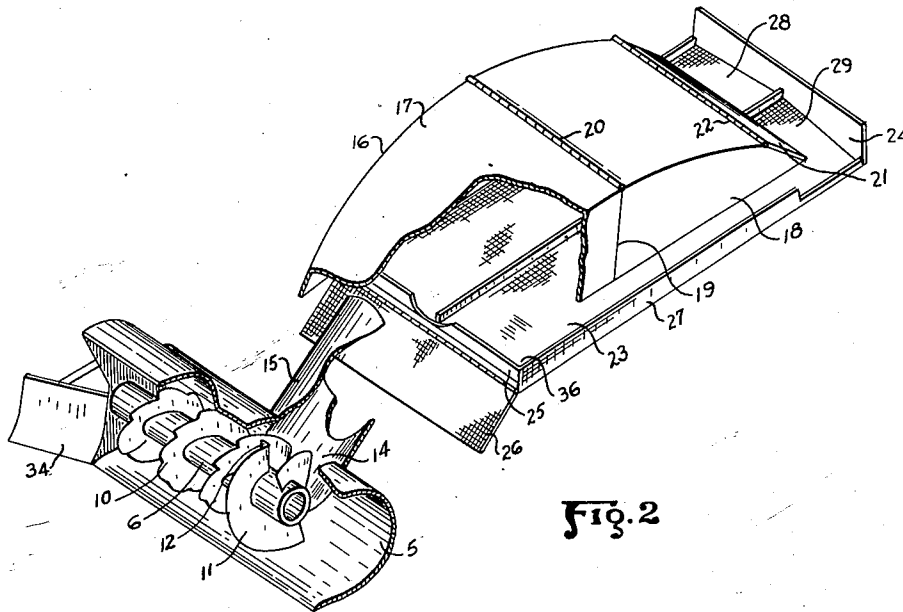


FIG. 2

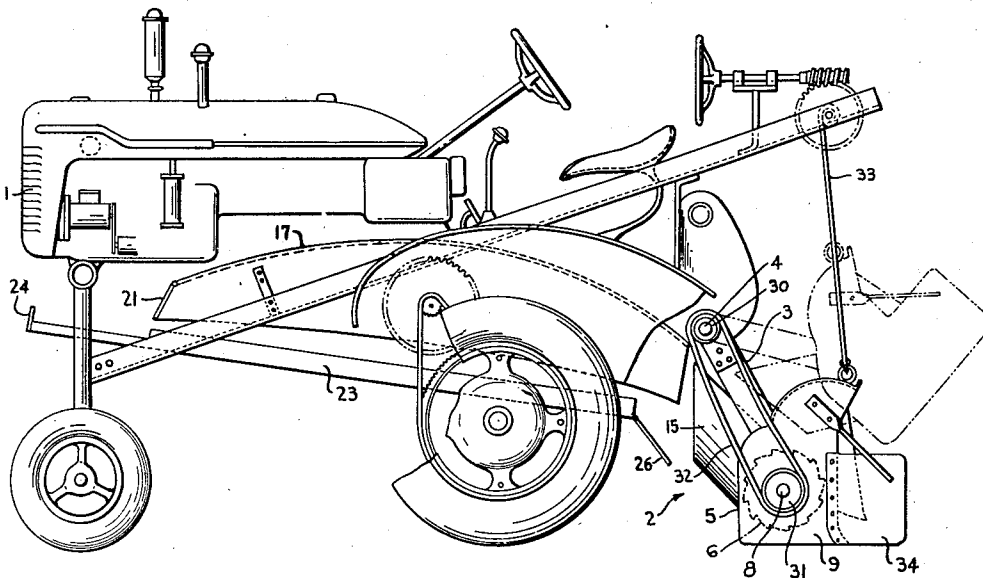


FIG. 1

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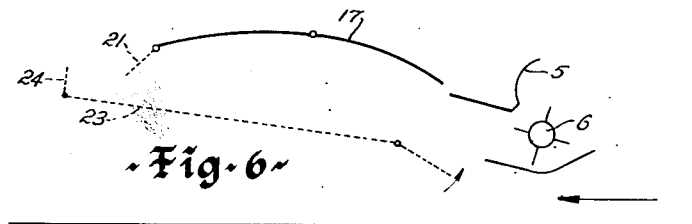
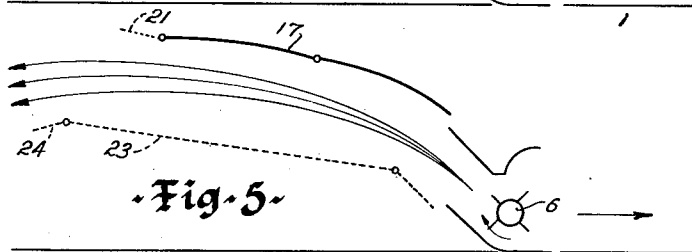
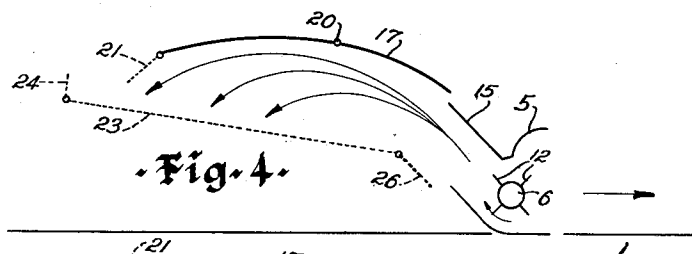
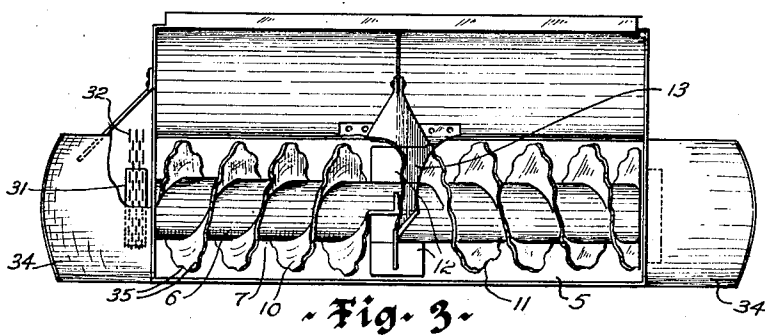
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MEANS FOR CONDITIONING GRANULAR AND LIKE MATERIALS

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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MEANS FOR CONDITIONING GRANULAR
AND LIKE MATERIALSRoy Carleton Crandall, Tillsonburg, Ontario,
CanadaApplication January 31, 1947, Serial No. 725,633
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4 Claims. (Cl. 209-262)

1

This invention relates to a method and means for breaking up and conditioning granular materials, such as sand and the like.

Various types of machines have been proposed heretofore for cutting and conditioning materials such as foundry sand to break up the lumps therein and render the same uniformly free flowing.

An object of the present invention is to provide an improved and simplified method and machine for cutting, piling, windrowing, screening, lump breaking, tempering and aerating foundry sand and the like and for removing scrap and core therefrom.

The invention includes the provision of a machine, preferably self-propelled, having a single cutting rotor adapted to cut and direct the material under treatment upwardly through a chute, and means for deflecting downwardly the material issuing from the chute.

The invention will be described with reference to the accompanying drawing, in which,

Figure 1 is a perspective side elevation of the machine,

Figure 2 is a perspective view, partly in section, of the material conditioning elements of the machine,

Figure 3 is an end elevation of the cutting rotor and associated casing, and

Figures 4, 5 and 6 are diagrammatic elevational views illustrating various operating steps of the device.

In the drawing, 1 is a self-propelled vehicle of ordinary construction, preferably of the farm tractor type. The conditioning device 2 of the present invention is pivotally suspended from the vehicle by means of supporting arms 3 pivoted to a shaft 4 mounted in the rearward portion of the vehicle.

The conditioning device comprises a substantially semi-cylindrical casing 5 to which the lower ends of arms 3 are fixed and having its open side in rearwardly directed relation to the vehicle. Mounted within the casing is a horizontally disposed rotor 6 having an axial cylindrical member 7 carried by shaft 8 journaled in end plates 9 of the casing. Mounted on the periphery of the member 7 on either side of the central portion thereof are one or more helical vanes or blades 10 and 11, the pitch of the blades to the left of the center being left hand and the pitch of the blades on the right of the center being right hand, whereby material engaged by the blades is conveyed from either end of the casing towards the central portion thereof. The inward ends of the helical blades terminate in

2

radially directed blades 12, constituting impellers adapted to engage and direct upwardly by centrifugal action the material conveyed thereto by the helical blades 10 and 11.

The casing is provided at its central portion with a shield 13 to provide a cover member for the radial blades and an opening 14 is provided in the upper portion of the casing in line with the shield 13. A chute 15 extends upwardly and rearwardly of the casing and encloses the opening 14 to form a delivery chute for the material directed therein by the radial blades 12.

A deflector member 16 is carried by the vehicle in slightly elevated relation to the chute outlet and having its end portion closely adjacent the chute. The deflector has a curved upper plate 17 and downwardly directed side plates 18. The deflector is preferably formed in substantially two halves which meet about the line 19, the two portions of the upper plate being hinged at 20 so that the rearward half of the deflector may be raised to vary the trajectory of material deflected therefrom. The rearward end of the deflector is also preferably provided with a downwardly inclined flap portion 21 hinged at 22 to the upper plate. The flap 21 is formed of screening material.

Also carried by the vehicle directly below the deflector and substantially coextensive therewith is a flat screen 23 having a stop 24 hinged to its rearward end, a screening stop 25 at its forward end, and a downwardly inclined screening flap or apron 26 fixed to its forward end and slightly below the outlet of chute 15. The screen 23 is provided with narrow side walls 27 and, as shown, is longitudinally inclined, the end adjacent the chute being lower than the opposite end. Moreover, the portions 28 and 29 of the screen on either side of its longitudinal axis are slightly inclined downwardly towards the sides.

The rotor 6 is preferably driven from the shaft 8 by means of gears 30 and 31 and chain drive 32. Shaft 8 is driven in any suitable manner, preferably from the prime mover of the vehicle.

Any suitable means is also provided for raising and lowering the rotor and casing to clear the sand piles or to place the same at floor level for engagement with a sand pile. A hoisting mechanism, preferably actuated by the vehicle power means, is indicated at 33.

Angularly directed scrapers 34 may be provided at either end of the casing 5.

The edges of the helical blades may be serrated as indicated at 35 to provide more effective cutting.

In operation, the vehicle is moved rearwardly

for engagement with a pile of sand or the like, and, for normal screening treatment, the parts of the conditioning device are positioned as shown in Figure 4. On actuation of the rotor and engagement of the sand thereby, the helical blades cut the mass of sand a greater number of times to eliminate lumps therein and impart a uniform texture thereto. Portions of the mass are conveyed inwardly by the helical blades into contact with the radial blades 12, which project a stream of sand upwardly through the chute 15 and into engagement with the deflector plate 17. The latter deflects the sand particles downwardly through the screen 23. This treatment thoroughly aerates the sand, as is desirable for foundry casting purposes. The flap 21, preferably screened, acts as a stop for any pieces of metal or like scrap which may be present in the sand and tends to break up any lumps remaining in the sand.

As the sand passes through the screen, pieces of scrap and the like move over the inclined surfaces of the screen and collect in the lower corners or pockets 36.

When the device is employed for cutting and piling the sand, the rearward half of the deflector plate 17 is raised to substantially the position shown in Figure 5, with the flap 21 also swung upwardly, as indicated, whereby the surfaces of such members are above the path or trajectory of the stream of sand issuing from the chute 15. The stream thus continues beyond the end of the screen 23, the stop 24 of which is swung downwardly out of the way.

Following cutting and screening and/or piling, in the manner described, the rotor and casing are raised to the position shown in Figure 6, whereupon the vehicle is actuated to move the machine forwardly for return travel over the treated sand pile.

The machine described requires the services of but one operator and combines the functions of cutting, aerating, screening, lump breaking, scrap removal, and piling of foundry sand and like materials.

What is claimed is:

1. In a conditioning machine for granular and like materials including at one end thereof an upwardly directed chute having an inlet at its lower end and an outlet at its upper end, and means adjacent said inlet for projecting through the chute by centrifugal force an aerated stream of said material, a deflector plate carried by the machine, and having one end overlying and in spaced relation to the chute outlet and its other end extending towards the other end of the machine, the lower surface of said plate being concave and disposed in intersecting relation with the normal trajectory of said stream as it emerges from the chute outlet to deflect the stream downwardly, said plate consisting of a forward section and a rearward section hingedly joined together along a transverse line, said sections being upwardly swingable out of intersecting relation with the normal trajectory of the stream, and a flat screen carried by the machine directly below said deflector plate to receive the stream deflected therefrom, said screen being longitudinally inclined in an upward direction from said chute outlet and transversely inclined in a downward direction from the longitudinal axis of the screen, said screen having stops at the sides and lower end thereof to provide scrap-receiving pockets.

2. In a conditioning machine for granular and

like materials including at one end thereof an upwardly directed chute having an inlet at its lower end and an outlet at its upper end, and means adjacent said inlet for projecting through the chute by centrifugal force an aerated stream of said material, a deflector plate carried by the machine and having one end overlying and in spaced relation to the chute outlet and its other end extending towards the other end of the machine, the lower surface of said plate being concave and disposed in intersecting relation to the normal trajectory of said stream as it emerges from the chute outlet to deflect the stream downwardly, said plate consisting of a forward section and a rearward section hingedly joined together along a transverse line, said sections being upwardly swingable out of intersecting relation with the normal trajectory of the stream, a flat screen carried by the machine directly below the deflector plate to receive the stream deflected therefrom, a downwardly inclined screened flap hinged to said other end of the deflector plate, said screen having one end adjacent the chute outlet and its other end adjacent said other end of the deflector plate, a stop hinged to said other end of the screen, a stop fixed to said one end of the screen and extending upwardly therefrom, and a screened apron hinged to said one end of the screen and extending in downwardly inclined relation therefrom.

3. In a conditioning machine for granular and like materials including at one end thereof an upwardly directed chute having an inlet at its lower end and an outlet at its upper end, and means adjacent said inlet for projecting through the chute by centrifugal force an aerated stream of said material, a deflector plate carried by the machine and having one end overlying and in spaced relation to the chute outlet and its other end extending towards the other end of the machine, the lower surface of said plate being concave and disposed in intersecting relation to the normal trajectory of said stream as it emerges from the chute outlet to deflect the stream downwardly, and a flat screen carried by the machine and having its major portion disposed directly below, and coextensive with, the major portion of said deflector plate to receive the stream deflected therefrom, said plate consisting of a forward section and a rearward section hingedly joined together along a transverse line, said sections being upwardly swingable out of intersecting relation with the normal trajectory of said stream to permit the stream to pass over the screen.

4. In a conditioning machine for foundry sand including a self-propelled vehicle having a forward end, a rearward end, an upwardly directed chute at said rearward end having an inlet at its lower end and an outlet at its upper end, and means adjacent said inlet for projecting through the chute by centrifugal force an aerated stream of sand, a deflector plate carried by the vehicle and having one end overlying and in spaced relation to the chute outlet and its other end extending towards the forward end of the vehicle, the lower surface of said plate being concave and disposed in intersecting relation with the normal trajectory of said stream to deflect the stream downwardly, and a flat screen carried by the vehicle and having its major portion disposed directly below, and coextensive with, the major portion of said plate, said screen being spaced from the plate to receive the stream

deflected therefrom and being inclined in an upward direction from the rearward end of the vehicle, said plate consisting of a forward section and a rearward section hingedly joined together along a transverse line, said sections being upwardly swingable out of intersecting relation with the normal trajectory of the stream to permit the stream to pass over the screen.

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