

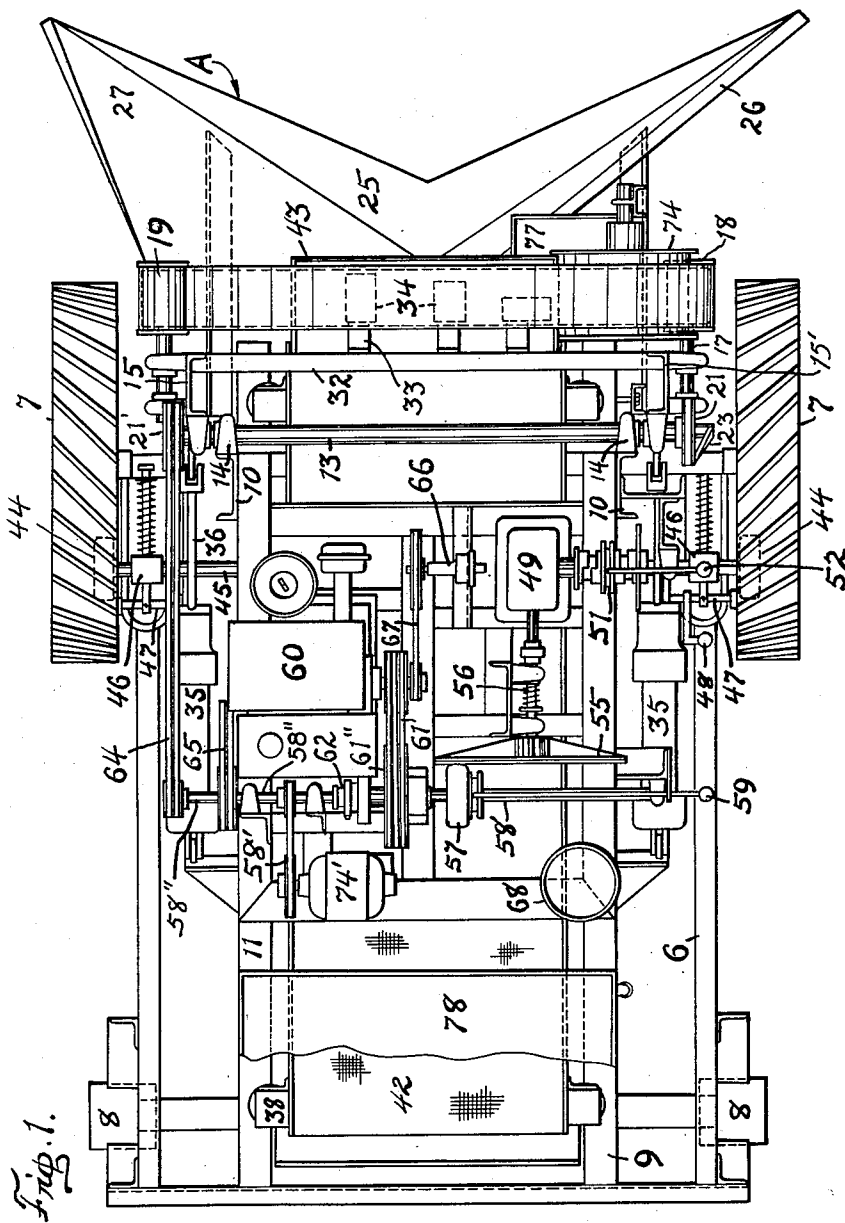
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G. M. BUTZOW
SAND TREATING APPARATUS

2,631,834

Filed April 22, 1947

4 Sheets-Sheet 1



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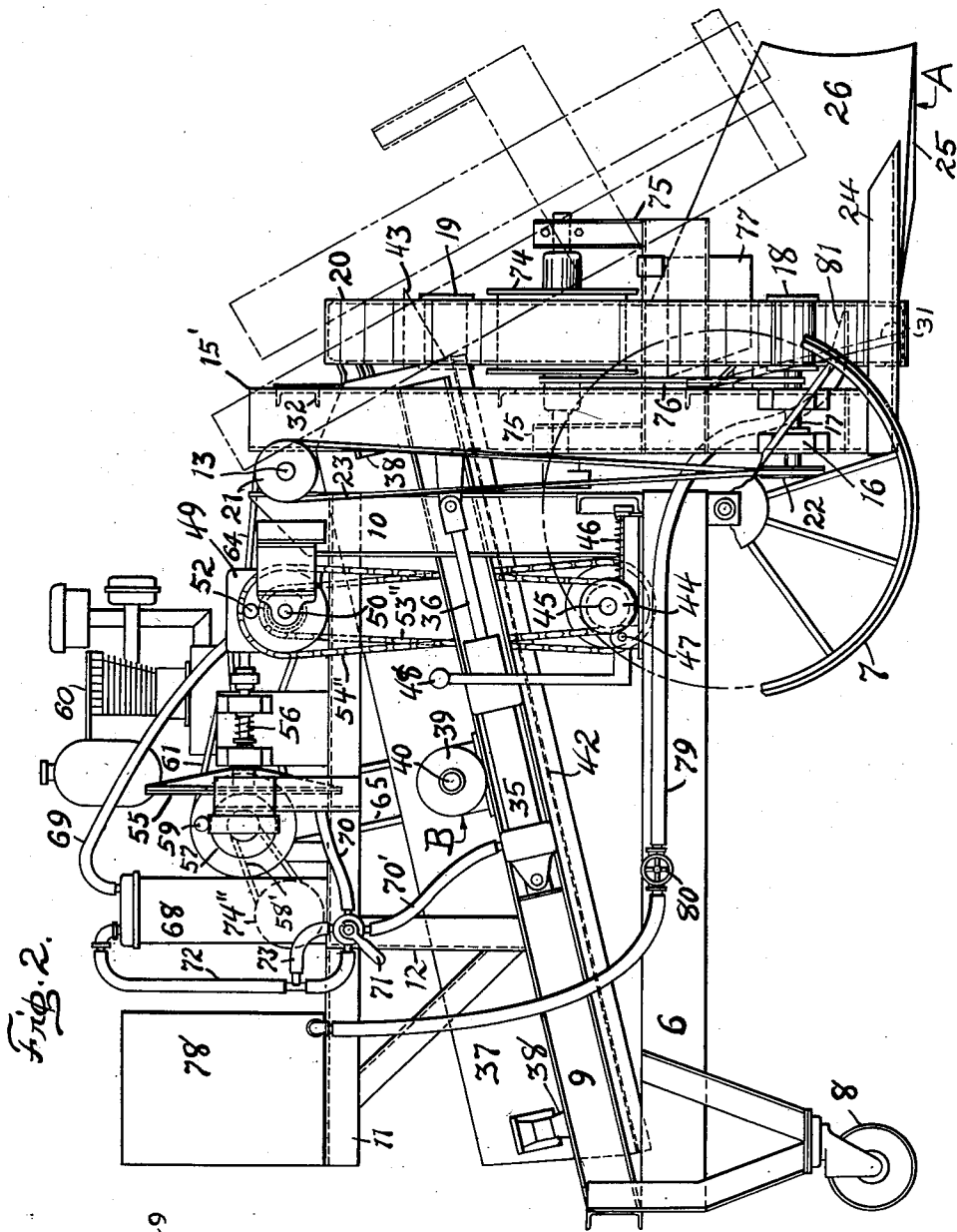
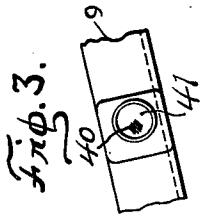
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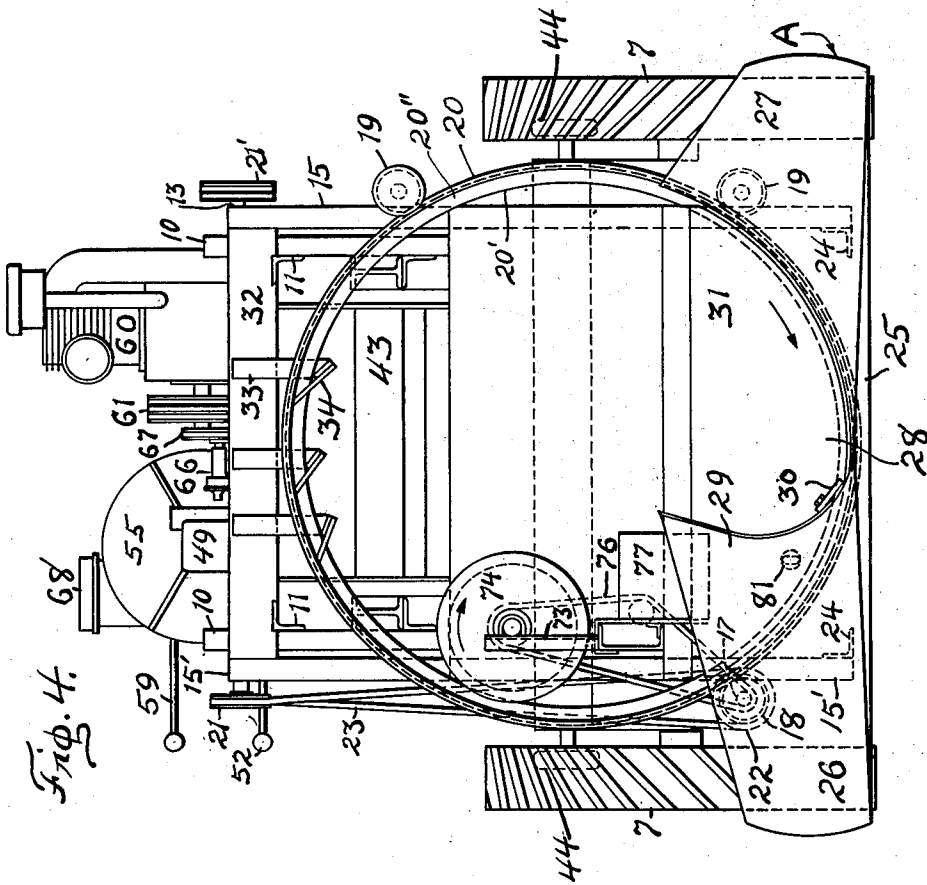
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4 Sheets-Sheet 3



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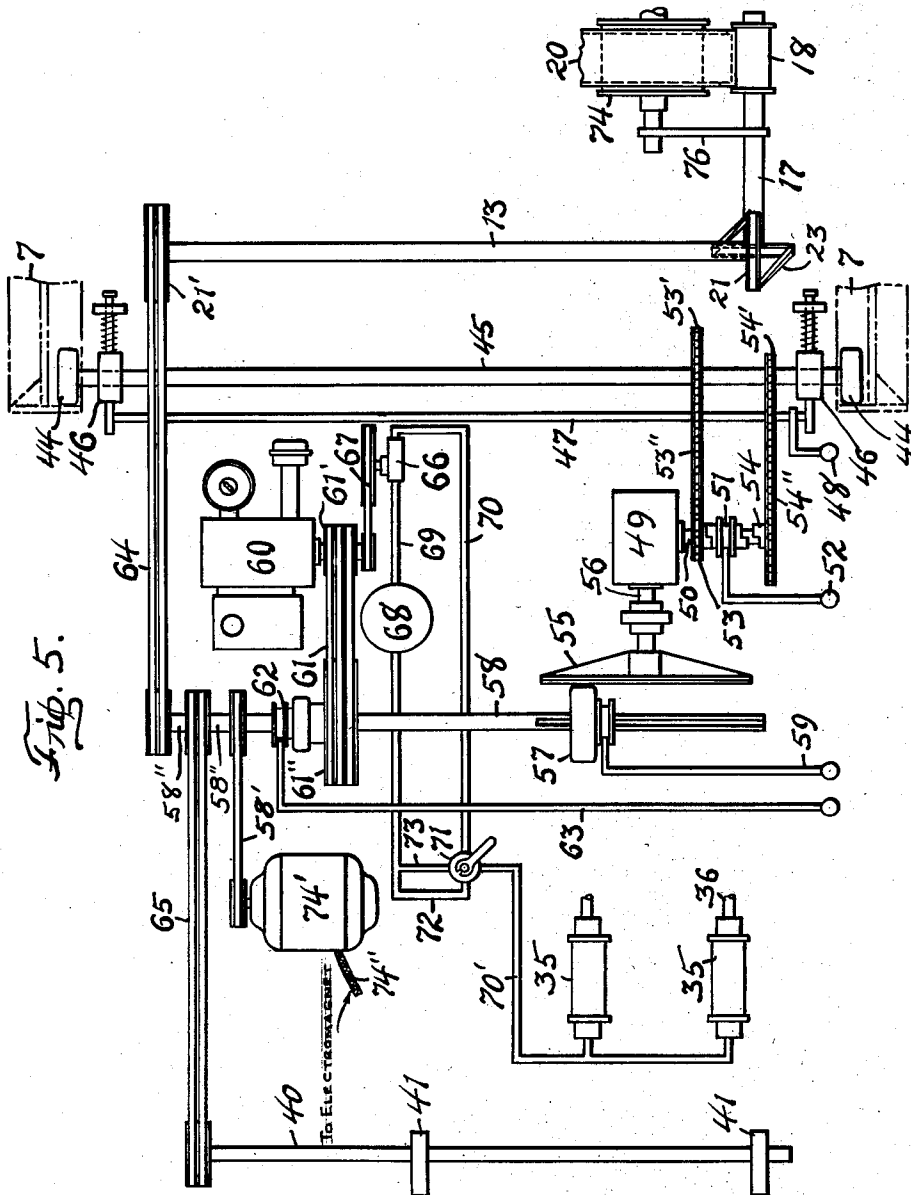
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4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE

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SAND TREATING APPARATUS

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15 Claims. (Cl. 262—2)

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This invention relates to improvements in sand treating apparatus adapted for reconditioning used foundry sand and the like.

Ordinarily, the molds formed of sand are broken up, sifted, gathered into windrows and dampened, which involves considerable expenditure of time and labor when the necessary operations are performed manually.

An object of the instant invention is to provide a mobile apparatus equipped with mechanism for scooping from the floor disintegrated material, such as broken molds, elevating and uniformly moistening the material, extracting from the material metallic scraps, and screening the material, all in a sequence of operation.

Another object of the invention is to provide a power-activated maneuverable apparatus capable of reconditioning used foundry sand efficiently and with dispatch.

And a further object of the invention is to construct a power-activated mobile foundry sand reconditioner manageable by one attendant.

Other objects and advantages of the invention appear in the following description.

An illustrative embodiment of the invention is shown in the accompanying drawings, in which:

Fig. 1 is a plan view of a structure in which the invention is incorporated showing the general arrangement of parts;

Fig. 2 is a side elevational view of the structure shown in Fig. 1;

Fig. 3 is a detail elevational view of a vibrator element for a screen used in the apparatus;

Fig. 4 is a front end elevational view of the apparatus; and

Fig. 5 is a schematic plan view of the prime mover and power transmission mechanism for the appliance.

The illustrative embodiment of the invention consists of a structure in which is included a base-frame or chassis 6 provided with traction wheels 7, located along side the forward part thereof, and caster wheels 8 that support the rear end of the chassis. A forwardly inclined frame 9 is superimposed upon the base-frame, and upright beams 10 are secured to the base and inclined frames at the forward ends thereof. A top frame 11 is supported in horizontal position above the inclined frame, the forward end of which is connected with the upright beams 10, the rear end being supported on braces 12 that project upwardly from the inclined frame 9.

A rotatable shaft 13, transversely disposed, is supported in bearings 14 on the beams 10 adjacent the upper ends thereof, and swinging beams 15—15' are similarly connected with said

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shaft and supported thereby. On the lower portion of said swinging beam 15' are secured bearings 16 in which is mounted a rotatable shaft 17 having secured on the forward end thereof a friction roller 18. On the other swinging beam 15 are supported idlers 19, said roller and idlers being arranged so as to support a rotatable annulus 20. Said annulus has end flanges 20' thus to provide an open interior channel 20'' for the purpose hereinafter set forth. The arrangement is such that the annulus is rotatably supported in connection with the swinging beams and is swung bodily therewith accordingly when said beams are moved, as indicated in dotted outline in Fig. 2.

The shaft 13 has on one end thereof a sheave 21 and the shaft 17 has a similar sheave 22, there being a belt 23 connecting said sheaves so that upon rotation of the shaft 13 the friction roller 18 is likewise revolved, thus causing rotation of the annulus.

A scoop, indicated generally by A, is arranged in connection with the front end of the apparatus and is supported upon arms 24 that extend forwardly from the lower ends of the swinging beams 15—15'. Said scoop has a transverse blade 25 the front edge of which extends divergently forward from its midportion and is provided with opposing upturned sides 26 and 27 that converge rearwardly toward the opening 28 in the annulus. The inner end portion of the upturned side 26 has an extension 29 that overlaps the annulus opening 28, and at the lower end of said extension and overlying the channel 20'' is disposed a gate 30 by which to limit the quantity of transient material moved by the annulus.

A breast-plate 31 is secured to the swinging beams 15—15' that extend across the opening of the annulus at the lower portion thereof and with its lower edge overlapping the rear flange 20' thereof, its purpose being to obstruct passage of material through the annulus opening past the channel.

The upper ends of the swinging beams 15—15' are connected by a cross-beam 32, and a series of brackets 33 secured thereon are provided with corresponding scrapers 34 that underlie and project up into the channel 20'' and serve to dislodge the transient material therefrom as the annulus revolves. Upon each side of the inclined frame 9 is mounted a hydraulic jack 35 the plunger rod 36 of which has connection with the corresponding swinging beam 15—15' so that when the jacks are activated said swinging beams are swung accordingly.

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Upon the inclined frame 9 is mounted a sand sifting appliance or sand treating apparatus consisting of an open box 37 supported thereon by flexible bearings 38 located adjacent the ends thereof, and which is provided with any suitable vibratory mechanism, indicated generally by B, supported by standards 39 on the frame 9 and provided with a drive-shaft 40 having eccentrics 41 for activating said mechanism. The bottom of the box 37 has a screen 42 and the forward end is provided with a chute 43 that extends through the annulus opening and underlies the channel 20'' beneath the scrapers 34, so that material dislodged from the channel by the scrapers is received by the chute and directed onto the screen of the sifting appliance.

Motion transmitting mechanism is provided for activating the traction wheels 7 in which is included friction wheels 44 mounted upon a drive-shaft 45 that engage the rims of the corresponding traction wheels, upon the inner faces thereof, and cause rotation of the traction wheels accordingly as the drive-shaft is rotated. The drive-shaft is mounted in spring-pressed movable bearings 46 located on the base-frame 6 whereby the friction wheels 44 are held in engagement with the traction wheels with more or less force. A rock-shaft 47 has engagement at its ends with the bearings 46 by which the bearings are adjustably moved, there being an operating lever 48 on the rock-shaft by which it is oscillated. By this means the pressure of the friction wheels against the rims of the traction wheels is selectively varied accordingly as the rock-shaft is moved. The particular construction of this mechanism is immaterial to the invention, the arrangement being such that the traction wheels are activated selectively with more or less force, thus effecting steering of the apparatus as it travels on the ground.

Upon the top frame 11 is mounted a gear transmission 49 from which extends a stub-shaft 50 having splined thereon a clutch 51 provided with an operating handle 52 therefor, and which is adapted to have selective engagement with sprockets 53 and 54 accordingly as the operating handle 52 is adjusted. The drive-shaft 45 has thereon sprockets 53'-54' that are connected respectively with the sprockets 53-54 by means of chains 53'' and 54''. The sprocket 53 is of less diameter than its companion sprocket 53' and the sprocket 54 is of greater diameter than its companion sprocket 54' so that the ratio of speed as between the stub-shaft 50 and the drive-shaft 45 is varied accordingly as the clutch 51 is shifted. A friction disk 55 is mounted upon a spring-pressed shaft 56 that is connected to the gear transmission 49 and has geared connection (not shown) therein with the stub-shaft 50.

The friction disk 55 is actuated by a friction-wheel 57 that is splined on a countershaft 58 supported on the top frame, and is provided with an operating handle 59 by which the friction wheel is adjustably moved across the face of the friction disk. By this means the drive-shaft 45 is rotated selectively at varying speeds and in opposite directions accordingly as the handle 59 is adjusted.

The countershaft 58 is actuated by a prime mover 60 consisting of a governor-controlled hydrocarbon engine which is connected with the countershaft by belts 61 and pulleys 61'-61''. The countershaft 58 has splined thereon a clutch 62 that engages a line shaft 58'' that is aligned with the countershaft 58, and is provided with an

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operating rod 63 by which said clutch is shifted into and out of action. The line shaft 58'' has a belt and pulley connection 64 with the rotatable shaft 13 through the medium of which the annulus 20 is activated, a second belt and pulley connection 65 with the shaft 40 by which the sifting appliance is activated, and a third belt and pulley connection 58' with the generator 74' for actuating it.

Means are provided for activating the hydraulic jacks 35 consisting of a hydraulic pump 66 having a belted connection 67 with the engine 60. The pump is supplied with liquid, preferably oil, contained in a reservoir 68 through a suction pipe 69, and the oil discharge from the pump is supplied to the jacks 35 through a feed pipe 70-70' controlled by a multiway valve 71 conveniently located on the top frame 11. A return pipe 72 is connected between the valve 71 and the reservoir 68 through which oil is released from the jack cylinders and returned to the reservoir when the valve is moved into a selected position. A by-pass pipe 73 is connected between the valve and the return pipe 72 so that when the valve is turned to another selected position the oil discharged from the pump is circulated freely through the by-pass into the reservoir without affecting the hydraulic jacks.

As a means of removing magnetic material from the channel 20'' of the annulus there is provided a rotary magnet 74 mounted on supports 75 that extend from the swinging beam 15' and is disposed within the annulus opening in close juxtaposition with said channel. The magnet is rotated by means of a belt 76 that is driven by the friction wheel shaft 17, and is energized by current from a generator 74' located on the top frame 11 and electrically connected with said magnet by a cable 74''.

The magnetic particles in the material in the channel are subjected to attraction by the magnet and become dislodged from the moving mass and are dropped into a catch box 77 located beneath the magnet.

As a means for uniformly moistening the transient material as it is carried in the channel of the annulus, a water supply tank 78 is mounted on the top frame 11 and provided with a discharge pipe 79 controlled by a hand-operated valve 80 located conveniently on the base frame. The discharge end of the pipe extends into the annulus opening and is provided with a spray nozzle 81 located over the channel 20''. Thus, the transient material therein is sprinkled while traveling during transit in the annulus.

Operation:

In using the invention the engine 60 is set in motion causing operation of the countershaft 58 and the pump 66, through the medium of their respective pulley and belt connections therewith. As the countershaft 58 revolves the friction disk 55 is rotated at varying speed in one direction or the opposite by the friction wheel 57, accordingly as the friction wheel is adjustably positioned on the countershaft by its operating handle 59. Motion is imparted to the drive-shaft 45 by shifting the clutch 51 into engagement selectively with one or the other of the sprockets 53 or 54, thus causing the traction wheels 7 to be rotated by action of their friction wheels 44.

When the clutch 62 is thrown into action the line shaft 58'' and the shaft 13 revolve so the friction wheel 18 is rotated through the medium of its pulley and belt connection 21-22-23.

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therewith, causing rotation of the annulus. During forward travel of the apparatus over the floor, the loose sand thereon is encountered by the scoop A and directed by the upturned sides 26—27 into the channel 20" of the annulus. As the annulus revolves the material deposited therein is entrained, passes beneath the gate 30 and is carried upwardly in the channel while held by centrifugal force due to the speed of the annulus. Upon reaching the top of the annulus the material is dislodged from the channel by the scrapers 34 and dropped into the chute 43 of the sifting apparatus which vibrates, causing the material to be shaken through the screen 42 from whence it is returned onto the floor. During the upward travel of the material past the revolving magnet, any magnetic particles contained in the material are attracted by the magnet and dislodged therefrom and deposited into the catch-box 77 to be subsequently removed. During travel of the annulus the material carried in its channel is subjected to a sprinkling of water regulated by the valve 80.

In this manner the sand is gathered from the floor, elevated by the annulus, moistened, relieved of magnetic particles, deposited in the sifting appliance and returned to the floor conditioned for reuse, all under management of one operator.

Variations from the particular construction above disclosed may be resorted to by the exercise of skill in the art, without departure from the spirit or scope of the invention.

What I claim is:

1. An apparatus for reconditioning used foundry sand and the like, said apparatus consisting of a chassis having front tractor wheels and rear caster wheels, a rotatable shaft transversely disposed supported in the forward upper part of said chassis, swinging beams supported on said shaft, a rotatable annulus having an internal channel, a friction wheel and idlers on said swinging beams to support said annulus, said friction wheel having belted connection with said rotatable shaft for activating said annulus, a scoop supported by said swinging beams at the lower ends thereof adapted to divert material from the floor into said annulus during forward travel of the chassis, a breast-plate on said beams extending back of the annulus across the lower portion thereof to obstruct passage of the material through the annulus opening, a gate overlying said channel to limit passage of material carried therein, a sand sifting appliance supported in the chassis provided with a chute that projects through the annulus opening, scrapers operatively supported by the swinging beams projecting into said channel adapted to divert material from the channel into said chute, an engine carried by the chassis, a countershaft supported on said chassis having a clutch-controlled pulley and belt connection with said engine, a drive-shaft on the chassis provided with friction wheels engageable respectively with said traction wheels, means for throwing said friction wheels selectively into and out of action, a clutch-controlled transmission mechanism connecting said countershaft and said drive-shaft adapted to impart forward or reverse movement to said drive-shaft, jacks on said chassis having connection with said swinging beams provided with pumping means driven by said engine for activating said jacks, and pulley and belt connections between said countershaft and sifting appliance and said rotatable shaft for activating same.

2. A foundry sand reconditioner consisting of a

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chassis provided with tractor wheels and supporting casters, a rotatable shaft transversely disposed supported on the upper forward part of said chassis, pendent beams supported on said shaft, an annulus having an inner channel supported in connection with said beams for rotation upon its axis, activating means in connection with said shaft and the annulus for rotating the latter, a scoop supported in connection with said beams adapted to divert material from the floor into said channel during forward travel of said chassis, a gate overhanging said channel to limit passage of said material therein, a sand sifter on said chassis having vibrating means therefor and provided with a chute extending through the annulus opening, scrapers supported by said beams beneath the top of the annulus projecting into the channel thereof adapted to divert said material into the chute, a drive-shaft having spring-pressed bearings supported on the chassis and provided with drive-wheels for engaging said traction wheels respectively, an engine carried by the chassis having speed change and reverse power transmission mechanisms connected with said drive-shaft including means for throwing said mechanism into and out of action, means activated by said engine connected with said rotary shaft, jacks on said chassis provided with pumping means driven by said engine and connected with said beams whereby said scoop is swung out of operating position, and another means connecting said engine and sifter for activating the latter.

3. In a sand reconditioner, a chassis including traction wheels and supporting casters, a drive-shaft supported in spring-pressed bearings on said chassis and provided with drive-wheels engageable with said traction wheels and provided with means for throwing said drive-wheels into and out of action, an annulus, having an inner channel, supported on the forward part of said chassis for rotation upon its axis, a scoop supported on said chassis ahead of the annulus adapted to divert sand from the floor into said channel, a sand sifter supported on said chassis provided with vibrating means therefor and having a chute extending through the annulus opening, scrapers operatively supported by said chassis under the upper portion of the annulus adapted to divert sand from said channel into said chute as the annulus rotates, and an engine on the chassis having driving connections with the annulus, said drive-shaft and vibrating means.

4. A sand reconditioner consisting of a wheeled chassis, an engine on the chassis provided with motion-transmitting mechanism operatively connected with certain of said wheels by which to maneuver said chassis, a sand sifter mounted on the chassis having vibrating mechanism therefor connected with said engine to the activated thereby, an annulus operatively supported on the front of the chassis for axial rotation provided with an inner channel and a connection with said engine to be activated thereby, a scoop operatively supported on the chassis ahead of said annulus adapted to divert sand from the floor into said channel during forward travel of the chassis, a chute supported with respect to the sifter and projecting through the annulus opening, scraper means supported with respect to said chassis beneath the upper portion of the annulus adapted to divert sand from said channel into the chute, and a gate operatively sup-

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ported by said chassis over the channel adapted to limit the quantity of sand carried therein.

5. In a sand reconditioner as defined in claim 4, a water supply tank supported on said chassis provided with a valve-controlled discharge pipe through which water from said tank is supplied to the sand carried in the channel of said annulus.

6. In a sand reconditioner as defined in claim 4, a rotatable magnet disposed in the annulus opening in juxtaposition with the channel thereof and provided with means in connection with said engine to be activated thereby, and a catch box supported with respect to said chassis beneath the magnet adapted to receive magnetic particles dislodged from the sand in said channel by said magnet.

7. A sand reconditioner consisting of a chassis having traction and supporting wheels, an engine on said chassis, motion transmitting mechanism including manual controlling means therefor, operatively connecting said engine and traction wheels, pendently supported swinging beams on the front of said chassis, an annulus supported on said beams for axial rotation provided with an inner channel, mechanism in connection with said engine and the annulus to activate said annulus, a sand sifter carried by the chassis provided with vibrating mechanism therefor operatively connected with said engine, said sifter having a chute projecting through the annulus opening, a scoop supported on said beams disposed ahead of the annulus adapted to divert sand from the floor into said channel, said annulus being adapted to elevate sand received from the scoop and deposit same into said chute as the annulus rotates, and mechanism including jacks on the chassis, connected with said swinging beams, operatively connected with said engine and provided with manual control means therefor by which the scoop is elevated from the floor.

8. A sand reconditioner consisting of a power-propelled wheeled chassis having on its forward end pendently supported swinging beams, an annulus supported on said beams for axial rotation provided with an inner channel, a scoop supported on said beams positioned ahead of the annulus adapted to divert sand from the floor into said channel, jacks on the chassis having connection with said beams whereby the scoop is elevated out of action, a sand sifter on the chassis arranged to receive sand from said annulus, and an engine on said chassis provided with manually-controlled motion-transmitting mechanisms operatively connected with the annulus, said jacks and the sifter for activating same.

9. In a traveling apparatus for reconditioning sand, said apparatus having a frame, an engine and mechanism in connection therewith for propelling said apparatus, a sand sifter on said frame and having an operative connection with said engine to be actuated thereby, swinging beams pendently supported on the front of said frame having mounted thereon an axially rotatable annulus and a scoop which is adapted to divert sand from the floor into said annulus to be elevated thereby, a chute operatively supported by said frame extending into the annulus opening for diverting the elevated sand onto said sifter, means connecting the engine and said annulus for activating said annulus, and mechanism on said frame connected with said beams for swinging said beams forwardly, thus to ele-

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vate the scoop out of action, said mechanism consisting of hydraulic jacks supported on said frame provided with a liquid circulating system controlled by a manually-operated multiway valve including a reservoir and a pump operatively connected with said engine for circulating liquid in said system.

10. In apparatus for reconditioning sand, a traveling frame, a sand sifter provided with a vibrator and carried by said frame, a scoop operatively supported by said frame, an annulus having an inner channel operatively mounted on said frame for axial rotation and located back of said scoop and adapted to receive sand from said scoop diverted from the floor for elevating same onto the sifter, a rotary magnet disposed within the annulus opening and adjacent the channel therein, a generator on said frame connected with said magnet for energizing same, said magnet being adapted to dislodge magnetic particles from the transient sand elevated by the annulus, an engine on said frame and having operative connections with said vibrator, annulus, magnet and the generator for activating same, and a motion transmitting mechanism actuated by said engine and carried by said frame for propelling the latter.

11. A motor-driven traveling mechanism including a wheeled chassis, a rotatable shaft transversely disposed on the upper forward part of said chassis, pendent beams supported on said shaft, an annulus, having an internal channel, supported on said beams for rotation, means carried by said chassis for directing material from the ground into said annulus, jacks on said chassis having operative engagement with said beams to move said annulus and said means out of operative position, and activating means operatively carried by said chassis for said jacks and said annulus.

12. In a sand reconditioner, a chassis including wheels, an annulus having an open interior channel rotatably supported on the forward part of said chassis transversely thereof, feed means supported on said chassis ahead of the annulus for collecting sand and diverting it into said channel, a sand handling apparatus mounted on said chassis to the rear of the annulus and including a chute operatively associated with the annulus at the upper part thereof, scrapers operatively supported by said chassis under a portion of the annulus and extending into juxtaposition therewith for diverting sand from the channel into the chute as the annulus rotates, and power means on the chassis having driving connection with the annulus and the sand treating apparatus.

13. In a sand reconditioner, a chassis including wheels, an annulus having an open interior channel rotatably supported on the forward part of said chassis transversely thereof, a scoop supported on said chassis ahead of the annulus for collecting sand from a floor and diverting it into said channel, a sand treating apparatus mounted on said chassis to the rear of the annulus for treating sand and returning it to said floor, material diverting means operatively associated with a portion of the annulus for diverting sand from the channel into the sand treating apparatus as the annulus rotates, and an engine on the chassis having driving connection with the annulus and the sand treating apparatus.

14. In a sand reconditioner, a chassis including wheels, an annulus having an open interior

channel rotatably supported on said chassis, a scoop supported on said chassis ahead of the annulus for collecting sand from a floor and diverting it into said channel, a sand treating apparatus mounted on said chassis adjacent to the annulus for treating sand and returning it to said floor, material diverting means operatively associated with a portion of the annulus for diverting sand from the channel into the sand treating apparatus as the annulus rotates, and an engine on the chassis having driving connection with the annulus.

15. In a sand reconditioner, a chassis including wheels, an annulus having an open interior channel rotatably supported on the forward part of said chassis transversely thereof, feed means supported on said chassis ahead of the annulus for collecting sand and diverting it into said channel, a sand treating apparatus comprising a sifter and a magnet mounted on said chassis adjacent said annulus, a chute operatively associated with the annulus at the upper part thereof, scrapers operatively supported by said

chassis under a portion of the annulus and extending into contact therewith for diverting sand from the channel into the chute as the annulus rotates, and an engine on the chassis having driving connection with the annulus and the sand treating apparatus.

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