July 31, 1928. 1,678,702

V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

Filed Oct. 15, 1926 6 Sheets-Sheet 1

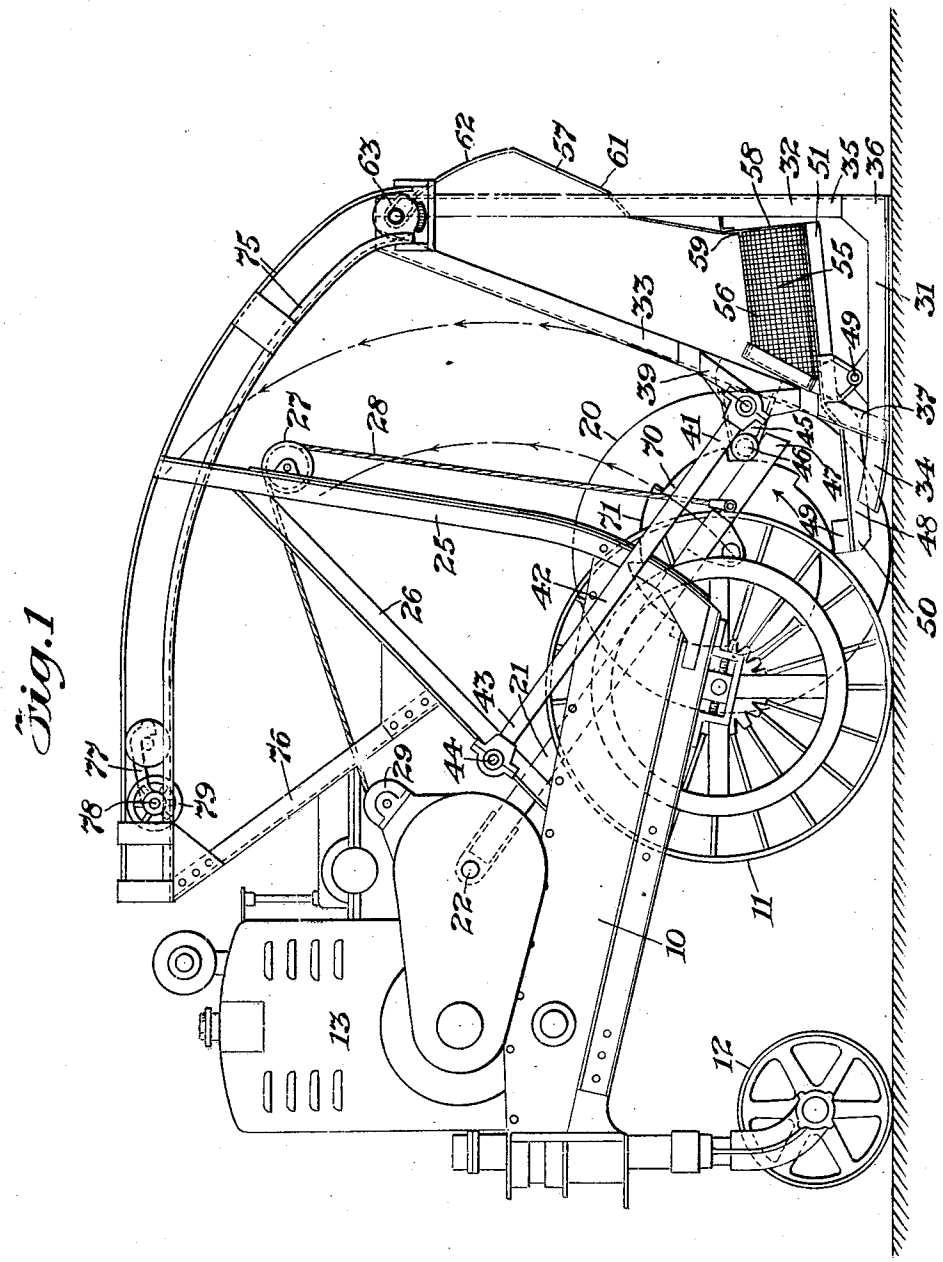


Fig. 1

INVENTOR
Verne E. Minich
BY
Albert H. Austen
HIS ATTORNEY

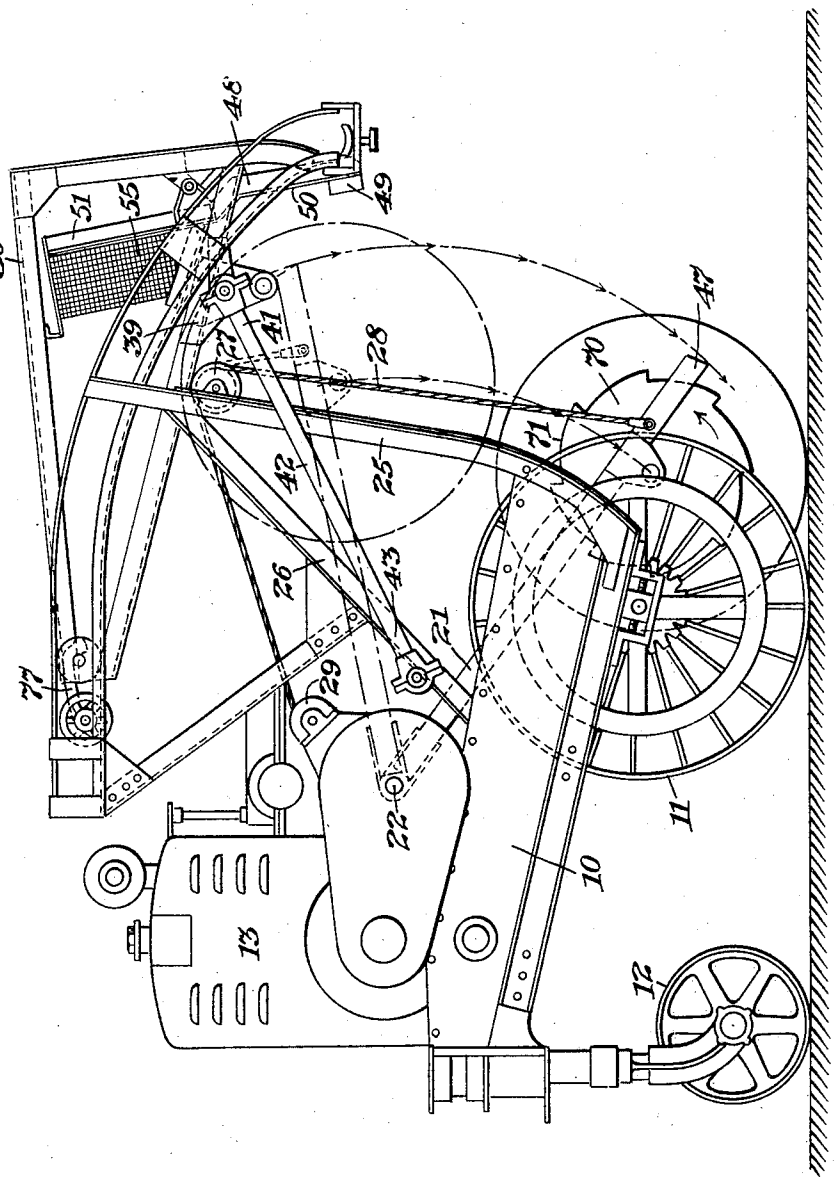
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V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

Filed Oct. 15, 1926 6 Sheets-Sheet 2

Fig. 2



INVENTOR
Verne E. Minich
BY
Albert M. Austin
HIS ATTORNEY

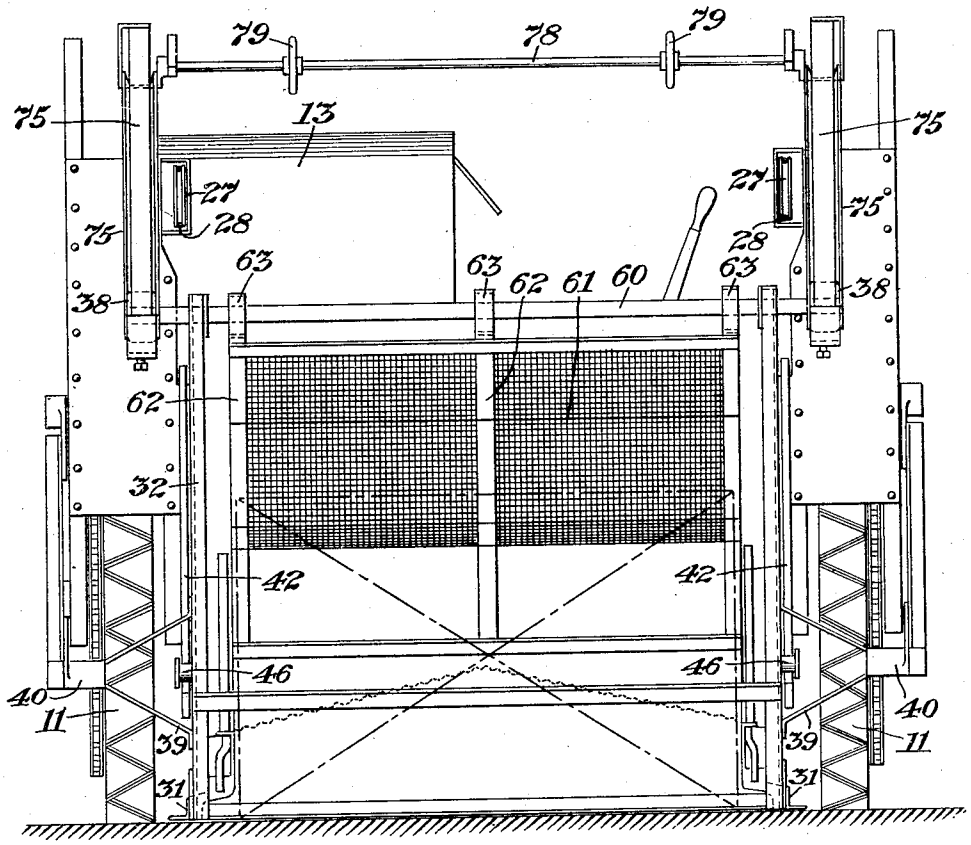
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V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

Filed Oct. 15, 1926 6 Sheets-Sheet 3

Fig. 3



INVENTOR

Verne V. Minich

BY

Albert M. Austin

HIS ATTORNEY

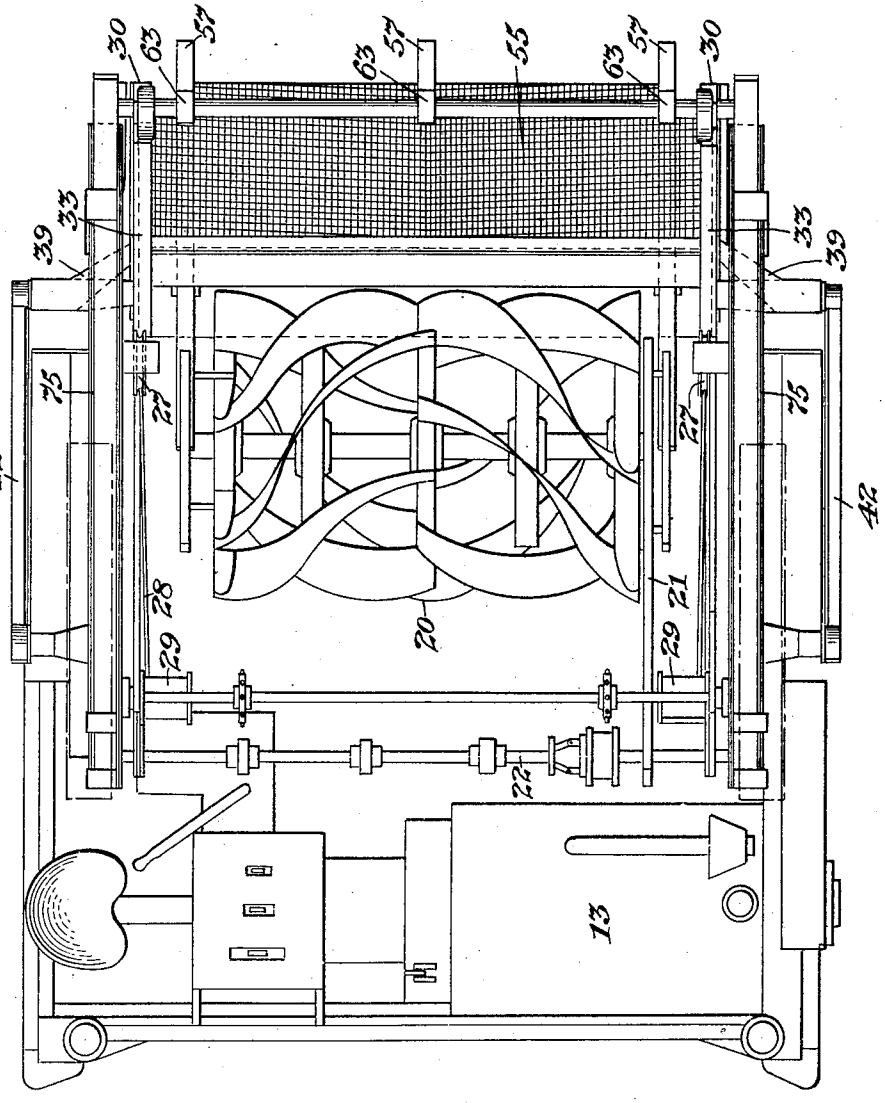
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V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

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Fig. 4



INVENTOR
Verne E. Minich
BY
Albert M. Austin
HIS ATTORNEY

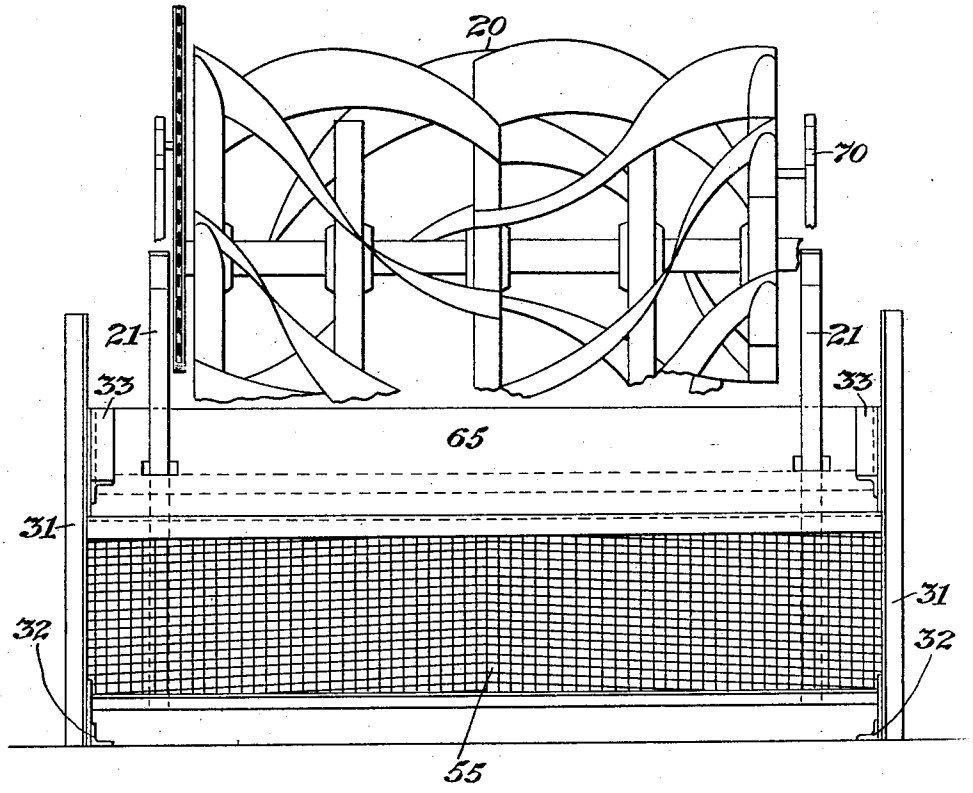
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V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

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Fig. 5



INVENTOR
Verne E. Minich
BY
Albert M. Austin
HIS ATTORNEY

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V. E. MINICH

SAND CUTTING, SCREENING, AND PILING MACHINE

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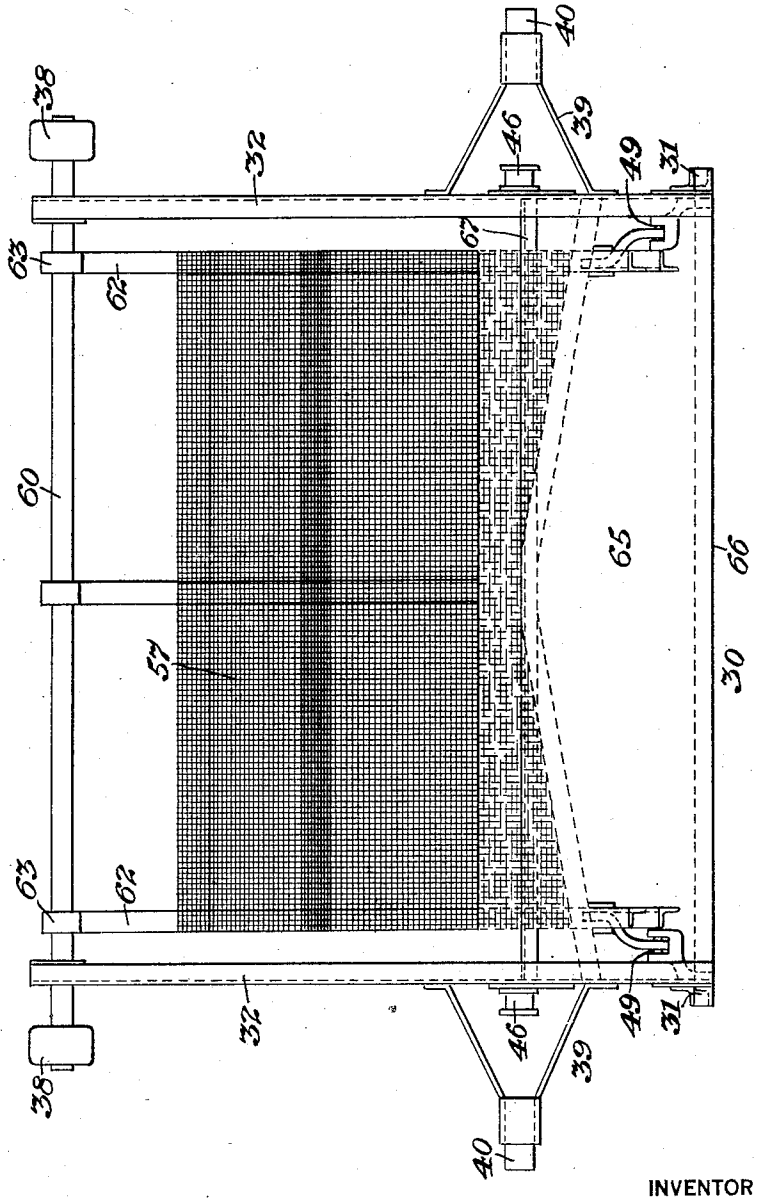


Fig. 6

INVENTOR

Verne E. Minich

BY

Albert M. Austin

HIS ATTORNEY

Patented July 31, 1928. 1,678,702

UNITED STATES PATENT OFFICE.

VERNE E. MINICH, OF SCARSDALE, NEW YORK, ASSIGNOR TO THE AMERICAN FOUNDRY EQUIPMENT COMPANY, OF NEW YORK, N. Y., A CORPORATION OF OHIO.

SAND CUTTING, SCREENING, AND PILING MACHINE.

Application filed October 15, 1926. Serial No. 141,711.

This invention relates to an apparatus for handling sand used in foundries to make molds for casting metal, and relates especially to a machine for effecting the several operations of cutting, screening and piling the sand either separately or in sequence as desired.

The invention more particularly relates to a machine adapted to travel over and operate upon a heap of sand so as to leave it in a condition ready for use by the molders, which will have incorporated with it means by which cutting mechanism and screening mechanism may be mounted upon the machine with screening mechanism movably supported in one position to permit the sand to be effectually cut, screened and piled, and in another position to permit the sand to be cut and piled without screening, and further to provide supporting means of a simple and sturdy construction which will be out of the way and not interfere with the movement or operation of the machine or any of its parts, and yet permit the screening mechanism to be quickly and easily moved either into or out of operative position, and securely held in either position as long as desired.

One of the features of the invention consists in a guide mounted on the frame of the machine to support the screening device and so constructed that the screening device can be elevated out of the path of the sand ejected by the cutting cylinder. This guide or supporting frame is mounted on I-beams carried by the main body of the machine so positioned that its center of gravity will not interfere with the operation of the machine.

Another feature of the invention is a screening device which is mounted upon a separate screen support provided with contacting shoes that ride upon the floor on which the sand lies, and having its upper end movably mounted in the guide structure. Between the two upright screen frames forming the screen support are mounted the screening devices which are a construction permitting ready, economical and simple screening of the material. The screens may be of any desired material, and are mounted so that the sand is thrown against these screens normally by the cutting blades when the screening device is in its operative position. The screens according to my invention, may be both vertical and horizontal, thereby securing the advantage of more ready and expeditious separation of the sand particles. Instead of screen surfaces, the screening devices may be of the travelling belt type or any other desirable form of mechanism.

Still another feature of my invention is the arrangement for imparting to the screens vibratory movement. This is accomplished by the provision of an impact device on each end of the cutter to engage portions of the pivoted frame on which the screens are mounted. By this arrangement the screens are agitated to facilitate the screening operation.

Still another feature of my invention is the provision of a piling shroud to direct sand thrown by the cutting cylinder onto the screens. This shroud is rigidly secured between the screen frames in a position intermediate the cutter and screens to co-operate most efficiently with them in carrying on the screening operation.

Another feature of my invention is a new and improved arrangement for raising and lowering the screening device, which is accomplished by utilizing the motive power of the machine. The upper portion of the screen support is mounted to ride in the curved track-way provided by the guide structure, and the screening device may be adapted to be raised simultaneously with the cutting cylinder or may be provided with separate cable means to permit being raised independently of the cutter.

Various other objects and advantages of the invention will be obvious from the following particular description of one form of mechanism embodying the invention, or from an inspection of the accompanying drawings; and the invention also consists in certain new and novel features of construction and combinations of parts hereinafter set forth and claimed.

In the accompanying drawings:

Fig. 1 is a side elevation of a sand cutting, screening and piling machine embodying my present invention;

Fig. 2 is a side elevation of the machine with the screen mechanism in elevated position;

Fig. 3 is an end view of the machine with the screen mechanism in lowered position;

Fig. 4 is a plan view of the entire machine;

Fig. 5 is a plan view of the cutting cylinder and screening mechanism; and

Fig. 6 is a front view of the screen support detached from the balance of the machine.

In the following description and in the claims parts will be identified by specific names for convenience, but they are intended to be as generic in their application to similar parts as the art will permit.

Referring to the drawings, the machine comprises a traveling vehicle having a body frame 10 mounted on relatively large rear wheels 11 and relatively small front wheels 12. The body frame near its forward end supports a prime mover such as a motor 13 and any suitable means for applying power to drive the machine over the floor and to perform other desired operations. Adjacent the motor, provision may be made for an operator to sit and control the operation of the vehicle. The controlling devices, such as the switches for the motors, if used, and the clutches, are grouped convenient to the operator but it is not considered necessary to show such elements or their mounting in detail as in themselves they form no part of the present invention.

A cutting cylinder 20 is adjustably supported in the rear of the machine to cut sand and throw it rearwardly in screening and piling operations. This cylinder may be of any desired form, but preferably is of the rigid or blade type.

The cutting cylinder is rotatably mounted in a swinging frame to permit raising and lowering as desired. The swinging frame may comprise a pair of supporting arms 21 pivoted to the sides of the body frame and extending rearwardly between the rear wheels. The cutting cylinder 20 being carried by the free ends of the supporting arms 21 may be moved into elevated position when the supporting arms are swung about their respective fixed pivots 22.

Extending upwardly from the body frame near its rear end are a pair of supporting members 25. Bracing members 26 extend from the body frame up to the upper end of the supporting members 25 to brace the same. Near their upper ends the supporting members carry pulleys 27 over which run hoist lines 28 connected at one end to the supporting arms 21 and at the other end to hoist drums 29 to permit the cylinder to be raised. Each hoist drum which is of any standard construction is suitably mounted upon the body frame and may be driven by the motor in any suitable manner.

Directly in the rear of the cutting cylinder is positioned a screen support for the screening mechanism and the piling shroud, and so arranged as to be elevated into non-operative position. The screen support comprises screen frames 30 which are similar in construction and are connected together in spaced relation and separated by a distance slightly less than the width of the machine.

Each screen frame comprises a shoe 31 and vertically extending members 32 and 33 converging upwardly. The shoe has its forward end bent upwardly as at 34 to adapt it to slide along the floor as the machine moves when the screen frame is in operative position. One vertical member 32 of the screen frame has its lower end 35 secured to the rear portion 36 of the shoe, and the other vertical member 33 has its lower end 37 secured near the forward end 34 of the shoe. These two vertical members 32 and 33 converge upwardly and have their upper ends joined together, forming a support for a guide roller 38 which is mounted for movement along an elevated track to guide the screen frame in moving to and from its elevated or non-operative position.

Bracket members 39 are secured to the screen frames in a position to project outwardly therefrom near the bases of the frames. The outer ends of these bracket members are formed as pivot points 40 which are journalled in the free ends 41 of radial arms 42, having their opposite ends 43 pivotally supported on the sides of the machine as at 44. Near the base of each screen frame, an arm 45 projects forwardly and carries a lifting roller 46 positioned to bear upon an extension 47 of a cutting cylinder supporting arm 21. Thus as the cutting cylinder is raised it carries with it the screening mechanism to a position above the machine where it may be locked in position by a latching device. If desired the screening mechanism may be provided with an individual hoisting unit to permit being raised into elevated non-operative position independently of the cutting cylinder. Near the shoe 31 of each screen frame, a vibratory arm 48 is pivoted on a horizontal pivot 49 permitting up and down rocking movement of the forward and rear portions 50 and 51 respectively of the arm.

The screens comprise horizontal and vertical members which may be made in two sections or as a unit surface. The horizontal screen 55 extends between the screen frames 30 and has its ends supported by the rear portions 51 of the vibratory arms 48 with the center of the screen elevated to form the apex 56 of an inverted V providing portions of the screen surface sloping downwardly from the apex to the supporting arms.

The vertical screen 57 has its lower end 58 secured to the rear portion 59 of the horizontal screen 55 and extends upwardly between the screen frames 30 with its upper end loosely supported on a transverse member 60 connecting the upper ends of the

screen frames. The vertical screen 57 is supported by frame members 62 having their upper ends 63 bent into elongated loop form to encircle the transverse member 60, and permit limited movement between the frames 62 and transverse member 60. The portion 61 of the vertical screen intermediate its upper and lower ends is not secured to the screen support but is loosely suspended between the screen frames so as to be free to be bent or buckled by the vibratory movement of the vibratory arms 48. It is obvious that other forms of screening devices, such as the traveling belt type or any other suitable type, may be substituted in place of the screen surface illustrated.

For directing sand thrown by the cutting cylinder onto the screens, a shroud 65 is provided. This shroud is preferably a metal plate rigidly secured at its ends to the forward vertical members 33 and having its lower edge 66 flush with the bottoms of shoes 31, and its upper edge 67 at the level of the apex 56 of the horizontal screen. With the screens in operating position, the shroud with its lower edge on the floor, is intermediate the cutter and the screens, and has its face inclining upwardly and rearwardly toward the screens.

On each end of the cutting cylinder an impact ratchet 70 is secured to rotate therewith. These ratchets have teeth 71 formed on their peripheries to co-operate with the forward portions 49 of the vibratory arms 48 carrying the screens. When the cutting cylinder and attached ratchets are rotated, the vibratory arms come into engagement successively with the teeth on the ratchets to produce an up and down movement of the vibratory arms, thus vibrating the screens to thereby facilitate the screening operation.

For raising the screen support with the screens and piling shroud into non-operative position, a guide structure is provided. This guide structure may be supported above the machine, and may comprise a pair of curved track members 75, which as shown in Fig. 2 may be directly above the large rear wheels. It is obvious that the guide track may be straight, inclining from the lower position at the back of the machine to a high position at the front, or may have any other desirable form. The guide may be supported in position in any suitable manner from the frame of the machine, as for example by truss-work comprising I-beams 25 and 76.

Near the forward end of each track member is a latching device for engaging the guide roller 38 to hold the screen frames 30 in elevated or non-operating position. This latching device comprises a latch arm 77 having one end secured to a shaft 78 which is rotated by wheels 79 fixed thereto to operate the latch.

In operation the machine may move slowly over a line or row of sand on the floor, the cutting cylinder being adjusted to a height to cut into the pile of sand as the machine wheels straddle the pile on either side.

When it is desired to cut and screen the sand, the cutter and screens are in the position shown in Fig. 1. The screen support is in lowered position with its shoes resting on the floor and the guide roller at the lower end of the trackway.

The vibratory arm is in engagement with the tooth periphery of the impact ratchet mounted on the cutting cylinder which is in lowered position to cut the sand lying on the floor.

On rotation of the cutting cylinder in the direction indicated by the arrow as the machine moves over a pile of sand, the sand is thrown rearwardly in the direction of the screens, the shroud guiding the sand up onto the screens. Part of the sand is thrown through the vertical screens to form in a pile behind the same while a portion of the sand falls upon the horizontal screen.

Simultaneously with the throwing of the sand rearwardly on the screens, the impact ratchet is rotated engaging the vibratory arm to rock it on its pivot and produce an up and down movement of the screens, thus facilitating the screening operation and in particular that portion of the sand thrown by the cutter and falling on the horizontal screen.

When it is desired to carry on the cutting and piling operations without screening, the motor raises the power hoist line to elevate the radial arms with the supported cutter, thereby through the engagement of the lifting rollers with the radial arms, also simultaneously raising the screen support, the guide rollers riding on the trackway to guide the A-frame into the elevated position shown in Fig. 2. The latch members engage the rollers and hold the screen support in non-operative position, and thereupon the radial arms can be lowered to permit the cutter to return to operative position where it can cut and pile sand without screening.

For cutting and piling without screening, the machine, with the screening mechanism in elevated, non-operative position, may be run over the pile of sand, the cutting cylinder cutting into the pile and throwing the sand rearwardly into a single large heap against a wall.

In order to facilitate the piling of the sand and to produce piles of the desired height and size, the cutting cylinder may be raised or lowered and its speed of rotation may be varied.

When it is desired to again carry on the screening operation the radial arms and cutter are raised up to the screen support, and

upon releasing the latches the cutter together with the screen support and screens are returned to operative position.

Thus the screening mechanism is quickly and easily shifted out of and returned into operative position and without the necessity of removing the screening mechanism and screen support from the body of the machine.

By means of this construction the operations of cutting and screening can be carried on, or the operations of cutting and piling can be carried on without screening, the arrangement of the trackway above the machine permitting the screening mechanism to be lifted and held in non-operative position when it is desired to carry on the cutting and piling operations, and yet allowing the screening mechanism to be quickly returned into operative position when it is desired to carry on the screening operation, while the form of screening mechanism and its relation to the cutter and other parts of the machine permit of a relatively large quantity of material being screened in a quick and efficient manner, the vibrator and the shroud constituting simple yet effective means for the expeditious and economical treatment of large quantities of sand.

While I have shown and described and have pointed out in the annexed claims certain novel features of the invention, it will be understood that various omissions, substitutions and changes in the forms and details of the device illustrated and in its operation may be made by those skilled in the art without departing from the spirit of the invention.

Having thus described my invention, I claim:

1. In apparatus of the class described, the combination with a sand cutter of a screen adapted to be raised out of the path of the sand ejected by said cutter, a support for said screen, a trackway above said machine, and means on the support engaging said trackway to guide the screen into non-operative position.

2. In apparatus of the class described, the combination with a sand cutter, of a screen for receiving sand therefrom, means for selectively raising said cutter and said screen, and means for holding said screen in raised position out of the path of material ejected by said cutter.

3. In apparatus of the class described, the combination with a sand cutter of a screen, and means carried by the cutter to vibrate the screen.

4. In apparatus of the class described, the combination with a sand cutter of a screen, and an impact ratchet on the cutter to vibrate the screen.

5. In apparatus of the class described, the combination with a sand cutter, of screening mechanism comprising horizontal and vertical screens forming a unitary structure, means for vibrating the entire screening mechanism as a unit and means for raising said screening mechanism out of the path of the sand ejected by the cutter.

6. In apparatus of the class described, the combination with a sand cutter of screening mechanism, comprising horizontal and vertical screens forming a unitary structure, and means for raising said screening mechanism out of the path of the sand ejected by the cutter.

7. In apparatus of the class described, the combination with a sand cutter of sand screening mechanism, means for raising said screening mechanism into non-operative position out of the path of sand ejected by the cutter, said means comprising a trackway to guide the screening mechanism into non-operative position and a latch to releasably hold said screening mechanism in non-operative position.

8. In apparatus of the class described, the combination with a sand cutter of a screen, a frame for said screen, means for raising said sand cutter, means associated with said cutter for engaging said frame to elevate said screen into non-operative position, and means for holding said screen in raised position.

9. In apparatus of the class described, the combination with a sand cutter, of a screen mounted on a vibratory arm, an impact ratchet fixed to the cutter and engaging said arm to vibrate said screen upon rotation of said sand cutter.

10. In apparatus of the class described, the combination with a sand cutter of a frame, a screen mounted on said frame, means for elevating said frame into non-operative position, and means rotatable with said cutter for vibrating said frame and screen.

11. In apparatus of the class described, the combination with a sand cutter of a screen, and a shroud interposed therebetween, mounted on a frame adapted to be elevated into non-operative position, said screen being pivotally mounted on said frame and said shroud being fixed to said frame to guide sand ejected by the cutter onto the screen when in its operative position.

12. In apparatus of the class described, the combination with a rotatable cutting cylinder, horizontal and vertical screens forming a unitary structure and mounted on a frame and adapted to be vibrated as a unit, means on said cutting cylinder for vibrating said screens, said means comprising an impact ratchet to engage said frame to vibrate said screens on rotation of the cutting cylinder.

13. In a cutting, screening and piling machine the combination with a sand cutter of

a screen support mounted on said machine, screening mechanism mounted on said screen support, said screening mechanism comprising vertical and horizontal screens, an impact ratchet rotating with said cutter, a vibratory arm pivoted to said screen support near its base, said arm having a rear portion supporting said vertical and horizontal screens and forward portion engaging said impact ratchet to vibrate said screens when said cutter is rotated.

14. In a cutting, screening and piling machine, the combination with a sand cutter of a screen support including screen frames, each of said screen frames comprising upwardly extending members joined at their upper ends, screening mechanism mounted on said screen support, said screening mechanism comprising vertical and horizontal screens, said vertical screen having its upper end loosely supported between the upper ends of the screen frames, an impact ratchet rotatable with said cutter, a vibratory arm pivoted to said screen support near its base, said arm having a rear portion supporting said horizontal screen and the lower end of said vertical screen and a forward portion engaging said impact ratchet to vibrate said screens when said cutter is rotated.

15. The combination of a sand cutting member, a screening member, and means for moving the screening member out of the path of the sand delivered by said sand cutting member.

16. In a sand cutting, screening and piling machine, the combination with a sand cutter of a screen adapted to be raised into non-operative position out of the path of the sand ejected by said cutter, a support for said screen, a trackway above said machine, said trackway comprising a pair of curved tracks supported on either side of the machine, supporting trusses for said tracks projecting upwardly from said machine and rollers mounted on said screen support to rest on said tracks to guide said screen into non-operative position.

17. In a sand cutting, screening and piling machine, the combination with a sand cutter, of screen frames mounted on said machine adjacent the ends of said cutter, vertical and horizontal screens mounted between said screen frames, a shroud extending between said screen frames in front of said screens, said shroud comprising a plate inclined upwardly toward said screens to direct sand thrown by the cutter onto said screens.

18. In a sand cutting, screening and piling machine, the combination with a sand cutter, of screen frames mounted on said machine adjacent the ends of said cutter, vertical and horizontal screens mounted between said screen frames, a shroud extending between said screen frames in front of said screens, said shroud comprising a plate inclined upwardly toward said screens to direct sand thrown by the cutter onto said screens, and means for elevating said screen frames with said screens and shroud above the level of the cutter.

19. In a sand cutting, screening and piling machine, the combination with a sand cutter of vertical and horizontal screens adapted to be raised into non-operative position, screen frames supported adjacent the ends of the sand cutter when the screens are in operative position, said vertical and horizontal screens being supported between said screen frames, transverse members for connecting said screen frames together including an upper member supporting the upper end of said vertical screen, and a shroud extending between said screen frames and located in front of said screens to guide sand thrown by the cutter onto said screens, said horizontal screen having an inverted V shape and provided with portions inclined toward said frame members.

20. In a cutting, screening and piling machine, the combination with a sand cutter of means for adjustably supporting said cutter, comprising a motor mounted on the machine, radial arms pivoted to each side of the machine and a hoist line connecting said radial arms and motor, a screen, a frame for supporting said screen, a pair of supporting arms pivoted at opposite ends to corresponding sides of the machine and frame, brackets mounted on said frame, rollers supported by said brackets, said rollers engaging said radial arms to permit said frame and screen to be elevated into non-operative position when said cutter and radial arms are raised.

21. In a cutting, screening and piling machine, the combination with a sand cutter of means for adjustably supporting said cutter, comprising a motor mounted on the machine, radial arms pivoted to each side of the machine and a hoist line connecting said radial arms and motor, a screen, a frame for supporting said screen, a pair of supporting arms pivoted at opposite ends to corresponding sides of the machine and frame brackets mounted on said frame, rollers supported by said brackets, said rollers engaging said radial arms to permit said frame and screen to be elevated into non-operative position when said cutter and radial arms are raised, and means for guiding said frame and screen into non-operative position, comprising a trackway supported above said machine and rollers mounted on said frame to rest on said trackway.

22. In a sand cutting, screening and piling machine, the combination with a sand cutter of radial arms pivoted to the sides of said machine, said cutter being mounted on the free ends of said radial arms to permit raising and lowering said cutter, elevating

mechanism for said cutter comprising a motor mounted on said machine, trusses extending upwardly from said machine, pulleys supported by said trusses, hoist lines running over said pulleys and connecting said radial arms and motor, screening mechanism supported on said machine adapted to be positioned in operative or non-operative position, and means for positioning said screening mechanism in operative or non-operative position.

23. In a sand cutting, screening and piling machine, the combination with a sand cutter of radial arms pivoted to the sides of said machine, said cutter being mounted on the free ends of said radial arms to permit raising and lowering said cutter, means for adjusting the position of said cutter, screening mechanism supported on said machine adapted to be positioned in operative or non-operative position with respect to sand ejected by said cutter, means for positioning said screening mechanism in operative or non-operative position, and means for holding said screen in non-operative position.

24. In a sand cutting, screening and piling machine, the combination with a sand cutter of radial arms pivoted to the sides of said machine, said cutter being mounted on the free ends of said radial arms to permit raising and lowering said cutter, means for adjusting the position of said cutter, screening mechanism supported on said machine adapted to be positioned in operative or non-operative position, a guide structure comprising trusses extending upwardly from each side of said machine, a trackway having curved tracks rigidly supported above said machine by said trusses, said screening mechanism comprising track rollers adapted to engage said curved tracks to guide said screening mechanism into elevated non-operative position, and latches mounted near the forward end of said tracks to engage said track rollers to hold said screening mechanism in elevated non-operative position.

25. In a sand cutting, screening and piling machine, the combination with a sand cutter adapted to be adjustably positioned of means for adjusting the position of said cutter, screening mechanism supported on said screens adapted to be positioned in operative or non-operative position, means for positioning said screening mechanism in operative or non-operative position comprising a guide structure having trusses extending upwardly from each side of said machine, a trackway having curved tracks rigidly supported above said machine by said trusses, said screening mechanism comprising track rollers adapted to engage said curved tracks to guide said screening mechanism into elevated position and latches mounted near the forward end of said tracks to engage said track rollers to hold said screening mechanism in elevated position.

26. In a sand cutting, screening and piling machine, the combination with a sand cutter adapted to be adjustably positioned, elevating mechanism for said cutter comprising a motor mounted on said machine, trusses extending upwardly from said machine, pulleys supported by said trusses, hoist lines running over said pulleys connecting said radial arms and motor, screening mechanism supported on said machine adapted to be positioned in operative or non-operative position, and means for adjusting said screening mechanism in operative or non-operative position.

27. In a sand cutting, screening and piling machine, the combination with a sand cutter of frames mounted on said machine adjacent the ends of said cutter, vertical and horizontal screens mounted between said frames, a shroud extending between said frames in front of said screen, said shroud comprising a plate inclined upwardly toward said screens to direct sand thrown by the cutter onto said screen, and means for elevating said frames with said screens and shroud above the level of the cutter.

28. In a sand cutting and screening machine, the combination with a sand cutter of vertical and horizontal screens adapted to be raised into non-operative position, frames supported adjacent the ends of the sand cutter when the screens are in operative position, said vertical and horizontal screens being supported between said frames, transverse members for connecting said frames together including an upper member supporting the upper end of said vertical screen, and a shroud extending between said frames and located in front of said screens to guide sand thrown by the cutter onto said screens, said horizontal screen having an inverted V shape and provided with portions inclined toward said frames.

29. In a sand cutting and screening machine, the combination with a rotatable sand cutter of a frame supported on said machine, an impact ratchet rotatable with said cutter, an arm pivoted to said frame opposite each end of said cutter, a screen having an inverted V shape provided with inclined portions supported by said arms, one of said arms engaging said impact ratchet to vibrate said screen upon rotation of said sand cutter.

In testimony whereof I have hereunto set my hand.

VERNE E. MINICH.