Jan. 11, 1938. G. JACOBS 2,104,928

EXCAVATING MACHINE

Filed Jan. 25, 1937 3 Sheets-Sheet 1

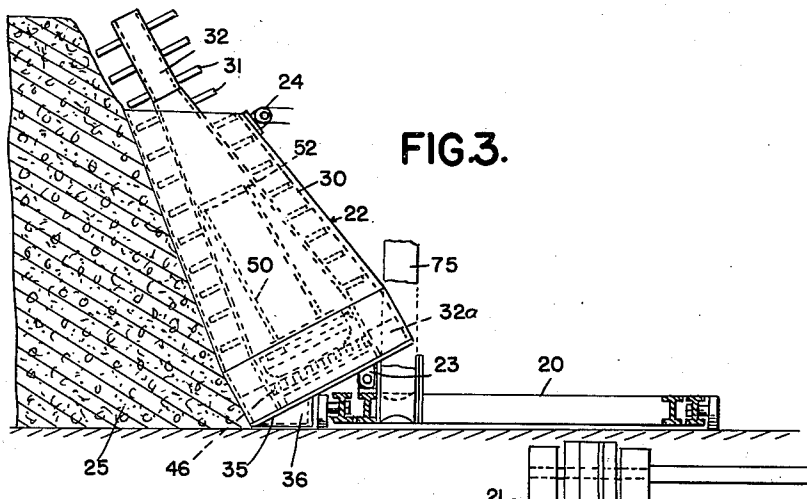


FIG.3.

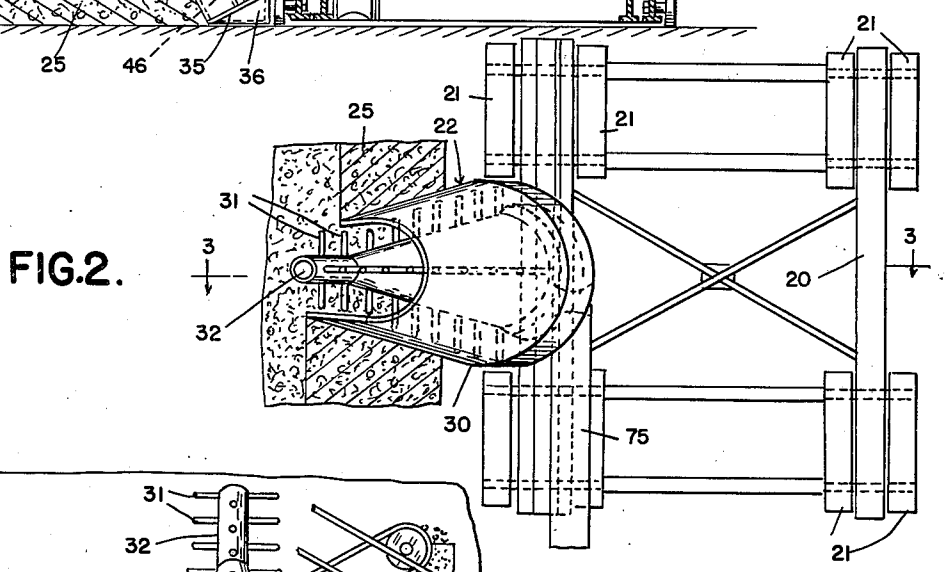


FIG.2.

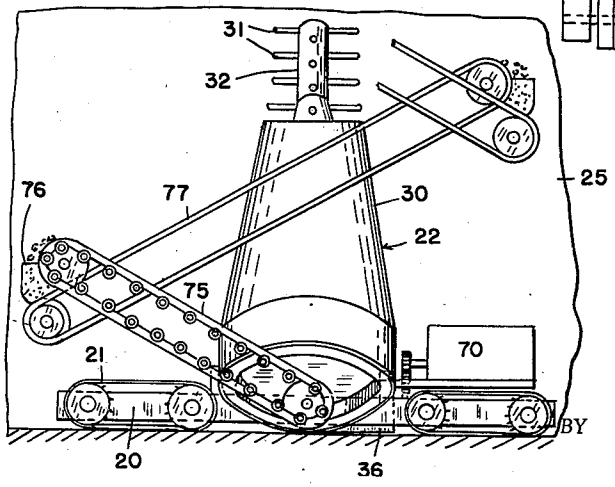


FIG.1.

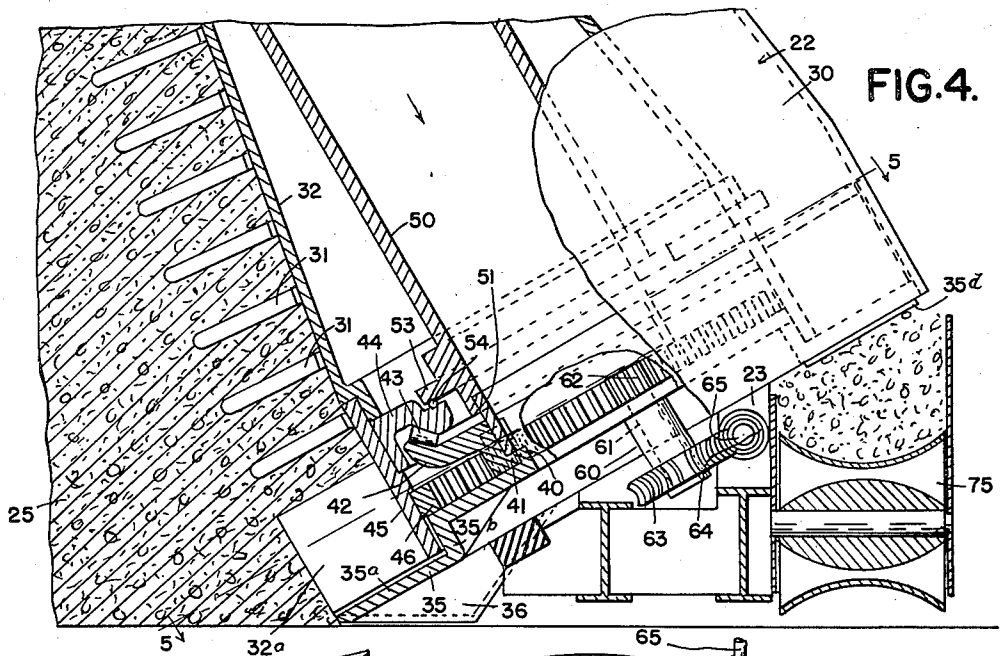
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Jan. 11, 1938. G. JACOBS 2,104,928

EXCAVATING MACHINE

Filed Jan. 25, 1937 3 Sheets-Sheet 2

FIG.4.



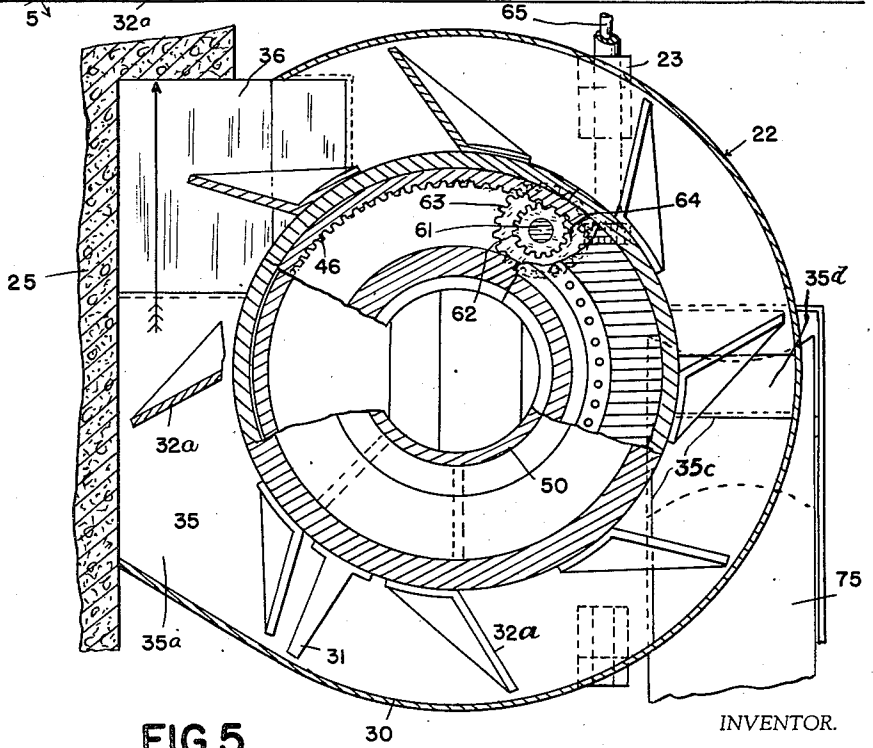


FIG.5.

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Jan. 11, 1938. G. JACOBS 2,104,928

EXCAVATING MACHINE

Filed Jan. 25, 1937 3 Sheets-Sheet 3

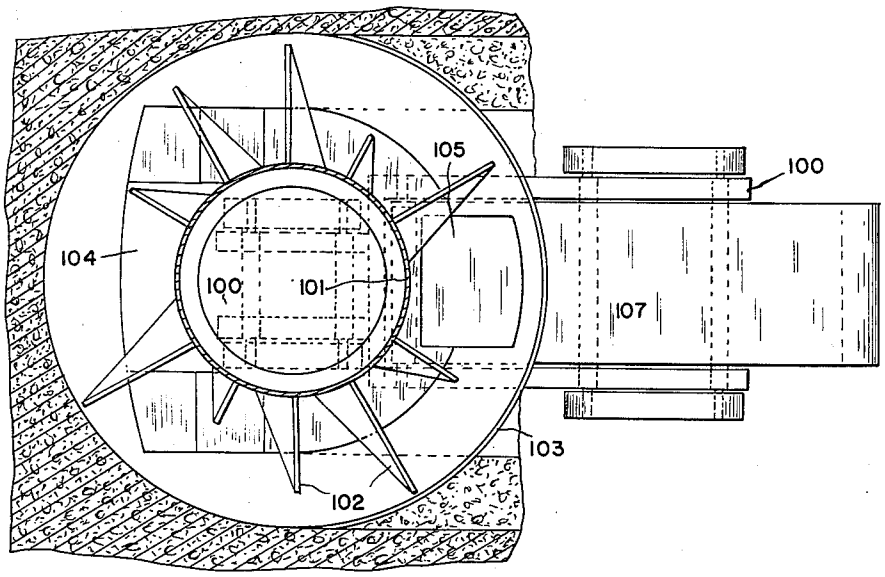


FIG.7.

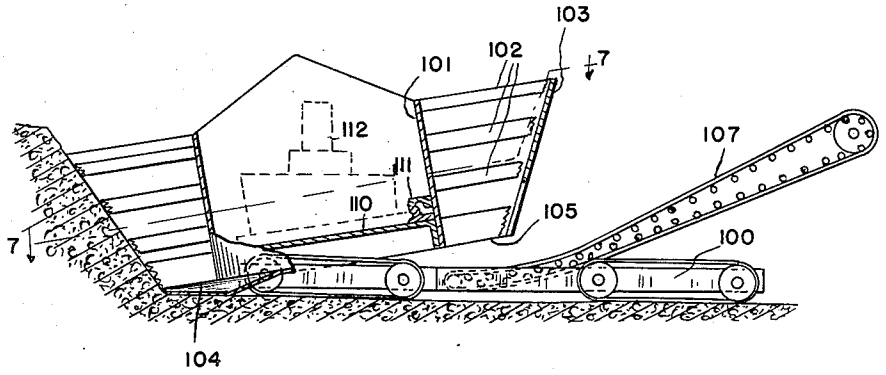


FIG.6.

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UNITED STATES PATENT OFFICE

2,104,928

EXCAVATING MACHINE

George Jacobs, Detroit, Mich., assignor of one-third to Emil Goetz and one-third to Joseph Grant, both of Detroit, Mich.

Application January 25, 1937, Serial No. 122,107

7 Claims. (Cl. 37—190)

The present invention relates to excavating machines and more specifically to machines for surface operations in deposits of alluvial material.

Among the objects of the invention is a machine which shall be of large capacity but simple in construction, and operation and which will not readily clog and thus be subject to breakage and incapacitation.

Another object is a machine of the character indicated which is mobile and adapted to travel laterally along the inclined face of a deposit of, for example, gravel and remove a layer of considerable thickness therefrom, while preparing a flat roadway for a succeeding operation.

Another object is such a machine in which the excavated material is transferred from the point of excavation to suitable receivers, such as trucks or treating devices, rapidly and easily.

Still other objects and advantages will readily appear to those skilled in the art upon reference to the following description and the accompanying drawings, in which

Figure 1 is a more or less schematic view in elevation of the main portions of the machine.

Figure 2 is a plan view with the conveyors omitted.

Figure 3 is a sectional view on line 3—3 of Figure 2.

Figure 4 is a similar sectional view of a portion of the machine on a larger scale.

Figure 5 is a section along line 5—5 of Figure 4.

Figure 6 is a vertical longitudinal section of another embodiment of the invention.

Figure 7 is a horizontal section on line 7—7 of Figure 6.

As indicated in the drawings, the machine is to be rendered mobile by mounting the operating portions upon a propellable chassis having a suitable bed or platform 20 in turn supported upon so-called "caterpillar" rolling members 21, driven in any suitable fashion by means (not shown).

Supported at one side of platform 20 is the excavating or digging element indicated as a whole at 22. This element is preferably supported on trunnions 23 to permit variation of its angle with respect to the platform or earth deposit 25 and to permit its being moved to vertical or other position for transportation. At 24 is indicated a block and cable to furnish support or to effect swinging movement.

The digging element 22 consists of a conical assembly comprising a housing 30, generally conical in shape, but open at one side to allow projection of the earth agitating fingers 31 carried by the rotatable agitator 32 mounted within housing 30. The agitator 32 consists of a hollow conical spindle member with the fingers or arms 31 fixed upon its periphery in a plurality of spirals as indicated best in Figure 1.

At the bottom of housing 30 is a plate or closure member 35 adapted to close the space between the housing and the lower edge of the hollow agitator 32 as well as support the latter and its driving means. This plate 35 is generally circular but at the portion below the opening in housing 30 is provided with an edged corner portion depressed to form a scoop or skimmer 36 for the purpose of removing that part of the earth deposit not touched by the angularly arranged agitator 32.

By referring specifically to Figures 4 and 5, the construction of the digging element is readily seen. Upon the plate 35, which is provided with a central opening surrounded by a short upstanding flange 40, is fixed a ring 41. This ring is formed to provide a bearing portion 42 for rollers 43 upon which in turn rests a ring 44 forming a part of the agitator 32. The plate is, as shown, provided with a peripheral portion 35a in a lower plane, the displacement providing a shoulder 35b serving as a guide for a sleeve 45. This sleeve 45 is fixed to bearing ring 44 and also has fixed to it an internal gear 46. The hollow conical agitator 32 is then fixed to and upon sleeve 45, so that the agitator 32, sleeve 45, and gear 46 form the rotatable assembly carrying the agitator pins 31.

In order to prevent tipping of the agitator 32 an internal supporting member is provided. This consists of a cylinder 50 fixed upon ring 41 through a sleeve 51. Cylinder 50 extends up within agitator 32 about half the length thereof and has bearings, as at 52, upon the inside thereof; suitable antifriction balls or rollers may be provided at this point.

At the lower end of the cylinder 50 is provided an outwardly extending flange 53, adapted to overlie bearing ring 44 and contact therewith through suitable antifriction bearing means indicated at 54 as balls or rollers.

Also carried by plate 35 is a bearing sleeve 60 within which rotates a shaft 61 to which is fixed a small gear 62, meshing with ring gear 46, and a worm wheel 63. The latter coacts with a worm 64 upon a shaft 65. This shaft 65 extends preferably through one of the trunnions 23, which is made somewhat larger than the other and bored axially for this purpose. Shaft 65 is connected

through suitable transmission means to a motor 70, also carried upon platform 20.

Referring again to agitator 32, it will be noted that the lower part thereof formed by sleeve 45 is cylindrical and carries blades 32a fixed thereto. These blades act upon the lower portion of the earth slope and also sweep the material within the housing 30 around to an opening 35c in the plate 35, where it drops upon a suitable conveyor 75 for transport to a receiver 76. This receiver may be the loading chute for a second conveyor 77 or any other suitable receiver. As indicated in Figure 1, there may be a series of such conveyors for lifting the excavated material to any desired height or point.

It is preferred also to depress a portion 35d of plate 35 at the far edge of opening 35c to form a lip or inclined surface opposed to blades 32a as they pass over the discharge opening, so as to permit the blades to push back into the digger any large stones which might not readily pass out.

In the operation of the excavator upon the alluvial deposits for which it is intended, the entire machine will be propelled parallel with the bank with the element 22 at a suitable angle, which angle, in the form shown, should be such an acute angle with the vertical that the line of the outer portion of the arms 31 will be at substantially the angle of repose of the earth deposit and with the arms 31 extending well beyond the projected area of the chassis.

As the machine is moved along, the element 32 is rotated and loosens the material, which rolls down toward opening 35c largely through gravity. Lifting of material by the blades 32a is therefore necessary with respect to the lower third, or thereabouts, of the cut.

The embodiment of the invention shown in Figures 6 and 7 is for the purpose of canal excavation in similar alluvial deposits. In this form, the chassis, represented as a whole by the numeral 100, carries at its forward end the digging device, which in this form, is shaped like an inverted truncated cone; when moved forward during operation, excavating a channel having a flat bottom and sloping sides, the slope of course being the predetermined angle of the excavator.

The digging or excavating device is constructed in much the same fashion as that of Figures 1 to 5 in that there is a rotatable central member 101 upon the periphery of which are the earth agitating arms 102 and a shield member 103 housing the agitator member around that portion not in contact with the earth bank. In the present case, however, the member 101 is preferably cylindrical as shown and shield 103 is only substantially semicircular.

Since it is desirable to produce a channel having a flat bottom, the bottom plate 104 will have its forward edge substantially straight or only slightly curved as indicated in Figure 7 and depressed as indicated in Figure 6, and extending the full width of the lower part of the digger..

At the rear portion of plate 104 an opening 105 is provided and such opening preferably extended by cutting away a notch in the lower edge of shield 103. This opening is of course to permit the discharge of dirt from the digger upon a suitable conveyor, such as is indicated at 107, of considerable capacity.

The rotary member 101 is preferably mounted upon a centered stationary plate or platform 110 on bearings such as have been described in connection with Figures 1 to 5, such bearings being indicated at 111, while the motor 112 for driving the rotary member 101 may be mounted therewithin upon the platform 110. This same motor, or another suitably located, may also be used for propulsion of the chassis 100 and conveyor 107.

Now having described the invention and the preferred embodiment, it is to be understood that said invention is to be limited, not to the specific details herein described, but only by the scope of the claims which follow:

What I claim is:

1. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one edge of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, a receiver for earth discharged from said housing, and means for rotating said spindle as said chassis is propelled.

2. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one edge of said chassis arranged at an acute angle to the vertical, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, a receiver for earth discharged from said housing, and means for rotating said spindle as said chassis is propelled.

3. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one edge of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, said spindle and arms forming a conical assembly, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, a receiver for earth discharged from said housing, and means for rotating said spindle as said chassis is propelled.

4. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one side of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, the outer forward edge of said closure member being formed with a substantially horizontal blade portion, a receiver for earth discharged from said housing, and means for rotating said spindle as said chassis is propelled.

5. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one edge of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing

for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, said spindle arm and assembly being conical and arranged with the line of the extreme outer part of the earth contacting portion substantially coinciding with the angle of repose of the earth deposit, a closure member at the bottom of said housing and having a discharge opening, a receiver for earth discharged from said housing, and means for rotating said spindle as said chassis is propelled.

6. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one edge of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, conveyor means for receiving earth discharged from said opening, and means for rotating said spindle as said chassis is propelled.

7. An excavating machine for alluvial earth deposits consisting of a propellable chassis, an upwardly extending rotatable spindle at one side of said chassis, earth agitating arms carried by said spindle and extending well beyond the projected area of said chassis, a shield or housing for the spindle and arms and enclosing the latter for the greater portion of the periphery thereof, but open over the earth contacting portion, a closure member at the bottom of said housing and having a discharge opening, the outer forward edge of said closure member being formed with a substantially horizontal blade portion, conveyor means for receiving earth discharged from said opening, and means for rotating said spindle as said chassis is propelled.

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