Jan. 8, 1935. W. A. HUELSDONK 1,987,192

DISINTEGRATOR

Filed Nov. 14, 1932 5 Sheets-Sheet 1

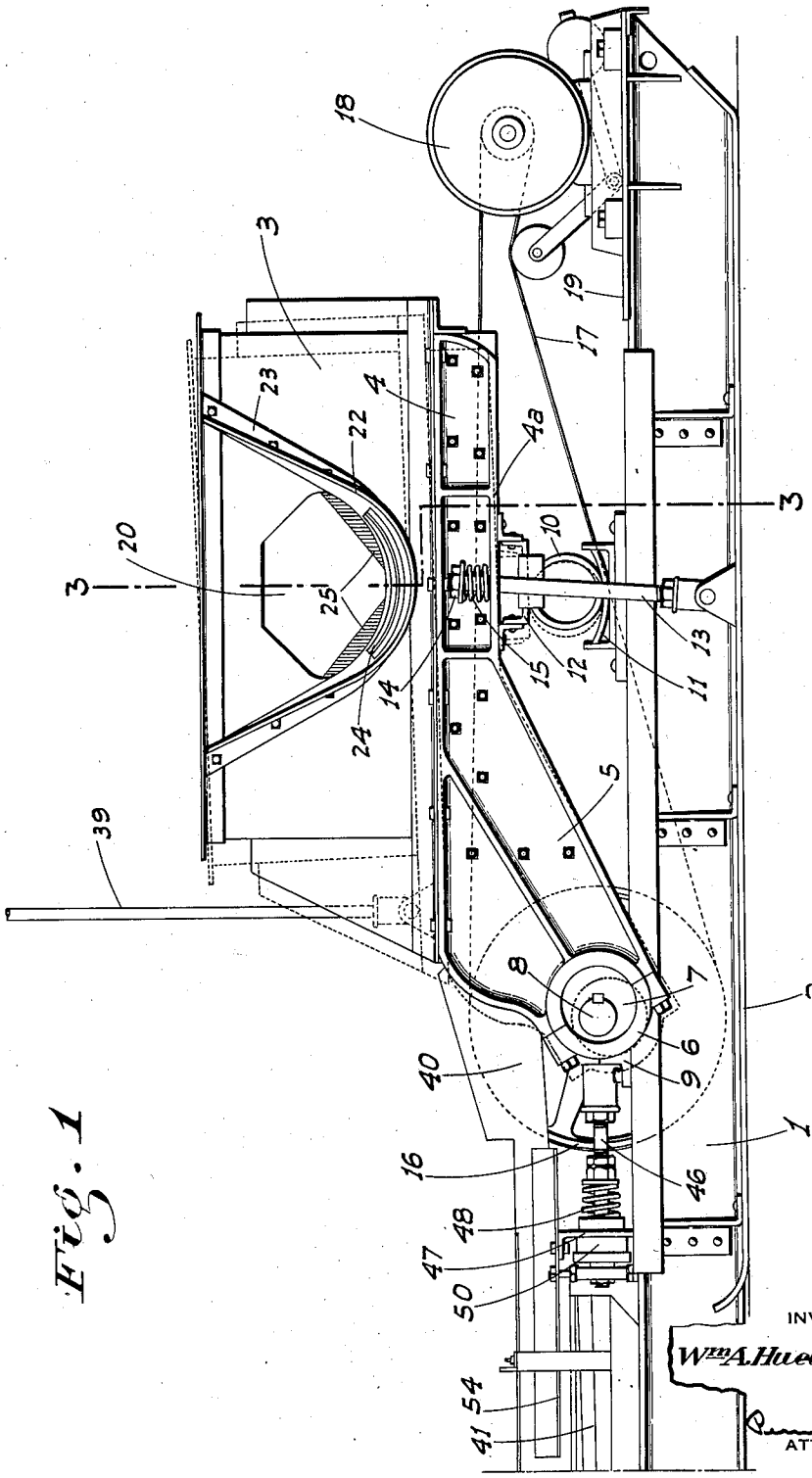

Fig. 1

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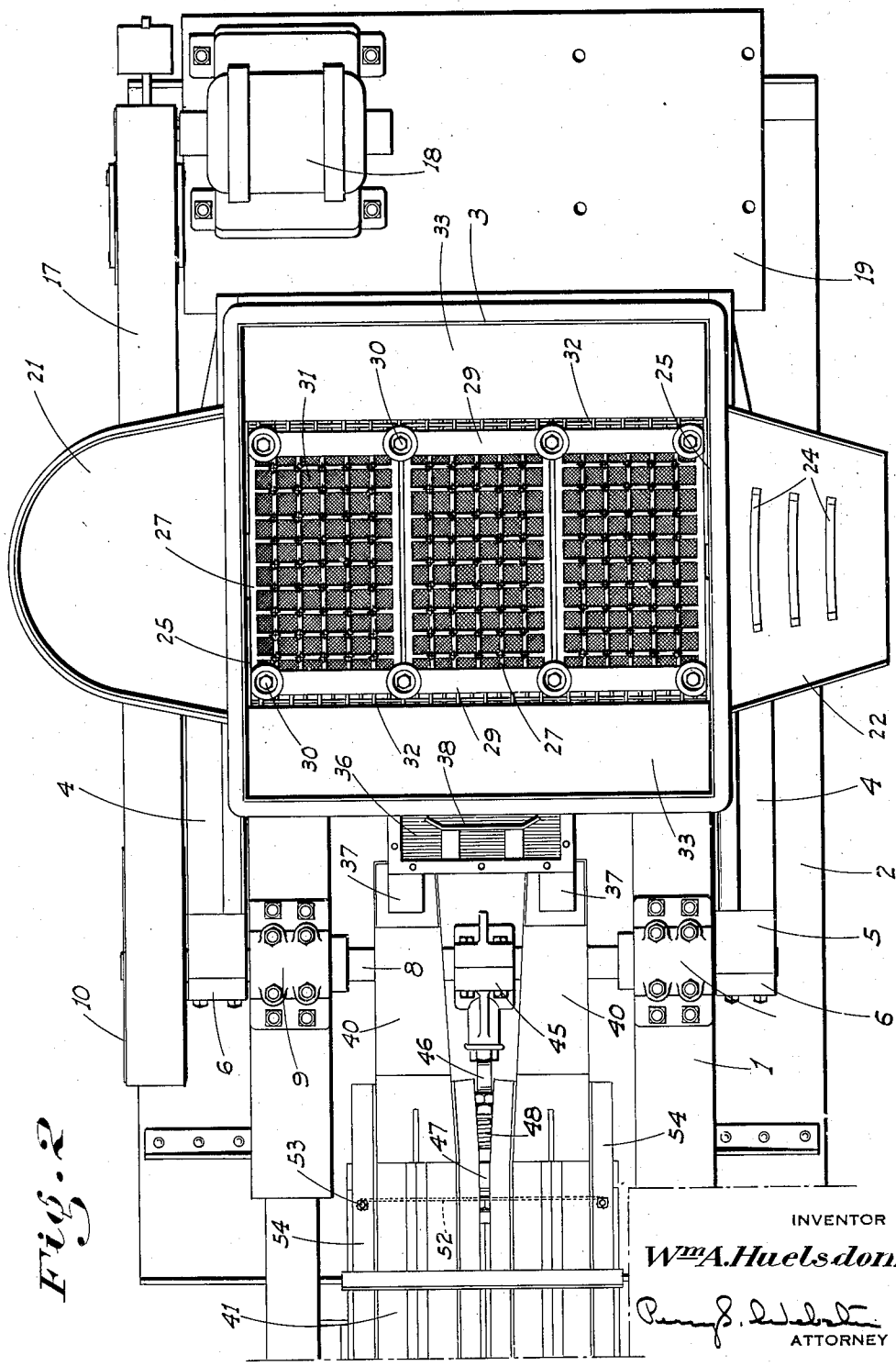

Fig. 2.

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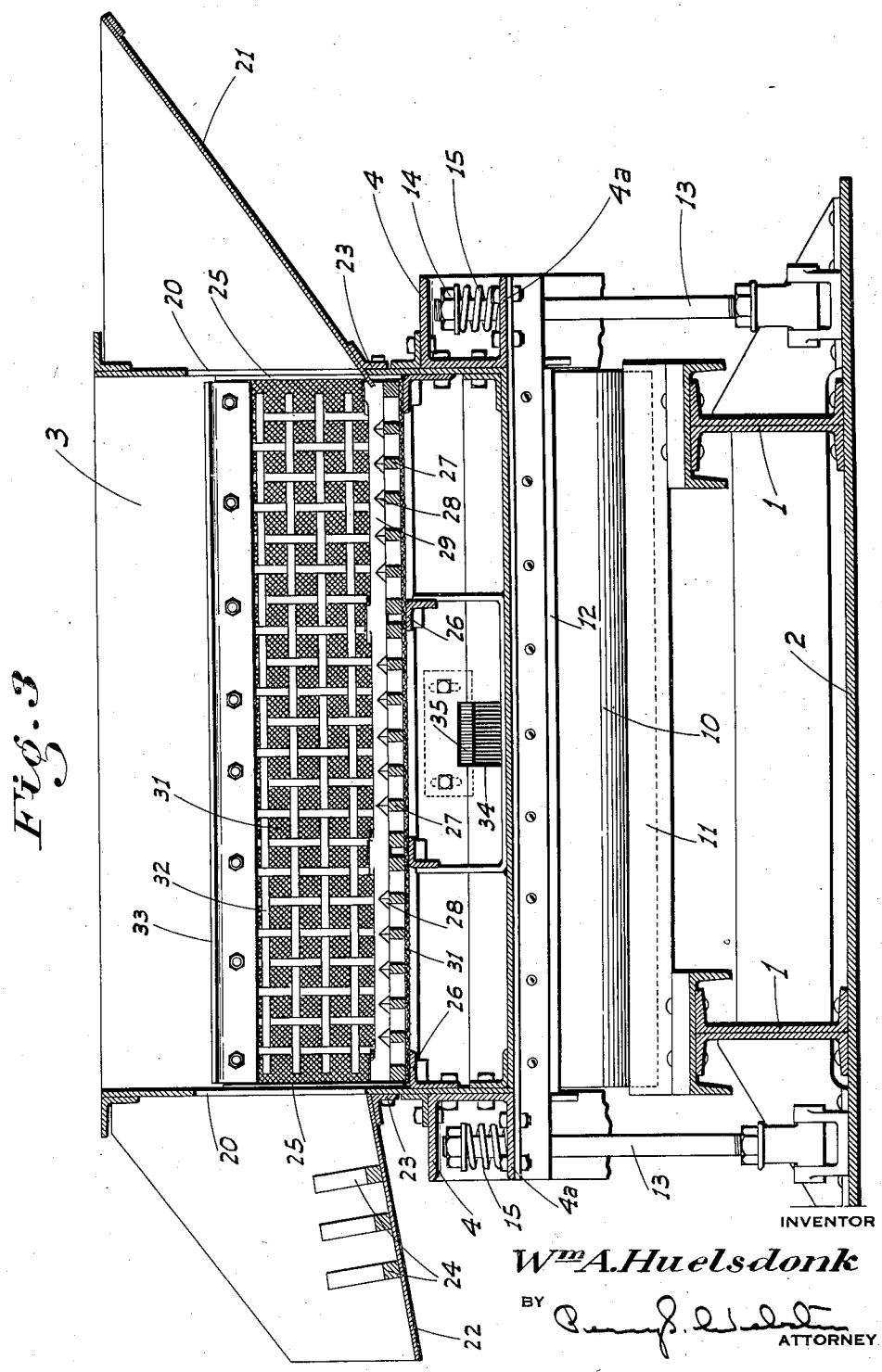

Fig. 3

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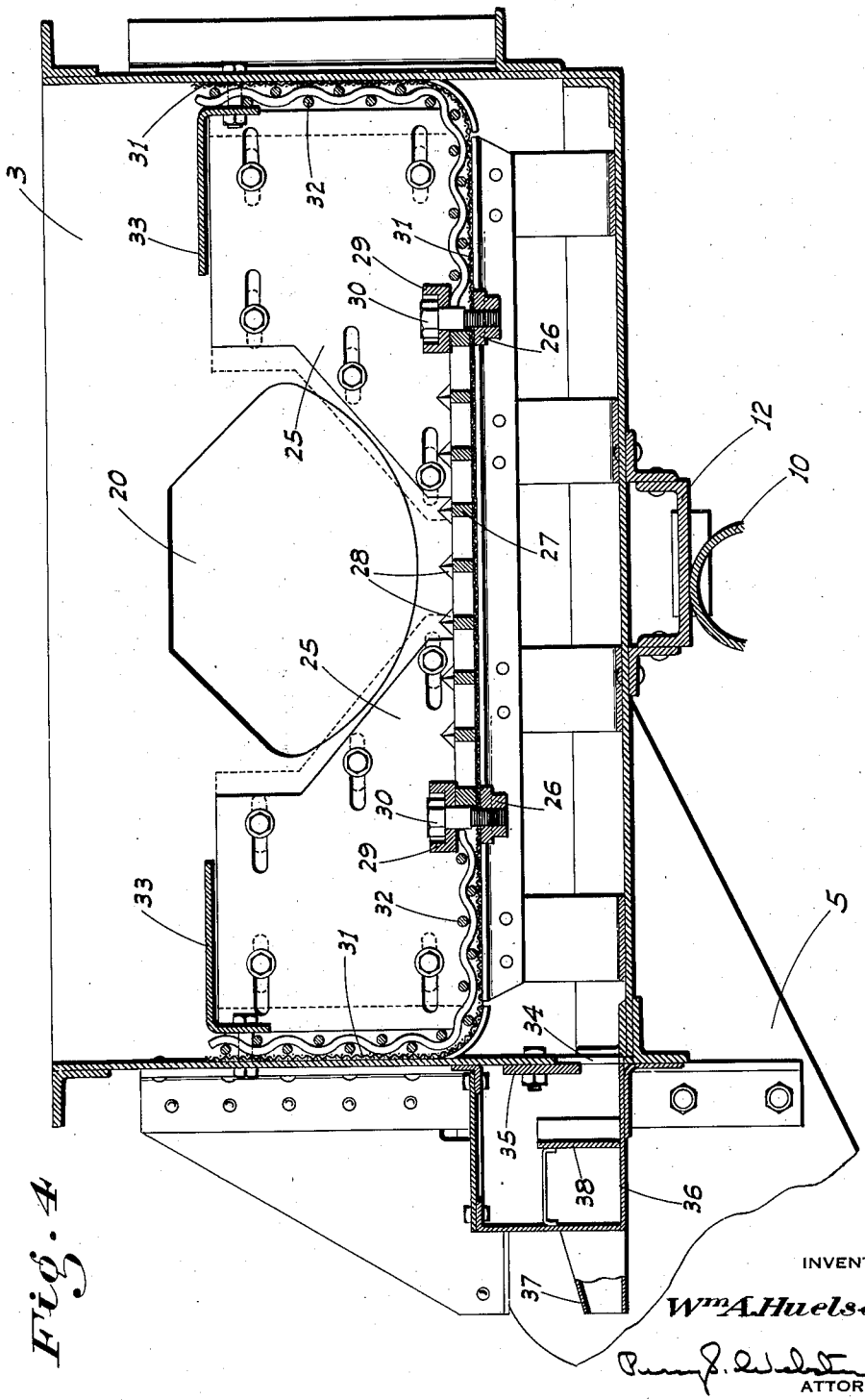

Fig. 4

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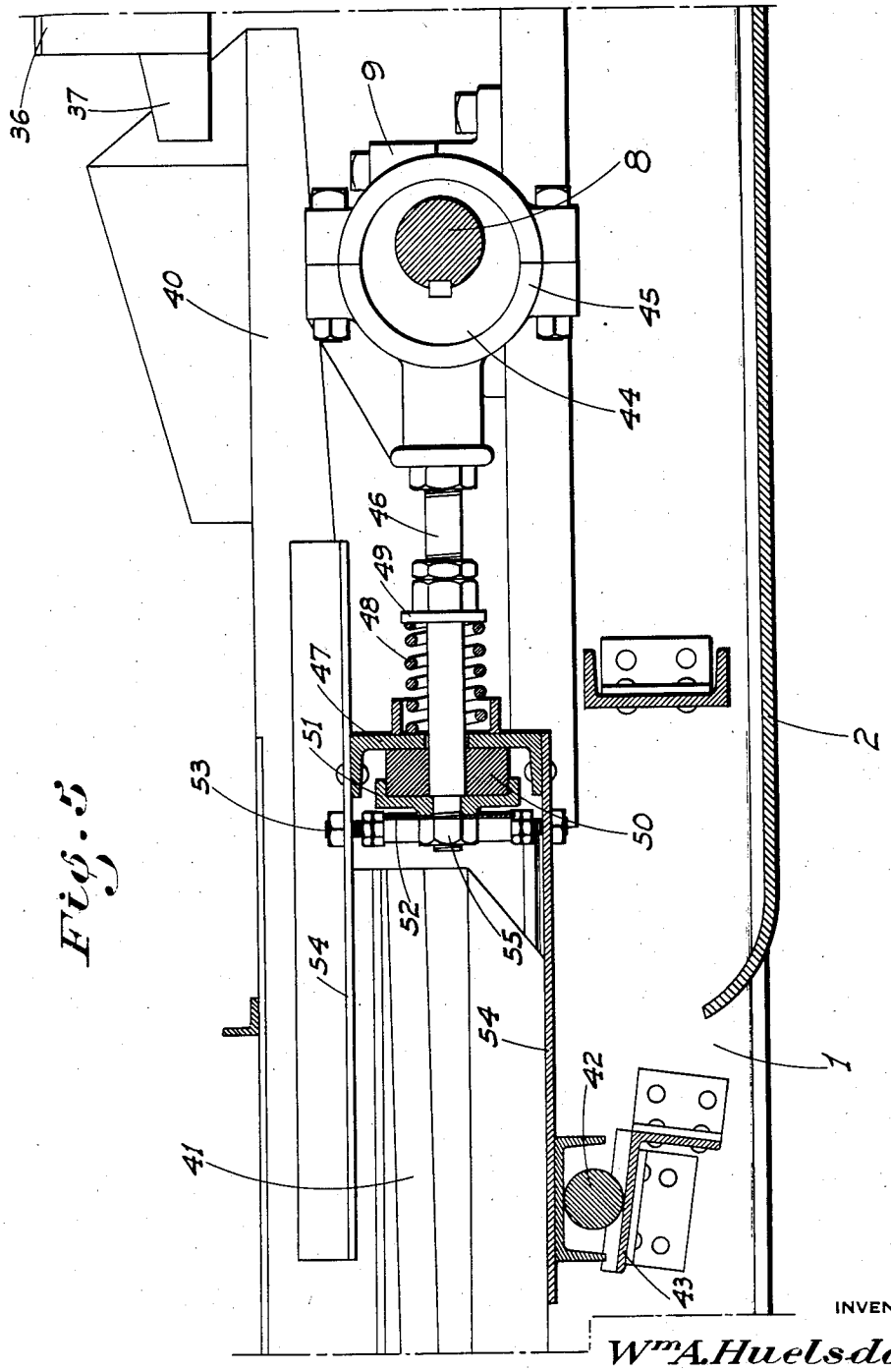

Fig. 5

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Patented Jan. 8, 1935 1,987,192

UNITED STATES PATENT OFFICE

1,987,192

DISINTEGRATOR

William A. Huelsdonk, Oakland, Calif., assignor to Clarence F. Dickenson, Fresno, Calif.

Application November 14, 1932, Serial No. 642,569

11 Claims. (Cl. 83—46)

This invention relates to mining machinery and particularly to a machine for use in gold and other precious metal mining operations, in connection with the recovery of free gold from the non-valuable matter with which it is initially mixed or associated.

The principal object of my invention is to provide an apparatus to initially receive such matter as it is dug and which may include sand, gravel, stones of various sizes, gold bearing quartz etc., and which will automatically cause the disintegration of the quartz and like material, will reject the stones and other bulky and valueless matter, while the precious particles, sand, fine gravel etc. will be retained and separated from such valueless matter and will be discharged to a suitable concentrator directly associated with the disintegrator.

A further object of the invention is to construct a machine so that no attention is required in its operation, and with the constant feeding of the material to the machine in predetermined volumes, the disintegrating action and the subsequent separating and discharge of the matter to be concentrated takes place automatically. Also there is nothing to get out of order or clog up and the parts subjected to rapid wear are made especially strong and wear resisting and may be easily replaced when worn out. Also such parts may be easily removed from the machine at any time when it is desired to clean the same.

Still another object is to mount the disintegrator and concentrator for the necessary shaking movement on a common base, and to employ a common power means for operating the shaking mechanisms of both machines, thus eliminating duplication of parts to a large extent and providing a compact unit.

These objects I accomplish by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings similar characters of reference indicate corresponding parts in the several views:

Fig. 1 is a side elevation of the machine shown in connection with a concentrator.

Fig. 2 is a top plan view of the same.

Fig. 3 is a transverse section on the line 3—3 of Fig. 1.

Fig. 4 is a longitudinal section of the hopper of the machine.

Fig. 5 is a fragmentary longitudinal section showing the driving or shaking connection between the concentrator and the power driven shaft.

Referring now more particularly to the characters of reference on the drawings, the base of the apparatus comprises a pair of transversely spaced beams 1 which support the disintegrator and concentrator; said beams being suitably braced at intervals and connected together to form a rigid frame. This frame at its forward end is mounted on a relatively wide and heavy skid plate 2, which rests directly on the ground or floor.

Disposed above the beams at their forward end is the disintegrating hopper which comprises a rectangular member 3 built up of structural steel elements and which is freely open on top but closed throughout its bottom area. The hopper along its sides and adjacent the bottom is securely bolted to cast beams 4 which at their rear ends are formed with angular depending extensions 5 provided at their lower ends with eccentric engaging straps 6. The eccentrics 7 with which these straps are engaged are secured on a transverse shaft 8 journaled in bearings 9 supported on the beams 1.

A roller 10 extends transversely of and under the hopper intermediate its ends, said roller riding in a concavely curved cradle 11 supported on the beams 1 and also engaging a plate 12 preferably formed by a channel which extends between and is secured to the under faces of the beams 4.

With the driving of the shaft 8 therefore the hopper will be rocked or shaken back and forth, the roller 10 acting substantially as a shaft so that with such rocking the hopper will tip up and down at its opposite ends. At the same time the roller moves lengthwise of the beams 1 somewhat and is alternately raised and lowered slightly on account of the shape of the supporting cradle 11. This compound movement of the hopper which is imparted thereto about 180 times a minute prevents anything tending to settle and remain in the bottom of the hopper for any length of time.

To prevent the hopper from possibly jumping from the roller with this relatively rapid shaking movement, upstanding rods 13 are pivoted at their lower ends on the plates 2 to the sides of the roller, and project upwardly through the lateral base flanges 4a of the beams 4. The upper ends of the rods are capped by adjustable nuts 14, there being compression springs 15 about the rods between the nuts and the flanges 4a. The hopper is thus yieldably held down so that it cannot jump up but no interference is offered with the necessary slight vertical or longitudinal movement of the same.

The shaft 8 at one end is provided with a pulley 16 engaged by a belt 17 which is driven from an electric motor 18. This motor is disposed at the front end of the beams 1 beyond the hopper and is mounted on a plate 19 supported on said beams. The plate is drilled on its opposite sides to receive the motor base bolts as shown in Fig. 2 so that the motor can be mounted on either side of the plate and hopper as installation requirements may dictate.

The hopper is provided centrally between its ends and intermediate the top and bottom with symmetrical openings 20 one of which serves as an intake and the other as an outlet for the material to be treated. Extending about the lower portion of one opening on the outside of the hopper is the material receiving scoop 21, while similarly disposed relative to the other opening is an outlet trough or chute 22. The chute and scoop are both provided at their hopper end with symmetrical bands 23 removably bolted to the hopper walls so that said members may be interchanged in position as convenience or the needs of installation and operation may require. The chute preferably has transverse riffles 24 to minimize the wear on the same due to the heavy matter discharged onto said chute and to catch any precious metal particles which might possibly be discharged along with the residue.

Inside and adjustably secured to the side walls of the hopper are horizontally movable wear plates 25 adapted to be moved toward and from the open sides of the corresponding opening. The plates of the discharge opening are normally set so that their edges project inwardly of the opening somewhat as shown in Fig. 1, and thus take the abrasive wear of the discharging material which otherwise would be imparted directly to the side walls of the hopper about the edge of the opening. The plates are removable so that when worn back as far as their adjustment permits they may be easily and cheaply replaced.

Mounted in the hopper in transversely spaced relation a short distance below the openings 20 are longitudinally extending bars 26 which support removable rectangular grids 27. The grids are of heavy and wear resisting material such as manganese steel and are provided with upstanding spikes 28 at the corners of the grid openings. The grids are clamped in place at their ends by transverse bars 29 over the same and which are secured to the supporting bars 26 by cap screws 30 or the like. A relatively fine mesh screen 31 covers the entire horizontal area of the hopper immediately under the grids and between said grids and the bars 26 and extends up the end walls a certain distance as shown.

The grids extend from side to side of the hopper but occupy only the central longitudinal portion of the same, the screen between the ends of the grids and the end walls of the hopper and up said end walls being covered by a very coarse mesh screen 32 preferably made of rods. Secured to the end walls of the hopper at the top of the screens and clamping the same in place are horizontal splash plates 33. These extend the full width of the hopper from said end walls toward each other and terminate substantially in the vertical planes of the opposed edges of the clamping bars 29.

The rear end wall of the hopper at the bottom and centrally of its width is provided with a relatively small outlet opening 34 with which a vertically adjustable gate 35 is associated. The gate is on the outside of the wall but inside a removable-lidded box 36 which projects from the hopper and into which the outlet 34 opens. Transversely spaced discharge spouts 37 project from the outer end of the box, the flow from the outlet 34 being distributed evenly to the spouts by reason of a vertical baffle plate 38 disposed in the box intermediate the spouts and outlet and extending transversely of said box. This arrangement is for use with a two unit concentrator. If a single unit is employed only one centrally located spout will be necessary as will be evident.

In operation the material to be treated is dumped into the scoop 21 from a suitable supply chute above the same and separate therefrom. Such material passes into the hopper through the adjacent opening 20, a certain quantity of water sufficient to keep the grids constantly covered being fed into the hopper as well. With the longitudinal and vertical shaking of the hopper the material is violently agitated and thrown about, the water sloshing back and forth with a wave-like action with great force, being prevented from splashing out of the hopper by the end splash plates 33.

The movement of the water quickly separates the gravel, sand and the like from the heavy and large stones, etc. and causes this small material to be discharged through the screen 31 at various points of its area into the lower portion of the hopper, from which it is carried through the outlet by the flow of water also passing through said outlet. With this movement of the water such light material is thrown against the end walls of the hopper, the heavy screening 32 acting to prevent the adhesion of any appreciable amount of material such as clay to the walls or the screen 31. I thus prevent such an accumulation of material of this kind on the walls as would ultimately choke up the screen and be detrimental to the desired separating and disintegrating action.

The heavy stones, large pieces of quartz etc. while thrown about by the shaking action of the hopper and the movement of the water are retained on the grids. The constant up and down and longitudinal jerking of the hopper causes the stones etc. to be brought into violent contact with the grid spikes and with the grids themselves. As a result any quartz and similar fracturable pieces are thoroughly disintegrated and broken up into small fragments capable of passing through the screen 31.

After the material has been thus disintegrated and has dropped through the screen 31 it passes through the outlet 34 along with a constant but limited flow of water as previously indicated and is delivered with such water to the concentrator for the separation of any precious content therefrom. The large valueless stones etc. which are not disintegrated by the shaking of the hopper ultimately pass through the upper discharge outlet 20 of the hopper whence they are delivered by the chute 22 to a dump heap.

The disintegrated and separated material is delivered by the spouts 37 onto the intake troughs 40 of a double unit concentrator 41. This may be of any suitable construction but is preferably of the shaking type such as is shown in my Patent No. 1,679,035. While the concentrator itself forms no part of this present invention, still it is an object, as stated in the preamble, to mount the concentrator in unitary connection with the disintegrator and to shake both pieces of apparatus with as little duplication of mechanism as possible.

To this end the beams 1 extend beyond the disintegrator and under the concentrator, the latter being supported at intervals for shaking movement on transverse rollers 42 riding on transverse plates 43 secured to the beams 1 and inclined lengthwise thereof as shown in Fig. 5. The shaft 8 is disposed under the troughs 40 (which extend ahead of the concentrator proper)

and has an eccentric 44 of a lesser stroke than the eccentrics 7 disposed centrally on said shaft between the bearings 9. This eccentric is preferably set on the shaft in opposed relation to the eccentrics 7 so as to aid in balancing the shaft.

A strap 45 engages the eccentric 44 and a rod 46 projects horizontally from said strap and through a cross beam 47 extending transversely of and secured to the concentrator at its forward end. A compression spring 48 is disposed about said rod between the forward face of the cross beam and a collar 49 on the rod. A heavy resilient bumper block 50 through which the rod passes is disposed against the back face of the beam 47 and is engaged on its rear end by a cap 51. A vertical transversely extending spring band 52 is mounted at its opposite ends on bolts 53 which are secured to certain of the concentrator frame elements 54; said band being disposed between the cap 51 and the end nut 55 on the rod 46.

The resilient block provides a flexible mounting for the rod and absorbs vibrations which would otherwise be imparted to the concentrator with the forward stroke of the eccentric rod. The spring 48 gives a yieldable cushioned movement to the concentrator with the back stroke of the eccentric, which is aided by the spring band 52 which prevents the block from jumping away from the cross beam. In this manner the concentrator is given a smooth shaking action without any severe vibrations such as might be detrimental to its efficient functioning.

From the foregoing description it will be readily seen that I have produced such a device as substantially fulfills the objects of the invention as set forth herein.

While this specification sets forth in detail the present and preferred construction of the device, still in practice such deviations from such detail may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described my invention what I claim as new and useful and desire to secure by Letters Patent is:

1. A disintegrator comprising a hopper having opposed material intake and discharge openings in its opposite sides, means to shake the hopper, disintegrating grids in the hopper below said openings but above the bottom of the hopper and on which the materials as fed into the hopper are deposited, and a relatively fine mesh screen extending over the hopper area under the grids; the hopper having an outlet of restricted size below the screen.

2. A disintegrator comprising a hopper having opposed material intake and discharge openings in its opposite sides, and centrally between its ends, means to shake the hopper longitudinally, disintegrating grids in the hopper extending from side to side in the central zone thereof and below said openings, a relatively fine mesh screen extending over the hopper area immediately under the grids, and a course mesh screen between the ends of the grids and the adjacent end walls of the hopper; the latter having a relatively small outlet below the first named screen.

3. A structure as in claim 2, with splash plates extending from side to side of the hopper and toward each other from the end walls of the hopper a certain distance above said grids.

4. A structure as in claim 2, with splash plates extending from side to side of the hopper and toward each other from the end walls of the hopper a certain distance above said coarse screen, the latter extending up the end walls of the hopper to said plates.

5. A disintegrator comprising a hopper having openings in its opposite sides, means mounting the hopper for longitudinal shaking movement, material receiving and discharge members secured to the outside of the hopper in register with the openings, disintegrating and screening elements in the hopper below the openings, there being an outlet from the hopper below the screening elements, and splash plates secured to the end walls of the hopper and projecting toward each other and disposed above the level of the disintegrating elements.

6. A disintegrator comprising a hopper having openings in its opposite sides, means mounting the hopper for longitudinal shaking movement, material receiving and discharge members secured to the outside of the hopper in register with the openings, disintegrating and screening elements in the hopper in register with the openings, disintegrating and screening elements in the hopper below the openings, there being an outlet from the hopper below the screening elements, and coarse mesh screening disposed against the end walls of the hopper and projecting upwardly from the level of the disintegrating elements.

7. A structure as in claim 5, with coarse mesh screening disposed against the end walls of the hopper and extending between the disintegrating elements and splash plates.

8. A disintegrator comprising a hopper having material intake and discharge openings, means to shake the hopper, disintegrating grids in the hopper comprising rigid crossed bars with spaces therebetween, means supporting said grids in spaced relation to the bottom of the hopper, a screen under the grids and above said bottom and spikes projecting upwardly from the grid bars at intervals.

9. A disintegrator comprising a hopper having material intake and discharge openings, means to shake the hopper in a longitudinal direction, disintegrating means in the hopper above the bottom thereof, a screen under said means above said bottom, and an outlet from one end wall of the hopper below the screen.

10. A disintegrator comprising a hopper having material intake and discharge openings, means to shake the hopper in a longitudinal direction, disintegrating means in the hopper above the bottom thereof, a screen under said means above said bottom, an outlet chamber projecting from one end wall of the hopper and communicating freely with said hopper below the screen, said chamber having transversely spaced outlet chutes projecting from its outer end, and means in the chamber to deflect material therein evenly to both chutes.

11. A disintegrator comprising a hopper having material disintegrating elements therein and an outlet opening for such material in one wall of the hopper above the elements, wear plates inside the hopper on opposite sides of the opening, and means mounting said plates on said wall of the hopper for horizontal adjustment whereby the adjacent edges of the plates may be set inwardly of the opposed edges of the opening to prevent direct wearing contact of the material with such edges.

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