

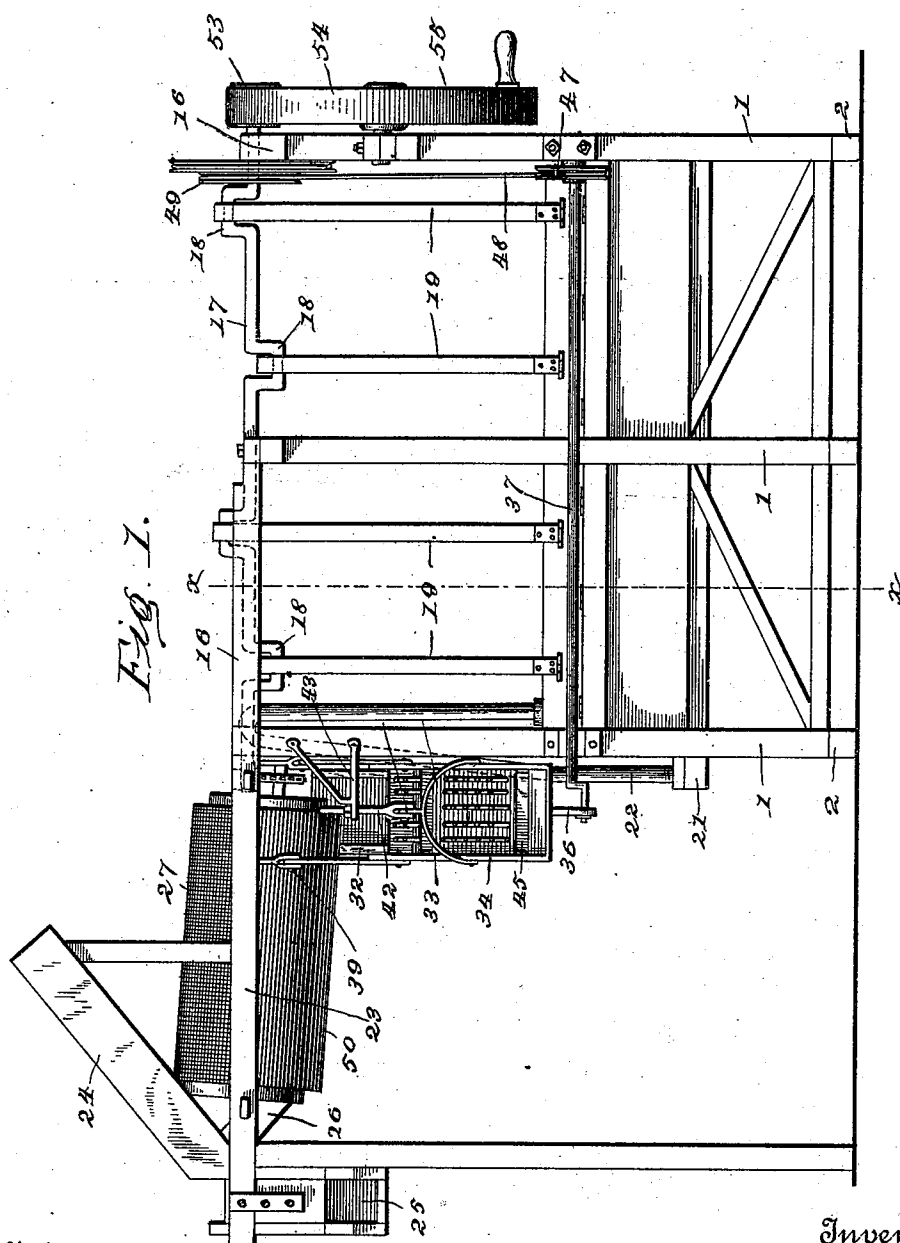
(No Model.)

3 Sheets—Sheet 1.

G. O. DICKINSON & R. G. GRAVES.
 DRY WASHING MACHINE AND CONCENTRATOR.

No. 548,299.

Patented Oct. 22, 1895.



Witnesses
Thos. L. Gatchel.
H. P. Wilson.

Inventors
 George O. Dickinson &
 Rodrick J. Graves
 by John L. Addelman
 their Attorney.

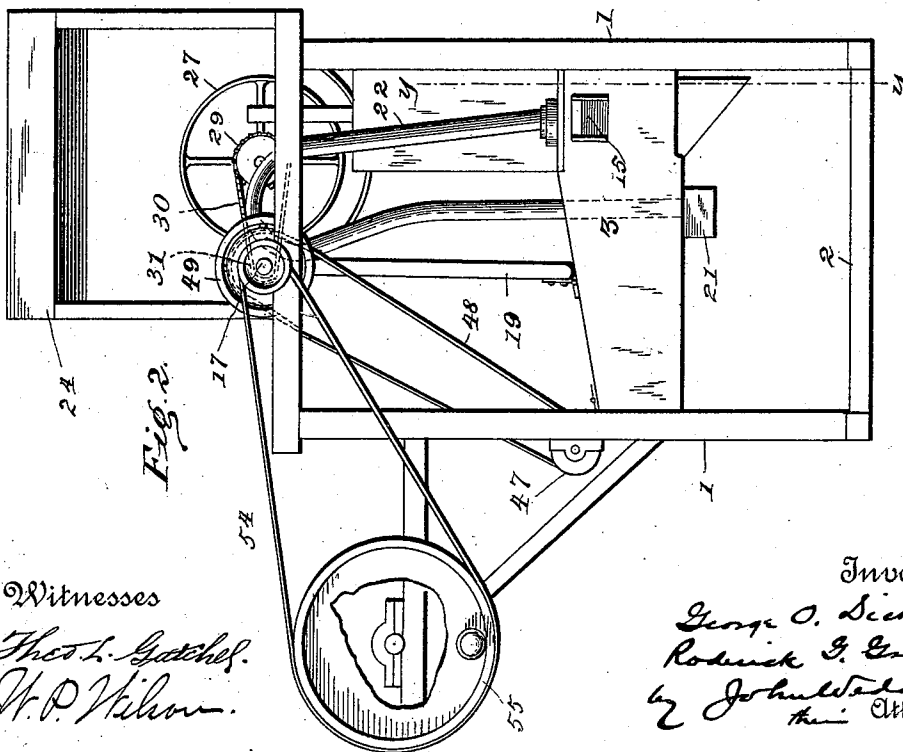
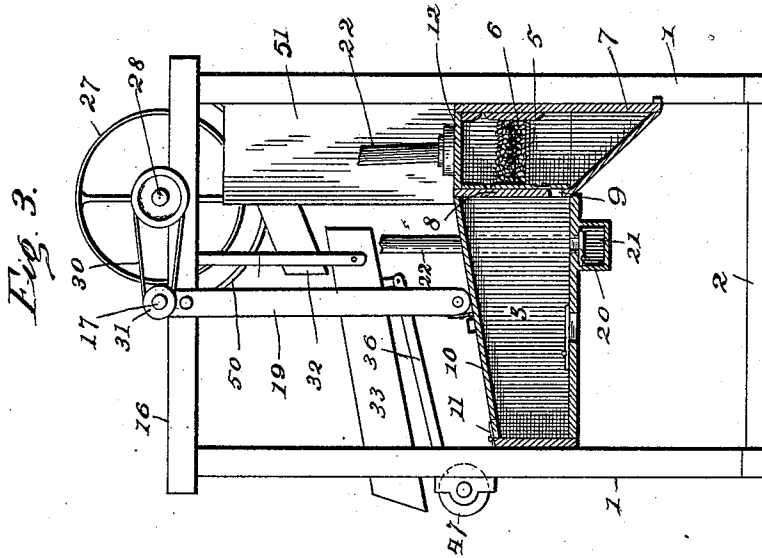
(No Model.)

3 Sheets—Sheet 2.

G. O. DICKINSON & R. G. GRAVES.
 DRY WASHING MACHINE AND CONCENTRATOR.

No. 548,299.

Patented Oct. 22, 1895.



Witnesses

Theo. L. Gatchel.
W. P. Wilson.

Inventor

George O. Dickinson &
Rodrick J. Evans
by John L. Addicks
their Attorney.

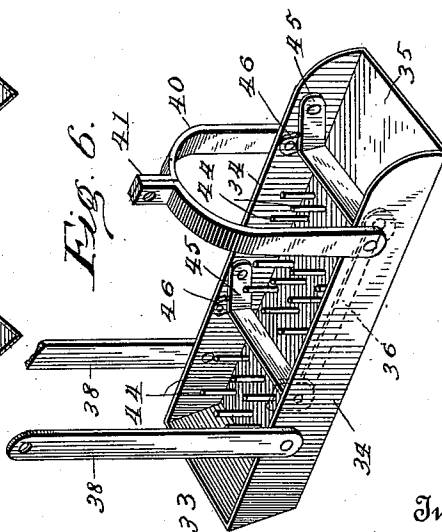
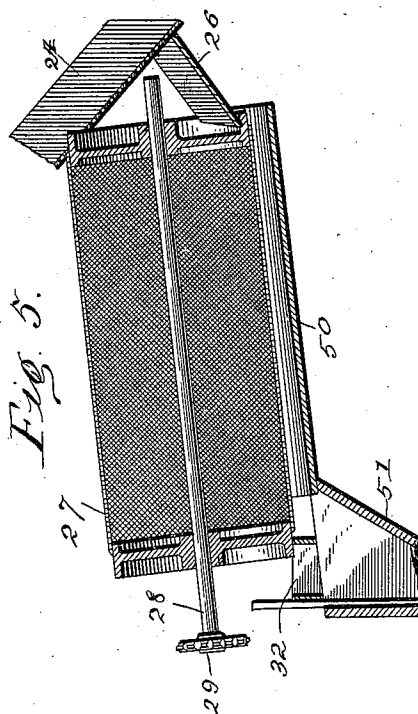
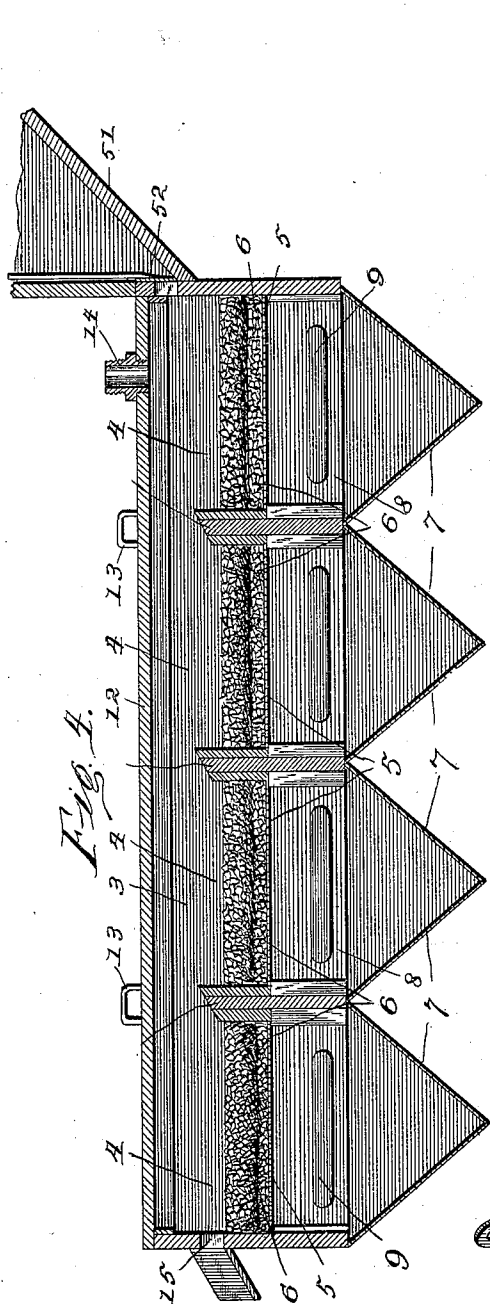
(No Model.)

3 Sheets—Sheet 3.

G. O. DICKINSON & R. G. GRAVES.
DRY WASHING MACHINE AND CONCENTRATOR.

No. 548,299.

Patented Oct. 22, 1895.



Witnesses
Thos. L. Gatchel.
W. P. Wilson.

Inventors.
George O. Dickinson,
Rodrick G. Graves,
by John W. Addendum,
their Attorney.

UNITED STATES PATENT OFFICE.

GEORGE O. DICKINSON AND RODERICK G. GRAVES, OF BUTTE, MONTANA.

DRY-WASHING MACHINE AND CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 548,299, dated October 22, 1895.

Application filed December 18, 1894. Serial No. 532,130. (No model.)

To all whom it may concern:

Be it known that we, GEORGE O. DICKINSON and RODERICK G. GRAVES, citizens of the United States, residing at Butte, in the county of Silver Bow and State of Montana, have invented certain new and useful Improvements in Dry-Washing Machines and Concentrators; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in dry-separating and concentrating machines for the ores of precious metals, the object of the same being to provide a device of this character which is comparatively simple in construction and is more effective in operation than any device of the kind which has preceded it.

The invention consists of a casing mounted upon suitable supports and divided into one or more compartments, each of which is provided with a horizontally-disposed screen upon which is placed a ragging of sulphureted lead, copper, or iron ore, or other heavy material, broken to a size near to that of the openings in the screen, but which will be supported upon the screen and not pass there-through. In each of the compartments we provide a bellows, each of which has a pitman connected thereto, which pitmen are connected at their upper ends to a crank-shaft rotated from a suitable source of power. The ore to be separated and concentrated is fed upon the ragging and the bellows force air from the under side of said ragging, agitating the same in connection with the granulated ore, causing the heavy particles thereof to fall through into hutches. We also provide a passage-way for air beneath the bellows, which connects by a suitable flexible pipe with valved openings in the cover of the different compartments, whereby surplus air is forced over the top of the ragging and ore, carrying off the finer particles through a discharge-outlet at one end of the machine. In connection with the foregoing we also provide a ridge for screening the ores, which feeds the finer particles thereof into a rotating screen, where the same are further separated, the finer particles thereof passing through said

rotating screen into a cradle which leads into a chute having a sliding gate or door, by means of which the fine particles of ore may be fed into the compartments referred to on top of the ragging. The coarser particles are led from said rotating screen or drum onto a shaking-slucice, the heavy particles thereof being caught by removable riffles therein.

The invention also consists in other details of construction, combinations of parts, and arrangements of instrumentalities which will be hereinafter more fully described and claimed.

In the drawings forming a part of this specification, Figure 1 represents a side elevation of our apparatus complete. Fig. 2 is an end view of the same. Fig. 3 is a section on the line *x x* of Fig. 1. Fig. 4 is a sectional view on the line *y y* of Fig. 2. Fig. 5 is a longitudinal sectional view of the rotating screen-drum, showing its connection with the feeding-chute of the machine. Fig. 6 is a detail perspective view of the shaking-slucice.

Like numerals of reference indicate like parts in the various views.

The framework of our machine consists of a series of uprights 1 1, which are suitably braced and supported upon base-pieces 2 2. Within the uprights 1 the casing 3 is located, which, as shown, is divided into four compartments 4, in each of which is a screen 5, upon which is placed ragging 6, which consists of sulphureted lead, copper, or iron ore or other heavy material broken to a size somewhat larger than the openings in the screen 5. From each of the compartments 4 leads a hutch 7, into which the washed ore is fed. The compartments 4 are divided transversely by a partition 8, having valves 9 in the lower part thereof. Back of the partitions 8, in each of the compartments 4, we place bellows 10, consisting of a hinged diaphragm or board which is adapted to be vibrated upon its pivot 11 and force air through the valve 9 and beneath the screen 5 and ragging 6. The compartments 4 are further provided in front of the partition 8 with a common lid or cover 12, having suitable handles 13, by means of which it may be removed. In the cover 12 is a valved pipe connection 14 for a purpose which will appear later. At one end of the casing 3 is a discharge-outlet 15. The uprights 1 have cross-beams 16 connecting them at their upper ends,

and in the said cross-pieces 16 is mounted a crank-shaft 17 running longitudinally of the machine. In the crank portions 18 thereof are connected a series of pitmen 19, which
 5 are pivotally connected at their other ends to the bellows 10. By the rotation of the said crank-shaft by this construction the bellows are vibrated back and forth. The lower part of the casing 3 just beneath the bellows 10 is
 10 provided with a series of valved openings 20, beneath which and running longitudinally of the machine is an air passage or duct 21, from one end of which leads a flexible pipe or hose 22, the other end of which pipe is connected
 15 to the valved opening 14 in the lid or cover 12. The excess of air from the bellows 10 which does not pass through the valve 9 in the partition 8 passes through the valved opening 20, air-duct 21, flexible pipe 22,
 20 through the opening 14 in the cover 12, and forces the lighter particles of dirt, &c., out through the discharge-opening 15 in the casing 3.

Supported upon extension-bars 23 of the
 25 framework just described is an angularly-disposed screen or riddle 24, from the lower outer end of which extends a chute 25. From the bottom of the riddle 24 extends a carrier 26, leading to the inside of a rotating screen-drum 27, which is mounted upon a suitable
 30 axle 28. Said axle 28 has a sprocket-wheel 29, on the inner end thereof, around which passes a sprocket-chain 30, connecting with a sprocket-wheel 31 on the crank-shaft 17. The
 35 rotation of the shaft 17 therefore causes the rotation of the screen-drum 27. Leading from the inner end of the said screen-drum 27 is a chute 32, by which the coarse ore which does not pass through the said screen is discharged
 40 into a shaking-slucice 33. This sluice is shown in detail in Fig. 6 and consists of a frame having two side bars 34 and a bottom 35, with a pitman 36 connected to the center thereof, the outer end of which connects with a crank-shaft 37, mounted in bearings along the sides
 45 of the uprights 1. To the side pieces 34 of said shaking-slucice are pivotally secured, at the rear end thereof, rods 38, which are pivoted at their upper end, as at 39, to a suitable part of the framework of the machine.
 50 To the said side bars, at the forward end thereof, is secured a strap or loop 40, formed with a slotted projection 41 thereon, to which is pivoted a rod 42, pivotally secured to a bracket 43, secured to one of the uprights 1.
 55 The bottom 35 of said sluice is provided with a series of upwardly-projecting pins 44, and on the inner side of the side pieces 34 are pivoted removable riffles 45, as clearly shown in the drawings. These riffles are held in their
 60 downward position by means of pivoted stops or catches 46. The shaft 37 is formed with a cranked projection at the end to which the pitman 36 is attached, and at the other end is provided with a pulley 47, around which
 65 passes a belt 48, which passes around a similar pulley 49 on the crank-shaft 17. The ro-

tation of the crank-shaft 17 therefore causes the rotation of the shaft 37, and through the crank-extension on the same, the pitman 36, 70 and the loose support for the sluice 33, a shaking motion is given to said sluice. The coarse particles of ore coming from the inside of the rotating screen-drum fall upon the shaking-slucice 33, the dirt coming in contact 75 with the projections rising from the bottom thereof, thereby keeping the particles agitated so that the gold settles to the bottom and is caught by the riffles 45. The said riffles can be raised and the gold or concentrates 80 shaken from the sluice. Beneath the screen drum 27 is a semicylindrical cradle 50 which receives the screenings from the drum 27 and conducts the same into a chute 51, secured to one of the uprights 1 and leading into the up- 85 per part of the casing 3. The discharge outlet from the chute 51 is provided with a sliding gate 52, by means of which the screened ore fed onto the ragging 6 may be regulated. The outer end of the crank-shaft 17 is pro- 90 vided with a fixed roller or pulley 53, around which a belt 54 passes for transmitting power to operate the machine from a suitable source thereof, as, for example, the hand-wheel 55, suitably mounted in bearings in the frame- 95 work.

The invention has been sufficiently described, it is thought, to enable the operation thereof to be readily understood.

Starting then with the apparatus in the po- 100 sition shown in Fig. 1, with the ragging 6, consisting of sulphureted lead, iron, or copper ore, spread over the screen 5 and the lid or cover 12 in place, the operation is as follows: The ore to be treated is granulated and is 105 then thrown upon the inclined riddle 24, the coarser particles thereof, which do not pass through the same, being discharged upon the ground through the chute 25. The particles which do pass therethrough are led upon the 110 carrier 26 to the inside of the rotating drum 27, and at the same time power is applied by means of the hand-wheel 55 or in any other suitable way to rotate the shaft 17. The sprocket-wheel and chain connection between 115 the shaft 17 and the axle of the rotating drum 27 causes a rotation of the latter. The rotation of said drum causes a further screening of the ore, the coarser particles thereof passing from the inside to the chute 32 and thence 120 upon the shaking-slucice 33. This shaking-slucice, by means of the upright projections therein, causes an agitation of the ore, and the heavier particles thereof fall to the bottom and are caught by the removable riffles 45. 125 The particles of the ore screened by the drum 27 pass therethrough into the semicylindrical cradle 50 and thence through the chute 51 onto the ragging 6 in the casing 3. The rotation of the shaft 17 further causes a vibratory 130 movement to be imparted to the pitmen 19, which operate the bellows 10, forcing a blast of air through the valve 9 up through the screen 5, ragging 6, and ore thereon, agitating

the same and causing the heavier and finer particles of said ore to pass through the screen 5 down into the hutch 7. The excess of blast made by the bellows 10 which does not pass through the valve 9 to the under side of the screen 5 and ragging 6 passes through the valve-opening 20 into the air-duct 21, flexible pipe 22, through the valved opening 14 into the upper part of the casing 3, beneath the cover 12. This drives the light particles or waste through each compartment to the discharge-opening 15 out of the machine.

By the foregoing construction it is readily seen that we have devised an apparatus which is very simple in construction, extremely effective in operation, and in which modifications in details can be resorted to without departing from the nature or spirit of the invention or sacrificing any of its advantages.

Having now described our invention, what is claimed as new, and desired to be secured by Letters Patent, is—

In a device of the character set forth, the combination of a suitable frame work consisting of uprights, and cross beams at the upper

ends thereof, a crank shaft mounted in said cross beams, and means for transmitting power thereto, a casing mounted in said frame divided into a series of compartments and having a common lid or cover for each of said compartments and a discharge-outlet beneath said lid or cover, screens adapted to carry ragging in each of said compartments upon which the ore to be treated is placed, a series of bellows, one for each compartment, an air duct leading from the lower part of said casing in which the bellows are mounted, to an opening in the lid or cover, and pitmen connecting said bellows and the crank portion of said crank shaft, substantially as and for the purpose described.

In testimony whereof we have signed this specification in the presence of two subscribing witnesses.

GEORGE O. DICKINSON.
RODERICK G. GRAVES.

Witnesses:

THOMPSON CAMPBELL,
JARVIS J. HAMMER.