

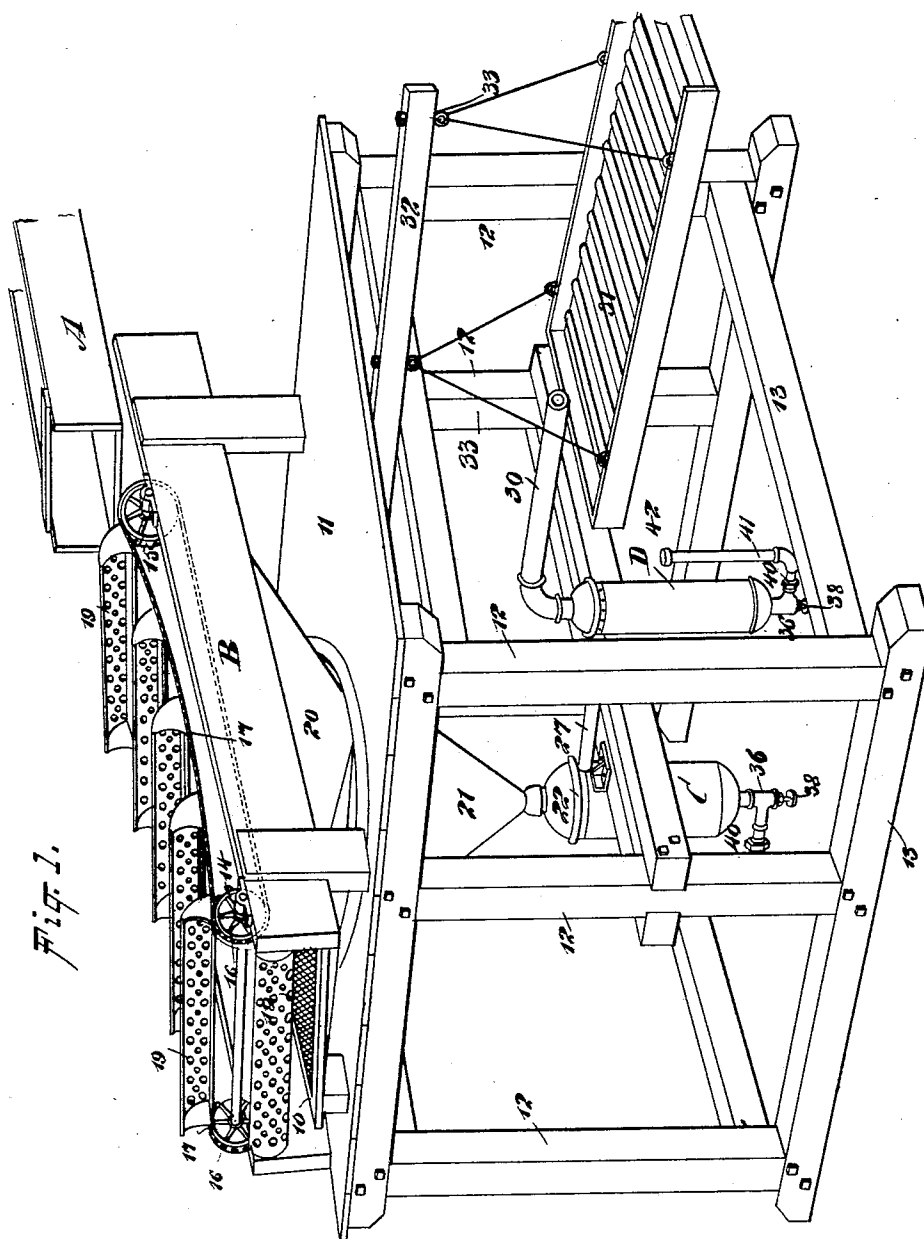
(No Model.)

4 Sheets—Sheet 1.

A. McKELLAR.
CONCENTRATOR AND AMALGAMATOR.

No. 586,451.

Patented July 13, 1897.



WITNESSES:

William P. Goebel.
J. A. Acker.

INVENTOR

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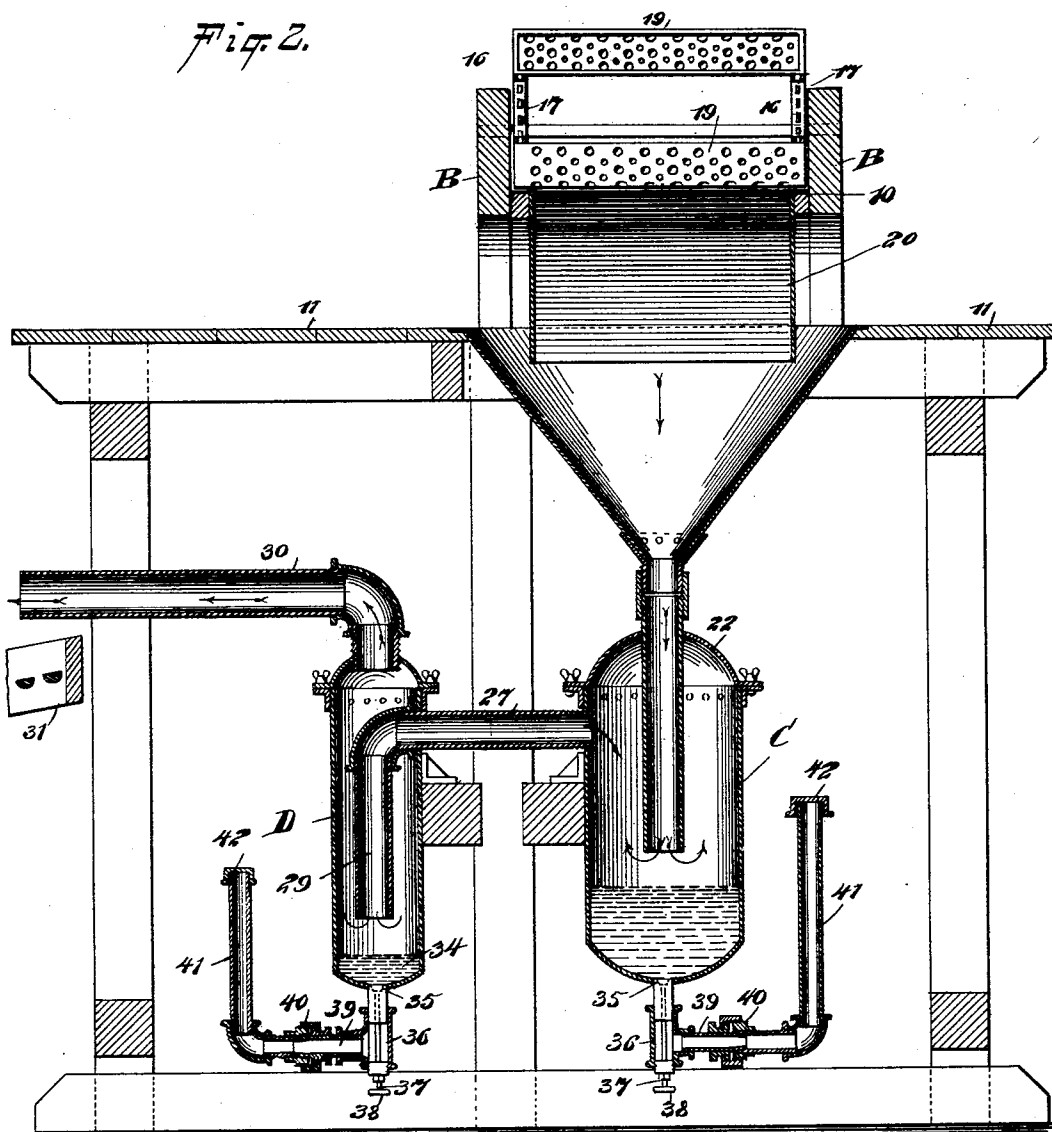
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Fig. 2.



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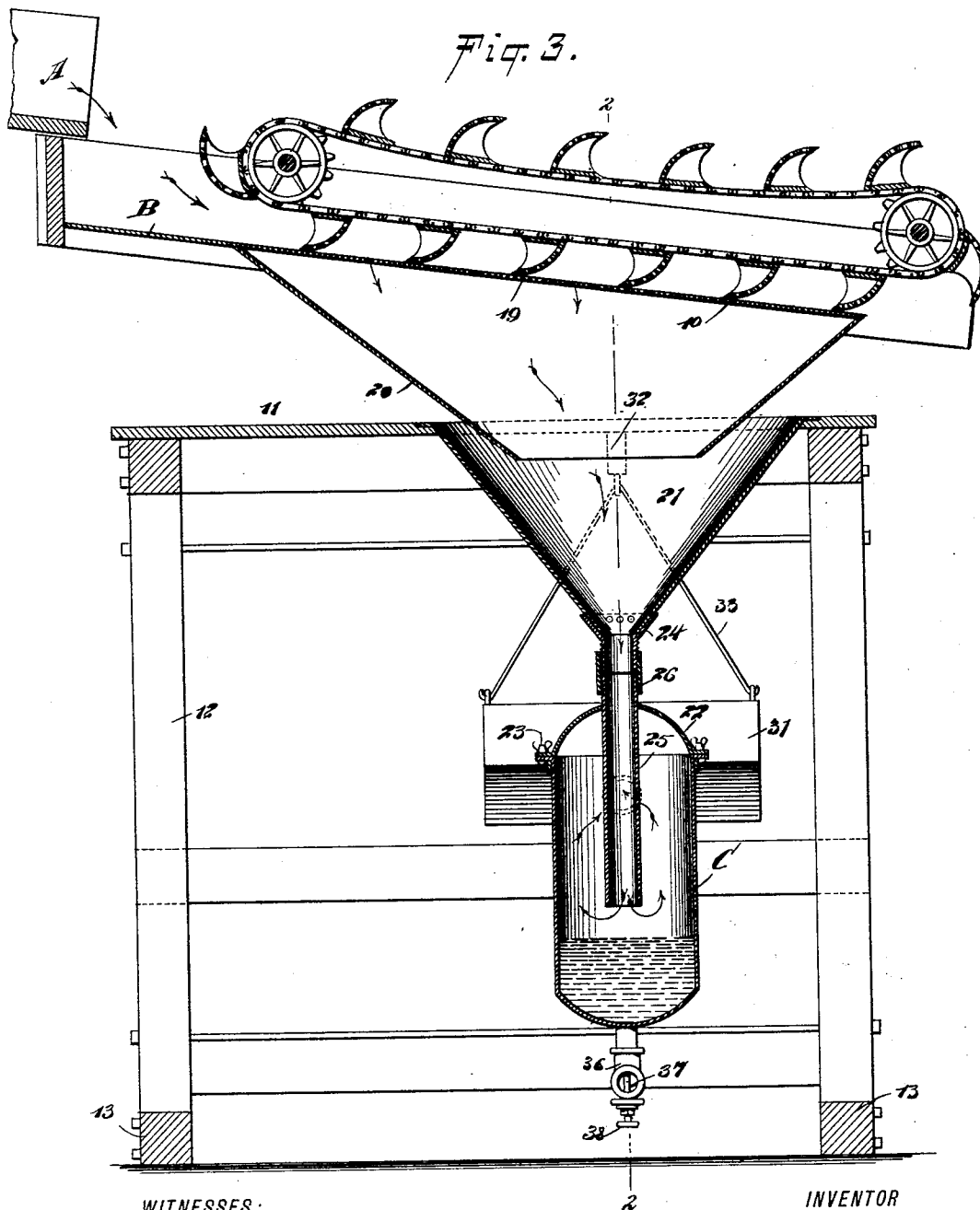
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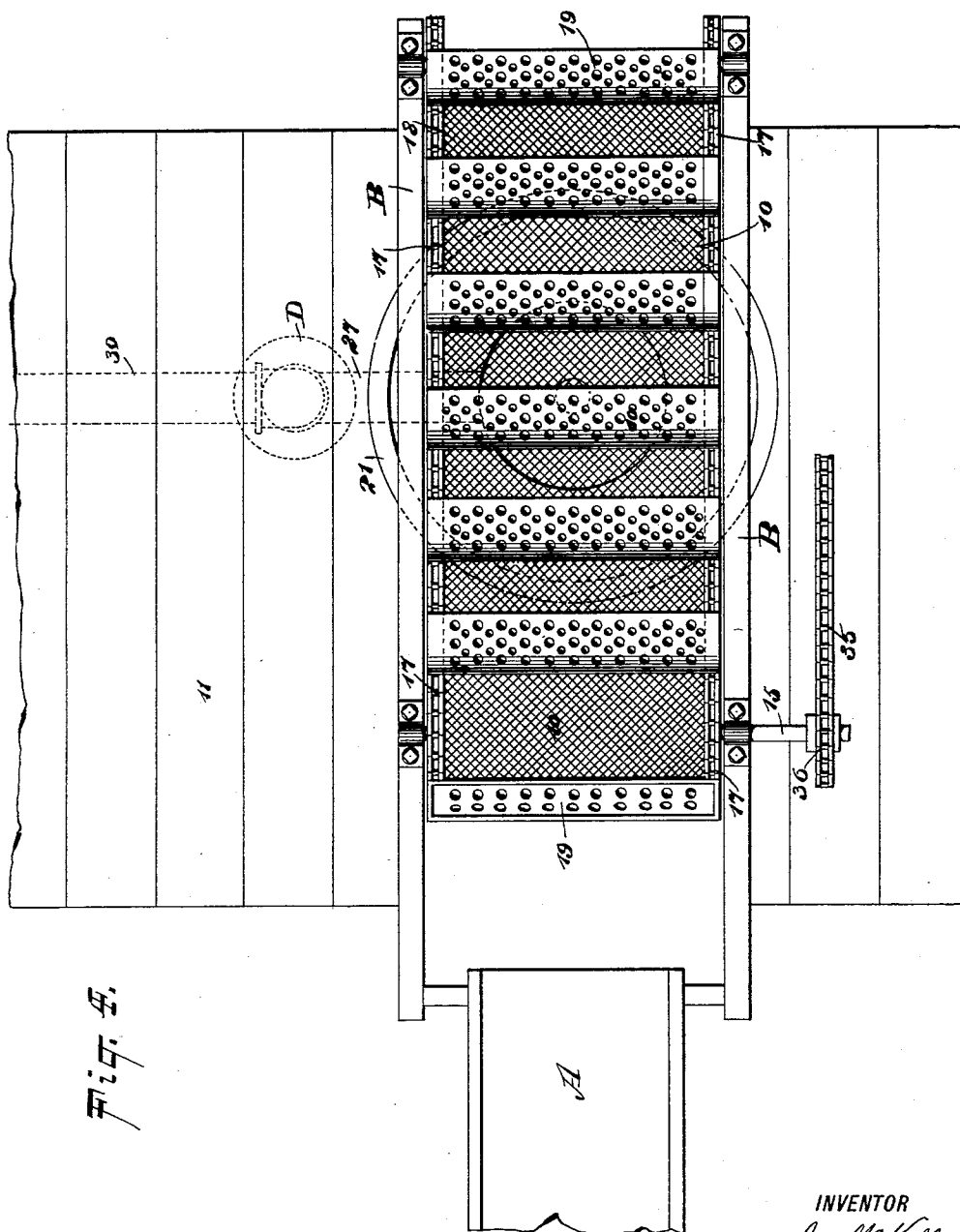
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A. McKELLAR.
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Patented July 13, 1897.



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UNITED STATES PATENT OFFICE.

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CONCENTRATOR AND AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 586,451, dated July 13, 1897.

Application filed September 9, 1896. Serial No. 605,261. (No model.)

To all whom it may concern:

Be it known that I, ANGUS MCKELLAR, of Salt Lake City, in the county of Salt Lake and State of Utah, have invented a new and Improved Concentrator and Amalgamator, of which the following is a full, clear, and exact description.

The object of my invention is to provide a concentrator and amalgamator especially designed for the purpose of sifting fine flour or flake gold from placer-gravel.

A further object of the invention is to construct the machine in a simple, durable, and economic manner, and to provide a means whereby all coarse material will be automatically and thoroughly removed from the screen and delivered to a point outside of the machine.

The invention consists in the novel construction and combination of the several parts, as will be hereinafter fully set forth, and pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a perspective view of the improved machine. Fig. 2 is a vertical section taken substantially on the line 2 2 of Fig. 3. Fig. 3 is a section taken longitudinally through the screen and vertically through the first cylinder containing the mercury and the parts connecting the cylinder with the screen, the riffle being shown in end view; and Fig. 4 is a plan view of the machine, a portion of the bucket-carrying apron being broken away.

The flume A is arranged to deliver the material to a screen 10, the said screen being located in a frame B, and the screen has an elevation of about seven to eight degrees, which is likewise the elevation of the flume A. The frame containing the screen is supported on a platform 11, which in its turn is supported by uprights 12 on a suitable base 13. Above the screen in the frame B two shafts 14 and 15 are journaled, provided with sprocket-wheels 16 at their ends, over which pass sprocket-chains 17. These chains are provided with a series of rakes 19, which are in the form of

buckets, the said bucket-rakes being secured transversely on the outer faces of the chains at predetermined intervals. These bucket-rakes are perforated, having large and small openings, which will admit of the fine sand and dirt passing through to the screen while the coarser gravel will be retained in the buckets which travel along the face of the screen from the lower end in direction of the top. The side of the bucket next the chain is closed, so that as it rises over the wheels at the upper end of the incline the material which may be within or upon the buckets will fall to the inner angle thereof and be carried upon the inner side of the bucket until it passes over the wheels at the lower end of the incline, where it will be dumped out upon the ground.

A pan or basin 20 receives the material from the screen. This pan or basin is funnel-shaped and delivers the material received into a hopper 21, which hopper is in direct communication with the upper end of a cylinder C, the cylinder being preferably made deep and narrow and contains a predetermined quantity of mercury in its bottom, as illustrated in Figs. 2 and 3. The head 22 of the cylinder C is removable, being secured thereto in a gas and fluid tight manner by means of interposed washers and suitable fastening devices—thumb-screws 23, for example—as illustrated.

A sleeve 24, exteriorly threaded, is fast to the lower end of the hopper 21, which is in the form of an inverted cone, and a pipe 25 is secured to the head of the cylinder C, which pipe extends downward within the said cylinder to a point above the level of the mercury, and the pipe likewise extends above the cylinder-head and is joined to the sleeve of the hopper by a suitable coupling 26.

A pipe 27 is led from one side of the cylinder C at a point slightly below its upper end into the upper portion of a second cylinder D, which is usually of less diameter than the cylinder C. The pipe 27 extends within the cylinder D and downward to near the bottom of the cylinder, ending just over a column of mercury 34 in the bottom of the cylinder D.

A pipe 30, adapted as an offtake-pipe for tailings and the like, is connected with the cap of the smaller cylinder D, which cap is secured to said cylinder in like manner as the cap of the opposing cylinder C. The offtake-pipe 30 conducts the waste material to a riffle 31, and this riffle is supported by slings 33 from a beam 32 or its equivalent, projecting from the table or platform 11, as illustrated in Fig. 1, whereby the riffle is adapted to be reciprocated.

In the bottom of each cylinder an opening is made which is normally closed by a valve 35, usually made of rubber or a like material. This valve is operated by means of a stem 37, extending through a casing 36 and provided with a hand-wheel 38 or other convenient operating means. The lower end of this casing is closed by a threaded plug through which the stem passes.

Under such a construction it will be observed that when the valve is opened the mercury will enter the valve-casing and may be drawn out therefrom in any approved manner. Ordinarily, however, each valve-casing is provided with a side branch in which a tube 39 is secured, and this tube is connected by a union 40 or the equivalent thereof with an angular pipe 41, normally closed at the top by a cap 42. The mercury may thus be drawn off without danger of splashing or loss of mercury by removing the cap 42 and turning the pipe 41 down below a horizontal position.

In operation the sand and gravel are placed in the flume A, together with the necessary amount of water, of which a small quantity only is required. The water serves to carry the material from the flume onto the screen, disintegrating the clay or cemented gravel, which disintegration is promoted by the drop of the material from the flume onto the screen, which is usually about six or eight inches. The material delivered to the screen is caught up on the series of rake-like buckets, and the fine sand and dirt will pass through the apertures in these buckets and then through the meshes of the screen, the coarser material retained by the buckets being delivered to the ground at the tail end of the screen.

The fine sand or dirt that passes through the meshes of the screen with the water is confined or concentrated by the funnel-like pan or basin 20 and is delivered into the hopper 21. In this manner considerable head is given to the mass, causing the said mass to flow with some force through the pipe 25 in the larger cylinder C upon the column of mercury contained in the said cylinder. The water and alluvial sand, being thus driven by the hydraulic head created by the weight and flow of the water and material collected in the basin, will strike the body of quicksilver with such force that the quicksilver will rise on both sides, and consequently fall

back on the material, bathing it completely. By the force of the water the material is carried to the outlet in the cylinder leading to the pipe 27, which connects with the cylinders C and D.

As heretofore stated, the cylinder D is smaller than the cylinder C, being deep and narrow, like the cylinder C, but smaller in diameter, and the said cylinder D acts as a safety-valve or compound bath. This cylinder D, like the cylinder C, has a quantity of quicksilver or mercury in its bottom, not so much, however, in proportion to the size of the cylinder as that contained in the cylinder C, and the material delivered to the smaller cylinder D will be acted upon by the mercury or quicksilver therein in the same manner as in the cylinder C. Therefore the material will receive a second bath. The object of the larger cylinder being connected with the smaller cylinder is to collect any particles of quicksilver that may have bubbled or floured by the continuous pressure and force of water and material passing into the cylinders, and consequently raising the quicksilver for a few inches above the level of the column. The cylinder D is as deep in proportion as the larger cylinder C, and having a smaller quantity of quicksilver at the bottom causes the water and sand to rise from six to eight inches higher than the elevation attained in the larger cylinder C. Hence it prevents the escape of any quicksilver, and consequently of any gold, with the tailings, which are carried off through the offtake-pipe 30.

Hardly a speck of valuable material escapes when this machine is running at full head, and this fact is demonstrated in the operation of the machine by the absence of any colors of gold, or but a speck, if any, and likewise in the absence of bubbles of quicksilver.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a screening-surface, a contracted pan or basin receiving the material from the said surface, and a hopper located beneath the pan or basin, taking the material from the latter, of a cylinder having an offtake-pipe in its top and adapted to be provided with mercury in its bottom, a pipe located within the cylinder at a point above the mercury and connected with the hopper, a valve located in the lower portion of the said cylinder, the said valve being of an elastic material and provided with a controlling-stem, and a capped pipe connected with the casing of the said valve, through which the mercury and the material held thereby may be withdrawn from the valve-casing when delivered thereto, as and for the purpose set forth.

2. The combination of an inclined screen with an endless belt provided with buckets attached to its outer surface and having their

outer sides and bottoms composed of perforated plates and backs for the same attached to the chains, carrying and operating means by which the said buckets are, during the
5 lower half of their circuit, moved up the incline of the said screen with their edges close to the same, whereby coarse material will be

caught by said buckets and carried back to the lower end and there dumped, substantially as described.

ANGUS MCKELLAR.

Witnesses:

JUNIUS YOUNG,
WM. MCKELLAR.