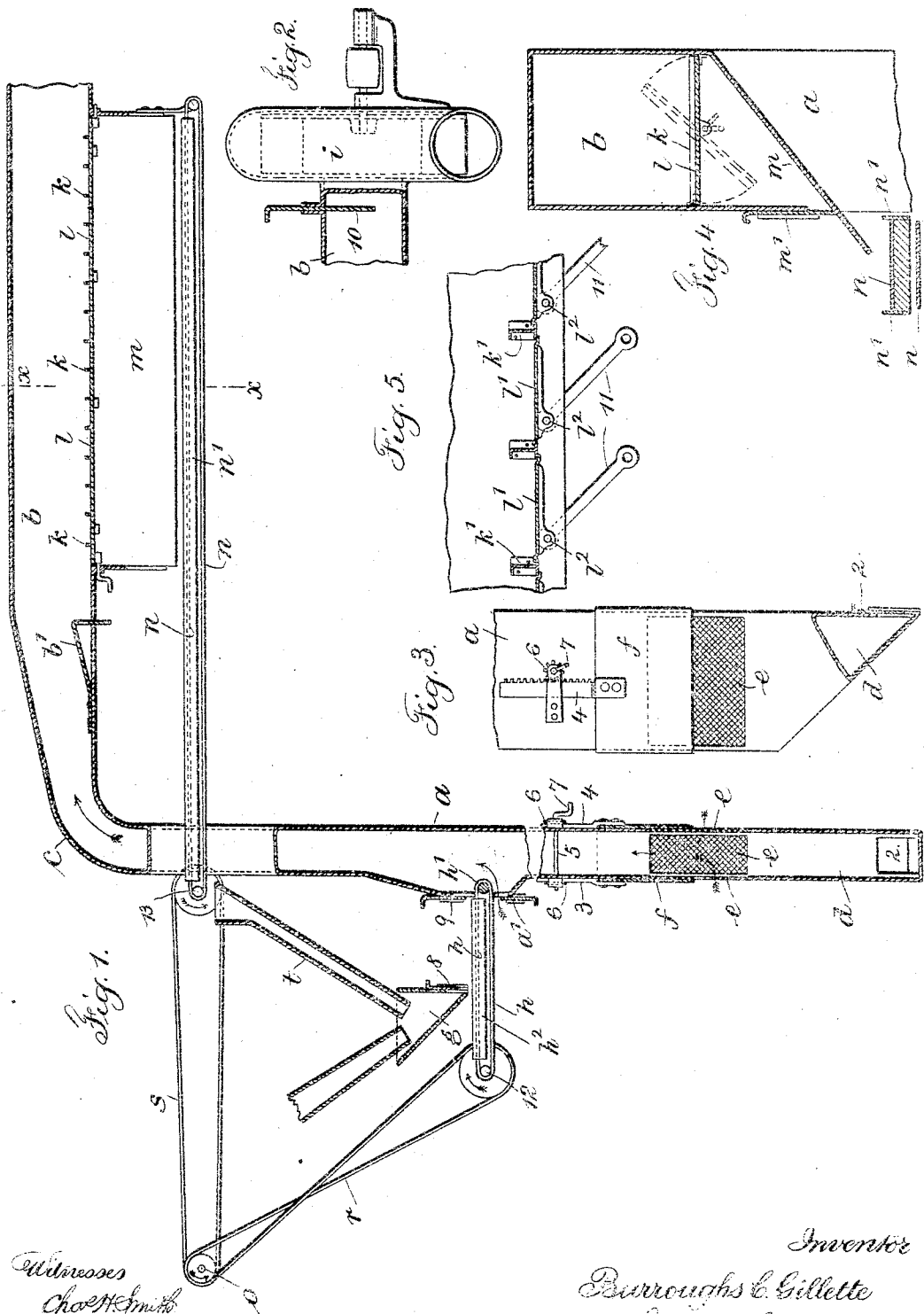


No. 888,156.

PATENTED MAY 19, 1908.

B. C. GILLETTE.
 DRY CONCENTRATOR.
 APPLICATION FILED MAY 16, 1907.



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UNITED STATES PATENT OFFICE.

BURROUGHS C. GILLETTE, OF NEW YORK, N. Y.

DRY CONCENTRATOR.

No. 888,158.

Specification of Letters Patent.

Patented May 19, 1908.

Application filed May 16, 1907. Serial No. 374,034

To all whom it may concern:

Be it known that I, BURROUGHS C. GILLETTE, a citizen of the United States, residing at the borough of Manhattan, city, county, and State of New York, have invented an Improvement in Dry Concentrators, of which the following is a specification.

The object of my invention is to provide a concentrator for the separation of gold from gravel and alluvial deposits and also for separating precious and other metals from crushed or pulverized ores, by pneumatic action and the difference in specific gravity.

My invention consists in certain improvements in or upon that form of concentrator which consists of an air-blast trunk having portions the one at an angle to the other and connected by a union.

My invention provides for the exact regulation of the air currents, the re-working of the middlings and of introducing the material to be operated upon in an improved manner.

In the device of my improvement, the lower end of the trunk is a receiving and delivery hopper adapted to receive the concentrates, that is, the particles too heavy to be carried up by the air-blast. Adjacent to this lower end is an open section or section of perforated or openwork metal through which air passes into the trunk, and around this section there is a movable sleeve adjustable to close off more or less the section.

The material to be separated or concentrated passes from a hopper onto an endless conveyer and therefrom into the upright part of the trunk above the open section, and a rotary suction or exhaust fan is located at the distant end of the higher and upper member of the trunk to draw the lighter material through the trunk and cause the separation by specific gravity, the lighter particles rising with the air-blast and the heavier particles or concentrates falling into the aforesaid hopper.

Located in the higher and upper portion of the trunk is a series of riffles for arresting the movement of and one or more hinged plates for receiving the middlings of the separated ore and which plates when tipped deliver the middlings upon an inclined member down which they pass onto an endless conveyer which returns the same to the hopper of the pulverized ore, and from which the same passes with the ore into the machine to be re-worked; the tailings meanwhile

being conveyed away by the suction fan and delivered as waste material.

In the drawing, Figure 1 is a vertical section and partial elevation with broken parts representing the device of my improvement. Fig. 2 is an elevation and partial section of the suction or exhaust fan located at the distant right hand end of the trunk. Fig. 3 is an elevation at the lower end of the vertical member of the trunk. Fig. 4 is a vertical cross section on line *x, x*, of Fig. 1, in larger size, and Fig. 5 represents the modified form of the riffles and plates of my invention.

The air-blast-trunk shown in Fig. 1 is composed of a vertical member *a*, a horizontal member *b* and a bent union *c*. I do not limit my invention to this relation of the parts as the same is only to be limited by one part being at an angle to the other part.

At the lower end of the vertical member *a* I employ a receiving and delivery hopper *d* for the concentrates, the same having an inclined bottom portion and slide-plate *2* through which the concentrates are delivered into a receptacle. Above this hopper portion the vertical member of the trunk is made with a perforated or open section *e* through which air enters into the trunk for the air-blast, and a sleeve *f* of suitable material closely surrounds the perforated or open section *e* and is movable vertically over the surface of said section so as more or less to close off the openings and limit the available area through which air passes to the interior of the trunk for the air-blast. This adjustment is provided for and regulated by the rack-bars *3 4*, the lower ends of which are secured to the upper portion of the sleeve *f* and a shaft *5* passes through the trunk and outside of the same with the gears *6* near the respective ends of said shaft meshing with the rack-bars *3 4* and held in place by suitable supporting arms, there being a crank *7* on one end of the shaft *5* so that by the turning of the crank and the action of the gears and rack-bars the sleeve *f* is raised and lowered to the desired extent for the performance of its regulating function.

I provide a hopper *g* and a spout which discharges therein the pulverized ore which is to be separated by the air-blast action in the trunk. This is delivered from this hopper *g* by a regulating gate *8* onto the endless conveyer *h*. This conveyer *h* is supported by the shafts *h'* and *12*; the shaft *h'* being just inside of the trunk *a* and the shaft *12* at

the distant end, and I have shown and prefer to employ guiding sides k^2 to this conveyer and between which the conveyer runs so as to prevent the spilling of the material which is delivered from the hopper onto the conveyer. Where this conveyer h passes through the wall of the trunk, I prefer to employ a regulating gate 9. This gate exactly regulates the size of the opening above the conveyer and the amount of air that will be drawn in at this point. Below the conveyer h in the trunk a I have shown another gate a^1 similar to the gate 9, the office of which is to let in air beneath the incoming pulverized ore to deflect and spread the same into the trunk area, and assist in the separation of the same.

At the distant right hand end of the horizontal or upper member b of the air-blast trunk I provide a suction or exhaust fan i as shown in Fig. 2. This fan is of ordinary or well-known construction and in connection therewith I prefer to employ in the horizontal or upper member b of the trunk a regulating gate 10 shown also in Fig. 2 which gate regulates the available discharge aperture for the tailings and air passing through the fan.

In the horizontal member b of the trunk I have also shown a deflector-plate b^1 . This is secured at one end to the bottom of the trunk as an inclined portion and a portion substantially at right angles thereto which passes through the trunk and may outside of the trunk be engaged by a suitable instrumentality which will pull the same down or push it up and place it where desired, and it is preferable to form this deflector-plate of material that will hold its position but which is readily bent so as to change the inclination.

In the bottom of the horizontal or upper member b of the trunk I employ a series of spaced apart riffles k . These are transverse strips which are preferably mounted upon a hinged-plate l . This is readily tipped as shown in the cross section Fig. 4. Lengthwise of the member b and beneath the same I employ an incline m adapted to receive the materials delivered upon the plate l and arrested by the riffles k and in turn to deliver the same upon the endless conveyer n . I have shown and prefer to employ a support for the said endless conveyer n which is formed with guiding sides n^1 between which the conveyer runs. These sides come up closely to the conveyer so as to hold pulverized materials or middlings delivered thereon and to prevent the same spilling over the sides of the conveyer. Fig. 5 shows a modified form of these riffles and plates for receiving the middlings, in which k^1 represents the riffles and l^1 separate hinged-plates. These riffles according to this modification are transverse metal bars fixed in position and the hinged-plates l^1 have separate pivot shafts l^2 set transversely

of the trunk member b , and edges that overlap and under-lap the structure of the riffles at the opposite edges of the plates.

I prefer to employ with each hinged-plate l^1 an arm 11. These arms may be connected together for simultaneous movement or they may be provided with any suitable actuating mechanism for independent movement.

Referring to Fig. 4, o represents a power-shaft with belt-wheels thereon around which extend the belts r and s ; the belt r passing to a belt-wheel upon the shaft 12 of the endless conveyer h and the belt s passing to a belt-wheel on the shaft 13 at one end of the endless conveyer n , and t is a chute with the lower end entering the hopper g and the upper widened end coming beneath the delivery edge of the endless conveyer n .

In the operation of the parts hereinbefore described the suction or exhaust fan i draws the air into the trunk at the perforated or openwork section e of the trunk and to a limited extent at the air regulating gates 9 and a^1 ; and the action of these strong currents of air causes the lighter particles of the pulverized ore to be carried up through the trunk with the air around the bend into the upper portion and permits the heavier particles of the pulverized ore or other material to settle into the receiving hopper d . In this upper portion of the trunk the heavier particles or middlings floating in the air have a chance to settle and are arrested by the riffles k and rest upon the upper surface of the plate l according to Figs. 1 and 4, or the plates l^1 according to Fig. 5; the useless and lighter particles or tailings of said materials passing on and through the suction fan are delivered at any convenient place for settlement. As these particles come over into the horizontal or upper portion of the trunk they are deflected above the bottom of the trunk by the deflector-plate b^1 ; said plate restricting or limiting the most active area of movement of the air, thus giving the heavier particles, which are the middlings, a chance to settle upon the plate or plates adjacent to the riffles and the riffles an opportunity to stop these particles from lengthwise movement of this member of the trunk, while the lighter particles or tailings move along to and through the fan. Periodically, the middlings arrested by these riffles and supported by the plate or plates are delivered upon the incline m , from which they pass to the conveyer n and along the same to the chute t and into the hopper g to be delivered with the pulverized ore onto the endless conveyer h and into the upright member of the trunk, to be separated and worked over again with pulverized ore or other materials introduced for the first time.

In the enlarged section Fig. 4, I have shown the left hand side of the trunk wall carried down almost to the surface of the in-

cline m only leaving a discharge aperture for the middlings delivered on the incline m and a gate m^1 for closing this opening so that a closed hopper is provided below the tilting-plate l for the middlings and into which they may be delivered without risk of admitting air to the upper member of the trunk when the plates l are moved to the detriment of the operation of the apparatus. The gate or slide m^1 is operated when the plates l are closed.

As a dry concentrator this device is exceedingly simple, is comparatively inexpensive to construct, is easily operated and is exceedingly efficient.

I claim as my invention:

1. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other material within the upright portion of the trunk, a receiving and delivery hopper at the lower end of the trunk, an air inlet section above this hopper and means for controlling the extent thereof.

2. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other material within the upright portion of the trunk, a receiving and delivery hopper at the lower end of the trunk, an openwork section in the trunk forming an air inlet to the trunk for the air-blast and located above this hopper and between the same and the inlet of the conveyer, and a device surrounding the trunk and adjustable along the same for controlling the extent of opening of the air inlet section.

3. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other material within the upright portion of the trunk, a receiving and delivery hopper at the lower end of the trunk, an openwork section forming an air inlet to the trunk for the air-blast and located above this hopper and between the same and the inlet of the conveyer and a sleeve surrounding the upright portion of the trunk at the openwork section and adapted to be raised and lowered for controlling the extent of opening of the said openwork section, rack-bars secured at their lower ends to the upper edge of said sleeve, a shaft passing through the upright member of the trunk, gears near the respective ends of the said shaft outside of the upright member of the trunk and meshing with said rack-bars, and a handle for turning the shaft and the gears to raise and lower the sleeve to the desired extent.

4. In a concentrator, the combination with an air-blast trunk having a vertical, a horizontal and a curved connecting portion, of a

conveyer for delivering pulverized or other material within the vertical portion of the trunk, a gate for regulating the opening adjacent to this conveyer, a hopper for receiving and delivering the ore to this conveyer, a receiving and delivery hopper at the lower end of the vertical portion of the trunk, means for supplying air for the air-blast to the trunk and for controlling the extent thereof, a series of riffles in the bottom of the horizontal portion of said trunk for arresting the middlings, an endless conveyer substantially parallel with the horizontal portion of the trunk, means for delivering the middlings onto the same and means for actuating the endless conveyer.

5. In a concentrator, the combination with an air-blast trunk having a vertical, a horizontal and a curved connecting portion, of a conveyer for delivering pulverized ore or other material within the vertical portion of the trunk, a gate for regulating the opening adjacent to this conveyer, a hopper for receiving and delivering the ore to this conveyer, a receiving and delivery hopper at the lower end of the vertical portion of the trunk, means for supplying air to the air-blast to the trunk and for controlling the extent thereof, a series of riffles in the bottom of the horizontal portion of said trunk for arresting the middlings, a tilting-plate in juxtaposition with said riffles, an inclined member below the same receiving the middlings delivered from said tilting-plate, a conveyer for receiving the middlings delivered from the incline and means for actuating the conveyer.

6. In a concentrator, the combination with an air-blast trunk having a vertical, a horizontal and a curved connecting portion, of a conveyer for delivering pulverized ore or other material within the vertical portion of the trunk, a gate for regulating the opening adjacent to this conveyer, a hopper for receiving and delivering the ore to this conveyer, a receiving and delivery hopper at the lower end of the vertical portion of the trunk, means for supplying air for the air-blast to the trunk and for controlling the extent thereof, a series of riffles in the bottom of the horizontal portion of said trunk for arresting the middlings an endless conveyer, means for delivering the middlings onto the same, means for actuating the endless conveyer and a deflector-plate located in the horizontal member of the trunk in advance of the position of the riffles for elevating the material entering the horizontal member of the trunk to the desired level above the level of the riffles.

7. In a concentrator, the combination with an air-blast trunk having a vertical, a horizontal and a curved connecting portion, of a conveyer for delivering pulverized ore or other material within the vertical portion of the trunk, a gate for regulating the opening

adjacent to this conveyer, a hopper for receiving and delivering ore to this conveyer, a receiving and delivery hopper at the lower end of the vertical portion of the trunk, means for supplying air for the air-blast to the trunk and for controlling the extent thereof, a series of riffles in the bottom of the horizontal portion of said trunk for arresting the middlings, a pivoted swinging device coming between and juxtaposed in relation to the series of riffles and means for actuating said plates simultaneously or separately, an inclined member coming below said pivoted swinging device and onto which the middlings are delivered, an endless conveyer beneath the lower end of said inclined member and means for actuating the same.

8. In a concentrator, the combination with an air-blast trunk having a vertical, a horizontal and a curved connecting portion, of a conveyer for delivering pulverized ore or other material within the vertical portion of the trunk, a gate for regulating the opening adjacent to this conveyer, a hopper for receiving and delivering the ore to this conveyer, a receiving and delivery hopper at the lower end of the vertical portion of the trunk, means for supplying air for the air-blast to the trunk and for controlling the extent thereof, a series of riffles in the bottom of the horizontal portion of said trunk for arresting the middlings, an endless conveyer, means for delivering the middlings onto the same, means for actuating the endless conveyer, a chute extending from the forward end of the middlings endless conveyer for receiving the middlings therefrom, said chute opening into the main hopper for delivering the middlings therein and means for simultaneously and from a common source of power actuating the respective endless conveyers.

9. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other material within the upright portion of the trunk, means at the lower end of said upright portion for receiving the concentrates, means for regulating the inlet of air, an exhaust fan at the opposite end of the air-blast trunk and a downwardly moving gate or slide-valve adjacent to said fan for regulating the available exit openings for the middlings.

10. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other materials within the upright portion of the trunk, means at the lower end of said upright portion for receiving the concentrates, means providing for the inlet of a regulatable quantity of air for the air-blast, riffles and discharge plates in the upper member of the trunk for receiving the middlings

and an adjustable deflector plate adapted to regulate the available delivery aperture of the upper member of the trunk and located between the said conveyer and the said riffles.

11. In a concentrator, the combination with an air-blast trunk having two members at an angle to one another and a connecting portion, of a conveyer for delivering pulverized ore or other materials within the upright portion of the trunk, means for receiving the concentrates, means providing for the inlet of a regulatable quantity of air for the air-blast, a series of riffles in the upper member of said trunk for arresting the middlings and adjacent devices for receiving the middlings, a normally closed hopper into which the said middlings may be delivered, a gate by which the said middlings are discharged from the hopper and a conveyer for receiving the discharged middlings.

12. In a concentrator, the combination with an air-blast trunk, of a conveyer for delivering pulverized ore or other material within the trunk, a receiving and delivery hopper at the lower end of the trunk, an air inlet section above this hopper and means for controlling the extent thereof.

13. In a concentrator, the combination with an air-blast trunk, of a conveyer for delivering pulverized ore or other material within the trunk, a receiving and delivery hopper at the lower end of the trunk, an open work section forming an air inlet to the trunk for the air-blast and located above this hopper and between the same and the inlet of the conveyer, and a device surrounding the trunk and adjustable along the same for controlling the extent of opening of the air inlet section.

14. In a concentrator, the combination with an air-blast trunk, of a conveyer for delivering pulverized ore or other material within the trunk, a receiving and delivery hopper at the lower end of the trunk, an openwork section forming an air inlet to the trunk for the air-blast and located above this hopper and between the same and the inlet of the conveyer and a sleeve surrounding the upright portion of the trunk at the openwork section and adapted to be raised and lowered for controlling the extent of opening of the said openwork section, rack-bars secured at their lower ends to the upper edge of said sleeve, a shaft passing through the upright member of the trunk, gears near the respective ends of the said shaft outside of the upright member of the trunk and meshing with said rack-bars, and a handle for turning the shaft and the gears to raise and lower the sleeve to the desired extent.

15. In a concentrator, the combination with an air-blast trunk, of a conveyer for delivering pulverized ore or other materials within the trunk, means for receiving the

concentrates, means providing for the inlet of a regulatable quantity of air for the air-blast, riffles and discharge plates in the trunk for receiving the middlings and an adjustable deflector plate adapted to regulate the available delivery aperture of the trunk and located between the said conveyer and the said riffles.

16. In a concentrator, the combination with an air-blast trunk, of a conveyer for delivering pulverized ore or other materials within the trunk, means for receiving the concentrates, means between the aforesaid means and the said conveyer providing for the inlet of a regulatable quantity of air for the air-blast, a series of riffles in the trunk for arresting the middlings and adjacent devices for receiving the middlings, a normally closed hopper into which the said middlings may be delivered, a gate by which the said middlings are discharged from the hopper and a conveyer for receiving the discharged middlings.

17. In a concentrator, the combination with an air blast trunk, of a conveyer for delivering pulverized or other material within the trunk, a gate in the trunk immediately below the delivery end of the conveyer for regulating the entrance of air below that of the pulverized material, a hopper for receiving and delivering the ore to this conveyer, a receiving and delivery hopper at the lower end of the air blast trunk, means for supplying air for the air blast to the trunk and for controlling the extent thereof and means for actuating the endless conveyer.

18. In a concentrator, the combination with an air blast trunk, of a conveyer for delivering pulverized ore or other materials within the trunk, means for receiving the concentrates, means providing for the inlet of a regulatable quantity of air for the air blast, a series of riffles in the trunk for arresting the middlings and adjacent devices for receiving the middlings, a normally closed hopper into which the said middlings may be delivered, a gate by which the said middlings are discharged from the hopper and means for receiving the middlings as discharged from the hopper.

19. In a concentrator, the combination with devices for separating pulverized ore or

other materials into concentrates and middlings, of a series of riffles for arresting the middlings and adjacent devices for receiving the middlings, a normally closed hopper into which the said middlings may be delivered, a gate by which the said middlings are discharged from the hopper and means for receiving the middlings as discharged from the hopper.

20. In a concentrator, the combination with devices for separating pulverized ore or other materials into concentrates and middlings, of a series of riffles for arresting the middlings, a normally closed hopper adjacent to the riffles, tilting devices receiving the middlings and adapted to deliver the same into the normally closed hopper, whereby the risk of admitting air while the middlings are being delivered into the hopper is obviated.

21. In a concentrator, the combination with devices for separating pulverized ore or other materials into concentrates and middlings, of a series of riffles for arresting the middlings, a trunk and a normally closed hopper formed as a downward prolongation of the trunk surrounding the riffles, and tilting devices receiving the middlings and adapted to deliver the same into the normally closed hopper, whereby the risk of admitting air while the middlings are being delivered into the hopper is obviated.

22. In a concentrator, the combination with devices for separating pulverized ore or other materials into concentrates and middlings, of a series of riffles for arresting the middlings, a trunk and a normally closed hopper formed as a downward prolongation of the trunk and the hopper provided with an inclined bottom plate and gate, tilting devices receiving the middlings and adapted to deliver the same into the normally closed hopper, whereby the risk of admitting air while the middlings are being delivered into the hopper is obviated, and a means for receiving the middlings as discharged from the hopper through the gate.

Signed by me this 13th day of May 1907.

BURROUGHS C. GILLETTE.

Witnesses:

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