No. 696,739. Patented Apr. 1, 1902.

J. KLEIN.

ORE CLASSIFIER.

(Application filed July 12, 1901.)

(No Model.) 2 Sheets—Sheet 1.

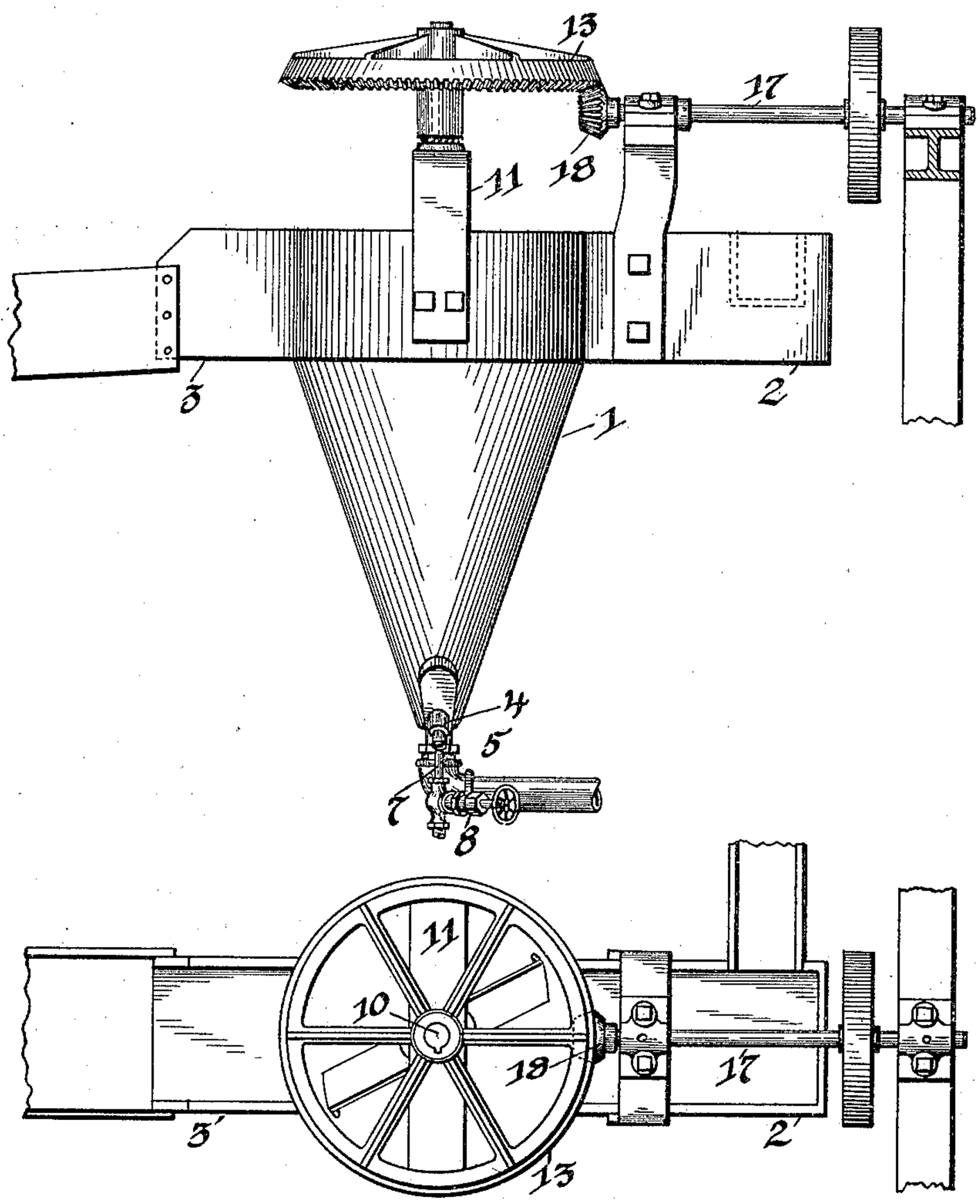

Fig. 1.

Fig. 2

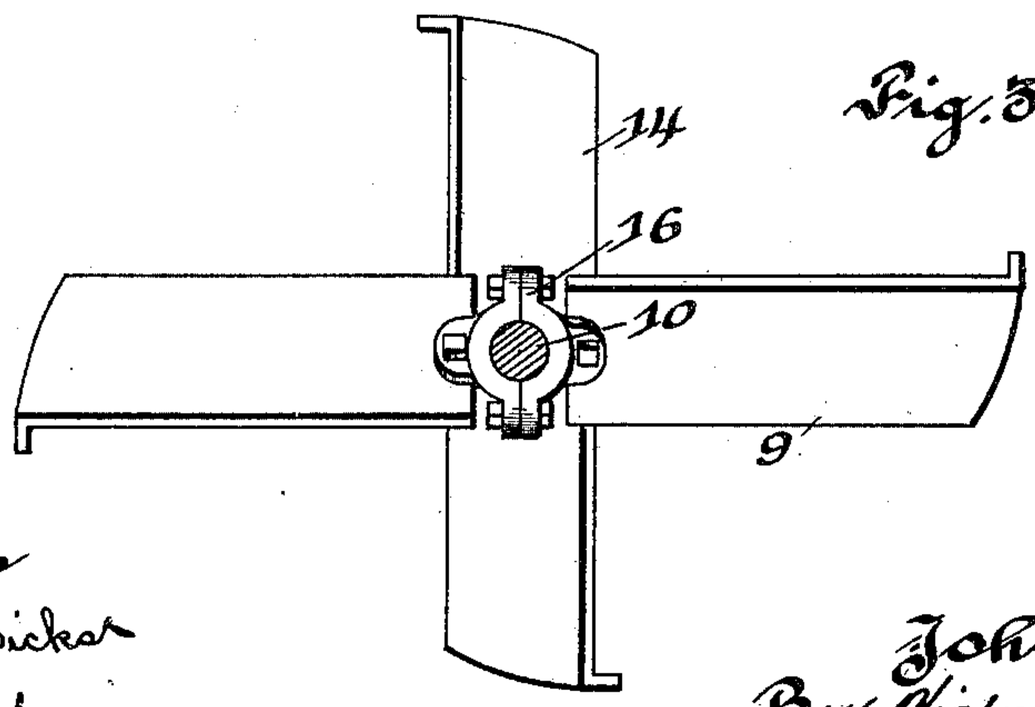

Fig. 3.

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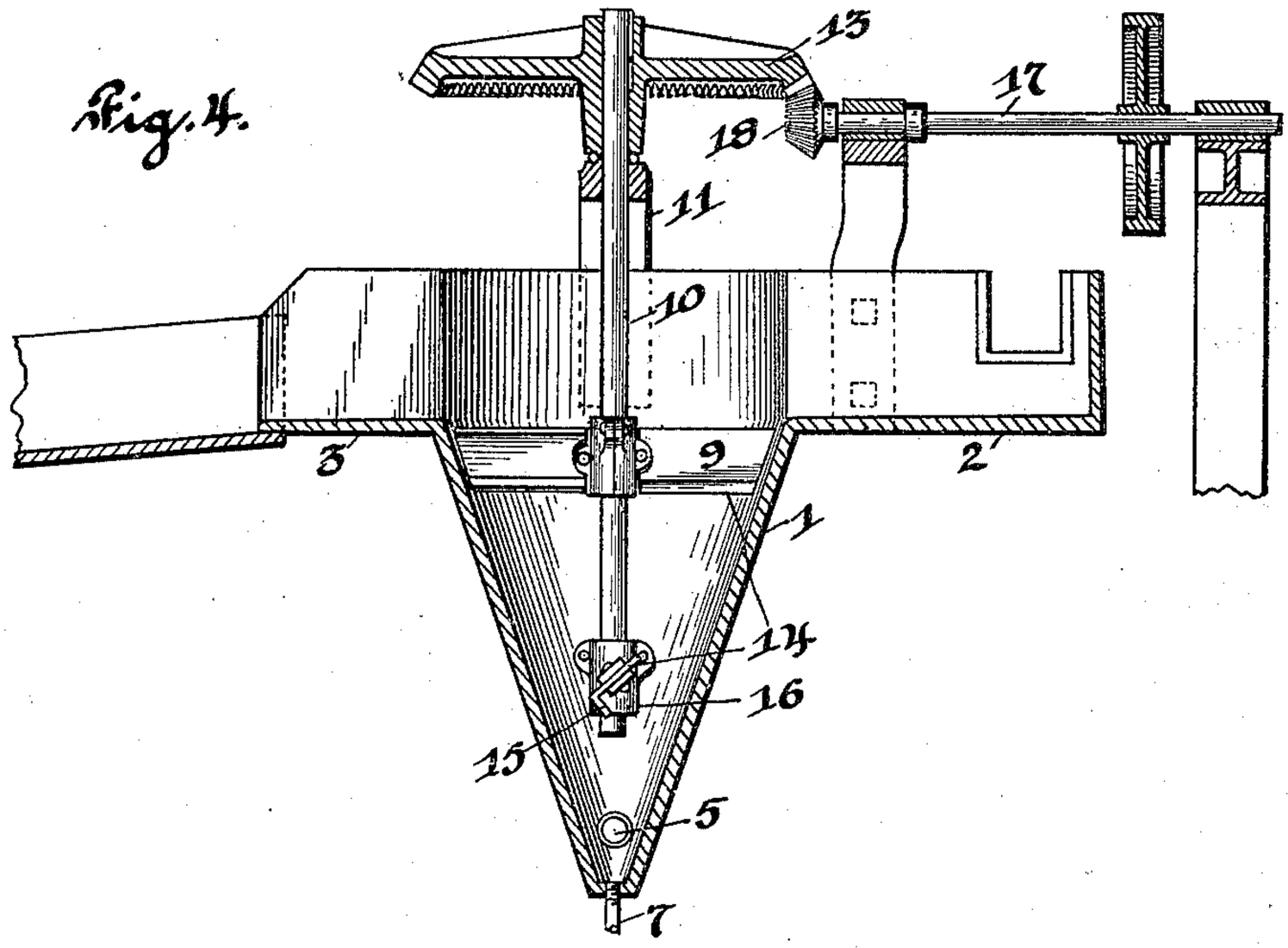
Fig. 4.



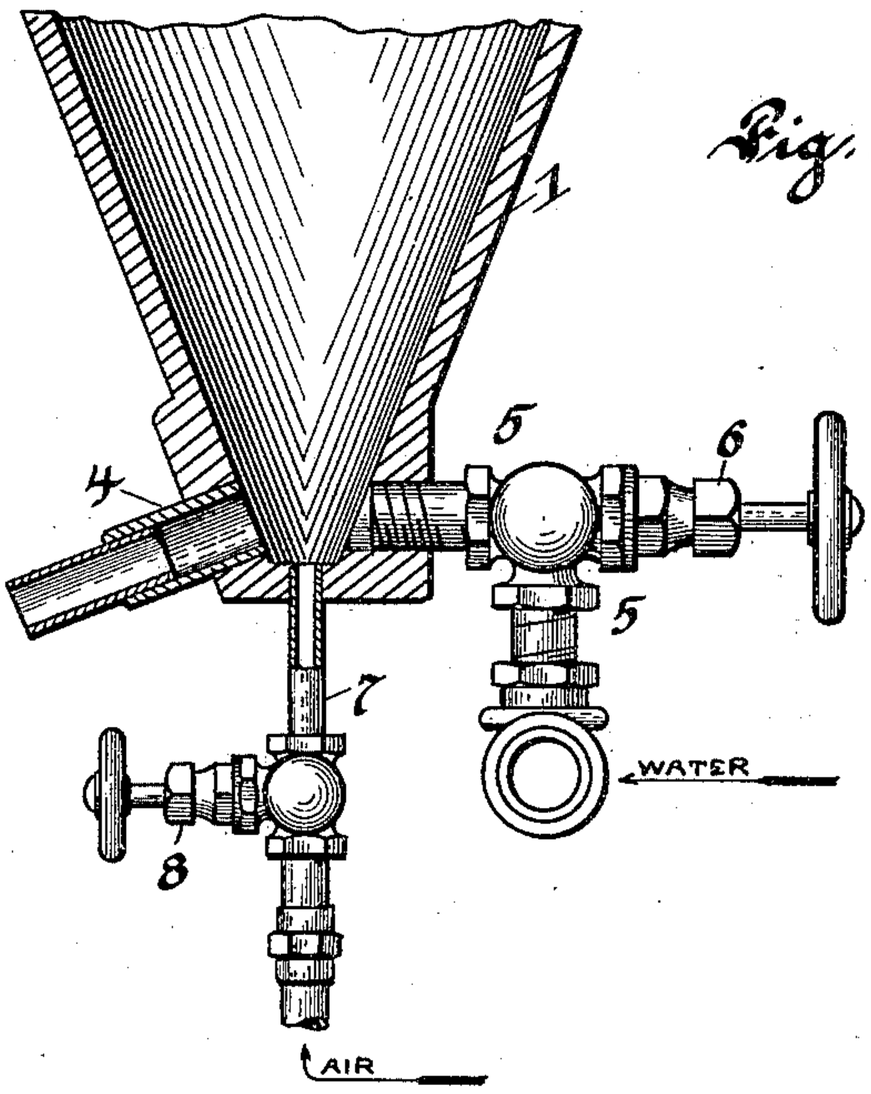


Fig. 5.

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UNITED STATES PATENT OFFICE.

JOHN KLEIN, OF DESLOGE, MISSOURI, ASSIGNOR OF TWO-THIRDS TO PAUL A. FUSZ AND CHARLES D. McLURE, OF ST. LOUIS, MISSOURI.

ORE-CLASSIFIER.

SPECIFICATION forming part of Letters Patent No. 696,739, dated April 1, 1902.

Application filed July 12, 1901. Serial No. 68,044. (No model.)

To all whom it may concern:

Be it known that I, JOHN KLEIN, of the city of Desloge, St. Francois county, State of Missouri, have invented certain new and useful Improvements in Ore-Classifiers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to ore-classifiers; and it consists of the novel construction, combination, and arrangement of parts hereinafter shown, described, and claimed.

One object of this invention is to provide an ore-classifier consisting of a hopper adapted to receive a mixture of ore and water and provided with entering air and water pipes through which currents of air and water may be admitted to assist in forcing the ore through one outlet, while the very fine particles of ore and the sludge are removed through a separate outlet.

Another object is to provide an agitator within the hopper with means for operating the same and to be constructed so that when the hopper becomes partially filled with ore the agitator will be automatically thrown into an inoperative position.

Another object is to direct the water and air currents toward the ore and sludge outlets, respectively, with the current of air crossing the current of water to assist in agitating the mixture in the hopper, so that the sludge will be raised to the top and pass to the sludge-outlet, while the heavier particles of ore will sink to the bottom and be driven by the current of water to the ore-outlet.

Figure 1 is a side elevation showing one form of my invention. Fig. 2 is a plan view. Fig. 3 is an enlarged view showing the agitators which operate within the hopper. Fig. 4 is a vertical section of the hopper. Fig. 5 is an enlarged transverse section of the lower part of the hopper, showing the air and water inlets and the ore-outlet.

The hopper 1 is preferably constructed of metal substantially in the shape of an inverted cone and provided at one side with the ore-feed trough 2 and at the opposite side with an outlet 3, through which the sludge and finer particles of ore pass, while the heavier particles sink to the bottom of the hopper and are removed, as will hereinafter appear. At or near the bottom of the hopper 1 I provide an ore-outlet 4, and on the side opposite therefrom is arranged a water-inlet pipe 5, controlled by means of a valve 6.

7 indicates an air-pipe leading preferably through the bottom of the hopper and controlled by means of the valve 8. It will be observed that the pipe 7 leads into the hopper across the path of the water-current entering through the water-pipe 5 and that the air is directed toward the sludge-outlet at the top of the hopper, while the water enters and is directed toward the ore-outlet 4. When the mixture of water and ore is fed into the hopper, the heavier particles of ore will naturally settle toward the bottom of the hopper and the opposing currents of air will assist in agitating the mixture, and thereby raising the finer particles of ore and the sludge so that they will be discharged through the sludge-outlet 3 at the top of the hopper. To further assist in agitating the mixture, I provide an agitator, consisting of the horizontal wings 9, mounted upon a vertical shaft 10, the latter being mounted in the bearing formed in the support 11, extending across the top of the hopper, and carrying a gear-wheel 13 on its upper end. The shaft 10 is intended to be rotated, and the wings 9 are inclined downwardly in the direction of rotation—that is, their forward edges, determined by the rotation of the shaft, are all lower than their rear edges, so that when the shaft is rotated these wings will assist the current of air in raising the finer particles of ore and the sludge and forcing the same to pass through the sludge-outlet 3. Near the lower end of the shaft 10 are other wings 14, arranged in the same manner as the wings 9, but at right angles thereto, and provided with the depending flanges 15 on their lower edges, the function of which will presently appear. These wings are connected to the clamps 16, adjustably mounted upon the shaft 10, so that they may be arranged in different positions thereon.

17 indicates a drive-shaft to which power is applied and which is provided with a gear

18, meshing with a gear 13, and thereby rotating the shaft 10 to operate the agitators.

In operation the mixture of ore and water is fed through the trough 2 and from there enters the hopper. The shaft 10 is driven by applying power to the shaft 17, and the wings 9 and 14 are rapidly rotated within the hopper, thereby keeping the mixture continually stirred and agitated. Currents of water and air are admitted through the pipes 5 and 7, respectively, and the heavier particles of ore fall to the bottom of the hopper and are driven out by the current of water through the ore-outlet 4. The air, which is admitted through the pipe 7, assists the agitators in raising the finer particles of ore and sludge, so that they will pass through the outlet 3 and be delivered to any suitable receptacle which may be provided for their reception. If the ore is fed faster than it can be removed through the pipe 4, it will be retained within the hopper, and when the said hopper becomes filled, so that the wings 14 operate upon the ore, the flanges 15 being inclined opposite from the direction of rotation will bear upon the ore, and thereby raise the shaft 10 in its bearings and move the gear 13 out of mesh with the gear 18, thereby making it evident that the hopper has become choked and that the ore is being fed too rapidly. The ore can then be removed from the hopper and the parts adjusted and the machine operated again.

The bearing formed in the support 11 consists of a number of balls, as shown in Fig. 4, and the hub of the gear 13 bears upon these balls, thereby supporting the entire weight of the shaft 10. This avoids the friction which would occur were the hub permitted to bear directly upon the support 11 and also prevents the hub and the support from becoming worn, as would occur were they permitted to bear against each other.

I claim—

1. An ore-classifier, consisting of a hopper adapted to receive the mixture containing the ore, an ore-outlet, a sludge-outlet, an agitator within the hopper, gearing for operating the agitator, and a device for automatically stopping the agitator when the hopper contains too much ore, substantially as specified.

2. An ore-classifier, consisting of a hopper adapted to receive the mixture containing the ore and having an ore-outlet and a sludge-outlet, a water-pipe leading into the hopper and directed toward the ore-outlet for driving the heavier particles of ore through the said ore-outlet, an agitator within the hopper, gearing for operating the agitator, and a device for automatically stopping the agitator when the hopper is receiving more ore than can be discharged through the ore-outlet, substantially as specified.

3. An ore-classifier, consisting of a hopper having an ore-outlet near its lower end, and a sludge-outlet at its upper end, a water-pipe leading into the hopper and directed toward the ore-outlet, an air-pipe leading into the hopper transversely of the water-pipe and directed toward the sludge-outlet, an agitator within the hopper, means for operating the same, and means for automatically disconnecting the agitator from the operating means when too much ore is contained in the hopper, substantially as specified.

4. An ore-classifier, consisting of a hopper adapted to receive the mixture containing the ore and having an ore-outlet near its bottom and a sludge-outlet at its top, a water-pipe leading into the hopper and directed toward the ore-outlet, an air-pipe leading into the hopper below the ore-outlet, transversely of the water-pipe and directed toward the sludge-outlet, an adjustable agitator within the hopper, a driver for operating the agitator, and means for automatically disconnecting the agitator from the driver when more ore is contained within the hopper than can be discharged through the ore-outlet, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN KLEIN.

Witnesses:
A. P. MACKLEY,
GEO. C. FINFROCK.