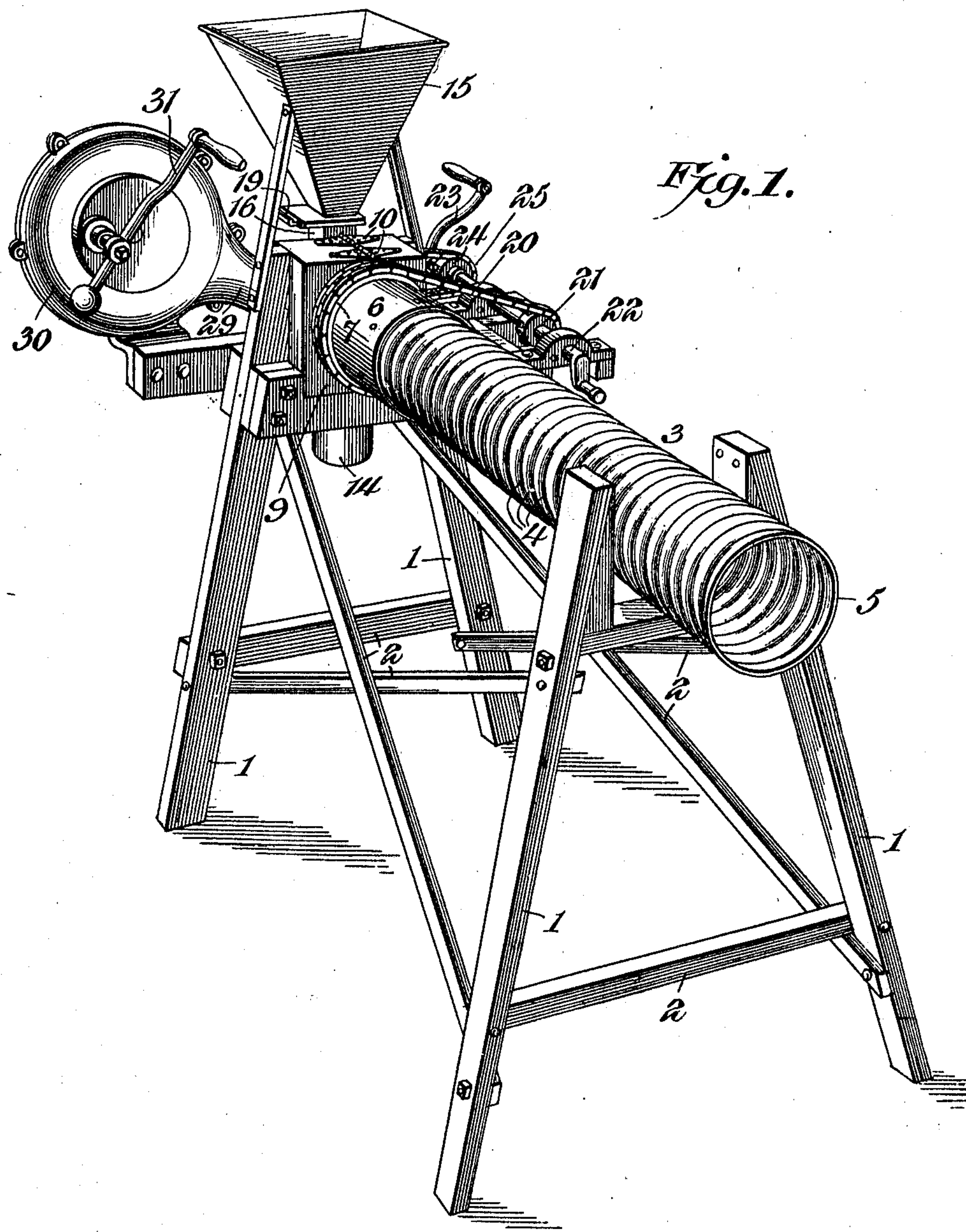


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MINING MACHINE.  
APPLICATION FILED JAN. 24, 1910.

993,593.

Patented May 30, 1911.

2 SHEETS—SHEET 1.



William Guernsey, Inventor,

Witnesses

Howard D. Orr.

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Attorney

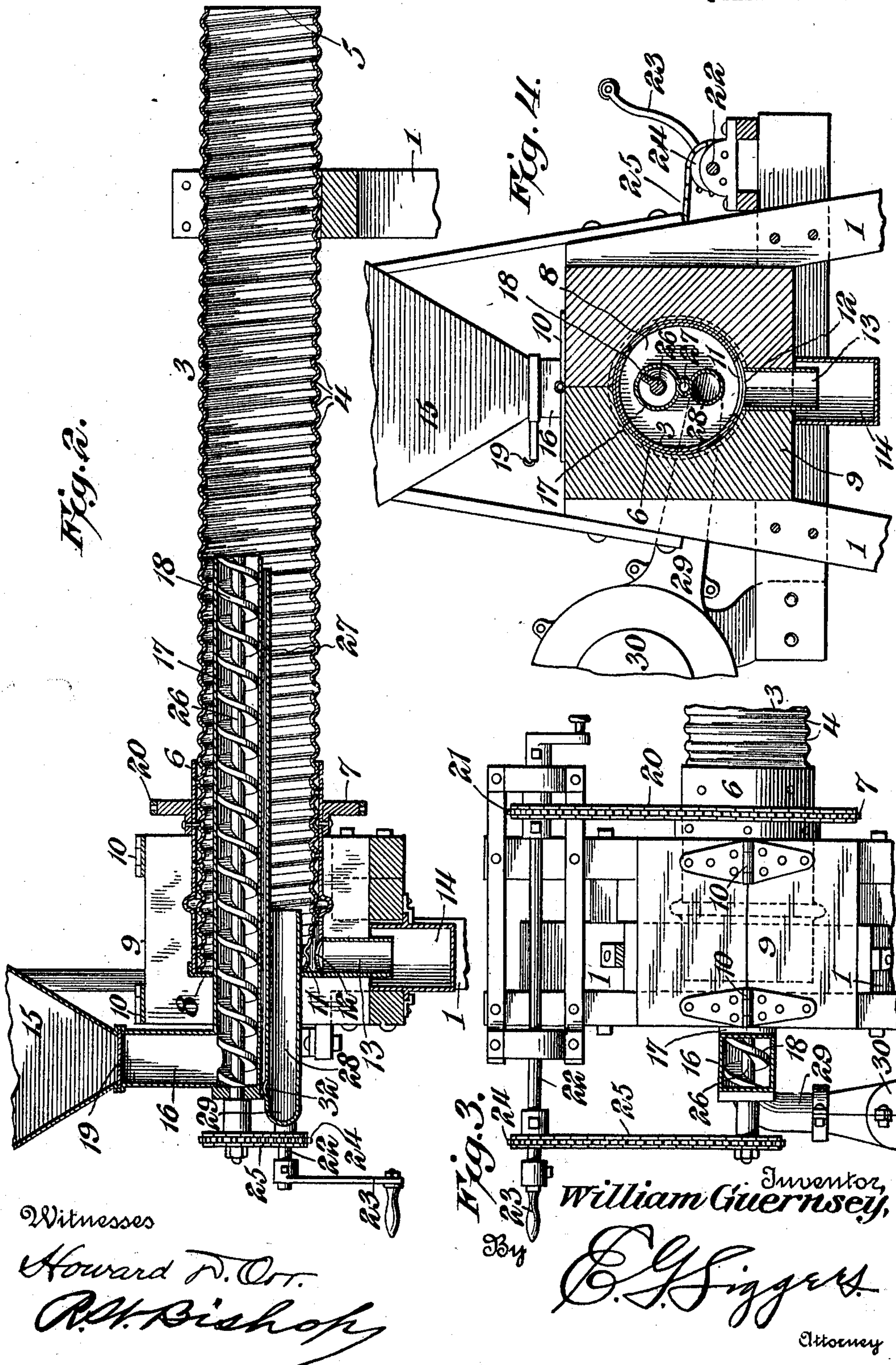


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Attorney



# UNITED STATES PATENT OFFICE.

WILLIAM GUERNSEY, OF PROSSER, WASHINGTON.

## MINING-MACHINE.

993,593.

Specification of Letters Patent.

Patented May 30, 1911.

Application filed January 24, 1910. Serial No. 539,889.

*To all whom it may concern:*

Be it known that I, WILLIAM GUERNSEY, a citizen of the United States, residing at Prosser, in the county of Benton and State of Washington, have invented a new and useful Mining-Machine, of which the following is a specification.

This invention relates to machines for separating precious metals from ore or earth containing the same, and has for its object the provision of a machine in which the operation will be continuous and the precious metals will be automatically separated from the foreign matters and deposited in a receptacle free from the said foreign matter.

The invention comprises a rotatable cylinder open at one end and provided with means for depositing the material to be treated in the cylinder in a stream in a direction toward said open end of the cylinder, the latter having means for conveying the material deposited therein away from said open end of the cylinder, while means are provided for directing fluid streams toward the said open end of the cylinder in traversing relation to the stream of material delivered into said cylinder, all as hereinafter described and claimed.

The invention further consists in the peculiar construction and arrangement of parts which will be hereinafter described and fully pointed out in the appended claims.

In the accompanying drawings, which fully illustrate my invention, Figure 1 is a perspective view illustrating the invention applied in a machine arranged to be operated by hand. Fig. 2 is a central vertical longitudinal section of the machine with the supporting frame removed. Fig. 3 is a plan view of the receiving end of the machine with the fan removed and the hopper shown in horizontal section. Fig. 4 is a transverse vertical section through the receiving end of the machine.

The supporting framework may be of any desired character but is illustrated as consisting of upwardly-converging legs or standards 1 connected by suitable transverse and longitudinal braces 2, the said parts being preferably so connected that they may be readily taken apart and packed in a small compass when the machine is to be shipped from point to point. In the upper portion of the supporting frame is mounted a cylinder 3 which is constructed of sheet metal, preferably copper, and is spirally corrugated as shown at 4, the said corrugations extending through the entire length of the cylinder and being continuous. The rear or tail end of the cylinder, 5, is open and is adapted to revolve on the supporting frame, while the front or feeding end of the spirally corrugated cylinder is fitted within a smooth cylinder 6 and secured rigidly to the same, a sprocket 7 being secured upon the outer surface of the smooth cylinder 6 in order that rotary movement may be imparted to the cylinder in the operation of the said machine. The said smooth cylinder 6 forms an inclosing cap or hood for the corrugated cylinder, and its front end fits closely against a plate 8 which serves as a closure for the said front end. The hood 6 and the front end of the corrugated cylinder are supported by and within a divided head 9 which is fitted upon the supporting frame and is held around the end of the cylinder so as to form a bearing therefor, the members of the head being connected by hinges 10 which facilitate the engagement of the same around the cylinders and the detachment of the head from the cylinders.

The front ends of the cylinders 3 and 6 are provided with discharge openings 11 and 12, respectively, through which the precious metals or other valuable matter may pass into a spout 13 and thence into a receptacle 14 suitably supported upon the frame. A hopper 15 is provided at the front end of the apparatus, and the said hopper communicates through a spout 16 with the front end of a feeding tube 17 within which is a feeding screw 18, the said feeding screw being coextensive with the feeding tube, and the tube terminating within the spirally corrugated cylinder at some distance from the front or receiving end of the same and preferably at about the center of the said corrugated tube. A valve 19 of any desired formation is provided in the hopper to regulate the flow through the same, and the material passing from the hopper is forced through the tube 17 by the screw 18 and thereby deposited within the corrugated tube, as will be readily understood. Suitable mechanism for rotating the corrugated tube and the feeding screw 18, is provided, and, in the present instance, I have shown the said mechanism as consisting of a



sprocket chain 20 passing around the sprocket wheel 7 and around a similar sprocket pinion 21 on a driving shaft 22 which is mounted on the frame at one side of the head 9, and is provided with an operating crank or handle 23, as shown. The shaft 22 is further equipped with a sprocket pinion 24 connected, by a chain 25, with a sprocket pinion on the end of the shaft 26 carrying the feed screw 18 and projecting through the front end of the spout 16, as will be readily understood.

The material escaping from the end of the tube 17, into the tube 3, will be separated so that the lighter particles will be discharged through the rear open end of the outer tube 3, while the heavier more valuable particles will be caught in the corrugations of the tube, and, by reason of the spiral arrangement of the said corrugations and the rotation of the tube, will be fed toward the front end thereof and discharged into the receptacle 14. Hydraulic means may be employed to effect the separation of the material fed into the spiral tube, but I prefer, and in the drawings have illustrated, a means whereby an air blast may be employed for that purpose. Secured to the under side of the feeding tube 17 is a small air tube 27 which terminates near the inner extremity of the said feeding tube, and below the said air tube 27 is a larger air tube 28 which leads directly from the outlet 29 of a fan or blower 30 supported on the frame of the machine and operated by any preferred means, in the present instance, a crank handle 31 being shown for that purpose. The larger air tube 28 communicates at its front end through an opening 32 with the smaller air tube, so that the air blast from the fan will partly pass into the smaller tube and be directed upon the material immediately upon its exit from the feeding tube.

The arrangement and construction of the several parts being thus made known, the operation of the apparatus will be readily understood. The broken stone, sand and other material containing the metals to be saved, are placed in the hopper and motion imparted to the cylinders, the screw and the fan in the manner described. The material passing from the hopper will be taken up by the feeding screw 18 and forced by the same through the feeding tube 17 and discharged into the outer spirally corrugated cylinder 3, which, by its rotation, will cause the heavier particles which are caught in the corrugations to be fed by these corrugations toward the front end of the machine, it being understood that the direction of rotation will be to the right or left, according to the inclination given the corrugations in order that the material may be fed toward the front end of the cylinder in the de-

sired manner. The pneumatic or hydraulic blast escaping from the tube 27 will act upon the material escaping from the feeding tube and break up the same so that the lighter particles will be blown toward the open rear end of the corrugated cylinder, while the heavier particles will drop into the corrugations, as before stated. The greater volume of the blast will enter the outer corrugated cylinder near the front end of the same so that any of the lighter waste material which may work toward the front or receiving end of the cylinder will be acted upon by the blast and thereby carried toward the open rear end of the cylinder, and a complete separation of the particles effected.

The device is very simple in its construction and is highly efficient in operation, it being unnecessary to stop the operation of the machine at any time in order to remove the separated particles, and the operation may be continued indefinitely as long as there is any material to be treated. The only limitation to the continuous operation of the apparatus is the capacity of the receptacle 14, in which the valuable matter is collected, and this receptacle may be of any convenient dimensions, as will be readily understood. The material is delivered with in the corrugated cylinder at such a point that the valuable particles will not be blown therefrom, while, at the same time, the material will not pass directly to the discharge point.

The machine operates without any vibration or agitation of the material, the specific gravity of the particles alone determining whether they will be discharged as waste or carried to the front end of the cylinder and saved. I thus avoid loss of the heavy valuable matter by reason of the same being caused to jump over the riffles formed by the edges of the turns of the spiral groove in the inner surface of the cylinder. Loss of material due to screening is overcome, inasmuch as no screening of the material before it is deposited in the hopper is necessary. All waste matter is carried off so that all the valuable matter is collected in a clean condition and delivered to a single receptacle. The hood or cylinder 6 at the front end of the corrugated separating cylinder 3 provides a smooth bearing therefor and also reinforces the same at the point where it is subjected to strain due to the application of the operating force.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus



which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a machine for the purpose described, a rotatable cylinder open at one end and provided with means for conveying material deposited in said cylinder in a direction away from said open end by the rotative movement of the cylinder, means for conveying the material to be treated to the interior of the cylinder and causing the same to fall in a stream within said cylinder in a direction toward the open end thereof, and means for causing air to move toward the said open end of the cylinder in traversing relation to the stream of material delivered thereinto.

2. The combination of a cylinder having an open rear end and a discharge opening near its front end and having its inner surface spirally grooved to feed material to its front end, means for delivering material within the cylinder at a point intermediate the ends thereof, and means for delivering a separating blast longitudinally of the cylinder directly upon the said material at the point of delivery of the same within the cylinder.

3. The combination in a separator of a cylinder having an open rear end and a discharge opening near its front end and having its inner surface spirally grooved to feed the material to its front end, of a feeding tube extending through the front end of the cylinder and terminating within the cylinder at a point intermediate the ends thereof, means for forcing material through the said feeding tube, an air tube disposed longitudinally within the cylinder immediately adjacent the feeding tube and terminating near the end thereof, a blower connected with said air tube, and means for rotating the cylinder.

4. The combination of a spirally corrugated cylinder having an open rear end and provided with a discharge opening near its front end, a hood at the front end of the said cylinder, a discharge spout leading from the said hood, a gear wheel on the said hood, means for rotating the said gear wheel, means for delivering material within the cylinder, and means for directing an air blast upon the said material at its point of delivery within the cylinder.

5. The combination of a supporting frame, a divided head thereon, a spirally corrugated cylinder having its front end mounted within the said divided head and provided with a discharge opening and its rear end supported by the frame and being open, a dis-

charge spout leading from the front end of the cylinder, means for delivering material within the cylinder, and means for delivering an air blast upon the material at its point of delivery.

6. In a machine for the purpose described, a rotatable tubular member open at one end and having means within it for causing the movement of material deposited therein in a direction away from the open end, means for delivering the material to be treated into the cylinder in a stream directed toward the open end of cylinder, and means for directing air streams of different intensity toward the open end of the cylinder in traversing relation to the stream of material being deposited in the cylinder.

7. The combination of a cylinder adapted to discharge at both ends, a feeding tube terminating within the cylinder, a fluid-conveying tube on the under side of the feeding tube, and a second fluid-conveying tube communicating with the first-mentioned fluid-conveying tube at the front end thereof and terminating within the cylinder near the front end thereof.

8. The combination of a cylinder open at its rear end and having a discharge outlet at its front end, said cylinder being continuously and spirally corrugated from end to end so as to provide spirally-disposed communicating receptacles on its inner side arranged to convey material to the front end of the cylinder, means for continuously rotating the said cylinder, a feeding tube entering the front end of the cylinder and terminating within the same at an intermediate point of its length, a feeding screw within the tube, a tube extending within the cylinder to a point adjacent the outlet of the feeding tube, and means for forcing a fluid through the last-mentioned tube to carry the lighter particles out through the open rear end of the cylinder.

9. The combination of a spirally corrugated cylinder, a feeding tube disposed longitudinally within the cylinder, and a plurality of fluid-conveying tubes arranged within the cylinder, the said tubes being eccentric to and parallel with each other and the feeding tube and of different diameters and the larger tube terminating near the front end of the cylinder and the smaller tube terminating adjacent the discharge end of the feeding tube.

10. An ore separating machine comprising a continuously spirally corrugated cylinder having an open rear discharge end, and a discharge opening near its front end, a feeding tube disposed longitudinally within the cylinder, entering the front end thereof and terminating at about the center thereof, a feeding screw within the feeding tube, a blast tube arranged longitudinally upon the feeding tube and terminating adjacent the



delivery end of the same, and a second blast  
tube arranged parallel with the first men-  
tioned blast tube and communicating there-  
with at the front end thereof and terminat-  
5 ing within the cylinder adjacent the front  
end of the same.

In testimony, that I claim the foregoing

as my own, I have hereto affixed my signa-  
ture in the presence of two witnesses.

WILLIAM GUERNSEY.

Witnesses:

G. W. HAMILTON,  
H. L. JACKSON.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,  
Washington, D. C."

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