No. 758,438. PATENTED APR. 26, 1904.

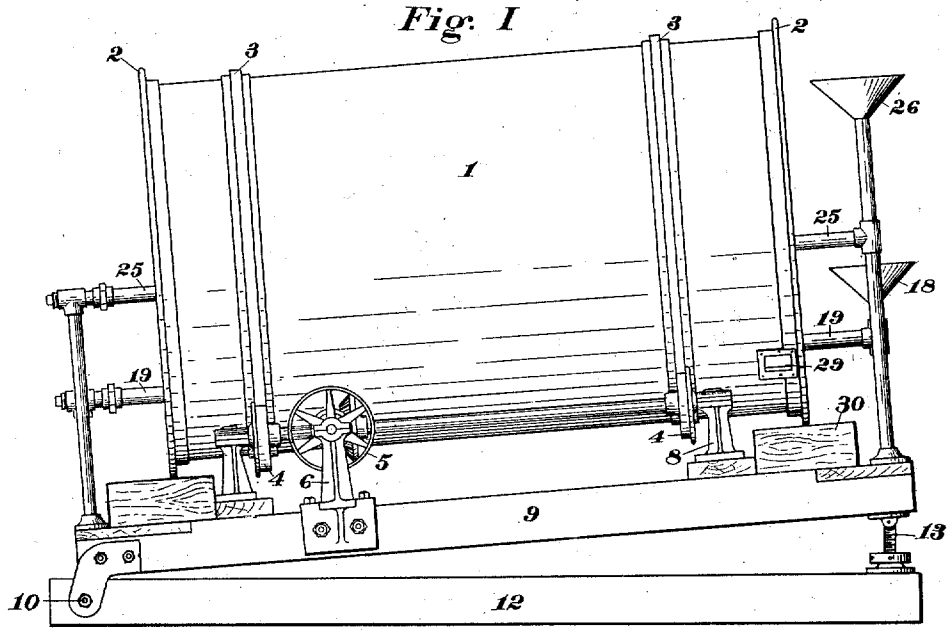
L. C. GRAUPNER.

CONCENTRATOR.

APPLICATION FILED AUG. 20, 1902.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. I



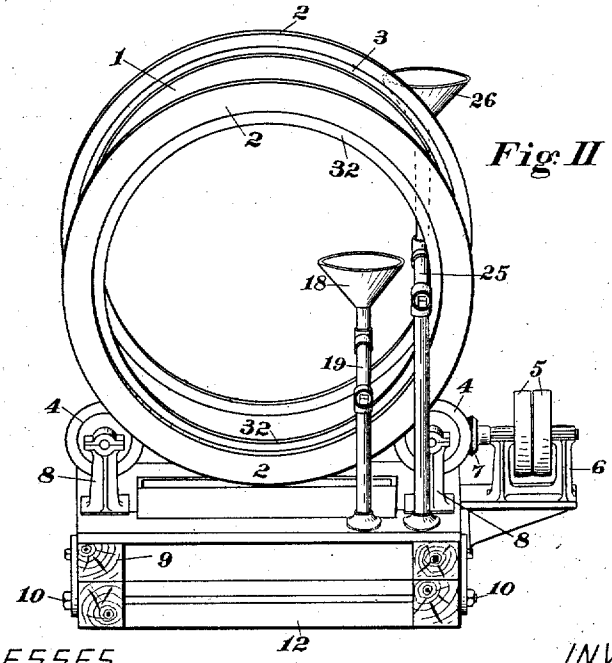


Fig. II

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No. 758,438. PATENTED APR. 26, 1904.

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APPLICATION FILED AUG. 20, 1902.

NO MODEL. 3 SHEETS—SHEET 2.

Fig. III

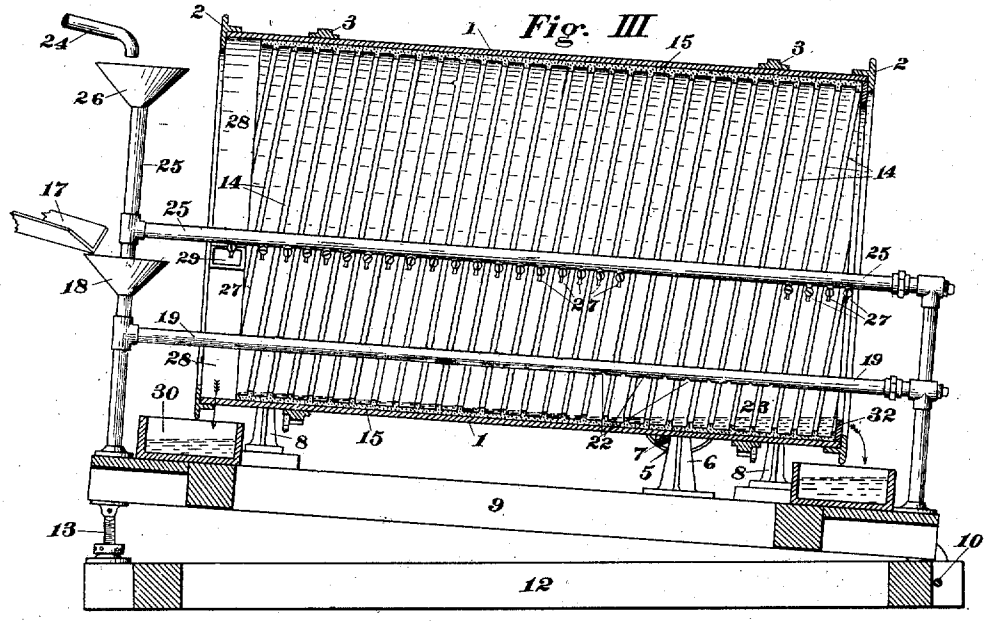
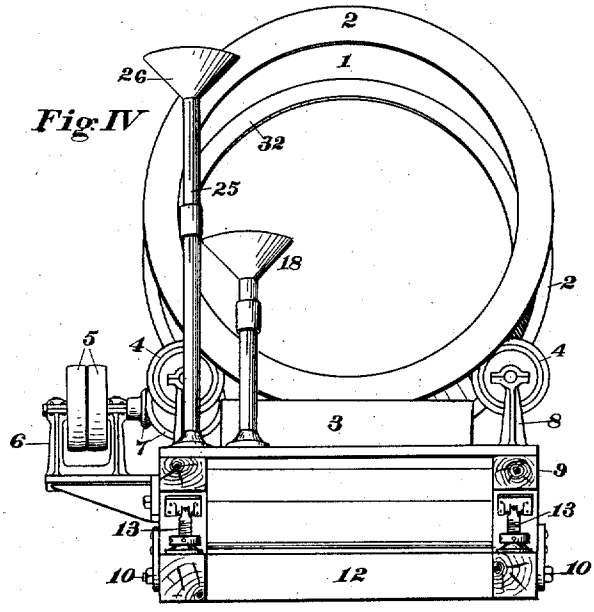


Fig. IV



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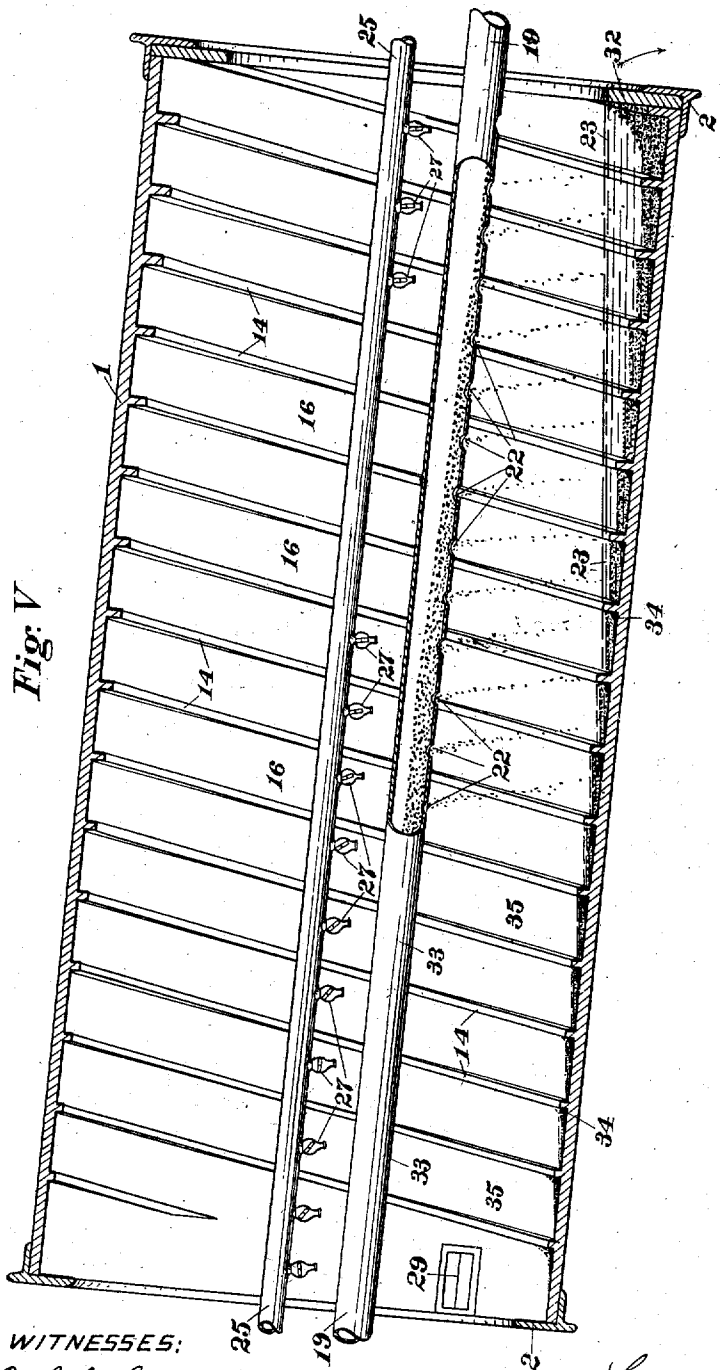
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APPLICATION FILED AUG. 20, 1902.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. V



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No. 758,438. Patented April 26, 1904.

UNITED STATES PATENT OFFICE.

LOUIS C. GRAUPNER, OF SAN FRANCISCO, CALIFORNIA.

CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 758,438, dated April 26, 1904.

Application filed August 20, 1902. Serial No. 120,426. (No model.)

To all whom it may concern:

Be it known that I, LOUIS C. GRAUPNER, a citizen of the United States, residing at San Francisco, county of San Francisco, and State of California, have invented certain new and useful Improvements in Concentrators; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification.

This invention relates to apparatus for concentrating or selecting metallic sand from gangue or pulverized ore and to certain improvements in such apparatus.

The improvements consist, essentially, in an improved means for treating the crushed ore, hereinafter designated the "material," in a manner analogous to the action of a common batea or hand-pan, at first in a considerable body of water to wash out the coarser and lighter sand, then in a gradually-diminishing body of water, and, finally, in a quantity sufficient only to maintain mobility of the material; also consist in an improved means for supplying the material to the concentrating-surfaces by devices that select or separate it into grades, so it will receive different degrees and kind of treatment in proportion to the amount of mineral contained therein, in coöperation with helical riffles of gradually-diminishing height in a rotatory apparatus, as is hereinafter described, and illustrated by drawings that form a part of this specification.

The object of this invention is to attain by machinery the washing and selection of minerals from sand or gangue, commonly called "concentrating," by a process analogous to hand-washing, employing therefor rotative machinery that avoids jar and concussion, also permits rapid and continuous action.

The art of concentrating or separating minerals from sand or gangue is one of much intricacy, and results are arrived at tentatively by careful and continuous experiment. Slight changes in the operating conditions may greatly affect the ultimate amount of mineral obtained and the profit derived from the process.

To best apply the means of concentrating that forms the subject of this application, I employ rotary apparatus, for the reason that it best conserves the object in view—namely, a free washing action at and near the point of discharging the lighter or waste sands, a gradually-diminishing washing action over a part of the concentrating range, and supplying the material so it will not have uniform treatment, but as the amount of mineral it contains, these being, as before stated, the essential objects of the invention. To these ends I construct devices as shown in the drawings herewith, forming a part of this specification.

Figure I is a side elevation of a concentrating-machine constructed according to my invention; Fig. II, a rear end view of the same machine; Fig. III, a longitudinal section through Fig. I; Fig. IV, a front end view of Fig. I, the interior helical channels being omitted in Figs. II and IV; Fig. V, an enlarged diagram of the main operating parts to assist in explaining the manner of operating, showing the diminishing-riffles on an exaggerated scale.

A main cylinder 1, preferably made of metal, is provided with reinforcing-rings 2 at the ends, and bands 3, that form bearing-ways for the supporting wheels or rollers 4, the latter being driven at one or both sides of the machine by means of the pulleys 5, held in the frame 6, and bevel gear-wheels 7, as shown and in the usual manner.

The bearing-wheels 4 are held by standards 8, set on an adjustable frame 9, the latter being pivoted at 10 on the main base-frame 12 and is adjusted to different degrees of slope by means of the screws 13 when such adjustment is required.

Within the main cylinder 1 I place a series of shallow channels 16, formed by the helical riffles 14, of diminishing depth from the lower end, as shown in Figs. III and V, as many in number as the desired pitch and slope of the machine and as the volume and nature of the material may require. Four such channels or convolutions are shown in the drawings. The channels 16 between the helical riffles 14 constitute the concentrating-surface. The riffles 14 can be made in any suitable manner and removable from the main cylinder, as in Fig.

III, or integral therewith, as in Fig. V, when the latter is of cast-iron. The depth of the riffles 14 may vary from one to four or one to six, depending on the slope of the main cylinder, the volume of material or rapidity of treatment, and its nature. In ordinary construction the proportions are approximately three-eighths of an inch high at the lower end, diminishing to one-sixteenth of an inch in height at the upper end of the cylinder.

Water is supplied from a pipe 24 and hopper 26 to the distributing-pipe 25, supported at each end beyond the main cylinder 1 and provided with a series of adjustable cocks 27, by means of which the quantity of water can be regulated relatively and distributed at various points as required.

The material to be treated mixed with water is supplied through a spout 17 or other source to a hopper 18, then to a pipe or conduit 19, that, like the water-pipe 25, passes entirely through the main cylinder 1 and has independent supports, as shown in Figs. III and IV. In the bottom of the pipe or conduit 19 are a series of outlets 22, through which the material to be treated falls into the pool 23. The heavier or mineralized portion of the material while flowing through the upper portion of the pipe 19, which is made large enough to produce a slow movement, settles or is distributed toward the bottom of the pipe and escapes in a graded or selected condition, according to weight and fineness, through the outlets 22 into the pool 23. This manner of supplying the material not only increases the quantity that can be treated in a given time, but adapts the washing and other treatment to the grade of the material, thus securing a better result.

The washing portion of the operation constitutes an important part thereof. The pool 23 is a prism of water extending about one-half of the length of the main cylinder 1 and is retained therein by an annular ledge or dam 32, preferably removable, so as to be varied in width, and thus regulate the length and depth of the pool 23 as required. At the discharge end of this pool 23 the material is mixed with a large amount of water, keeping it loose and well disintegrated, so the waste sand will at once wash over the dam 32 and the mineral or concentrates 34 sink freely to the bottom, as indicated in Fig. V. As this water-washing process goes on the mineral and the heavier portion of the sand or gangue are moved forward by the helical riffles 14, the volume of water and amount of material, also the washing action, gradually diminishing as the operation becomes more and more like that of a common concentrating-machine that has uniform treatment throughout. This goes on until the riffles 14 diminish to a depth that will barely contain the concentrates or mineral substance 34, which is then discharged through the outlets 29 into a receptacle 30 and removed for further treatment. During the progress of the material through the main cylinder 1 it rises higher and higher on the sides 35, receiving the sliding and selecting action required inversely as the amount of water combined with material and as the general process of concentration demands. In this manner of operating it will be seen that the different operations supplement and harmonize with each other and the treatment varies from the beginning throughout, leading to a new and advantageous result.

Having thus explained the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a mineral-concentrating apparatus, a hollow revoluble cylinder set in a sloping position, shallow helical riffles on the interior surface of said cylinder, gradually diminishing in height throughout the entire length from the lower end to the upper end thereof, an inclined pipe in the cylinder for distributing ore therein, perforated in its lower half, and an inclined pipe passing through the cylinder from the upper to the lower end, for distributing a water-supply therein, having a series of adjustable cocks by which the water-supply can be distributively regulated, substantially as specified.

2. In a mineral-concentrating apparatus, a hollow revoluble cylinder set in a sloping position, a series of continuous shallow helical flanges constituting riffles on the interior surface of the cylinder, gradually diminishing in height from the extreme lower to the upper end of the cylinder, an annular retaining wall or flange at the extreme lower end of the cylinder, higher than the riffles, to form a dam to hold a pool of water in the lower half of the cylinder, an inclined pipe in the cylinder for distributing ore therein, passing from the upper to the lower end, perforated in its lower half over said dam portion, and an inclined pipe passing through the cylinder from the upper to the lower end, for distributing a water-supply therein, having a series of adjustable cocks by which the water-supply can be distributively regulated, substantially as specified.

3. In a mineral-concentrating apparatus, a hollow revoluble cylinder set in a sloping position, a series of continuous shallow helical flanges constituting riffles on the interior surface of the cylinder, gradually diminishing in height from the extreme lower to the upper end of the cylinder, an annular retaining wall or flange at the extreme lower end of the cylinder, higher than the riffles, to form a dam to hold a pool of water in the lower half of the cylinder, of diminishing depth from the retaining-wall upward, an inclined pipe in said cylinder for distributing ore therein, passing from the upper end to the lower end, perfo-

rated in its lower half over said dam portion, and an inclined pipe passing through the cylinder from the upper to the lower end thereof, for distributing a water-supply therein, having a series of adjustable cocks by which the water-supply can be distributively regulated, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LOUIS C. GRAUPNER.

Witnesses:

ALFRED A. ENQUIST,

P. W. J. LANDER.