

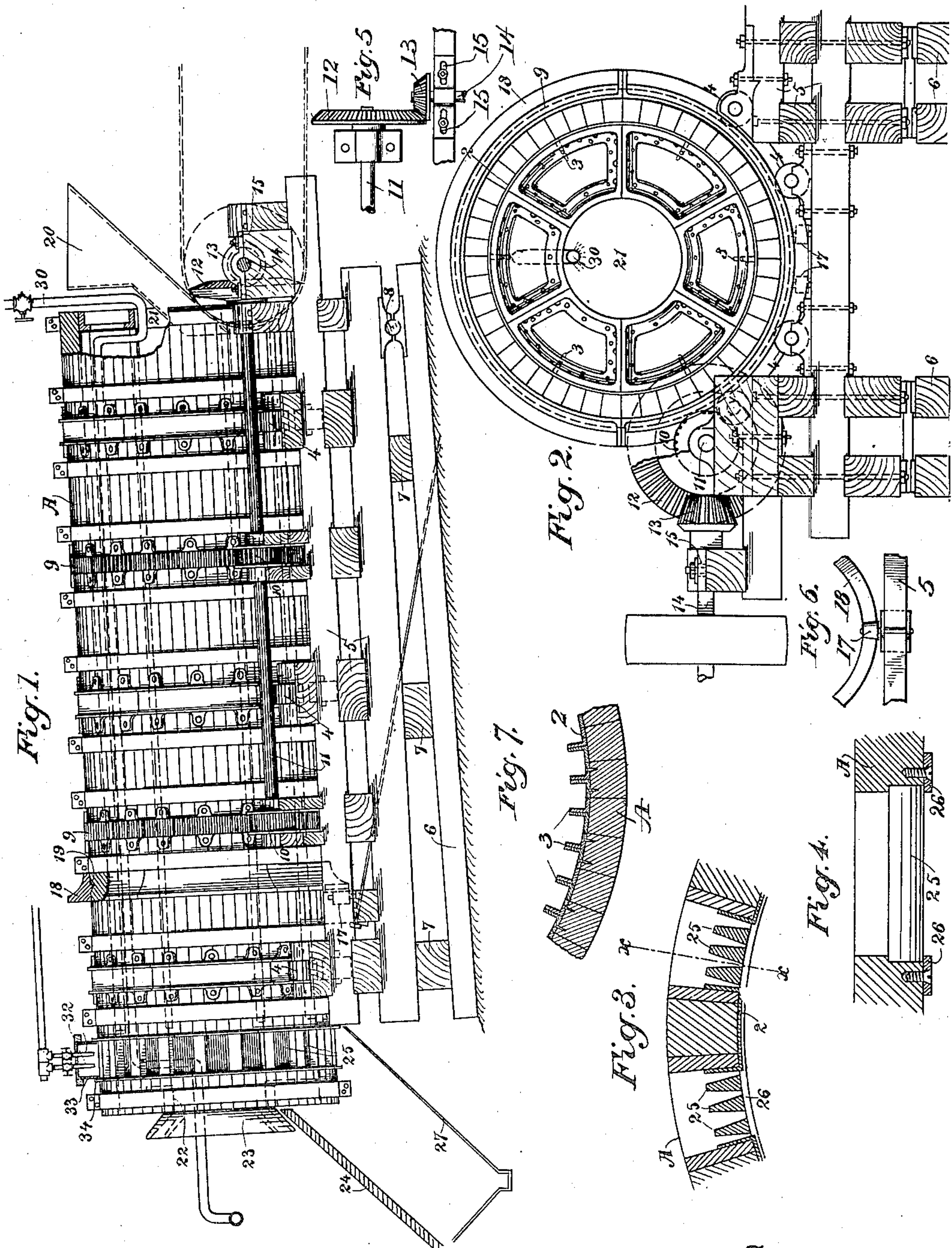
No. 726,498.

PATENTED APR. 28, 1903.

J. BEHM.
CEMENT AND GRAVEL SEPARATOR.

APPLICATION FILED JAN. 6, 1902.

NO MODEL.



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UNITED STATES PATENT OFFICE.

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CEMENT AND GRAVEL SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 726,498, dated April 28, 1903.

Application filed January 6, 1902. Serial No. 88,517. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH BEHM, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Cement and Gravel Separators; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to an apparatus which is designed to separate cement from gravel or rock to which it is found adherent, so that the process may be carried on upon a large scale and in an economical manner.

It consists of the parts and the constructions and combinations of parts which I will hereinafter describe and claim.

Figure 1 is a side elevation of the separator. Fig. 2 is a front end view. Fig. 3 is a section through the rear end. Fig. 4 is a similar view on line *xx* of Fig. 3. Figs. 5, 6, and 7 are details to be referred to.

In mining gold is found associated with earth, sand, or fine gravel which by some process of nature has afterward become cemented to larger gravel and rounded or water-worn or other rocks, so that it is difficult to separate the valuable gold-bearing material from the larger and worthless rocks. This is often accomplished by crushing the whole mass by the aid of a stamp-battery; but it is expensive, because of the amount of work necessary and the large additions of valueless material caused by crushing the boulders.

It is the object of my invention to separate the gold-bearing cement from the gravel or rock by attrition and to at the same time reduce the material to such a degree of fineness that it can at once be put through the usual processes for saving gold which is mixed with sand or tailings.

My apparatus consists of a cylinder A, which may be six feet, more or less, in diameter and twenty-five feet in length. In order to make this cylinder of sufficient strength to carry the great weight of the material which is to be passed through it, I prefer to make it of wooden staves, these staves being approximately six by eight inches, secured together and strongly hooped or banded. The interior of the cylinder thus formed has a metal lining 2, Fig. 7, bolted therein,

which serves to protect the wood from the wear of the material which is being acted upon, and this composite cylinder gives the best possible results in its operation. The interior of the cylinder has also longitudinal ribs 3 projecting approximately radially toward the center and of sufficient height to prevent the material from sliding when the cylinder is rotated. These ribs extend from the receiving end to a point short of the discharge end, where they terminate. The cylinder is supported upon bearing-rollers, as at 4, these rollers being mounted and suitably journaled upon heavy frame-timbers 5, properly secured together. These frame-timbers 5 are again supported upon a foundation of bed-timbers 6 by means of transverse timbers 7, interposed between the main frame and the foundation, and near one end the timbers 5 and 6 are connected together by a shaft turnable in boxes, as shown at 8. The object of this is to allow the adjustment of the cylinder after it has been set up, so that it will stand at such an angle as is necessary for the treatment of the particular quality of cement which is being operated upon. Thus with a soft cement the angle of the cylinder may be such as to allow the material to pass through with considerable rapidity; but with a harder and more intractable material it is necessary that the cylinder stand more nearly horizontal, so that the action on the material within it will be continued for a longer time. The apparatus having been thus set up upon the foundation 7, when it is determined what angle is best fitted for the work in hand the framework 5 and the cylinder and machinery carried thereon may be raised by jack-screws and the transverse timbers 7 may be made of the desired thickness to insure the proper angle for the cylinder, after which it is let down into position again, turning about the shaft 8. The cylinder is revolved by means of gears 9, which are formed of segments bolted around the cylinder at as many points in its length as may be desirable to prevent the strain of turning being greater at one point than another. These gear-segments are engaged by pinions, as at 10, and the pinions are mounted upon a shaft 11, journaled upon the main frame and parallel with the cylinder, so that

the teeth of the pinions will mesh with those of the gear and revolve the cylinder upon its bearing-rollers 4, previously described.

12 is a bevel-gear secured to the shaft 11, and 13 is a pinion engaging with the gear 12 and mounted upon a drive-shaft 14, through which power is transmitted to rotate the cylinder.

As the adjustment of the angle of the cylinder previously described is made about the shaft 8 between the frame and foundation, it will be manifest that this adjustment will in a measure change the relative position of the gears 12 and 13, and in order to adjust these gears to any such changes I have shown the boxes in which the gear-shaft 14 is turnable made with slots, as at 15, as shown in the detail Fig. 5, so that this shaft can be adjusted out or in to maintain the proper mesh of the gears.

As the cylinder stands at an angle, it will be manifest that the tendency will be to also move longitudinally down the grade as it revolves, and in order to prevent this I have shown rollers, as at 17, Fig. 6, journaled upon the frame-timbers, so that their shafts are approximately radial to the axis of the cylinder.

Around the cylinder is fixed a flange 18, which may be made in segments bolted to the cylinder, so as to form a continuous flange, and the outer face of this flange bears against the rollers 17 during the revolution of the cylinder, thus preventing the cylinder from getting out of place. Suitable anchors prevent the displacement of the rollers 17. In order to engage the flange firmly with the cylinder, I have shown the interior of the flange-sections formed with an angular rib, as at 19, and this rib is let into a groove formed around a cylinder, so that it makes a sort of abutment and prevents the flange from moving out of place.

Material to be treated, consisting of masses of cement with gravel and small boulders mixed together, is delivered into the end of the cylinder by means of a chute 20, which opens through the center of the head of the cylinder, as at 21. This central opening is here shown as formed by a rim having radial ribs extending outwardly to the periphery of the cylinder, and to these ribs are bolted sectional plates which form a complete head outside of the circular central opening, and by reason of the depth of the ribs they are sufficiently strong to resist any interior pressure. These plates being secured on the interior to the ribs form a smooth end to the cylinder, and they may be separately removed and replaced at any time by removing the securing-bolts. The slow revolution of the cylinder acting upon the material will by attrition and constant change, together with the great weight of material, which may amount to ten or fifteen tons or more within the cylinder, by its own action separate the cement from the boulders or gravel before it reaches

the lower end of the cylinder. The radial ribs 3 within the cylinder terminate at some distance short of the lower end of the cylinder, and after passing these ribs the material not being so much agitated and mixed up as previously will gradually separate, the finer cement going to the bottom and the larger rocks and gravel to the top. The discharge-head of the cylinder has an opening at 22 larger than the receiving-opening, and it is here shown with flaring or divergent exterior flanges 23, over which the gravel, rocks, and worthless material will pass, falling upon the chute 24, by which they are delivered away from the machine.

In order to save the cement and the valuable material mixed with it, I have shown the lower end of the cylinder as having gratings around its whole periphery. These gratings are formed by bars 25, which extend parallel with the axis and are let into grooves or sockets formed in the staves of the cylinder, so that these gratings or bars may lie between every alternate stave, thus making about half the surface of these bars and the other half of the staves which continue through to the end of the cylinder. The grating-bars being laid in their position, as shown, are retained by means of curved metal plates 26, fitting the interior of the cylinder and just over the ends of the gratings, so as to hold them in place. By removing these holding-plates the grating-bars may be removed at any time. The continued rotation of the cylinder will thus cause the fine material to pass through these gratings upon a chute or grizzly, as at 27, by which the material is carried to some point for further treatment.

As water is usually essential to the work of separating and pulverizing the cement, I have shown a pipe 30, which extends through the feed-opening in the upper head, thence is bent upwardly and passes along within the upper portion of the cylinder above the mass of material contained therein, and thence it is bent and extends out through the opening in the discharge end of the cylinder. This pipe has a suitable controlling-cock and is perforated within the cylinder, so that water may be discharged from it into the mass of material at will. After leaving the cylinder at the discharge end the pipe may also, if desired, supply water to the material after it has left the cylinder.

In order to prevent the clogging of the discharge-gratings, I have shown pipes 32 delivering water under pressure against the outside of the gratings from above when the revolution of the cylinder brings them successively beneath the jets, and to prevent splash and escape of water the pipes open into a casing 33, closed at the top and open at its junction with the periphery of the cylinder, against which it is curved to fit. The cylinder has flanges 34 extending just outside the box and forming a joint therewith.

The bearing-rollers 4 are shown in three or

more sets between the ends of the cylinder and four in each set and plane—two on each side of a vertical central line. The outer rollers take the bearing of the cylinder at a considerable distance up the sides, and the inner ones being located on each side of the center the cylinder revolves with great steadiness notwithstanding its size and weight.

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

1. An apparatus for the separation of cement from gravel and pulverizing the cement consisting of a cylinder and an adjustable supporting-framework therefor; annular tracks fixed around the exterior of the cylinder, and bearing-rollers on the frame engaging said tracks; annular gears formed of sections bolted to the cylinder; a shaft extending along the outside of the cylinder and provided with pinions to engage said gears; a power-transmitting shaft extending transversely across the head end of the cylinder and intermeshing gears between the two shafts; and means for maintaining the transmitting-gear in mesh with the gear of the first-named shaft consisting of boxes in which the power-shaft is journaled, said boxes having slots transverse to the axis, and bolts passing through said slots whereby the boxes and power-shaft may be moved to maintain the gears in mesh when the inclination of the cylinder is changed.

2. An apparatus for separating cement from gravel, pulverizing the cement consisting of an approximately horizontal cylinder with adjusting-frame and bearing-rollers journaled thereon, annular tracks surrounding the cylinder adapted to rest upon the rollers, toothed segments fixed to form annular gears around the cylinder, a shaft journaled upon the cylinder-frame parallel therewith having gears, the teeth of which engage those of the toothed segments, a beveled adjustable gear through which motion is transmitted to revolve the shaft and cylinder, an opening made centrally through one cylinder-head, and means for delivering material therethrough, an opening made in the opposite cylinder-head for the

discharge of the gravel and gratings consisting of spaced bars extending parallel with the axis of the cylinder and fitting grooves or sockets therein, and curved retaining-plates for said bars said grating extending around the cylinder within the said discharge-head through which gratings the pulverized cement escapes, and independent chutes adapted to receive the gravel and the cement respectively.

3. An apparatus for separating cement from gravel including an approximately horizontal revoluble cylinder composed of wooden staves with interior metal lining with radial ribs and metallic heads with central receiving and discharge openings, and a discharge for pulverized material consisting of gratings including spaced bars extending parallel with the axis of the cylinder and fitting sockets or grooves therein, and curved plates for removably retaining the bars in place.

4. In a cement and gravel separating apparatus, a revoluble cylinder composed of metal-lined wooden staves and centrally-perforated iron heads, said cylinder having discharge-screens near the lower or discharge end, said screens being composed of V-shaped grate-bars let into correspondingly-shaped grooves in alternate staves around the cylinder, and segmental plates and bolts by which they are secured over the ends of the grate-bars.

5. The combination in a cement and gravel separator of an inclined tubular revoluble cylinder, with inlet and discharge openings in the heads and annularly-disposed gratings around the lower end of the cylinder, and means to prevent clogging of the gratings consisting of exterior water-jet tubes discharging against the gratings, an inclosing box shaped to the cylinder, and flanges on the cylinder between which the sides of the box fit.

In witness whereof I have hereunto set my hand.

JOSEPH BEHM.

Witnesses:

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JESSIE C. BRODIE.