No. 743,201. PATENTED NOV. 3, 1903.

F. W. SHERMAN.

ORE SLIME SETTLING AND CLASSIFYING APPARATUS.

APPLICATION FILED OCT. 6, 1902.

NO MODEL. 4 SHEETS—SHEET 1.

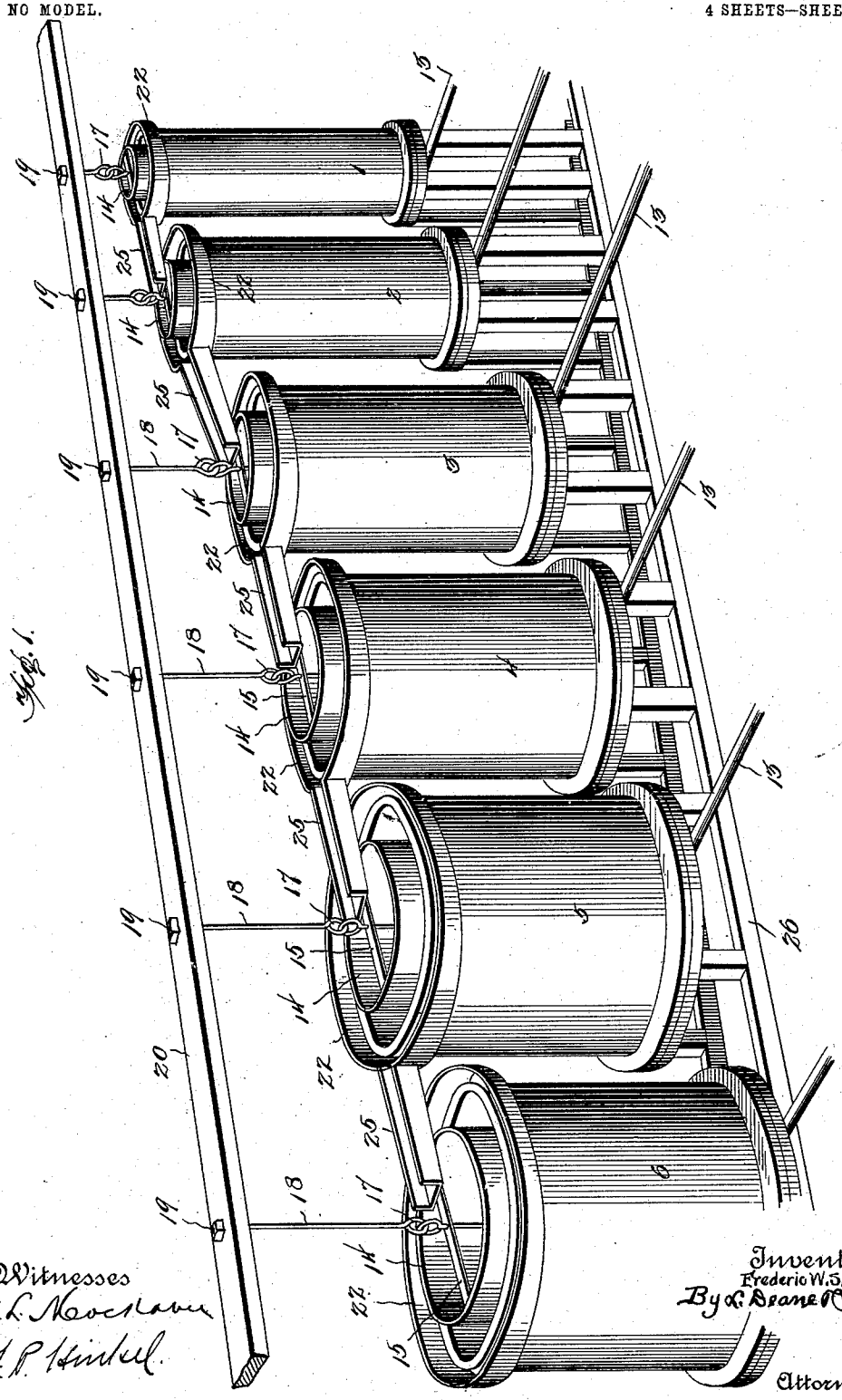


Fig. 1.

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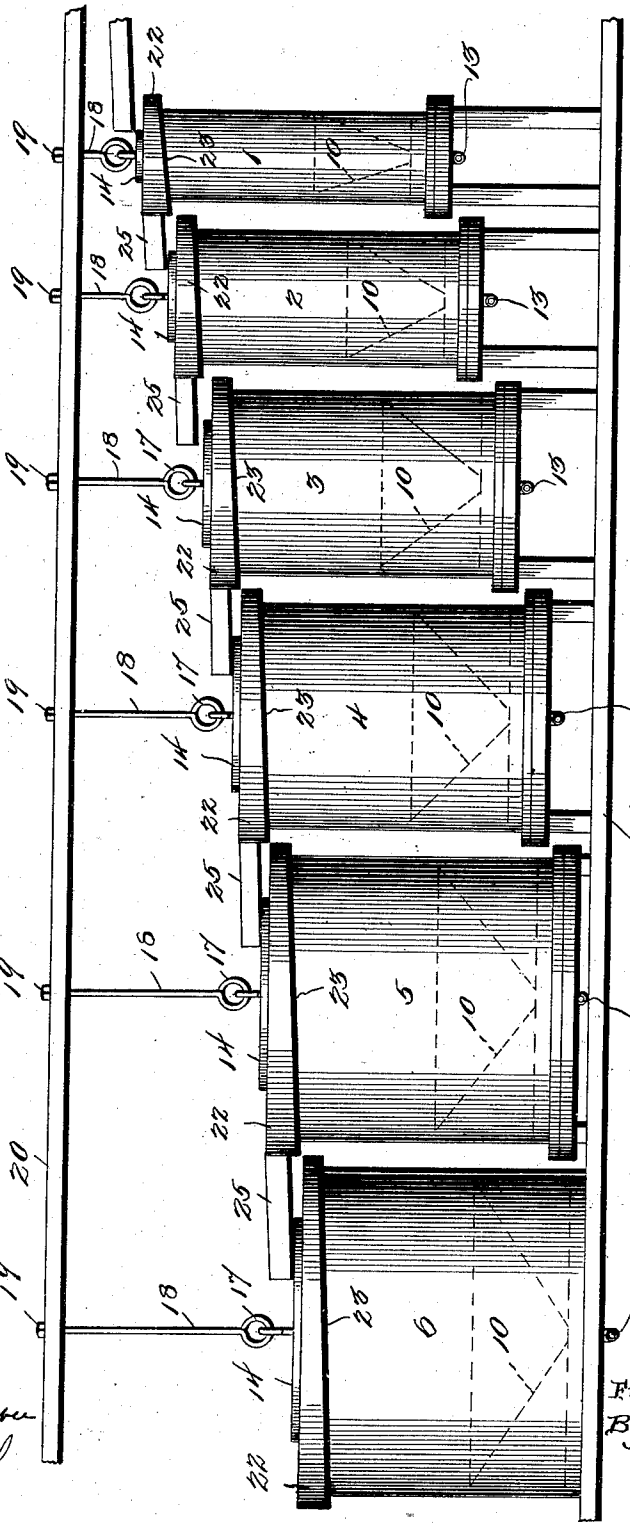
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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.



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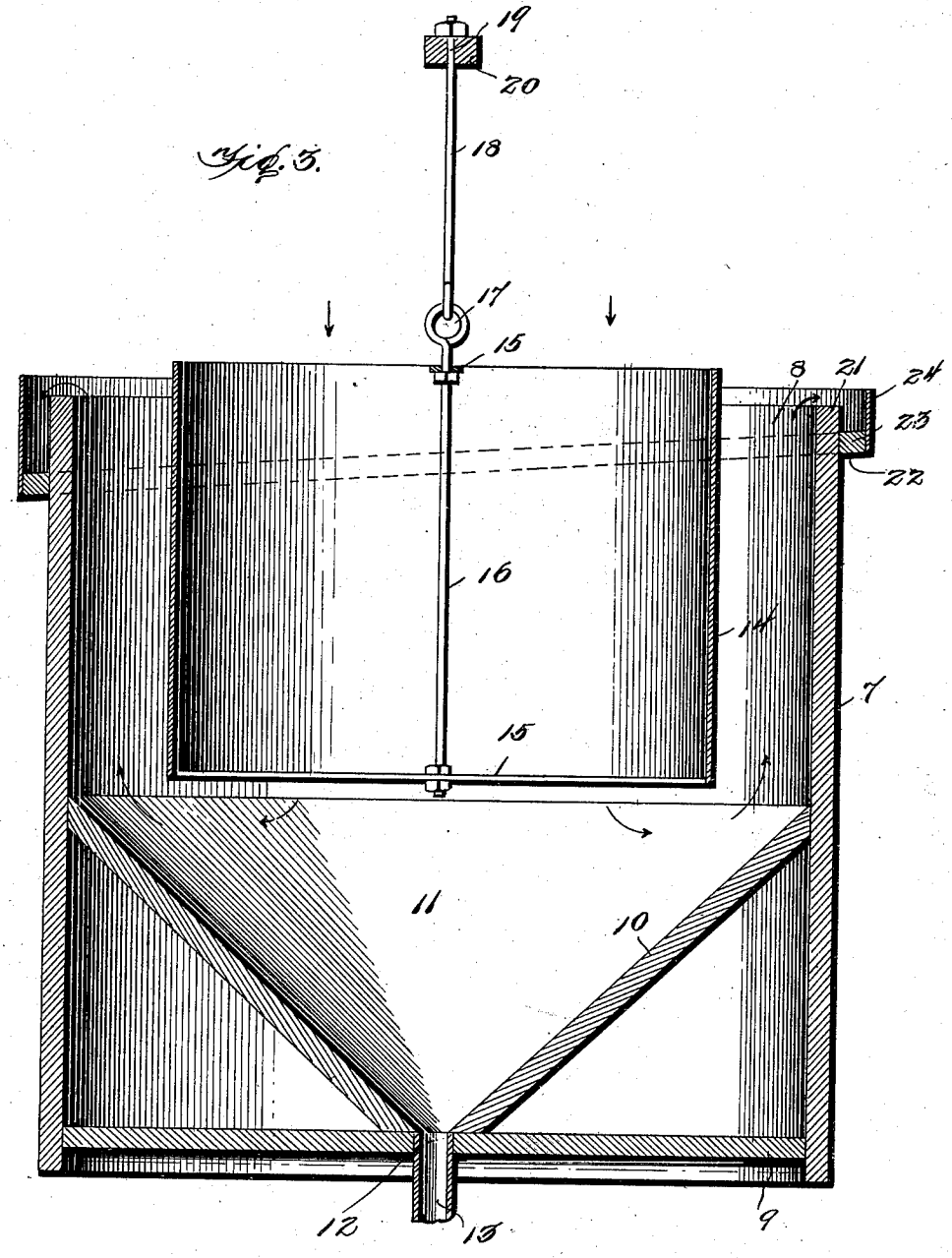
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ORE SLIME SETTLING AND CLASSIFYING APPARATUS.

APPLICATION FILED OCT. 6, 1902.

NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 4 SHEETS—SHEET 4.

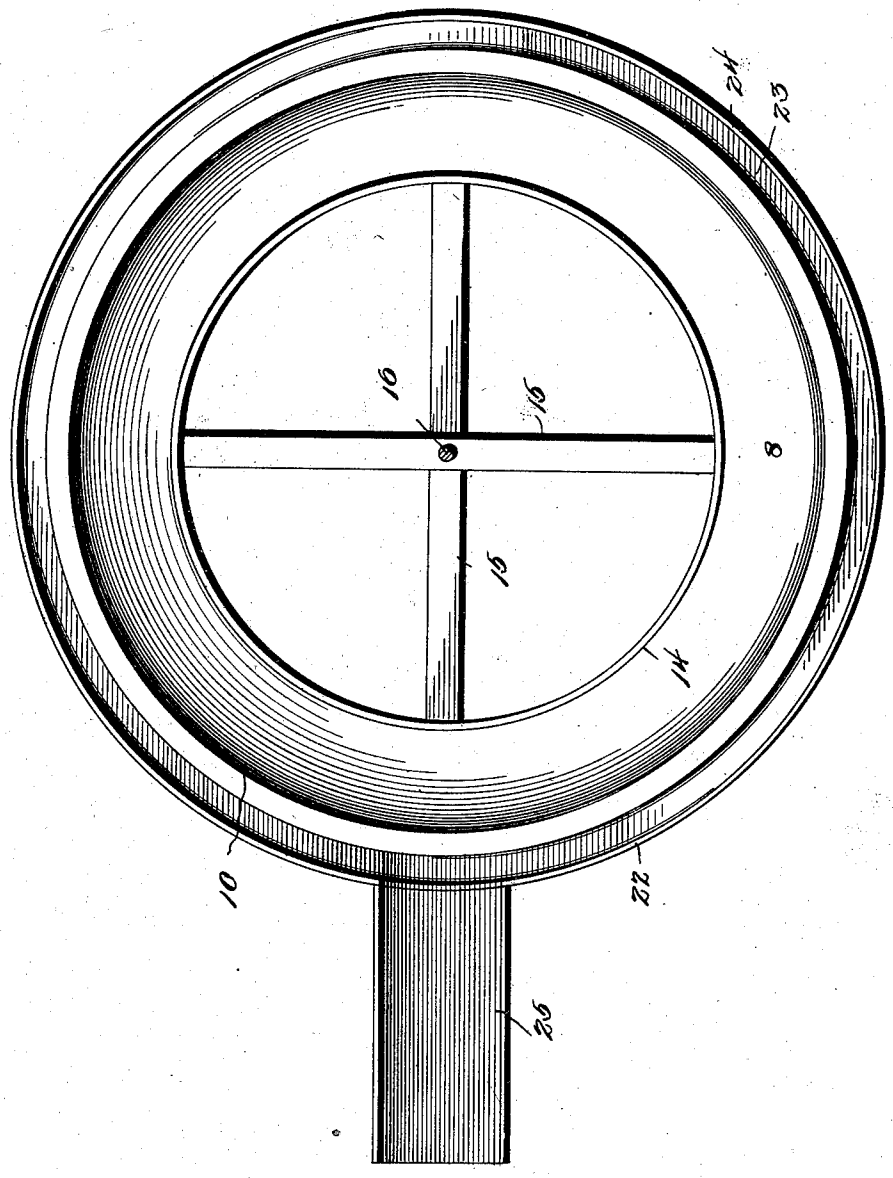


Fig. 4.

Witnesses
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No. 743,201. Patented November 3, 1903.

UNITED STATES PATENT OFFICE.

FREDERIC WOOSTER SHERMAN, OF PARK CITY, UTAH.

ORE-SLIME SETTLING AND CLASSIFYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 743,201, dated November 3, 1903.

Application filed October 6, 1902. Serial No. 126,102. (No model.)

To all whom it may concern:

Be it known that I, FREDERIC WOOSTER SHERMAN, a citizen of the United States, residing at Park City, in the county of Summit and State of Utah, have invented certain new and useful Improvements in Ore-Slime Settling and Classifying Apparatus, of which the following is a specification.

This invention relates to ore-treating apparatus, and has special reference to an improved apparatus of this character designed to provide a practical and effective means for settling and classifying fine particles of ore, especially such particles as are so fine as to remain in suspension in the water when there is a strong current.

It has been demonstrated that "ore-slimes" when classified and freed from an excessive amount of water can be concentrated successfully and also that gold-bearing slimes can be treated much more successfully both by amalgamating on copper plates and by cyaniding if the slimes are classified and freed from an excessive amount of water. It is therefore the special object of the present invention to effect these desirable results in a thoroughly practical manner.

In carrying out the invention a special object in view is to provide a peculiarly novel and effective arrangement of settling-tanks bearing such relation to each other and to the instrumentalities associated therewith as to progressively vary the force of the circulation or current to insure the thorough classification of the particles and the collection thereof in such a manner as to permit of the delivery thereof to the concentrating tables or plates with only such amount of water as is desirable for the successful working thereof.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts, which will be hereinafter more fully described, illustrated, and claimed.

The essential features of the invention involved in the equipment of each settling-tank and the peculiar arrangement and relation of the series of tanks are necessarily susceptible to some modification without departing from the spirit or scope of the invention; but a preferred embodiment thereof is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a complete ore-slime settling and classifying apparatus constructed in accordance with the present invention. Fig. 2 is an elevation thereof. Fig. 3 is an enlarged vertical sectional view of one of the tanks and its individual equipment. Fig. 4 is a top plan view of a tank and its equipment.

In carrying out the invention a distinctive feature thereof resides in associating together a series of settling-tanks bearing a definite arrangement and relation to each other. Any number of these tanks may obviously be employed, according to the conditions of the mill in which they may be used or the conditions of the particular ore-bearing slimes to be treated; but for illustrative purposes a series of six of these tanks are illustrated in the drawings and according to their order are designated, respectively, 1, 2, 3, 4, 5, and 6. From a structural standpoint the several tanks, with their individual equipments, are duplicates of each other; so in this particular a description of one will suffice for the others. In connection with the construction of each tank and its individual equipment the same is plainly shown in Figs. 3 and 4 of the drawings, and, referring particularly to these figures, it will be noted that in the preferable construction each tank consists of a cylindrical body open at the top, as indicated at 8, and provided with a main closed bottom 9. The cylindrical tank-body 7 of each tank may be constructed of suitably-calked staves or in any other approved fashion without affecting the invention; but one of the important features of the invention resides in providing the body of each tank within the bottom portion thereof with a downwardly-tapering or downwardly-convergent false bottom 10. This downwardly-tapering or downwardly-convergent bottom 10 within the bottom portion of each tank-body confines within such bottom portion a well-defined settling-pocket 11, and at the apex of the inclined bottom 10 for such pocket the bottom of the tank-body is pierced by a slime-outlet 12, to which is suitably fitted a slime-conductor pipe 13,

which is designed to conduct the settled slimes to the concentrating tables or plates, where the same are to be treated. In other words, the settled slimes are piped from the slime-outlets 12 to the concentrating tables or plates, and these pipes may be suitably valved, so that the slimes can be let out upon the tables or plates with just the proper amount of water.

The settling-pocket 11 of each tank-body is located below the plane of the lower end of a centered circulating feed-cylinder 14, suspended within the open top portion of the tank-body. The said circulating feed-cylinder for each tank is usually made of galvanized iron, although it may obviously be constructed of copper or other equivalent material if there is much acid in the ore to be treated. The cylinder 14 is open at both top and bottom and at its upper end projects a slight distance above the plane of the top edge of the tank-body 7, while the lower and inner end of the cylinder 14 terminates within the tank-body just above the settling-pocket 11.

The circulating feed-cylinder 14 of each tank-body may be suspended in its centered position within the body through any suitable means. A preferable construction, however, is shown in the drawings and consists in providing the cylinder at the open top and bottom thereof with suitable cross-bars 15, to which is bolted or otherwise suitably secured a central suspending-rod 16, having a looped or equivalent connection 17 at its upper end with the lower end of a hanger rod 18, preferably bolted at its upper end, as at 19, to a main supporting-beam 20, which is preferably so arranged in the building as to extend longitudinally over the entire series or group of tanks 1, 2, 3, 4, 5, and 6, as may be plainly seen from Fig. 2 of the drawings.

In addition to the features referred to each tank-body 7 has fitted thereto, contiguous to the top overflow edge 21 thereof, an exterior overflow annular launder 22. This launder may be constructed in any suitable manner to provide a circular gutter about the top edge of the tank to receive the overflow therefrom; but the bottom 23 of the launder or gutter 22 is set at an inclination to the horizontal plane of the tank, so as to provide a fall for the water toward the next succeeding lower tank. The bottom 23 of the launder is usually fitted directly to the tank-body, so that the latter forms one of the walls thereof, while the outer wall of the launder or gutter is formed by an upstanding metal or other suitable flange 24. At its lowermost point the launder 22 has projected therefrom a delivery-spout 25, which projects over the next succeeding lower tank and overhangs the upper open end of the circulating feeding-cylinder 14 thereof.

Each tank is mounted upon a supporting-base 26, usually of timbers and of sufficient height to hold the tank at proper elevation, according to its position in the series or group.

In reference to the particular arrangement and relation of the tanks it is to be first observed that while the tanks are of uniform height the same are arranged in a stepped series and are of progressively larger areas—that is, each tank is of a greater area than the immediately-preceding higher tank and of less area than the immediately-succeeding lower tank. Also a definite relation is preserved between each tank and the feed-cylinder 14 therefor—that is, the number of square inches of surface at either end of the cylinder are equal to the number of square inches of surface between the outer edge of said cylinder and the inner surface of the tank. By reason of having the tanks and their feed-cylinders in this proportion means are provided so that the water falling into the top ends of the cylinder and then downward through the same and then upward through the space between the cylinder and the tank will constantly travel through the same number of cubic inches of space. Therefore the current of water will be unchanged while passing through the tank. Again, it will be observed that while the false bottoms 10 of the different tanks extend up to the same height in each tank the grades of the false bottoms are lessened as the tanks increase in size. Also as the tanks increase in size the velocity of the current of water that flows through them decreases, finer material is settled, and not so steep a cone-shaped bottom is required in order to conduct the settled material to the piping 13, leading to the concentrators.

From the foregoing description it is believed that the operation of the apparatus will be clear. The ore-bearing slime is delivered successively and progressively from the delivery-spout 25 of one tank into the upper end of the feed-cylinder 14 for the other tank. By reason of the cylinder 14 of each tank the stream of water is first compelled to pass downward through such cylinder to a number of feet below the top of the tank. Then the stream rises up through the space between the cylinder and the side of the tank and overflows the top edge of the tank into the launder 22. The particles of ore that are too heavy to rise with the up-current drop into the conical false bottom 10, and slimes cannot settle thereon, but are directed into the conductor 13. It will be obvious that as this operation progresses from the smaller to the larger tanks the current necessarily becomes much slower and has less and less power of lifting the slimes with the up-current. Hence a very thorough classification necessarily results, and a separate classified product is secured in each tank.

From the foregoing it is thought that the construction, operation, and many advantages of the herein-described apparatus will

be readily apparent, and it is also understood that changes in the form, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a settling apparatus, a cylindrical tank having an open top and a conical bottom with a settlings-opening at the lowest point of the bottom, an open-ended cylindrical feed-tube arranged concentrically within the tank with its lower open end terminated short of the conical bottom of the tank and its upper open end projected above the top of the tank, the area of the feed-tube being equal to that of the annular space between the feed-tube and the tank, cross-bars at the top and bottom of the feed-tube, a central rod connecting the cross-bars, and a hanger connected to the upper end of the rod to suspend the tube within the tank.

2. In a settling apparatus, a cylindrical tank having an open top and a conical bottom with a settlings-opening at the lowest point of the bottom, an open-ended cylindrical feed-tube arranged concentrically within the tank with its lower open end terminated short of the conical bottom of the tank and its upper open end projected above the top of the tank, the area of the feed-tube being equal to that of the annular space between the feed-tube and the tank, and means for hanging the tube within the tank independently of said tank.

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

FREDERIC WOOSTER SHERMAN.

Witnesses:
F. A. McCARTY,
F. E. BACKUS.