S. NORTON.

MAGNETIC SEPARATOR.

APPLICATION FILED AUG. 1, 1907.

945,408.

Patented Jan. 4, 1910.

2 SHEETS—SHEET 1.

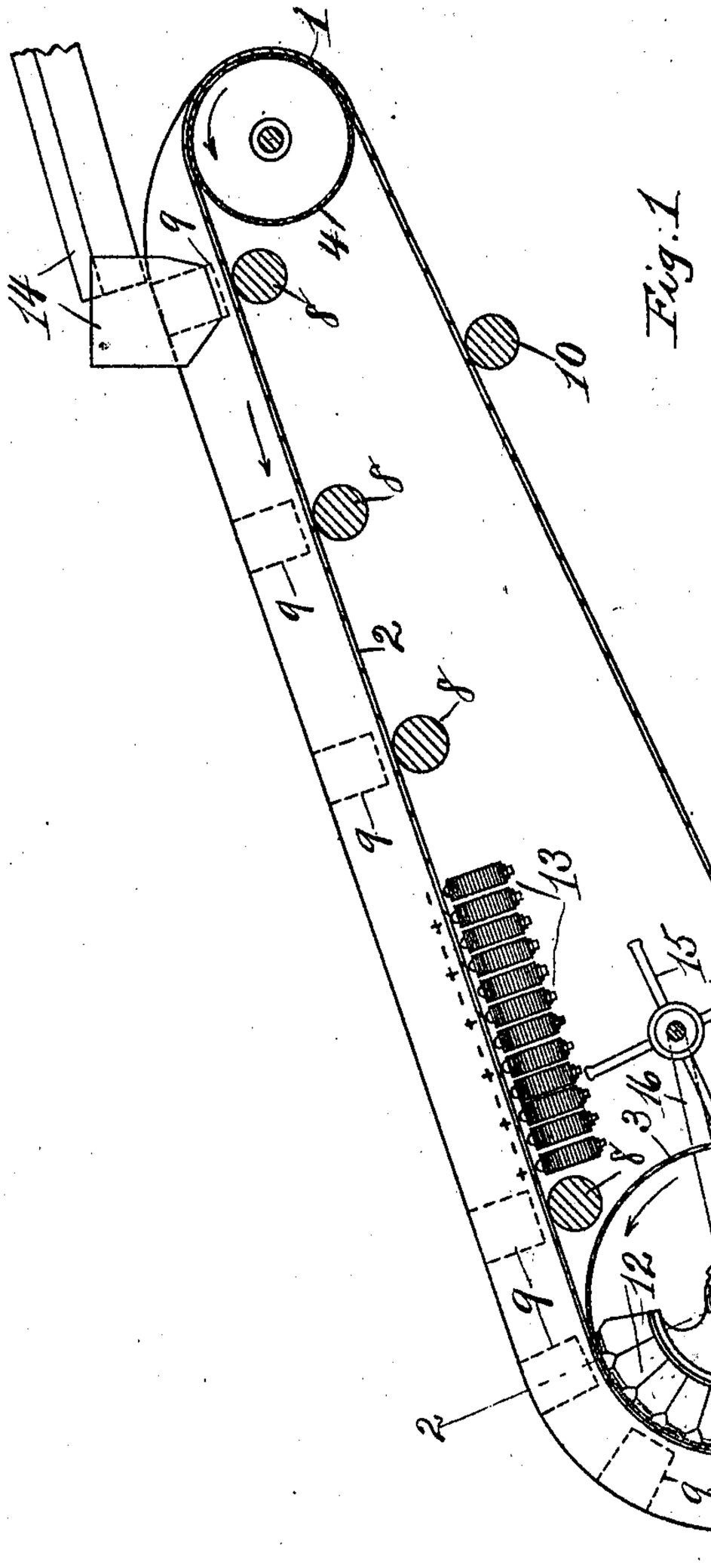

Fig. 1

WITNESSES

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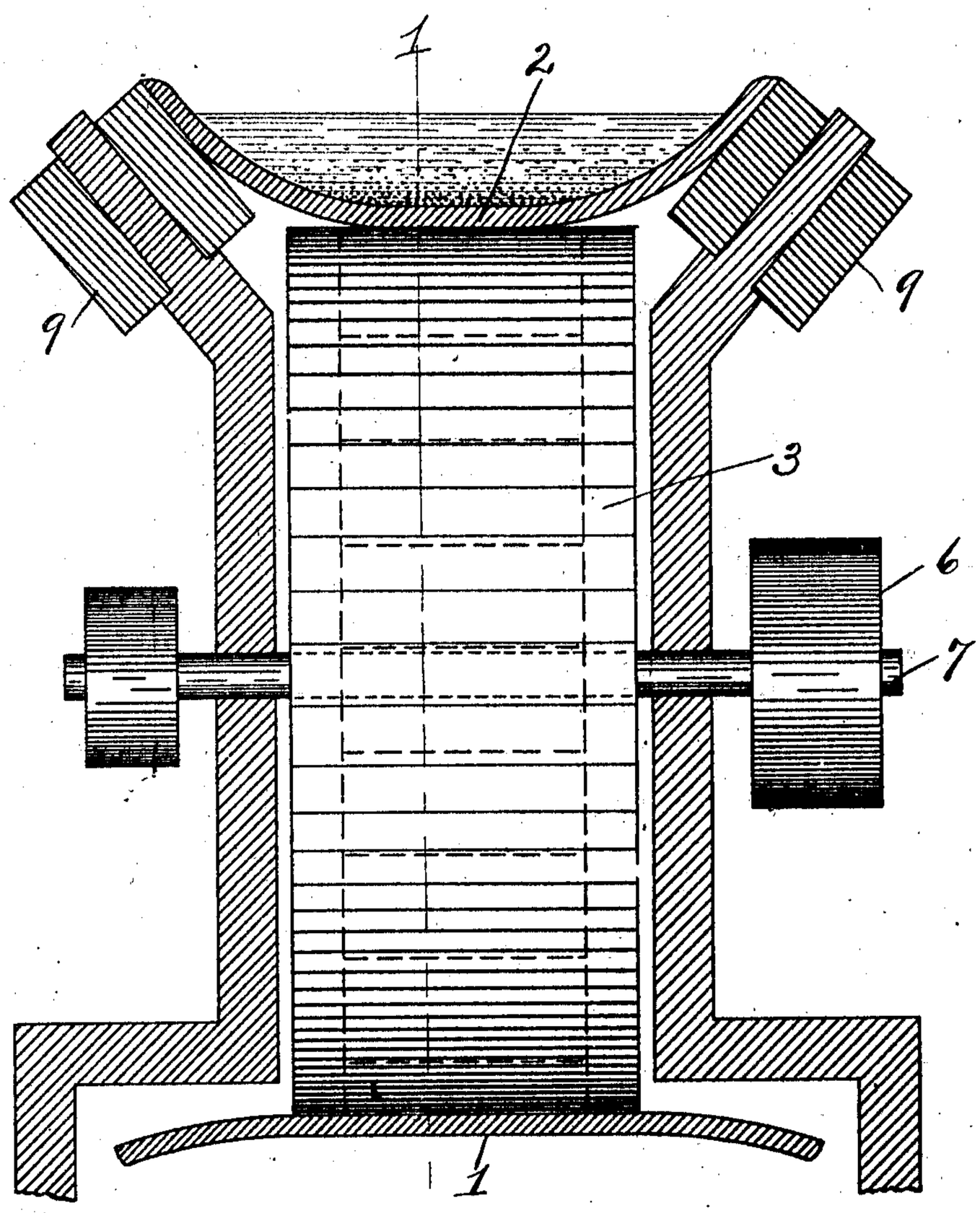
2 SHEETS—SHEET 2.

FIG. 2



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UNITED STATES PATENT OFFICE.

SHELDON NORTON, OF MINEVILLE, NEW YORK.

MAGNETIC SEPARATOR.

945,408. Specification of Letters Patent. Patented Jan. 4, 1910.

Application filed August 1, 1907. Serial No. 386,513.

To all whom it may concern:

Be it known that I, SHELDON NORTON, a citizen of the United States, residing at Mineville, county of Essex, and State of New York, have invented certain new and useful Improvements in Magnetic Separators, of which the following is a specification.

The invention relates to such improvements and consists of the novel construction and combination of parts hereinafter described and subsequently claimed.

Reference may be had to the accompanying drawings, and the reference characters marked thereon, which form a part of this specification. Similar characters refer to similar parts in the several figures therein.

Figure 1 of the drawings is a view in central, vertical, longitudinal section of my improved magnetic separator, the plane of the section being indicated by the broken line 1—1 in Fig. 2. Fig. 2 is a cross-section of the same taken on the broken line 2—2 in Fig. 1, on an enlarged scale with the drum shown in elevation.

My invention consists in a novel means for separating magnetic from non-magnetic particles, as in the magnetic separation of iron-ore.

The principal object of my invention is to facilitate the operation of separating magnetic from non-magnetic particles, and to secure a more effective separation of the magnetic from the non-magnetic particles.

Other objects will appear in connection with the following description.

In carrying out my novel method in the preferred manner, the solid matter to be treated is mixed with liquid, as water, to such a consistency that the mass will flow freely, and the mixture is then caused to flow downwardly past subjacent magnets, and the more magnetic particles are attracted to the bottom of the mixture by gravity and the force of said magnets, while moving in the direction of the flow of the mixture.

Referring to the drawings wherein is shown a preferred form of apparatus for carrying out my invention, 1, represents an endless belt, the upper stretch, 2, of which is supported in inclined position by means of the drums, 3 and 4, around which said belt passes, to one of which drums power may be transmitted through the belt-pulley, 6, and the shaft, 7, upon which said drum is fixed. The upper stretch of said belt is supported at intervals by subjacent rollers, 8, having their axes horizontal, and by other rollers, 9, having their axes inclined and upwardly diverging those on one side of the belt from those of the other, which rollers are adapted to support in upturned position the side portions of the belt, making the same trough-shaped or channeled in cross-section, as shown in Fig. 2.

The drum, 3, is so rotated as to cause the upper stretch of the belt to move downwardly. The lower stretch of the belt is supported by a plurality of subjacent rollers, 10, upon which the belt rests flatly. The belt remains substantially flat in passing around the drum, 4, but the inclined edge-supporting rollers, 9, are continued part way around the drum, 3, so that the belt is retained in trough-shape until it begins to pass beneath said drum 3.

Fixedly mounted within the drum, 3, and with their poles in close proximity to the shell of said drum, are a plurality of electro-magnets, 12; and another plurality of electro-magnets, 13, are supported in fixed position beneath the upper stretch, 2, of the belt.

The material to be treated is mixed with water to the desired consistency, which should be such that the mass will be practically fluid with the solid particles in a state of semi-suspension, and is then fed by the chute, 14, into the upper end of the trough formed by the upper stretch, 2, of the belt, while said upper stretch of the belt is being moved downwardly, due to the rotation of the drum 3. As the liquid mass passes down the trough formed by the upper stretch of the belt, and past the magnets, 13, the magnetic particles in the flowing mass are drawn to the bottom thereof, and to the bottom of the trough formed by the upper stretch of the belt, both by gravity and by the attractive force of the electro-magnets, 13, while the less magnetic particles flow with substantial freedom past said magnets and leave the belt as the same passes around the drum 3. The magnets thus not only assist the tendency of the magnetic particles to settle by gravity, but also retard the movement of such particles down the inclined trough or channel, while the water and non-magnetic particles pass freely down the chute and escape. By moving the magnetic particles in the same direction as the flowing

mass, and simply retarding their movement, I am able to secure effective separation without lifting the magnetic particles up through the mass of water and gangue particles flowing in the opposite direction, as has been heretofore done. As the upper stretch of the belt continues to move downwardly toward the drum, 3, it carries with it in the same direction of the flow of the liquid mixture the magnetic particles which have been caused to be deposited upon the belt by the attractive forces of gravitation and of the electro-magnets, which deposited particles are held firmly to the belt by the attractive force of the electro-magnets, 12, and are thereby carried around the drum, 3, to a point somewhat in rear of said drum, where, as said particles are carried beyond the influence of the electro-magnets, 12, they fall by gravity upon the ground or a receptacle placed to receive them, the particles so deposited constituting the concentrates or magnetic particles of the material under treatment.

To facilitate the depositing of the separated magnetic particles, I have provided a beater, 15, the arms of which are adapted to engage at intervals the upper surface of the lower stretch of the belt just in rear of the drum, 3, said beater being rotatively mounted and driven by a belt connection, 16, with the shaft, 7, of the drum 3.

The magnets may be all of the same polarity, but I prefer to have them alternate in polarity, so as to cause the attracted particles to be inverted or rotated in passing from one magnet to the next, the movement of magnetic particles so induced tending, in connection with the flowing liquid, to free them from non-magnetic particles which might adhere thereto.

Any known form of magnets may be employed in my improved apparatus, and in carrying out my novel method.

What I claim as new and desire to secure by Letters Patent is—

1. In a magnetic separator, and in combination, a drum; means for rotating said drum; magnets located within said drum; a movable channeled conveyer for the material to be treated leading obliquely downwardly to and over said drum; means for moving said conveyer downward toward said drum; magnets subjacent to said channeled conveyer in advance of said drum, means for feeding a mixture of ore and liquid to the conveyer; and means for separately collecting the separated components near the lower end.

2. In a magnetic separator, and in combination, a drum; a roller at a higher level than said drum; an endless belt passing around said drum and roller; means for maintaining the upper stretch of said belt in channeled form; magnets subjacent to said upper stretch of belt; magnets within said drum; means for causing a downward movement of the upper stretch of said belt, means for feeding a mixture of ore and liquid to the belt; and means for separately collecting the separated components near the lower end.

In testimony whereof, I have hereunto set my hand this 29th day of July, 1907.

SHELDON NORTON

Witnesses:
GEO. H. SPRING,
R. J. BIGLEY.