No. 849,385. PATENTED APR. 9, 1907.

J. W. GIBSON.

ORE SEPARATOR.

APPLICATION FILED APR. 2, 1906.

2 SHEETS—SHEET 1.

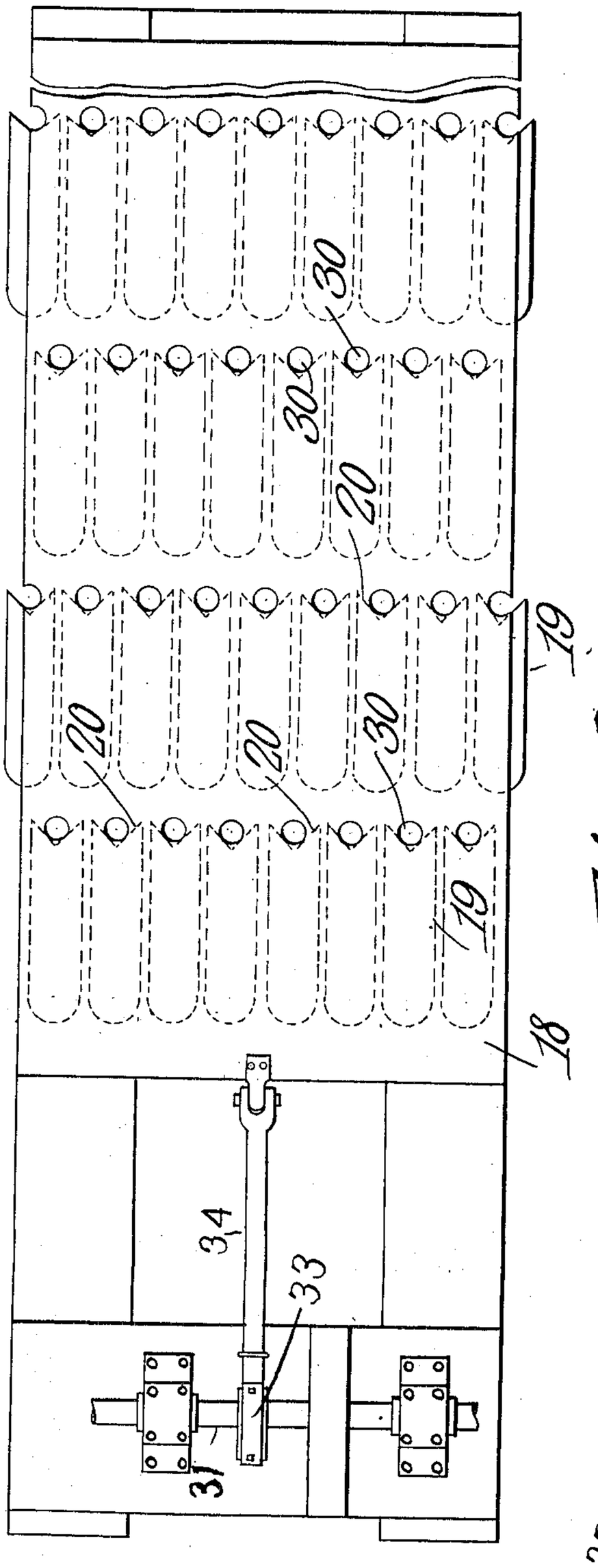

Fig. 1.

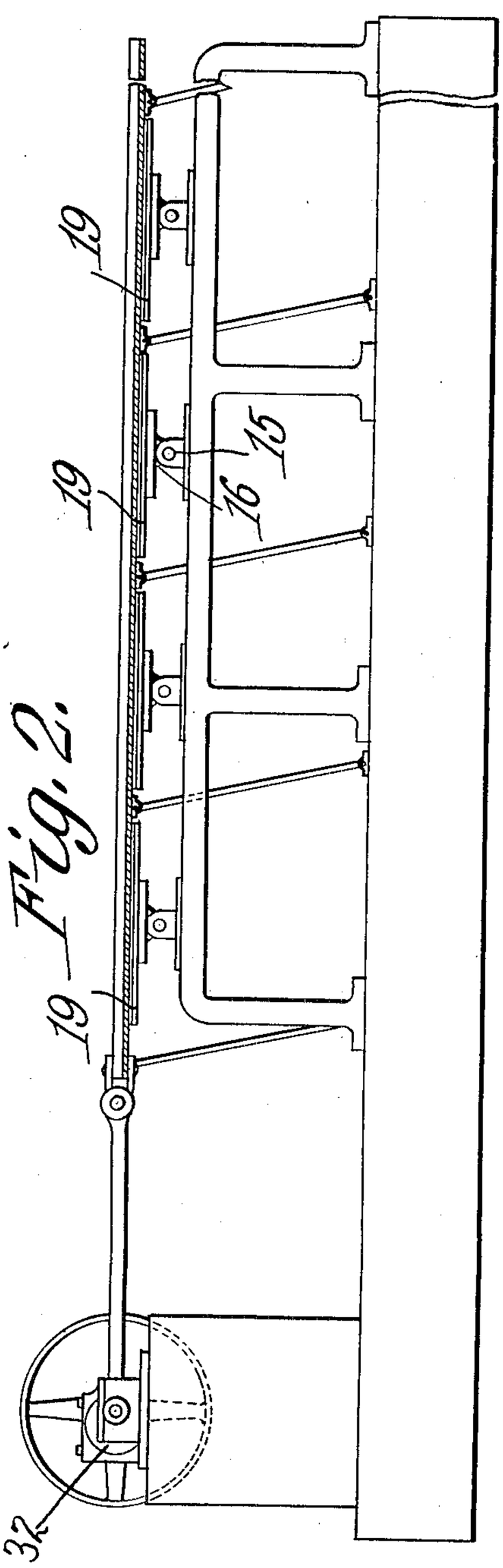

Fig. 2.

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Fig. 3.

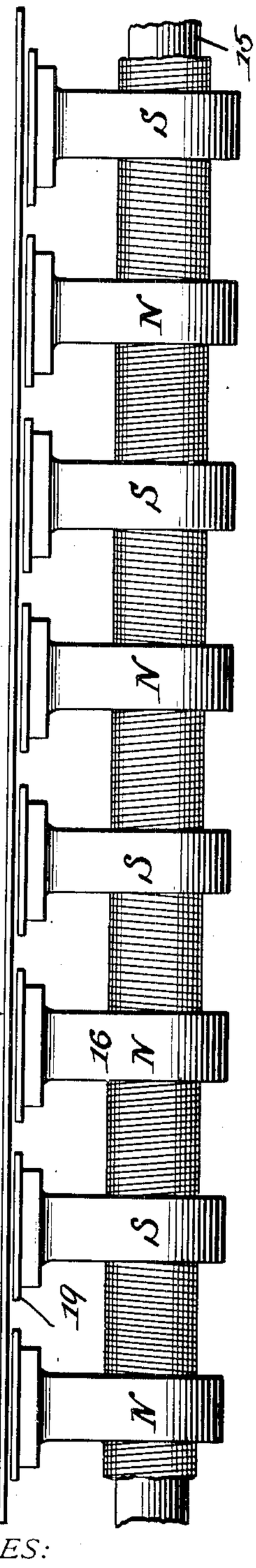
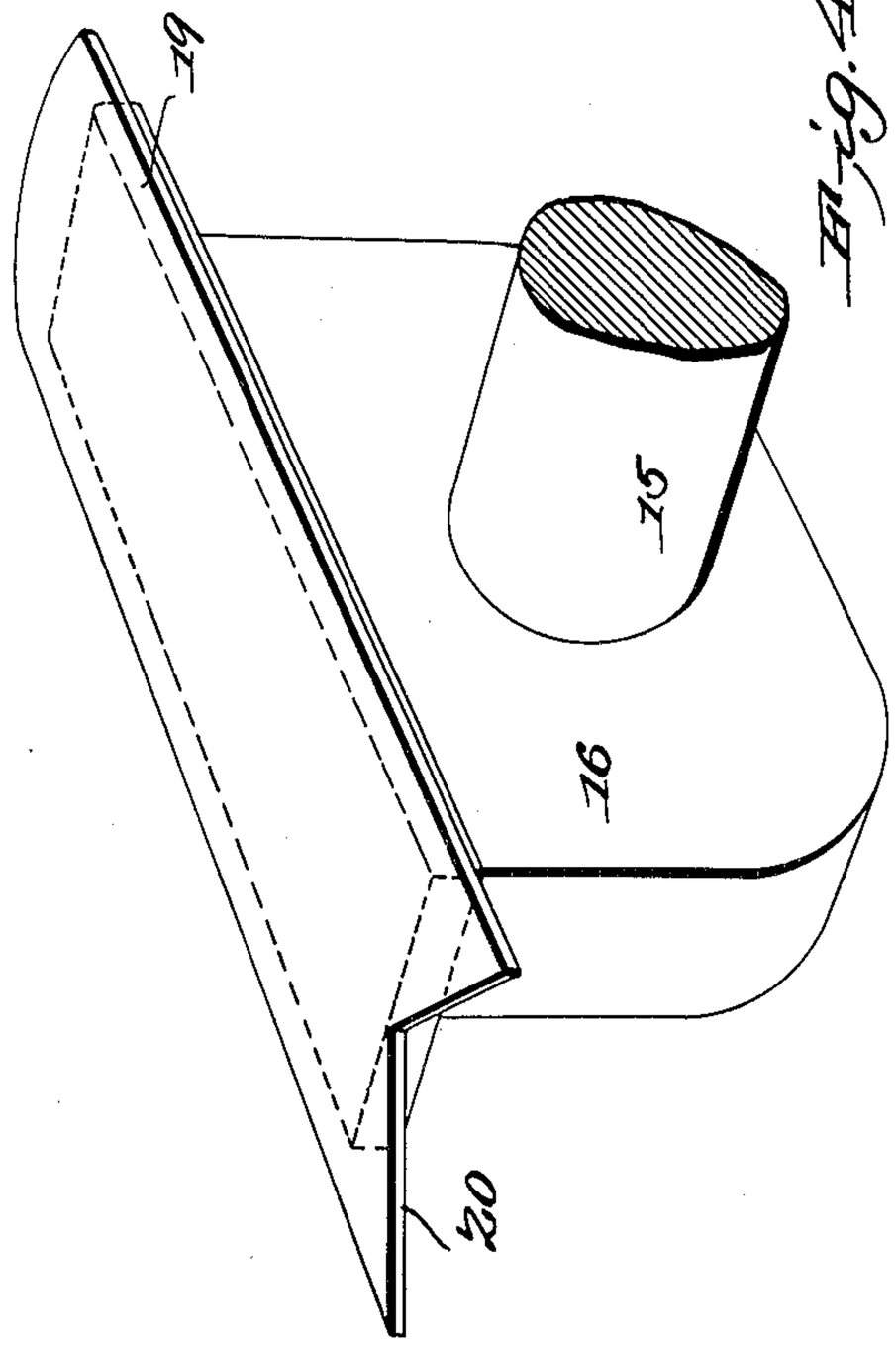


Fig. 4.



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UNITED STATES PATENT OFFICE.

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ORE-SEPARATOR.

No. 849,385. Specification of Letters Patent. Patented April 9, 1907.

Application filed April 2, 1906. Serial No. 309,396.

To all whom it may concern.

Be it known that I, JOHN WILLIAM GIBSON, a citizen of the United States, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Ore-Separator, of which the following is a specification.

This invention relates to magnetic-ore separators, and has for its principal object to provide a simple and effective mechanism for rapidly and thoroughly separating magnetic ore from gangue.

A further object of the invention is to provide a separating device in which electromagnets are associated with a shaking-table of diamagnetic material to the end that the magnetic ore may be placed under the control of the electromagnets, while the gangue is left free to move to a discharge point or points.

A still further object of the invention is to provide a mechanism of this type in which a table of diamagnetic material is mounted for reciprocatory movement in a plane above and within the field of force of a plurality of horseshoe-magnets and in which said table is provided with discharge-openings for the gangue.

With these and other objects in view, as will more fully hereinafter appear, the invention consists in certain novel features of construction and arrangement of parts, hereinafter fully described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that various changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a plan view of an ore-separator constructed in accordance with the invention. Fig. 2 is a side elevation of the same. Fig. 3 is a transverse sectional view of the table, drawn to an enlarged scale. Fig. 4 is a detail perspective view of one of the electromagnets, showing one of the cores and one of the extension pole-pieces.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The working parts of the machine are supported on a suitable frame, and said frame further carries the core members 15 of the electromagnets, there being four series of electromagnets shown in the present instance, although this number may be increased or decreased, if desired.

The electromagnets are provided with pole-pieces 16, which alternate as to polarity, those of a single series being arranged in N S, N S, &c., and the windings between the core-pieces being arranged to effect or produce the desired polarity. The ends of the cores are projected upward to a short distance below the shaking-table 18, and said pole-pieces are provided with extension-plates 19, one end of each plate being cut away or recessed, as indicated at 20.

The shaking-table 18, which may be operated by any well-known means capable of giving a longitudinal reciprocatory motion, is preferably formed of thin sheet metal of some diamagnetic material—such, for instance, as brass (nickel may be employed)—and said table is arranged to extend over all of the electromagnets.

The table is vibrated in the direction of its length and operates in the well-known manner for effecting the travel of any material placed on such table, the material being fed to that end of the table nearest the shaft and the magnetic ore being discharged at the opposite end.

The table is provided with a large number of openings 30, of which there is one in alinement with each of the pole-pieces 19, and these openings serve to permit the gravitational discharge of the gangue while the magnetic ore is retained on the table.

The electromagnets of each series are disposed in staggered relation to those of the next series and the openings are correspondingly arranged—that is to say, a straight line drawn parallel with the length of the table across the plane of the first opening and one of the electromagnets of the first series will pass midway between two of the openings and two of the electromagnets of the next series and will cross the plane of an opening and an electromagnet of the third series.

If the electromagnets are energized and ore is placed on the table, the vibrations of the latter will carry the ore over the first series of magnets—that is to say, the series of magnets nearest the free end. At this point the magnetic iron will tend to move to a position between the poles of the horseshoe-magnets and to accumulate in small rows

between the poles, while the gangue or earthy material not being magnetic, will tend to travel along toward the discharge end of the table and will move over the poles of the electromagnets without being affected thereby and will fall through the openings 30 in the table. As the material travels along toward the next series of electromagnets and the rows of magnetic iron, more or less mechanically mixed with gangue, are now directed in the path of the pole-pieces of the electromagnets; but as the material moves over this second series of magnets the magnetic iron will move to the right or to the left to a position between the poles of the horseshoe-magnets of the second series, leaving the gangue to travel straight ahead and fall through the openings at the ends of the second series of magnets. This operation is repeated at the third and fourth, and, if necessary, additional series of magnets, the gangue traveling in a practically straight line from end to end of the table, while the magnetic iron moves in a zigzag path between the series of magnets. The bodily movement of the particles of magnetic iron will tend, of course, to travel some of the gangue as the magnetic iron is moved laterally of the table; but after a number of lateral movements it is found that the gangue is entirely removed, leaving only the magnetic ore on the table.

The operating means disclosed consists of a shaft 31, which may be driven by any suitable power (not indicated) carrying an eccentric 32, embraced by an eccentric-strap 33, to which is attached an eccentric-rod 34, pivotally connected with the table.

I claim—

1. In an ore-separator, a movable table of diamagnetic material and provided with gangue-discharging openings, a plurality of electromagnets disposed under said table and means for passing magnetic ore over the table.

2. In an ore-separator, a movable table of diamagnetic material and provided with gangue-discharging openings, means for shaking said table and a plurality of electromagnets disposed under said table.

3. In an ore-separator, a table of diamagnetic material provided with staggered openings, electromagnets arranged in staggered relation under the table and means for passing magnetic ore over the table.

4. In an ore-separator, a table of diamagnetic material provided with staggered openings, means for shaking said table and electromagnets arranged in staggered relation under the table.

5. In an ore-separator, a movable table, a plurality of series of horseshoe-magnets arranged under the table, the magnets of each series being staggered with relation to those of an adjacent series, the table being provided with openings in alinement with the pole-pieces of the electromagnets, and means for passing magnetic ore over the table.

6. In an ore-separator, a movable table, means for shaking said table, a plurality of series of horseshoe-magnets arranged under the table, the magnets of each series being staggered with relation to those of an adjacent series, the table being provided with openings in alinement with the pole-pieces of the electromagnets.

7. In an ore-separator, the combination with a shaking-table, of a plurality of horseshoe-magnets arranged in staggered order under the table and having extension pole-pieces, the table being provided with openings in alinement with such pole-pieces, and means for passing magnetic ore over the table.

8. In an ore-separator, the combination with a shaking-table, of means for operating the same, a plurality of horseshoe-magnets arranged in staggered order under the table and having extension pole-pieces, the table being provided with openings in alinement with such pole-pieces.

9. In an ore-separator, a longitudinally-movable table, horseshoe-magnets arranged in series under the table, the magnets of each series being disposed in staggered relation with respect to those of the adjacent series, said magnets having extension pole-pieces, and the table being provided with gangue-discharging openings in alinement with the pole-pieces and means for passing magnetic ore over the table.

10. In an ore-separator, a longitudinally-movable table, means for shaking said table, horseshoe-magnets arranged in series under the table, the magnets of each series being disposed in staggered relation with respect to those of the adjacent series, said magnets having extension pole-pieces, and the table being provided with gangue-discharging openings in alinement with the pole-pieces.

11. In an ore-separator, the combination with a reciprocatory table of diamagnetic material, a plurality of horseshoe-magnets arranged under the table and having their pole-pieces of different polarity alternating in the width of the table, extension pole-pieces for said electromagnets, the table having gangue-discharging openings in alinement with such pole-pieces, and means for passing magnetic ore over the table.

12. In an ore-separator, the combination with a reciprocatory table of diamagnetic material, of means for operating the same, a plurality of horseshoe-magnets arranged under the table, and having their pole-pieces of different polarity alternating in the width of the table, and extension pole-pieces for said electromagnets, the table having gangue-discharging openings in alinement with such pole-pieces.

13. In a magnetic-ore separator, a reciprocatory table having staggered discharge-openings, electromagnetic means for moving the magnetic ore in a zigzag path across the table and directing the same between the openings, and means for passing magnetic ore over the table.

14. In a magnetic-ore separator, a reciprocatory table having staggered discharge-openings, means for operating the same and electromagnetic means for moving the magnetic ore in a zigzag path across the table and directing the same between the openings.

15. In a magnetic-ore separator, a shaking-table, means for reciprocating the table, a plurality of horseshoe-magnets extending transversely across the table, the pole-pieces of the electromagnets of one series alternating with the pole-pieces of an adjacent series, the table having gangue-discharging openings in alinement with the pole-pieces.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN WILLIAM GIBSON.

Witnesses:

C. D. BLACKWOOD,

GEO. G. MCLAREN.