C. E. STEBBINS.

MAGNETIC ORE SEPARATOR.

APPLICATION FILED APR. 17, 1908.

899,348.

Patented Sept. 22, 1908.

2 SHEETS—SHEET 1.

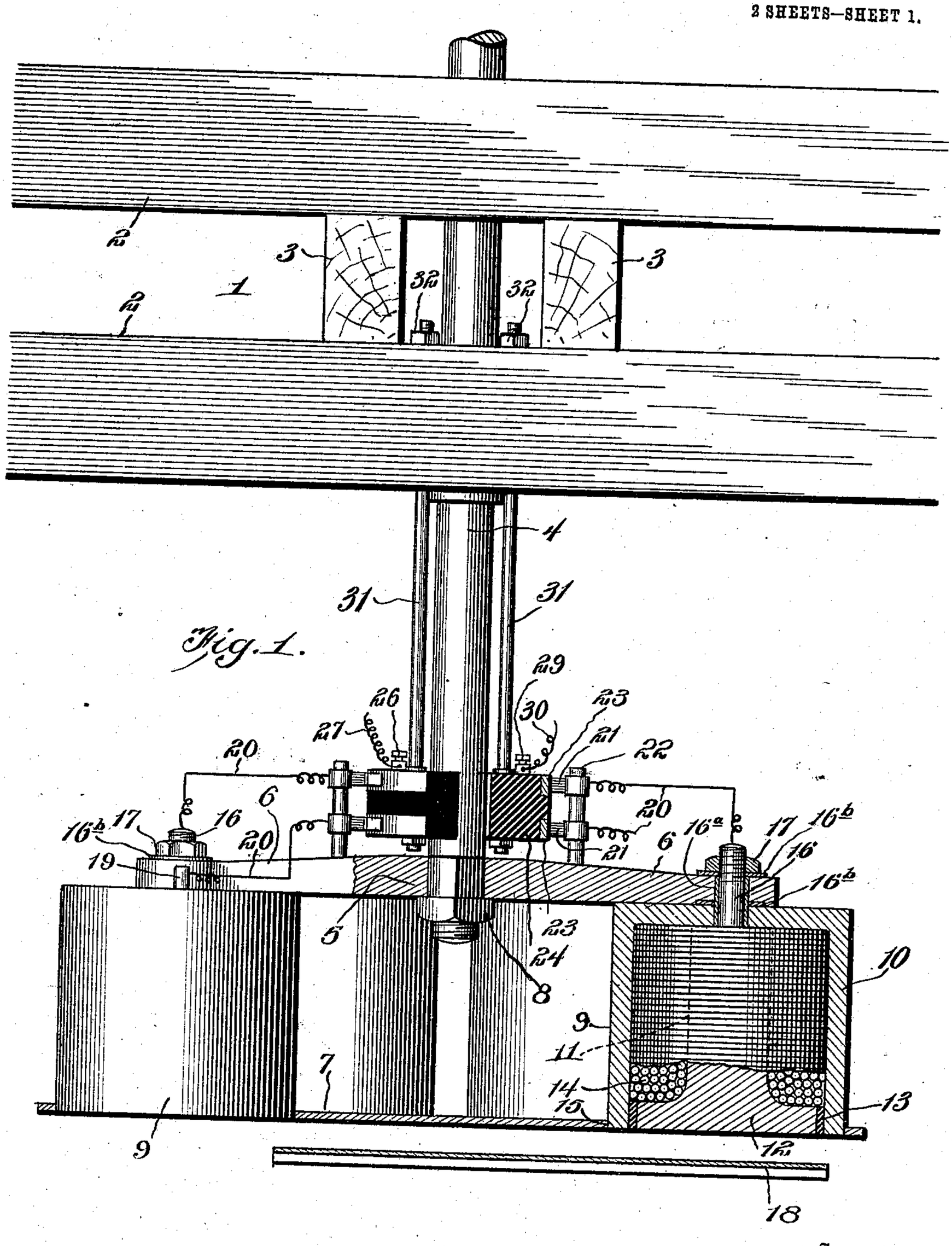

Fig. 1.

Witnesses

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2 SHEETS—SHEET 2.

Fig. 2.

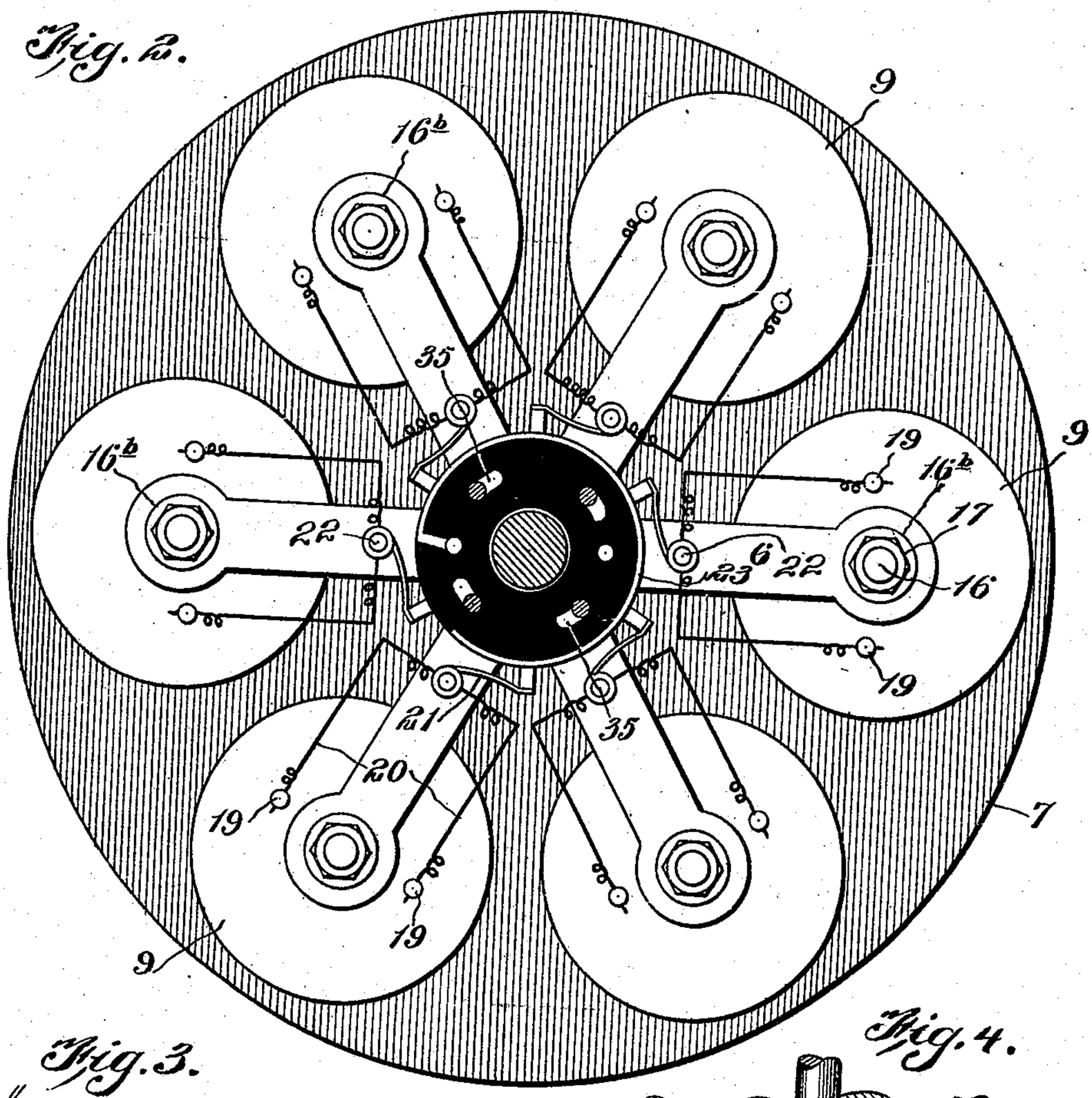


Fig. 3.

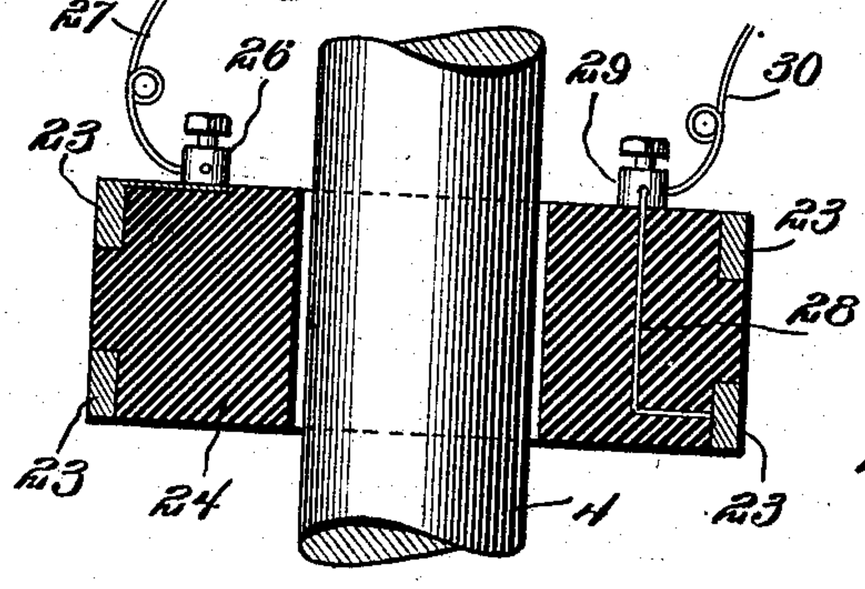
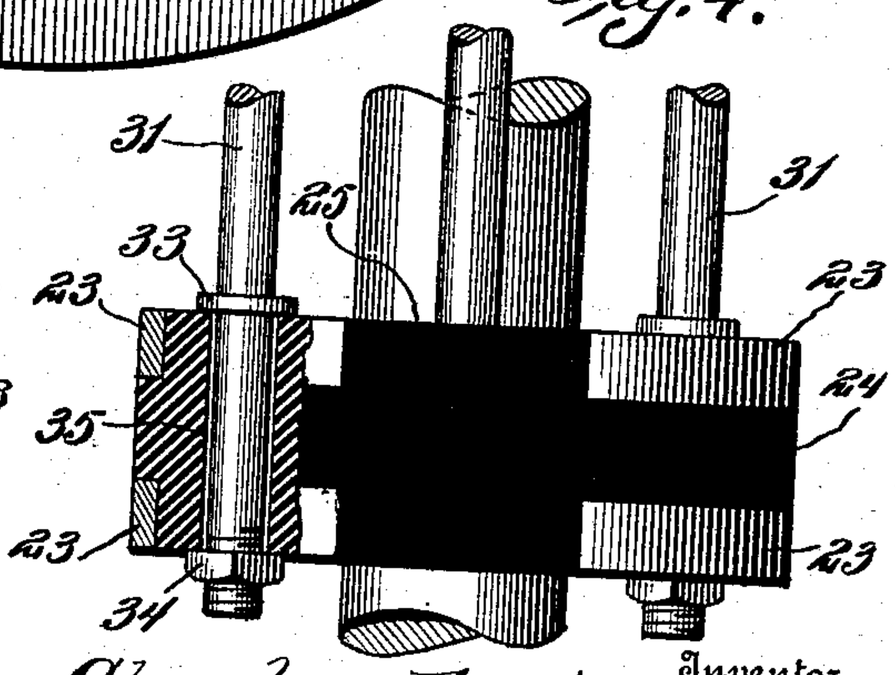


Fig. 4.



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UNITED STATES PATENT OFFICE.

CHARLES E. STEBBINS, OF IOLA, KANSAS.

MAGNETIC ORE-SEPARATOR.

No. 899,348. Specification of Letters Patent. Patented Sept. 22, 1908.

Application filed April 17, 1908. Serial No. 427,636.

To all whom it may concern:

Be it known that I, CHARLES E. STEBBINS, a citizen of the United States, residing at Iola, in the county of Allen and State of Kansas, have invented new and useful Improvements in Magnetic Ore-Separators, of which the following is a specification.

This invention relates to improvements in magnetic ore separators of that type embodying a series of magnets mounted to rotate in unison above a belt or table carrying the ore from which the magnetic particles are to be extracted, the object of the invention being to provide a simple, inexpensive and effective type of separator of this character in which a rotating head carrying a series of electromagnets is provided to operate in conjunction with a stationary commutator whose segments engage brushes connected with the coils of the magnets, the segments being spaced to form a gap crossed by the brushes when the magnets pass beyond the surface of the table or belt to discharging position, whereby the magnets, which are energized when moving over the table, will be deënergized at their point of rotation beyond the table to drop the extracted particles, means being provided whereby the commutator may be adjusted to vary the point of deënergization in the path of rotation to suit different conditions of service.

Another object of the invention is to provide a rotating head in which provision is made for supporting the magnets and coöperating parts in a simple and effective manner, whereby the parts may be conveniently assembled and disassembled in the operations of installing and removing a separator and repairing the same; to provide novel means for adjustably and removably supporting the stationary commutator; to provide for the arrangement of the magnets whereby economy is secured in the use of current and the full effective attractive force of the magnets utilized; and to generally simplify and improve the construction and increase the practical efficiency of separators of this type.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a sectional elevation of a separator embodying my invention as arranged for operation above the ore carrying table or belt. Fig. 2 is a sectional plan view of the same. Fig. 3 is a vertical cross-section through the commutator arranged in operative position about the drive shaft. Fig. 4 is a side elevation of the commutator, partly in section, to show the manner of attaching said commutator to the supporting rods or bolts.

Referring to the drawings, 1 designates a suitable overhead support, comprising, in the present instance, a pair of superposed beams 2 held in spaced relation by a pair of spaced parallel cross beams 3. Journaled for rotation in said support and extending upwardly through the beams 2 between the beams 3 is a vertical driving shaft 4, which may be operated through any suitable type of drive gearing, the construction of which I have not deemed it necessary to show.

The extractor is mounted upon the lower end of the shaft 4 and comprises a head composed of upper and lower spaced members, the upper member preferably consisting of a spider formed of a central hub 5 and a series of radial arms 6, while the lower member consists of a non-magnetic plate 7 of brass or other suitable material and of relatively greater diameter than the spider and arranged a suitable distance below the same. The hub 5 of the spider has an angular opening to receive an angular portion at the lower end of the shaft 4, which is threaded below said angular portion for the reception of a nut 8 by which the spider and parts of the extractor are detachably mounted upon the shaft.

Arranged in the space between the spider 6 and plate 7 is an annular series of electromagnets 9, each comprising an outer armor inclosing casing 10 within which is arranged a core 11 provided at its lower end with a circular head or enlargement 12 insulated from the lower end of the casing by a non-conducting bushing ring 13. The magnet coil 14 incloses the body of the core and snugly fits within the casing, which latter is closed at its upper end and open at its lower end to expose the head 12, the closed upper end of the casing bearing against the coöperating arm 6, while the lower end of the casing snugly fits within an opening 15 in the plate 7, the lower face of the head 12 of the core lying flush with the lower face of the plate, as shown. The upper end of the core is provided with a stem 16 projecting through the

top of the casing and the contacting arm 6 and insulated therefrom by a bushing sleeve 16[a] and washers 16[b] of brass or other non-magnetic material, said stem being threaded at its upper end for the reception of a nut 17 by which the magnet is supported in position upon the spider. The plate 7 serves to hold the lower ends of the magnets in proper spaced relation and is frictionally engaged with the casings of the magnets or fastened thereto in any preferred manner.

The head as a whole rotates with the shaft to successively bring the magnets over a movable table or conveyer belt 18, so that the magnets will rotate in a circular path across the belt and when energized will extract the magnetic particles from the feeding ore. At one point in its path of revolution each magnet passes beyond the surface of the table or belt, and at such point is deënergized, as hereinafter described, to release and drop the extracted particles of metal onto the floor or into a suitable receiver.

Suitable binding posts 19 are connected with the windings of the coil of each magnet, and to such posts are connected conducting wires 20 leading to a pair of brushes 21 mounted upon a post 22 of insulating material on the adjacent radial arm 6, said brushes being arranged to engage and ride in contact with contact strips or segments 23 on a commutator 24, comprising a ring or annular body of non-conducting material surrounding the lower end of the shaft 4 above the hub 5, the terminals of said contact strips or segments being separated to provide a gap or intervening space 25 filled by the insulating material by which the commutator body is exposed, and across which the brushes of each magnet pass at that point in their revolution where they pass beyond the surface of the table and thus become deënergized to drop the taken-up particles of ore.

The upper commutator segment is in electrical connection with a binding post 26 to which is connected a feed wire 27 while the lower commutator segment is connected by a conductor 28 extending through the insulated body of the commutator ring with a binding post 29 to which is connected a feed wire 30, the wires 27 and 30 being connected in practice with a suitable source of current supply. The commutator is stationary relative to the brushes 21 and is supported in concentric relation to the shaft 4 by rods or hanger members 31 extending at their upper ends through the lower beam 2 and provided with securing nuts 32 resting on said beam, whereby the rods are maintained in proper position parallel with the shaft. The lower ends of the rods extend downward through the commutator ring or body and are provided with collars or heads 33 bearing against the upper surface of the ring and are threaded at their extremities for the application of nuts 34 bearing against the lower surface of the ring, by which the latter is clamped securely from movement against the collars. The rods extend downward through segmental slots 35 in the ring, which slots extend on an arc concentric with the axis of the ring, thus permitting adjustment of the latter to dispose the gap 25 in such a position in the path of rotation of the brushes to insure deënergization of the magnets during the period only when they are beyond the surface of the traveling table or conveyer belt 18. The slots may be of any desired length to vary the position of the gap or non-conducting portion of the surface of the commutator at the proper point in the path of revolution of the brushes as circumstances may require to secure maximum efficiency of action and to accord with variations in the position of the table or conveyer belt.

It will be understood from the foregoing description that the commutator remains stationary while the magnets are rotated by the shaft 4, so that they will successively pass across the surface of the table or belt and magnetize and take up the magnetic particles of the ore, each magnet being energized by engagement of its brushes with the commutator segments during its full path of travel across the surface of the table or belt and deënergized by the passage of the brushes across the gap 25 as it passes beyond the surface of the table in one point in its path of rotation. Hence, during the travel over the table, the magnets will successively exert an extracting action and as they pass at one point in their path of revolution beyond the table will be rendered inactive to retain the magnetic particles, which will drop therefrom onto the floor or into a suitable receptacle.

Through the construction described, the parts of the extractor are rendered readily removable for repairs and may be conveniently assembled and disassembled, and through the adjustability of the commutator a nicety of action is insured to accord with variations in the position of the table or conveyer belt to adapt the magnets to be deenergized only when they reach a discharging position wholly beyond the surface of the table or belt.

Having thus fully described the invention, what is claimed as new is:—

1. In a magnetic ore separator, the combination of a main support, a shaft journaled therein and depending therefrom, supporting rods also depending from said main support and arranged about said shaft, a head fixed upon the lower end of the shaft to rotate therewith, a series of electro magnets carried by said head, brushes carried by the head and in electrical connection with the magnets, an annular commutator inclosing the shaft above the head for coöperation with the

brushes and provided with a gap adapted to be crossed by the brushes, said commutator having arcuate openings through which said supporting rods extend, whereby the commutator is adjustable circumferentially on the rods to vary the position of the gap, means for securing the commutator to the rods in adjusted position, and electrical conductors for connecting the commutator with a source of electrical energy.

2. In a magnetic ore separator, the combination of a vertical shaft, an armed spider fixed upon the lower end of the shaft, a non-magnetic plate disposed beneath the spider and having a series of openings corresponding in number to the arms of the spider, a series of electro-magnets disposed between the spider and plate, and each comprising a casing bearing at its upper end against the overhanging arm of the spider and fitting at its lower end in the underlying opening in the plate and a core within the casing exposed at its lower end therethrough and having a stem at its upper end projecting upwardly through said spider arm, means for securing said magnets in position, brushes carried by the arms of the spider and connected with the terminals of the windings of the magnets, a commutator supported about the shaft independently thereof and engaged by the brushes and having a gap adapted to be crossed by the brushes, said commutator being provided with conductors for connecting it with a source of electrical supply, and means connecting said commutator for circumferential adjustment on its support, whereby the position of the gap may be varied.

3. In a magnetic ore separator, the combination of an overhead support, a shaft journaled in said support and depending therefrom, a head mounted upon the lower end of the shaft to rotate therewith, a series of electro-magnets carried by said head, brushes carried by the head and connected with the magnets, an annular commutator surrounding the shaft and provided with arcuate openings extending vertically therethrough, a series of supporting rods depending from said overhead support and projecting through the openings in the commutator, said commutator being provided with a gap adapted to be crossed by the brushes and circumferentially adjustable on said rods to vary the position of the gap, means for securing the commutator in adjusted position upon the rods, and electrical conductors connected with said commutator.

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

CHARLES E. STEBBINS.

Witnesses:

WILLIAM E. STARKS,

LINCOLN F. WILSON.