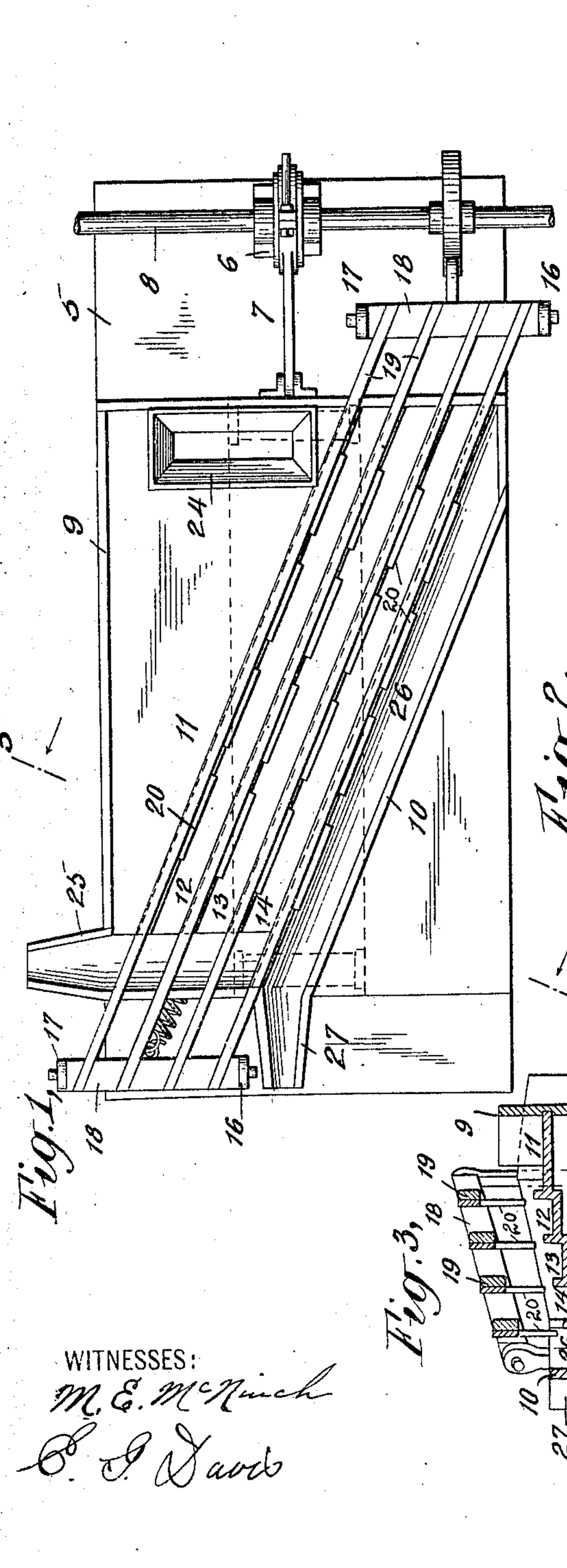
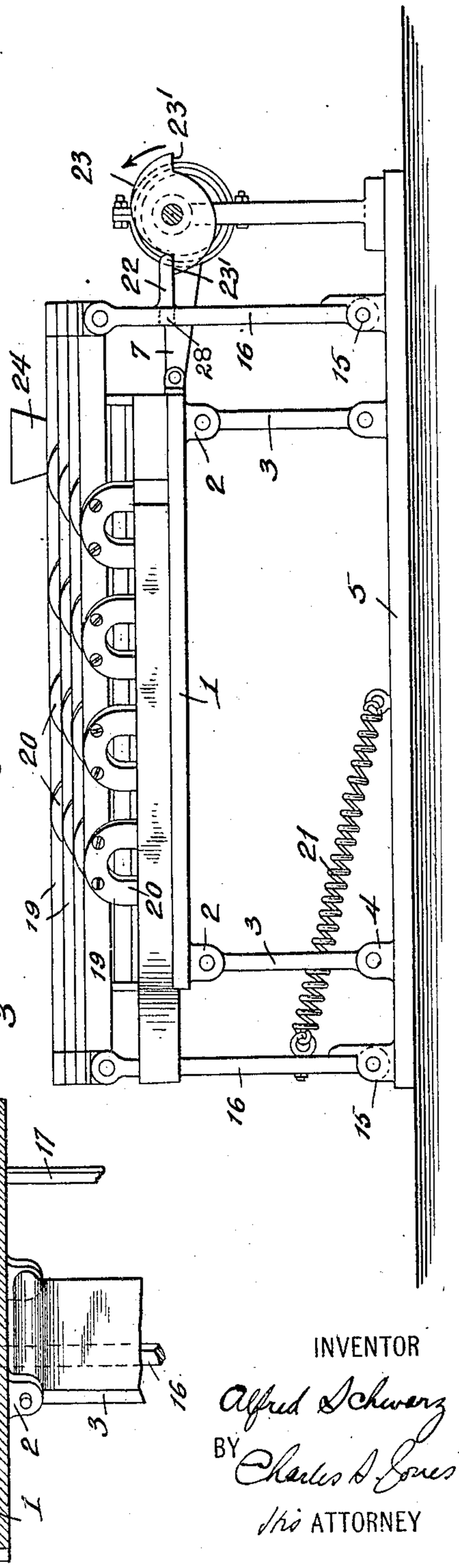
No. 871,367. PATENTED NOV. 19, 1907.

A. SCHWARZ.

MAGNETIC SEPARATOR.

APPLICATION FILED APR. 7, 1906.





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ALFRED SCHWARZ, OF NEW YORK, N. Y.

MAGNETIC SEPARATOR.

No. 871,367. Specification of Letters Patent. Patented Nov. 19, 1907.

Application filed April 7, 1906. Serial No. 310,446.

To all whom it may concern:

Be it known that I, ALFRED SCHWARZ, a subject of the Emperor of Germany, and a resident of the borough of Manhattan, city, county, and State of New York, have invented certain new and useful Improvements in Magnetic Separators, of which the following is a specification.

The present invention relates to magnetic separators and in the present embodiment thereof comprises a table, a series of magnets, means for producing a reciprocating movement of the table relatively to the magnets, and means for imparting a jarring or jogging movement to the magnets at predetermined times to release or dislodge the magnetic particles therefrom.

The invention will be understood by reference to the accompanying drawings in which Figure 1 is a top view; Fig. 2 a side elevation; and Fig. 3 a vertical section on the plane of the line 3—3 of Fig. 1.

Similar reference numerals indicate similar parts in the several views.

Referring to the drawings the numeral 1 designates a table having brackets 2 on the under side thereof in which are supported the upper ends of links 3. The lower ends of said links are supported in brackets 4 secured to the floor or base 5. The table 1 is reciprocated by a crank or eccentric 6 through a pitman connection 7, the said eccentric being mounted on a shaft 8 driven by any convenient means. Between the side pieces 9 and 10 of the table extend a series of riffles designated respectively 11, 12, 13, 14 and 26, and preferably arranged in step like formation, as indicated in Fig. 3. The riffles are so disposed as to run diagonally of the table or at an angle to the direction of its reciprocatory movement.

Pivotally supported in brackets 15 secured to the base 5 are two pairs of links 16 and 17 the upper ends of which are connected by cross heads 18. The links 17 are of greater length than links 16 so that the cross heads 18 will be inclined at an angle corresponding to the angle of inclination of the riffles. Extending between the cross heads 18 are slats or bars 19 to which are secured a number of magnets 20, which may be either permanent or electro magnets, the former being illustrated. The slats 19 are so disposed that the poles of magnets 20 project to within a short distance above the riffles and substantially over the dividing wall between the contiguous riffles as indicated in Fig. 3.

Secured to a cross bar between the rear pair of links 16 and 17 is a spring 21 said spring being attached at its other end to the base 5. Projecting from a cross bar 28 between the front pair of links 16 and 17 is an arm 22 normally held by said spring against a cam 23 keyed on shaft 8. The cam 23 is cut as indicated in Fig. 2 with two diametrically opposite high points with the radial faces 23′ intersecting the same.

At the forward end of the table is a hopper 24 through which the material to be separated is fed, said material falling into riffle 11 in proximity to the first row of magnets. At the rear of the table is a chute 25 which extends across the ends of the riffles 11, 12, 13 and 14. The outermost riffle 26, formed by the side wall 10 and the outer wall of riffle 14, connects with a chute 27. There may be as many rows of magnets and as many magnets in a row as may be desired provided that they are disposed relatively to the riffles as above described.

In operation the material to be separated, as for example a magnetic ore, is fed through hopper 24 upon the upper side of the riffle board, falling into the first riffle 11. The rapid reciprocations of the table by means of eccentric 6 will cause the ore to spread in a comparatively thin mass over the riffle 11 in proximity to the first row of magnets 20. By reason of the oblique disposition of the magnets all of the ore will ultimately be brought within the magnetic fields of the magnets of the first row. As the ore is carried within the magnetic fields the magnetic particles thereof will be attracted and will attach themselves to the magnets 20 of the first row. Cam 23 is so timed that at the end of each forward and backward movement of the table the frame carrying the magnets will be given a sudden jar by the release of arm 22 from a high point 23′ of said cam and the throwing forward of said frame by spring 21. This blow delivered to

the magnet frame should be sufficient to practically overcome the force of magnetic attraction. The particles thus released from the first row of magnets 20 will be deposited in riffle 12 from which they will be immediately attracted by the magnets 20 of the next succeeding row, only to be dislodged therefrom at the completion of the next movement of the riffle board to be deposited in riffle 13 in the manner above described. A given mass of magnetic particles will thus be transported across the table in a direction at an angle to that of the reciprocations of said table. The magnetic particles will ultimately be deposited in the last riffle 26. As the magnetic and non-magnetic particles are thoroughly intermingled in the original mass fed through hopper 24 more or less of the latter will be mechanically carried over in the mass separated by the first row of magnets 20 and deposited in riffle 12, but as the mass is tumbled over and over during its progress across the table the non-magnetic particles finally become shaken out so that the masses deposited in riffle 26 contain practically nothing but magnetic particles. Owing to the rapid reciprocations of the table the non-magnetic particles will be caused to travel forward along the riffles in a direction at an angle to that of the reciprocations of the table, and the magnetic particles will be carried in a direction substantially transverse to that of the direction of movement of the non-magnetic particles until deposited in riffle 26. The non-magnetic particles from all the riffles will be deposited in chute 25 and from thence delivered to a suitable bin. In order to effect the travel of the non-magnetic particles toward the foot of the table it is to be understood that the table will be given a slight downward inclination; or a so-called differential shaking means may be employed.

In my application Serial Number 310,445 filed April 7, 1906, I have described a magnetic separator having rows of electro magnets disposed above the table, and means for energizing said rows successively to transport the magnetic particles in a general direction transversely of the table. In my application, Serial Number 298,977, filed February 1, 1906, I have described a magnetic separator having rows of magnets disposed above and below the table, and means for energizing said rows of magnets successively. In my application Serial Number 298,978, filed February 1, 1906, I have described a magnetic separator of the same general type as the two cases above referred to except that the riffles are arranged in a step like formation. None of these cases disclose means for imparting a jarring or jogging movement at predetermined times to the magnets, it being my intention to limit the present case to a separator embodying such means.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In a magnetic separator the combination of a table, a series of magnets having their poles disposed in proximity to the upper side of said table, means for imparting a relatively reciprocating movement between said table and magnets, means for imparting a jarring movement to said magnets at predetermined times to dislodge the magnetic particles therefrom, means for feeding the material to said table, and means to receive the separated products.

2. In a magnetic separator the combination of a table and means to reciprocate the same, a series of magnets having their poles disposed in proximity to the upper side of said table, means to impart a jarring movement to said magnets at predetermined times, means for feeding the material to said table, and means to receive the separated products.

3. In a magnetic separator the combination of a table and means to reciprocate the same, a pivotally mounted frame, a series of magnets secured to said frame having their poles disposed in proximity to the upper side of said table, means to impart a jarring movement to said frame and magnets at predetermined times, means for feeding the material to said table, and means to receive the separated products.

4. In a magnetic separator the combination of a table having riffles thereon, rows of magnets extending longitudinally of said riffles and having their poles disposed in proximity to the upper side of the table over the riffles, means for imparting a relatively reciprocating movement between said table and magnets, means for imparting a jarring movement to said magnets at predetermined times to dislodge the magnetic particles therefrom, means for feeding the material to said table, and means to receive the separated products.

5. In a magnetic separator the combination of a table having riffles thereon extending diagonally across the table, a series of magnets having their poles disposed in proximity to the upper side of said table, means for imparting a relatively reciprocating movement between said table and magnets, means for imparting a jarring movement to said magnets at predetermined times to dislodge the magnetic particles therefrom, means for feeding the material to said table, and means to receive the separated products.

6. In a magnetic separator the combina-

tion of a table having riffles thereon arranged in step like formation and extending diagonally across the table, a series of magnets having their poles disposed in proximity to the upper side of said table, means for imparting a relatively reciprocating movement between said table and magnets, means for imparting a jarring movement to said magnets at predetermined times to dislodge the magnetic particles therefrom, means for feeding the material to said table, and means to receive the separated products.

In witness whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ALFRED SCHWARZ.

Witnesses:
OLIN A. FOSTER,
CHARLES S. JONES.