July 28, 1931. G. ULLRICH 1,816,305

MAGNETIC SEPARATING MACHINE

Filed Aug. 17, 1929

Fig. 1

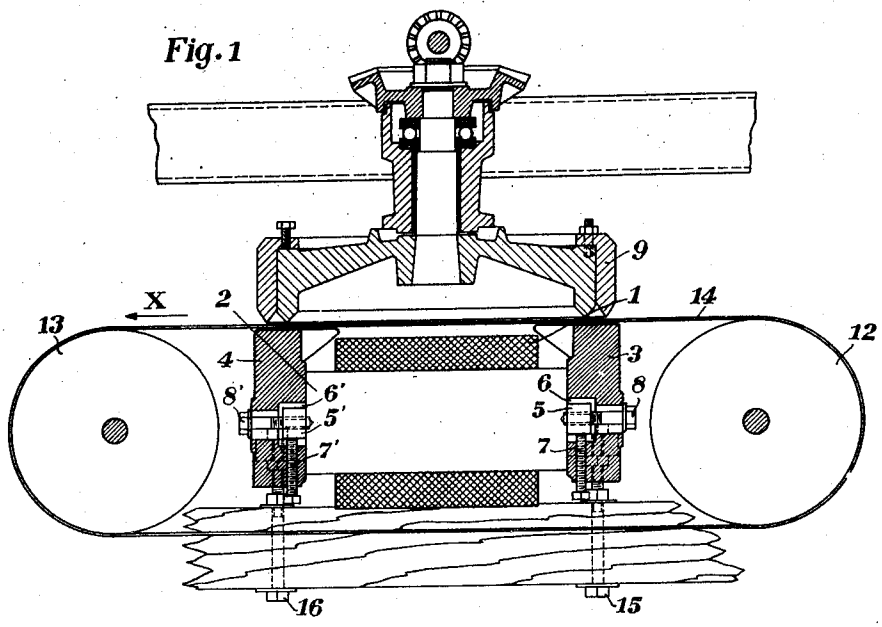


Fig. 2

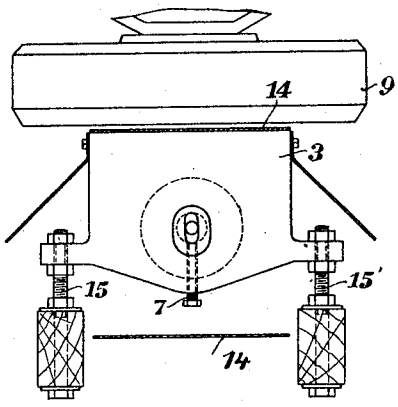


Fig. 3

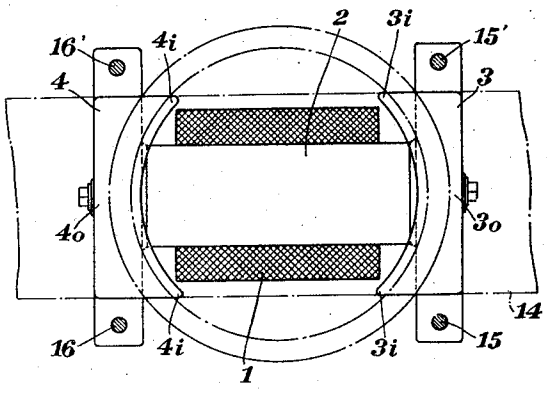


Fig. 4

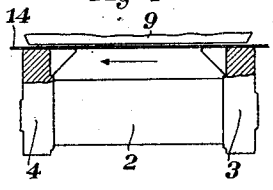


Fig. 5

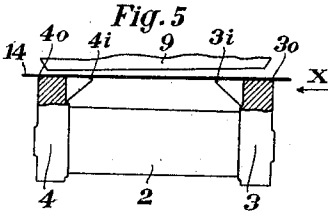
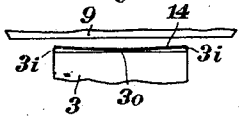


Fig. 6



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UNITED STATES PATENT OFFICE

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MAGNETIC SEPARATING MACHINE

Application filed August 17, 1929, Serial No. 386,690, and in Germany August 23, 1928.

My invention relates to machines for dressing finely comminuted ores and metallurgical waste products such as slags, sweepings and other residues by separating and recovering from same those valuable particles, which are responsive to magnetic force.

The invention relates more especially to improvements in magnetic separating machines for the purpose described and of the type shown in the drawing in which a cylindrical magnetic shell rotates on a vertical axis closely above the poles of a stationary field magnet, the faces of which are bounded by curved inner edges, corresponding to the opposed circular working face at the bottom of the cylindrical shell,—the material under treatment being fed and carried through the machine by an endless conveyor belt passing through the gaps underneath the said cylindrical shell over the poles of the field magnet.

In order to insure with machines of this type the best results viz. efficient working of the rotary cylindrical shell, by which the particles of the material responsive to magnetic force are to be attracted and withdrawn, the distance of the upper face of each pole of the field magnet from the opposed circular working face of the cylindrical shell must be appropriately adjusted within very close limits—fractions of an inch—so as to cope with the nature of the materials under treatment, their responsiveness to magnetism, the grade of fineness to which the material has been ground and with other conditions.

Great difficulties have been found hitherto in practice in accomplishing the required adjustments by reason of the peculiar shape of the poles of the field magnet bounded by curved edges.

The nature and scope of my invention are briefly outlined in the appended claims and will be more fully understood from the following specification taken together with the accompanying drawings in which:

Fig. 1 is a cross section through the principal parts of an improved separating machine shown by way of an example,

Fig. 2 is a front sectional elevation of the same,

Fig. 3 is a plan showing the stationary field magnet and the shape and position of its pole-shoes relatively to the rotary cylinder.

Figs. 4–6 diagrammatically illustrate the adjusting problem to be solved by this invention.

By simply tilting the field magnet 2, 3, 4 in the manner shown in Figs. 4 and 5 the distance of the outer edge 3*o* of the pole 3 from the shell 9 will be obviously greater than the distance at the inner corners or extensions 3*i*, as indicated in a somewhat exaggerated manner in Fig. 6, the latter being a front view seen in the direction of arrow *x* in Fig. 5.

As seen in Fig. 5 reversed conditions exist at the pole 4, of which the inner corners 4*i* are farther apart from the shell 9 than the outer edge 4*o*.

For this reason adjusting mechanism adapted to simply raise or lower the poles 3, 4 of the field magnet which results in tilting the latter bodily, have been found unsatisfactory in practice.

The principal object of my invention is to provide an improved supporting and adjusting mechanism by which the poles of the field magnet of separating machines of the type described can be raised and lowered relatively to the rotary shell independently of each other and in such manner that the top face of each pole will at all points of its whole area retain its equidistant position relatively to the opposed face of the rotary shell.

Other objects of my invention will incidentally appear hereinafter.

The principal parts of the improved separating machine are an electro-magnet, comprising a coil of wire 1, the latter surrounding the core 2 of the magnet, and two pole-shoes 3, 4, a cylindrical member of magnetic material, cooperating with and rotatably suspended above the said poles 3, 4 so as to revolve on a vertical axis, and an endless conveyor belt 14, travelling in the direction of arrow *x* over pulleys 12, 13 and through gaps formed between the rotary cylinder 9 and the poles 3, 4 of the field magnet closely above the latter. By said conveyor belt 14 the material under treatment is fed into and carried through the machine, in which it is dressed

by the rotating cylinder 9 in a manner known per se in the art.

As indicated in Fig. 1 the core 2 and the poles 3, 4 of the field magnet are made in three separate pieces, held together by clamping screws 8, 8′ threaded in stays 5, 5′ which project from the core 2 into recesses 6, 6′ of the poles.

It will be noted that the said stays 5, 5′ have ample play in upward and downward direction within the recesses 6, 6′—set screws 7, 7′ being provided for supporting and re-adjusting the core 2 in its appropriate position relatively to the poles 3, 4 after one or both of the latter have been adjusted relatively to the cylindrical shell 9.

The mechanism for adjusting the poles 3, 4 comprise two pairs of set screws 15, 15′ and 16, 16′ by the nuts of which the poles are supported—as indicated in Fig. 2—in such manner as to permit the poles 3, 4 to be raised or lowered independently of each other, retaining at the same time the equidistant position of their top faces relatively to the rotary cylinder 9. This is accomplished by the following manipulations:

In order to enlarge the effective distance e. g. of pole 3 from the rotary shell 9 or in other words to broaden the gap at the intake end of the machine the nuts of the set screws 15, 15′ are loosened and turned back so as to bodily lower the pole 3 and to thus slightly tilt the whole field magnet in clockwise direction;—whereupon the clamping screw 8 is slackened and by turning home the set screw 7 the core 2 of the magnet is lifted until its normal position—with its central axis extending at right angles to the pole-shoes 3 and 4—is restored.

By corresponding manipulations with the set screws 16, 16′ and 7′, accompanied by slackening and re-tightening clamping screw 8′, the other pole shoe 4 can be raised or lowered so as to broaden or narrow the gap at the discharge end of the machine and to retain under all conditions the uniformly equidistant position of the upper faces of the poles 3, 4 relatively to the rotary shell 9.

What I claim is:—

In a magnetic separating machine for dressing ores and metallurgical waste products the combination with a stationary field magnet having two pole shoes, the upper faces of which being bounded by curved inner edges, of a rotary cylindrical shell suspended above and spaced from said field magnet, an endless conveyor belt passing through the gaps between the said shell and said magnet poles, and of means for individually supporting the core and each pole of the field magnet in such manner as to render adjustable the effective distance of the upper face of each of the poles from the rotary shell independently of each other retaining at the same time the faces of the said pole-shoes in equidistant position relatively to the cylindrical shell, said means comprising a plurality of set screws adapted to adjustably support the pole-shoes of the field magnet independently of each other, another set of screws adapted to adjustably support the core of the field magnet by the pole-shoes, the core and the pole-shoes of the field magnet being made in three separate pieces and being detachably assembled by clamping means, said clamping means comprising recesses provided at the inner side of the pole-shoes, stays projecting from the core of the magnet into said recesses and having ample play therein in upward and downward direction, set screws adapted to support the said stays within the said recesses and clamping bolts adapted to retain the core of the magnet in re-adjusted position relatively to the pole-shoes.

In testimony whereof I have signed my name to this specification.

Dr. Ing. h. c., GEORG ULLRICH.