

912,363.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 1.

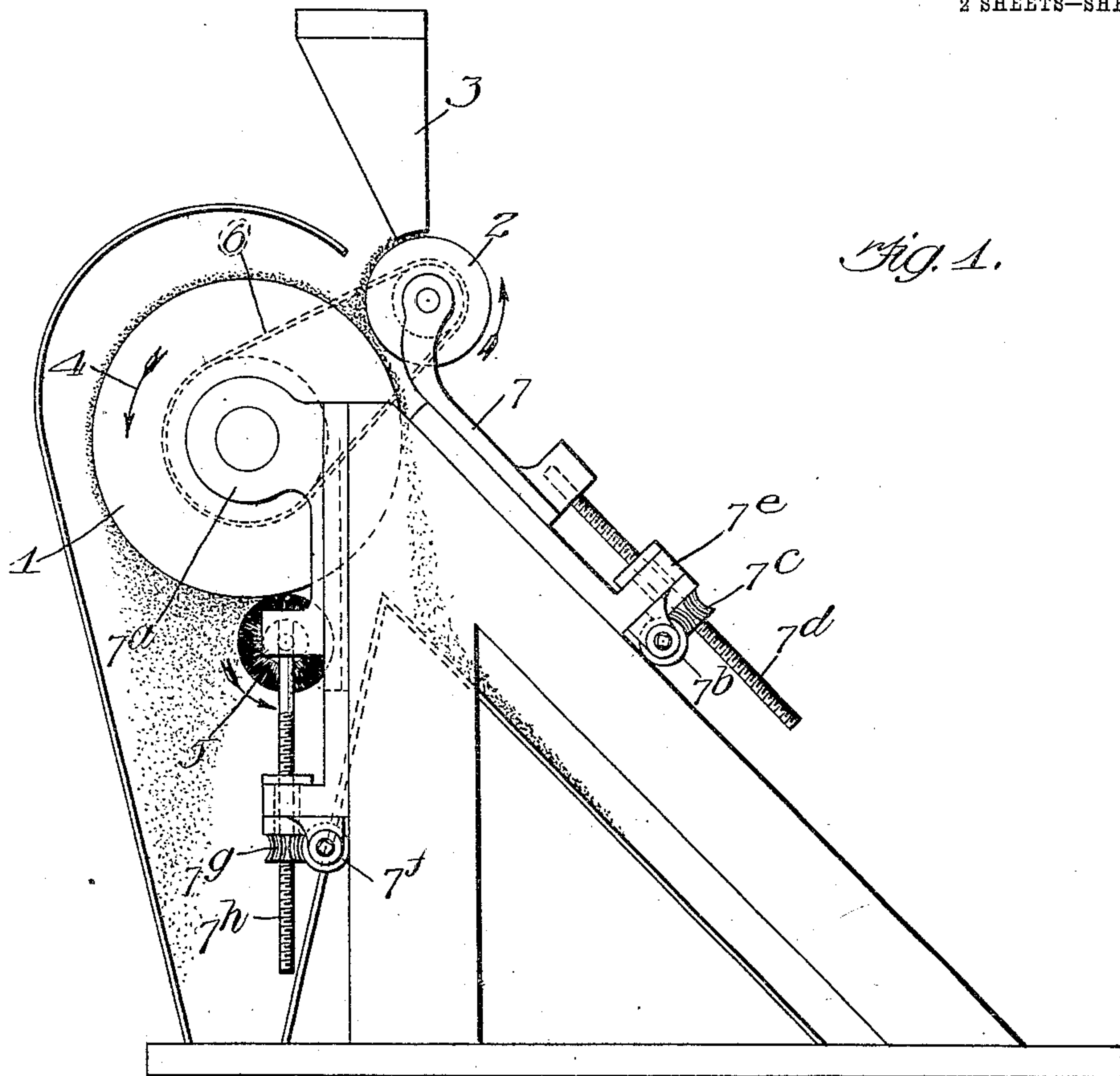
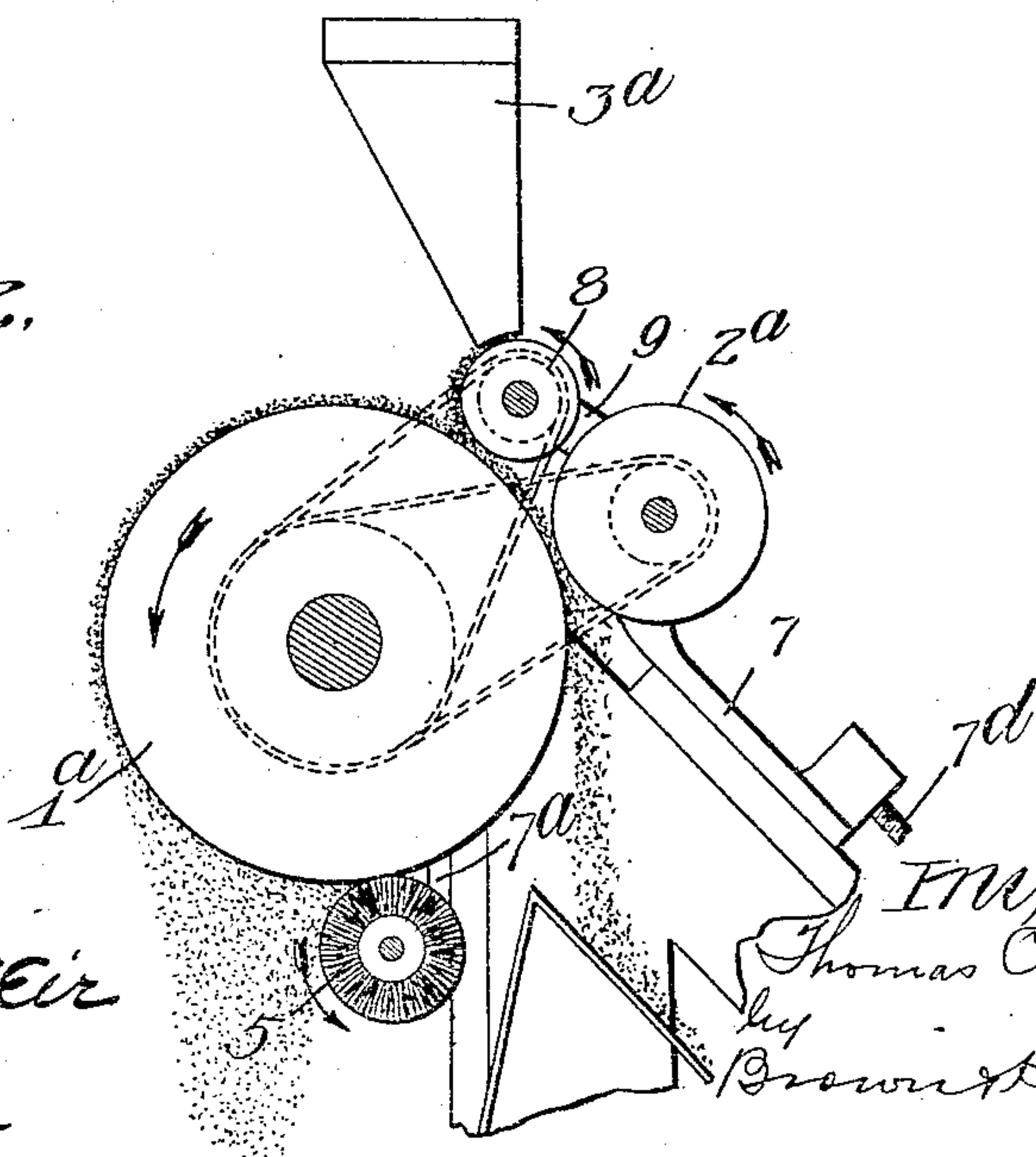


Fig. 1.

Fig. 2.



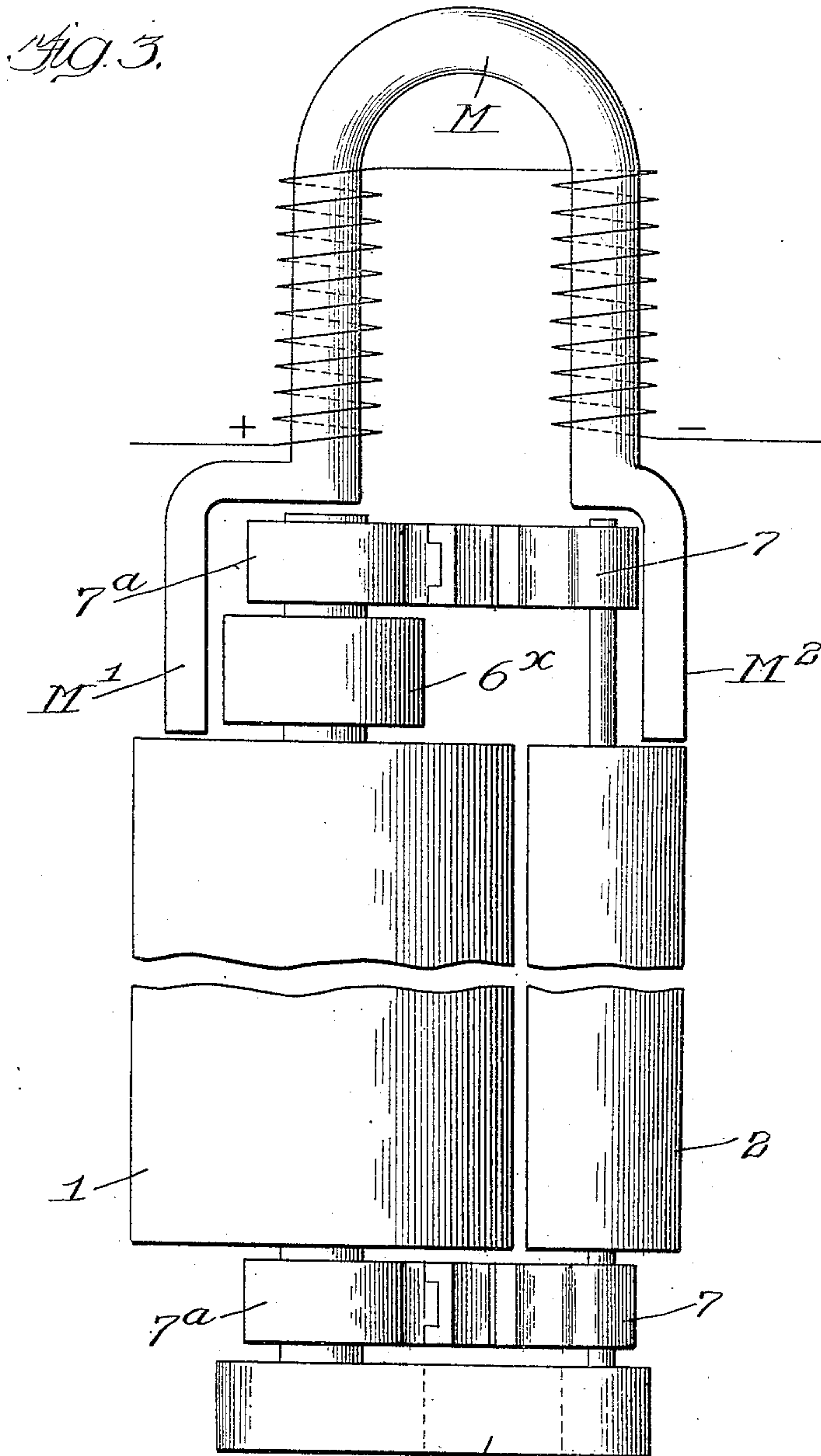
Witnesses:
Robert H. Weir
C. H. Seem

Inventor:
Thomas Charlton
by
Brown & Hopkin
Attys

912,363.

Patented Feb. 16, 1909.

2 SHEETS—SHEET 2.



Witnesses:

Robert A. Weir

J. A. Jochims, Jr.

Inventor:
Thomas Charlton

By Brown & Hoofman
Attys

UNITED STATES PATENT OFFICE.

THOMAS CHARLTON, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-FIFTH TO ROBERT L. DORBANDT AND ONE-FIFTH TO JAMES H. PARKER, BOTH OF EL PASO, TEXAS.

ELECTROMAGNETIC ORE-SEPARATOR.

No. 912,363.

Specification of Letters Patent.

Patented Feb. 16, 1909.

Application filed October 7, 1907. Serial No. 396,138.

To all whom it may concern:

Be it known that I, THOMAS CHARLTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electromagnetic Ore-Separators, of which the following is a full, clear, and exact specification.

This invention relates to that class of ore separators in which the particles of value, together with the gangue or waste, are deposited upon a moving magnetic surface or member which is so constructed and operated as to have the effect of permitting the gangue to fall by gravity while the particles of value are taken possession of by the magnetic surface and deposited separately, and my invention has for its primary object to provide an improved and efficient form of magnetic ore separator in which the opportunity for gravity to act upon the particles of value and thus prematurely detach them from the magnetic surface will be deferred for a period longer than heretofore and consequently the possibility of the particles of value falling from the machine while still associated with the gangue will be reduced to the minimum.

With a view to the attainment of these ends and the accomplishment of certain other objects which will hereinafter appear, the invention consists in the features of novelty which will now be described with reference to the accompanying drawings and more particularly pointed out in the claims.

In the said drawings Figure 1 is a diagrammatic side view of an electro-magnetic separator embodying this invention. Fig. 2 is a similar view illustrating a modification hereinafter described. Fig. 3 is a diagrammatic plan view of the form shown in Fig. 1, looking at right angles to the plane passing through the axes of the rolls.

The moving magnetic surface before referred to in some instances is a magnetized roll which constitutes one pole of a magnet, while in other instances the same is a moving band or belt. In this exemplification of my invention I have elected to show the moving magnetic surface as a rotating member or roll. Referring first to the form of the invention diagrammatically illustrated in Fig. 1, 1 is the magnetic roll which is preferably made of soft steel or other like

magnetic metal and constitutes one pole of a magnet, while 2 is a companion roll which constitutes the other pole of the magnet and these two rolls are magnetized in the usual or any suitable way, as well understood in this art and unnecessary to explain in detail. These two rolls 1, 2, are so mounted that the roll 2, which is preferably considerably smaller than the roll 1, has its center of rotation considerably elevated with respect to the center of the roll 1 so that it will be in a measure above the roll 1 and hence material dropped upon the roll 2 will be fed by it approximately upon the top of the roll 1. When the two rolls are magnetized the strongest points of the poles will lie in a plane cutting the centers of the rolls and consequently it will be seen that the material fed by the roll 2 from any suitable hopper 3 arranged thereover, will be deposited upon the roll 1 at approximately the point on its surface where the magnetism is strongest. This will enable the roll 1 to take immediate possession of the particles of value and carry them upwardly in the direction of the arrow 4 and eventually drop them on the other side of the roll 1, the smaller particles which might still adhere being dislodged, if desired, by a rotating brush 5 or other suitable means engaging the surface of the roll 1 at the under side thereof. This magnetic action of the roll 1, however, has no influence whatever upon the silica or other particles of the gangue which are freed or fall by gravity the instant they strike the roll 1 and, as they are not supported upon the roll 1 any material length of time, they consequently are not carried by centrifugal force over the top thereof and again thrown into association with the particles of value. The rolls 1 and 2 may be magnetized in any suitable way so as to constitute opposite magnetic poles; for this purpose an electromagnet M is arranged adjacent thereof with two pole pieces M^1 , M^2 located close to the rolls 1, 2 respectively, so as to communicate their magnetism thereto as the rolls rotate. The rolls 1, 2, are caused to rotate in the same direction by belt 6 or any other suitable means one roll, as roll 1, having a pulley 6^x whereby it may be driven and the roll 2 is mounted in an adjustable support 7 whereby its position with relation to the

roll 1 may be changed and the distance between the two rolls varied to suit different grades of material. The adjustable bracket 7 which carries the roll 2, it will be seen, is mounted to slide at a tangent to the roll 1 so that the center of the roll 2 may be raised and lowered with relation to the center of the roll 1. This not only varies the distance between the rolls but it changes the point on the periphery of the roll 1 at which the material is deposited by the roll 2. In order, however, that the distance between the rolls may be maintained notwithstanding the tangential adjustment of the roll 2 with relation to the roll 1, the roll 1 is also made adjustable with relation to the center of the roll 2 and to that end is mounted in a vertically sliding bracket 7^a so that as the roll 2 moves away from the roll 1 as an incident of its tangential adjustment, the roll 1 may be moved up to or away from it to compensate for the increase or decrease in the distance between the rolls. The bracket 7 may be conveniently moved by a worm gear 7^b engaging worm gear 7^c constituting a nut through which passes a screw 7^d, the upper end of the screw being fixed to the bracket 7 while the member 7^c is rotatably mounted and held against longitudinal movement in a bearing 7^e. The bracket 7^a may be moved by similar worm gears 7^f, 7^g and a screw 7^h assembled and operating like the corresponding parts of the adjusting mechanism of the bracket.

In the form of the invention shown in Fig. 2, the poles of the magnet are indicated at 1^a, 2^a, and interposed between them is a non-magnetic roll 8; the office of this roll 8 being to feed the material from the hopper 3^a to the magnetized roll 1^a while the office of the roll 2^a is to constitute the second pole of the magnet. By thus removing it from the point on the surface of the roll 1^a where the material first strikes the latter, it will be seen that the particles of value are not subjected to its magnetic influence and consequently the roll 1^a is permitted to exert its full magnetic effect upon these particles the instant they come into its magnetic field from the feed roll 8. In this form, therefore, there is absolutely no downward tendency imparted to the particles of value when they strike the surface of the roll 1^a while at the same time gravity is permitted to exert its full force upon the gangue from the time it leaves the supporting surface of the feed roll. In this form it is desirable to rotate the rolls 1^a and 8 in the same direction and as the roll or member 2^a serves only as a pole piece it is, of course, apparent that it need not be rotated at all, unless to avoid clogging at the adjacent sides of the rolls. In this form of the invention the non-magnetic feed roll 8 may be carried in an extension 9 of the bracket 7 so that this roll will

be adjusted simultaneously with the roll 2^a and their relative positions maintained constant.

With both forms of the invention it will be seen that the rolls 1 and 2 in the first form, and the rolls 1^a and 2^a in the second form constitute a magnet, and that the axes of these rolls are arranged in an inclined plane with the adjacent periphery of the upper roll situated over the other and lying in a vertical plane cutting the periphery of the lower roll at a point between the vertical and horizontal diameters of the lower roll where the material to be separated is deposited, that is to say, the material is deposited against the periphery of the lower roll on the rising side thereof and within its upper quarter, thus enabling the lower roll to at once take possession of the particles of value and carry them upwardly, while the gangue or waste is free to fall directly from the roll under the influence of gravity, thus in effect causing the values and the gangue to commence to separate or move in opposite directions the instant they touch the lower roll, and thereby avoiding the hitherto objectionable result of causing them to travel together throughout a portion of the circumference of the separating roll before they commence to separate.

In order that the invention may be understood by those skilled in the art, the details of these exemplifications thereof have been thus specifically described but

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

1. In a magnetic ore separator the combination of two magnetic pole pieces of opposite polarity, one of which magnetic pole pieces is in the form of a rotating roll, the axes of said poles being arranged in an inclined plane with one side of the upper pole piece situated over the said roll and lying in a vertical plane cutting the periphery of the lower pole piece or roll at a point between the vertical and horizontal diameters of the said lower pole piece, means for rotating the upper side of the lower pole piece in a direction away from the upper pole piece, and means for depositing the material to be separated against the periphery of the lower pole piece at a point within the upper rising quarter thereof.

2. In a magnetic ore separator, the combination of a magnetic roll constituting one pole of a magnet, a second magnetic roll constituting another pole of the magnet, means for rotating said rolls in the same direction, the axes of said rolls being arranged in an inclined plane with the adjacent periphery of the upper roll situated over the other and lying in a vertical plane cutting the periphery of the lower roll at a point between the vertical and horizontal diameters of the latter said roll, and means

for depositing the material to be separated
between the rolls, the rotation of the lower
roll with respect to the upper roll being such
that the values will be carried by the lower
5 roll away from the upper roll and in up-
ward direction.

In testimony whereof I have signed my

name to this specification, in the presence
of two subscribing witnesses, on this 4th day
of October, A. D. 1907.

THOMAS CHARLTON.

Witnesses:

CHARLES H. SEEM,
FRANCIS A. HOPKINS.