U. DI MARCO.

MACHINE FOR GRANULATING MAGNESIA.

APPLICATION FILED JULY 9, 1908.

961,848.

Patented June 21, 1910.

3 SHEETS—SHEET 1.

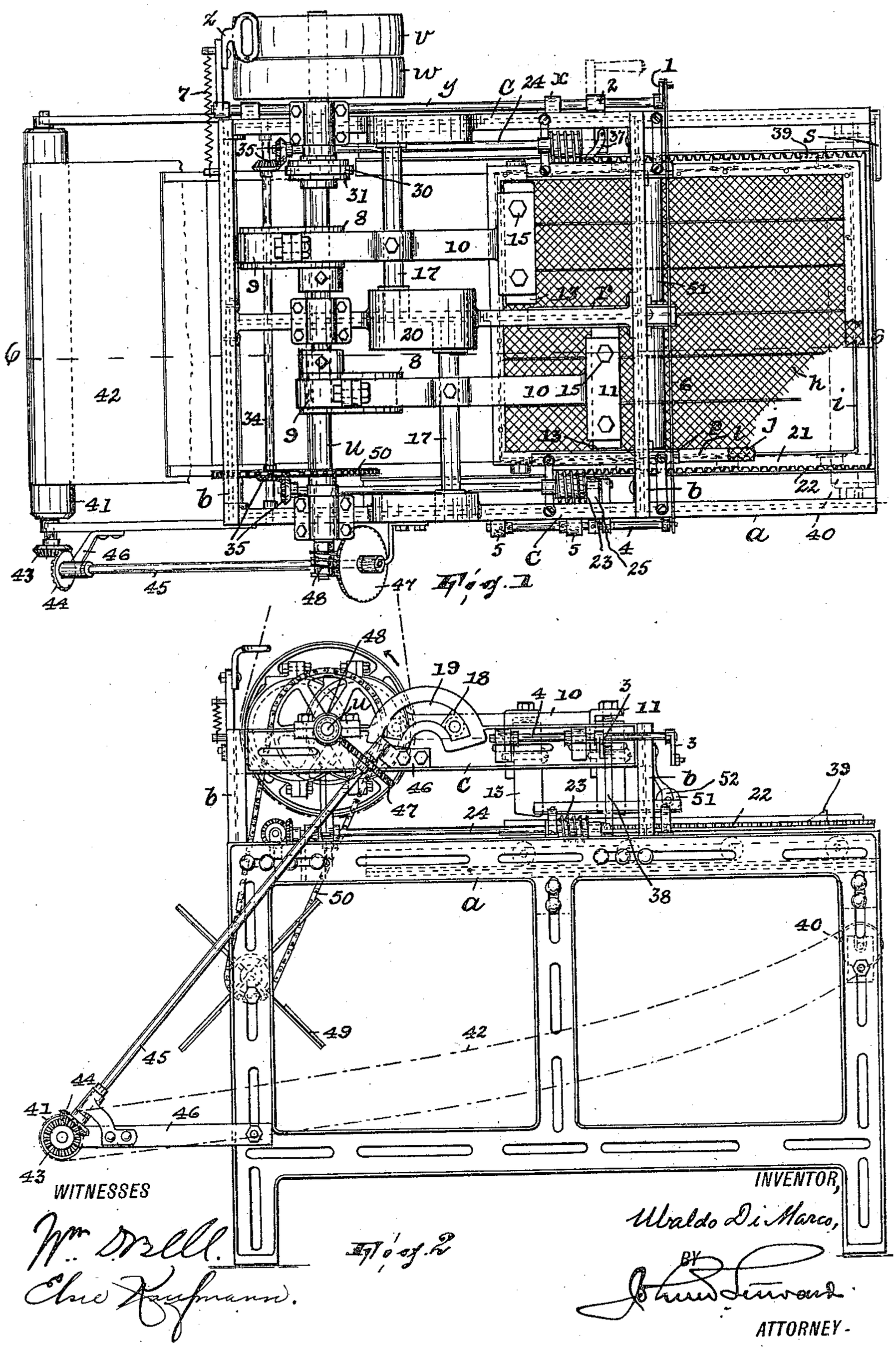

Fig. 1.

WITNESSES

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Fig. 2.

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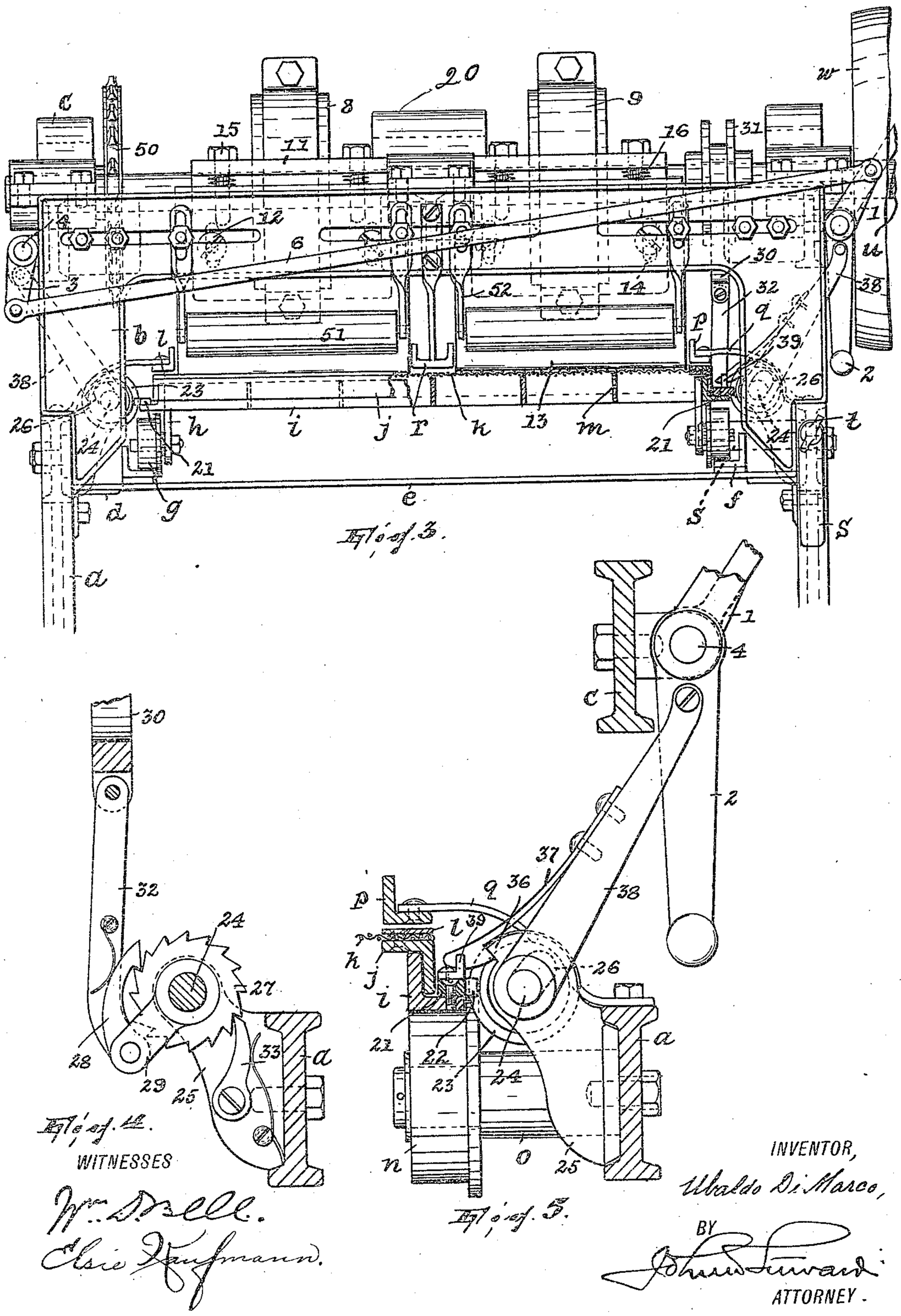

Fig. 3.

Fig. 4.

Fig. 5.

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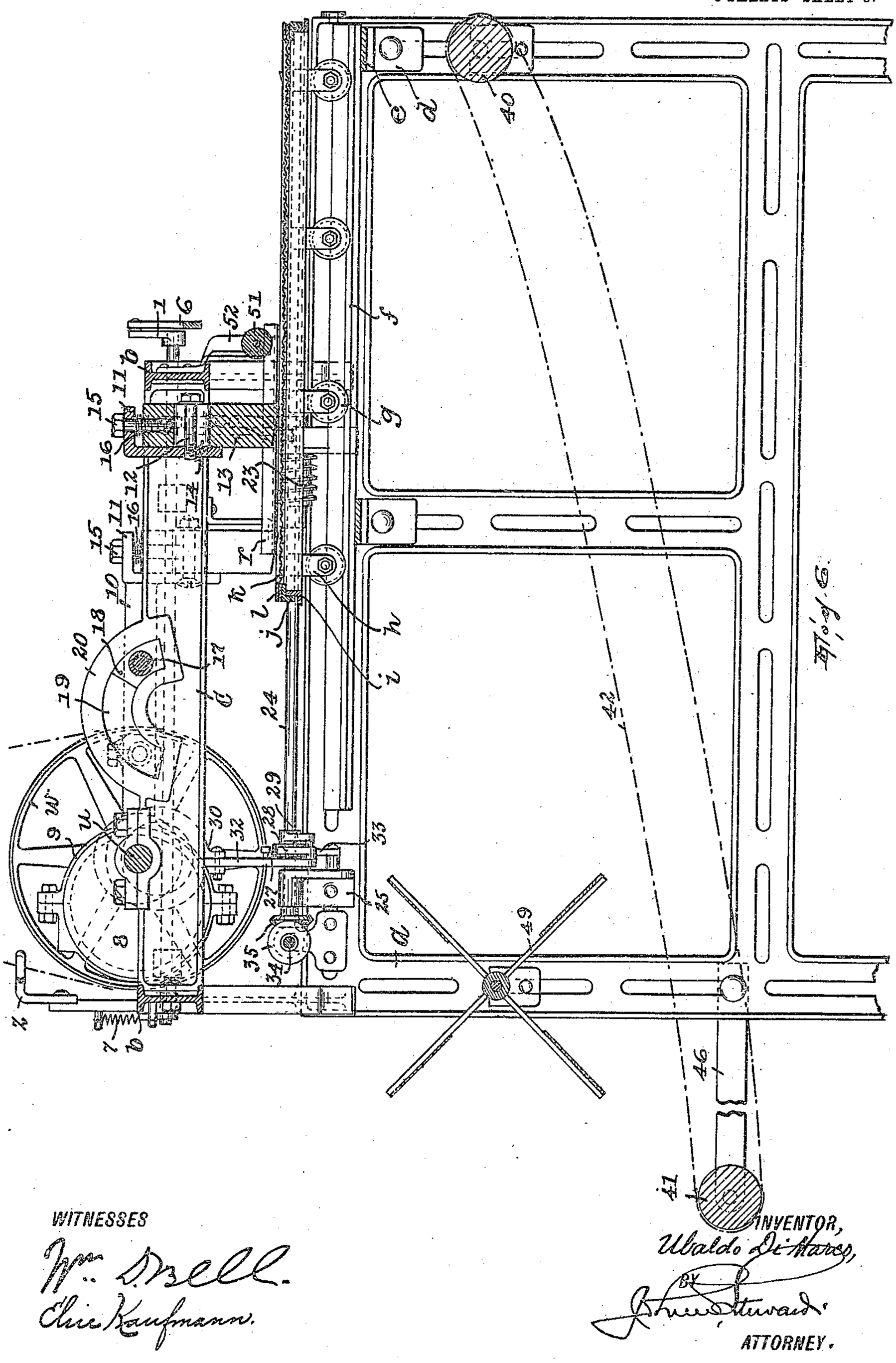

WITNESSES

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MACHINE FOR GRANULATING MAGNESIA.

961,848. Specification of Letters Patent. Patented June 21, 1910.

Application filed July 9, 1908. Serial No. 442,719.

To all whom it may concern:

Be it known that I, UBALDO DI MARCO, a citizen of the United States, residing in Hawthorne, Bergen county, New Jersey, have invented certain new and useful Improvements in Machines for Granulating Magnesia; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to characters of reference marked thereon, which form a part of this specification.

This invention relates to means for comminuting or reducing bodies of solid or semi-solid material, for instance, and, particularly, magnesia, and it has for its principal object to provide a machine in which this operation may be performed with convenience and facility and in such a way as to insure a uniform division of the material being operated upon; among other objects, the invention contemplates further to provide means for conveying the reduced material away from the machine and for drying it after it has reached the reduced state.

In carrying out my invention I provide a foraminous support on which the material to be reduced is placed and devices acting intermittently on the material in cooperation with the support in such a way as, in effect, to rub it over the support and work it through the same, the support and said devices having the one a constantly advancing movement with reference to the other while the operation is proceeding so that the material is kept continually within the reach of the said devices.

In the accompanying drawings, in which my invention will be found fully illustrated, Figure 1 is a plan view of the machine, certain parts being broken away; Fig. 2 is a view in side elevation of what is shown in Fig. 1; Fig. 3 is a view in front elevation, on a larger scale, certain parts appearing in section; and, Figs. 4 and 5 illustrate details, Fig. 5 also comprehending a slight modification. Fig. 6 is a longitudinal vertical sectional view taken on the line 6—6 in Fig. 1.

In the drawings, *a* designates a rectangular frame and *b b* and *c c* the ends and sides of a superstructure which is supported on and bolted to the frame *a*, said superstructure extending short of the frame at the front, as best appears in Figs. 1 and 2.

To the inner faces of the sides of the frame *a* are secured the angle-irons *d* carrying the bridge-strips *e* on which in turn are supported the parallel angle-iron rails or tracks *f f;* on these rails run the anti-friction rollers *g* journaled in bearings *h* projecting downwardly from a rectangular angle-iron frame *i* over which is fitted the angle-iron rim *j* of a screen *k* the edges of which are secured between the rim *j*, which is likewise rectangular, and a rectangular binding-frame *l*. The foraminous support thus formed may be removed from the frame *i* at will, on drawing the frame far enough forward to clear other parts of the machine yet to be described, and when in place on the frame will exactly follow the movements thereof along the rails; the frame *i* may be braced longitudinally by the ribs *m* which extend just high enough so as also to support the screen and prevent its distention under pressure applied from above. In lieu of arranging the rollers on frame *i*, and with a view particularly to prevent the sagging of the front portion of the frame when the front rollers clear the tracks *f f* on the frame being drawn forward in the construction above described, the rollers (*n*, Fig. 5) may be journaled on studs *o* projecting inwardly from the sides of frame *a* and the frame arranged to bear directly upon them.

The magnesia, which is laid in a mass on the screen adjacent the front end thereof (at which time the screen is in its forward position, as will later appear), is kept from working laterally over the sides or side-edges thereof by the guides *p* which are sustained parallel to each other by their supporting brackets *q* fixed to the frame *a;* in the machine shown in the drawings, two bodies of material are worked on at once and in order to keep them separated from each other a partition wall *r* may be suspended from the superstructure (Figs. 1 and 3).

The starting position of the screen is shown in Figs. 1 and 2; to prevent the screen from being normally drawn out beyond this position, a stop *s* may be provided, the same being pivoted on a thumb nut *t* which may be employed to secure it in the path of the frame, *i. e.*, the broken line position in Fig. 3.

In the sides *c c* of the superstructure is journaled the main shaft *u* carrying at one end fast and loose pulleys *v* and *w;* in brackets *x* on the superstructure is journaled a rock shaft *y* which carries at one end the belt shifter *z* for a driving belt (not shown) coöperating with the pulleys *v* and *w* and at the other end carrying an upwardly extending crank 1 and a handle 2, the crank being connected with a downwardly extending crank 3 on a rock shaft 4 journaled in bearings 5 at the opposite side of the superstructure by a pitman 6. A spring 7 tends to pull the belt shifter from the fast pulley *v* to the loose pulley *w*, the parts *z*, *y*, 1, 6, 3 and 4 being normally held in the position shown by mechanism now to be described.

On the shaft *u* are arranged the eccentrics 8, the same being set at 180° to each other and these eccentrics receive the eccentric straps 9 of levers 10 each of which has its free end formed with an overhang 11. To the end of each lever is secured by means of screws 12 tapped into the same a spreading blade 13 having vertical slots 14 receiving the screws and allowing vertical movement of the blade, the latter being limited in its downward movement by the heads of screws 15 tapped into the top of the blade and penetrating the overhang 11 and being cushioned in its upward movement by the spiral springs 16 coiled around the screws 15 between the overhang and the blade. Each lever 10 has trunnions 17 journaled in bearings 18 which are adapted to move in the arc-shaped slots 19 formed in the sides *c c* of the superstructure 6 and in an intermediate brace 20 comprised in the superstructure and affording a central bearing for the shaft *u*. By virtue of the eccentrics 8 and the fact that the fulcrums of levers 10 move in upwardly curving paths as the levers oscillate, when shaft *u* is rotated in the direction of the arrow in Fig. 2 each spreading blade 13 will move to the rear substantially parallel and in close proximity to the screen and then return in an upwardly curved course. Undue vibration is prevented by arranging the eccentrics opposite to each other so that one blade will be advanced as the other is receding.

While the blades are oscillating the screen and the frame carrying the same are being gradually moved rearwardly. This is effected as follows: On the angle-iron frame *i* is arranged a rectangular frame 21 having rack teeth 22 formed in the sides thereof. With these rack teeth engage worms 23 on the rotating shafts 24 which are journaled in brackets 25, the brackets 25 adjoining the front of the machine having diverging slots 26 affording the bearings for said shafts; when the shafts stand in their normal positions, in the bottom of these slots, the worms engage the rack, but when the shafts are raised in the slots the worms clear the racks, thus allowing the frame *i*, with the screen, to be moved independently of the worm.

The right hand shaft 24, Fig. 4, carries a ratchet 27 with which engages a pawl 28 carried by an arm 29 fulcrumed on the shaft and connected with an eccentric strap 30 on an eccentric 31 on shaft *u* by a link 32, 33 being a spring-controlled holding pawl for ratchet 27. The rotation of the right-hand shaft 24 is transmitted to the left hand shaft 24 through a cross-shaft 34, journaled in the superstructure, and beveled gearing 35. By this arrangement, the worms being in mesh with the racks 22, the screen is intermittently advanced during the rotation of shaft *u* and the consequent oscillation of spreading blades 13.

The right hand front bracket 25 is formed with a projection 36 and this projection is engaged by a spring pawl 37 carried by one of two links 38 which are pivoted to handle 2 and crank 3 and afford bearings for the respective shafts 24; said pawl normally holds the worm in mesh with the racks 22 and the belt shifter in the position to retain the belt on the fast pulley *v*. In order to automatically stop the machine and advance of the screen when the frame *i* has traveled rearward as far as it should go, an inclined lug 39 is secured on the right hand side of the frame *i* in position to engage the free end of the pawl 37 and force it up out of engagement with the projection 36, whereupon spring 7 will throw the belt shifter opposite pulley *w* and cause a corresponding movement of parts *y*, 1, 6, 3, 2, 38 and 24, so that the worms are made to clear their racks. This operation may of course be performed by hand by lifting spring pawl 37 out of engagement with projection 36. The parts may be reset by moving handle 2 to the left until the spring pawl 37 engages projection 36.

Rollers 40 and 41 are journaled in suitable bearings beneath the screen and over these extends a conveyer belt 42 onto which the reduced material falls. The belt is kept in movement by bevel gears 43 and 44, the former being on roller 41 and the latter on a shaft 45 which is journaled in brackets 46 and carries a worm wheel 47 which meshes with a worm 48 on shaft *u*. A rotary fan 49, journaled in the frame and driven from shaft *u*, by a sprocket and chain connection 50 may be employed to dry the material as fast as it falls in reduced form onto the belt.

In the operation of the machine, the screen is set at the position shown in Figs. 1 and 2, shaft *u* being rotated in the direction of the arrow in Fig. 2. Each blade executes a movement first to the left, substantially parallel and in close proximity to the screen and then to the right in an upward curve. In this its return movement it descends against

the material and presses it against the screen, rubbing it against the screen and through the same as it follows up its return movement with its next advance movement. Intermittently, the screen is being moved rearwardly, so that each blade thus operates on a relatively small part of the material at a time.

I find it of considerable value to provide a means for partly reducing the material before the blades operate on it; to this end, fixed rollers 51 may be journaled in the bearings 52 arranged to be adjustable vertically in the front end *b* of the superstructure.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is:

1. The combination of a frame, a foraminous support for the material to be operated upon, a fulcrumed device coöperative with said support to force the material through the same, said frame comprising curved guiding means and the fulcrum of said device being movable in said guiding means, and means for moving said device bodily and also on its fulcrum, substantially as described.

2. The combination of a frame, a foraminous support for the material to be operated upon arranged substantially horizontally, said frame having upwardly curved guiding slots, a fulcrumed device coöperative with said support to force the material through the same, bearings movable in said slots, said device being fulcrumed in said bearings, and a shaft journaled in the frame, said fulcrumed device having an eccentric connection with said shaft, substantially as described.

3. The combination of a frame, a foraminous support for the material to be operated upon, an oscillatory device operative to force the material through said foraminous support, means for effecting a relative movement as between said support and said device while the latter is moving whereby to gradually subject the material being operated upon to the action of said device, and means for checking such relative movement upon the same having advanced to a predetermined extent, substantially as described.

4. The combination of a frame, a foraminous support for the material to be operated upon, an oscillatory device operative to force the material through said support, means for effecting a relative movement as between said support and said device while the latter is moving whereby to gradually subject the material being operated upon to the action of said device, and means, controlled by the support, for checking such relative movement upon the same having advanced to a predetermined extent, substantially as described.

5. The combination of a frame, a foraminous support for the material to be operated upon, means for forcing the material through said support, a driving mechanism, means, disconnectively connecting the driving mechanism with the support, whereby to advance the support relatively to the means for forcing the material through said support, and means, controlling said last-named means, for disestablishing the connection afforded by said last-named means between the support and the driving mechanism, substantially as described.

6. The combination of a frame, a foraminous support for the material to be operated upon, means for acting upon the material on said support to force the same therethrough, a rotary shaft, another rotary shaft, means for transmitting a rotary motion from the first to the second shaft, a worm on the second shaft, and a rack on said support engaged by the worm, substantially as described.

7. The combination of a frame, a foraminous support for the material to be operated upon, means for acting upon the material on said support to force the same therethrough, a rotary shaft, another rotary shaft, means for transmitting a rotary motion from the first to the second shaft, a worm on the second shaft, a rack on said support engaged by the worm, said second shaft being movable laterally to disengage the worm from the rack, and means, controlled by the support, for effecting the lateral movement of said shaft, substantially as described.

In testimony, that I claim the foregoing, I have hereunto set my hand this 7th day of July, 1908.

UBALDO DI MARCO.

Witnesses:
JOHN W. STEWARD,
WM. D. BELL.