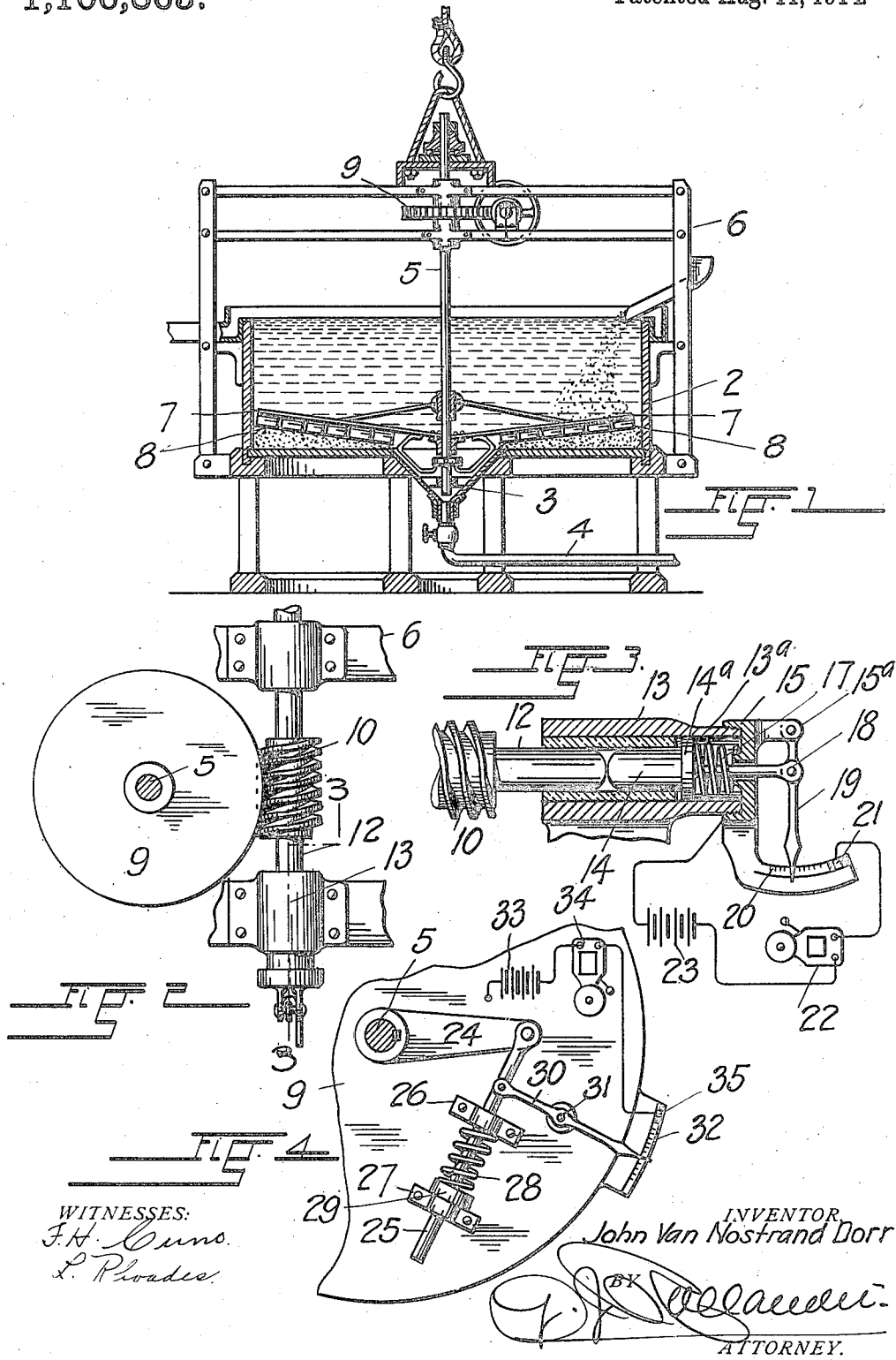


J. VAN N. DORR.
RESISTANCE INDICATOR.
APPLICATION FILED DEC. 13, 1911.

1,106,865.

Patented Aug. 11, 1914.



UNITED STATES PATENT OFFICE.

JOHN VAN NOSTRAND DORR, OF DENVER, COLORADO.

RESISTANCE-INDICATOR.

1,106,865.

Specification of Letters Patent.

Patented Aug. 11, 1914.

Application filed December 13, 1911. Serial No. 665,538.

To all whom it may concern:

Be it known that I, JOHN VAN NOSTRAND DORR, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented certain new and useful Improvements in Resistance-Indicators, of which the following is a specification.

My invention relates to certain new and useful improvements in settling apparatus or more specifically in apparatus of the type in which solid matter is removed from a tank in which it is settled as it reaches the bottom thereof.

An apparatus of this character has been shown in my United States Patent Number 867,958, issued on the 15th day of October, 1907 and in the drawings accompanying this specification, I have shown the present invention in operative connection with an apparatus of the construction shown in the patent, although it may be used in association with different devices, adapted to the same purpose as will fully appear in the following description.

In the construction shown, the mechanism whereby the settled matter is removed from the tank, consists of a rotary element which includes a plurality of radial arms each provided with a flight of scraper-blades which impel the settled matter toward a central opening in the bottom of the tank. It will be readily understood that the resistance offered to the movement of this rotary element varies in accordance with the consistency of the thickened material which accumulates at the bottom of the tank and that as this resistance increases it will effect a detrimental strain on the operating parts which eventually will result in breakage.

It is obviously difficult, if not impossible, to ascertain the consistency of the thickened liquid at the bottom of the tank and the resistance it offers to the mechanism above referred to. Consequently it frequently happens that some part of the mechanism gets broken or bent which results in serious loss due not only to the repairs rendered necessary, but also to the apparatus being thrown out of work.

The object of the present invention is to provide a mechanism of simple construction whereby the resistance offered by the material at the bottom of the tank to the movement of the rotary element, is indicated at a

point without the tank and whereby warning will be given when said resistance exceeds a predetermined maximum.

With this object in view I interpose in the gearing, by which motion is transmitted to the mechanism referred to, a spring and with such spring I arrange an indicator by which the compression of the spring can be ascertained or an alarm which will be actuated when the spring is unduly compressed but before breakage is likely to occur. Obviously, both indicator and alarm may be used if desired.

In the accompanying drawings in the various views of which like parts are similarly designated, Figure 1, represents a vertical section of the settling apparatus as shown in the above mentioned patent, Fig. 2, a plan-view of the driving parts of the rotary element included in said apparatus, with my improvements in operative position and drawn to an enlarged scale. Fig. 3, an enlarged section taken along the line 3—3, Fig. 2, and, Fig. 4, a fragmentary plan view of the worm-wheel included in said driving mechanism showing a modified construction of the present invention.

Referring to Fig. 1 of the drawings, the settling apparatus comprises a tank 2 having in the center of its bottom, a discharge opening provided with an inverted cone-shaped receiver 3 which at its lower extremity connects with a conduit 4 through which the thickened material is conveyed to a suitable receptacle. The rotary element by which the settled matter is continuously moved to the discharge-opening, consists of a vertical shaft 5, which is rotatably mounted in suitable bearings in the receiver 3 and on a frame-work 6, and which at its lower extremity, carries a plurality of radially extending arms 7 each provided with a flight of obliquely arranged scraper-blades 8. The shaft 5 is rotated by means of a worm-wheel 9 at its upper extremity which is in operative engagement with a worm 10 on a driving shaft 12.

In the preferred form of the present invention, shown in Figs. 2 and 3, the usual thrust-bearing for the worm-shaft is replaced by an elongated bearing 13 into which the worm shaft projects in end-to-end engagement with a plunger 14 which is slidably fitted in axial alinement therewith. The plunger 14 has a head 14^a which is

loosely fitted in a chamber formed by an extension 13^a of the bearing 13, and closed at its outer end by means of a screw-cap 15. A coiled spring 17 disposed between said head and said screw-cap, constitutes the resilient element which yieldingly opposes the endwise movement of the worm and the driving shaft on which it is mounted when the resistance offered by the settled material to the rotary movement of the shaft 5, increases beyond the normal. The plunger 14 is provided with an axially extending stem 18 which projects through an opening in the cap 15 and which at its exterior end is pivotally connected with a lever 19 which at its upper end is fulcrumed on a lug 15^a formed integral with the cap 15, while its opposite extremity provides a pointer which on a segmental graduated scale 20, indicates the degree of resistance offered by the thickened matter in the bottom of the tank 2, to the movement of the rotary element. At one end of this scale, an insulated contact member 21 is disposed to be engaged by the pointer at the end of the lever 19 when the degree of resistance of the matter in the tank has reached a predetermined maximum, the said contact member being together with an alarm 22 connected in the electric circuit of a source 23, the opposite pole of which is connected with a convenient part of the mechanism which is in electric communication with the lever 19.

In the modified form shown in Fig. 4, the worm-wheel 9 is loosely mounted on the shaft 5, and the latter is provided with a laterally extending arm 24 which is rigidly secured thereto. In pivotal connection with the end of this arm, is a rod 25 which is slidably supported in bearings 26 and 27 on the wheel, and a coiled spring 28 is disposed between the bearing 26 and a collar 29 on the rod, to provide a resilient means for transmitting the movement of the wheel 9 to the shaft 5, and for absorbing the resistance offered to the movement thereof. A lever 30 fulcrumed at 31 on the wheel 9 is pivotally connected at one end to the rod 25, while its opposite extremity is pointed to indicate the degree of resistance on a scale 32 fastened to the wheel. A source of electricity 33 mounted on the wheel provides the circuit for the alarm 34, one pole of said source being connected with a convenient part of the wheel while the opposite pole is connected with a contact member 35 on the scale 32 as in the preferred form of the invention hereinbefore described.

What I claim and desire to secure by Letters-Patent is:

1. The combination with a container and a rotary device adapted to move the contents thereof, of means operatively connected with said device so as to be displaced in accord-

ance with the resistance offered to the movement of the same by a mass in said container, and an alarm connected to be sounded at a determinate point in said displacement.

2. The combination with a container and a rotary device adapted to move the contents thereof, of a driving mechanism in operative connection with said device, means associated with said mechanism to be displaced in accordance with the resistance offered by said device to the driving action of the same, and an indicator to indicate the degree of said resistance by the displacement of said means.

3. The combination with a container and a rotary device adapted to move the contents thereof and immovable in the direction of its axis of rotation, of a longitudinally movable driving shaft in operative connection therewith, means to yieldingly oppose the endwise movement of the said shaft, and an indicator appliance adapted to be operated by said endwise movement.

4. The combination with a rotary device, of a worm wheel connected therewith, a worm in operative engagement with said wheel and mounted to move in the direction of its axis of rotation, means to yieldingly oppose said movement, and an indicator appliance adapted to be operated by the endwise movement of said worm.

5. The combination with a rotary device, of a worm wheel connected therewith, a worm in operative engagement with said wheel and mounted to move in the direction of its axis of rotation, a sliding member in cooperative engagement with said worm, a spring to resiliently oppose a movement of said member, and an indicator appliance connected to be operated by movement of the latter.

6. The combination with a rotary device, of a worm wheel connected therewith, a worm in operative engagement with said wheel and mounted to move in the direction of its axis of rotation, a sliding member in cooperative engagement with said worm, an adjustable abutment, a spring between the latter and the member to yieldingly oppose a movement thereof, and an indicator appliance connected to be operated by movement of said member.

7. The combination with a container and a rotary device adapted to move the contents thereof, of an element having a driving connection therewith and capable of displacement independent of any movement of said device, and means to yieldingly oppose the said displacement of the said element.

8. In combination, a driven element, an element having a driving connection therewith, and capable of independent action, and indicator means associated with said elements to be operated by an independent ac-

tion of the driving element, induced by a resistance to the movement of the driven element.

9. In combination, a driven element, an
5 element having a driving connection therewith and capable of independent action, and means for measuring resistance to the movement of the driven element by yieldingly op-

posing independent action of the driving element.

In testimony whereof I have affixed my
signature in presence of two witnesses. 10

JOHN VAN NOSTRAND DORR.

Witnesses:

G. J. ROLLANDET,
L. RHOADES.