

June 13, 1933.

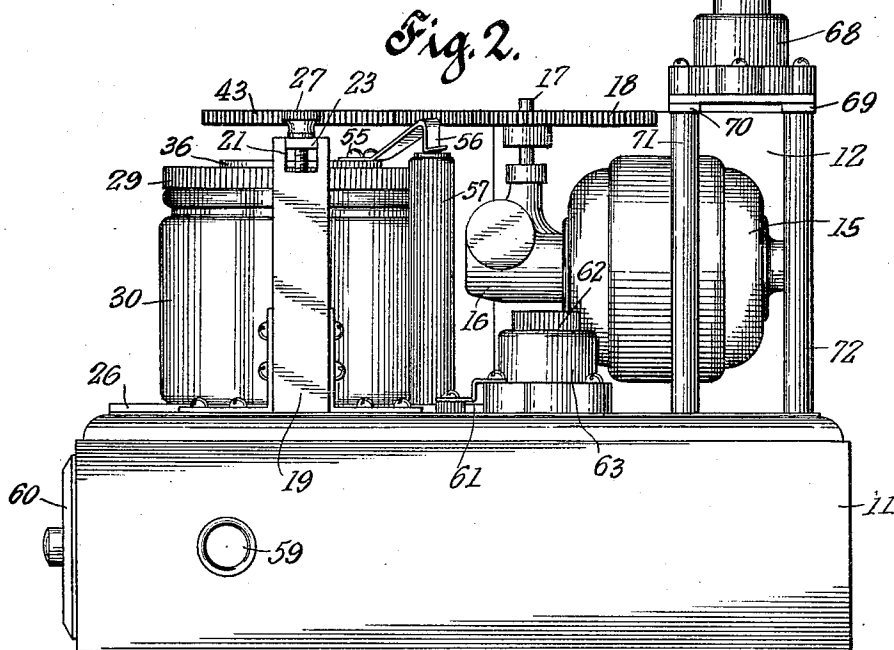
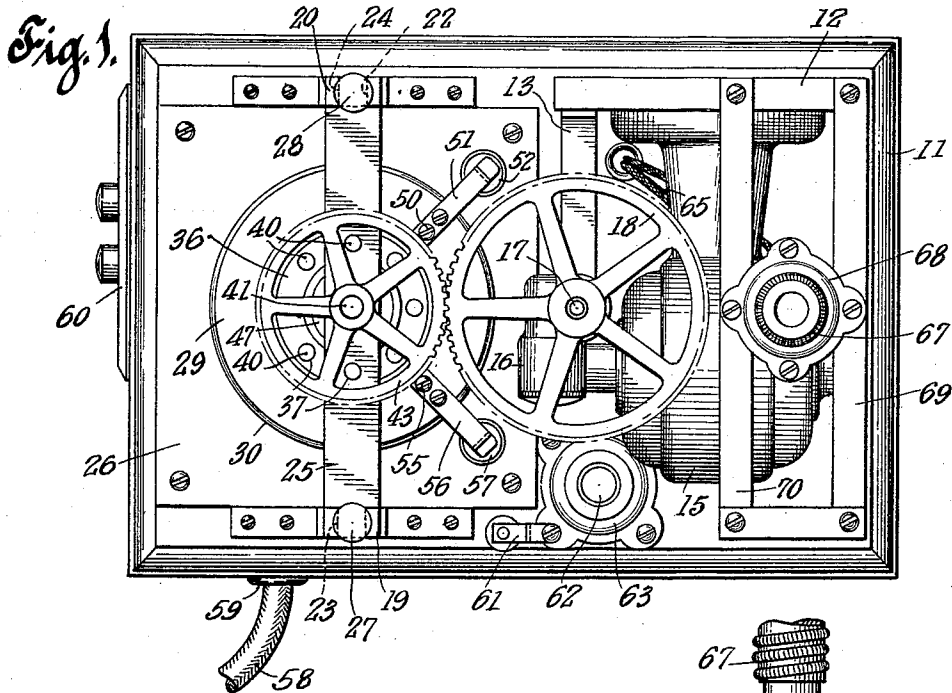
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MEANS FOR MAKING FERRIC HYDROXIDE AND RESULTING PRODUCTS

Filed May 27, 1930

2 Sheets-Sheet 1



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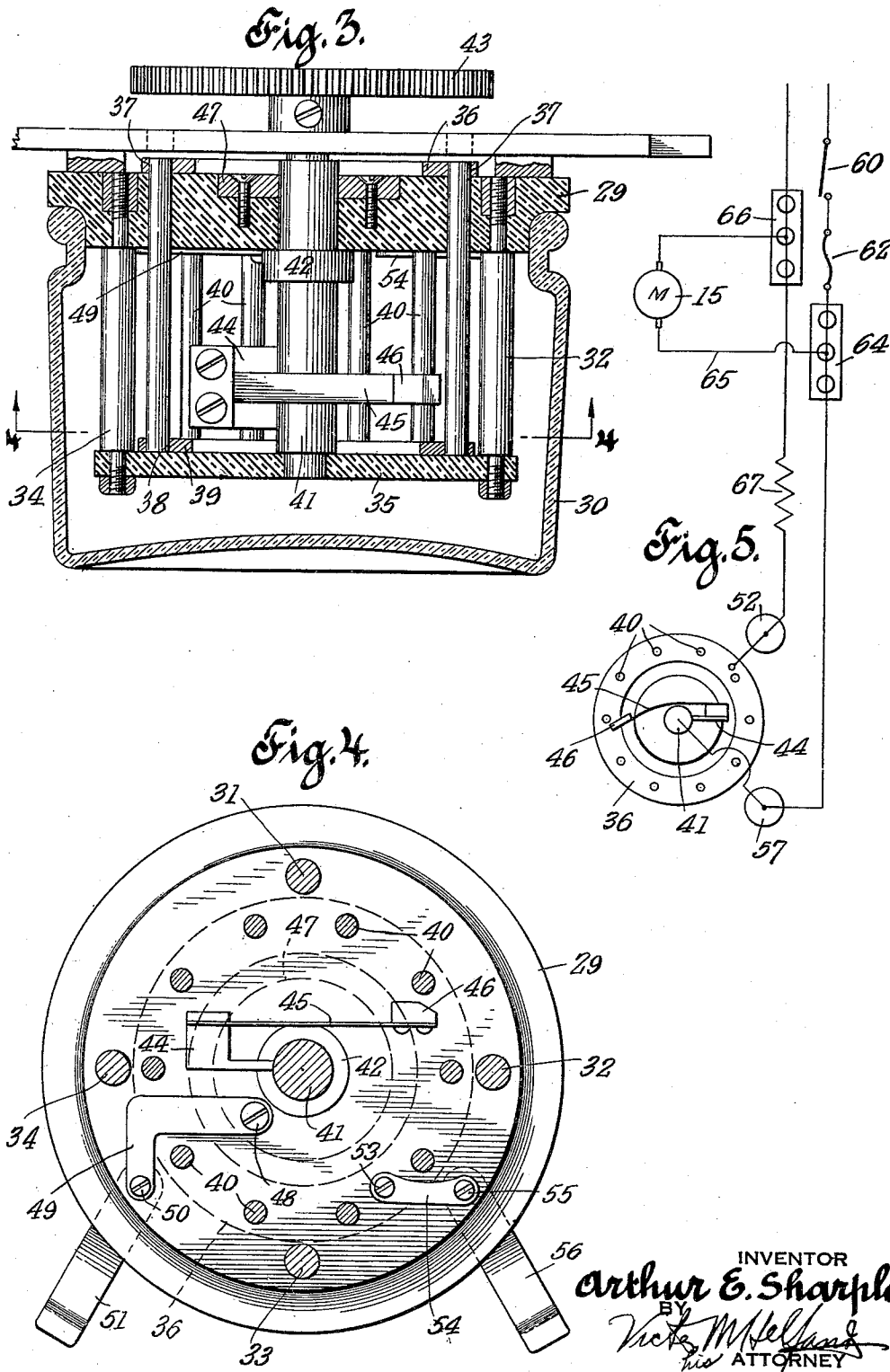
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UNITED STATES PATENT OFFICE

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MEANS FOR MAKING FERRIC HYDROXIDE AND RESULTING PRODUCTS

Application filed May 27, 1930. Serial No. 456,182.

My present invention relates to methods and apparatus for the production of ferric hydroxide directly from the basic substances of iron and water, and of the other products and by-products resulting from the employment of such methods and apparatus.

It is the object of the present invention to devise methods for producing such products in a simple and convenient way, which may be practiced everywhere that an electric current is available, and which do not require any skill to practice.

It is also an object of the present invention to devise apparatus for the practice of the methods aforesaid, which is efficient, compact, convenient to handle, economical to produce, and which may operate on small quantities.

It is a further object of the present invention to provide electrically prepared, colloidal, ferric hydroxide, in pure form, as well as in solution in water in combination with other substances, by-products of its production, which solutions possess many desirable chemical and medicinal properties, such as will be apparent to those skilled in the art to which the present invention relates.

In the accompanying drawings, illustrating a preferred embodiment of the apparatus of the present invention, one which is well suited for the practice of the methods of the present invention,

Fig. 1 is a top plan view of the apparatus;

Fig. 2 is a side elevational view of the same;

Fig. 3 is a transverse sectional view of the operating part of the apparatus of the present invention; and

Fig. 4 is a cross-sectional view taken along line 4-4 of Fig. 3; and

Fig. 5 is a schematic view of the electric circuit of the apparatus of the present invention.

In the accompanying drawings, the numeral 11 designates a rectangular platform or stand of wood or other suitable material, having mounted thereon, at one of its edges, adjacent one corner, the upright panel, 12, of insulating material, which is firmly held in place by means of the angle bars 13 and 14. Fixed securely to the panel 12 is an electric motor, 15, which may be of any kind, adapted to the nature of the electric current with which it is intended to be used, or a universal motor, the said motor 15 having an adapter, 16, which carries a shaft, 17, on which is mounted the gear wheel, 18.

Mounted also on opposite edges of the platform 11, are the two facing posts, 19 and 20, having at their upper extremities the recesses, 21 and 22, respectively, which are adapted to receive the reduced ends, 23 and 24, of a cross bar, 25. The posts, 19 and 20, as well as the cross bar, 25, may be of metal, such as brass, or of any other suitable material. The surface of the platform, 11, between the posts, 19 and 20, and below the cross bar, 25, may be covered by an insulating flooring, 26, of hard rubber, or fibre, or the like. The bar, 25, is adapted to be removably and adjustably fixed across the space between the posts, 19 and 20, by means of the thumb screws, 27 and 28, which pass, respectively, through the openings provided therefor in the reduced ends, 23 and 24, of the cross bar, 25, and into the threaded screw seats in the posts, 19 and 20.

Fixed to the under side of the cross bar, 25, is the disc or cover, 29, of an insulating material, such as fibre, which is adapted to serve as a cover and fit closely in the opening of a container or jar, 30, of glass or other suitable non-conductive material which will readily hold water, and which is freely and removably placed on the insulating flooring 26. Underslung below the cover 29, by means of the posts, 31, 32, 33, and 34, and adapted to fit within the jar, 30

30, is another circular disc of non-conductive material, 35.

The upper surface of the disc or cover, 29, carries a metal ring, 36, circular in shape, and being of an electro-conductive metal, such as copper or the like. The circular ring 36, has a plurality of perforations 37, which perforations extend through the cover, 29, and correspond with an equal number of perforations 38, in a similar ring, 39, fixed to the upper surface of the disc 35. These perforations, 37 and 38, are adapted to hold a plurality of iron electrodes, 40, which may be slipped into and held in position by such perforations.

Passing through the center of the cross-bar, 25, of the cover, 29, and of the disc, 35, is a freely rotatable shaft, 41, held in position by means of the collar, 42, fixed there-to immediately below the cover, 29. This shaft, 41, is insulated from the rest of the apparatus, except as hereinafter set out, and carries at its upper end a gear wheel, 43, which is adapted to mesh with the gear wheel 18, of the motor, 15. It may here be stated that the posts, 19 and 20, are so placed with respect to the motor, 15, that when the cross bar 25, is placed in position between the posts, the gear wheel 43, will exactly mesh with the gear wheel, 18, of the motor 15. It may also be here stated that the jar, 30, since it is freely movable and unattached to any other part of the apparatus, may be readily placed in position below the cover, 29, before the same is fixed in place.

Fixed to a flattened or reduced portion of the shaft, 41, which portion may be at any point on the shaft, between the cover 29 and the disc, 35, is an "L" shaped bar, 44, to which is attached a spring bar, 45, which extends across the shaft, 41, and carries on its free end a contact member, 46. The spring bar, 45, is sufficiently long so that the contact member at its end, will contact and pass successively, each of the electrodes, 40, when the shaft 41, is rotated in the proper direction. The shaft, 41, also serves during such rotation to support the spring bar, 45, and to prevent its breaking.

The contact member, 46, and each of the electrodes, 40, are terminals in an electric circuit, which will hereinafter be more fully described. The contact member, 46, the spring bar, 45, and the shaft 41, are brought into the circuit by means of the metal, electro-conductive ring, 47, set into the cover, 29, surrounding, and always touching the shaft 41, at its point of entry into the cover, 29. The ring, 47, is connected by means of the screw, 48, to the connecting bar, 49, on the under side of the cover, 29, which is connected, by the screw, 50, to the electro-conductive spring contact member, 51, which contacts, when the cross bar is fixed in position, with the insulated terminal post, 52,

of the electric circuit. Similarly, each of the electrodes, 40, is always in contact, particularly when pressed by the contact member, 46, with the ring, 36, which is connected by the screw, 53, to the connecting bar, 54, on the under side of the cover, 29, which is in turn connected by the screw, 55, to the spring contact member, 56, which contacts, when the cross bar, 25, is in position, with another insulated terminal post, 57, of the electric circuit.

While it would be possible to operate the part of the apparatus just described by rotating the shaft, 41, by any means whatever, I prefer to have the same turned by an electric motor, which motor I also prefer to have operate on the same circuit with the rest of the apparatus. For that purpose I have devised the electric circuit which is diagrammatically illustrated in Fig. 5 of the drawings. The circuit commences with the cable, 58, which enters the platform 11, at the opening, 59, from which it goes to the toggle switch, 60. From the switch, a wire, not appearing in the drawings, except diagrammatically, leads to a fuse, 62, in a fuse socket, 63, whence another wire, not shown, leads to a bus bar, below the platform, 11.

From the bus bar, 64, the current flows in two parallel circuits. One circuit goes to the motor 15, by means of the wire, 65, and thence to the bus bar, 66, from which it goes back to the cable, 58. The other circuit goes from the bus bar 64, to the terminal post 52, to the connecting bar, 48, to the disc, 47, to the shaft, 41, to the contact member, 46, which, when the motor operates and turns the shaft, 41, contacts intermittently and successively with each of the electrodes, 40, to which the current passes. From the electrodes, 40, the current goes to the ring, 36, to the connecting bar, 53, to the spring contact bar, 56, to the terminal post, 57, from which it passes through a resistance coil, 67, in a socket, 68, and to the bus bar, 66, and out.

It may here be stated, that the resistance coil, 67, may be varied to suit the current used; and may be single or double, in parallel or in series, and may be fixed in the circuit in any manner. I prefer, however, to have it set in a socket, 68, which is mounted on two parallel bars, 69 and 70, one end of each of which rests on the panel, 12, the other ends on the posts, 71 and 72.

In practical operation of the apparatus just described, the jar, 30, is filled with the desired quantity of water, which may be plain, filtered or distilled, as may be desired, and placed on the insulated flooring, 26. The cover, 29, is then placed on the jar, with the disc, 35, and the electrodes, 40, inside the jar, with the contact member, 46, and a portion of each of the electrodes, at least, submersed in the water. The jar is

then adjusted in position, so that the cross bar, 25, may be adjusted in position between the posts, 19 and 20, and secured in position by the thumb screws, 27 and 28. When the bar 25 is in position, the gear wheels 43 and 18, mesh. The switch 60 is then thrown, the motor started, and the sparking circuit charged.

It may here be stated that the direction of rotation of the motor is such that when it operates, the gear wheel 43 is turned in such a direction that when the contact member, 46, is in contact with any of the electrodes, 40, the spring bar, 45, is pressed back against the shaft 41, which supplies a fulcrum for the spring bar, which bends the spring bar, and permits the contact member to slip past such electrode.

When the contact member connects with any of the electrodes while the current is on, an electric spark or arc is produced, and as the contact member rotates and contacts successively with all the electrodes, a succession of intermittent sparks or arcs results.

I have found that during the sparking or arcing of the iron electrodes, various physical and chemical changes take place, and certain new products result. While the exact nature of all of the changes is not clearly understood, nor all of the resulting products or their properties definitely known, I have found that at the location of the electric spark or arc, the iron is "burned", and is transformed by reaction with the water, into ferric hydroxide. During the process, ozone in a nascent state, as well as hydrogen, is produced.

The ferric hydroxide, as it is produced, goes into solution in the water, until the water becomes saturated, when the ferric hydroxide begins to form a colloidal solution with the water. The ozone and hydrogen, and whatever other products are formed during the reaction, also go into solution in the water, until the water becomes saturated with respect to them. The excess of these substances escapes.

In the apparatus illustrated in the drawings, wherein the motor has been reduced and geared to rotate the shaft 41 at the rate of about ten revolutions per minute, and where there are ten electrodes provided, and one contact member, it has been found that it takes between twenty and twenty-five minutes to produce a saturated colloidal solution of ferric hydroxide, ozone and hydrogen. After that time there is precipitation. It has also been found that the solution thus formed may stand for about half an hour without losing any of its properties.

The solution thus formed, and the various products entering therein, probably because of the method of producing them, are found to contain many advantages and superiorities over the solution or any of the

products produced in any other way. Such solution and such products possess many chemical and medicinal properties such as will be apparent to those skilled in the art to which the present invention relates.

While the foregoing is descriptive of the preferred embodiment of the apparatus of the present invention, of the methods of its practice, and of the resulting products, it is to be understood that I do not wish to be limited to such embodiment, as obviously, others may be made, without the exercise of the inventive faculties, and within the scope of the present invention.

What I claim is:

1. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes, each forming a terminal in an electric circuit, positioned in the said electrode holding means, a contact member forming another terminal in the said electric circuit, and means to bring the said contact member in contact successively with each of the said electrodes.

2. Apparatus of the character described, comprising a container for water, means for holding an electrode within the said container, an iron electrode forming a terminal in an electric circuit positioned in the said electrode holder, a contact member forming another terminal in the said electric circuit, and means to bring the said contact member intermittently in contact with the said electrode.

3. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes each forming a terminal in an electric circuit, positioned in the said electrode holding means, a movable contact member forming another terminal in the said electric circuit, and means to move said contact member to bring it in contact successively with each of the said electrodes.

4. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes, each forming a terminal in an electric circuit, positioned in said electrode holding means, a rotatable shaft passing through the center of said electrode holding means, said shaft being in the electric circuit and carrying a contact member adapted to rotate with the shaft and to contact successively with each of the said electrodes when the said shaft is rotated.

5. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes, each forming a terminal in an elec-

tric circuit, circularly disposed in the said electrode holding means, a rotatable shaft passing through the center of said electrode holding means, said shaft being in the electric circuit and carrying a contact member adapted to rotate with the said shaft and to contact successively with each of the said electrodes and intermittently make and break the electric circuit when the said shaft is rotated.

6. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes, each forming a terminal in an electric circuit, circularly disposed in such electrode holding means, a rotatable shaft passing through the center of said electrode holding means, said shaft being connected in the electric circuit, and carrying a contact member adapted to rotate with the shaft and to contact successively with each of the said electrodes and intermittently make and break the electric circuit, and means to rotate said shaft.

7. Apparatus of the character described, comprising a container for water, means for holding a plurality of electrodes within the said container, a plurality of iron electrodes, each forming a terminal in an electric circuit, circularly disposed in such electrode holding means, a rotatable shaft passing through the center of said electrode holding means, said shaft being connected in the electric circuit and carrying a contact member adapted to rotate with the said shaft and to contact successively with each of the said electrodes and intermittently make and break the electric circuit, and means to rotate said shaft, such rotating means comprising a gear carried on the rotating shaft, said gear being adapted to mesh with a gear carried on the shaft of an electric motor.

8. Apparatus of the character described, comprising a container for water and associated means for creating intermittent electric sparks on iron electrodes within the said container, such means comprising a lid of non-conductive material for the container, and underslung non-conductive disc attached to the said lid, a circular ring of electro-conductive material on the upper surface of the said lid, said ring being connected in an electric circuit, a corresponding ring of electro-conductive material on the upper surface of the said disk, a plurality of perforations through the said lid and ring carried thereon, said perforations being adapted to have a plurality of electrodes inserted therein and to have said electrodes come in contact with the electro-conductive ring, and a plurality of corresponding perforations in the disk ring, such perforations forming seats for the ends of the inserted electrodes, a plurality of iron elec-

trodes positioned in said perforations, said electrodes being in the electric circuit, a rotating shaft passing through the center of the lid, such shaft being connected in the electric circuit and carrying a contact member, which member is adapted to rotate with the shaft and to contact successively and intermittently with each of the said electrodes, and intermittently make and break the electric circuit, and means to rotate the said rotatable shaft.

9. Apparatus of the character described, comprising a container adapted to hold a liquid, means for holding an electrode within the said container, an electrode forming a terminal in an electric circuit positioned in the said electrode holder, a contact member forming another terminal in the said electric circuit, and means to bring the said contact member intermittently in contact with the said electrode.

10. Apparatus of the character described, comprising a container adapted to hold a liquid, means for holding a plurality of electrodes within the said container, a plurality of electrodes, each forming a terminal in an electric circuit, positioned in the said electrode holding means, a contact member forming another terminal in the said electric circuit, and means to bring the said contact member in contact successively with each of the said electrodes.

11. Apparatus of the character described, comprising a container adapted to hold a liquid, means for holding a plurality of electrodes within the said container, a plurality of electrodes, each forming a terminal in an electric circuit, positioned in the said electrode holding means, a movable contact member in the said container, forming another terminal in the said electric circuit, and means to move the said contact member to bring it in contact successively with each of the said electrodes.

12. Apparatus of the character described, comprising a container adapted to hold a liquid, means for holding a plurality of electrodes within the said container, a plurality of electrodes, each forming a terminal in an electric circuit, positioned in the said electrode holding means, a rotatable shaft passing through the center of the said electrode holding means, said shaft being in the said electric circuit and carrying a contact member adapted to rotate with the shaft and to contact successively with each of the said electrodes when the said shaft is rotated.

13. Apparatus of the character described, comprising a container adapted to hold a liquid, means for holding a plurality of electrodes in a circular arrangement, a plurality of electrodes positioned in the said electrode holding means, each forming a terminal in an electric circuit, a rotatable shaft passing through the center of the said electrode

holding means, said shaft being in the said electric circuit and carrying a contact member adapted to rotate with the said shaft and to contact successively with each of the said electrodes and intermittently make and break the electric circuit when the said shaft is rotated.

In testimony whereof, I have signed my name to this specification this 20th day of May, 1930.

ARTHUR E. SHARPLES.