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E. E. LITTLEFIELD

1,709,083

ELECTRIC CONTROLLING APPARATUS

Filed Oct. 3, 1919

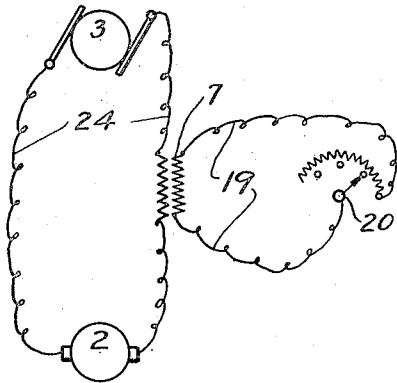
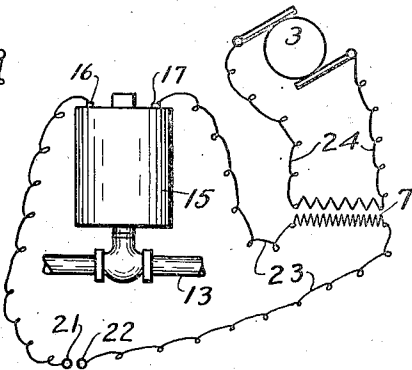
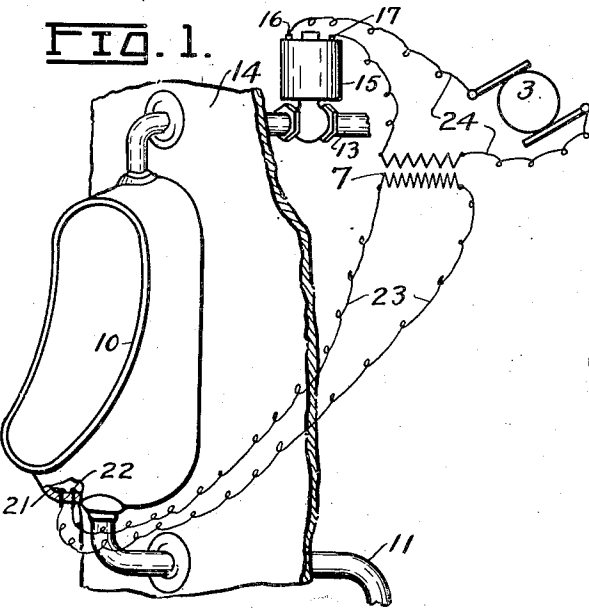


FIG. 3.

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ELECTRIC CONTROLLING APPARATUS.

Application filed October 2, 1919. Serial No. 328,305.

This application contains subject matter common to Patents No. 1,335,380 and No. 1,404,155 issued to applicant herein Mch. 30, 1920 and Jan. 17, 1922 respectively.

My invention relates to electrical apparatus particularly to those employing transformers in their operation.

It consists, in certain instances, of applying the current carried by the secondary circuit of a transformer to the operation of valves for controlling flows of fluid, for the operation of motors and translating apparatus generally. In other instances it consists in employing the primary current of transformers for such purposes.

One of the objects of my invention is to provide a means for controlling the flow of current in electric circuits employed to control flows of fluid, and especially those fluids whose path of flow is in the path of the controlling current.

In the accompanying drawings one of the forms which may be assumed by each of the respective features of my invention is illustrated, it being understood that the invention may be embodied in various other forms.

Other and further objects of my invention will become obvious, to persons skilled in the art, from a consideration of the following description when taken in conjunction with the drawings wherein:

Figure 1 is a view, partly in elevation and partly in section, of an urinal embodying my invention; Figure 2 is a plan view of my invention showing a modified circuit arrangement; Figure 3 shows a general plan view of apparatus embodying the feature of Figure 1.

Similar reference characters indicate like parts in the several figures of the drawings.

Referring to Figure 1, 10 is an earthenware urinal bowl adapted to be flushed by operation of the valve 15 which controls the admission of the flushing fluid through the source of fluid supply 13. 24 is a valve energizing circuit which receives current from an alternating current generator 3, for which may be substituted any other suitable energizing means such, for instance, as an ordinary service main supplying alternating current. This circuit also forms a primary for

the transformer 7. The secondary circuit 23, of this transformer, terminates in the electrodes 21 and 22 disposed in the basin of the bowl 10 for which bowl an overflow 11 is provided. Where desirable, additional resistance may be included in circuit 24.

Since urine is a good conductor of electricity, when deposited in the bowl 10, it will bridge the terminals 21 and 22 closing circuit 23, and, by operation of the transformer 7 and circuit 24, energize the valve 15. Upon operation of the valve 15 flushing water enters the bowl 10 substituting itself for the waste which forms a conducting medium between the terminals 21 and 22. Since water is a non-conductor of electricity, or, at least, a very poor one, the substitution of this fluid for the waste acts to de-energize the valve 15 thereby interrupting the flow of fluid.

The adaptability of this system of control to apparatus of various types will appear obvious and I, therefore, do not limit myself to the particular embodiment of Figure 1.

The principles of transformer operation and construction are so well known that those skilled in the art will be able to provide transformers capable of meeting the requirements of any particular case. For flushing purposes, however, it is desirable to employ transformers having comparatively low secondary voltage and these may, or may not as desired, be combined with the valve operating means.

As is well known, losses occur in transformers which impair their efficiency. From this it follows that the strength of the current in the primary is greater than that in the secondary. In other words, no transformer gives out an amount of energy equal to that which it receives. In some cases this loss of energy is considerable but even in cases where it is less it is an important factor. It develops from this fact that motors, or apparatus for controlling electrical energy, or various translating apparatus, may be operated by using the power supplied by the primary instead of that supplied by the secondary circuit. Of course, in some cases it would be found desirable to use power supplied by both circuits in conjunction. In the case previously cited the secondary circuit might be

said to function substantially as a relay, while the primary might be termed the work circuit.

It becomes evident that transformers might be designed with particular reference to the character of work to be performed. To this end it is easily within the skill of those expert in the art to so design the transformer that the proper, or desirable, wattage difference exists between the primary and secondary currents. Several elements would, of course, enter into the designing of such transformers, including impedance, self-induction, reactance, magnetic or other screening effects, etc. Also a consideration of the effect which the secondary current has of increasing the strength of the primary current.

From the foregoing description it becomes evident that the difference in current capable of being supplied by the primary in excess of that supplied by the secondary becomes important, especially in connection with apparatus whose operation requires current in excess of that capable of being supplied by the secondary. In many cases a small excess of current in the primary over the secondary will enable apparatus to be satisfactorily operated which otherwise would require either larger, or possibly, specially designed transformers, entailing additional cost.

Figure 2 shows a plan view of the valve of Figure 1 arranged to be energized by current supplied by the secondary circuit of a transformer. While, in this as in other cases, the current supplied by the secondary is less than that supplied by the primary, it is, however, sufficient for operation of such devices as are, or would be employed, in flushing systems, such as electrically operated valves, and particularly when properly designed valves are employed. The desirability of using this arrangement in preference to that of Figure 1 would depend more or less upon particular conditions and in some cases it might be purely optional.

Figure 3 is a plan view of a system of control embodying my invention. 3 is an alternating current generator, for which may be substituted any other suitable means such, for instance, as an alternating current service main. 2 is a motor connected by circuit 24 to any current supply, as above indicated, to perform any kind of work desired. For this motor may be substituted any translating device. 7 is a transformer which includes the primary circuit 24 and the circuit 19. Included in the secondary circuit 19 is a rheostat 20 for which occasion might require the substitution of any other electrical device such as translating devices, or devices for controlling electrical energy, or relays, etc.

Having described my invention, what I claim is:—

1. A flushing system including; a trans-

former; a valve; energizing means common to said valve and said transformer; a source of liquid controlled by said valve; a secondary circuit for said transformer, said circuit being adapted to control the operation of said valve. 70

2. A flushing system including; a transformer; a valve; energizing means common to said valve and said transformer; a source of liquid controlled by said valve; a secondary circuit for said transformer, said secondary circuit being adapted to be bridged by liquid supplied by said valve. 75

3. A flushing system including a transformer adapted to supply secondary current at comparatively low voltage; a valve; means for energizing said valve and said transformer; a source of liquid controlled by said valve; a secondary circuit connected to be energized by said secondary current, said secondary circuit being adapted to be bridged by liquid supplied by said valve. 85

4. Means for controlling a flow of liquid including; a transformer; a valve; energizing means for said valve, said valve being arranged on the primary side of said transformer in closed circuit relation with said energizing means; a secondary circuit for said transformer, said secondary circuit being adapted to control the operation of said valve. 90

5. A flushing system including; a transformer; energizing means therefor; a valve interposed between said energizing means and said transformer on the primary side of said transformer; a source of liquid controlled by said valve; a secondary circuit for said transformer, said secondary circuit being adapted to control the operation of said valve. 95

6. A flushing system including; a transformer; energizing means therefor; a valve in circuit with said energizing means, said energizing means being common to said transformer and said valve; a source of liquid controlled by said valve; a secondary circuit for said transformer, said secondary circuit being adapted to control the operation of said valve. 100

7. In combination; a transformer; a valve arranged on the primary side of said transformer; energizing means common to said valve and said transformer; a fluid medium controlled by said valve; a secondary circuit for said transformer, said secondary circuit being adapted to control the operation of said valve. 105

8. An electrically controlled flushing system including a transformer designed to supply secondary current at comparatively low voltage; a primary and a secondary circuit for said transformer; energizing means for the primary circuit, the secondary circuit being connected to be energized by said secondary current; a valve in circuit with said transformer; a source of liquid controlled by said valve, said secondary circuit being arranged to be bridged by liquid supplied by said valve. 120

9. An electrically controlled flushing sys- 130

tem including a transformer designed to supply secondary current at comparatively low voltage; a primary and a secondary circuit for said transformer; energizing means for the primary circuit, the secondary circuit being connected to be energized by said secondary current; a valve so arranged in said system that its actuation is controlled by said secondary circuit; a source of liquid controlled by said valve, said secondary circuit being arranged to be bridged by liquid supplied by said valve. 10

In testimony whereof I have hereunto affixed my signature at Seattle, Washington, this 27th day of September, 1919.

EDGAR EARLE LITTLEFIELD.