G. SIMON & F. BALZER.

REVERSING MECHANISM FOR WASHING MACHINES.

APPLICATION FILED FEB. 8, 1915.

1,264,340.

Patented Apr. 30, 1918.

3 SHEETS—SHEET 1.

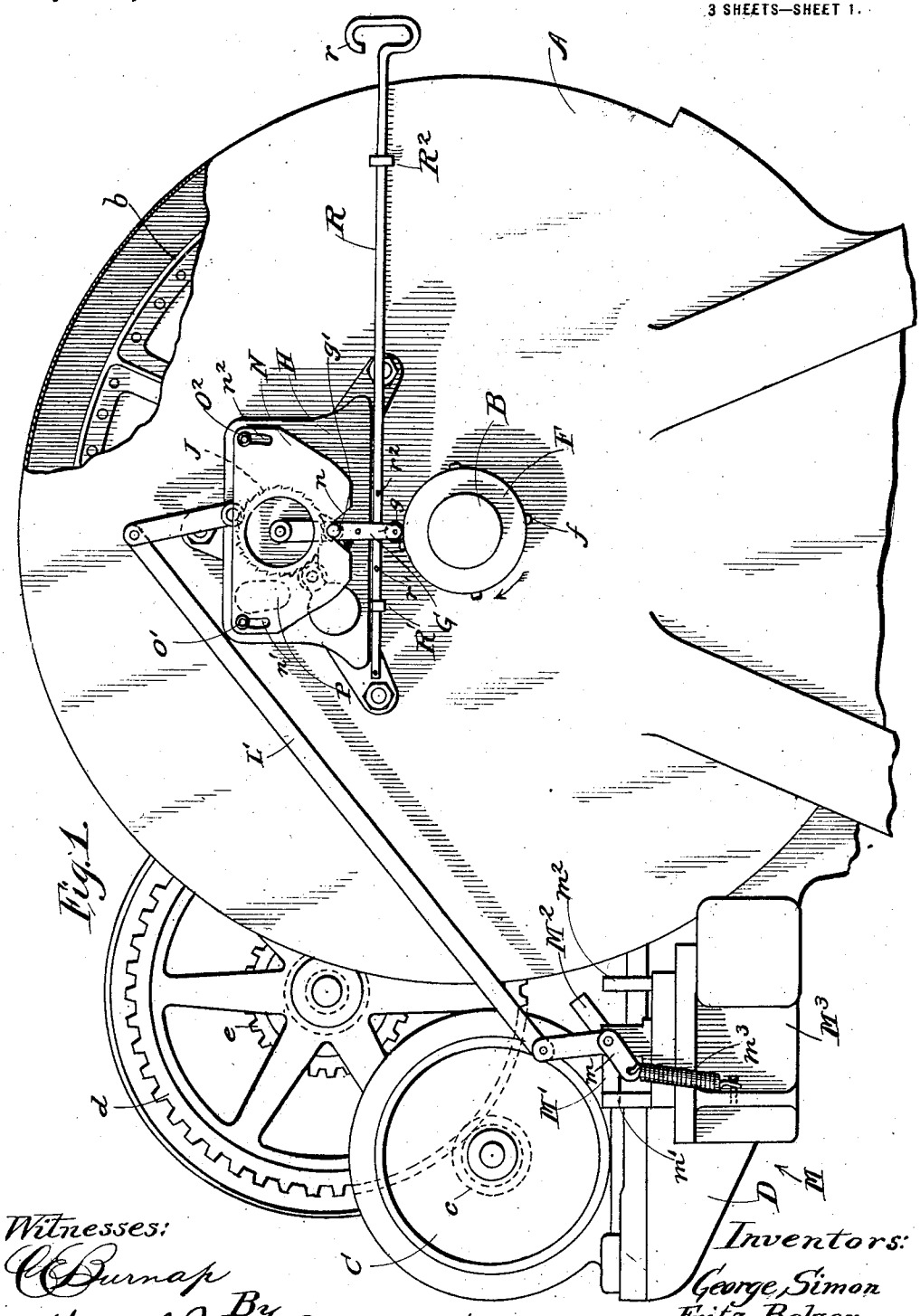


Fig. 1.

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3 SHEETS—SHEET 2.

Fig. 3.

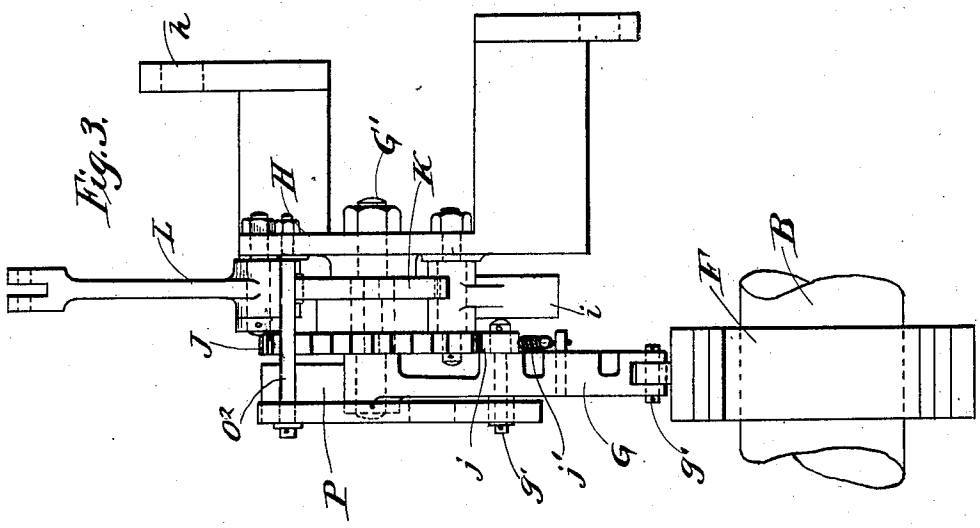
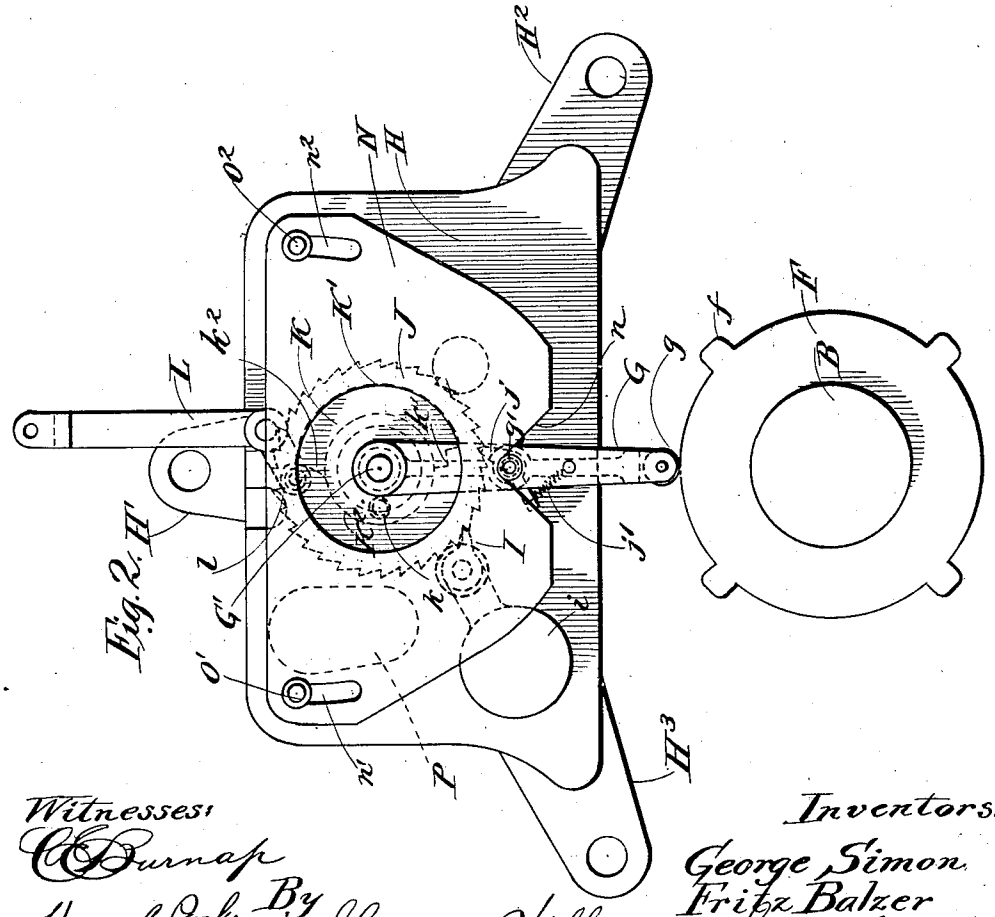


Fig. 2.



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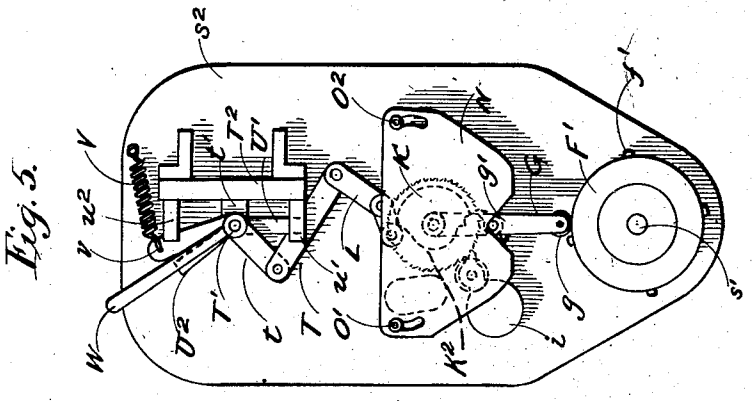
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3 SHEETS—SHEET 3.

Fig. 3.



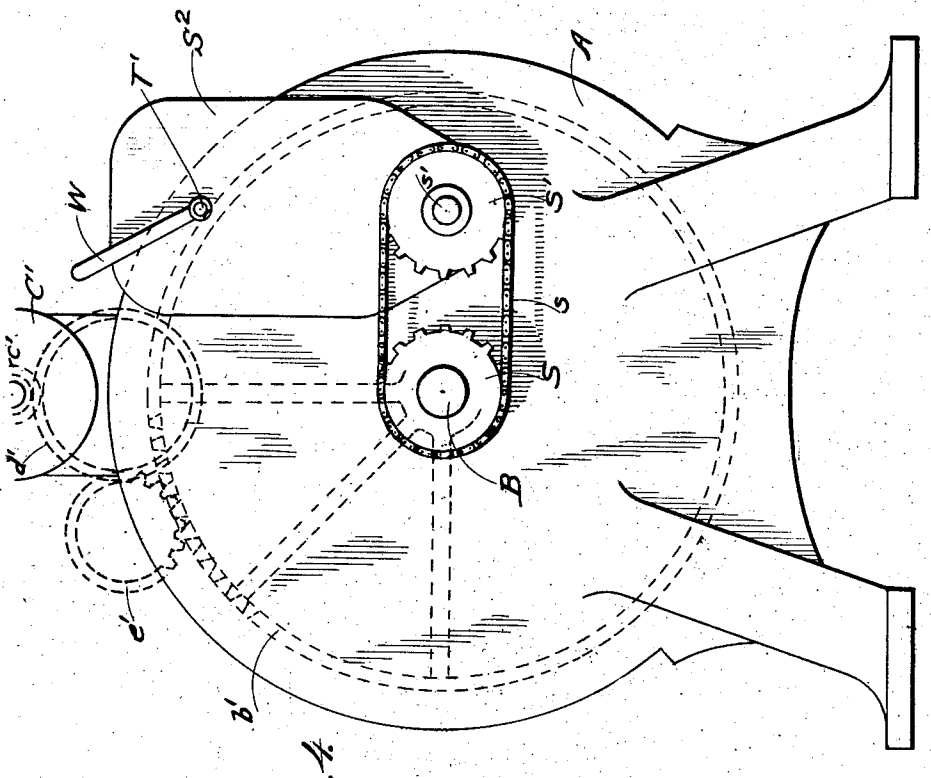


Fig. 4.

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UNITED STATES PATENT OFFICE.

GEORGE SIMON AND FRITZ BALZER, OF CHICAGO, ILLINOIS, ASSIGNORS TO TROY LAUNDRY MACHINERY COMPANY, A CORPORATION OF NEW YORK.

REVERSING MECHANISM FOR WASHING-MACHINES.

1,264,340. Specification of Letters Patent. Patented Apr. 30, 1918.

Application filed February 8, 1915. Serial No. 6,940.

To all whom it may concern:

Be it known that we, GEORGE SIMON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, and FRITZ BALZER, a subject of the Emperor of Germany, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Reversing Mechanism for Washing-Machines, of which the following is a specification.

Our invention relates in general to mechanism for reversing moving parts of machines, and more particularly to mechanism for automatically reversing the direction of rotation of the cylinders of washing machines.

In the operation of various machines it is desirable to periodically reverse the direction of movement of certain parts, such for instance as the cylinders of washing machines, the direction of rotation of which is periodically reversed in order that the articles may be agitated and directly subjected to the action of the suds.

The primary object of our invention is to provide mechanism for reversing the moving parts of a machine which will be actuated by the movement of the reversible parts to so change the application of power to the machine as to effect the reversing of the machine.

A further object of our invention is to provide an electrically driven cylinder washing machine with reversing mechanism controlled by the rotation of the cylinder to effect the periodical reversal of the direction of rotation of the cylinder.

A still further object of our invention is to provide mechanism for reversing a moving part of a machine which will be efficient in operation, durable in use, and comparatively simple in construction.

Our invention will be more fully disclosed hereinafter with reference to the accompanying drawings, in which the same is illustrated as embodied in two convenient and practical forms, and in which,—

Figure 1 is an end elevational view of a cylinder washing machine equipped with our invention;

Fig. 2 is an enlarged elevational view of the mechanism actuated by the rotation of the cylinder;

Fig. 3 is a side elevational view looking from the right in Fig. 2;

Fig. 4 is an end elevational view of a cylinder washing machine equipped with a modified form of our invention; and,

Fig. 5 is an enlarged elevational view of the reversing mechanism detached from the machine shown in Fig. 4.

Similar reference characters are used to designate similar parts in the several figures of the drawings. Reference character A designates one end wall of the tank of a cylinder washing machine of well-known construction. B designates one of the end trunnions of the usual cylinder *b*, inclosed by the tank A and adapted to contain the articles to be washed. The structural details of the washing machine are not illustrated or disclosed, inasmuch as they do not in themselves form parts of our invention, and a specific description of them is unnecessary to a complete understanding of our invention.

C designates an electric motor mounted upon any suitable support D. The motor is connected through a suitable train of gearing, such as a pinion *c*, a gear wheel *d*, and gear wheel *e*, with a gear wheel (not shown) fixed to the trunnion of the cylinder which projects from the opposite side of the machine to that shown in Fig. 1.

The trunnion B has fixed thereto a ring F, on the periphery of which is carried a plurality of equidistant radial projections *f*. A lever G is pivotally supported at its upper end upon a post G^1 projecting outwardly from a plate H, secured to the end wall A of the tank of the machine by any suitable means, such for instance as a plurality of brackets H^1—H^2 and H^3. The lower end of the lever G carries an antifriction roller *g*, which normally lies in the path of rotation of the projections *f*.

Loosely mounted upon the portion of the post G^1, adjacent the upper end of the lever G, is a ratchet wheel J, the teeth of which are engaged by a spring-actuated pawl *j* carried by the lever G. The pawl is retained in contact with the periphery of the ratchet wheel by any suitable means, such for instance as a coiled spring j^1 connecting the tail of the pawl with the adjacent portion of the oscillatory lever G. A gravity pawl I is mounted upon the supporting plate H in

position to engage the teeth of the ratchet wheel J and retain the ratchet wheel against reverse movement. *i* designates the weight of the pawl I for retaining the same normally in contact with the periphery of the ratchet wheel J.

Mounted upon the post G^1, adjacent the inner surface of the ratchet wheel J, is a cam K which is non-rotatably connected with the ratchet wheel by means of a pin *k*. The cam K is provided with two substantially semicircular surfaces K^1 and K^2, the former having a greater radius than the latter. A shoulder k^1 is formed on the cam K intermediate two adjacent ends of the cam surfaces K^1 and K^2, while an inclined surface k^2 connects the opposite adjacent ends of the cam surfaces K^1 and K^2.

Fulcrumed upon the plate H, adjacent the top thereof, is a bell crank lever L, carrying an antifriction roller *l* on the short-arm thereof, which rests upon the periphery of the cam K. The upwardly projecting arm of the bell crank lever L is connected by a link L′ with an electric switch M, comprising a bell crank lever *m*, which carries two oppositely projecting contact blades M^1 and M^2, adapted to alternately engage stationary contacts m^1 and m^2, respectively, when the bell crank lever *m* is oscillated. A spring m^3 is connected to the opposite arm of the bell crank lever *m* from that to which the link L is connected, said spring serving to oscillate the bell crank lever *m* to close the circuit through movable contact M^1 and fixed contact m^1 when the cam surface K^2 passes beneath the antifriction roller *l* on the bell crank lever L. The switch M controls a circuit for effecting the reversal of direction of rotation of the electric motor C.

Inasmuch as our present invention is not concerned with any particular arrangement of motor circuit, we have not deemed it necessary to illustrate and disclose electrical connections through the medium of which the switch M reverses the direction of rotation of the motor. The switch M, which comprises the bell crank lever *m*, the blades M^1 and M^2, and the fixed contacts m^1 and m^2, may be supported in any suitable manner, as by means of a bracket M^3 fixed to the tank of the machine.

In order to automatically return the oscillatory lever G to a position in the path of the projections *f*, after it has been oscillated by said projections, we provide a gravity member comprising a plate N supported adjacent its top by means of posts O^1 and O^2, supported upon the plate H. The said posts extend through slots n^1 and n^2, respectively, in the plate N. The lower edge of the plate is provided with an angular notch *n* which surrounds a stud g^1 on the lever G. The plate N is provided with a weight P at the portion thereof adjacent the slot n^1. If desired, the plate N may have the requisite weight given to it for performing the necessary functions in any other suitable manner.

The operation of our improved reversing mechanism is as follows: The rotation of the cylinder causes the radial projections *f* to successively engage the lower end of the lever G and to oscillate the same in a direction corresponding to the direction of rotation of the trunnion B of the cylinder. When the trunnion B rotates in the direction of the arrow in Fig. 1, the lever G is successively oscillated toward the right, thereby rotating the ratchet wheel J step by step through the engagement therewith of the pawl *j* on the lever G. Each oscillation of the lever G toward the right oscillates the plate N about the post O^1 as a fulcrum, such oscillation being permitted by the upward movement of the slot n^2 around the post O^2. Such oscillation is imparted to the plate N through the engagement of the stud g^1 on the lever G, with the inclined edge at the right of the recesses *n* in said plate. When each projection *f* has oscillated the lever G to the right sufficiently to pass beneath the lower end of said lever, the weight of the plate N, acting through its engagement with the stud g^1, returns the lever G to its normal central position in the path of the projections *f*, so that it will be engaged by the succeeding projection and again oscillated toward the right. Each oscillation of the lever G toward the left causes the pawl *j* to engage a succeeding tooth of the ratchet wheel J, so that each oscillation of the lever G toward the right rotates the ratchet wheel a step corresponding to the angular oscillation of the lever G. When the ratchet wheel J has been moved step by step a sufficient distance for the antifriction roller *l* on the lower end of the bell crank lever L to engage the inclined cam surface *k*, the bell crank lever L is oscillated by reason of the antifriction roller *l* moving outwardly by reason of the passing beneath it of the cam surfaces K^1 of greater radius than the cam surfaces K^2. This oscillation of the bell crank lever L oscillates the switch M, through the medium of the link L′, from the position shown in Fig. 1 into a position in which the blades M^2 will engage the fixed contacts m^2, such oscillation of the switch instantly disengaging the blade M^1 from the fixed contact m^1. This movement of the switch M changes the circuit conditions so as to reverse the motor and to thereby reverse the direction of rotation of the cylinder of the machine.

The reversal in the direction of rotation of the cylinder, of course, reverses the direction of rotation of the trunnion B, so that the projections *f* carried thereby move in a path opposite to that indicated by the arrow in Fig. 1. As each projection *f* engages

the oscillating lever G, it is moved toward the left, and the pawl j thereon is engaged with another tooth on the ratchet wheel J. The rotation of the lever G toward the left swings the plate N upwardly about the post O^2 as a fulcrum, such movement being permitted by the slot n^1 moving relatively to the post O^1 extending therethrough. This oscillation of the plate N is effected through the engagement of the stud g^1 on the lever G with the inclined edge at the left of the notch n in the plate. Immediately upon each projection f passing beneath the antifriction roller on the lower end of the lever G, the latter is oscillated toward the right by reason of the weight of the plate N applied to the lever through the engagement of the edge of the notch n with the stud g^1. The lever G is therefore returned to its central position in the path of the next proection f, while at the same time the ratchet wheel J, and with it the cam K, have been stepped toward the right.

When the cam has been moved relatively to the lower end of the bell crank lever L a distance corresponding to the surface of the cam K^1, the roller l moves inwardly on to the shoulder k^1, permitting the oscillation of the bell crank lever L by the tension of the spring m^3 exerted through the ball crank lever m of the switch and the connecting link L. During the instant that the roller l rests upon the shoulder k^1, the switch M is in a neutral position, such neutral position being accomplished only momentarily, as the momentum of the cylinder causes the same to continue its rotation and thereby rotate the cam K the distance of one tooth of the ratchet wheel J, so that the cam surfaces K^2 pass under the roller l. This movement of the bell crank lever L permits the spring m^3 to oscillate the switch M to the position shown in Fig. 1, in which the circuit through the blade M^2 and fixed contact m^2 has been broken and a circuit established through the blade M^1 and fixed contact m^1 to reverse the direction of the motor, and consequently the direction of rotation of the cylinder. The cylinder continues to rotate in its reversed direction until the cam surface K^2 has passed the antifriction roller l on the inner end of the bell crank lever L, and the inclined surface k^2, which connects the cam surface K^2 with the cam surface K^1, oscillates the bell crank lever L and again reverses the motor through the oscillation of the switch M. The inclined surfaces k^2 and the shoulder k^1, which connect the adjacent ends of the cam surfaces K^1 and K^2, are important in that the antifriction roller l rests upon the inclined surface k^2 during the oscillation of the ratchet wheel J a distance of one tooth, and during that interval retains the switch M in a neutral position, while the shoulder k^1 accomplishes a similar object when the roller l passes from the cam surface K^1 to the cam surface K^2, namely, it supports the roller l during the interval of the movement of the ratchet wheel a distance of one tooth, and hence retains the switch M in a neutral position during such interval. The cam surfaces, together with the inclined contacting surfaces k^2, and the shoulder k^1, serve to so actuate the switch M that the motor is driven in one direction, is then disconnected from the current, is then driven in a reversed direction, and then is again disconnected from the current.

Should the operation of the machine be discontinued at a time when the switch M is in a neutral position, it may be moved so as to engage the blade M^1 with the fixed contact m^1, or to engage the blade M^2 with the fixed contact m^2, by moving the rod R, mounted upon the end frame A of the machine, such rod being provided with pins r^1 and r^2, either of which may engage the lever G and oscillate the same a distance of one tooth of the ratchet wheel J, to move the cam the slight distance necessary to permit the oscillation of the bell crank lever L to a position in which the switch M will be moved into one of its circuit-closing positions.

In the modified form of our invention shown in Figs. 4 and 5, the switch for reversing the current to the motor is mounted on one end of the tank adjacent the mechanism for oscillating the same. In this form of our invention a sprocket wheel S is fixed upon the trunnion B at one end of the cylinder of the washing machine, and is connected by a sprocket chain s with a sprocket wheel S^1 at the end of a stub shaft s^1 located at one side of the trunnion B. The stub shaft is mounted in the lower end of a casing S^2, having a base plate s^2 fixed to the adjacent end wall of the tank of the washing machine. A ring F^1, having equidistant radial projections f^1, similar to the ring F having projections f on the form of our invention shown in Figs. 1, 2 and 3, is fixed upon the stub shaft s^1 and located within the bottom of the casing S^2. The projections f' successively engage and oscillate the lever G, which, through the mechanism shown in Figs. 1, 2 and 3, effect the oscillation of the bell crank lever L for actuating the switch. Inasmuch as the mechanism actuated by the projections f^1 for oscillating the bell crank lever L, in the form of our invention shown in Figs. 4 and 5, is the same in construction and operation as the correspondingly designated mechanism of the form of our invention shown in Figs. 1, 2 and 3, detailed description thereof need not be repeated. The bell crank lever L is connected by a link T with a crank arm t, fixed to a rock shaft T^1, journaled upon the bearings t^1, suitably sup-

ported upon a base T^2, fixed to the back plate s^2 of the casing S^2. Oppositely projecting contact blades U^1 and U^2 are fixed to the rock shaft T', and are adapted to alternately engage stationary contacts u^1 and u^2 mounted upon the base T^2. A spring V is connected at one end to the base plate s^2, and at its other end to a crank arm v fixed to the rock shaft T, the tension of the spring serving to oscillate the rock shaft so as to move the contact blade U^2 into engagement with the fixed contact u^2, and to simultaneously disengage the contact blade U^1 from the fixed contact u^1, such action of the spring only occurring when the cam surface K^2 of the cam K passes beneath the roller l on the short-arm of the bell crank lever L. Fixed to the end of the rock shaft T', which projects through the casing S, is a lever W for manually oscillating the rock shaft T' to engage the contact blade U^1 with the fixed contact u^1, should the switch blades have been left in a neutral position when the machine was previously stopped.

The operation of the form of our invention shown in Figs. 4 and 5 is substantially the same as the operation of the form of our invention shown in Figs. 1, 2 and 3. The rotation of the cylinder serves to periodically reverse the current to the motor C^1, and thereby reverse the direction of rotation of the cylinder. The motor C^1 is operatively connected to rotate the cylinder through any suitable train of gears, such for instance as gear e^1 fixed to the motor shaft, which meshes with a larger gear d^1, which in turn meshes with a gear wheel e^1, in mesh with a large gear wheel b^1, fixed to the trunnion of the cylinder on the opposite side of the machine from that shown in Fig. 4

From the foregoing it will be observed that we have invented an improved mechanism for reversing the direction of movement of a machine, which although illustrated and described in connection with an electrically-driven cylinder washing machine, is applicable to other machines, whether driven by an electric motor or other power connection.

While we have illustrated and described in more or less detail a specific embodiment of our invention herein disclosed, yet we wish it understood that we do not desire to be limited thereto, as we contemplate changes in form, the proportion of parts, and the substitution of equivalents as circumstances may require or as may be deemed expedient.

We claim:—

1. A machine comprising a movable member, means for driving said member, a movable projection actuated by the movement of said member, an oscillatory lever extending into the path of said projection and oscillated thereby, a pawl on said lever, a ratchet wheel rotated by the successive engagements therewith of said pawl, a weight lifted by each oscillation of said lever by said projection, said weight serving to return said lever into the path of said projection and to thereby impart movement to said ratchet wheel, and means actuated by said ratchet wheel to periodically reverse the direction of movement of said driving means.

2. A machine comprising a rotary member, driving means for said member, a movable projection actuated by the rotation of said member, an oscillatory lever extending into the path of said projection and oscillated thereby, a pawl on said lever, a ratchet wheel rotated by the successive engagements therewith of said pawl, a weight lifted by each oscillation of said lever by said projection, said weight serving to return said lever into the path of said projection and to thereby impart movement to said ratchet wheel, a cam movable with said ratchet wheel, and mechanism operated by said cam to periodically reverse the direction of movement of said driving means.

3. A machine comprising a rotary member, an electric motor for rotating said member, a movable projection actuated by the rotation of said member, an oscillatory lever extending into the path of said projection and oscillated thereby, a pawl on said lever, a ratchet wheel rotated by the successive engagements therewith of said pawl, a weight lifted by each oscillation of said lever by said projection, said weight serving to return said lever into the path of said projection and to thereby impart movement to said ratchet wheel, a cam movable with said ratchet wheel, a switch for effecting the reversal of current through said motor, and operative connections between said cam and switch for oscillating the latter to periodically reverse the current through said motor.

4. A machine comprising a movable member, driving means for moving said member, a movable projection actuated by the movement of said member, a reciprocating element extending into the path of said projection and moved thereby in one direction to a position out of the path thereof, a gravity member engaging said reciprocating element to return the same into the path of said projection after each movement thereof by said projection, and mechanism actuated by the reciprocation of said element to periodically reverse the direction of movement of said driving means.

5. A machine comprising a rotary member, driving means for said member, a movable projection actuated by the rotation of said member, an oscillatory lever extending

into the path of said projection and oscillated thereby to a position out of the path thereof, a gravity member engaging said lever to return the same into the path of said projection after each oscillation thereof by the engagement therewith of said projection, and mechanism actuated by the oscillation of said lever to periodically reverse the direction of rotation of said driving means.

6. A machine comprising a rotary member, an electric motor for rotating said member, a projection rotated by said member, an oscillatory lever extending into the path of said projection and oscillated thereby, a gravity member engaging said lever to normally maintain the same in the path of said projection and to return said lever to said normal position after each oscillation thereof by said projection, and mechanism actuated by the oscillation of said lever to periodically reverse the current through said motor.

7. A machine comprising a movable member, means for driving said member, a series of spaced projections rotated by said member, a reciprocating element extending into the path of said projections and successively moved by them, a gravity member engaging said element to return the same into the path of said projections after each movement thereof by them, and mechanism actuated by the reciprocations of said element to periodically reverse the direction of movement of said driving means.

8. A machine comprising a rotary member, driving means for rotating said member, a series of spaced projections rotated by said member, a lever extending into the path of said projections and successively oscillated by them, a gravity member engaging said lever to return the same into the path of said projections after each oscillation thereof, and mechanism actuated by the oscillation of said lever to periodically reverse the direction of said driving means.

9. A machine comprising a rotary member, an electric motor for rotating said member, a series of spaced projections rotated by said member, a lever extending into the path of said projections and successively oscillated by them, a gravity member engaging said lever to return the same into the path of said projection after each oscillation thereof, and mechanism actuated by the oscillation of said lever to periodically reverse the current through said motor.

10. A machine comprising a movable member, driving means for said member, a series of projections rotated by said member, an element extending into the path of said projections and successively moved by them, gravity means engaging said element to return the same into the path of said projections after each successive movement thereof by said projections, a pawl on said element, a ratchet wheel rotated by the successive engagements therewith of said pawl, a cam movable with said ratchet wheel and having two curved surfaces of different radius connected by an intermediate surface, a lever engaging said cam and oscillated thereby, and mechanism operated by said lever to effect the periodical reversal of the direction of movement of said driving means.

11. A machine comprising a rotary member, driving means for rotating said member, a series of projections rotated by said member, a lever extending into the path of said projections and oscillated through engagement therewith, a gravity member engaging said lever to return the same into the path of said projections after the successive oscillations thereof by said projections, a pawl on said lever, a ratchet wheel rotated by the successive engagements therewith of said pawl, a cam movable with said ratchet wheel, a lever engaging said cam and oscillated thereby, and means operated by the oscillation of said latter lever to effect the periodical reversal of the direction of of rotation of said driving means.

In testimony whereof, we have subscribed our names.

GEORGE SIMON.
FRITZ BALZER.

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