

H. S. ATKINSON.

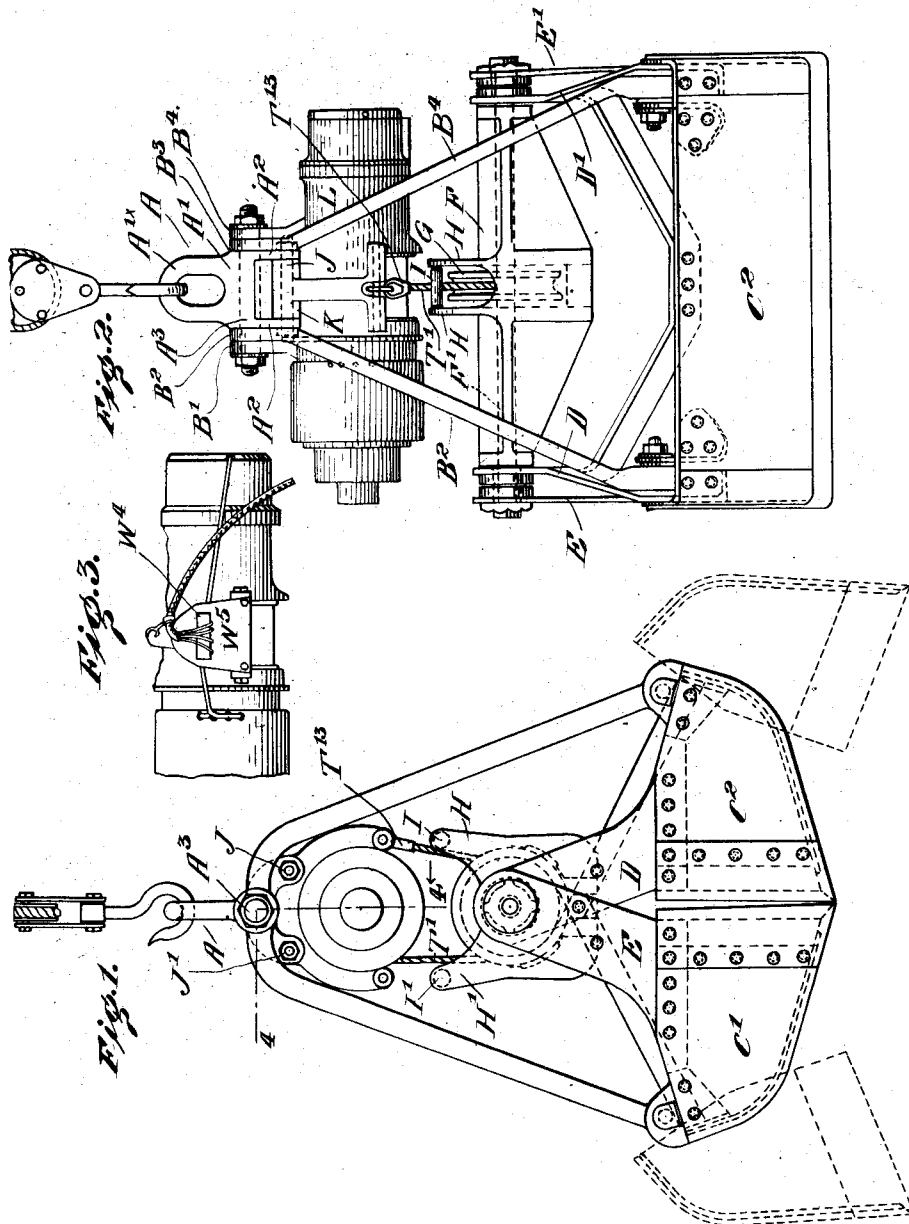
BUCKET.

APPLICATION FILED DEC. 6, 1912.

1,056,248.

Patented Mar. 18, 1913.

4 SHEETS—SHEET 1.



Witnesses:
C. S. Ashley
C. C. Coffey

Inventor
Herbert S. Atkinson
By his Attorneys
Macdonald & Macdonald

H. S. ATKINSON.

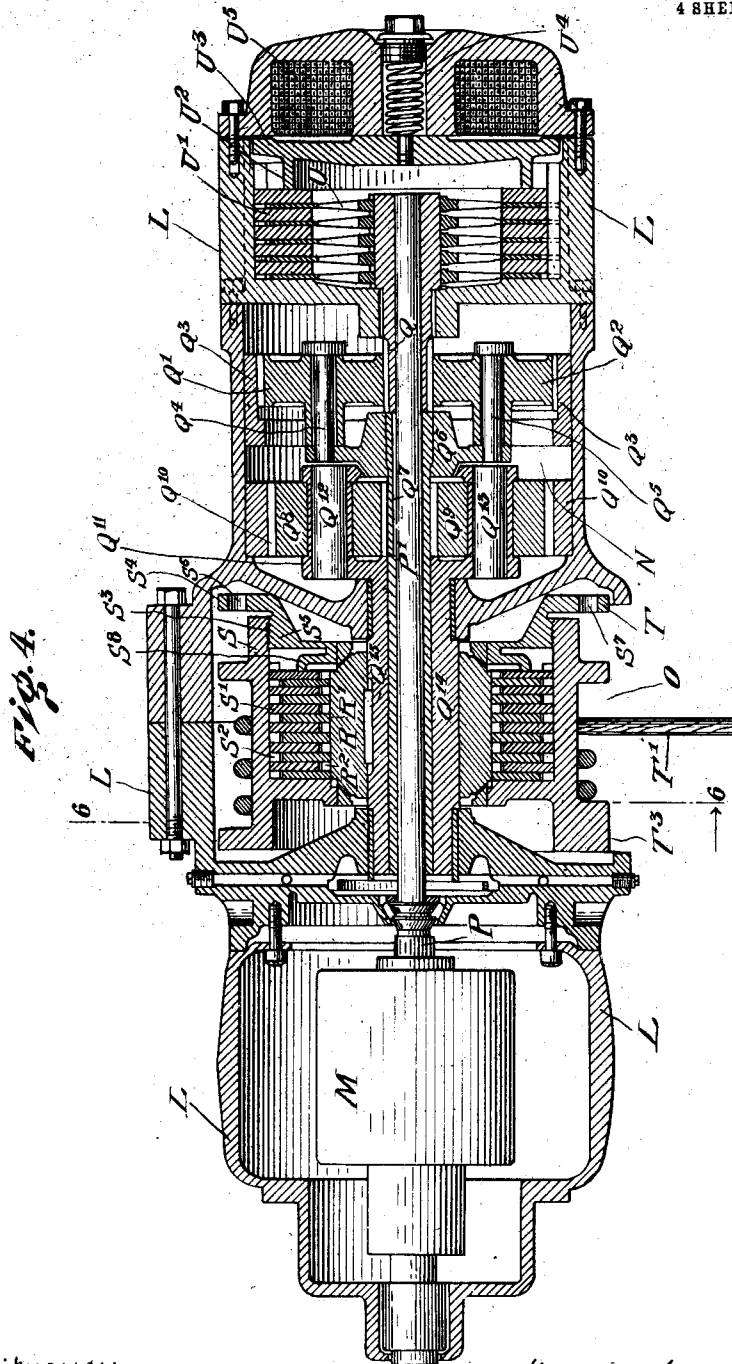
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4 SHEETS—SHEET 2.



Witnesses:
C. S. Ashler
G. B. Cope

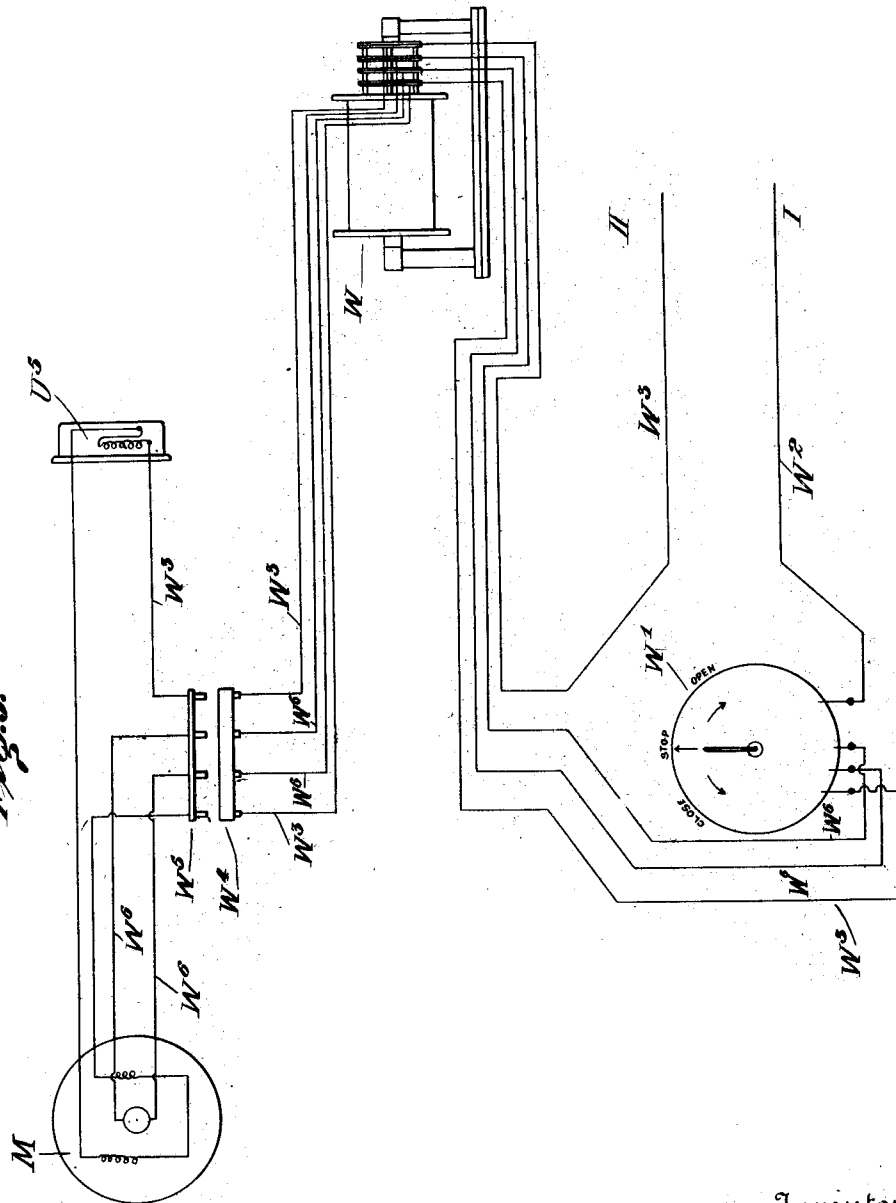
Inventor
Herbert S. Atkinson
By his Attorneys
Macdonald & Macdonald

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4 SHEETS--SHEET 3.

Fig. 5.



Witnesses:

Witnesses:
C. S. Ashley
A. E. Cyle

Inventor

Robert S. Atkinson

By his Attorneys

By His Attorneys
Macdonald & Macdonald

H. S. ATKINSON.

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4 SHEETS—SHEET 4.

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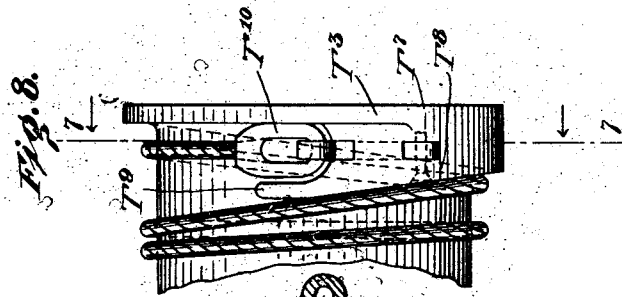


Fig. 7.

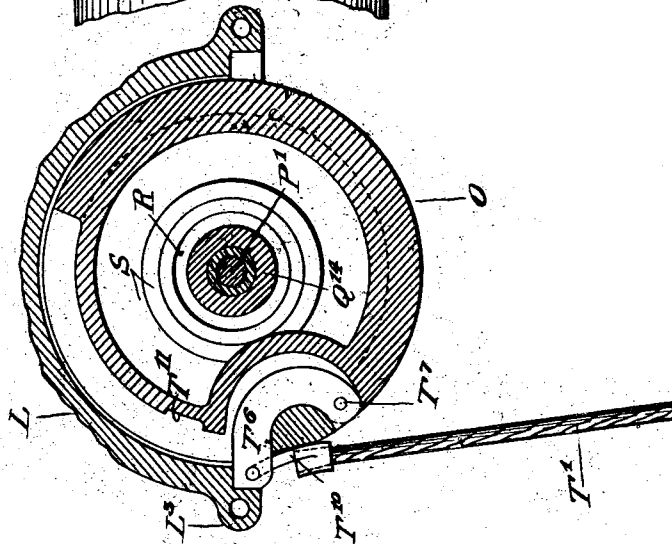
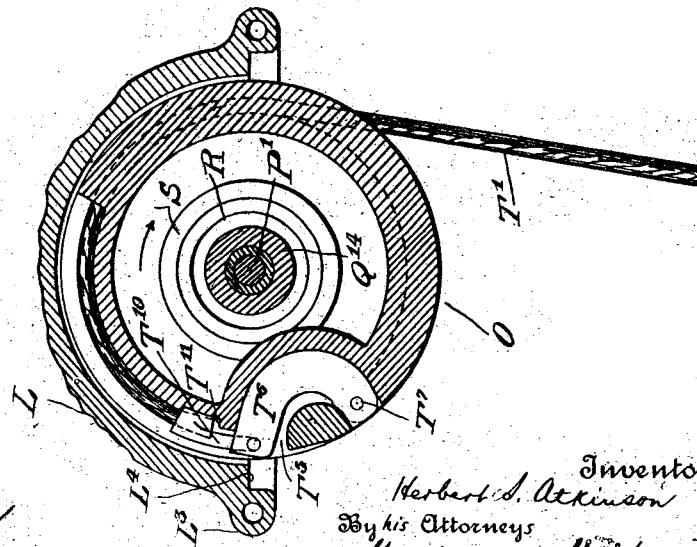


Fig. 6.



Witnesses:
W. S. Ashley
W. E. Coyne

Inventor
Herbert S. Atkinson
By his Attorneys
Macdonald & Macdonald

UNITED STATES PATENT OFFICE.

HERBERT S. ATKINSON, OF EAST ORANGE, NEW JERSEY, ASSIGNOR TO THE HAYWARD COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

BUCKET.

1,056,248.

Specification of Letters Patent.

Patented Mar. 18, 1913.

Application filed December 6, 1912. Serial No. 735,183.

To all whom it may concern:

Be it known that I, HERBERT S. ATKINSON, a citizen of the United States, and a resident of East Orange, in the county of Essex and State of New Jersey, have invented certain new and useful Improvements in Buckets, of which the following is a full, clear, and exact specification, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to hoisting buckets, and particularly that class known as the clam shell.

The object of my present invention is to provide a thoroughly practical bucket, the opening and closing mechanism of which is operated by electricity, through the medium of an electric motor and associated mechanism suspended from the bucket head.

I am aware that others have produced buckets, the opening and closing mechanism of which has been operated through one or more motors on the bucket, but so far as I am aware, all of such buckets have embodied the principle of positively gearing the bowl sections to the driving motor or motors and they have not gone into general use on account of numerous objectionable features, among which may be mentioned the ease with which such gearing takes up gritty matter from the material handled, the tendency of which is to interrupt the operation of the bucket, if not to destroy its working parts.

One of the salient features of my electrically operated bucket is that the motor is not positively geared to the bucket sections, there being provided a flexible means of opening and closing the bucket sections, the gearing between the motor and said flexible means being so incased as to eliminate practically all possibility of the parts coming in contact with dirt, grit or other hard material to injure the same.

Another object of my invention is to provide an electrically operated bucket which may be operated from a distant point, without the use, on the bucket, of circuit breakers, or fuses to be blown, to open the electrical circuit when the bowl sections encounter an insurmountable obstruction to their closing, the absence of which features in my

bucket makes it a much more practical and operative apparatus than buckets otherwise constructed, since it is extremely important that the electrical circuit should not be broken whenever the maximum closing power of the motor is reached. By the use of my apparatus, in such event, the operation of the motor is not interrupted.

A further object of my invention is to provide means on this bucket, whereby the bowl sections are automatically brought to rest when they have reached the fully opened position, without the employment of positive stops for that purpose on the bowl sections, which stops, in this type of bucket, would be objectionable, as will be hereinafter explained, and this operation is effected without the necessity of, at the same time, stopping the operation of the motor.

Other objects, such as economy in construction and operation, as well as simplicity of parts, will be readily apparent from the following description, in connection with the accompanying drawings, in which,

Figure 1 is a side elevation of a bucket embodying my invention; Fig. 2 is an end elevation; Fig. 3 is a detail, broken away; Fig. 4 is a longitudinal vertical section on line 4—4 of Fig. 1; Fig. 5 is a diagrammatic illustration of the electric circuit and the use of the bucket in connection with an electric controller and a novel form of take-up device interposed between the controller and the bucket; Figs. 6 and 7 are detail vertical sections on line 6—6 of Fig. 4 from the rear of the apparatus, shown in Fig. 4, and on line 7—7 of Fig. 8; Fig. 8 is a detail elevation of parts shown in Figs. 6 and 7.

The specific form of take-up device, diagrammatically illustrated in Fig. 5, forms the subject of a separate application, Serial No. 744,088, filed by Herbert S. Atkinson and Herman J. Brendlin, January 25, 1913, the use of which device, however, it will be understood, may be dispensed with in situations where there is no great rise and fall of the bucket in its operation.

Referring to the construction illustrated, and with particular reference to Figs. 1 and 2, A represents the supporting head of the bucket, comprising a body portion A' from which projects upwardly a clevis A'', and

downwardly two supporting lugs A^1 . The body portion A' is apertured to carry a supporting bolt A^2 , upon which, at each end thereof, are pivotally mounted the upper ends of a plurality of links B^1, B^2, B^3, B^4 , which links are, at their lower ends, pivotally connected to the outer edges of a plurality of bowl sections, indicated at C^1, C^2 .

Each of the bowl sections C^1, C^2 is provided with a pair of side arms D, D', E, E' , which side arms, at their upper ends, are pivotally connected to a weighted member F , which at its upper portion is longitudinally bored to receive a pin F' , which acts, not only to hold the side arms E, E', D, D' , to the weighted member F , but also acts as a support for the roller G mounted on said weighted member F . The weighted member F is also provided, at each side thereof, with a pair of upward projections H, H' , each pair of which carries rollers I, I' , to assist in keeping the weighted member F in a substantially horizontal position.

The depending lugs A^2, A^3 of the supporting head A are apertured to receive, at each side of said supporting head, holding bolts J, J' , which bolts likewise pass through holding lugs K formed integral with a casing L , adapted to inclose and support the bowl-operating mechanism to be now described. Said operating mechanism is more clearly illustrated in Fig. 4, and may be referred to in general, as comprising, at the left hand end of the figure, a motor M , at the right hand end thereof, the gearing actuated by said motor indicated at N , and a winding and lifting member, intermediate thereof, indicated in whole at O .

The motor M may be of any well known type, the armature shaft of which, indicated at P , is coupled to and transmits motion to an operating shaft P' , which, in turn transmits motion to the winding and lifting member O through a system of planetary gearing indicated at N , which, as here illustrated, comprises the pinion Q fast to the shaft P' , through which motion is transmitted to the planetary gears Q^1, Q^2 , meshing with the internal gear Q^3 , which gears Q^1, Q^2 through the pins Q^4, Q^5 , transmit motion to the gear cage Q^6 , keyed to which is the pinion Q^7 which, meshing with the planetary gears Q^8, Q^9 , traveling on the internal gear Q^{10} , transmits motion to the gear cage Q^{11} , through the pins Q^{12}, Q^{13} . As will be seen, the winding and lifting member O receives motion through the rotary movement of the gear cage Q^{11} , to which it is secured by means of the sleeve Q^{14} fast to the gear cage Q^{11} and keyed to said member O at Q^{15} .

The winding and lifting member O comprises an inner annular body R and an outer annular body S , and a flanged and threaded annular adjusting member T . The inner body R carries, at its outer periphery, a se-

ries of annular friction plates or disks R' feathered to said inner body at R^2 . The outer body S is provided at its inner surface with a series of annular friction plates or disks S' feathered to said outer body at S^2 . At one side, the inner surface of the outer body S is threaded, at S^3 .

The adjusting member T is annular in form, and is provided with a plurality of right angled flanges S^4, S^5 , the latter of which is exteriorly threaded to engage the threads S^3 of the outer body S , and the former of which is bored, near its outer periphery, as at S^6, S^7 , to receive and to be adjusted by—either tightened or loosened—a proper tool such as a spanner wrench. The inner portion of said adjusting member T is formed with an inwardly and upwardly projecting spring flange S^8 , which is annular in shape, the inner face of which is adapted to bear against and press together the series of friction disks R', S' .

It will be observed that there is here provided, a winding and lifting member, comprising two main parts, which, due to the friction of the disks R', S' , when pressure is exerted thereon by the adjusting member T , will rotate as one, but when the force opposing rotation is sufficient therefor, only one of said parts will rotate, that is to say, the inner member R .

A flexible connection is provided between the weighted member F and the outer body S of the winding and lifting member O , which, in this instance, is shown as comprising a rope T' (but it is to be understood that a chain, preferably one having a flat link, may be used as well). The manner and form of the connection of the rope T' with the outer body S of the winding and lifting member O , as well as the utility of this connection, when associated with the friction disks heretofore described, will require some little description.

Referring to Figs. 6, 7 and 8, L indicates the casing which partly encircles the winding and lifting member O which casing is shown in this figure with a portion of the exterior broken away. It will be seen that on each side, and at the lower portion, of the casing L , there is a bulge or offset indicated at L^1 , and on the inner surface thereof, a shoulder L^2 is formed, the purpose of which will be hereinafter referred to.

The connection of the rope T' with the outer body S of the winding and lifting member O will now be described. Adjacent the flange T^2 , the outer surface of said body S is formed with a curved recess or channel T^3 , within which rests a curved link T^4 , which at one end is pivotally secured, by means of the screw T^5 to an offset T^6 on the flange T^2 , which offset is continued upwardly to form a tongue T^7 to act as a deflector or guide for the rope T' . The oppo-

site end of the link T^a is pivotally secured to the rope T' by means of the socket T^{10} . It will be observed that the upper end of the link T^a is considerably smaller than the upper portion of the recess T^a (see Fig. 6) so as to permit of some play of said link, within said recess, upon the pivotal point T^7 . The socket T^{10} is curved to conform to the curved surface of the outer body S of the winding and lifting member O , which body is, at this point, formed with a small recess T^{11} to permit said socket to lie close to the surface of the outer body S adjacent the flange T^a .

When the bucket is in closed position, the rope T' will have one or two passes around the outer body S of the winding and lifting member O , thence the rope passes from said outer body S around the roller G , being secured at its farther or outer end to a relatively stationary part of the bucket, as indicated at T^{12} (see Figs. 1 and 2).

With the parts in the position indicated in Fig. 6, the rope T' may be unwound from the winding and lifting member O , in the direction of the arrow, in which action, the tension of the rope T' will be such as to draw the socket T^{10} toward the outer periphery of said body, and the tendency to occupy this position will continue as long as there is a continuous wrap of the rope T' around said body, but when the last wrap has been unwound, and the bucket has reached its fully opened position, as shown in dotted lines in Fig. 1, the pull of the rope T' will act to draw the link T^a away from the periphery of the outer body, compelling the same to occupy a position as indicated in Fig. 7, in which position, the free end of the link T^a , on the further rotation of the outer body S , will contact with the shoulder L^4 on the casing L , the result of which will be to arrest the travel of said link, and, therewith, arrest the rotary travel of the outer body S , without, however, arresting thereby the rotary travel of the inner body R of the winding and lifting member O or interrupting its operation or the operation of the motor and the intermediate gear, this being permitted by reason of the slip friction device connecting the inner body R and the outer body S .

By this arrangement I avoid the use of stops on the bowl sections such as are commonly employed in types of clam shell buckets otherwise operated, such for example, as illustrated in the drawing of the application for patent, Serial No. 681,197, filed March 2, 1912, by John H. Hayward and Herbert S. Atkinson. Were I to employ a positive stop on the bowl sections, such as there illustrated, complications would result, due to the fact that if the movement of the motor were not arrested at just the right time, and it was permitted to run too far,

considerable slack would result in the rope T' , with resultant tangling thereof which would cause interruption and delay in the operation of the apparatus. By the employment of this feature of the invention, I not only dispense with positively acting stops on the bowl sections, but I am not required to rely upon any particular alertness on the part of the operator in the opening of the bowl sections, since if the operator holds the current on too long, the unwinding operation stops automatically and the rope is always in proper position and in no danger of tangling.

My invention involves the use in connection with the apparatus above described of one of the well known forms of magnetic brake, one of which forms is illustrated in Fig. 4, comprising a series of friction disks U rotatably mounted in the casing L and carried by the shaft P' , and a series of friction disks U' , non-rotatably mounted in said casing and secured thereto, said disks being adapted to be compressed by the annular face plates U^2 of the magnet armature U^3 , normally held under pressure against said disks by the spring U^4 , and released from such pressure by means of the electromagnet U^5 .

No invention is claimed herein in the above mentioned brake *per se*—as it is a well known form of brake in general commercial use—but only in so far as it forms a necessary part of the combination of elements. I do claim, however, as essentially novel, the winding and lifting member hereinbefore described, both separately and in combination with the respective elements whose functions and use it affects and modifies.

The wiring circuit of the apparatus above described is illustrated diagrammatically in Fig. 5, wherein M indicates the motor end of the actuating mechanism, U^5 the magnetic brake and W the take-up device hereinbefore referred to for automatically taking up slack in the wires when the bucket is hoisted and for paying out the same when the bucket is lowered. W' indicates an electrical controller for closing and opening an electrical circuit, comprising the line wire W^2 leading to the controller, W^3 a wire leading from the controller, thence to the take-up device W , thence to a terminal plug indicated at W^4 , thence through a terminal board indicated at W^5 , thence through the field of the motor M , thence through the electromagnet U^5 , thence through the terminal board W^5 , plug W^4 , the take-up device W , thence to the generator; the conductor W^6 passes from the controller W' to and through the take-up device, thence through the terminal plug and terminal board mentioned, to the armature winding of the motor, thence back to the terminal

board, plug, and take-up device to the controller W'.

The operation of the entire apparatus is as follows: Assuming that the bucket is ready for its load, and the bowl sections, open, as shown in dotted lines in Fig. 1, and the spring U^a of the magnetic brake operating to press the magnet armature U^a forward, and press the friction plates U, U', together, the operator simply turns on the current from the controller W', thereby energizing the coils of the magnet U^a, the armature of which magnet is thereby drawn back against the action of the spring U^a to release the friction plates U, U', and actuating the motor M, and its associated gearing, in one direction, thereby rotating the winding and lifting member O, to raise the weighted member F, and bringing said member and the head of the bucket toward each other to close the bowl sections C', C². As soon as the bowl sections have been closed, the electrical circuit is opened by the operator by means of the controller W', thus at the same moment deenergizing the magnet U^a and releasing the spring pressure of the armature U^a and compressing the friction plates U, U', to hold the bowl sections in closed position. It will be understood that the winding and lifting member O will be preliminarily adjusted by means of the tightening member T so that the friction disks R', S', will resist all desired and proper amount of rotative force to be opposed thereto, and this adjustment may be made in view of the character of material to be handled or to suit special conditions in the nature of the operation. In case the bucket is handling a soft molding sand in a foundry, there will be less likelihood of an insurmountable obstruction being opposed to the closing of the bowl sections, but in case the bucket is used for unloading a mass of large sized coal, the bucket would frequently encounter, in its loading operation, masses of coal upon which it would be impossible to close its jaws, and unless the motor were instantly relieved, it would interrupt the operation of the same, if not seriously injure or destroy it. In the operation of my bucket, in such a case, the relief of the motor is automatic, the adjusting member T being in advance, set to impart the required degree of friction to the friction disks R', S' of the winding and lifting member O, for all ordinary work required of the bucket and its motor, and, in the contingency just referred to, should the maximum power of the motor be overcome by the force opposed thereto, the inner body R of the winding and lifting member O will continue to be rotated by the motor M, with no lifting effect upon the outer body S of said member, it being simply necessary then to slightly raise the bucket, whereupon the

resistance being lessened, the bucket will close. It will be observed that this frictional engagement of two bodies normally moving as one is applied at a point where the rotating member is comparatively slow in its movement, the point of application being of great importance, since it is obvious that to apply a slip friction device upon a rapidly moving part, as for example, the motor shaft, which is traveling at the rate of say one thousand revolutions per minute, would be utterly inoperative in an apparatus of this character, while to apply it to a slowly moving part, as for example, the winding and lifting member, traveling at say eight revolutions per minute, is entirely practicable. Thus it will be seen that all of the operating parts of the bucket respond instantly to the action of the operator, and are, at all times, under his immediate control, without involving the employment of such objectionable features as circuit breakers, or the blowing of fuses, and the like, to avoid injury to the motor in such emergencies as that above stated, the employment of which features, as I have hereinabove indicated, would be a source of interruption and delay in the operation of the bucket.

When the bucket has taken its load, and is ready for the opening movement and depositing said load, the operator closes the circuit by moving the controller to the reverse position, energizing the magnet coil U^a, releasing the brake, and operating the motor in the reverse direction, thereby actuating the gearing and the winding and lifting member O, in the reverse order, to unwind the flexible means T' and lower the weighted member F and open the bowl sections, which, when they have opened sufficiently, are held in that position by opening the circuit, and thus permitting the automatic actuation of the magnetic brake.

I have already pointed out that on the opening movement of the bucket, if the operator does not open the circuit to stop the motor at just the proper time, the unwinding operation ceases, due to the positive stop on the casing L, the motor, however, being free to rotate. The same may be said of the operation of the bucket and its motor in closing, the motor being free to rotate after the bucket is fully closed, or at any intermediate stage between open and closed position in case an excessive obstruction is opposed to the closing movement.

It will be evident that I have provided an electrically operated bucket, the operating parts of which are so flexible in their connections and so constantly under the immediate control of the operator that it can be opened and closed, and held and locked in open or closed position, or in any intermediate stage of the open or closed position.

to such a fractional nicety that the operation results in greater expedition of loading and unloading, and yet, as it does not depend upon any particular skill or watchfulness on the part of the operator, it completely avoids the delays and interruptions so frequently resulting from injury to the motor and other parts, as in the case of electrically operated buckets heretofore constructed.

I desire it to be understood that I do not limit myself to the precise details of construction and arrangement of the invention herein set forth, as modifications and variations may be made without departing from the spirit of the invention as defined by the appended claims.

What I claim is:

1. In a bucket, the combination of a supporting head, links pivotally connected to said head, a plurality of bowl sections pivotally connected to said links, a weighted member having pivotal connection with said bowl sections, a winding and lifting member supported by said head, flexible means connected to said winding and lifting member and to said weighted member whereby the latter is raised and lowered, an electric motor, gearing connected to said motor and to said winding and lifting member to actuate the latter at a slower speed than that of said motor, and frictional means interposed between said gearing and said flexible means whereby a predetermined load only may be carried by said winding and lifting member.

2. In a bucket, the combination of a supporting head, links pivotally connected to said head, a plurality of bowl sections pivotally connected to said links, a weighted member having pivotal connection with said bowl sections, a winding and lifting member supported by said head, flexible means connected to said winding and lifting member and to said weighted member whereby the latter is raised and lowered, an electric motor, gearing connected to said motor and to said winding and lifting member to actuate the latter at a slower speed than that of said motor, frictional means interposed between said gearing and said flexible means whereby a predetermined load only may be carried by said winding and lifting member and means for varying the friction exerted by said frictional means.

3. In a bucket, the combination of a supporting head, a winding and lifting member supported by said head, an electric motor, gearing connecting said motor and said winding and lifting member, a plurality of bowl sections, links pivotally connected to said head and to said bowl sections, a weighted member pivotally connected to said bowl sections, flexible means connected to said winding and lifting member and to said weighted member to lift and lower the latter and thereby close and open the bowl sections

and a brake member for holding the bowl sections in any desired open or closed position.

4. In a bucket, the combination of a supporting head, a winding and lifting member supported by said head, an electric motor, gearing connecting said motor and said winding and lifting member, a plurality of bowl sections, links pivotally connected to said head and to said bowl sections, a weighted member pivotally connected to said bowl sections, flexible means connected to said winding and lifting member and to said weighted member and cooperating therewith to close and open the bowl sections, means whereby the winding and lifting operation of said winding and lifting member may be interrupted without interrupting the operation of said motor, and a brake member for holding the bowl sections in any desired open or closed position.

5. In a bucket, the combination of a supporting head, a winding and lifting member supported by said head, an electric motor, gearing connecting said motor and said winding and lifting member, a plurality of bowl sections, links pivotally connected to said head and to said bowl sections, a weighted member pivotally connected to said bowl sections, flexible means connected to said winding and lifting member and to said weighted member and cooperating therewith to close and open the bowl sections, means whereby the winding and lifting operation of said winding and lifting member may be interrupted without interrupting the operation of said motor, and an automatic brake member in circuit with said motor for holding the bowl sections in any desired open or closed position.

6. In a bucket, the combination of a supporting head, a winding and lifting member supported by said head, an electric motor, gearing connecting said motor and said winding and lifting member, a plurality of bowl sections, links pivotally connected to said head and to said bowl sections, a weighted member pivotally connected to said bowl sections, flexible means connected to said winding and lifting member and to said weighted member and cooperating therewith to close and open the bowl sections, means whereby the winding and lifting operation of said winding and lifting member may be interrupted without interrupting the operation of said motor, and a brake member, electro-magnetically controlled, in circuit with said motor, for automatically holding the bowl sections in any desired open or closed position when the circuit is opened.

7. In a bucket, the combination of a supporting head, a plurality of bowl sections, links pivotally connecting said head and said bowl sections, a weighted member piv-

totally connected to said bowl sections, a winding and lifting member supported by said head, reducing gear connected thereto for operating the same, an electric motor on said head for actuating said gear, flexible means cooperating with said weighted member and with said winding and lifting member to raise and lower said weighted member and thereby close and open the bowl sections, frictional means having operative connection with said reducing gear and with said winding and lifting member for limiting the load carried by said last named member and a brake member for holding the bowl sections in any desired open or closed position.

8. In a bucket, the combination of a supporting head, a plurality of bowl sections, links pivotally connecting said head and said bowl sections, a weighted member pivotally connected to said bowl sections, a winding and lifting member supported by said head, reducing gear connected thereto for operating the same, an electric motor on said head for actuating said gear, flexible means cooperating with said weighted member and with said winding and lifting member to raise and lower said weighted member and thereby close and open the bowl sections, frictional means having operative connection with said reducing gear and with said winding and lifting member for limiting the load carried by said last named member and an automatic brake member in circuit with said motor for holding the bowl sections in any desired open or closed position.

9. In a bucket, the combination of a supporting head, a plurality of bowl sections, links pivotally connecting said head and said bowl sections, a weighted member pivotally connected to said bowl sections, a winding and lifting member supported by said head, reducing gear connected thereto for operating the same, an electric motor on said head for actuating said gear, flexible means cooperating with said weighted member and with said winding and lifting member to raise and lower said weighted member and thereby close and open the bowl sections, frictional means having operative connection with said reducing gear and with said winding and lifting member for limiting the load carried by said last named member, and a brake member, electromagnetically controlled, in circuit with said motor, for automatically holding the bowl sections in any desired open or closed position when the circuit is opened.

10. In a bucket, the combination of a supporting head, links pivotally connected to said head, a plurality of bowl sections pivotally connected to said links, side arms on said bowl sections, a weighted member pivotally connected to said side arms, a winding

and lifting member supported by said head, flexible means connecting said last named members to raise and lower said weighted member and close and open the bowl sections, speed reducing mechanism operatively connected to said winding and lifting member for actuating the latter, an electric motor on said head for actuating said mechanism, and a slip friction device driven by said reducing mechanism and acting on said winding and lifting member to limit the load placed on said winding and lifting member.

11. In a bucket, the combination of a supporting head, links pivotally connected to said head, a plurality of bowl sections pivotally connected to said links, side arms on said bowl sections, a weighted member pivotally connected to said side arms, a winding and lifting member supported by said head, flexible means connecting said last named members to raise and lower said weighted member and close and open the bowl sections, speed reducing mechanism operatively connected to said winding and lifting member for actuating the latter, an electric motor on said head for actuating said mechanism, a slip friction device driven by said reducing mechanism and acting on said winding and lifting member to limit the load placed on said winding and lifting member and means for varying the degree of friction exerted by said friction device.

12. In a bucket, the combination of a supporting head, a plurality of bowl sections pivotally connected to said head, an electric motor on said head, a friction-held winding and lifting member actuated by said motor to open and close the bowl sections and a stop for said member to interrupt the operating movement of the bowl sections without interrupting the operation of said motor.

13. In a bucket, the combination of a supporting head, a plurality of bowl sections pivotally connected to said head, an electric motor on said head, a friction-held winding and lifting member actuated by said motor having flexible connection with the bowl sections to open and close the latter and a stop for said member for automatically interrupting the opening movement of the bowl sections without interrupting the operation of said motor.

14. In a bucket, the combination of a supporting head, a plurality of bowl sections pivotally connected to said head, a weighted member pivotally connected to said bowl sections, an electric motor on said head, a friction-held winding and lifting member actuated by said motor, flexible means connecting said winding and lifting member and said weighted member, and means for interrupting the winding and lifting operation of said winding and lifting member and thereby interrupting the operating move-

ments of the bowl sections without, however, interrupting the operation of said motor.

15. In a bucket, the combination of a supporting head, a plurality of bowl sections having pivotal connection with said head, a motor on said head, speed reducing driving mechanism connected thereto and operated thereby, and a winding and lifting member for opening and closing said bowl sections, said winding and lifting member comprising a part positively geared to said mechanism, a part having flexible connection with said bowl sections, and friction means on said parts whereby they normally rotate in unison.

16. In a bucket, the combination of a supporting head, a plurality of bowl sections having pivotal connection with said head, an electric motor on said head, a composite winding and lifting member having operative connection with said bowl sections and with said motor, frictional means on portions of said member whereby said member is normally actuated in whole by said motor to open and close the bowl sections, and a stop for said member whereby the movement of the bowl sections is interrupted without interrupting the operation of the motor.

17. In a bucket, the combination of a supporting head, a plurality of bowl sections, a plurality of links pivotally connecting said head and said bowl sections, a composite friction-held winding and lifting member, an electric motor on said head, mechanism connected thereto and to said winding and lifting member for driving the latter, flexible means connected to said winding and lifting member and to said bowl sections to open and close said sections, a stop on a relatively stationary part of said bucket, and a stop on said flexible means, whereby the rotation of one part of said winding and lifting member may be interrupted without interrupting the operation of said motor.

18. In a bucket, the combination of a supporting head, a plurality of bowl sections supported thereby, an electric motor, speed-reducing mechanism connected to said motor, and friction-held means actuated by said reducing mechanism, having flexible connection with said bowl sections for operating the latter.

19. In a bucket, the combination of a supporting head, a plurality of bowl sections supported thereby, an electric motor, speed-reducing mechanism connected to said motor, friction-held means actuated by said reducing mechanism having flexible connection with said bowl sections, for operating the latter, and means for varying the friction holding said friction-held means.

20. In a bucket, the combination of a supporting head, a plurality of bowl sections

supported thereby, an electric motor, speed-reducing mechanism connected to said motor, friction-held means actuated by said reducing mechanism having operative connection with said bowl sections, for operating the latter, said means including a series of friction members positively driven by said reducing mechanism and a series of friction members frictionally driven by the first named members.

21. In a bucket, the combination of a supporting head, a plurality of bowl sections supported thereby, an electric motor, speed-reducing mechanism connected to said motor, friction held means actuated by said reducing mechanism having operative connection with said bowl sections, for operating the latter, said means including a series of friction members positively driven by said reducing mechanism and a series of friction members frictionally driven by the first named members, and means for increasing or decreasing the friction between said friction members.

22. In a bucket, the combination of a supporting head, a plurality of bowl sections supported thereby, an electric motor, speed-reducing mechanism connected to said motor, friction-held means actuated by said reducing mechanism having operative connection with said bowl sections, for operating the latter, said means including a series of friction members positively driven by said reducing mechanism and a second series of friction members, adapted to contact with the first named members, and means for holding said friction members in frictional contact.

23. In a bucket, the combination of a supporting head, a plurality of bowl sections supported thereby, an electric motor, speed-reducing mechanism connected to said motor, friction-held means actuated by said reducing mechanism having operative connection with said bowl sections, for operating the latter, said means including a series of friction members positively driven by said reducing mechanism, a second series of friction members adapted to contact with the first named members, and a yielding adjustable member for holding said friction members in frictional contact.

24. In a bucket, the combination of a supporting head, a winding and lifting member supported by said head, an electric motor, speed reducing gear connecting said motor and said winding and lifting member, a plurality of bowl sections, links pivotally connected to said head and to said bowl sections, a weighted member pivotally connected to said bowl sections, flexible means connected to said winding and lifting member and to said weighted member and cooperating therewith to close and open the bowl sections, and frictional means con-

nected to said winding and lifting member and driven by said speed reducing gear whereby the winding and lifting operation of said member may be interrupted without interrupting the operation of said motor.

25. In a bucket, the combination of a supporting head, a plurality of bowl sections, links pivotally connecting said head and said bowl sections, a weighted member pivotally connected to said bowl sections, a winding and lifting member supported by said head, speed reducing gear connected thereto for operating the same, an electric motor on said head for actuating said gear, flexible means coöperating with said weighted member and with said winding and lifting member to raise and lower said weighted member and thereby close and open the bowl sections, and frictional means having operative connection with, and driven by, said reducing gear and connected to said winding and lifting member for limiting the load carried by said last named member.

26. In a bucket, the combination of a supporting head, a plurality of bowl sections, links pivotally connecting said head and said bowl sections, a weighted member pivotally connected to said bowl sections, a winding and lifting member supported by said head, speed reducing gear connected thereto for operating the same, an electric motor on said head for actuating said gear, flexible means coöperating with said weighted member and with said winding and lifting member to raise and lower said

weighted member and thereby close and open the bowl sections, frictional means having operative connection with, and driven by, said reducing gear and connected to said winding and lifting member for limiting the load carried by said last named member, and means for adjusting and varying the friction exerted by said frictional means.

27. In a bucket, the combination of a supporting head, a plurality of bowl sections having pivotal connection with said head, an electric motor, speed reducing gear driven thereby, a winding and lifting member supported by said head and actuated by said reducing gear and having flexible connection with said bowl sections to open and close the latter and friction means acting on said member driven by said reducing gear for interrupting its operation without interrupting the operation of said motor.

28. In a bucket, the combination of a supporting head, a plurality of bowl sections pivotally connected to said head, an electric motor on said head, speed reducing gear actuated thereby, a friction-held winding and lifting member actuated by said gear and flexibly connected to said bowl sections to open and close the latter, and means for increasing or decreasing the friction holding said winding and lifting member.

HERBERT S. ATKINSON.

Witnesses:

LAURA E. SMITH,
EUGENE S. MACDONALD.