

J. L. LATTA.

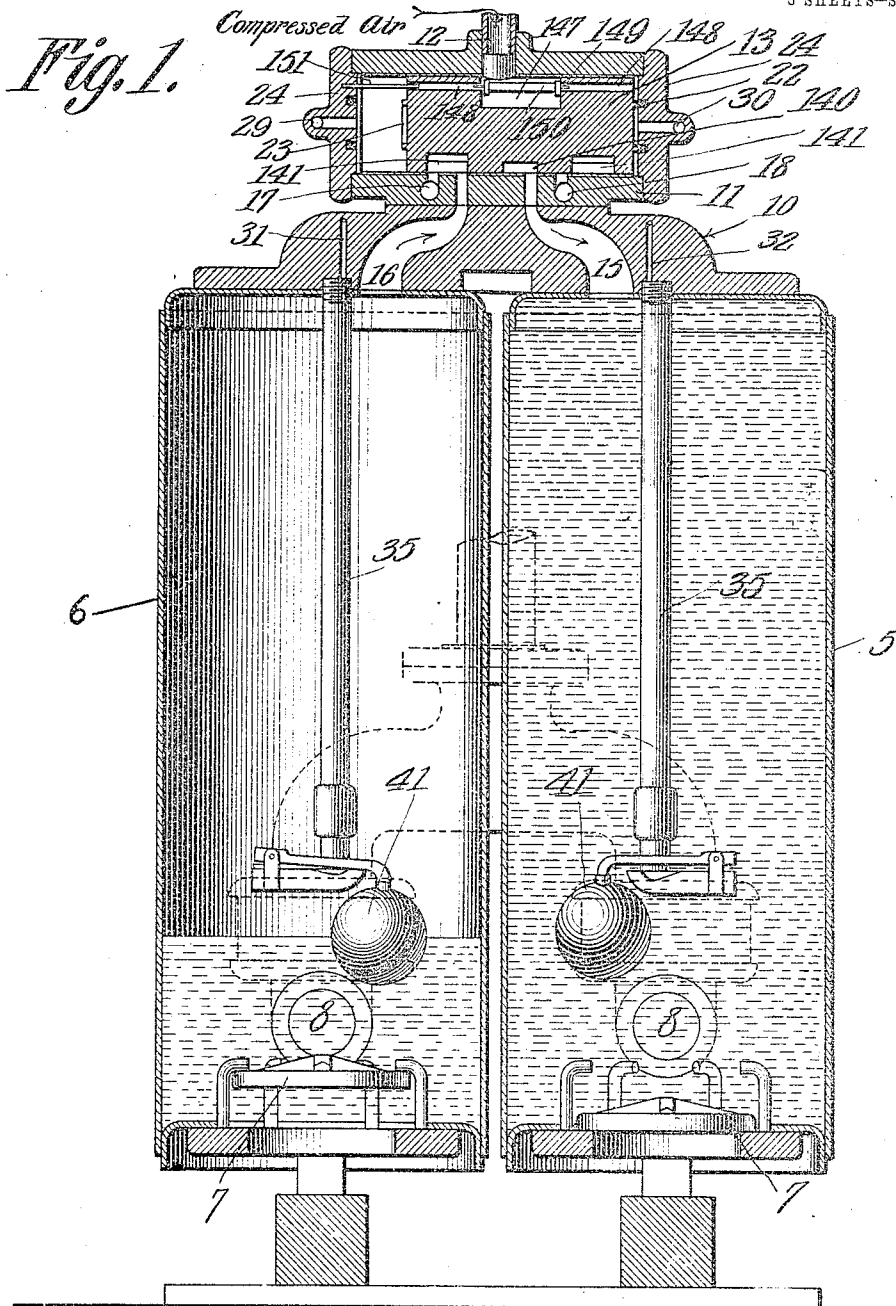
PUMP.

APPLICATION FILED DEC. 15, 1910.

Patented Aug. 8, 1911.

3 SHEETS—SHEET 1.

1,000,021.



Witnesses

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W. C. Collins

John L. Latta Inventor,
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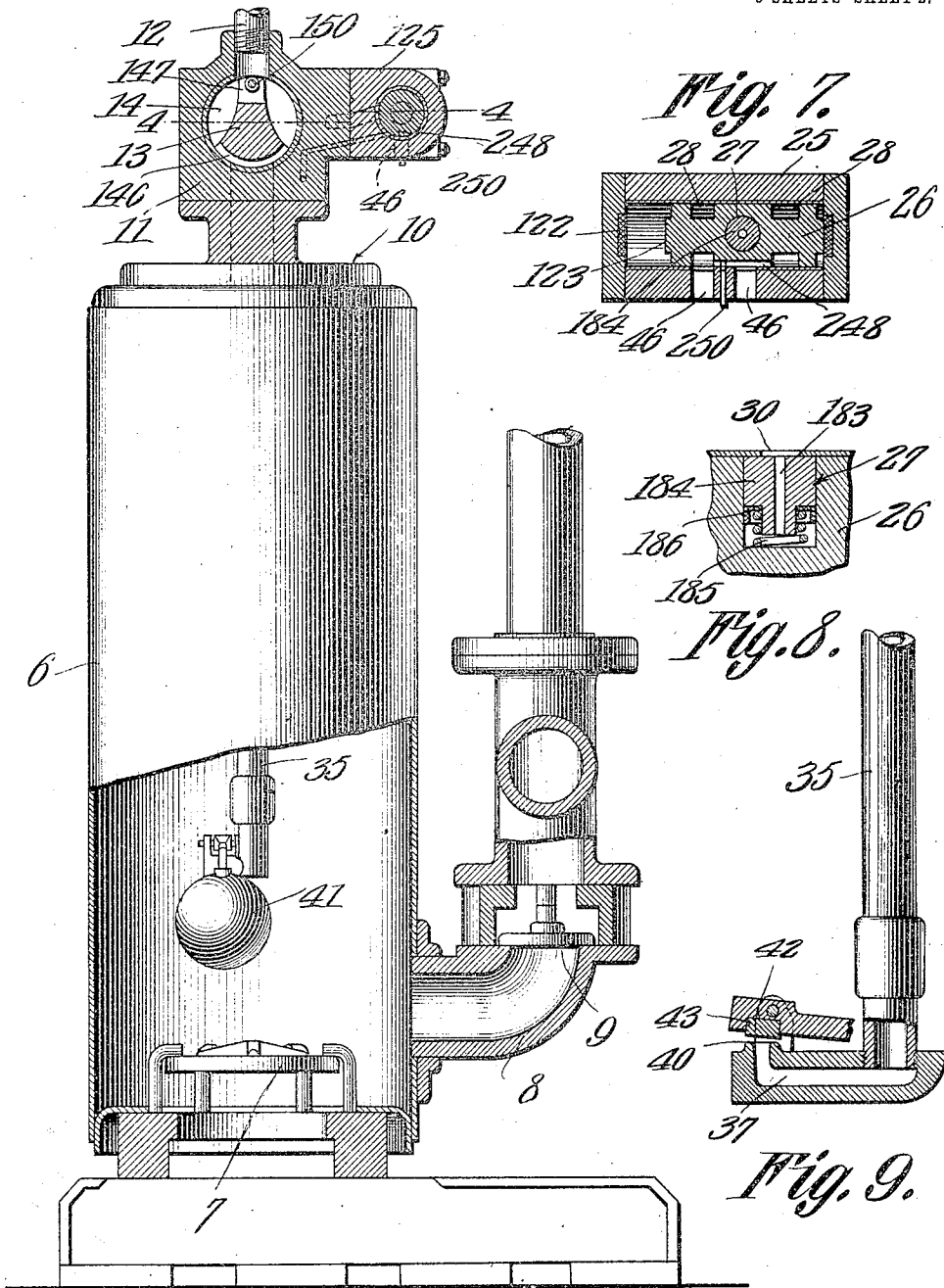
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3 SHEETS—SHEET 2.

1,000,021.



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1,000,021.

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3 SHEETS—SHEET 3.

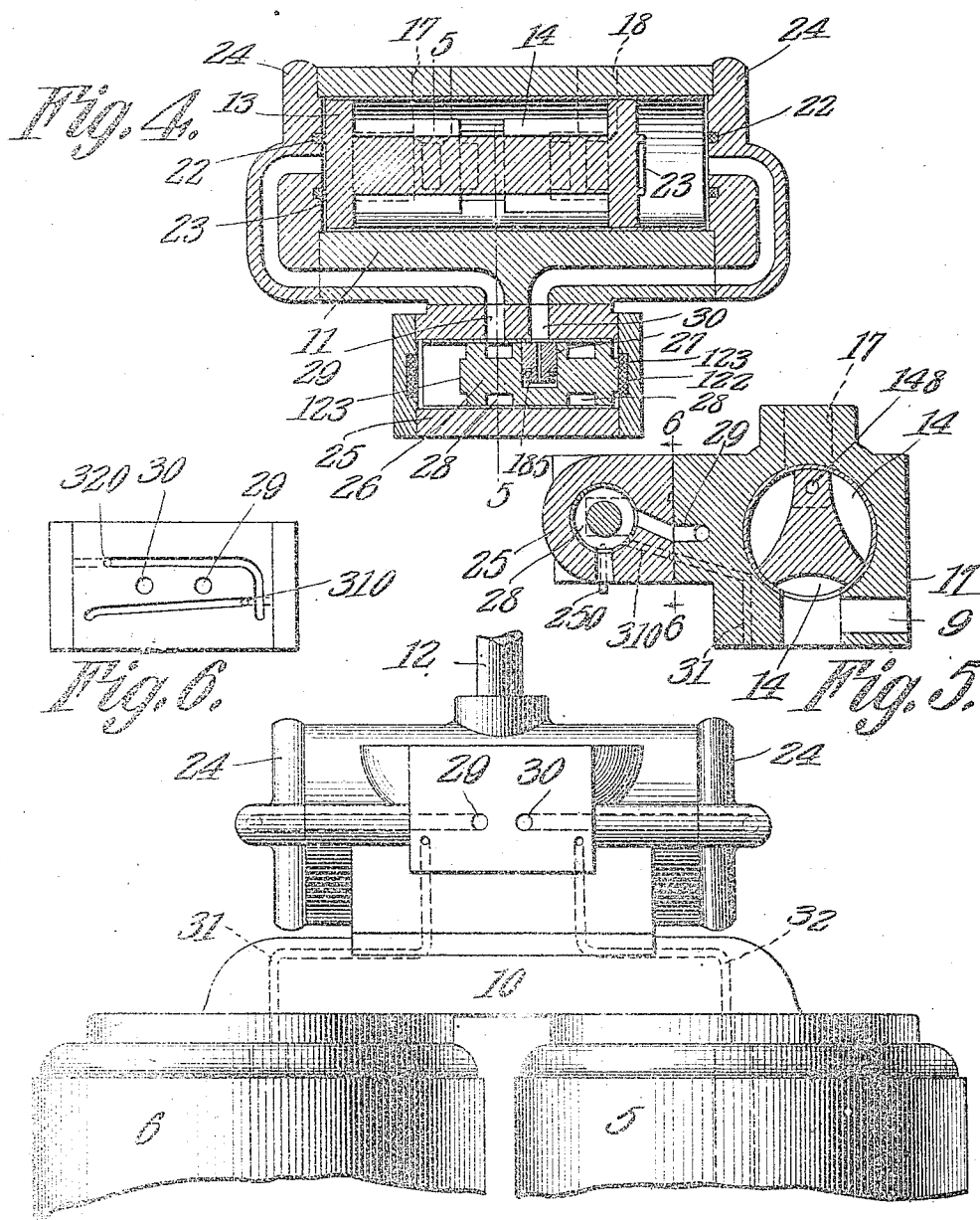


Fig. 3.
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UNITED STATES PATENT OFFICE.

JOHN LEE LATTA, OF HICKORY, NORTH CAROLINA.

PUMP.

1,000,021.

Specification of Letters Patent.

Patented Aug. 8, 1911.

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To all whom it may concern:

Be it known that I, JOHN L. LATTA, a citizen of the United States, residing at Hickory, in the county of Catawba and State of North Carolina, have invented a new and useful Pump, of which the following is a specification.

This invention relates to pumps, and more especially to those employing compressed air for elevating water or other liquid; and the object of the same is to produce certain improvements in my United States Patent No. 947,827 and issued February 1, 1910.

To this end the invention consists in the details of construction described and claimed herein which differ from those set forth in said patent, all as shown in the drawings wherein—

Figure 1 is a vertical sectional view of a compressed air water elevator of my improved construction. Fig. 2 is a vertical sectional view at right angles thereto, partly in section. Fig. 3 is an enlarged elevation of the upper portion of the pump with the casing of the auxiliary valve removed. Fig. 4 is a section on the line 4—4 of Fig. 2. Fig. 5 is a section on the line 5—5 of Fig. 4. Fig. 6 is an elevation of the inner wall of the auxiliary valve casing, viewed from the line 6—6 in Fig. 5. Fig. 7 is a central horizontal section through the auxiliary valve and its casing. Fig. 8 is a detail of the leather-capped valve therein. Fig. 9 is an enlarged sectional detail through one of the trip valves.

The pump, forming the subject matter of the present invention is designed more especially for use in connection with water pumping or elevating devices where compressed air is employed to alternately displace the water from a pair of tanks or cylinders, and in the drawings there is shown a pair of tanks 5 and 6 each provided with a water inlet valve 7 opening under the influence of gravity or external pressure and closing when the air is acting to force the water from the chamber. Each tank or cylinder is provided with a discharge pipe 8 having a check valve 9 disposed within the same. Closing the upper ends of the tanks

5 and 6 is a casting 10 having a valve casing or cylinder 11 secured thereon, and connected to a suitable source of compressed air supply through the medium of a pipe 12.

The main valve 13 is loosely mounted for sliding movement in the casing 11, and has its sides cut away into pockets 14 at about the center of its length, which pockets are connected by a passage 140 cut across the bottom of the valve and which in the reciprocation of the valve alternately registers with air inlet ports 15 and 16 leading to the adjacent water containing tanks and through which air is admitted to the interior of the tanks for the purpose of displacing the water therein and discharging the same through the pipes 8. Longitudinally beyond the inlet ports 15 and 16 are exhaust ports 17 and 18 through which the displaced air from the interior of the tanks is alternately exhausted in this operation, and in the bottom of the main valve near its ends are formed outlet pockets 141 as best seen in Fig. 5 which alternately connect said inlet ports 15 and 16 with the exhaust ports 17 and 18 bored into the bottom of the casing 11, so that the air from the interior of the tanks is alternately discharged or exhausted as the main valve 13 travels back and forth. The ends of the main valve 13 have projections 23 (preferably annular ribs) which bear against similarly shaped pieces of yieldable material 22 seated in recesses in the ends or heads 24 of the casing, whereby the strokes of the valve are cushioned.

In the upper side of the main valve at its center is formed an elongated pocket 147 as best seen in Fig. 1 (and which connects the side pockets 14 as best seen in Fig. 2) and from the ends of this elongated pocket holes 148 extend to and open out through the ends of the valve. The inner ends of these holes loosely receive stems 149 at the extremities of a spool valve 150 mounted loosely in the pocket 147 which we may therefore call the "spool pocket" and which is slightly longer than the spool valve so that the latter has a little lost motion longitudinally therein. One of said holes 148 may slide loosely over

a guide rod 151 carried by one of the heads 24 of the casing so as to prevent the valve 13 from rotating in its place.

The auxiliary valve reciprocates rather loosely in a casing 25 at one side of the main casing 11 as best seen in Figs. 2 and 5, and this auxiliary valve 26 is obviously for the purpose of controlling the position of the main valve, whereas the latter controls the inlet and exhaust of compressed air with which the pumping is done. The valve itself is provided near its ends with annular grooves 28 alternately registering with ports 29 and 30 which lead to opposite ends and through the heads 24 of the main valve casing (and within the ring of yieldable material 22 if employed), and midway between these grooves is a pocket 27 in which is mounted the leather-cup valve best seen in Fig. 8. This is in the shape of a plug 184 closely fitting said pocket and bored longitudinally with a fine hole 183 whose inner end is normally closed by a leather cup 186 held in place by a weak spiral spring 185 resting on the bottom of the pocket 27. The position of parts is such that the fine hole registers with the port 30 when the other port 29 registers with one of the grooves 28, and vice-versa, as seen in Fig. 4. The ends of the auxiliary valve may have projections 123 engaging yieldable material 122 in the heads of its casing, like the extremities of the main valve as above described; and through the valve casing (preferably through its bottom at the center thereof) extends a guide rod or pin 250 whose inner end engages a groove 248 in the bottom of the auxiliary valve to prevent the latter from rotating within its casing. At either side of said guide is an exhaust port 46 leading through the auxiliary valve casing to the outer air, and these exhaust ports are spaced so as to register with the grooves 28 alternately in communication with the exhaust ports 29 and 30 leading from the ends of the main valve casing.

Pivoted within each tank is a float 41 whose lever near its pivot has a recess 42 in which is fitted a vulcanite disk 43 adapted when the float rises to close against a seat 40 constituting what I term the "trip valve." When the float descends the packing disk 43 opens a port 37 which communicates with a pipe 35 that rises throughout the length of the tank and enters the casing 10. The latter is cored with fine passages 31 and 32 communicating with the pipes 35 and leading upward as best seen in Fig. 3, and these passages in turn communicate with similar passages 310 and 320 in the auxiliary valve casing (as best seen in Figs. 5 and 6) which latter cross each other and open into the interior thereof as shown.

In operation, compressed air enters the

pipe 12 in Fig. 1, passes around the main valve to the point 140, down through the port 15 to the right hand tank 5 which is then filled with water, and drives the latter out through the discharge 8 and check valve 9. When the water level therein falls below the float 41 the trip valve (see Fig. 9) is opened and a part of the compressed air flows up the pipe 35 and through the fine passages 32 and 320 and into the auxiliary valve casing at its left end. The auxiliary valve is by this air pressure driven to the right to the position shown in Fig. 4 (the air forward of it escaping slowly around it by reason of its looseness), and this throws the left hand port 29 from the main valve casing into communication with the exhaust port 46 in the auxiliary valve casing as there shown. The release of pressure within the left end of the main valve casing in the position shown in Fig. 1 and beyond the left head of the spool valve 150 permits the latter to move to the left, as it will under the force of the inrush of compressed air through pipe 12, thereby uncovering the right hand hole 148 through which passes compressed air to the right end of the main valve 13, and the latter is thereby forcibly driven to the left by the power of the compressed air before it can enter either of the tanks. In the movements of the main valve to the left the air beyond it is expelled through the exhaust as explained, until the rib 23 seats against the yieldable material 22. The shifting of the main valve obviously switches the inlet of compressed air to the other tank and the operation is repeated. As the water rises in the other tank, it first closes the trip valve shown in Fig. 9, and the air trapped above it is then expelled through the port 16 in the casing 10 and out through the exhaust port 17 in the casing of the main valve.

A feature peculiar to the present invention is that in the movements of the auxiliary valve its cup valve (see Fig. 8) comes alternately under the ports 29 and 30, and the pressure of the air at the corresponding end of the main valve casing passes through the fine hole in the plug and seeks to escape. The plug being larger in diameter than the port which it covers, sufficient pressure is accumulated beneath the plug to force it tightly toward said port, and thereby the escape of the compressed air is prevented and practically all of it is delivered to the tank and employed to expel the water therefrom.

What is claimed as new is:—

1. A device of the class described including a plurality of upright liquid-containing tanks each having inlet and discharge valves, a main valve casing connected with a source of compressed air supply, the casing having inlet ports leading respectively to said tanks

and also having outlet ports adjacent thereto, and a main valve reciprocating in said casing and adapted to alternately switch the compressed air into one tank and open the outlet from the other; an auxiliary valve casing having two exhaust ports and passages through the heads of the main valve casing, an auxiliary valve reciprocating in said casing and having grooves spaced so as to alternately switch one of said passages into communication with one of said outlets and a pocket between said grooves, a spring supported plug loose in said pocket and having a fine hole adapted to register with the other passage at that time, a cup valve over the lower end of said hole, and means for reciprocating said auxiliary valve by the exhaust of air alternately from said tanks.

2. A device of the class described including a plurality of liquid-containing tanks, a main valve casing, a main valve reciprocating in said casing and adapted to alternately switch the inlet of compressed air into one tank and open the outlet from the other; an auxiliary valve casing, an auxiliary valve reciprocating in said casing and having grooves spaced so as to alternately switch one of said passages into communication with one of said outlets, and a pocket between said grooves, a spring supported plug loose in said pocket and having a fine hole adapted to register with the other passage at that time, a cup valve over the lower end of said hole; pipes depending from said casing into said tanks, the casing being cored with fine passages from the upper ends of the pipes through the auxiliary valve casing to the respectively opposite ends thereof, and means for admitting air to the lower ends of said pipes as the water in the tanks descends.

3. A device of the class described including a plurality of upright liquid-containing tanks each having inlet and discharge valves, a casting closing their upper ends, a main valve casing on the casting connected with a source of compressed air supply, the casing and casting having cored inlet ports leading respectively to said tanks and also having outlet ports adjacent thereto, and a main valve reciprocating in said casing and having pockets spaced so as to alternately switch the inlet of compressed air into one tank and open the outlet from the other; an auxiliary valve casing having two exhaust ports and passages cored through its wall and through the heads of the main valve casing, an auxiliary valve reciprocating in said casing and having grooves spaced so as to alternately switch one of said passages into communication with one of said outlets and a pocket between said grooves, a spring supported plug loose in said pocket and having a fine hole adapted to register with the other

passage at that time, a cup valve over the lower end of said hole, and means for reciprocating said auxiliary valve by the exhaust of air alternately from said tanks.

4. A device of the class described including a plurality of upright liquid-containing tanks each having inlet and discharge valves, a casting closing their upper ends, a main valve casing on the casting connected with a source of compressed air supply, the casing and casting having cored inlet ports leading respectively to said tanks and also having outlet ports adjacent thereto, and a main valve reciprocating in said casing and having pockets spaced so as to alternately switch the inlet of compressed air into one tank and open the outlet from the other; an auxiliary valve casing having two exhaust ports and passages cored through its wall and through the heads of the main valve casing, an auxiliary valve reciprocating in said casing and having grooves spaced so as to alternately switch one of said passages into communication with one of said outlets, and a pocket between said grooves, a spring supported plug loose in said pocket and having a fine hole adapted to register with the other passage at that time, a cup valve over the lower end of said hole; pipes depending from said casting into said tanks, the casting being cored with fine passages from the upper ends of the pipes through the auxiliary valve casing to the respectively opposite ends thereof, and means for admitting air to the lower ends of said pipes as the water in the tanks descends.

5. A device of the class described including a plurality of upright liquid-containing tanks each having inlet and discharge valves, a casting closing their upper ends, a main valve casing on the casting connected with a source of compressed air supply, the casing and casting having cored inlet ports leading respectively to said tanks and also having outlet ports adjacent thereto, and a main valve reciprocating in said casing and having pockets spaced so as to alternately switch the inlet of compressed air into one tank and open the outlet from the other; an auxiliary valve casing having two exhaust ports and passages cored through its wall and through the heads of the main valve casing, an auxiliary valve reciprocating in said casing and having grooves spaced so as to alternately switch one of said passages into communication with one of said outlets, and a pocket between said grooves, a spring supported plug loose in said pocket and having a fine hole adapted to register with the other passage at that time, a cup valve over the lower end of said hole; pipes depending from said casting into said tanks, the casting being cored with fine passages from the upper ends of the pipes through the auxil-

iary valve casing to the respectively opposite ends thereof, and a trip valve at the lower end of each pipe comprising a seat, a pivoted lever carrying a packing disk adapted to close against the seat, and a float whereby the valve is opened by the descent of the water.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN LEE LATTA.

Witnesses:

F. A. HENDERSON,
N. W. CLARK.