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Stone Mountain Scenic Railroad is something to see for a railroad buff, but their effective weed control program is something to

see for anyone with a weed control problem. Clear track as far as the eye can see, is the objective of their program.

RAILROAD *(from page 10)*

to try a Hi-Rail on his tracks. Previous sprays were applied with hand equipment. A Nalco Chemical Company truck put out the herbicide treatment mid-May of last year, and "we got results in about three weeks," McAfee says.

Another bonus with the herbicides used is that at normal rates of application they have no direct effect on wildlife or people — and with 2,000 to 3,000 tourists underfoot watching the spraying operations, you can't be too careful and safety conscious. A. H. McAfee is certainly safety conscious lately. He's been replacing the original 60-

pound rail that was laid with 85 and 90-pound rail to give his passengers a better ride.

They get quite a ride the way it is. The track was laid out through the lovely Georgia woodland, and scenes along the line do a fantastic job of depicting life in the mid-1880's. There are Indians, train robbers and recreations of towns from the film, "The Great Locomotive Chase." All three of the railroad's engines are replicas and namesakes (General II, Yonah II and Texas II) of the locomotives that took part in the famous Civil War chase of 1862 which started not far from Stone Mountain at Big Shanty (now

Kennesaw, Ga.) where a Union spy and his men stole the locomotive, "General." The chase ended in Ringgold, Ga., near Chattanooga.

Even if you're not a railroad history buff, you'll probably enjoy the ride. It starts from under the imposing sculpture of Jefferson Davis, Robert E. Lee and Stonewall Jackson carved out of the face of the mountain. After the ride, there are lots of other things to do — take the mountain skylift, ride a steamboat or visit an authentic ante-bellum mansion. Or you could visit Alexander Hamilton McAfee. And if you want to see him smile, just ask about his weed control program. □



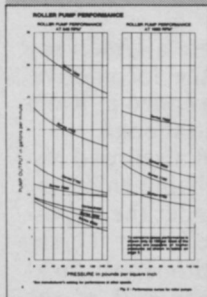
The Hi-Rail truck sets up to spray the residual herbicide and 2,4-D treatment. This versatile on-off track vehicle is faster and more

efficient than the hand sprayers the railroad had been using. Background displays the "1880's motif" seen along the track.

Sprayer Pump Handbook... yours free.

18 pages of helpful information

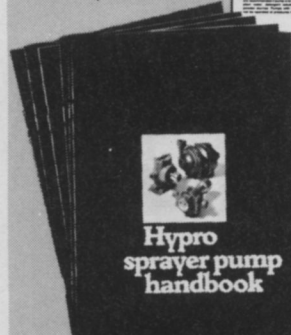
Hook up diagrams for roller, centrifugal and piston pumps.



Graphs of pump outputs, flow through spray nozzles and pressure drop in hose.

How to select the right pump and sprayer components.

| Pump output (gpm) vs. pressure drop (psi) | |
|---|---------------------|
| Flow rate (gpm) | Pressure drop (psi) |
| 1.0 | 1.0 |
| 2.0 | 4.0 |
| 3.0 | 9.0 |
| 4.0 | 16.0 |
| 5.0 | 25.0 |
| 6.0 | 36.0 |
| 7.0 | 49.0 |
| 8.0 | 64.0 |
| 9.0 | 81.0 |
| 10.0 | 100.0 |



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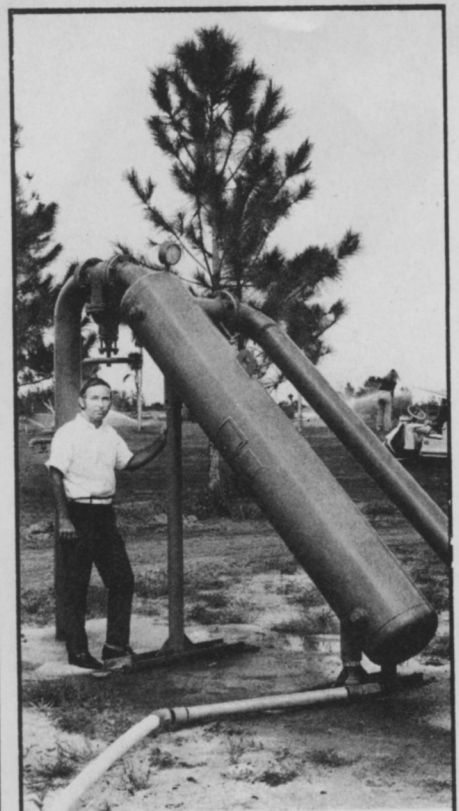
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Three months of heavy emphasis on equipment in the green industry. The July, August and September issues of WEEDS TREES and TURF will carry more features, more data, more photographs on equipment than ever before. Rolling stock, engines, tree care and sod equipment, golf cars and course maintenance equipment, tractors, trucks and hand tools. Watch for the biggest green industry equipment rally ever held.



The lightweight shell of the Eronator can be easily transported by one man. Robert E. Eron, inventor of the device, told WTT the unit's total weight is approximately 100 to 200 pounds, depending upon accessories added.

The Eronator

A Boost for Water Quality

IRRIGATION WATER, sewage treatment ponds, golf course water hazards — did you ever consider the importance of the *quality* of the water you have to deal with each day?

Robert E. Eron, "inventor and developer of marketable and needed inventions," thinks water quality is pretty important, but is too often neglected. On that premise, he is introducing one of his latest inventions — the Eronator — an aerator and treatment device for eutrophic water.

The Eronator is designed to transfer oxygen-laden water to the

surrounding water at any predetermined level of the water column. The oxygenated-water outlet may be effectively placed on the bottom of the impoundment, thus causing an upward and outward flow of treated water.

Operation

Floating on the water's surface, the lightweight unit consists of a closed plenum-type exchange chamber which houses the Eronator's sole moving part, a rotating impeller, at the upper end of the intake tube. This impeller forcefully disperses and slings finely divided water into

almost a fog, thus increasing the interfacial exchange of water to oxygen and other gases or chemicals which may be within the chamber.

This cloud then collapses back to liquid water with one important difference — it is now oxygen rich. The liquid builds up a pressure head inside the chamber, and the pressure differential (gravity) forces the treated water out the discharge tube down to the desired depth.

According to the St. Petersburg, Fla., inventor, "We are putting oxygen-saturated water into the impoundment by positive displacement, blending or pushing the bad water away. The water that goes down the outlet tube is better water."

Chemical Mixing

The Eronator is also reported to be a highly effective and convenient method for adding prescribed chemicals to water which may be necessary for the well-being of fish and aquatic crops. Herbicides for controlling algae and other non-desirable aquatic vegetation, chemicals for purifying and conditioning water, even medications and feed for improving fish health can all be easily introduced via the mixing chamber, Eron said. Activated charcoal can also be used for controlling water odors and tastes. Chemical mixing through the exchange chamber prevents loss of the chemical from spillage or the danger of contamination to the surrounding environment, including the atmosphere.

There is another obvious advantage to being able to add chemicals (especially herbicides) to the water through the Eronator's mixing chamber: the potential danger of drift when herbicides are applied by surface or aerial spraying is eliminated. By directing a flow of water carrying well-mixed herbicides to the bottom of a body of water infested with submersed aquatic vegetation, the herbicides are placed where they can do the most good — at the root system where they can be readily picked up the plant.

Eron told WTT that preliminary tests and documented research have indicated that most chemicals react more favorably and effectively in a highly-oxygenated environment, thus a savings can be realized by reducing the strength or amount of chemicals needed. Also,

the volume of chemicals required for treatment is reduced since the entire water column is not involved during the treatment process

Sewage Treatment Application

The machine can be used as an aerating and treating apparatus for sewage and industrial waste treatment systems or lagoons, too. Oxygen or other chemicals can be incorporated into the water to aid bacteriological or viral action, control algae and reduce water turbidity.

The Eronator is said to be effective for adding various chemicals used during tertiary treatment of sewage waste waters. The addition of alum, lime or iron salts used to remove phosphorus during advanced waste water treatment can be accomplished by using a modified unit. The chemical is placed in the exchange chamber and the exhaust pipe can be raised or lowered as necessary to get total coverage of the water area, Eron said. The Eronator can also be used to obtain extended and controlled aeration of waste materials such as bottom muds, algae and any accumulation of disintegrated organic or inorganic debris.

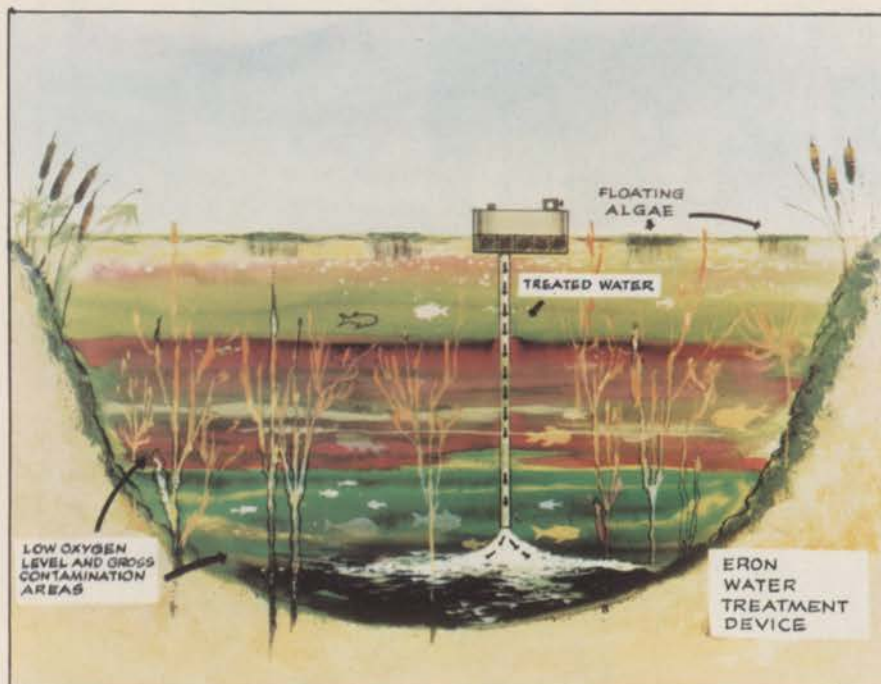
Several aeration systems on the market today are designed to introduce air at the bottom of a lake by means of air stones or small-diameter plastic pipe with small apertures. Some water circulation *does* result from air bubbles rising from the bottom of the lake to the surface. However, the amount of oxygen picked up by the water as the air bubbles rise is rather low, Eron said.

On the other hand, the Eronator is reported to move water which is supersaturated with oxygen to the bottom of a pond where muds and muck can receive maximum benefits of large amounts of highly oxygenated water.

Compared with conventional aerators, "the Eronator doesn't destratify the water," explained Eron. "We want that crud to stay at the bottom, and to allow the oxygen and so forth to work on it there. Then animal life will prosper. You see, what we are doing is assisting a natural process."

Additional Features

Eron said the airtight mixing chamber can be fitted with oxygen



This artist's sketch shows the flow of treated water down the Eronator's discharge tube, to the oxygen-depleted depths of an impoundment.

or other gas cylinders. This permits high concentrations of gases to be absorbed by water in the chamber, which is then forced downward through the discharge pipe by the weight of the water in the head (gravity). This method of oxygen introduction could be used to prevent low-oxygen or ammonia related fish kills in fish ponds, hatcheries and aquaculture facilities. In the case of fish farms, Eron said many thousand dollars worth of fish can be lost in a short period if oxygen is depleted by an algae die-off, possibly triggered by a period of several cloudy days.

The Eronator can be fitted with filters which will remove suspended particles from the water column while gently recirculating the water. The addition of heating devices can serve to warm water temperatures, and Eron reports that the unit does cool water naturally by condensation within the chamber.

There is a possibility that the unit will also act as a fish attractor, Eron said, and thus actually cause fish to congregate where fishermen can be reasonably assured of success. This fish-attracting feature is one phase of the Eronator's testing program.

Early Testing

In one early test program, the Eronator was placed in a four-acre

lagoon near St. Petersburg, Fla., which received water run-off from a sanitary land fill, coupled with sewage sludge. This water had a phytoplankton bloom and substantial growth of filamentous algae along the shoreline.

One section of the lagoon was
(continued)



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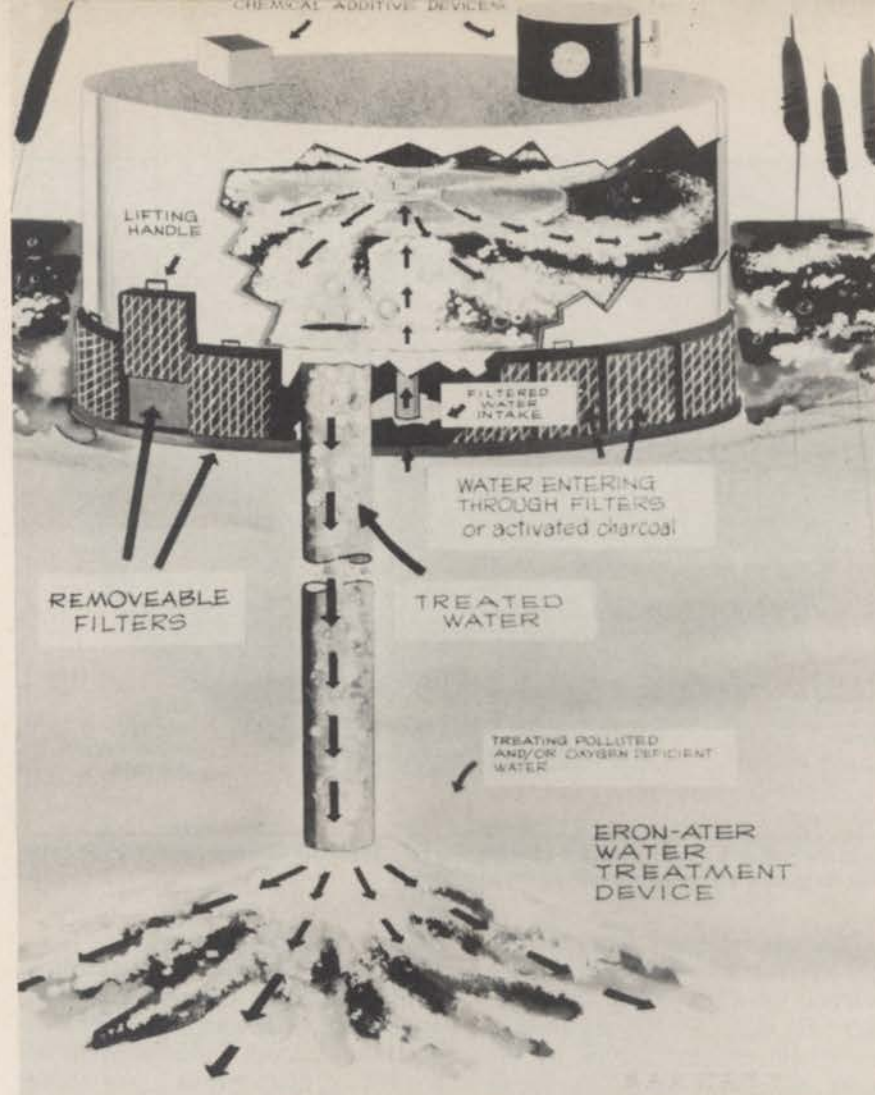


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This cut-away drawing shows the unit in operation — filtered water enters through the intake tube, the rotating impeller breaks the water into a fog, and treated water leaves via the discharge tube to the desired depth.

to 4.0 ppm two feet below the surface.

Then the Eronator was started and run for one hour, and water samples were collected at a location adjacent to the reservoir or exchange chamber (Station No. 1) and in the effluent of the discharge hose (Station No. 3).

The surface dissolved oxygen increased from 7.0 ppm to 15.0 ppm after the Eronator had been in operation for an hour. Dissolved oxygen samples collected and analyzed from Station No. 3 indicated 8.4 ppm so the Eronator apparently was increasing the dissolved oxygen found in the effluent of the discharge hose.

Visual observations in the treated lagoon revealed the presence of a high zooplankton population in contrast to the high phytoplankton bloom in adjacent untreated lagoons and in the control area, Eron said. And filamentous algae in the treated lagoon was, for all practical purposes, reported to be non-existent when compared with adjacent non-treated lagoons.

Coliform counts, often used as indicators of fecal contamination in water supplies, were taken by Florida's Department of Health and Rehabilitative Services. According to Eron, a Coliform count of 1,000 is considered safe for swimming. In the control area, the Coliform counts ranged from 7,000 to over 10,000. In the treated areas, the average Coliform count was 100, and was reported to be as low as 20 in some sample areas. Later tests for phosphates, which were made at distances of 300 feet from the Eronator, showed that phosphate levels in the treated areas were significantly decreased — from 25 mg/liter to only .15 mg/liter.

Recent Field Testing

In a more recent Eronator demonstration, Eron was called upon by a group of Lummi Indians in Marietta, Wash., last fall. The Indians operate a 750-acre fish farm and hatchery where they raise salmon, trout and some salt-water species. Conventional methods of water oxygenation were not proving effective, and their fish kills were tremendous.

Although the unit was in operation for only a short time before winter shutdown, it performed quite satisfactorily. According to Jim Ellis, fisheries consultant for the

isolated by means of a plastic barrier from the bottom to several inches above the surface. This enclosure served as a control area for the water quality tests and field observations.

Water chemistry samples were collected before the Eronator was started, after one hour's operation and from the control area. A Hach Water Test Kit Model AL-36-B was used to test carbon dioxide, dissolved oxygen, phenolphthalein and total alkalinity, hardness and pH. The Eronator had been in operation for several weeks prior to the testing period, Eron said.

When tested, the dissolved oxygen on the surface and for a two-foot depth was reported to be the same (7.0 ppm) at an 85 degree F. water temperature, thus indicating that the Eronator was not only circulating the water, but was also maintaining higher oxygen levels in the water column. Tests for dissolved oxygen in the control area ranged from 7.0 ppm at the surface



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Lummi Indian Tribal Enterprises, "The machine functioned very well. Oxygen levels were increased from 6 ppm to 9 ppm.

"Dye studies indicated a rapid movement of effluent water from the unit, along the bottom of the pond and towards the far end," he said. "This means that any chemical introduced into the unit would be distributed uniformly along the bottom where the need might be the greatest.

"We feel that the unit will increase dissolved oxygen levels in a pond," Ellis said, "and we hope to use it again in 1975."

Eron has recently been introducing his invention through speaking engagements. He has addressed a group at a Catfish Farmers' Convention in Little Rock, Ark., was on the program at a lake restoration conference in Wisconsin, and has spoken to several civic groups.

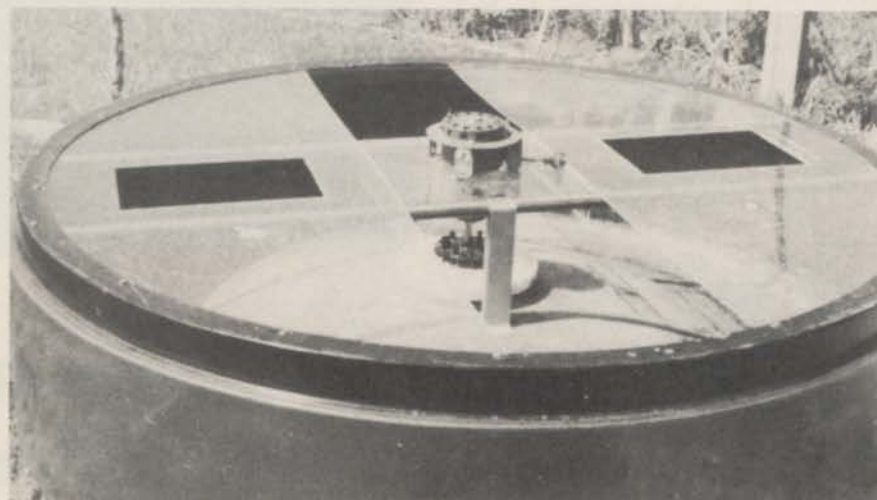
Marketing

Eron told WTT that his marketing plans for the Eronator involve franchising it to people in different regions and for different appli-

cations, such as fish farms, irrigation water, city ponds, and so on. The machine will be operated and maintained by the franchise holders, except in the case of sewage treatment plants. Eron said that one man can be trained to service possibly up to 100 of the units in his specific field of application. The ren-

tal fee will probably be about \$800 to \$1,000 annually.

The Eronator is just about as near to its perfected state as possible, Eron told WTT. But, he added, there will always be changes and modifications to be made as new uses for his device continue to develop. □



The early prototype of the Eronator had a Plexiglas top for observation. The transparent top was discarded, however, due to cost and sunlight penetration which gave false algae readings and created heat.



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IT TOOK A LOT of imagination and some big thinking to create an 83,000 acre environmental park in a semi-arid area 35 miles south of Los Angeles. The rolling hills and canyons defied settlement since the days of California's founding. And with ten million people camped on its outskirts, the area defied the crush of an expanding city until 1969.

Part of the sprawling Irvine ranch, the man-made oasis, now includes complete villages, recreationally self-contained, reaching from the ocean to the Santa Ana Freeway several miles inland.

The Big Canyon Country Club is located much in the center of things; an area which formerly was used for motorcycle hill climbs and trails. According to Greg Arrowsmith, course superintendent, building the course required one of the most expansive ground moving projects since the building of the Panama Canal. The 6,800 yard course winds through canyons, requiring up to 70-feet of fill in laying out the fairways. Robert Muir Graves and Associates were the architects of this fabulous project with Roger Gordon doing the irrigation architecture. There are 155 acres of labeled turf with 32 acres of manicured slopes. The site has 7 lakes holding 8-million gallons of water. There are 2 acres of traps taking in 72 bunkers. The flat land of Big Canyon contains 3,700 trees with twice that number planted on the slopes. To add to maintenance problems there are 9 different types of turf on the course.

Big Canyon has two types of terrain: the Canyon 9 with water hazards and trees and the Highland 9 with a mountain type course. The course was laid out with Bermuda fairways, mixed bluegrass roughs, seaside tees and aprons, and Penn-cross Bentgrass greens.

Arrowsmith noted that the climatic conditions averaged 70 to 75 degrees year around. Extreme lows and highs range from 28 to 95 degrees. As the Bermuda fairways

Top: Long view down one of the fairways at Big Canyon gives some perspective of the amount of fill used to create a golf course in a canyon.

Bottom: Crew loads ryegrass in vericut seeder in preparation for overseeding bermuda fairways.



Big Canyon Golf Course, An Engineering Marvel

By W. SCOTT LAMB

began to go dormant in the winter months, Arrowsmith considered ryegrass overseeding. The climate was not too hot for perennial ryegrass and indicated a program of overseeding with Pennfine and Manhattan perennial ryegrass, rather than using the old favorite annual ryegrass. Arrowsmith began his overseeding program on 1 and 9 fairways two years ago using a verticut seeder. The bermuda had been going out from 3 to 10 weeks in the winter but Arrowsmith was pleased

to find the ryegrass grows upright and helps hold the ball up even through the winter and summer months. He decided ryegrass was a good companion grass for the climate and has started a program of overseeding the balance of the fairways with straight perennial ryegrass, because it comes up strong and dark green. For seeding rate, Arrowsmith experimented with 150, 300 and 450 pounds per acre in his overseeding program. He feels the

