

Because of better design, ours saves money over the long haul.

With a Toro Central System, you control the entire course from one location. Make instant changes in your program as the weather shifts. Savings on labor costs can be dramatic. Water efficiency is maximized.

Soggy turf and puddling are virtually eliminated.

Let us help you build and maintain the kind of turf you've been dreaming about.

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Toro Manufacturing Corporation, Moist O'Matic Division 5825 Jasmine Street—P.O. Box 489, Riverside, California 92502



A Toro Vari-Time* Central Control System keeps the turf here at Oak Ridge Country Club and over 300 courses installed in the last two years.

*Exclusive Trade Name Toro Mfg. Corp.

Beard

continued from page 39

also occur due to (a) actual displacement of sods and soils when subjected to flowing water of high velocity; (b) covering portions of the turf with wood, soil, and other debris which results in death of the turf by light exclusion and (c) deposition of a soil layer, particularly silt, which creates a soil layering problem and associated long term disruption of soil air and water movement. The latter problem is particularly difficult to correct.

A study of certain nutritional requirements for Tifgreen bermudagrass (Cynodon dactylon x C. transvaalensis L.) Utilizing a hydroponic system. W.G. Menn and G.C. McBee. 1970. 62(2): 192-194. (from the Department of Soil and Crop Sciences, Texas A&M University, College Station, Tex. 77843).

Tifgreen bermudagrass was grown under various levels of nitrogen, phosphorus and potassium for the purpose of correlating visual analyses of these elements. Six-inch diameter plugs were taken from a mature monostand of Tifgreen bermudagrass. The plugs were thoroughly

washed to remove all soil and decayed plant material. Most of the root system was also eliminated. The plugs were placed in plexiglass frames over fiberglass screens. The frame containing a plug was then placed in a gallon, glazed, porcelain container.

Seven individual nutrient treatments of nitrogen, phosphorus and potassium were utilized in the study with four replications. The seven treatments were maintained by a modified hydroponic system where all other essential elements were provided. The culture solutions were aerated and maintained at a pH between 5.8 and 6.2. The nutrient levels maintained during the experiment include 0, 35 and 140 parts per million (ppm) of nitrogen; 0, 7.75 and 31 ppm of phosphorus; and 0, 58.5 and 234 ppm of potassium.

Visual ratings of turfgrass quality were made at weekly intervals for a month following development of the first visual nutrient deficiency symptoms. Leaf clippings were also collected weekly for analyses of the nitrogen, phosphorus and potassium content.

Specific relationships were established between the visual turfgrass quality of Tifgreen bermudagrass

and the nutrient content in the leaf tissue. Nitrogen was the first nutrient to show a visual deficiency symptom. A reduction in shoot growth and loss of color occurred as the tissue nitrogen content declined below 22,500 ppm. Chlorosis of leaves and increased seedhead formation also occurred when the tissue nitrogen content dropped below 15,000 ppm.

Phosphorus deficiencies in Tifgreen bermudagrass first appeared as a dark purplish-green coloration of the shoots. Subsequently a pale green color and reduction in shoot growth occurred when the phosphorus content dropped below 2,000 ppm. In addition shoot growth suppression occurred at higher phosphorus levels in the range of 4,500 ppm.

Symptoms of potassium deficiency first appeared as a thinning of shoots and narrowing of the leaf blade. This occurred when the potassium level decreased below 18,000 ppm and was very distinctive at potassium tissue contents less than 10,000 ppm. The grass did appear somewhat pale green at this lower potassium level.

Comments: The primary analytical method of determining turfgrass quality
(Continued on page 43)

Robert Dean Putman designs the fourth great golf course for the Monterey Peninsula. Rancho Cañada.



Already a golfer's paradise, the central California oceanside becomes a total golfing experience with the completion of the new Rancho Cañada course. Famed designer Robert Dean Putman created a distinctive personality for Rancho Cañada, complementary to the other famous courses nearby; Pebble Beach, Spyglass and Cypress. The 36 holes are laid out to fully utilize the lush Carmel River bottom with numerous small lakes adding to the beauty and challenge.

9,999 other golf courses have preceded Rancho Cañada. It has been designated the ten thousandth built in the United States and, like the rest of the best, it is provided the finest in turf irrigation. Designer Putman specified the use of over 190,000 feet of WESTERN PVC plastic pipe in the automatic sprinkling system.

WESTERN

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fertilization practices has been through the use of a soil test. Sometimes this method can be inadequate because the nutrient level determined for the soil may not be available for uptake by the plant.

An alternate approach involves the use of tissue analysis which measures the actual nutrient status of the turfgrass plant. The laboratory analysis of tissue is very accurate. However, the primary problem involves proper tissue sampling procedures, and proper interpretation of the results. Representative uniform, tissues of the same age and type must be selected. A particularly difficult problem frequently associated with turfs is that minute quantities of dust or soil present on the shoots can adversely affect the tissue analysis. Another serious problem in effective utilization of turfgrass tissue analysis has been the lack of sound scientific data on which to base interpretation of the results. Studies of the type reported in this paper will assist in eliminating this latter problem.

Specific observations relating to this data include defining the nitrogen and potassium content of the tissue at which deficiency symptoms develop. In the case of these two nutrients, the severity of deficiency symptoms increases as the nutrient content of the tissue decreases. In the contrast, phosphorus appears to have a critical level in Tifgreen bermudagrass tissue rather than a range. In summary, continuing investigations of this type may eventually provide sufficient information so that tissue analysis of turfgrasses could be effectively used in diagnosing the turfgrass nutrient status and requirements. □

Other papers of interest:

1. *Performance of crownvetch and selected cool season grasses on roadside backslopes as affected by slope exposure and nitrogen fertilization.* A.E. Dudeck and J.O. Young. 1970. *Agronomy Journal*. 62(3):397-399. (from the Department of Horticulture and Forestry, University of Nebraska, Lincoln, Neb. 68503).

2. *Sources of variation in Cynodon Dactylon (L.)* pers. J.R. Harland and J.M.J. deWet. 1969. *Crop Science*. 9(6):774-778. (from the Department of Agronomy, University of Illinois, Urbana, Ill. 61801).



DOUBLEKNIT STRETCH GOLF SLACKS



Stripes, checks, plaids, solid colors, twills, salt'n pepper, chevron-stripes, herringbones and others, in dozens of colors



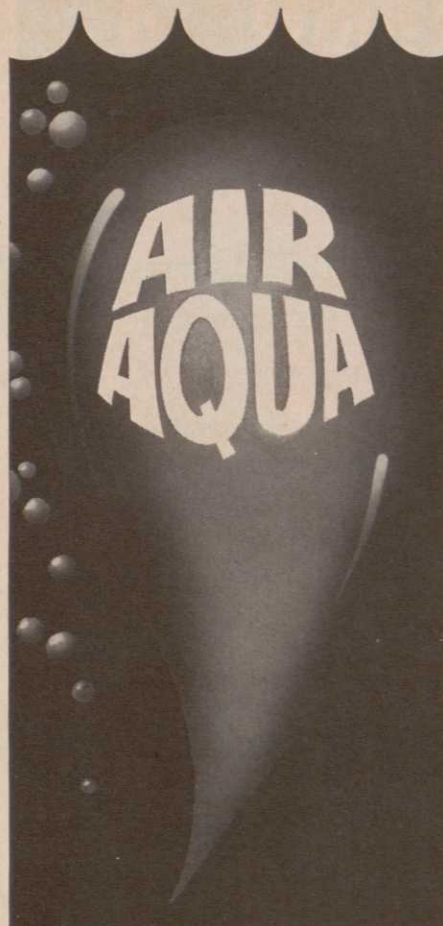
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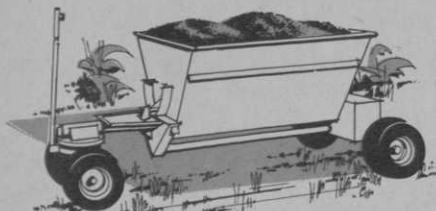
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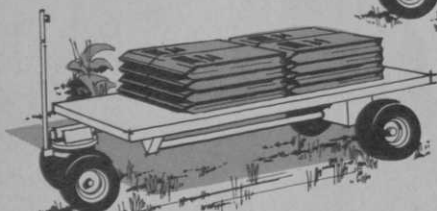
A rugged chassis on Terra-Tires, with removable, interchangeable 1 cu. yd. hopper and big flat bed



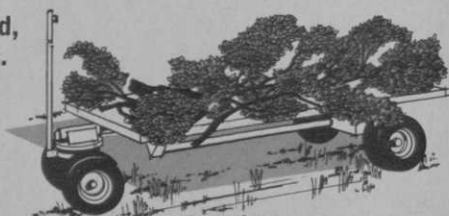
Bulk loads of sand, dirt, etc.



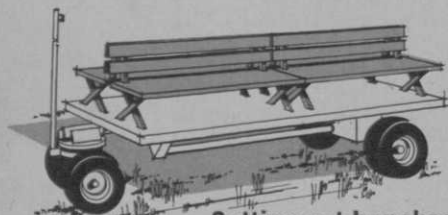
Trash of all kinds



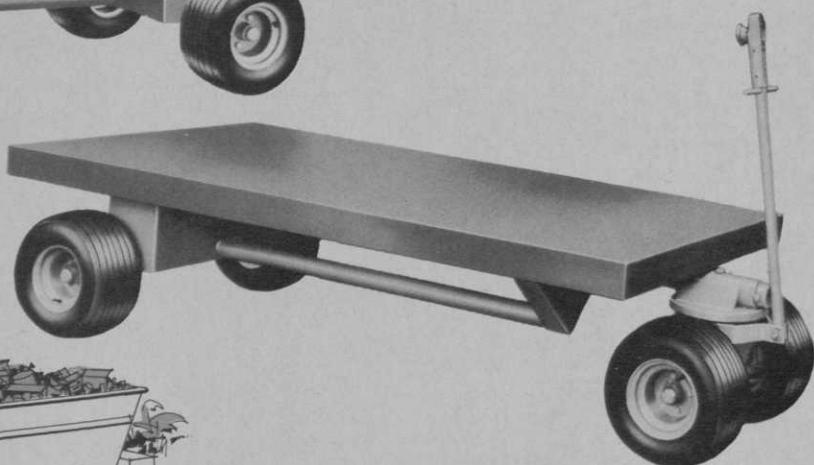
Sacks of seed, fertilizer, etc.



Debris from all parts of course



Setting out benches, shelters, etc.



Carrying loads up to 5,000 pounds, these unique trailers cradle the weight on Terra-Tires across a 48-inch width to protect your fine turf from ruts. Keep your crews working more days. Handle a hundred-and-one hauling jobs with an easy change from roll-dump hopper to flat bed as needed. For **big** hauls, like rebuilding tees or greens, we make a 2 cu. yd. hopper model that treats your turf the same gentle way.

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SEE YOUR EQUIPMENT JOBBER**

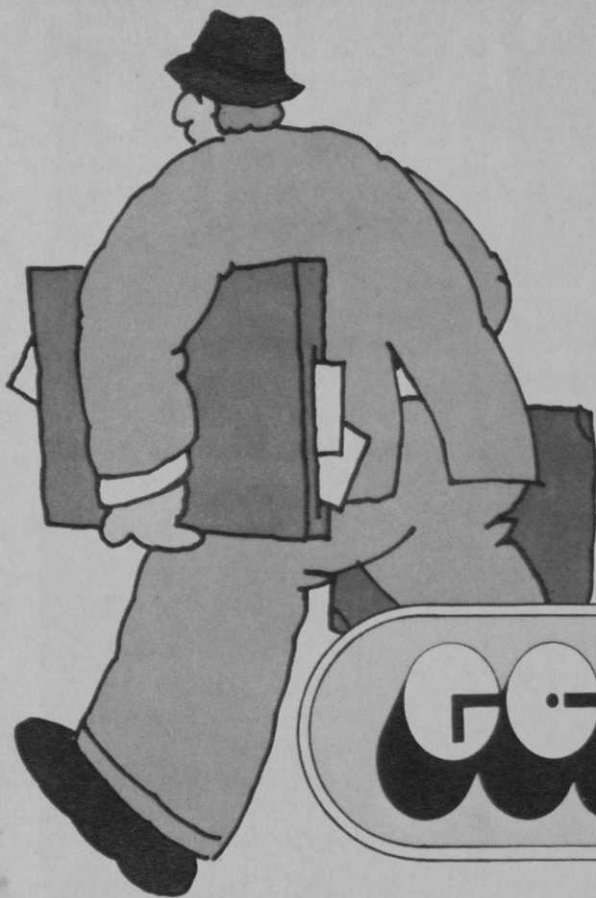


THE CHAMPION COMPANY

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Business at the 42d Annual Golf Course Superintendents Assn. of America Conference in Denver, February 7th to 12th, will get underway with the first educational session chaired by Warren Bidwell. Its theme is Golf and Man's Environment. Superintendents will then be welcomed to the conference by state and local officials and Norman Kramer, GCSAA president. The Profile of a Professional and a look at The Bright 70s complete the opening program.

The second session on Monday afternoon will be chaired by L. Palmer Maples Jr.; the theme is Thoughts—Past, Present and Future. Superintendents' thoughts will be explored in the first part of the presentation when nine turfmen air their pet

ideas or innovations with slides. The remainder of the program will give superintendents much to think about because it is concerned with Regulatory and Research Viewpoints on Pesticides.

On Tuesday morning the equipment show will open. As of press time the advance bookings promised the biggest show to date. Irrigation and riding greenmowers are expected to draw the biggest interest as they did in Houston in 1970.

Tuesday afternoon, the third session, will be chaired by Dr. Paul Alexander, director of education for the GCSAA. This is Dr. Alexander's first national conference in this position. Practical Irrigation Operation is the theme, which many superintendents believe is the key to a successful summer operation.

The fourth group on Wednesday morning meets with A. Caranci as chairman. This session is devoted to The Total Effort, and five men will tell how the superintendent can effectively conduct a public relations campaign.

The final fifth and sixth sessions will be chaired by staff members of the United States Golf Assn. Green Section, and the topic will be The Budget and Its Impact on the Golfer.

Because more and more superintendents have been bringing their wives to conferences, a full ladies' program has been planned.

Bookings have been very good for the Ski In, to begin on the 12th. Several package deals are available from \$80 to \$100 per person and all necessary equipment and clothes may be rented in Denver or at Vail.

—Bill Smart

On the following pages are highlights of the merchandise that manufacturers, distributors and representatives will be exhibiting at the GCSAA show. The companies appearing are those that have indicated to GOLFDOM that they will be at the show; it does not represent an official exhibitors listing. An asterisk following a company's entry indicates that specific details on its product line were unavailable at press time.



Golf and utility cars

American Golf Car Manufacturers Assn.

Club Car, Inc., features the four-wheel electric *Caroche* golf car. It has a gross operating weight of 840 pounds with a suggested list price of \$1,319.50. Club Car has discontinued its line of gas-powered cars and its three-wheel cars.



Cushman Motors., Div. of Outboard Marine Corp. makes the *Trophy* four-wheel electric golf car, constructed of terneplate steel to resist corrosion. It features individual bucket seats, automotive steering and a 36-volt electric motor. A windshield and canopy are available.

E-Z-Go Car Div., Textron Corp., features the *Four Wheel Model X-444* and the *Three Wheel Model X-440* electric golf cars. The X-444 offers a low center of gravity and high ground clearance for stability and short turning radius. Cars are constructed of steel and feature spike-proof dash padding, open mesh bag wells and wrap around bumpers.



Harley-Davidson makes the *Utilicar* line of utility cars in gas or electric models. The body is made of heavy gauge steel and impact-resistant fiberglass, and it has a minimum gross carrying capacity of 750 pounds. Available with a line of accessories which includes a trailer,



cab enclosure, personnel carrier seat, cargo box of heavy gauge steel and a wooden stake box.

Texas Refinery Corp. offers *Tire Seal*, a liquid sealant, *Dzl-Lene*, a fuel stabilizer, and *Big Red*, a concentrated liquid chemical detergent.

Viking Corp. offers the *Viking '71* and the *Viking Baron* golf cars. The former has a fiberglass front cowl with built-in drink holders and a large storage area, customized suspension system, two pedal braking and speed control systems and a 36-volt electric power system. It is available in a color to match a club's color.

The Baron features a combination fiberglass and steel body, a console for the ignition and shift and an arm rest. It is available in lime green.



Irrigation equipment

Aqua-Dial makes a line of turf irrigation equipment which includes valves, heads and automatic controls. The line features a geared rotor sprinkler in two models. *Model 14* is a part circle sprinkler, and *Model 13* is a full circle sprinkler.

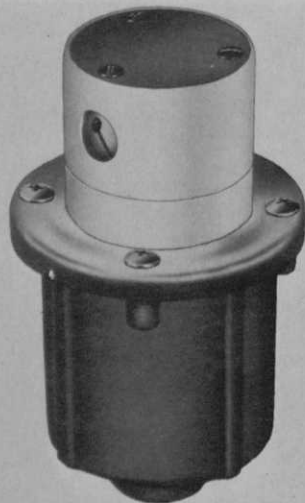
Buckner Sprinkler introduces a line of geared sprinklers and piston valves new this year. In addition the *Buckner Central Programmer Sys-*

tem for irrigation control is offered. The system features an infinitely variable syringe cycle from 1.5 to 5 minutes which overrides any existing programs.

Ethyl Corp., Visqueen Div., will feature PVC pipe made of polyvinyl chloride resin that maintains the strength of the original polymer. The piping is constructed using a Bell:Ring method which offers joint components for easy assembly. The pipes and fittings exceed all commercial requirements and ASTM tests.

Griswold Controls makes *Modular* and *Zone Control Systems* which automatically control irrigation. The Modular System programs a desired watering cycle throughout the course, while the Zone Control System controls the irrigation cycle in individual zones. In addition, Griswold offers diaphragm valves which feature slow closing action to prevent water hammers and which operate with sandy water.

Hays Mfg. Company features *Safe-T-Rain* pop-up sprinkler in its line of broad-range sprinklers and solenoid valves. *Safe-T-Rain* is a ball rotor drive sprinkler which is a combination impact and pop-up. Its adjustable nozzle trajectory covers a radius of 16 to 43 feet. A single unit can be used for a circle of 30 to 360 degrees. Also offered are *Marfaid* automatic solenoid valves, *Rise-N-Rain* pop-up sprinklers, a spray head wrench and sprinkler housings.



Moody Sprinkler Company, Inc., features the *CP-18 Central Programmer* designed to control the automatic sprinkling system when
(Continued on page 48)

Mow 35% more turf with the new

Parkmaster 9[†]



This new TORO cuts up to 90 acres a day. It has 35% more mowing capacity than our Parkmaster 7[†] or any comparable machine. But capacity isn't the whole story on this versatile, labor-saving rig.

Cutting units are individually controlled by a hydraulic system that picks them up or sets them down in under 60 seconds.

You can drop one or nine, whatever you need.

Between jobs, you roll along at 30 mph, with the 18½ foot spread tucked into a safe 8 feet.

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Hills are no problem. The 6 cylinder engine develops 79 horsepower, and the cutting units are free floating to follow the curve of the turf. And while they're following it, they won't be crushing it because of oversized pneumatic tires.

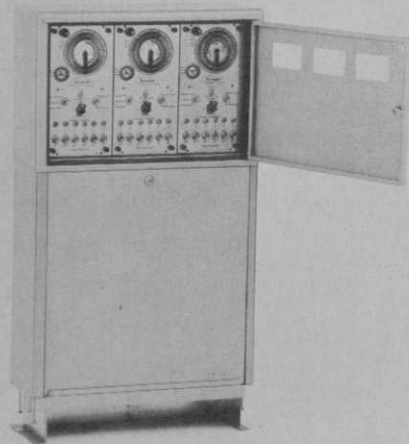
We think this adds up to a lot of mowing. So if you have a lot of turf to take care of, get in touch with us.

[†]Exclusive trade names of Toro Manufacturing Corp.

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IRRIGATION CONTINUED

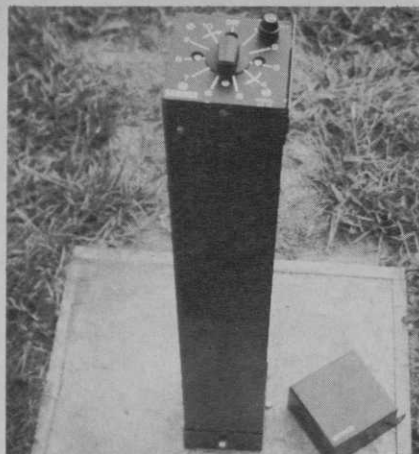


used with *Moody Slave Controllers*. It can stop, start or override watering programs set on remote slave controllers. Moody also makes a line of sprinklers, valves, heads, nozzles, attachments and accessories.

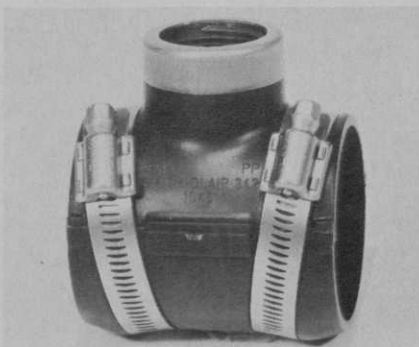
Rain Bird Sprinkler Mfg. Company offers a line of irrigation equipment which includes the *Rain Bird 41* rotor pop-up sprinkler with positive impact arm drive. Also offered is the *E.F. Electric Remote Control Valve*, a fluid resistor which does not use small orifices. A grit filter stops debris from entering the solenoid tubes and prevents the plunger from sticking in an open position. In addition, Rain Bird makes the *Master Control Satellite Systems* which features a syringe cycle timing adjustment.

Rain-O-Mat Sprinklers, Inc., features the *Model 21* rotary pop-up sprinkler in its line of sprinklers, automatic controllers and valves. The *Model 21* features a 180-foot diameter range and a 38-gallon-per-minute capacity.

Skinner Irrigation Company introduces a *Central Control System* which features individual valve operation and timing from the Center. Skinner also offers the *AC-10 Area Controller* and a system for converting a manual irrigation system to automatic.



Smith-Blair, Inc., features the *342* saddle for plastic piping connections which eliminates the need for solvent welding and delays in pressurizing the water system. In addition, a full



line of repair clamps and fittings for water system maintenance will be offered.

Thompson Turf Irrigation Products offers the *Challenger*, an intermediate range pop-up sprinkler with a tri-nozzle combination, free-spinning cap, easily removeable nozzle cartridge, positive high torque transmission and a three-year guarantee. In addition, Thompson offers the *Commander Rotor*, a medium range, gear driven pop-up sprinkler.

Toro Mfg. Company offers four new sprinkler heads in their line of *Moist O'Matic* irrigation equipment. The *620 Series* features a pop-up stroke of 2 3/8 inches, a high impact plastic body and a counter-sunk cover.

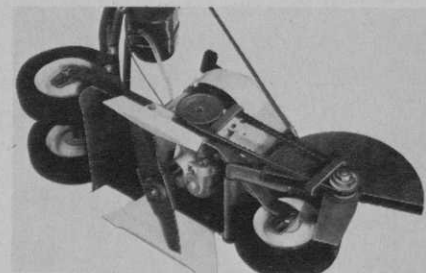
Weather-matic Div., Telsco Industries, introduces the *Command Satellite System* to its line of turf irrigation equipment. The *Command System* has a solid state control which enables syringing greens automatically. Weather-Matic also makes solenoid electric valves and pop-up rotary heads.

Maintenance vehicles

John Bean Div., FMC Corp., announces its *Model 1010-T Turfkeeper* sprayer. The *Turfkeeper* is equipped with high flotation tires, the *Royalette 10* pump which delivers 10 g.p.m. at up to 500 psi and a 13-nozzle boom and hose connections. Available with 150, 200 or 300 gallon tanks and powered by a 6 1/4 hp engine.



Bunton Company introduces the heavy-duty 22-inch self propelled mower with front wheel drive to its line of rotary power mowers, rotary push mowers and edger-trimmers. The *Model 22SPF-4T8* features 10 by 2.75 wheels, an aluminum alloy frame, a four hp engine with a five



quart fuel tank and a snorkel type air cleaner mounted on the handle. Also new is the *Four-Way Edger-Trim-mer* which has both a horizontal and vertical cutting blade.

The Champion Company features its line of *Doo-All Trailers* with *Terra-Tires*, a removable interchangeable one-cubic-yard hopper and a capacity of up to 5,000 pounds.

Cushman Motors offers the four-wheel and three-wheel model *Turf Trucksters*. The four-wheel model has a hydraulic jack and an air-cooled 18hp engine. The three-wheel model has a wide-box body and a 12 or 18hp engine. In addition, Cushman offers the *Turf Minute-Miser*, a one-passenger gas engine vehicle available with a covered cargo box.

Cyclone Seeder Company, Inc., offers its line of broadcast spreading equipment. The line includes the *Cy-*
(Continued on page 53)

America's foremost sports turf fertilizer . . .

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*Builds
stronger
healthier
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versatile, high-quality vehicle
for efficient
grounds maintenance



Slide-away-ramp for loading mowers is an accessory. Stows beneath bed. Optional fold-away rear seat allows the Big Box to carry three passengers in addition to mowers or other equipment.

The Cushman Turf-Truckster is a hefty vehicle designed especially for turf applications. Available with three or four wheels and in your choice of standard Pickup Body or Big Box.

An air-cooled, 18-hp, 4-cycle engine enables the Turf-Truckster to take the steepest hills in stride. And tow three-gang mowers with ease. It has a top speed of 22 mph, and a payload capacity of 1,000 pounds. Equipped with big traction tread 8.50 x 8, 4-ply rating Terra Tires, the Turf-Truckster can go anywhere on a golf course or park without damaging the turf. Even in damp weather.

Two different box sizes are available; the Pickup Body is 46" x 34 $\frac{7}{8}$ ", and the Big Box measures 57" x 53".