Jump placement can be coordinated to vary the takeoff and landing points at different events held at the same venue.

fine sands may result in the equivalent of concrete. A high degree of silt or clay components may infiltrate enough of the sand-created voids to severely reduce infiltration and percolation rates. Organic or man-made fibrous materials also act in this manner, impeding the voids and channels that are necessary for turf survival. The key is to achieve stability without using anything that will hamper percolation or infiltration.

Race tracks require a softer surface than athletic fields. Jumping areas have to be firmer than race tracks. The Clegg Impact Soil Tester (Clegg Hammer) is used to measure the surface absorption of impact energy (hardness). Studies by Dr. Sam Sifers and Dr. James Beard at Texas A&M have established the rating in gravities suitable for various sports venues. (See chart below for turf race track characteristics.)

These findings have later been studied and accepted by many leading sports turf institutions. A new standard test method developed by the American Society of Testing and Materials also has confirmed the use of the Clegg Hammer for measuring shock-attenuation characteristics of natural playing surface systems. The grounds manager can assess conditions during and after construction with Clegg Hammer readings.

Moisture Characteristics

Moisture characteristics of the final material will affect turf growing conditions and site usability. Density, porosity, hydraulic conductivity and plant-available water retention must be analyzed. In other words, how quickly does water move through the soil profile and how much water will be available to turf roots before it passes beyond their reach?

In addition, general climatic conditions of the site must be known. What effect will heat, humidity and winds have on the evapotranspiration rate of the desired turf? What is the anticipated rainfall or snowfall for the season, and when would it normally occur? What are the temperature variations during each portion of the turf-growing season? How will these factors affect the turf growth and the competitive surface during periods of minimal or extremely heavy use?

Irrigation must be closely monitored. Moisture content impacts relative softness or hardness. Inconsistent moisture can produce problems.

A sand-based track or arena — even a turfed one — that is kept too dry will be overly soft. The horses' hooves will sink in, throwing sand behind the horses. Watering and rolling the area will increase the relative hardness and reduce flying sand at least temporarily.

Initial construction must be keyed not only to providing a safe, uniform, stable site, but also to providing an area that can be maintained at that high standard over the long term in an efficient and cost-effective manner. Higher initial costs can be justified if the benefits will pay off in cost savings and improved conditions over the following years.

Turf Selection

Proper selection of the turf type and cultivars is essential for success. In horse events on turf, top green growth might not be as important as the roots. When roots are not deep and well-developed, and the soil lacks stability, a thousand-pound animal driving in with three-inch hooves can produce divots up to 12 inches across and ten inches deep. The root system should extend four to six inches or more for sufficient holding power.

The turfgrass selection must be suited for the climate during the period in which the facility will be used — the prime racing or performance months. Also the lay of the track, the slope, and any shadows or shade that might create different conditions for the turf must be considered.

Once the best grass type or types have been selected and established, height of cut becomes a factor. Trainers and jockeys have the perception that tall grass softens the track, but if grass is so long that it lays down, and turf density is reduced, it becomes hard.

Bermudagrass maintained at a height of two to three inches forms a good running base but requires an intense maintenance program because it starts to thin at heights over 1 1/2 inches. A four-inch height is too tall to maintain vigor in bermudagrass. Roots and top growth both decline.

Cool-season grasses, such as perennial ryegrass, bluegrass and turf-type fescue, can be maintained at heights between

continued on page 12

Surface absorption of impact energy* (hardness) in gravities	Turf race track character
Less than 30	Too soft, slow, more injury potential
30 - 50	Acceptable
50 - 70	Good, fast, low injury potential
70 - 90	Good, most speed, low injury
90 - 110	Acceptable
More than 110	Firm, more injury potential

* Measured by a Clegg Impact Soil Tester with a 0.5 kg hammer weight

Turf Tracks
continued from page 11

four and six inches and remain dense and vigorous. Increased top growth will encourage deeper rooting up to a point. Owners, trainers and facility personnel often specify that these grasses reach a height of ten inches or greater for certain races. Though the weight of the grass does help hold down the sand and cuts back on some divoting, lengths over six inches become difficult to mow, and thinning is inevitable.

Turf maintenance practices, including aeration and fertilization, must be precisely manipulated to reach the prescribed height at the proper time without sacrificing root development and plant vigor. After a sustained period of four or five weeks at extremely long heights, turf thins and root development slows.

Areas of wear can be managed to a limited degree by adjusting heavy use locations. For example, jump placement can be coordinated to vary the takeoff and landing points at different events held within the same arena. Some race tracks are wide enough to allow moving the position of the inner rail.

As with any high-maintenance turf field, problems with the grass often signal problems in underlying conditions. Because *Poa annua* thrives in wet areas, invasions of this weed generally warrant inspection of the subsurface moisture for inconsistencies in the irrigation pattern or problems with compaction, percolation and drainage. Thinning turf or discoloration may indicate dry conditions but have similar underlying problem sources.

The grounds supervisor is often placed in a difficult position. Different people connected with a track or other equestrian facility will want different things. Track stewards may want a firm surface with little or no divoting. Trainers say that those conditions lead to "hot foot" for the horses caused by the friction between the hoof and the firm track. A "hard" track has injury-causing potential that trainers want to avoid but may be favored by racing promoters and fans who want to see "fast" horses. Because 1/16 of an inch can determine whether the track is soft or hard, last-minute preparations may include running a grooming harrow over the surface with the depth adjusted to cut into the turf base.

Ultimately, a track will be appreciated by all if it is free of characteristics that favor one type of horse over another. Certain surfaces and conditions may favor the horses that lead wire to wire or the horses that come from deep in the field for a fast finish. If both types of horses win races on the same day, there is no track bias.

One sign of a good turf course is the number of photo finishes. Horses that traditionally lead wire to wire and the closers end up all together at the home stretch. If a track is determined to be fair to all types of horses, the field (number of competing horses) is larger, and the betting handle (the dollar total of all bets placed) is greater.

Hong Kong Turf Tracks

In Hong Kong turf racing rules. Racing generally takes place two days a week, but up to ten races are run each day. Racing is big business; the average family bets $6,000 a year.

Tracks are subject to tropical monsoon and typhoon rainfall, as well as the normal wear of the natural turf. In 1983, 17 race meetings were transferred from the Royal Hong Kong Jockey Club turf tracks to alternative all-weather tracks, resulting in less exciting racing and lower revenue from the tote. Following that season, track stewards embarked on a research and development program to find a natural turf track with all-weather characteristics.

The existing silt and clay components were removed, and a combina-

From the Jockey's Mouth: What Makes a Good Turf Track

A great jockey forms a team with his or her horse, sensing the animal's current disposition, gauging its abilities and reading its reaction to the field, the action of the race and the track. Jockey Chris McCarren says he can feel differences in track conditions "telegraphed" from the racing surface through the horse's legs. He once alerted a grounds crew to a drainage system clog by telling them about a soft area in one small section of the course.

Superior track conditions allow the jockey to concentrate on the horse and the field. Jockey Gary Stevens spent the spring and early summer commuting from Hong Kong to the U.S. to lead the field in such high profile races as the Kentucky Derby and Belmont Stakes, two legs of the Triple Crown. Stevens had contracted to ride for trainer Steve Leung in Hong Kong at the turf tracks of Sha Tin and Happy Valley in multiple races every Wednesday and Sunday.

Stevens says, "A good turf course is one that has a good root system, has some cushioning and doesn't get torn up easily from traffic. As far as turf height, I think a good course needs three to four inches to give it some protection. It also helps if the course is wide enough so they can put the inside rail in different settings to save the turf from wear."

Just how good did Stevens consider the Sha Tin turf conditions? Just look at his results. Stevens placed first on 23 percent of his rides and finished in the money (first, second or third) 85 percent of the time.

"Sha Tin is one of the best courses I've ridden on," says Stevens. "Ninety percent of the races in Hong Kong are run on turf. The drainage is excellent, and despite getting lots of rain, the turf still held up great."

Jockey Julie Krone has not had the dream season of Gary Stevens. A hairline fracture of her pinkie kept her off the horses for nearly 30 days, but she returned with a vengeance, giving Stevens a run for the money in the Belmont, where she placed second. Like Stevens, Krone has multiple-track experience on soil and turf both in the U.S. and overseas. She, too, praises the turf tracks of Hong Kong. "The Happy Valley Course is the best I've ever ridden on," she admits.

Jockeys quickly learn that track conditions affect the outcome of the race. Jockey Dodie Duys says, "The biggest complaint from jockeys comes when tracks are used beyond their capability to recover and become soft and filled with divots. If conditions are erratic, your horse will be tentative, unsure of his footing, and you'll be unsure of your horse."

tion of sand and Netlon mesh elements were installed at the Sha Tin and Happy Valley race courses beginning in 1986. Total installations on both courses were completed in 1990.

Rainfall now moves quickly through the profile, and the track remains in good condition, virtually eliminating the transfer of races to the non-turfed track. In addition, the tracks have shown a marked reduction in divoting, with maximum divot size of four inches across and three inches deep. Grass roots grow down through the mesh, and this combination supplies the cohesion normally provided by silt and clay.

USGA Green Profile Used on Track

Initial reports have been very good from the E.P. Taylor grass track which opened in the early fall of 1994 as part of a three-track Woodbine Racetrack complex of the Ontario Jockey Club. The inner oval, a limestone track, accommodates standard-bred racing, the next oval is a dirt track for thoroughbred racing, and the outer oval is the turf track. This track is constructed on a modified USGA greens profile with underlying drainage in a four-inch layer of coarse stone covered by a layer of finer stone in lieu of a choker layer. The stone sizes were designed to prevent infiltration of the rootzone material yet allow easy passage of air and water. This was topped with a 12-inch rootzone layer consisting of a three-to-one blend of a precisely graded sand and a high sand content, loamy topsoil.

As the Kentucky bluegrass sod matures, some roots are anticipated to extend the full 12 inches of the sand-soil profile, with the majority of active roots concentrated in the upper six inches.

Equestrian Requirements

The Grand Ring Equestrian Arena of England's Stoneleigh Royal Agricultural Showground is a showcase for premium jumpers. Following the installation of a sand and mesh profile there, Harvey Smith, noted show jumping champion, said, "The surface was so good, John McEnroe could have played tennis on it last week, and he wouldn't have complained!"

Not all equestrian area constructions have been as successful. In the 1994 English hurdle racing season on all-weather, sand-based tracks, some horses suffered injuries and death. The construction and maintenance of the particular tracks provided surfaces that tended to be less forgiving, stamina-sapping to run on and unyielding to fall on. Hurdles on such tracks increase the stress factor and the injury potential.

All racing and jumping events put tremendous stress on horses. Equestrian site grounds managers have no less responsibility for the safety of their athletes than any other sports turf managers. ❑

Stephen Guise is president of Guise & Associates, Fullerton, CA, a turfgrass consulting company specializing in the construction and management of high-traffic sports turf. He is treasurer of the national Sports Turf Managers Association and a founding member of the Southern California Chapter of STMA.

The racing schedule at Retama Park calls for 139 days of live racing per year with 17 weeks of thoroughbred racing and ten weeks of quarterhorse racing.

Bladerunner Farms provided rolls of zoysia sod for installation at Retama Park.

South Texas Racetrack Bets on Zoysia

By Kathy Smith

Traffic along Interstate 35 just north of San Antonio slows noticeably as it approaches Selma, Texas. Travelers still brake reflexively as they cross the city limits of the tiny burg which once held a considerable reputation as a hungry speed trap.

Today the Selma City Hall police station is the site of a roadside restaurant. Locals still pass through the town at a sedate 54 mph, but Selma is banking on making money in a new speed-related enterprise. Thoroughbred horse racing has come to Selma.

Retama Park, a Class One racing facility, already has boosted the economy with construction jobs, new staff, purchase of building materials and more. Open since the first week of April, the track is destined to bring long-term benefits in the form of an expanded horse-racing industry, which, in turn, translates into enhanced opportunities for suppliers, growers, breeders, trainers and others.

The turf track is considered one of the most important elements of the facility. Racing on turf produces fewer injuries to horses, appeals more strongly to the public and generates more entries from breeders and trainers.

A new variety of turfgrass is being used for the first time in a racing setting at Retama Park. Bender Wells Clark Design, a firm devoted to urban design, landscape architecture and environmental graphic design, selected ZoyBoy, a recently developed form of zoysiagrass, for the turf track. After careful study zoysia was chosen over several other varieties of grass because it fulfilled all of the characteristics considered critical for the turf on the track. The ZoyBoy variety is fine-textured and deep-green in color. ZoyBoy grows vigorously, establishing itself quickly. ZoyBoy recovers easily from damage, divots, traffic and more, so the track designers expect that it will stand up to the thundering hooves of the horses.

Low Maintenance Turf

ZoyBoy is an excellent turfgrass for this part of South Texas, where summer temperatures stay in the high 90s, and rainfall is rare. Developed and grown by David Doguet of Bladerunner Farms in Poteet, TX, the grass requires less water, fertilizer, chemicals and general maintenance than other, better known varieties.

"It really takes to heat," says Javier Barajas, track superintendent for Retama Park. "ZoyBoy likes that 95-degree weather." Currently, the turf is being watered for about five minutes, three times a day, he adds. By comparison, the turf track at Arlington International Racecourse, where Barajas worked for

18 years, required frequent watering — about ten minutes to 15 minutes each night.

Larry Clark, ASLA, of Bender Wells Clark Design oversaw the installation of 550,000 square feet of ZoyBoy last November. Twelve acres of the sod were unrolled to cover the track, which measures 1 1/8 miles by 90 feet. The turf was cut into segments 42 inches wide by 112 feet long. Nylon net was placed over the rootzones to protect the roots and make the rolls easier to handle. The segments were rolled onto lengths of PVC pipe. Three light-duty tractors unfurled the rolls of grass in five days, roughly 1/6 of the time it would have taken had the track been sodded by conventional means.

Soil Specifications

Bender Wells Clark Design specified that a ten-inch soil layer be placed over a gravel drainage layer to establish a separation from subsoil moisture. Proper procedure for establishing a high-traffic turf on horse racetracks involves the use of a high-sand rootzone construction, with an underdrain layer. The high sand content of the rootzone allows deep root growth, rapid draining of the soil after a rain and good footing for racing.

Turfgrass experts recognize and understand the need to avoid placing a layer of finer-textured soil at the rootzone that differs from the soil found below the rootzone. The finer-textured soil attached to a sod being transplanted onto a high-sand soil will typically form a layer known as a "perched hydration zone" of excess water above the interface with the underlying high-sand rootzone. In other words, surface water will not penetrate beyond the depth of the fine-soil layer until that layer reaches full saturation. Only then will water begin leaching into the high-sand zone below. A perched hydration zone can lead to excessive divoting and a general deterioration in the surface quality of the turf.

Given this possibility, the landscape architect chose a sod that was propagated and grown off-site in a soil medium specified to be as close as possible to the same soil-particle distribution as the soil used in the rootzone layer at the construction site. The root structure of the ZoyBoy zoysiagrass allowed the sod to be harvested with as little as 1/8-inch of soil substrate attached.

Dr. Milt Engelke, an agronomist and professor of turfgrass breeding, genetics and management at Texas A&M University who has worked with the zoysia genus for 15 years, is consulting with Retama Park to develop the best management practices for a first-class turf track. Although he has never worked with ZoyBoy previously, Engelke says, "Zoysia as a species offers an opportunity to provide a racetrack that's second to none."

Preliminary reports on the performance of the grass on the turf track have been favorable, and the track superintendent expects the fully established grass to be even better. "I think it's going to be a very strong turf course," Barajas says. "It's going to handle a lot of races." ❑

Kathy Smith is a freelance writer in San Antonio, TX.

Overseeding

Owen Field at the University of Oklahoma has a carpet of SR4300 perennial ryegrass overseeded on bermudagrass. The university switched to natural turf two years ago. Photo courtesy: Don Hatcher, University of Oklahoma.

Two side-by-side soccer fields provide a graphic display of untreated vs. fungicide-treated seed on overseeded bermudagrass. Photo courtesy: Gustafson, Inc.

Making the Transition

By Robert E. Reaves

When fall arrives in the South, overseeding bermudagrass becomes the predominant topic of discussion among sports turf managers. Overseeding may seem to be only a seasonal matter, but it actually involves a great deal of planning throughout the year. Overseeding too early or late in the fall may mean a poor cool-season turf on the athletic field. Bad timing at overseeding may also result in a poor transition back to bermudagrass in the late spring and early summer.

Factors to be considered before initiating an overseeding program include seed selection, seeding date, preparation of the seed bed, control of annual bluegrass and disease.

Seed Selection: Depending on budget, most athletic fields in the South are overseeded with perennial ryegrass. Today's perennial ryegrass varieties are stellar performers. Eric Nelson, director of research and product development at Medalist America in Albany, OR, does not recommend unimproved "common" varieties of any grasses for athletic turf. Nelson says, "Seed is the least expensive component needed for a successful athletic field. Choosing the right varieties and mixtures can make the difference between success and failure. There is nothing more frustrating and expensive than having to do a job twice, especially when time is short."

Thomas Koske, extension horticulturist at Louisiana State University in Baton Rouge, says, "Transition early or late in the spring will be based on the cultivar or blend selection. Baseball fields may choose a later transition. An example may be the need for a very green turf for a June baseball tournament or a green football field for graduation ceremonies. To lengthen an overseeding, you may wish to blend tall fescue with a heat- and drought-tolerant perennial ryegrass. Perennial ryegrass is a tough grass; it lasts through May at LSU."

A short transition period in the spring is desirable on football fields, since play on the field is limited during that time. Don Hatcher, athletic maintenance supervisor at the University of Oklahoma desires a perennial ryegrass with a short transition period. Hatcher intentionally selected a variety that does not tolerate heat. Unfortunately, this year's late spring and early summer was wetter and cooler than normal. This enabled the perennial ryegrass to linger through July, making it difficult for the bermudagrass to compete.

Seeding Date: General guidelines for selecting seeding dates come from a USDA Plant Hardiness Zone Map, plus soil and air temperatures. Turfgrass in zone ten should be overseeded between November 15 and December 15, zone nine between October 15 and November 15, zone eight between October 1 and October 15, and zone seven between September 15 and October 1.

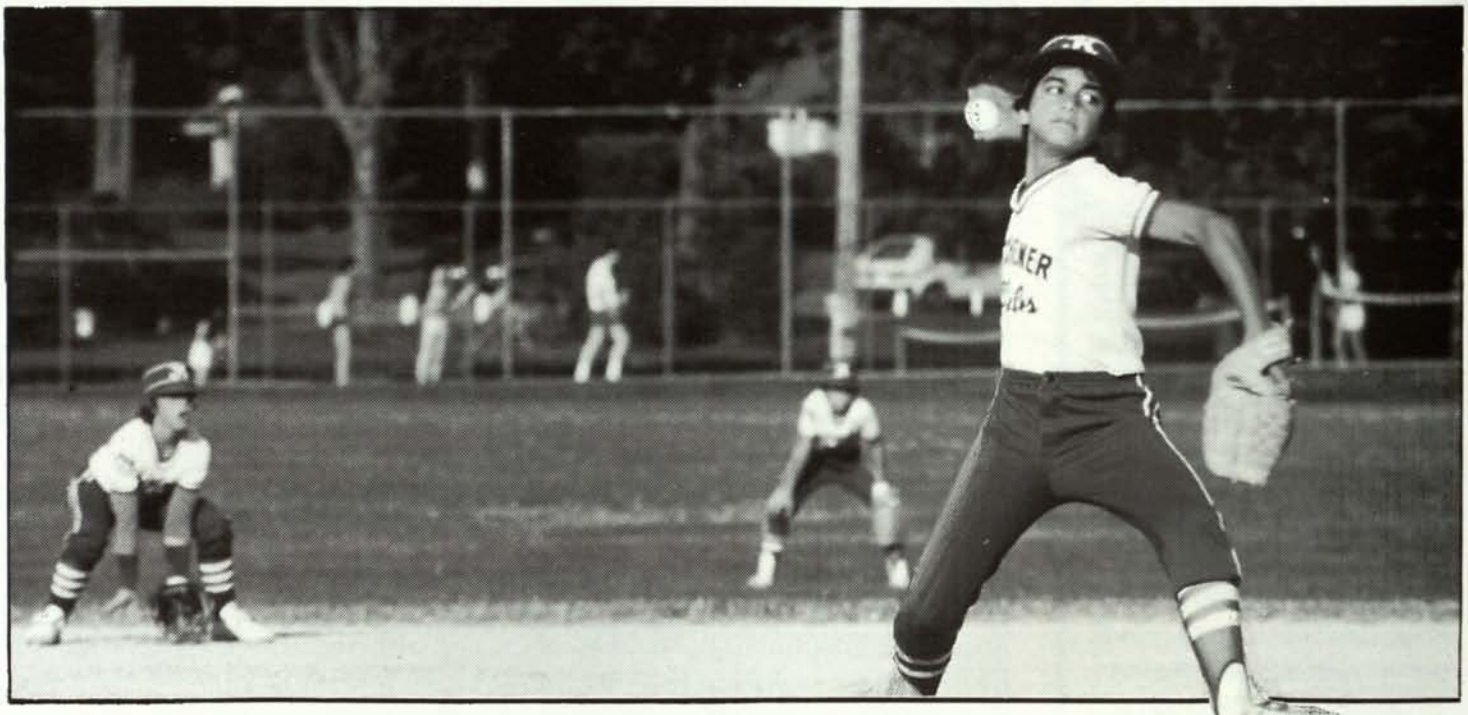
Burke McCarty, associate professor in the Department of Environmental Horticulture at the University of Florida in Gainesville, offers some advice on using temperatures for overseeding dates. "A general indicator of optimum overseeding time is when fall night temperatures consistently are within the 50-degree range," he explains. "Other timing indicators include overseeding when soil temperatures at a four-inch depth are in the middle 70s. Overseeding should be timed at least 20 to 30 days before the first expected killing frost."

Use of a fungicide-treated seed may prove especially beneficial where earlier overseeding must take place. One product for seed treatment is Apron™, manufactured by Gustafson Inc., of Plano, TX.

Preparing the Seedbed

Preparation of the seedbed for fall overseeding actually begins during the summer. "Coring, light topdressing and light vertical mowing during the summer will promote upright growth [of the bermudagrass] and discourage excessive thatch development," says McCarty. Thatch accumulation over 1/2-inch build-up discourages good soil-to-seed contact, resulting in a spotty overseed stand.

continued on page 21



DIAMOND GROOMING

with the Ballpark-6 and Diamond Master

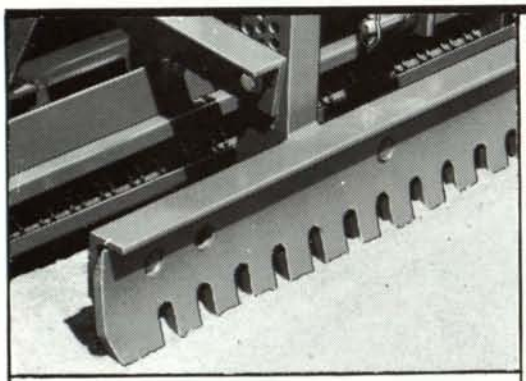
BALLPARK-6 Groomer

The Ballpark-6 is the original, all-purpose groomer. It combines five essential and individually adjustable grooming tools as illustrated below.

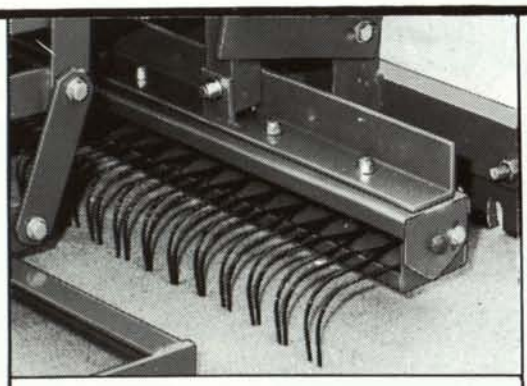
Hundreds of ball diamonds in North America are now being groomed regularly with the Ballpark-6.

Talk to those who know. They'll tell you how it saves manpower, saves time and keeps their diamonds sparkling.

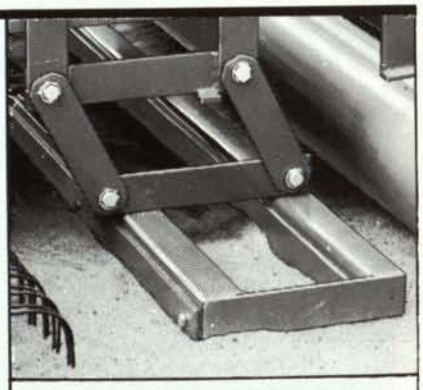
BANNERMAN



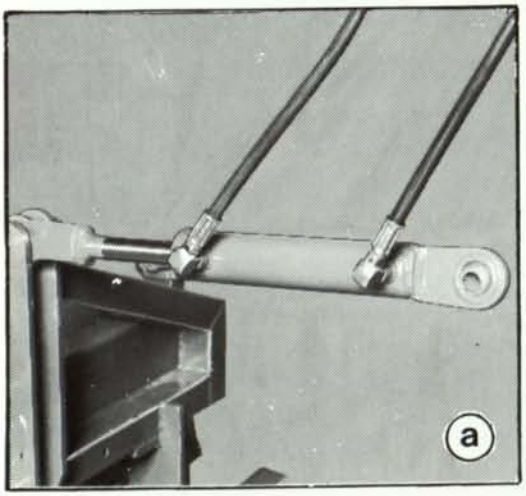
1. **RIPPER BLADE** - To move large amounts of material or break down ridges as required.



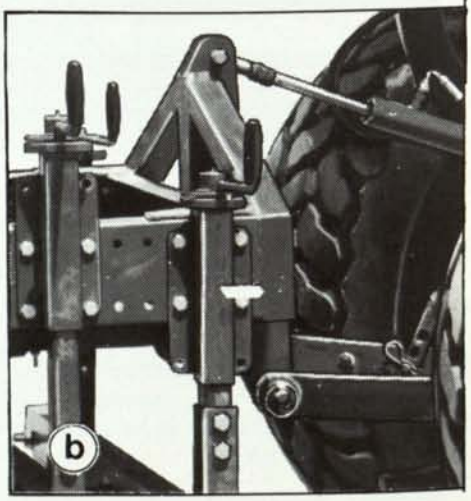
2. **SPRINGTOOTH RAKE** Adjustable from light to heavy raking or severe scarification.



3. **DOUBLE BLADE LEVELLING DEVICE** - floating, parallel linkage.



7. **Your groomer is designed for 3 pt-hitch mounting** on any tractor from 17 h.p. and up. Photos (a) and (b) show optional 2-way hydraulic ram which enables the operator to adjust the top-link without dismounting. The top-link controls the pitch of your groomer in relation to the grooming surface.



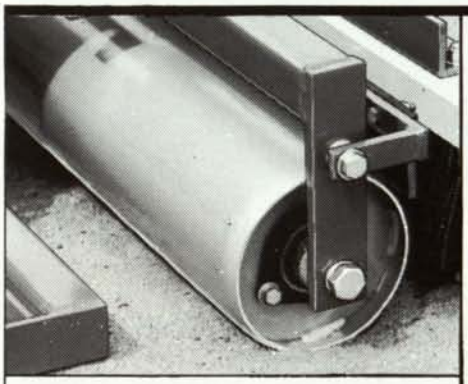
DIAMOND MASTER

We've told you about the Ballpark-6 and how it saves time and manpower.

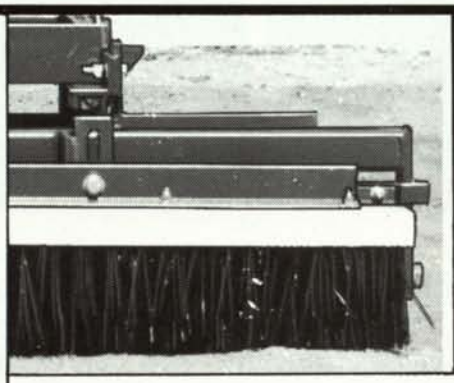
Well the Diamond-Master carries the same tools, and does basically the same job, but we've made it much easier. Individual tool adjustments can now be made with simple screw jacks. (See photo 'C' below)

That's a big help when you have 5, 10 or 25 diamonds to do in a hurry.

BANNERMAN

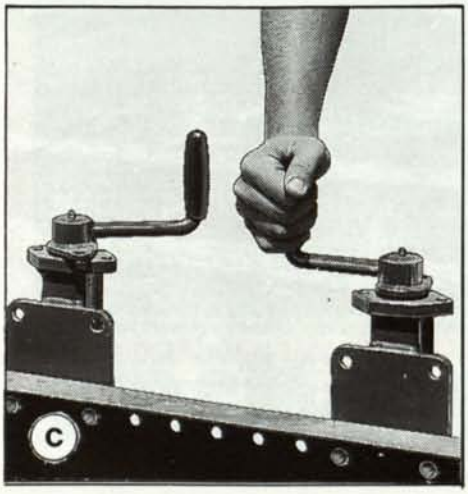


4. **HOLLOW STEEL ROLLER** - Designed to give firmness without compacting top layer.



5. **THE BRUSH** - Adds that well-groomed professional look.

6. **EXTENTION BRUSHES** available for the super-finish without extra passes.



8. Depending on the condition of the diamond, surface material used, etc. grooming tools may need adjustments. (Illustration from Diamond Master) (c)

9. This 50 gal. water tank (d) with pump and broad spray nozzle keeps dust down when working and can be used to firm up areas of loose material.

What's a Ballpark Without an Outfield?

Wet and Dry Line Markers

Parks & Playground Seeder

Topdresser — 4 yd. Capacity

Multi-Ject Aerifier

This brochure concentrates on diamond grooming, but as the title of this page indicates, we believe the grooming of your outfield is every bit as important as anything you can do for your diamond.

As a matter of fact some of the equipment shown above regularly performs in at least two areas of sports turf maintenance. LINE MARKERS for example, used properly can enhance almost any diamond both infield and outfield. Yet it can also mark parking areas etc.

YOUR GROOMER can be used to brush in topdressing and assist in levelling of your outfield.

The PARKS & PLAYGROUND SEEDER can be used on virtually any of your turf grass areas, whether it's new or overseeding. The same applies to the TOPDRESSER and the MULTI-JECT and SUPER-JECT AERIFIERS. Both can serve you well, season after season.

BANNERMAN

TOLL-FREE CAN 1-800-325-4871
USA 1-800-665-2696

Gordon Bannerman Limited • 41 Kelfield Street, Rexdale, Ontario, Canada M9W 5A3 • Telephone 416-247-7875 • Fax 416-247-6540

The home of Sportsturf Magic