JUST THIRTY-FOUR YEARS AGO

Jimmy Demaret played golf with his first set of clubs with steel shafts. He then predicted the steel shaft would eliminate the hickory shaft in a few years. You know the story.

Four years ago Jimmy Demaret played, for the first time, the First Flight Steel Power Center Golf Ball. He immediately predicted it would eliminate the old type golf ball just as the steel shaft eliminated the hickory.

"Greatest Ball I Ever Played."—Jimmy Demaret

PLAY THE BIG WINNER!

- 1961 MASTERS — Gary Player
- 1961 LEADING MONEY WINNER — Gary Player
- 1961 INTERNATIONAL — Gary Player
- 1961 SUNSHINE — Gary Player
- 1961 NEW ORLEANS — Doug Sanders
- 1961 HOT SPRINGS — Doug Sanders
- 1961 EASTERN — Doug Sanders
- 1961 COLONIAL — Doug Sanders
- 1962 NAT'L PGA CLUB CHAMPIONSHIP — Jim Stamps
- 1961 CAJUN CLASSIC — Doug Sanders
- 1962 NEW ORLEANS — Bo Wininger
- 1962 BATON ROUGE — Joe Campbell
- 1962 INTERNATIONAL — Gene Littler
- 1961 BEAUMONT — Joe Campbell
- 1962 PENSACOLA — Doug Sanders
- 1962 THUNDERBIRD CLASSIC — Gene Littler

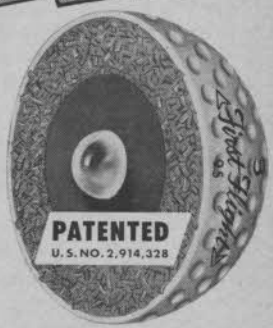
No ball has ever before made such a record! This shows that Jimmy Demaret's prediction was right!

INSIST ON THE ORIGINAL

STEEL POWER CENTER GOLF BALL

made under Patent No. 2,914,328 and introduced by

First Flight



THEY ARE SOLD ONLY IN PRO SHOPS

62-28

First Flight Company CHATTANOOGA 5, TENNESSEE

Turf Questions ...and answers

FRED V. GRAU

How Nitrogen Works

(Second of Two Articles)

There are great differences in the way and in the speed by which nitrogen is released to the plant, both of which mean a great deal to the grass and the manner in which it can use the nitrogen.

Each nitrogen material is mineralized (converted to nitrate nitrogen) at a rate which is dependent on the composition of the material and its ease of conversion by bacteria.

Ammonium Sulfate, $(NH_4)_2SO_4$, nitrifies rapidly in the soil. The ammonia quickly is seized upon by the nitrifiers and is converted to nitrates which are made immediately available to the grass. It is very easy to have too much nitrate, more than the grass can use. The excess may be lost in the air as ammonia, or it may be leached downward by rain or irrigation water. The excess taken into the plant causes greatly accelerated growth. The excess also may scorch (ammonia burn) the grass. Because of the rapidity of conversion this source of N must be used frequently at light rates to avoid sudden excesses with attendant flushes of soft succulent growth.

Must Be Converted

Urea cannot be used as such by plants. Even though it is soluble it must be converted to mineral forms before plants can use it. Under ideal conditions this occurs after about a three-day delay following application.

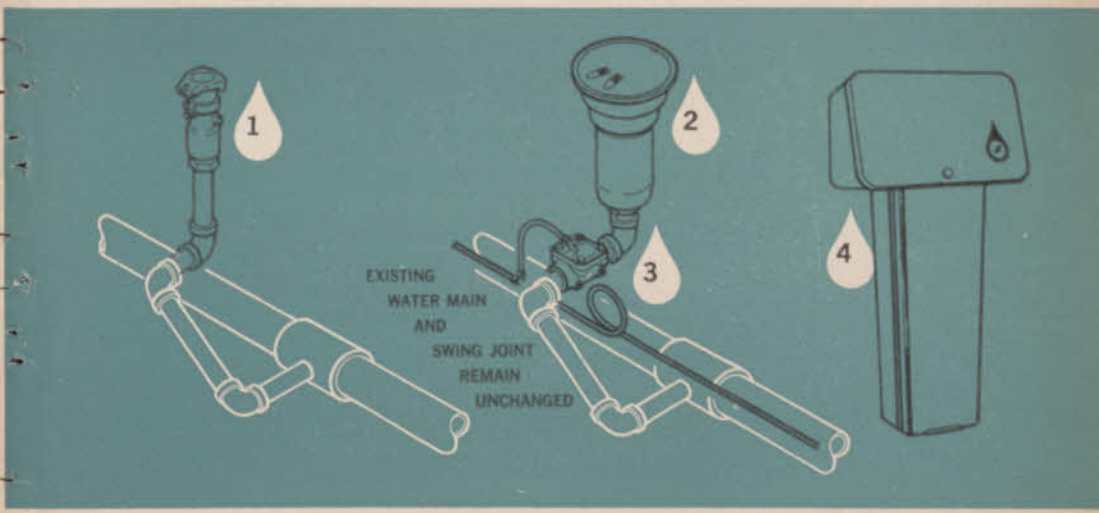
Natural organic materials (seed meals, sludges, tankage) hold most of their N as proteins which must be "decayed" by microorganisms which, by steps, form ammonia, nitrites and finally, nitrates. Part of this protein nitrogen is so resistant to decay that it can be considered unavailable to grass up to 70 per cent in some forms of leather tankage and up to 50 per cent in some sludges. Proteins which microbes easily can digest and convert will be nitrified at about the same rate as ammonium sulfate or urea.

The synthetic organic, ureaform, is a nitrogen product that is manufactured to a rigid set of specifications that assures a controlled rate of release. A small portion nitrifies easily, similar to ammonium sulfate or urea. Another portion, the larger, more complex molecules, mineralizes over a much longer period because it is less attractive to the soil microflora. Still another portion releases its nitrogen months after application, resembling somewhat the more resistant portions of natural organics but differing in that the microbes finally do break it down. Each portion grades insensibly into the next by gradual changes in molecule sizes. There are no abrupt changes from one to the other.

Nitrification Studies

Nitrification studies are conducted in laboratories without plants to measure relative rates of mineralization to nitrate nitrogen. The temperature usually is held at 80 to 85 degs. F., a point at which optimum bacterial activity may be expected. A typical set of results is presented to show the way in which quickly available and slowly-available materials are converted. (*See table on page* 44)

4 steps to converting your Q.C. valve system to *fully automatic*



STEP 1 Remove Q. C. valve & fittings

STEP 2 Install **AQUA-DIAL** #15 geared sprinkler and valve

STEP 3 Cut a 2" trench for control tubing

STEP 4 Locate **AQUA-DIAL** controller in convenient place and connect control tubing to it

The **AQUA-DIAL** *fully automatic system has these advantages:*

■ Minimum conversion cost ■ No changes required in your present pump or piping system ■ No labor required to operate system ■ Individual sprinkler head timing ■ Water during off-play hours ■ Eliminates soggy spots ■ Reduces water cost through efficient application ■ Healthier greens, tees, and fairways through controlled application.

AQUA-DIAL

BOX 1325/NEWPORT BEACH, CALIF.
52 VANDERBILT AVE./NEW YORK, N. Y.
BOX 27/1485 BAYSHORE BOULEVARD/
SAN FRANCISCO, CALIF.

	Per Cent of Total Nitrogen Converted to Nitrates in:		
	3 Weeks	9 Weeks	15 Weeks
Cottonseed Meal	49	54	54
Leather Tankage	28	34	35
Process Tankage	30	35	36
Sewage Sludge	42	49	50
Ammonium Sulfate	89	93	91
Ureaform (C.A.M.)	17	42	50
6-6-6 Fertilizer, 50% of N from UF (C.A.M.)	47	68	74

Interpretation: The best natural organic materials released only half of their total N. Most of it was converted to nitrate in the first 3 weeks the same as sulfate of ammonia. Thus the first five materials are classed as quickly available.

The ureaform released only 17 per cent of its total N in the first 3 weeks. At the end of 9 weeks, only 42 per cent had been converted to nitrates. Half of it was converted in 15 weeks with nitrates still being formed. This performance places this material in the slowly-available class.

The 6-6-6 fertilizer exhibits an excellent steady curve of nitrate formation over the 15 week period, giving this formulation a "controlled release" classification.

Varied Reactions

Reactions in the soil are varied and complex but, in order to understand them we are forced to oversimplify them, for purposes of illustration.

$$\text{Fertilizer} + \text{Bacteria} = \underset{\text{Ammonia}}{NH_3} \quad \underset{\text{Ammonia}}{NH_3} + \underset{\text{Oxygen}}{O_2} = \underset{\text{Nitrous Acid}}{HNO_2} \quad \underset{\text{Water}}{\pm H_2O}$$

Nitrosomonas

$$\underset{\text{Nitrous Acid}}{HNO_2} + \underset{\text{Oxygen}}{O_2} = \underset{\text{Nitric Acid}}{HNO_3} \quad \underset{\text{Nitric Acid}}{HNO_3} + \underset{\text{Magnesium Oxide}}{MgO} = \underset{\text{Magnesium Nitrate}}{MgNO_3} + \underset{\text{Water}}{H_2O}$$

Nitrobacter

Magnesium nitrate is soluble and can be absorbed by the plant through the root hairs. In addition to magnesium there will be nitrate salts of all other available bases (Ca, K, Na, etc.)

Optimum Conditions

Nitrification proceeds most effectively under these conditions:

Temperature: 85 degs. F. optimum, but organisms can adapt readily to gradual changes.

Moisture: 50-70 per cent of water-holding capacity, the same as for higher plants — but can tolerate wide extremes.

Acidity: Neutral (7.0) reaction best for beneficial organisms, fungi flourish in acid soils. Disease-producing fungi often are destroyed by bacteria.

Aeration: Abundant oxygen favors beneficial organisms. Excess of water reduces oxygen supply and encourages anaerobic conditions with formation of nitrites and other toxic substances. Nitrates are torn apart when oxygen is low because bacteria need oxygen.

Salts: Low concentration. Continued use of salt forming nitrogen carriers discourages bacteria.

Light: Kills most microorganisms. Surface of soils tends to be nearly sterile. May explain poor response of granular materials that lie on top of turf.

Organic Matter: Organic matter is a source of food and energy. Both natural and synthetic sources of carbon and nitrogen favor microbial activity.

Food Supply: Microbial population densest where food supply is plentiful and continuous.

Summary: Nitrogen of the air must be fixed, then converted to nitrates for use by the plant. Bacteria do work, therefore, require a source of energy to accomplish conversion, carbon in organic materials furnish energy. Bacteria use nitrogen as food. Bacteria require oxygen, therefore, a well-aerated soil is essential. A neutral reaction (pH 7.0) favors optimum microbial activity.

Midsummer Disease

Q. We built our own greens with no experience whatsoever. The grass looks good but lately I am beginning to think that our soil mixture was not in the correct proportions.

The greens are very firm with shallow root systems. I've read your column in GOLFDOM for years. For hard greens you say to aerate and incorporate sand. Should the sand be applied as is or should it be mixed with topdressing?

Also, our greens are very susceptible to disease in midsummer. We don't fertilize at all during this time. I was wondering if fertilizer, applied in midsummer, would aid the grass in

(*Continued on page* 81)

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Revolutionary War Ghosts Haunt Farmington Shop

By JOE GAMBATESE

It would be hard to find in this country a golf shop with more history attached to it than the one occupied by Joe Cannon, professional at Farmington CC, Charlottesville, Va., since 1950.

The shop is in what used to be the harness room of the stables on the Farmington estate. The estate was confiscated by the Colonial government during the Revolutionary War because the owner was a British sympathizer.

The most famous architect of that day, Thomas Jefferson, designed the main mansion on the 1,000-acre plantation (now the

(*Continued on page* 52)

Various aspects of the displays in the Farmington shop are shown in the four photos above. In the top photo are Joe Cannon, head pro, and his assistant, Paul Brown. (Left) Exterior view of shop which once was the harness house on the Farmington estate.

Turf Talk

by Bob Miller

Many superintendents have asked me if fungi become resistant to turf fungicides. I have never seen any technical literature reporting that this occurs and no one at Du Pont has ever seen it happen in the laboratory.

"Semesan", the first organic mercury turf fungicide, was developed in 1923 and it is still an excellent disease control chemical after 39 years. In recent years, Du Pont has developed other fungicides for specific disease control with maximum safety to turf.

TWO-WAY PROTECTION—"Tersan" 75 and "Tersan" OM are two examples. "Tersan" OM is a combination of "Semesan" a mercurial fungicide and "Tersan" 75, an organic sulfur. This effective combination gives quick knockdown of diseases from the "Semesan" plus long-term protection from the "Tersan" 75, with optimum safety to turf.

We have tested "Tersan" OM at 1 lb. in 5 gallons of water per 1000 sq. ft. on bent grass at 90°F. This rate is 5 times greater than that recommended for preventive spraying. Yet there was no turf injury. You'll find "Tersan" OM is easy to use. It's pre-mixed, conveniently packaged and compatible with most insecticides and fertilizers.

ADDED PRECAUTIONS—Normally, fungicides are used for disease prevention. But if conditions are extremely favorable for disease outbreak, it may be necessary to increase the concentration of the fungicide and reduce the intervals between sprayings. This *does not* mean the disease is resistant to the fungicide. It simply means added coverage is needed to assure a protective barrier against disease organisms.

The growing of vigorous, healthy turf requires good soil, proper pH, adequate feeding, good air and water drainage plus weed and insect control and reliable turf fungicides.

You, as superintendents, know good turf is not grown by accident. It takes planning and hard work.

Bob Miller