



Fig. 1—Pin positioned to hold valve open.

The illustrations show the installation of a one-inch, spring operated gate valve in the radius supply pipe, also a valve control pin attached to the reel drum. At the start of the sprinkler operation, the one-inch gate valve is opened (against spring tension) and the control pin placed in position to hold the valve open. (See Figure 1). The valve and control pin rotate with the sprinkler.

While the sprinkler is in operation, it pulls a dead-load of 200 to 300 pounds and considerable tension is built up in



Fig. 2—When control valve closes irrigation stops.

the anchor stake, power wire, or guide wire. Should either wire break, or the stake pull out of the ground, tension is released which results in torque or backlash movement at the reel drum thereby displacing the valve control pin, which in turn allows the gate valve to close immediately, and the sprinkler operation stops. (See Figure 2).

This is a simple positive mechanism which appears to be a valuable accessory to the travelling sprinkler of the type mentioned.

## ***The Effect of Fertilizer Rates and Placement on Turfgrass Seedlings***

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**F**requently, it is desirable to use generous quantities of fertilizer on the day of seeding or shortly before seeding turfgrass. It is known that fertilizer can injure grass seedlings, but the dangers have not been defined. It was the purpose of this study to determine the effect of a complete fertilizer of soluble nature on turfgrasses when used at the time of seeding.

### **Procedure**

Fertilizer rate and placement treatments with turfgrass seed were made in 5-inch greenhouse pots. All treatments

were repeated three times and they were seeded with equal numbers of Kentucky bluegrass and red fescue seed at a rate of 40 seeds per square inch.

A 5-10-5 fertilizer of soluble nature was used at rates that gave  $\frac{1}{4}$ ,  $\frac{1}{2}$ , 1 and 2 pounds of nitrogen per 1000 square feet. One of the  $\frac{1}{4}$  pound rates was left on the soil surface and the other was mixed throughout the soil. With  $\frac{1}{2}$ , 1 and 2 pound rates three procedures were used as follows:

1. Fertilizer applied to the soil surface (slight incorporation in the

surface crust occurred with the covering of the seed).

2. Fertilizer mixed throughout the soil.
3. The fertilizer required for a  $\frac{1}{4}$  pound of nitrogen applied to the surface with the remainder previously mixed throughout the soil.

After seeding the cultures were allowed to grow for 7 weeks. The number of shoots and the grass yield were determined at the end of the growing period.

### Results

Placing the fertilizer on the surface gave no significant suppression of seedling development when the fertilizer was used at a rate that gave  $\frac{1}{4}$  and  $\frac{1}{2}$  pound of nitrogen per 1000 square feet (Table). However, a highly significant reduction in the number of shoots occurred when the applications with 1 and 2 pounds of N were placed on the surface as compared with mixing all or part of the fertilizer through the soil depth. Also, complete mixing of the fertilizer for these rates gave a significant increase in clippings over those obtained with surface application. Further support of suppression by surface applications was shown by the significantly greater number of shoots produced by the unfertilized check. The figure illustrates the growth response ob-

tained with different rates and methods of application.

### Conclusions

Seed and fertilizer placement is critical in turfgrass seedings. The following guides are suggested by this study:

1. Use of balanced soluble fertilizer at rates that will give 1 and 2 pounds of nitrogen per 1000 square feet does not offer a hazard to immediate seeding if the fertilizer is thoroughly incorporated to a depth of five inches on a loam soil.
2. Applications of a balanced soluble fertilizer at rates that supply  $\frac{1}{4}$  to  $\frac{1}{2}$  pound of nitrogen per 1000 square feet in the surface layer offers no hazard to immediate seeding if watering or rain follows. If larger quantities are used serious stand reduction can occur if seeding is not delayed until the chemical concentration is reduced.
3. Fertilizers with insoluble components would be less dangerous to turfgrass seed than soluble types, however, it would seem unjustified to apply these in large quantity to the soil surface in close association with turfgrass seeding.

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The number of shoots and the top growth from turfgrass seedings made with varied rate and placement of fertilizer. New Brunswick, N. J. 1959.

Fertilizer Placement	Nitrogen from fertilizer* lbs. /1000 sq. ft.	Number of shoots	Topgrowth grams
Check		198	1.2
Surface	0.25	288	2.3
Mixed	"	245	2.6
Surface	0.50	236	3.7
Mixed	"	257	3.6
Surface $\frac{1}{4}$ lb. — Mixed $\frac{1}{4}$ lb.	"	223	2.9
Surface	1.00	121	2.1
Mixed	"	235	3.7
Surface $\frac{1}{4}$ lb. — Mixed $\frac{3}{4}$ lb.	"	231	4.1
Surface	2.00	128	4.5
Mixed	"	283	5.6
Surface $\frac{1}{4}$ lb. — Mixed 1- $\frac{3}{4}$ lb.	"	282	4.6
L.S.D. at 0.05		51	1.2
" " 0.01		69	1.6

\*A 5-10-5 fertilizer was applied at a rate that supplied the respective quantities of nitrogen.