BEARD *from page 18*

ions were established and maintained for a 140-day period. All solutions containing chlorides had comparable milliequivalents of anions. The treatments were replicated four times.

The turfs were cut weekly at a height of 1.6 inches. Clippings were collected at six intervals during the experimental period and were oven dried for total shoot growth determinations and chloride analysis. Visual estimates of the effects on turfgrass growth were also taken.

The visual ratings and shoot yields indicated that the turfgrasses included in this experiment tolerated relatively high chloride levels for considerable lengths of time. Chloride levels above 0.3 per cent were required to cause death. Chloride uptake by the plants increased with time and also with increasing chloride content in the nutrient solutions. Chloride uptake was less from alkaline than from acidic solutions.

Comparisons among the turfgrasses included in this experiment showed Norlea perennial ryegrass and Kentucky 31 tall fescue to be the most tolerant to chlorides. Kentucky bluegrass and Pennlawn red fescue ranked intermediate whereas Highland colonial bentgrass, Italian ryegrass and timothy were the least tolerant to chloride toxicity. The initial symptom noted on the turfgrasses was a bleached or chlorotic appearance on the leaves.

Comments: Salts containing chloride are commonly applied during the winter period to melt ice and snow from walks and roadways. This practice is of concern because of injury to turfs growing adjacent to these surfaces. The effects of chloride involve two aspects (a) direct physiological drought, or foliar burn, caused by the presence of the salt in direct contact with the leaf tissue and (b) toxic buildups of salt in the soil.

Foliar toxicity or desiccation results in immediate death of the affected tissue. It may or may not cause serious thinning of the turf. The washing of salts from the leaf surfaces will minimize the probability of foliar burn, if it can be done when the salt first comes in contact

continued on page 23

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BEARD *from page 21*

with the leaf.

The second aspect involves phototoxic salt accumulations in the soil root zone. We are quite fortunate in this regard because the turfgrasses are fairly tolerant of soil salinity. However, injurious effects can result if the soil levels become high enough. The potential for this to occur is greatest in regions of low rainfall or where drainage has been restricted due to poor soil permeability to water. Fortunately, this soil salinity problem is only temporary in areas of relatively high rainfall and on soils having adequate internal water movement. The salt level is readily dissipated by the leaching action of spring and early summer rains.

The selection and use of a more salt tolerant turfgrass species should also be considered. Norlea perennial ryegrass and Kentucky 31 tall fescue proved to be quite salt tolerant. Earlier studies by Youngner in California also revealed that Kentucky 31 tall fescue was quite salt tolerant along with Seaside creeping bentgrass. Seaside also had superior recuperative potential from the effects of salinity.

A higher soluble salt level occurring in soils adjacent to walks and roadways may not result in direct damage to the turf. However, there may be some indirect effects that will become noticeable during the subsequent growing season. More specifically, the high salt concentration in the soil solution will impair the absorption of water and essential nutrients by the turfgrass root system. Thus, proneness to wilt and desiccation will be increased.

Visual symptoms of salinity include wilting and a grayish-green appearance that gradually develops into an irregular stunting of growth. Tip burn may also appear. A distinct thinning of the shoots may develop under higher salt levels. Should salt effects associated with the application of de-icing materials during the winter be suspected of causing these symptoms, an intensive program of leaching should be initiated to move the salts from the turfgrass root zone. Soil cultivation in the form of coring or slicing will also help achieve this end. □

GOLF PIONEER DIES

Tom Walsh, PGA president in 1940 and 1941, and one of five pro brothers who honored and enriched golf, died recently in Chicago. Tom built and operated the Westgate Valley courses in south suburban Chicago.

He was building another course, Green Garden CC, in Frankfort, Ill., when stricken by terminal illness. The father of the five Walsh brothers and four sisters was born in Ireland. He landed in the United States with $5 and said he went to Chicago because he couldn't afford New York. Tom started in golf as caddie at the Beverly CC on Chicago's South Side.

One time I asked Walsh why he kept working so hard in Illinois and national PGA office when there was a lot of work, criticism and no money in the job. He gave me the simple and surprising reply: "It's a way of serving God."

I'm still wondering about that statement.

Walsh brought peace and progress to the PGA after stormy political battles. Ed Dudley was PGA president during World War II, but because the PGA's main office was in Chicago, Walsh cared for much of its work.

Tom said that the best thing he ever did for the PGA was to hire Tom Crane. Tom Crane, an ex-Marine who had a small law practice in Chicago, nursed the PGA through all sorts of growing pains and became its executive director.

The minimum house account appears to be steadily and solidly growing. Earlier there was decided objection to requiring each member to account for a certain amount of house food and/or drink revenue a month. For some reason that guarantee seemed to be contrary to the private club principles of free spending and prestige at various clubs, but in practice the plan worked. It stabilized budgeting of house business and reduced assessments because of the house operating deeply in the red. Naturally, members whose house accounts weren't up to par, didn't like the plan.

Discussing the minimum house account plan with veteran managers, we were reminded that *George S. May,* business engineer who owned the Tam O'Shanter CC on the northwest rim of Chicago, pioneered and popularized the plan. May asserts the increase in club restaurant volume enabled the club to serve the highest quality food.

The colorful May was a profitable businessman for golf. He was the first to stage big money tournaments, to build stands for spectators and to have a nationwide television hook-up for a golf tournament, his world championship. May also was the first to pay a professional big money for playing with prospective customers of the company. May gave that job to the winner of his world championship and "sold" the idea as a productive planned promotion to other business firms.

After May's death Tam O'Shanter was sold for a commercial and residential development.

More important than ever before is recruiting and training of competent mechanics for golf course equipment maintenance.

Mid-Atlantic superintendents stress that point in their News-Letter, edited by *Craig A. Spotswood,* superintendent, Manor CC, Rockville, Md.

As a reminder that perhaps education of golf course machinery

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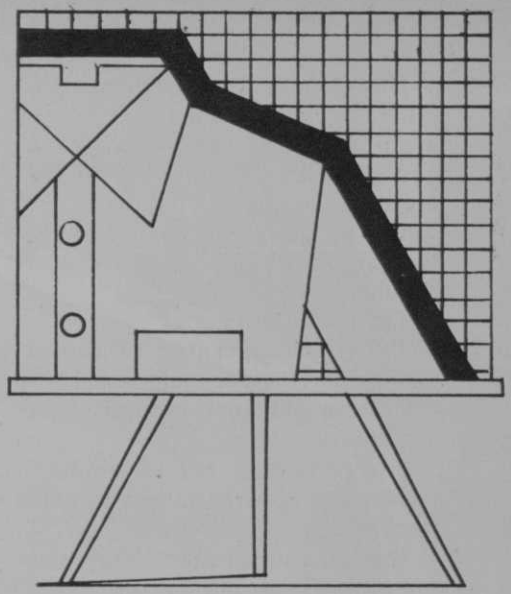

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GRAFFIS *from page 24*

mechanics and equipment users hasn't progressed satisfactorily, Spottswood reprints the Top Ten Tips on equipment management that was prepared by Roger Thomas of the Jacobsen Company in a paper for the 1962 GCSAA conference at Miami. There hasn't been too much adoption of the Thomas Ten Top Tips, and depending on the operators, catching onto the ABCs of equipment care continues to be the custom extensively. With the price of equipment and its sophistication rising each year, the training programs of the manufacturers have become increasingly important.

But whether correct maintenance of machinery is a matter of home study, supervised by the superintendent or something for a post graduate degree at a manufacturer's school, is debatable with the right answer being dictated, probably, by the superintendent's own knowledge and skill as a mechanic and by the time he has available for training.

That training has to be done in the off-season at all courses. If a program of winterizing equipment and educating employees in the use of each item isn't done in the winter at most American courses, the failure will cost heavily next summer.

The Thomas tips:

Train the operator to report missing parts on the equipment;

Observe and report general course conditions;

Projecting the need for replacement parts must be taught to your mechanic;

Teach the importance of listening for sounds of impending problems;

Educate employees with a planned rainy day program;

Never expect a good performance from poor instruction to workers;

Tell the operator to report immediately if equipment is damaging turf or evidence of vandalism appears;

Insist that equipment be kept clean;

Plan regular maintenance checks with employees present;

Spare the worker jobs he cannot capably handle, or better yet, train him to know the limitations of the equipment.

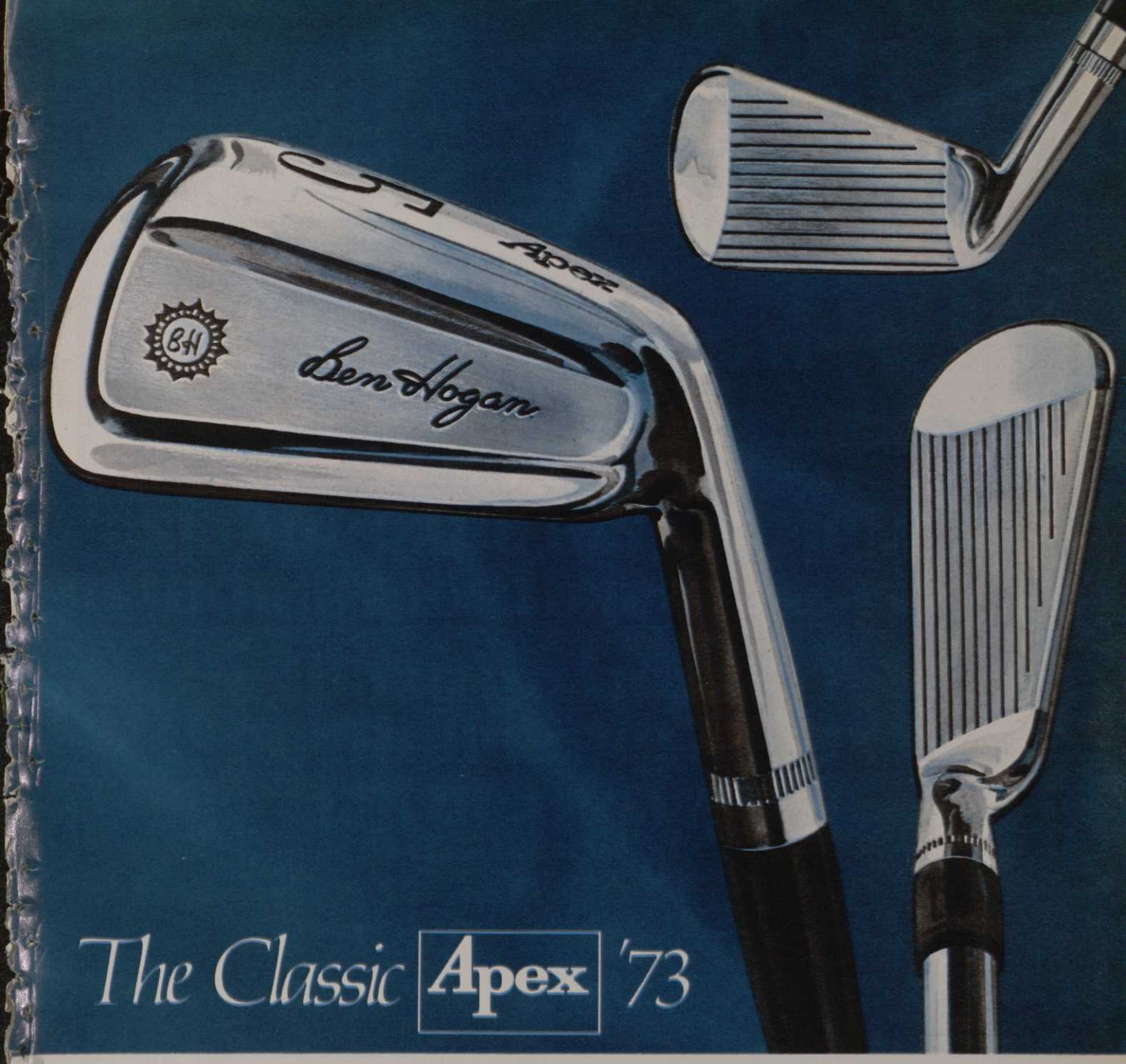
How are you doing on the program? It's just as good today and tomorrow as it was 10 years ago—maybe even better because the equipment costs more.

There'll be no shortage of Golf Halls of Fame in the United States. Work is proceeding on the Hall of Fame at Foxburg, Pa., at a scenic site adjoining what is said to be the oldest golf club in the United States on its original location. The American Hall of Fame organization has been operating for some years. Its president is *John W. Brand,* a son of a pioneer Scottish-American professional in the Pittsburgh district. Arnold Palmer and George H. Love are on the advisory committee.

The World Hall of Fame has issued a beautiful booklet on its building, to be constructed at Pinehurst as a feature of the Diamondhead Corp., developer of the noted golf resort. *William H. Mauer,* Diamondhead executive, is the World Hall of Fame chairman of the board. *John Derr* is executive vice president and *Lionel Calloway,* curator. The World Hall of Fame in its lengthy announcement did not mention the Tufts family, Donald Ross or Bob Harlow, golf notables who established the world fame of Pinehurst as a golf resort. The first Golf Hall of Fame in the United States was formed at Augusta, Ga., in 1934 with the PGA as sponsor and Grantland Rice, O.B. Keeler, Fred Corcoran, Kerr Petrie, Bob Harlow and Herb Graffis as the selection board. Later the PGA took over the ideas and selected additional names on a pro only basis. For years the PGA discussed having a hall of fame in its headquarters.

The LPGA has had its Hall of Fame for some years in the Augusta (Ga.) CC.

It'll be a long time, if ever, before the other historical shows catch up with the USGA Museum, although its library for cataloging and indexing certainly is no help to scholars. □



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INVESTMENT CASTING: Pro Shop Boon?

Cast clubs offer the professional a whole new sales approach. While you are teaching your member how to swing, you can sell him clubs that will correct his mistakes during the learning process by PARKER SMITH

The club professional should be entering a new era of selling golf equipment. Technological advances made by the major (and a few minor) manufacturers have enabled the professional to buy and sell clubs that are beneficial to the average player, clubs that actually help him hit the ball farther and straighter.

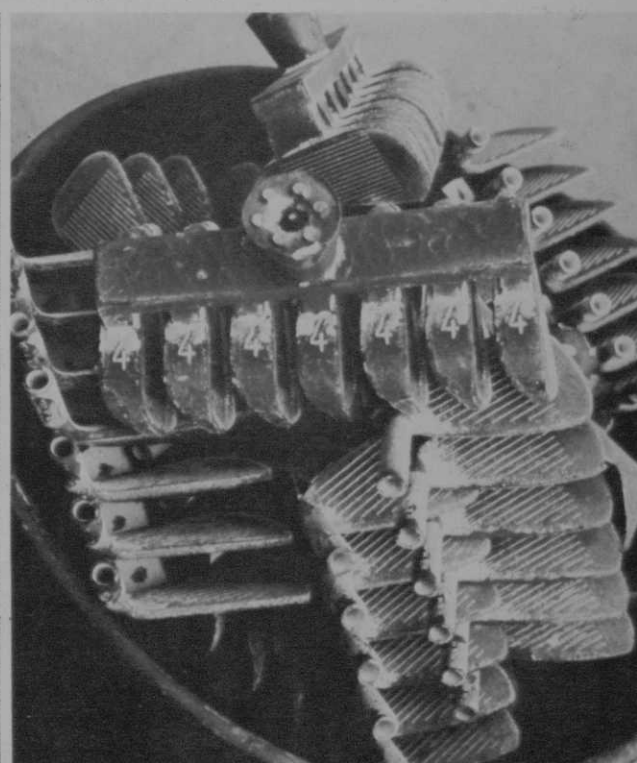
In the past, different types of shaft designs and materials captured the advertising headlines. This year, however, the professional has a major story to tell his members about what has been done for them at the end of the club.

The process of investment casting, a concept borrowed from the aerospace industry, has opened a whole new dimension to the club manufacturers. Up until now, all irons were made by forging. Although forged clubs are by no means inferior, they are limited in their ability to distribute weight to specific areas of the clubhead. Forgings are made by drop-hammering red hot steel bar stock in a pair of hardened steel die. This means that the object to be forged sits on a bottom die and another die is dropped down onto it. The shape of forged material is thus limited to that which can be withdrawn from the dies. The dies themselves are subject to wear from the pressure of the hot metal, and forgings can vary somewhat as the dies wear. The forged clubheads have to be ground and polished to uniform weights for a matched set of clubs. Of course this is done with extreme precision on all top quality forged heads. The economics of inexpensive sets, however, usually don't provide the money for completely precise polishing and grinding. This variation in forged head weights accounts in large measure for the variation in swing weights within a set of these clubs—a good point to remember when your member complains about a set of clubs that were forged. Don't be afraid, though, to buy forged sets of top lines. They will be every bit as good as the cast clubs, will have excellent workmanship and will help the golfer when he does hit the center of the blade.

When forging first became a sophisticated club-making process and the manufacturers knew they

continued

Two stages of the investment casting process—pouring the hot wax and the cast clubs as they come out of the mold. During the casting process, the molten wax is "lost" by melting and running out of the mold, leaving a cavity of the exact shape required.



CASTING *from page 29*

needed a new wrinkle in design, they tried different shapes for the heads. With casting, they can try different weights. Casting allows heads to be weighted in new ways—sole, toe-heel, toe-sole-heel, total perimeter—and even makes possible new ways to weight the "sweet spot." Each of these has a special value to a certain type of golfer and can be sold as such.

The short hosel took the non-productive weight out of the head and added it to the blade. The hollow-back took the weight from the "sweet spot," where "the average player hits it once in 10 tries" anyway, and put it out on the corners—the part of the blade that usually hits the ball. By removing this weight from the center and adding it to the edges, the moment of inertia is increased. The benefits for the average golfer should become apparent immediately. A weighted sole lowers the center of gravity of the head, thus getting the ball in the air more easily. Got a few members who complain they hit line drives? Hand them a sole-weighted club, tell them what it's designed to do and watch their eyes light up.

Conversely, the player who skies the ball should try the old-fashioned blades with thick tops or the new perimeter-weighted clubs where the center of gravity is at a higher point, thus enhancing the player's ability to keep the ball "down." A toe-weighted club is the perfect gift for the golfer who toes it, the heel-weighted for the man who tends to catch it in the "neck.

In each case, the casting process gives the manufacturer virtually unlimited freedom and consistent accuracy in producing any desired shape of club. Briefly, the cast head starts with a pattern from which a two piece metal "master" mold is constructed. Molten wax is then injected into the mold and allowed to cool, producing an expendable wax clubhead. This is "invested" or dip-coated with several layers of a refractory slurry to form an expendable shell. Then the wax is melted out, the shell is cured in an oven (burning off any remaining wax) to leave a female cavity or mold of the exact shape desired. Finally, molten steel is poured into the expendable shell mold, producing the cast head. Note that the wax patterns are "lost" when they're melted out and that molten steel, being poured into the mold, does not contact the metal master wax mold. That's why the 100,000th or last "precision" cast head will be nearly exactly the same as the first.

When you're doing your buying, don't think that cast clubs will totally replace forgings, however, because many of your members will have psychological problems changing. Your better golfers may not want to change. For the most part, though, investment casting gives you the opportunity to sell a set of clubs with the knowledge that they'll help the individual buying them—and that's no small selling point. □

Author's Note: My thanks to Bill Winquist, who supplied the facts on the forging and casting processes.

APPROXIMATE MECHANICAL PROPERTIES OF SOME FORGED AND CAST ALLOYS REPORTED BY CLUB MANUFACTURERS

	Forged, Plated Steel	Forged Stainless Alloy Steel	Investment Cast Stainless Alloy Steel	
Alloy Type	1018-1020	416	17-4	431
Tensile Strength lbs./sq. in. (psi)	64,000	70,000	180,000	125,000
Yield Strength (psi)	54,000	40,000 (1)	150,000 (2)	110,000 (2)
% Elongation in 2" (ductility)	15	22	6	18
Capable of bending to adjust lie	readily	readily	with caution	readily

(1) Bending strength of material adequate if one uses large diameter hosel over shaft
(2) Note: cast clubs require higher strength material if one uses short hosel with small diameter pin inside shaft