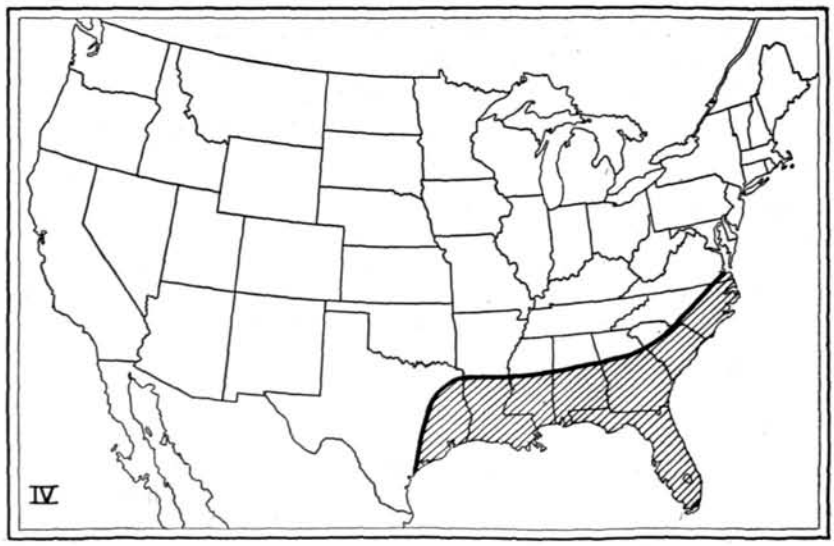

MAP IV. CARPET GRASS. The hatched area is that in which carpet grass is adapted.

A, B, C of Golf Course Hydraulics

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During the past few years there has been a great increase in the interest taken in golf, with a resulting large increase in the number of courses used. The more pretentious of these courses, supported as they are by clubs having a large membership, are generally well laid out and cared for. But in the case of many of the smaller clubs the financial situation does not permit of expert planning and supervision.

In order that a golf course may be kept in satisfactory condition, a water supply is of prime importance, and, strangely enough, it is the one feature which seems to have received the least attention. Even among the better courses many examples of insufficient water supply are found, or of a water supply with such inadequate piping as to prevent the water being applied either economically or satisfactorily.

With a water supply satisfactory in quantity, delivered through piping of sufficient size, and with a suitable pressure at the hydrants, the greens can be watered or sprinkled so as to obtain a satisfactory growth of grass, and that without danger of the greens becoming soggy. But where the water supply is insufficient or the piping too small or the pressure too low, a proper application of the water becomes so difficult or tedious as to render it reasonably certain that a proper irrigation of the greens will not be had. Some parts will probably be insufficiently irrigated while other parts may be injured by the application of too much water.

In view of the above statement of conditions it has seemed that a few notes bearing upon the water supply subject would be welcome. These notes, being intended for the assistance of those who are not technically informed rather than for those who have made a study of the subject, will begin with the most elementary facts and be extended to such an extent

as will, it is believed, be of assistance in dealing with the subject of a water supply satisfactory for the ordinary golf course.

The quantity of water is usually stated in gallons or in cubic feet.

A cubic foot of water weighs, at the ordinary temperature of 60°, 62.4 pounds.

A cubic foot of water contains 7.48 gallons, each gallon containing 231 cubic inches.

A gallon of water weighs 8-1/3 pounds.

As an example of the use of the above facts, suppose an area of 10 feet square to be covered with water 1 inch in depth. How many gallons or cubic feet or pounds of water would be used?

$10\times10\times1/12=8\text{-}1/3$ cubic feet.

$120\times120\times1\div231=62.33$ gallons.

$8\text{-}1/3\times7.48=62.33$ gallons.

$8\text{-}1/3\times62.4=520$ pounds.

Areas of ground are usually stated in acres or square feet. The smaller areas, such as the cross-sections of pipe, etc., are usually stated in square inches.

An acre contains 43,560 square feet.

To irrigate an acre, therefore, to the same extent as an inch of rainfall, would require $43,560\times1/12$ or 3,630 cubic feet of water. This is equivalent to $3,630\times7.48=27,152$ gallons.

If a faucet or valve on a system supplying water be opened, the water flows through the pipe and from the faucet because of the pressure to which the water in the pipe is subjected.

Water flows in all pipe systems because of pressure. This pressure may be produced by pumps or by elevated reservoirs or by elevated tanks in which the water is stored.

Pressure is usually stated as so many pounds per square inch. It may conveniently be measured by using a pressure gauge attached to the piping system.

If we measure the pressure on a piping system at different points we will find that it varies with the elevation of the points at which the pressure is measured, being less at the higher points. It will be found by experiment that a difference in level of 100 feet will produce a difference in pressure of 43.3 pounds per square inch.

The volume and weight of a column of water 100 feet high and 1 inch square would be as follows:

$1\times1\times1200\div231=5.195$ gallons.

$5.195\times8\text{-}1/3=43.3$ pounds.

The height of a column of water necessary to produce a certain pressure we speak of as the head corresponding to that pressure. So head or pressure may be used interchangeably with the provision that 100 feet of head is equal to 43.3 pounds per square inch. This would make a head of 10 feet equal to 4.33 pounds, or a head of 1 foot would be equal to .433 pounds. From the above a pressure of 10 pounds per square inch equals 23.1 feet of head.

The Green Committee of the U. S. Golf Association is always glad to publish items showing how work around courses can best be done.