RURAL HYDRAULICS: A PRACTICAL TREATISE ON RURAL HOUSEHOLD WATER SUPPLY

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Rural Hydraulics: A Practical Treatise on Rural Household Water Supply by W. W. Grier

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RURAL HYDRAULICS

A PRACTICAL TREATISE

ON RURAL HOUSEHOLD WATER SUPPLY.

GIVING A FULL DESCRIPTION OF SPRINGS AND WELLS, OF PUMPS AND HYDRAULIC RAM, WITH INSTRUCTIONS IN CISTERN BUILDING, LAYING OF PIPES, &c.

BY

W. W. GRIER.

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PREFACE.

Having for years sought a practical work on rural hydraulics without success, and in the meantime experimenting largely on the subject, and gaining by experience and cost, many points of value, I have concluded to give my gleanings to the rural world at a trifling cost, and in a homely way.

Technical terms have been studiously avoided, and the plainest and most pointed terms at my command used. If I can add my mite to the store of knowledge, and aid in helping my fellow farmer and toiler to an additional home comfort, I shall have accomplished my purpose

INTRODUCTION.

The subject of Hydraulics has ever been one of interest to the human mind, and for ages commanded the attention of the learned and enterprising. From the time of Rebecca at the well, to the Centennial of American independence, the crowning year of mechanical perfection, the practical application of machinery to elevate water for use or for ornament, has been the study of earth's noble benefactor—the inventor.

First, the simplest of hydraulic machinery, the earthen vessel; then the attachment of a rope or pole, letting the vessel into the well; next the wheel, with an ascending and descending series of buckets; again the use of a treadle; then of oxen; then water to elevate water by wheels; the Hydraulic Ram; then wind; and last, but perhaps the most popular, steam.

It may well be said that we can judge of the civilization of a country by consulting the perfection of its practical hydraulics.

ANCIENT WATER WORKS.

When Babylon was at the zenith of its glory its hanging gardens 350 feet high were copiously watered by wonderful machinery, raising the water step by step from the river Euphrates. Like many of the arts of the Ancients the means or machinery by which such wonderful results were attained has passed with that strange but intelligent people into the shades of forgetfulness. Not a sketch, a drawing or a trace of that device has been handed down to us.

The power devices of the Ancients were very crude but as in the case of Babylon were very efficient. The want of pipes of sufficient strength to carry such heavy pressure must have opperated very seriously in their hydraulic engineering. We who live in an age of Iron and Steel cannot appreciate the difficulties of engineering encountered by the Ancients when as at Herculaneum the hammers were made of gold, because of its abundance, and tipped with iron, because of its scarcity and value.

THE ORIGIN OF WATER IN THE EARTH.

Nearly all the water above the sea level is elevated by the agency of the Sun, whose heat evaporates the surface water. The air being dry and warm absorbs the vapor thus forming clouds which are wafted over the land becoming under favorable circumstances condensed into fine drops or globules which unite forming rain drops, or still farther, snow and hail which by their reduced bulk and increased specific gravity fall to and sink into the earth, filter through the porous earths and sand till reaching a stratum of clay or rock impervious to it, flows pown to its greatest depression and issues in hilly countries as a spring or in flat or low countries in a subterranean basin.

The action of the sun on the water seems slow and insignificant, but its results are mighty, its work silent and surely done, and earth otherwise arid and parched, is made to bud and blossom as the rose, and form for man a beautiful, fruitful, and verdant home.

Man with his limited understanding, cannot comprehend in their true proportions, the wonderful aerial visions, which become so common from frequent association that they lose all novelty, and cease to elicit a word of comment or even to attract attention. The glorious sun-set or sun-rise, gilding the heavens with its thousand hued rainbows, and spreading daily before us such a varied and wondrous display of colors and grandeur, is unheeded, and the part they perform in the economy of nature and the service of man, cost him, at most, but a casual thought.

CAUSE OF SPRINGS.

The water, from rain, filtering through the various strata, composed of such varied minerals; is more or less charged with and carries in solution, lime, salt, sulphur, magnesia, etc. These substances give it character. Springs most prized flow from granite, freestone, or sandstone rock, which either does not possess or give off in solution their peculiar constituent elements.

MEDICINAL SPRINGS.

Other springs highly prized for their medicinal properties carrying in solution, iron, sulphur, salt, lime, chalybeate, and other combinations, are highly prized for their medicinal and health restoring properties. Institutions such as the Sanitarium of Clifton springs, N. Y., are built up on the supposed or real merits of the healing efficacy of their springs containing, sulphur, iron and such other combinations as are admitted to be sovereign remedies.

HOT SPRINGS.

Springs which do not depend on the rain for supply are very rare but occur in certain districts far separated, such are the hot springs of Arkansas, the hot (mud bath) springs of California, and the noted Geysers of Iceland, which discharge from a subterranean source.

ARTESIAN WELLS.

Artesian wells, or springs rather, (man having only made an outlet for them,) have been made in various countries of the earth and in some cases eject large quantities of water, oil, or gas.

WELLS.

Having briefly referred to the origin of springs we now come to the description of the best means of utilizing them, beginning with the spring and the means of securing a body of water near where it issues. When a spring issues on the surface the means of controlling it is a comparatively easy matter, but as in many localities no springs appear on the surface, water must be sought by digging, as a good supply of water can usually be found in from 10 to 100 feet of the surface, either by sinking to a fissure through which a spring is flowing or by reaching a subterranean lake or basin. In localities where the sub stratum is composed of gravel, water will be found at a uniform depth but where the stratum is of rock or clay no uniformity of depth prevails. And reaching water in many cases depends entirely on striking a fissure. Selecting the spot for sinking a well is therefore of great importance but as yet little light has been thrown on the subject by science. The topography of the land may give some indication of fissures in the sub-stratum, but is not of much practical value. We may have selected a site for a well just over a solid rock hundreds of feet deep, through which there is no fissure, and as a consequence though water may surround that rock to near its surface the well will remain dry, which is abundantly proved by the experienced of those drilling for oil. Many wells producing little or no oil till by the use of nitro glycerine, a blast is made at the bottom of the well hundreds of feet deep, which breaking the rock into which the well was drilled, allows the oil to flow into the well. A few years since on property of Mr. Jas. Irons, in Beaver Co., Pa. a well was dug through rock to a depth of perhaps 30 ft. without striking water. At one time as Mr. Irons was ascending the well he heard running water, by the aid of a drill he made an opening a few inches deep, striking a fine spring, which soon filled the well to that depth.