NEW PLAN FOR TIDE-MILL WATER-WORKS.

The following plan for arranging water-works for a tide-mill is communicated by Dr. J. Seguin to *Le Génie Industriel*. It is so simple, and, in certain situations where the tides rise to a great hight and where there are conveniences for forming the ponds, it would furnish so extensive and constant a motive power that we wonder it has not been employed before this time.

Two large basins are formed communicating with the sea, and the works are placed in a trench leading from one basin to the other. Dams are placed across the mouths of the basins leading to the sea, one of which dams is provided with a hanging gate or series of gates swinging inward, while the other has gates swinging outward. The former basin is filled by the high tide, and the latter is emptied whenever the tide is low; and thus the water is constantly maintained at a higher stage in the former than it is in the latter. By this arrangement, a constant waterfall is obtained in the canal connecting the two basins.

Of course, the fall would be considerably less than the rise and fall of the tides, and the plan would be practicable only where this amounted to several feet. In order to show, at a glance, on what parts of the coast this plan might be practicable, we give the rise and fall of the tide at several points on the Atlantic and Pacific coasts. The figures are extracted (by permission) from the tide tables compiled by Professor A. D. Bache, Superintendent of the United States Coast Survey, and published by E. & G. W. Blunt, No. 179 Water-street, this city.

Port.	Mean. Feet.	Spring Tides. Feet.	Neap. Tides. Feet.
Portland, Maine	8·8	10·0	7·8
Portsmouth, N. H.	8·6	9·8	7·2
Newburyport, Mass.	7·8	9·1	6·5
Salem, Mass.	9·2	10·6	7·8
Boston Light, Mass.	9·3	10·9	8·1
Boston, Mass.	10·6	11·3	8·5
Nantucket, Mass.	3·1	3·6	2·6
Montauk Point, L. I.	2·0	2·5	1·4
Sandy Hook, N. J.	4·8	5·6	4·0
New York City	4·3	5·4	3·4
Watch Hill, R. I.	2·7	3.1	2·4
New Haven, Conn.	4·8	6·6	5.1
Cold Spring Inlet, N. J.	4·4	5·4	3·6
Cape May Landing, N. J.	4·8	6·0	4·3
Delaware Breakwater, Del.	3·5	4·5	3·0
New Castle, Del.	6·5	6·9	6·6
Philadelphia, Pa.	6·0	6·8	5·1
Old Point Comfort, Va.	2·5	3·0	2·0
Baltimore, Md.	1·3	1·5	0·9
Charleston (Castle Pinckney), S. C.	5·3	6.3	4·6
Fort Pulaski (Sav. entr.), Ga.	7·0	8·0	5·9
Savannah (Dry Dock Whar.), Ga.	6·5	7·6	5·5
St. Augustine, Fla.	4·3	4·7	3·5
Key West, Fla.	1·4	2.3	0·7
San Diego, Cal.	3·7	5·0	2·3
Monterey, Cal.	3·4	4·3	2·5
San Francisco (north beach), Cal.	3·6	4·3	2·8
Astoria, Oregon Territory	6·1	7 3	4·5

In the preface to these tables, Professor Bache makes the following general remarks in regard to the tides on the coasts of the country:—"The tides of the coast of the United States on the Atlantic, Gulf of Mexico and Pacific are of three different classes. Those of the Atlantic are of the most ordinary type, ebbing and flowing twice in 24 hours, and having but moderate differences in hight between the two successive high waters or low waters, one occurring before noon and the other after noon. Those of the Pacific coast also ebb and flow twice during 24 hours, but the morning and afternoon tides differ considerably in hight, so much so that, at certain periods, a rock that has 3½ feet water upon it at low tide may be awash on the next succeeding low water. The intervals, too, between successive high or successive low waters may be very unequal. The tides of ports in the Gulf of Mexico, west of Cape St. George, ebb and flow, as a rule, but once in 24 hours, or are single day tides. At particular parts of the month, there are two small tides in the 24 hours. The rise and fall in these ports is small. East of Cape St. George the rise and fall increases; there are two tides, as a rule, during the 24 hours, and the daily inequality referred to in the Pacific tides is large."

AMERICAN NAVAL ARCHITECTURE.

[Reported expressly for the Scientific American.]

THE STEAMER "DANIEL DREW."

This fine steamer, having a very easy and a very superior model, has been erected with the view to attain a very high speed, and such are the sanguine expectations of those who are her builders, that they have made the assertion that she will beat the majority of the vessels of her tunnage in our waters. We deem it advisable, therefore, to publish the details of the construction of hull and machinery; they will be found annexed:—

Length on deck from fore-part of stem to after-part of stern-post, above the spar deck, 252 feet; length at load line, 245 feet; breadth of beam at midship section above the main wales (molded) 30 feet 6 inches; depth of hold to spar deck, 9 feet 4 inches.

Her hull is of white oak, &c., &c., and very securely fastened with rivets, treenails, spikes, &c., of appropriate diameter and lengths; her frames are molded 15¾ inches; the same are sided 4 inches, and distance apart at centers, 30 inches; the depth of her keel is 3 inches.

The *Daniel Drew* is fitted with one vertical beam condensing engine; diameter of cylinder, 60 inches; length of stroke of piston, 10 feet; diameter of water wheels over boards, 29 feet; material of same, iron; length of wheel blades, 9 feet; depth of same, 2 feet 4 inches; and their number 24.

She is supplied with two return flue boilers, each 29 feet long; their breadth at furnace is 9 feet; at shell, 8 feet; hight of same, exclusive of steam chimney, 9 feet 7 inches; number of furnaces, 2; length of grate-bars, 7 feet; number of same below, 10; internal diameter of flues below, 2 of 13½ inches, 1 of 13 inches, 1 of 11 inches and 1 of 7¼ inches; internal diameter of flues above, 9¼ inches; length of flues above, 22 feet. She has two smoke pipes, whose diameters are 4 feet; hight of same, above grate surface, 32 feet; draft forward, 4 feet 6 inches; draft aft, 4 feet 6 inches.

The boilers possess a heating surface of 3,350 square feet. Maximum pressure of steam, 35 pounds; point of cutting-off, one-half. Maximum revolutions at maximum pressure, 26. Her boilers are located in the hold; she possesses water-tight compartments, bunkers of iron, and one independent (extra size) steam fire and bilge pump, bilge injection, and bottom valves or cocks to all openings in her bottom. In addition to these features, she is amply protected from communicating fire by felt, iron tin, &c.

The builder of the hull of the vessel is Thomas Collyer; the builders of her machinery are the Neptune Ironworks; the route of her intended service is from New York to Albany.

AGRICULTURAL SCIENCE AND ART.

The water wheel is an exceedingly old motor, and, although the steam engine has proved to be the greatest mechanical agent of modern times, it has not, and never will, supersede the former for some purposes and situations. Where water-power is abundant and fuel dear, of course, a water wheel is the most suitable, because it is the most economical motor; and as it is with this water engine, so we have the same claims to advance for the old windmill. In such situations as extensive plains—where there is no water-power and where fuel is expensive—the windmill is a most useful motor, and may be economically adapted to circumstances. The *California Farmer* takes this reasonable view of the subject in regard to windmills for several sections of that great State, where fuel is dear and no water-power can be obtained. Their application for pumping water from low rivers to higher elevations and into reservoirs is recommended, so that it may be used for irrigation during the periodical drouths. This application of the windmill deserves attention, because it is founded on a good appreciation of its merits in such cases.

In reference to the benefit of agricultural machines, the *California Farmer* says:—"In an age of inventions of labor-saving machines, nothing has tended more to develop our national wealth than those contrivances which enable the farmer to increase the amount of the product per acre—to raise and convert into marketable condition a greater annual value of the means of life without a proportionate increase of cost or labor. Steam has indeed increased and cheapened the facilities for the transport of commodities, and, while it has opened new fields for labor, has also given us new markets for the product of labor. Printing has disseminated knowledge, and the electric telegraph furnished a lightning express for the conveyance of information that cannot wait the slow movements of steam or horse-power. But the earth is the primal source of wealth and power which sets all this machinery in motion; and, though it is said 'man cannot live by bread alone,' it is certain that he cannot live without it. Reaping machines have been of peculiar benefit to California, a country which can produce wheat enough to supply the continent, and which has now the prospect of a crop surpassing the product of Egypt, or the harvest which is annually shipped from the ports of the Black Sea. We cannot too earnestly impress upon our farmers the policy of being provided with good and reliable instruments of husbandry. Any other policy is 'penny-wise and pound-foolish.'"

The *Cincinnatus*, for last month, states that R. Peters, of Atlanta, Ga. (who is one of the persons that first cultivated the *sorghum* plant in this country, and who went into the business on a large scale for several years, under the sanguine expectations of ultimate success), has at last given up its cultivation. He is satisfied that, for cattle feed, its stalks are not superior to Indian corn, while its seed is injurious. As a producer of sirup, it will not compete with the common sugar cane in the South; but where fuel is plenty, in some of the northern States, it may be cultivated with economy for this purpose.

No crop can be more profitably raised for domestic animal feed than carrots and sugar beets. Horses are very fond of the former, and a few of them fed out every evening tend to keep the hard-working animals in good condition. About 30 tuns of this root may be raised upon an acre of well-cultivated land. Milch cows and sheep delight in sugar beets; it is a very healthy food for them, and should be cultivated by every farmer for this purpose.

MICHIGAN SALT.

If the sea were the only source for furnishing salt, the interior of our continent would perhaps be rendered uninhabitable. It has been far otherwise ordered, however, as there are found vast reservoirs of salt in the condition of saturated brine, extending over an extensive area in several States. These saline subterranean fountains are indications of a pre-arrangement for the supply of this useful agent, to a vast population, just as the great coal fields afford indications of a pre-arranged supply of fuel for the development and advancement of civilization. In the centre of New York, the salt springs of Salina are a source of State revenue, and they are essentially more useful than gold mines. In Pennsylvania and Virginia, there are also very many brine springs which afford salt for the people, and quite recently a very valuable one has been opened at East Saginaw, Michigan. The bore of this spring is only 3⅝ of an inch in diameter, but the supply is very abundant, as by continual pumping for 36 hours, drawing 22 gallons per minute, there was no sensible diminution noticed. The well is 617 feet deep, and a pint of the brine (by the analysis of Prof. J. G. Webb, of Utica, N. Y.,) contains 1416 grains of pure salt (chloride of sodium) and 32 grains of solid impurities. A bushel of commercial salt has been obtained from 23½ gallons of the brine. The East Saginaw Salt Co. are about boring another spring of 6 inches in diameter, and, no doubt, they will soon be able to supply a large quantity of this necessary article. In 1858, the New York salt springs yielded 7,033,000 bushels, most of which was sent to the North and West; no less than 1,669,000 bushels of it having been entered at the single port of Chicago. The discovery of salt springs in Michigan, therefore, is held to be of vast importance to the northwestern States.

THE MOTION OF A CANNON BALL.

The latitude of New York City is 40° 42′ 40″; and as the degrees of longitude diminish in length from the equator to the poles, the length of a degree of longitude here is about 52½ miles, or more nearly, say 277,250 feet. As the earth turns on its axis once in 24 hours it carries everything on its surface, from West to East, to the distance of one degree in four minutes; so that the city of New York, with everything else in this latitude, is constantly running round towards the East at the rate of about 13 miles a minute, or, more accurately, 1,155 feet in a second. Now, this is just about the velocity of an ordinary cannon ball. Hence, if a cannon in this latitude is fired when pointing exactly West at a fort, the ball is simply *stopped* in its eastern motion—the cannon *runs away from it*, and the fort *comes up against the ball* with a crash! This refers merely to the motion of the ball in relation to the diurnal rotation of the earth; if we attempted to ascertain the absolute motion of the ball, considering the motion of the earth in its revolution around the sun, and the motion of the sun among the stars, we should find the problem not only very complicated, but absolutely insoluble in the present state of astronomical science; indeed, it is impossible to conceive that we ever can have such knowledge of the universe as to enable us to determine the absolute motion of the sun in space.