

The Cactus Plants of California.

The San Francisco *Bulletin* says:—"The cactus—the celebrated family of the floral kingdom, the glory of the hot-houses of Europe and the wonder of travelers, whose flowers and fruits are seen in every league of surface in South California, Arizona and the Peninsula—has never sufficiently attracted the attention of our florists or farmers. Fifty-five species of cactus are known in the botany of these sections, and they include some with magnificent flowers and of extraordinary appearance, forming beautiful ornaments when in the vicinity of other vegetation. If the different species, all covered with thorns, could be got together in a California garden, they would form one of the most singular and unique displays it is possible to conceive in gardening, and it is to be remembered that the fruits are as valuable for human food as the flowers are for feasting the eye.

"The cactacia have an immense range in the altitudes of Central North America, or in what we may term the California *simulacra* of climates and soils, as they are found from the parallel of Cariboo to Cape St. Lucas, and from the eastern slopes of the Rocky Mountains in North Dakota to the Gila river. They are met with in all latitudes between the Gila and Panama, from the line of perpetual snow to that of the sea-shore. Some two hundred different species of this singular family of American plants are enumerated in the botany of Mexico, ranging from the shape of a cabbage to that of a grape-vine, and looming high as a tree and umbrageous as a small oak. Their flowering is of extraordinary splendor and loveliness, and is from the purest white to vermilion, including every mixture of the prismatic colors. But it is the fruit, the standby of the poor and the Indians in the seasons of drouth and famine, that unfolds this providential blessing of the desert in all its value.

"Engleman, of St. Louis, an eminent writer on this family, enumerates as indigenous to Arizona and South California four genera of the cactus; that is, thirty-seven species of the cereus or perpendicular stems, six cumamalarias or mamacs, and six echinocactus or cabbage heads. Almost every one of these is found in the mountain ranges and deserts of Los Angeles, San Bernardino and San Diego counties. In Lower California many specimens are met with which are foreign to our parallels and latitudes, one of which, a climbing variety, is found in the driest months to be full of the purest water. One of the opuntas has a small fruit, specific in scurvies and blood impurities, while others have fruits with the flavor of pine-apples, of strawberries, peaches, plums and cherries, of the luscious cheramoya and mangostein, of the fig and grape, and of the lemon, apple and pear.

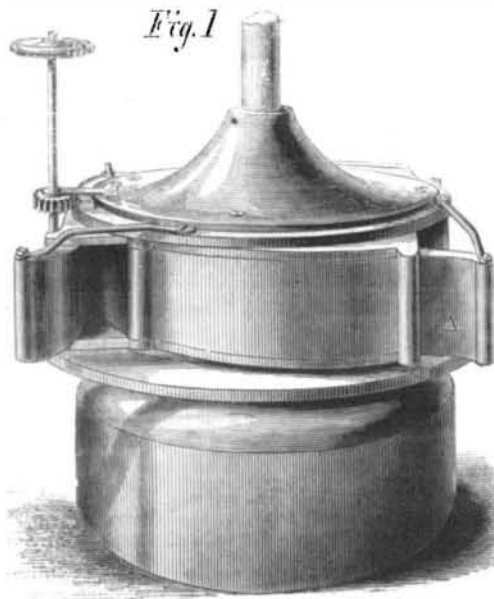
"The *Cactus Opuntia*, or Indian fig of Mexico—white and red—was introduced into the mission gardens of our State from Santa Clara to San Diego in the early settlement of the country, some seventy years ago; but they are also found indigenous to the mountains of the Colorado, in San Bernardino and San Diego counties. Near all the southern missions below Point Conception they grow luxuriantly, particularly at Santa Barbara, San Fernando and San Gabriel. At the two last named places they are extremely abundant and luscious. These varieties of the prickly pear are valuable additions to the food of our State, as the fruit is not only very plentiful in summer and fall but is highly nutritive and agreeable, and can be gathered at will, and the plant requires no care. When stripped of the prickles they can be boiled down to an excellent conserve or sirup, or dried in the sun for preservation, as they contain a large quantity of sugar and gum. The plant is easily propagated by slips or seeds, and has a wonderful endurance, vitality and hardness. It comes to perfection in three years. Its seeds, which are very abundant in the fruit, are toasted by the Indians as a substitute for corn. The mucilage of the leaves or fronds is thrown into water and used in making cements and white-washes, and gives great strength to those house-building materials in the arid districts of Mexico. It is in common use around Los Angeles.

"Being such plentiful and excellent producers of sugary fruit, so necessary to the laboring man in our dry and attenuated atmosphere, this matter should be attended to by our people, as well as the arts of making molasses from maguey, pumpkins, melons,

watermelons, grapes, pears, beets, cornstalks, and the wild sugar-cane or panoche-carisso of the Tulares. All these fruits are well known to the Indians and Mestizoes of Sonora and New Mexico, and those of Chihuahua and Coahuila, as producing sugar; and particularly the Cactacea and Agave, among the Pimos and Papagos of Arizona, who consider the cactus and the maguey as gifts of the gods, for from them they receive food, clothing, shelter and fencing. The reduction of these articles to conserves and molasses is often facilitated among these simple people by a concentrating process of roasting and baking, and boiling down slowly afterwards, with a little water, to a viscid sirup which never ferments in their keeping, though several of them are also used in the fabrication of mescal or spirits. Of such an exhilarating quality is this fire-water that when 'in the spirit,' they would not give a *clauco* to call themselves king, priest or judge, for they often give for such alcoholics weight for weight in silver, and bless the vender for his trade."

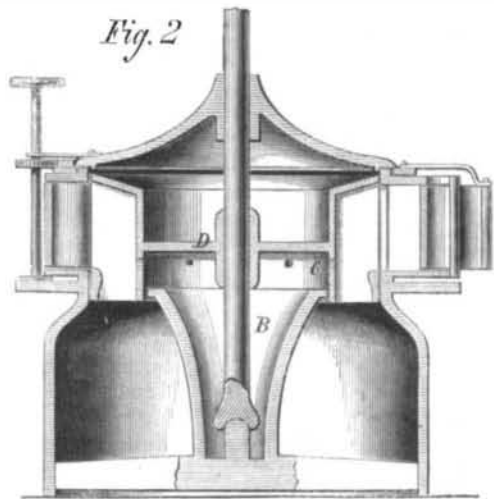
VANDEWATER'S TURBINE WATER WHEEL.

The engravings published herewith represent one of Van Dewater's improved water wheels. These



wheels are quite celebrated and are in use in all parts of the country. We have seen testimonials from different parties now using them, who express the greatest confidence in, and satisfaction with them. Mr. Van Dewater says:—

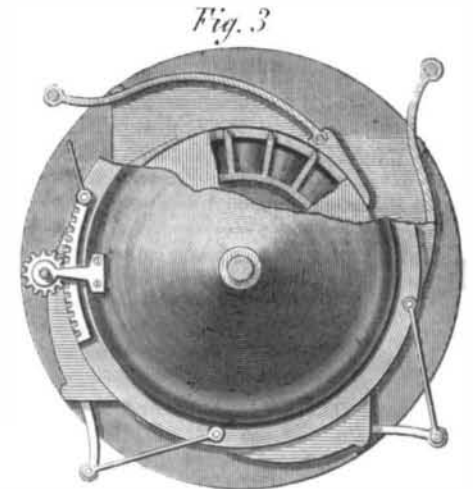
"My experience for upwards of twenty-three years has enabled me to become thoroughly acquainted with all the difficulties that each and every water wheel of the day is subject to, and I have made effort to avoid them; from my certificates I think that manu-



facturers and mill owners will be able to convince themselves of its utility and superiority. My long experience in building turbines has enabled me to construct my buckets so as to gain a maximum speed of the velocity of the water on all their points at the working speed of the wheels.

"I am ready at all times to contract with manu-

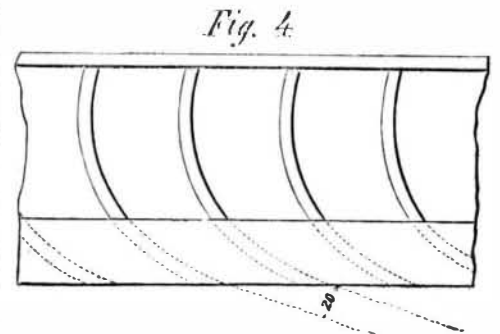
facturers and mill owners to construct and set in operation my Improved Jonval Water Wheel, from 3 to 350 horse-power, upon the most reasonable and satisfactory terms. The wheel is highly finished, and



the buckets are polished, and so constructed that they can be built of iron or steel. I am willing to warrant my wheel to work up to my table, which yields the most horse power from the amount of water used. The great outlay of building penstock is avoided, and under a fall from 15 to 25 feet the pressure is so great that the floom must waste more or less water in time if the wheel is not located near the upper level of the fall. It can be located at any point, or between two levels of the fall or set in the bottom of the floom."

An 18-inch wheel, under 6 feet head, 24 inches of water, makes 189 revolutions per minute at work—giving, according to Mr. Van Dewater, 1.81-horse power; and he says he has yet to learn of a single instance where they have failed to give satisfaction.

The several engravings depict the following views:—Fig. 1 a perspective, Fig. 2 a vertical section, Fig. 3 a plan, and Fig. 4 a section showing the shape of the buckets. In Fig. 1 the inlet gates, A, are represented with the mode of operating them; in Fig. 2 the section shows the buckets and the device for balancing the wheel, so as to avoid excessive friction on the step. This is attained by making the step chamber, B, water-tight, and having a series of small holes, C, in the circumference of the wheel disk. Through these wheels the water finds its way when



the wheel is at work and filling the step chamber, bears up against the diaphragm, D, and finally escapes at the inside edge of the chamber. This does not in any way affect the discharge which takes place at the bottom of the buckets.

This wheel is quite different from that patented by Mr. Van Dewater on June 2, 1863, having many essential alterations which changes its character. The water passes out at the bottom of the wheel, owing to the shape of the buckets, at a tangent of twenty degrees, and the shape of the curve is shown in Fig. 4.

Mr. Van Dewater has obtained several patents on his wheels, and one is now pending on this through the Scientific American Patent Agency; for further information address H. Van Dewater, Buffalo, N. Y.

HOWDAN FOWLS.—In the vicinity of Paris great attention is paid to poultry breeding. The Howdan breed has the advantage of great precocity. Fifteen weeks suffice to enable them to attain their development, and eighteen or twenty days complete the fattening process, on barley meal mixed with milk, without water.