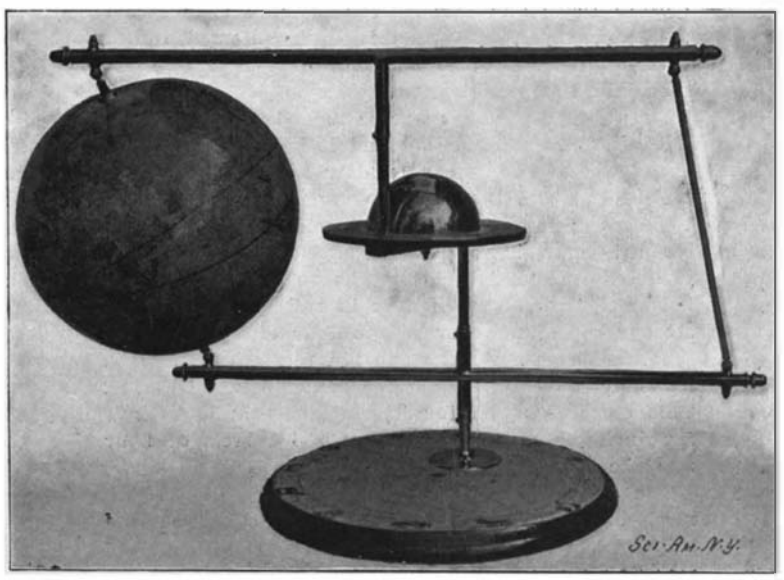
THE CRADDOCK TELLURIAN.

An apparatus of simple, durable construction, which will illustrate in an intelligible way the earth's motion upon its axis and around the sun, the alternation of day and night, the varying length of day according to latitude and season, and other phenomena connected with the earth's motion, has been brought out by the Craddock Tellurian Company, of Knowlesville, N. Y., in accordance with the plans drawn up by the inventor, Mr. John H. Craddock. The tellurian consists of a base which supports a stationary standard, comprising two vertical portions out of alinement and connected by a cross-piece. On these two vertical portions, two parallel, horizontal swinging arms are pivoted, the pivots being so located that an imaginary line connecting them would form an angle of 23 deg. 15 min. with the vertical. The arms at one end are joined by a rod forming an angle of 23 deg. 15 min. with the vertical, and at the other end are provided with pins connected by ball and socket with a globe representing the earth. On the cross-piece joining two vertical portions of the standard rests a hemisphere representing the sun, provided with a board representing the plane of the ecliptic. The board is divided into twelve sections representing the months. The cardinal points are marked to show the direction of the earth's motion.

Our illustration pictures the conditions prevailing at the winter solstice (December 21). The tellurian clearly shows that the earth is in perihelion and that the southern hemisphere is more brightly illuminated than the northern, the direct rays falling upon the tropic of Capricorn, showing that summer is beginning in the Southern Hemisphere and that at noon the sun will be at the zenith for places on the tropic of Capricorn. An imaginary line drawn through the point of intersection of the equator with the ecliptic will indicate the division of day and night over the earth. The declination of the sun at noon can also be readily figured for any point; for instance, 23 deg. 15 min. south for any point of the equator. By turning the arms, the various phenomena occurring with the change of seasons can be faithfully reproduced. Such movement will show that the earth's axis always remains parallel to itself, that day and night are always of equal length at the equator, that at the autumnal equinox the sun is at the zenith at noon for any point of the equator, that day and night are of equal length for all points of the earth, and that the sun's rays reach both poles.



THE CRADDOCK TELLURIAN.

THE SANTA CRUZ WAVE MOTOR.

BY H. W. H. PENNIMAN.

Ever since man first sought to render useful the various forces of nature the wonderful power in the mighty waves of the ocean has excited his awe and exercised his ingenuity. Fortune after fortune has been expended to carry out the carefully calculated plans of the mechanical engineer or the fancy of the sanguine theorist. A few have worked: stockholders were elated, the inventor hilarious; but soon the sea arose in wrath, restraints of wood, cement or steel were but playthings before the storm, and by morning the contrivances of man lay a crumpled wreck upon the beach.

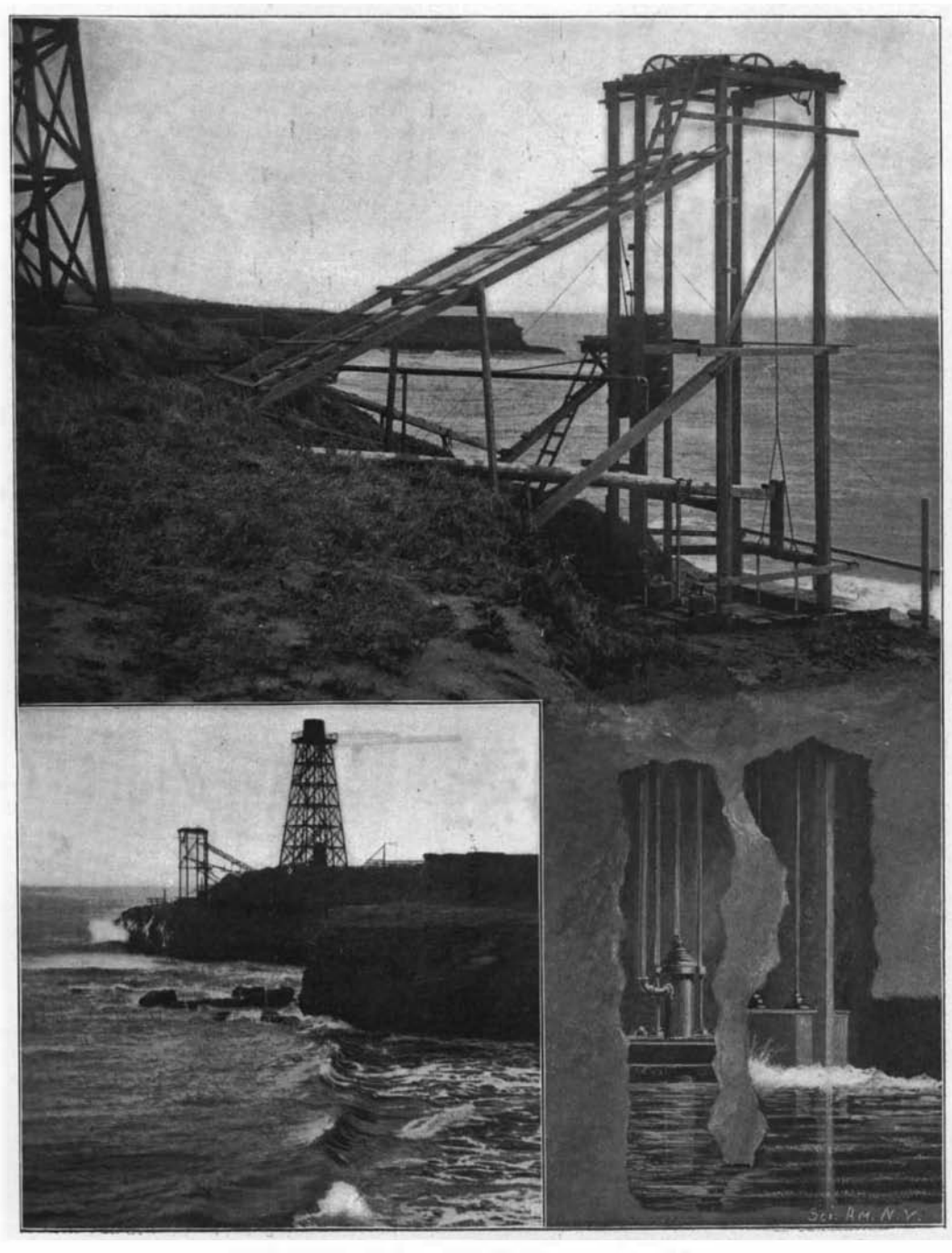
The city of Santa Cruz, California, owns what is perhaps the only practical and efficient wave motor in existence to-day, and it has stood the test of four years' operation.

One of the many attractions of Santa Cruz is the Cliff Drive, extending for four miles northerly from the city along the rugged sandstone bluffs rising in places sheer fifty feet from the breakers below, tunneled and worn by the ceaseless swell of the open Pacific.

At a point unprotected by outlying rocks or shoals two wells eight and five feet in diameter respectively were sunk in the cliff, one behind the other, the foremost but five feet from the brink. These wells extended from thirty feet above high tide to below the ebb and opened at bottom in the ocean.

The simplicity of the motor precludes a lengthy description. A counterbalanced float rises and falls between vertical guides in the foremost well as the swells outside raise or lower the water level. The plunger of a common force pump working in any part of a long pump barrel occupies the second well, forcing on the down stroke the salt water vertically 125 feet to a 5,000-gallon tank raised on a 60-foot derrick on the bank above, from whence it runs to tanks along the country roads for miles around and is used for sprinkling purposes. In ordinary weather the pump fills the supply tank in about one hour. The surplus will also shortly be utilized in the manufacture of salt.

But to return to the motor. A 35-foot, four-post derrick carries the vertical guides for pump and float which are fastened at and near the outer end of a 12-inch round timber 60 feet in length, the butt counterbalanced on the bank over two small iron car wheels rolling on a short track, and thus allowing the timber to recede and advance as well as to oscillate as its outer end follows the vertical guides. The stopping and starting contrivance, however, caps the climax for simplicity. A strong chain leads from the outer end of the beam above the float over two shelves at the top of the derrick and suspends a large barrel in vertical guides at the side. To stop the motor the barrel is filled with water from a short garden hose attached to a convenient connection from the tank. The weight of the filling barrel gradually overbalances the float, raising it above the waves. When the motor is to start a plug is pulled from the bottom of the barrel and the float gradually goes into action.



THE SANTA CRUZ WAVE MOTOR IN OPERATION.

The British consul for Siam has issued an interesting report regarding the developments of the teak timber industry in that country. The British foresters were the pioneers of this trade in Siam. As it has been brought to a high state of development and is established upon a sound basis, these foresting companies, whose invested capital aggregates $10,000,000, state that in view of the expenses and risks they incurred in opening and extending such a business as that of teak in a new field, they should receive proportionate consideration at the hands of the Siamese government and the Forest Department, now that these conditions have been changed and the forest administration and patronage has become centralized at, and controlled by, Bangkok. They also demand equality of treatment in the matter of reduced areas, increased royalties, and other new restrictions with traders of Siamese or other nationality, which form the basis of all past competition. Taking the proportion of the output for 1898-99 controlled by British subjects and other nationalities, British interests preponderate in the ratio of about 3 to 5. In response to the petitions the Siamese government has decided at the end of the year to grant to present lessees or permit-holders of areas now being worked a renewal of their leases for a further term of six years, but upon the following terms: (1) A reduction of the areas leased by one-half, the other half being considered as a reserve area; (2) the prohibition of all girdling; (3) the imposition of a royalty of 10 rupees on all logs measuring over the pikat standard of three ticals (about thirty cubic feet), and of 6 rupees on all below that size. The half-areas opened are the most productive, and should for a time afford work for the present elephant power, but no girdling being allowed, the supply of timber is limited, and must speedily be exhausted. At the commencement of the new leases, chiefly in 1902, the out-turns will be at once affected by the heavy royalty on small logs of the three ticals and four ticals pikat standard above referred to, very large quantities of which have lately been worked. The reduction of areas will, it is estimated, not affect the output until 1904. After that date, should no further girdling be allowed, the out-turn will diminish rapidly with each year of the lease. Given, however, equality of treatment with other nationalities and equality of opportunity, and provided that conservancy restrictions are as rigidly enforced against others as against themselves, British foresters and traders are entitled to anticipate, if not the same profits as heretofore, at least a maintenance in the future of the same proportion of the teak trade in their hands as in the past. As a result of the good floating season of 1900 a considerable quantity of logs, which have failed to reach the duty station, will be left in the main streams, and will swell the out-turns of 1901. Thus, with fairly favorable rains, the arrivals at the duty station may amount to 90,000 logs. After these accumulations have been worked off, a considerable diminution in the annual supply of teak from Siam may be anticipated.

An experiment is to be made at Barnes, Surrey, in lighting the streets with 700 Nernst lamps.