

Correspondence.

Irrigation by Wind.

To the Editor of the SCIENTIFIC AMERICAN:

In your issue of May 18 is an alleged discussion of "Irrigation by Wind." The writer takes the bicycle as an illustration, and traces its growth from its crudest forms through forty-six years to its present marvelous perfection—the most perfect, from a mechanical point of view, of any machine now in existence, not even excepting the watch, because the bicycle has more scientifically and perfectly constructed bearings than the watch. The writer then tumbles from this exalted height to the "Jumbo" windmill and lauds it for its "ease of construction, economy of cost, capacity in power," etc., none of which qualities does it possess.

In the first place, the "Jumbo," 21 feet in diameter and 27 feet long, with eight fans alluded to, will require 2,264 feet of lumber for the shield up to its shaft. This makes no mention of the frame on which the lumber is to be nailed and which carries the wheel, and which would doubtless bring it up to 4,000 feet of lumber. As a moment's reflection will show, of the eight fans described, but a quarter of them, or two, will be exposed to the wind at any one time, and of those two you really get no benefit except from one of them, for either one shields the other or else both stand so obliquely to the wind that not more than half efficiency is attained. You are, therefore, reduced to one-eighth of the sail surface. This one-eighth, by reason of the fact that it faces in one of two directions, is reduced to one-half of its efficiency again, leaving the sail surface with an efficiency of only one-sixteenth. Now add to this the further fact that it is not practical to get these wheels up where they get a good wind exposure, and the efficiency is reduced to almost nothing, which is found to be the case in practice.

A wheel needs to be at least 30 or 40 feet above the ground even in a level country to get good results, and in these prairie countries where irrigating is now being done, numerous groves are being planted, and the efficiency of the wheel that must be placed on the ground is very small and very little figuring will show that its cost is very large as compared with the marvelously efficient steel wheels now made. So far from the "Jumbo" being the germ of a new idea, it is a very old form that, together with a similar wheel with a vertical shaft, which is much better, were among the first of wind wheels and the most frequently reinvented and the most easily demonstrated to be utterly worthless.

A modern steel wheel, on a 40 foot steel tower that will pump more water in a year than this "Jumbo" described, can be bought at one-fifth its cost, and the pump for the steel wheel, since it works constantly when the wind blows instead of only a small portion of the time, is proportionately smaller and proportionately less costly.

L. W. NOYES.

Breaking of the Earth's Crust.

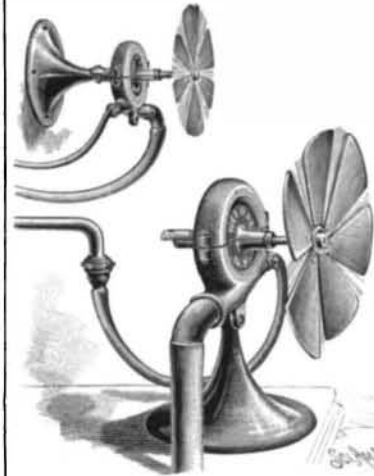
From the point of view of the general geographer, whose scope takes in not only the superficial aspects of a country, but its physical construction as well, perhaps the most interesting contribution to African knowledge that has been made within late years is the demonstration by Dr. J. W. Gregory, of the British Museum, that there exists in Eastern Africa, occupying a very considerable portion of its extent, a narrow, and in places a very deep, trough, in which the great lakes and many of their tributaries are located, and which, with a more or less open and depressed lowland, communicates with the basin of the Red Sea, and yet further with the Dead Sea and to the Valley of the Jordan. To use Dr. Gregory's own words: "From Lebanon, then almost to the Cape, there runs a deep and comparatively narrow valley, margined by almost vertical sides, and occupied either by the sea, by salt steppes and old lake basins, and by a series of over twenty lakes, of which only one has an outlet to the sea. This is a condition of things absolutely unlike anything on the surface of the earth." The presence of such a rift, for rift it appears to be, can only be compared with the long lunar rifts which have so long puzzled astronomers. To Professor Suess, the eminent geologist of Vienna, we owe, indeed, the first demonstration that over large areas of the earth's surface the crust has been steadily breaking through in the direction of the earth's center, and that the crust has been torn and rifted throughout all time by the subsidences of earth blocks; and he truly, many years ago, pointed out the probable existence of this vast Afro-Asiatic trough, the evidence to which has now been supplied by Dr. Gregory.

This investigator was actually able to trace a long parallel-sided and steeply-walled valley, of perhaps twenty to twenty-five miles wide, extending southward from the Great Nyanza to beyond the first parallel of south latitude, or over a linear distance of some 150 miles or more. Over much of this extent the boundary walls are described as being "so precipitous that not even the most expert of cragsmen could scale

them;" sheer precipices are indicated with elevations of 800 and 1,000 feet. This remarkable structure of most unique development and extraordinary persistency must be regarded as one of the most interesting features of the earth's surface.—Prof. Angelo Heilprin.

SIMPLE AND EFFICIENT FANS.

For ventilating or cooling sleeping rooms and other apartments, or for use in any situation where running water, at a pressure of twenty pounds or more, is available, the simple fan and connected motor herewith illustrated is designed to afford most efficient service, at a low first cost, and needing but the slightest possible attention afterward. The standard or base, as shown, may be fixed in a vertical or horizontal position, and the water connections may be satisfactorily made with hose where it is not desired to make permanent lead or iron pipe connections, the work being done by any one without the aid of a mechanic. This improvement has been introduced

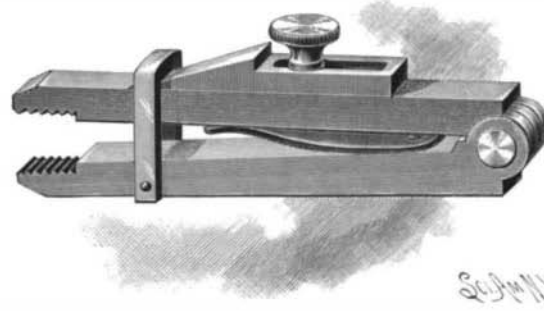


THE WEED WATER FAN MOTOR.

by Messrs. A. F. Weed & Company, 106 and 108 Liberty Street, New York, who originally designed the motor to operate a line of mechanical models requiring a light power. It has been found to be so well proportioned and so accurately adjusted that it runs at high speed without vibration and almost without wear, requiring no attention beyond an occasional oiling of the bearings, and has been adapted for all kinds of light machinery. Fittings are furnished for ready attachment to any style of basin cock, and, once installed, the device is always ready to operate by simply turning the faucet.

A NOVEL WRENCH.

In the wrench shown in the illustration the pivoted jaw arms are pressed apart by a spring, and one of the arms carries a pivoted holder or bail which extends over the other arm, limiting its outward movement, the jaws of the two arms being held in close gripping engagement with a nut, pipe, or other article by sliding a wedge along one arm and under the bail. The improvement has been patented by Mr. Alexander Delhommer, of Breaux Bridge, La. The wedge has a rearwardly extending shank in which is a longitudinal slot engaged by a screw screwing in the arm, and when this screw is loosened the wedge is free to slide along the arm, but when the jaws are brought into engagement with an article to be gripped, and the



DELHOMMER'S WRENCH.

wedge is moved forward under the bail, the wedge is fastened in position by means of the screw, locking the gripping jaws upon the article.

The Clean Streets of Rome.

A correspondent of the New York Sun, in a recent letter from Rome, writes as follows:

I have been a good deal interested in observing the mode of cleaning the streets in Rome. They are kept so clean, even the poorest of them are kept so much cleaner than the best streets in New York, that I have given some time to the study of the system in force here and its expense. I have been kindly furnished by the officials of the city, on a request made through the consul-general, with answers to a series of questions which I framed in order to enable me to obtain accurate knowledge on the subject.

What the stranger sees of the process of street cleaning is that all over the city are men in a cheap uniform, armed with a broom of twigs, a basket, a shovel and a small red painted covered cart, very much as we see used by the men engaged in repairing the pavements with us, only smaller. Each obviously has allotted to him a certain portion of the street, and he is engaged all day in keeping it clean by

sweeping up the dirt and putting it into his red cart. When he has no work of this kind to do he sits down on the edge of the sidewalk and proceeds, from a supply of twigs, to mend or make his broom. At stated periods in the day he wheels his cart off to a place of deposit, where its contents are emptied into large carts in waiting, which in turn carry the dirt out to places just outside the city gates.

There are two circumstances which render it easier to keep the streets clean at Rome than with us. One is the excellence of the pavement. A little more than one-half of the superficial area of the streets is macadamized, while the other half is chiefly paved with small trap rock blocks, almost identical with those brought from the Palisades and used with us. About one per cent of the superficial area is paved with asphalt, and a very small fraction with wood. But, however paved, the streets are kept smooth, so that there are no inequalities to retain dust.

The other circumstance which facilitates street cleaning here is that nothing is ever thrown into the streets from the houses or stores. No one seems to think of throwing any such matters into the street, for the reason in part that garbage and all the dirt and refuse that accumulate in the houses and stores are taken from them daily by men employed by the city, who ordinarily come into the houses and buildings and remove such refuse and carry it off in carts to places of deposit outside of the city. When the owners do not arrange to have the raccogletoli, as the collectors of garbage are called, come into the houses, they deliver it to them at fixed hours.

You will be astonished at the absurdly small figure which it costs to keep clean and sweet the streets of Rome, a city of 500,000 inhabitants. The following are the official figures, which include not only the expense of sweeping the streets and removing the sweepings to the places of deposit outside the city, but also the like removal of the garbage and house dirt and the watering of the streets. The horses and carts belong to the city, it having been found that the work was done more cheaply and better in that way than by contract, though ordinarily the contract system prevails for similar public work—such for instance as the collection of the octroi—much more generally than with us. A small charge, averaging only six cents a month, is made for the removal of garbage from each house, where the owners elect, as they almost universally do, to have the collectors come into the houses for that purpose. The sweepings are taken away from the several places of deposit outside the city walls by the peasants, who are glad to come and get the stuff.

If we reckon the dollar at five francs, the total expenditure in 1894 for all the service I have specified was \$148,461, but from that must be deducted \$31,428 received from various sources, including about \$29,200 for the removal of garbage from houses, so that the net expense was only \$117,033.

With reference to the length of streets swept there are in all about 180 miles, of which all except eighteen are swept daily. Each street is not only swept in the daytime, as I have described, but also specially each night. As to the superficial area there are about 2,956,000 square yards of street and 332,000 of sidewalk, making a total superficial of 3,286,000 square yards for the city.

There are employed in the performance of the work I have specified about 813 persons of all grades. Of these, 453 are the sweepers, 42 the cart drivers who carry away the street sweepings, 58 the cart drivers who carry away the garbage and refuse of houses and stables, and 129 the men who enter the houses and carry out the garbage from them. There is one superintendent, who has twelve clerks and as many assistants. Hostlers, farriers, harness makers, watchmen, etc., make up the balance. The total number of 813 is sometimes increased by men for a special service to 853.

The amount of street surface assigned to each sweeper varies with its width, its locality and importance, and with the mode of pavement. In the streets that are macadamized it is a maximum of about 30,000 square feet, while in those that are paved it is in some cases as low as 12,000 square feet. The average for the city is about 20,000 square feet to the sweeper.

The surprise which the small aggregate expense will excite will be much diminished when we come to know the wages that are paid. The street sweepers get, if we reckon the franc at 20 cents, 36 cents a day, and are entitled to a summer and winter suit of clothes and to two hats and two pair of shoes a year; but the total expense of these for the whole 453 sweepers is only \$2,680 a year. The highest salary paid is \$850 a year, to the superintendent, and there are only thirteen persons who receive annual salaries, some of them getting only \$216 a year. The cartmen get from 45 to 50 cents a day. Those who deal with house garbage get from the city 25 cents a day, but are allowed to have some pickings from the matter removed. The highest wages paid to any employes is to the foremen, \$1.25 a day. The mechanics get 50 to 60 cents and harness makers 50 to 80 cents.