

SAND AND WATER SPOUTS.

It is a well known fact that all atmospheric changes, winds, thunder storms, tornadoes, etc., originate in changes of temperature; and sand and water spouts are also due to the same cause.

The annexed engravings, showing sand and water spouts, are taken from "Die Erde und ihr organisches Leben. Dr. Klein und Dr. Thomé. Stuttgart: Spemann."

Sand and water spouts are formed when the air rises upward and assumes a rotative movement. It then draws upward the bodies or liquids over which it rises, and moves forward, retaining its longitudinal axis. In many cases these spouts occur during thunder or showers, then clouds and rain descend to unite with the upward moving spouts, as is shown in the representation of the water spout. The mariner can in most cases avoid the water spouts, but the sand spout destroys everything in its path, uprooting the largest trees, demolishing strong buildings, carrying the debris upward and distributing it over large areas. As these spouts always appear simultaneously with thunderstorms, they have been attributed to the action of electricity. But as whirlwinds are often produced, for instance above fires or on a small scale at almost every corner on a windy day, without the co-operation of electricity, it will be safe to say that electricity is generated by the action of the whirling and rising air.

Dr. Th. Reye has shown, by careful calculations, that an unstable equilibrium necessary to the formation of spouts or whirlwinds exists only when the decrease in temperature is 3.42° C. (6.16° F.) for every 325 feet of vertical distance. In this case the ascending column of air being considerably lighter than the air into which it passes, the air ascends with great rapidity.

If the ascending air passes into a layer of air that is so cold as to condense its moisture, the heat will be liberated, and that will expand the ascending air. The unstable equilibrium also causes the upper layers of air to sink into the lower layers; in this case descending spouts are produced.

Generally the air that enters into the column of rarefied air from the side produces the rotative movement. The condensation of the vapors produces rain, and a sudden contact with cold air may produce snow or hail, all accompanying the spouts.

In the engravings the spouts are grouped rather closely in order to show the various forms to the greatest advantage. The spouts, as a rule, do not approach each other nearer than half a mile.

Measurement of Railways.

Measurements for mile posts have been made recently on the New York, Pennsylvania, and Ohio Railroad over its whole line in a somewhat novel way, says the *Railroad Gazette*. A velocipede hand car, with a four foot wheel, was fitted with a revolution counter, and after determining carefully the number of revolutions per mile, the distances were rolled off by running it over the track. There was found to be a slight irregularity in the measurement, owing to the play and coning of the wheels, but the error was far within the limits of ordinary careful chaining and very much more rapid as well.

Thirty-five to forty miles per day were made without much difficulty under the interruption of a heavy traffic, setting a stake every quarter mile—the quarter-mile points being marked with a small stone for convenience of employes. It was judged from the result that a still better way, especially if stakes were to be set only at every mile or half mile, would be to put the counter on an engine. As six miles an hour was made with the hand car, setting stakes every quarter mile, there should be no difficulty in making ten or fifteen miles with a locomotive, which might thus be able to make an ordinary freight run, without too many "lay outs." This very method, by the way, was used, we believe, by the government inspectors on the Pacific railroads, or some of them, to measure off the length of their subsidy bills, and certainly it is vastly more accurate than the chaining which preceded them, or, in fact, any but the most careful and

tance alongside the shafts or thills. The short leather traces are attached to the front ends of these rods by means of keys or eyebolts, which may be withdrawn, for the purpose of releasing the horse from the vehicle, by means of cords or straps that pass through a ring on the crupper or back strap of the harness, and extend back over the dasher of the vehicle, so as to be easily accessible to the driver.

A billiard table cushion of improved shape has been patented by Mr. Samuel May, of Toronto, Canada. The invention consists of a rubber billiard table cushion having a broad steel ribbon embedded in the rubber and running longitudinally through the entire length of the cushion, and extending from a socket in hard rubber at the bottom of the cushion upward in the elastic rubber to a point above where the ball comes in contact with the cushion.

A simple and durable device, by means of which the rain water flowing through the rain water conductors to the cistern may be cut off and made to flow in another direction when the cistern is full, has been patented by Mr. John Straszer, of Manchester, Mo.

Mr. Jean M. Berger, of St. Etienne, France, has patented improvements in magazine fire-arms of that class in which the magazine is in the nature of a supplemental cylinder or barrel just beneath the firing barrel, and from which the cartridges are projected as fast as they are used up by the expansion of a spiral spring within, having a cartridge pusher on its end.

A device to be attached to a vehicle for the purpose of equalizing the draught of three or four horses, has been patented by Mr. Herman E. Schmidt, of Rapidan,

Minn. The invention consists of several bars or levers for carrying the double and single trees, arranged upon the tongue or pole of the vehicle in such a manner that the draught or pull of one horse on the long arm of the main lever will equalize the draught of two or three horses at the short arm.

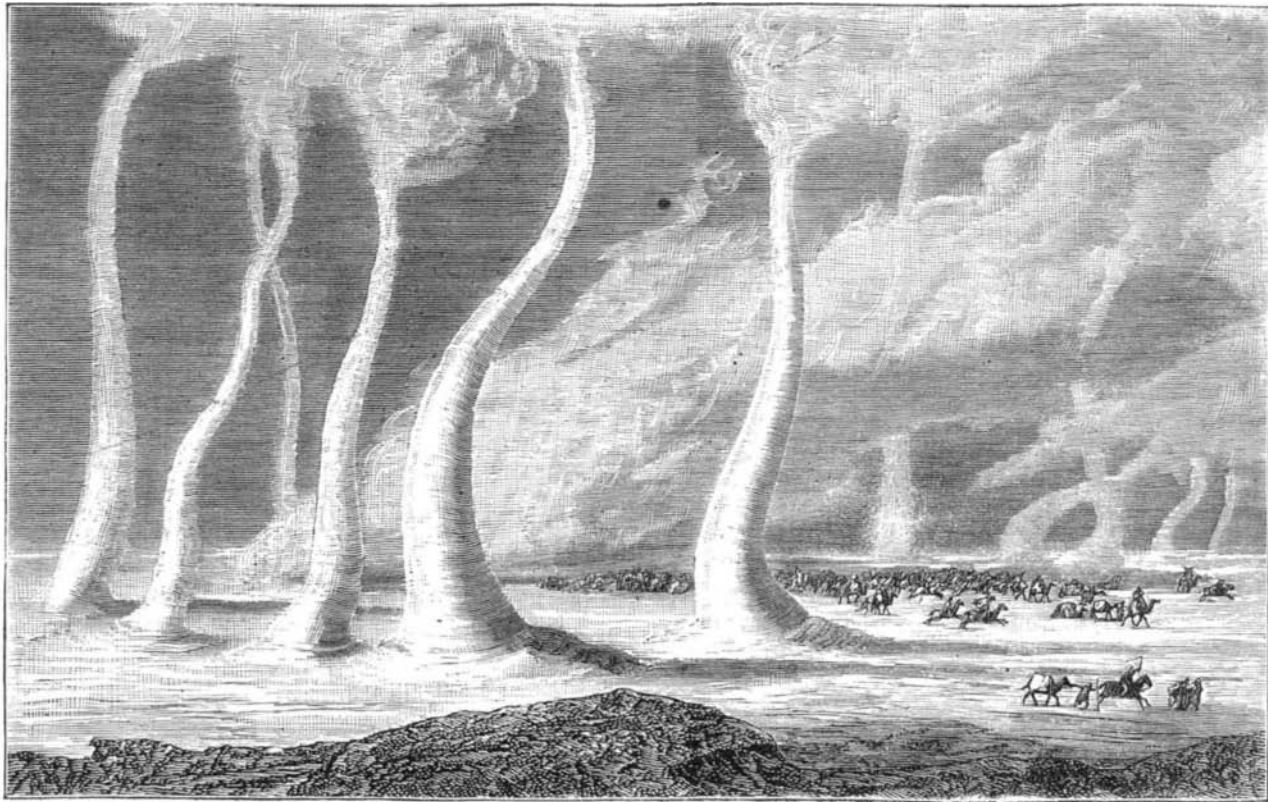
Mr. William J. Dawson, of Lawrence, Kansas, has patented an improvement in the front running gear of wagons which permits of the independent lateral oscillation of the body.

Messrs. Jules Schmerber and Charles Schmerber, of Paterson, N. J., have patented a process for obtaining a plastic compound by the treatment of the nitro-derivatives of cellulose, dextrine, and glucose mixed with gums, balsams, or pigments, which consists in first treating the material while in a wet state with a liquid solvent, then reducing the product to a semi-liquid form by heat, then grinding and mixing the semi-liquid mass, and finally drying the compound to a plastic consistency.

Mr. Claude Varlot, of Grenoble, France, has patented an improved lacing staple which can be firmly attached to the leather or other material, and permits of lacing without passing the lace or string through apertures in the article to be laced.

Mr. Heinrich Baum, of Höchst-on-the-Main, Germany, has patented a red coloring matter, formed by subjecting the diazo compound derived from amidoazo-benzole to the action of disulphobetanaphtholic acid.

An improved fire-escape which is simple, safe, and reliable, and does not deface the building to which it is attached, has been patented by Mr. Felice Tocci, of New York.



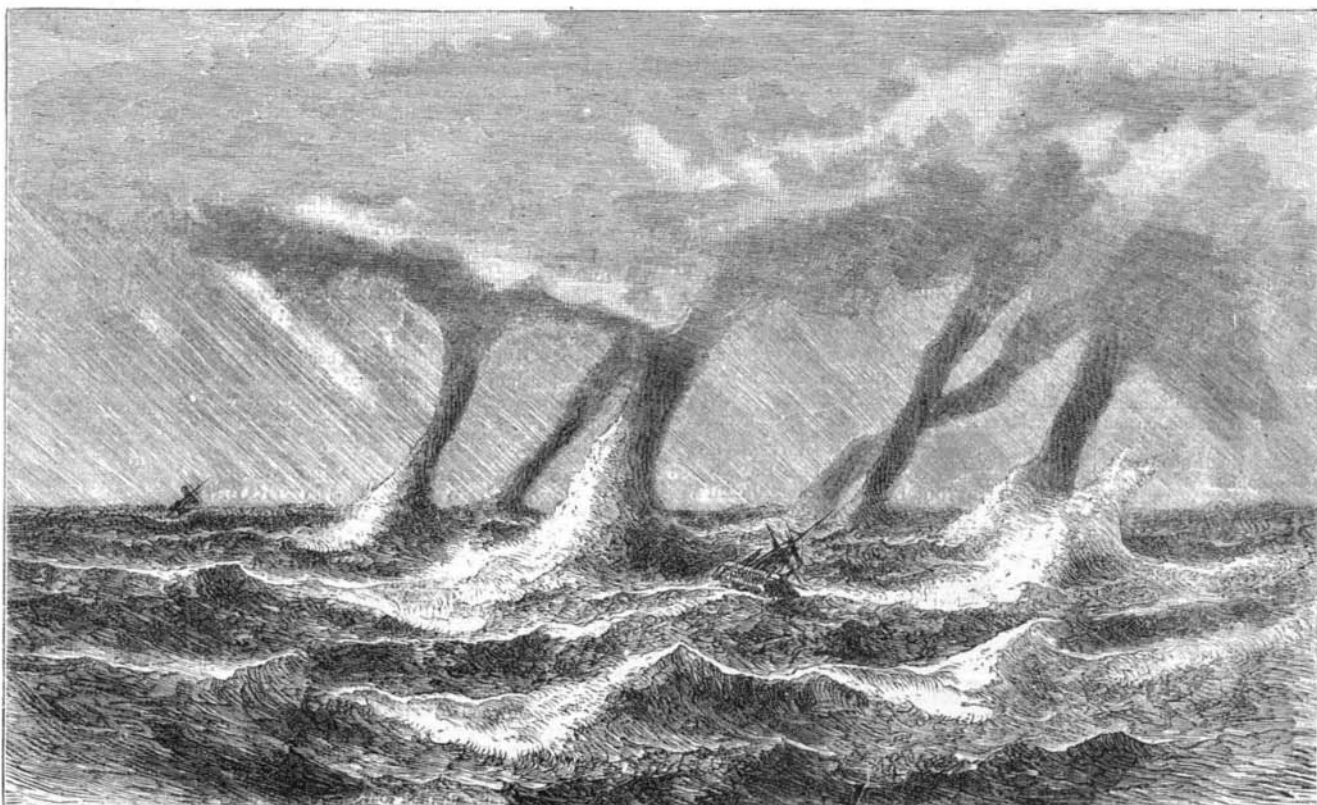
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accurate measurements with corrections for temperature. Measuring wheels for ordinary surveying purposes, working on the same principle as the above, have long been in use.

RECENT INVENTIONS.

An improved device, whereby the wind wheel may be thrown from a vertical to a horizontal position, has been patented by Mr. Adam W. Haag, of Fleetwood, Pa. The invention consists in journaling the horizontal axle of the wheel in a box that swings on trunnions and is adjustable in a vertical plane.

An improvement in that class of devices that are designed for releasing a horse instantly from the vehicle to which he may be attached, has been patented by Mr. Whiteford S. Martin, of Maybinton, S. C. An iron rod is attached to each end of the whiffletree and extends forward a short dis-



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