engraving) and further east a log stable is demolished. No. 4 was a barn with the roof wrecked by a twister from along the line A, the house being left uninjured.

There is evidence that this offshoot rejoined the main storm whirl while the latter was at No. 3. The front fence of strong posts was borne down to the north, and trees near it hurled back southeast across it. When the whole left No. 3, along the line, B, it swept everything loose in a straight line after it, leaving the uprooted orchard trees strewn tops eastward. There are signs of a rebound at No. 5. Barn and house were only slightly strained, and a wagon was carried high over the former. Along C are evidences of only a straight blow with a southward tendency till it neared No. 6, when it veered quickly northeastward, leaving scarcely a vestige of the house, but only wrecking the barn, which was farther over. Along D it only strewed the *debris* of No. 6—straining now and then a post—till it came to a pile of fence posts at No. 7. At once the whirling motion takes place, and the standing fence is mowed down by the loose posts and all scattered for rods southeastward. This deflection saved the house at No. 8, only a few rods away, a tree in the front yard being swept nearly due south into the main track. Along E is a well marked swath, perhaps eighty yards wide, of broken trees, strained fences, and the grass swept along the line as with a water flood.

At No. 9 the tornado evidently struck the house first square on, and the whirling motion and deflections were secondary. The main part of the *debris* is carried eastward, but the floor system was whirled north into the road, back south and west into the yard, cutting a double swath through fence and shrubbery, and was dropped a few feet northwest of its original place (see illustration). Thence a blow went northeast, loaded with loose things, to the tall woods at F. The trees here show less evidence of twisting than of a straight blow nearly south. One tree lies southeast, but under its top is furniture from the house. A short distance northwest of F, the disturbance ceases abruptly. Thence the storm went to No. 10, forty rods south, passing around it, cutting only kitchen and leaving the house unhurt. There are signs that a portion of the straight blow continued on directly eastward from No. 9, and was joined by that from No. 10 almost immediately, for the hedge north of No. 10 is strewn with garments from the latter. At this point it first began to plaster objects with mud. Now note its path over Nos. 11, 12, 13, 14, and 15 (and there are others further on), crossing roads and hedges wherever an upright object stood. Here was a lane of fifteen or more homes, not one of which escaped damage.

The upward vortex motion of this storm continued long after it rose again; for objects as large as window sashes fell thirty miles from where it did its last damage, and lighter substances bearing names identifying them were found much farther east.

On June 2 following, we had at Mexico exactly the same condition of barometer, temperature, moisture and wind direction that we had on May 20, and yet no unusual disturbance. The New York *Herald* attempts an application of the Finley theory to our Missouri tornado. But all the conditions did not appear to exist. We had the moist warm south wind, but no cold dry northwest wind. Not until the morning of the 22d did any cold wind reach us, and that from northeast, and during and sometimes after our storm the area of low barometer was in the Dakotas, so that the trend of *all* our winds should have been northward as it was.

Our local weather service shows on 20th: Wind S. E. at 7 A. M., S. at 2 P. M. (just before storm), S. at 9 P. M. (after). Uncorrected and unreduced barometer 29·98 all day, rising next morn to 29·21 and remaining stationary all day. *Apropos* the barometer cannot be depended on as a tornado warner. During those of Marshfield, Mo. (one hundred and twenty-five miles south), and Louisville, Ky., this instrument stood at 28·35 and 28·21 respectively.

As to the theory of uprushing warm currents, we had nothing unusual in temperature for the season, but one reliable observer, at a short distance away, speaks of a hot wind rushing past him to the funnels. Precipitation in the immediate part of the funnel was comparatively slight, but on its outer edge—noticeably on its northern—hail stones, measured by reliable witnesses, fell—evidently from great height—measuring four inches through and weighing two pounds and over. On breaking up these irregular lumps, they were found formed around a spherical center drop. Some penetrated the plowed fields ten or twelve inches.

While this storm raged near Centralia, the smoke from the Mexico factories rose vertically to a great height, and was cut off suddenly by an upper current toward the storm.

The writer wishes to acknowledge valuable aid from Mr. J. F. Llewellyn, local observer for the State Weather Service, and from the graphic reports of the local papers.

THERE is no way to bend wood better or cheaper than by steaming.

Correspondence.

Remedy for Snails.

To the Editor of the Scientific American:

In reply to your snail correspondent, would state that large poultry will destroy them; at least it does so here. If he cannot keep poultry, I kept them under some by the following method: When working or visiting my garden, I carried a salt sprinkler, or cellar, in my pocket, and when I met any of the gentry, I sprinkled a small quantity on him. He needn't mind whether it is on head or tail; they don't seem to love it; in fact, it is certain death to slug or snail; but poultry works best. ONE THAT HAD THE PEST.

Stanton's Ginseng Farm.

To the Editor of the Scientific American:

My attention has recently been called to an article written by Nicolas Pike, entitled "The Ginseng," published in your valuable paper, January 10, 1891, in which Stanton's ginseng farm is located at Summit Station, N. J. The article in question refers to a subject which is of interest to a large class of the American people, and is calling out some correspondence which is being improperly directed to Summit Station, New Jersey. Will you kindly make correction in your next issue? There is a place called Summit, in New Jersey, but Summit *Station* and Stanton's ginseng farm are in Onondaga County, State of New York.

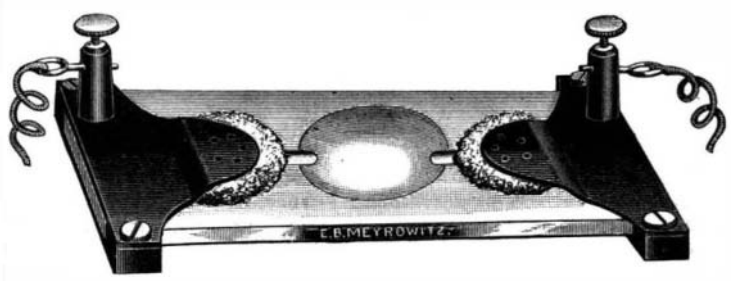
GEO. STANTON.

Summit Station, Onondaga Co., N. Y., July 27, 1891.

ELECTRO-MICROSCOPIC SLIDE FOR TESTING THE ANTISEPTIC POWER OF ELECTRICITY.

To the Editor of the Scientific American:

I represent in the accompanying cut an instrument devised by myself for the purpose of ascertaining whether electricity would destroy the life of germs or not. It is the result of a number of experiments to confirm the belief I have long held, that electricity is an antiseptic and disinfectant, and it was while I was



engaged in these experiments that I discovered that Apostoli had made the same claim.

The instrument consists of a glass slide, in the center of which is a sunk cell. Two grooves, each ¾ of an inch long, run from the sunk cell outward. Two brass pieces are fitted over the extremities of the slide in such a way that the rounded points, the undersurfaces of which are lined with platinum, will extend over the outer ends of the grooves. These rounded points do not touch the glass, but are raised above the grooves about ⅛ of an inch.

Binding posts are attached to the brass pieces for connection with a battery. To apply the instrument a sufficient quantity of the fluid containing the bacteria should be used to fill the sunk cell and grooves. A cover glass is placed over the cell and its contents. Two small clean sponges saturated with either the fluid or distilled water are then placed underneath the platinum points and in contact with the fluid in the grooves. The bacteria are now ready for observation, the electricity is turned on and the quantity noted by the milliampere meter until all signs of germ life disappear. They can afterward be cultivated on gelatine in the usual way, if desired, to determine whether their vitality has been entirely destroyed. Other uses for this slide will readily occur to one working in the same field. For example the effect of electricity on the blood and different tissues. I have found this instrument very satisfactory, not only as an easy but as a quick way of finding out the amount of electricity required to destroy these micro-organisms.

ROBERT L. WATKINS, M.D.

320 W. 145th St., New York.

The Artificial Production of Rain.

To the Editor of the Scientific American:

I have read in our daily papers lately of the production of rain by means of mechanical appliances, and also by explosives, and that our government has set aside a sum for experiments by the latter process.

If they are successful, is there not great danger in store for us, as every person having the means could use these appliances and rob the atmosphere of its moisture? And what a wet time we would have! Those owning small water power would want rain nearly all the time to drive their increased machinery, while the tillers of the soil would want dry weather to develop their crops; but what is more serious to think of, what effect would the heat of the sun have on the earth if we drew all the moisture from the heavens or clouds above us? JAMES MALLEN.

North East, Md., July 29, 1891.

Emery Wheels.

To the Editor of the Scientific American:

In your issue of July 25 is the account of a so-called "singular and fatal accident" from the bursting of a 12 inch emery wheel, while running over 8,000 revolutions per minute. We can see nothing singular in this accident, as the standard speed is only 1,800 revolutions. People who violate the simplest rules for safety must expect to be killed.

It is not singular that a farmer should violate rules which a skilled mechanic would have observed. There is, however, a class of emery wheel accidents which is singular, and that is the class which arises from the use of wheels of types and varieties essentially unsafe. Of late years the craze for low prices has so demoralized buyers that they no longer pay much attention to the quality of goods, some of which are essentially dangerous and some essentially safe. Some responsibility ought to attach to employers who provide tools for their men's use without taking pains to procure those which are free from danger. It is a mechanical heresy that one emery wheel is as good as another. The truth is that there are a number of safe varieties and a greater number of unsafe ones.

THE TANITE COMPANY,
T. DUNKIN PARET, *President.*

Stroudsburg, Pa., July 30, 1891.

Invisible Photography Made Visible.

To the Editor of the Scientific American:

Most amateur photographers have at some time in their career ushered the family or their friends into the dark room, with its mysterious light, to witness that wonderful and interesting process—the developing of a negative.

This is certainly very entertaining, but they must remember that the ladies are averse to this semi-darkness, especially when the color of the light does not suit their complexion. When I wish to entertain my friends now with photography, I produce a dozen or so perfectly white sheets of paper, and in *open daylight, or lamp light,* immerse them one by one in a solution, and slowly a beautiful *positive* picture appears and remains permanent.

The process is as follows: Take an ordinary silver print, wash and fix in a solution (ordinary strength) of hypo. soda, with an addition of teaspoonful of bicarbonate soda to the pint. *No gold must be used.*

Wash the prints well, and immerse in a saturated solution of chloride of mercury. A part of the chlorine passes over to the silver of the picture and changes the brown silver particles into white chloride of silver, which is *invisible* on the white paper. At the same time subchloride of mercury (mercurous chloride), which contains less chlorine than the chloride of mercury, is precipitated. This body is also white, and therefore *invisible* on the white paper.

When the paper is perfectly white, wash in clean water and dry. These prints will keep any length of time and light cannot affect them.

To develop, place the print in a solution of ammonia or hypo. soda and the picture will slowly appear.

A. SMEDLEY GREEN.

4517 Main Street, Frankford, Pa.

Oddities about Fleas.

Nothing curious about a flea, eh? Let us see. Put one under a strong microscope. What a transformation! It seems to be clothed in armor "from head to foot" formed of brown, overlapping plates, that are so exceedingly tough as to be almost indestructible. Its head is small and very thin, with a single black eye on each side, the rays of light scintillating through the tiny optic like sparks of fire. Puget managed to look through the eye of a flea with his powerful glass, finding that its surface diminished objects in size while it multiplied them in number—a man appearing like an army of fairies, and the flame of a candle becoming a thousand tiny stars. From the shape of its head, and for other reasons, the flea is supposed to use but one eye at a time. The offensive weapon of the little creature is composed of two palpi, or "feelers," two piercers and a tongue. When it feeds it stands erect, thrusting this sucker into the flesh, and will eat without intermission if not disturbed.

The flea's manner of breathing is still undetermined, but it is thought to be through two small holes at the end of the palpi.—*St. Louis Republic.*

THE upper part of a room heated by a furnace is always hotter than the floor. The difference is not a uniform amount, but varies with the temperature outside, the colder weather making a greater difference between the floor and ceiling temperature. You may have 5, 10, or even 20 degrees difference between the floor and ceiling.

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