

density of the film, ranging from the white light where the cuticle is thickest to the violet ray as it darkens to black just at the bursting point.

ENGINEERING INVENTIONS.

In driving piling for railroads by a driver moved forward on the piles as the work proceeds it is essential that the piles be dressed and tenoned as rapidly as possible, in order that there be no delay in moving and working the driver. Mr. Andrus L. Gilbert, of Albany, N. Y., has patented an invention, the object of which is to dress the piles by machinery carried on the car of the pile-driver and driven by the same engine, so that the work can be done as fast as the piles are driven, the caps then put on, and the track for the car laid rapidly and with less than the usual expense. The same inventor has also recently invented and patented an improvement on pile-drivers used in the construction of railroads; the invention consists in the arrangement of parts for driving inclined piles. The car will carry an engine for driving the winding-drum, and in operation the car is moved forward to project the platform in front, and then by transverse adjustment of the platform the leaders are brought to place to drive the straight piles in succession. The leaders are then set at the required inclination, and the table turned first to one side and then to the other to drive the inclined piles in line with the straight piles. The work of driving is thus completed as the machine is advanced.

Mr. Christopher C. Bomberger, of Crocker Station, Mo., has patented an improved windmill, in which the wheel revolves in a horizontal plane, and is provided with wings which are kept in a vertical position during half of the revolution, and in a horizontal position during the other half of the revolution by an ingeniously arranged mechanism. The wheel exposes a great vane surface to the wind, and is regulated automatically.

Mr. Thomas Keith, of New York city, has patented an improvement in endless-chain elevators for elevating or lowering and delivering freight on docks and vessels. The object of the invention is to provide for transfer of freight from a vessel to a dock, or the reverse, by arrangements that are practically automatic in their actions. The invention consists in a jointed frame apparatus that can be set to both elevate and convey the freight, so that no handling is required between the vessel and dock.

An improved car-coupling, patented by Mr. Jefferson E. Barrett, of Mount Vernon, Iowa, consists in a draw-head having a U shaped groove in its upper surface, combined with a flat bar sliding in a vertical longitudinal slot in the draw-head, and provided with two lugs. The bar having levers pivoted thereto for raising and lowering it, the free ends of these levers pass through slots in plates provided with locking devices. When the vertically sliding bar is in the lowered position it holds the link in the groove in the draw-head, and it raises the link out of the groove in the draw-head when it is raised by means of the levers or the handle at its upper end.

An improvement in lubricators has been patented by Mr. Henry R. A. Boys, of Barrie, Ontario, Canada. This improvement relates generally to the class of lubricators for engine cylinders operated by condensing steam, a drop of water displacing a similar quantity of oil, which enters the steam-pipe and passes thence to the cylinder. The great advantage secured by the use of this form of lubricator is that the lubrication is carried on continuously, effecting a more perfect lubrication than can be secured in the ordinary lubricator, besides saving a large percentage of the oil.

An improvement in rotary steam engines has been patented by Messrs. George W. Wade and Joshua M. Wardell, of Cadillac, Mich. The object of this invention is to construct a cheap and durable engine and to economize steam in the application of power. The casing of the engine is ellipsoidal, and the rotating piston, which is set centrally in the casing, is provided with radial wings capable of sliding in and out of the piston, to follow the inner surface of the cylinder.

Mr. Leonard Anderson, of Painesville, O., has patented an improvement in locomotive valve-gear, which consists of a vertically fixed lever, pivoted on the main pin, knuckle-pin, or other point on the parallel rods, having pivoted to its head on horizontal horns or pins two forward extending rods, one of which connects by a pin with a perpendicular rocker-arm, to whose lower end is pivoted the valve rod, while the other forward extending rod connects with a fixed slotted arc that hangs nearly parallel with the rocker-arm, a pin in the end of the rod sliding in the slot of the arc. This pin serves as the fulcrum on which the gear operates, and is adjustable by means of lever and suitable connections in the slot of the arc, whereby the cut-off may be varied and the steam reversed. Motion is transmitted to the gear by a quadrant-lever, fixed on the parallel rods.

Earthquake at Sea.

Capt. Horner, of the German ship *Stella*, from Bremen to Baltimore, arriving April 15, reports that on the morning of March 18, in latitude 37° 21' north, longitude 23° 51' west, his vessel suddenly halted in her course with a shock that gave to those below the impression that the ship had struck a rock. The weather was clear and the sea smooth and calm. Neither the chief mate, who was on the quarter-deck at the time, nor the look-out, could account for the strange occurrence. The captain ordered the heaving of the lead, but found no bottom at 100 fathoms. The pumps were sounded and the ship found to be tight. The shock lasted

only half a minute, after which the ship went on as before. Capt. Horner himself went aloft, but could discover no signs of any obstructions.

Correspondence.

Converting Water into Steam Without Heat.

To the Editor of the *Scientific American*:

Reading your remarks concerning the instantaneous expansion of the water at the bursting of the boiler in Mr. Lawson's test, on page 230, it called to mind some experiments at Ballston Spa, N. Y., some few years since, where a lot of boys were trying to make a great noise with a small gun in celebrating one Fourth of July. After using paper wads to but little effect, I suggested water. The gun had a caliber of about 1 inch, and some 12 inches long. We put in 2 ounces of rifle powder, then rammed down a good paper wad, then filled the bore up to within 2 inches of the nozzle with water, then put on another hard wad; the gun being placed on a carriage, which elevated its nozzle about 22 degrees. Fearing explosion, we set a slow match, and ran away. The charge gave a loud report, sending the gun backward and over end some half dozen times. The water burst into vapor like a puff of steam from an engine, when the wind carried it away. This appears a very quick way of getting up steam; whether economical or not I am unable to say.

P. H. WART.

Sandy Hill, N. Y., April 17, 1882.

The Lawson Boiler Experiment.

To the Editor of the *Scientific American*:

In the boiler test by D. T. Lawson, described on page 230, did not the cutting away of the diaphragm and allowing the whole strain of supporting the heads to be sustained by the one inch stay rod, weaken the boiler sufficiently to account for its giving away at the 65 lb. less pressure than it sustained with the diaphragm intact? It so appears to me, as in all probability it was the first point of rupture.

W.

Ground Air as a Source of Disease.

To the Editor of the *Scientific American*:

In connection with the article, "Cellars as Centers of Malaria," in your valuable paper of January 14, it may interest and benefit many of your readers to state a fact observed by me in Berlin, Prussia, a few years since. It is this: Before building lots are about to pass into hands of intending intelligent occupants, they almost invariably first obtain a specimen of the air contained in the soil at the site of the intended dwelling for analysis, because it has been found that such air invariably fills the cellar, and if unwholesome causes disease. The fact observed by many farmers in this country, that certain cellars are unfit for the storage of meat, however well salted, and milk, is a further proof of necessity to use intelligent care in the selection of a building site.

Deloro, Ont.

F. KOERNER.

Courtship and Marriage among the Choctaws of Mississippi.

BY H. S. HALBERT,

The two thousand Choctaws still living in their ancestral homes in Mississippi, retain, in their pristine vigor, many of the usages of their ancestors. Among these are the methods employed in conducting a courtship and the marriage ceremony.

When a young Choctaw, of Kemper or Neshoba county, sees a maiden who pleases his fancy, he watches his opportunity until he finds her alone. He then approaches within a few yards of her and gently casts a pebble toward her, so that it may fall at her feet. He may have to do this two or three times before he attracts the maiden's attention. If this pebble throwing is agreeable, she soon makes it manifest; if otherwise, a scornful look and a decided "ekwah" indicate that his suit is in vain. Sometimes instead of throwing pebbles the suitor enters the woman's cabin and lays his hat or handkerchief on her bed. This action is interpreted as a desire on his part that she should be the sharer of his couch.

If the man's suit is acceptable the woman permits the hat to remain; but if she is unwilling to become his bride, it is removed instantly. The rejected suitor, in either method employed, knows that it is useless to press his suit, and beats as graceful a retreat as possible.

When a marriage is agreed upon, the lovers appoint a time and place for the ceremony. On the marriage day the friends and relatives of the prospective couple meet at their respective houses or villages, and thence march toward each other. When they arrive near the marriage ground—generally an intermediate space between the two villages—they halt within about a hundred yards of each other. The brothers of the woman then go across to the opposite party and bring forward the man and seat him on a blanket spread upon the marriage ground. The man's sisters then do likewise by going over and bringing forward the woman and seating her by the side of the man. Sometimes, to furnish a little merriment for the occasion, the woman is expected to break loose and run. Of course she is pursued, captured, and brought back. All parties now assemble around the expectant couple. A bag of bread is brought forward by the woman's relatives and deposited near her. In like manner the man's relatives bring forward a bag of meat and de-

posit it near him. These bags of provisions are lingering symbols of the primitive days when the man was the hunter to provide the household with game, and the woman was to raise corn for the bread and hominy. The man's friends and relatives now begin to throw presents upon the head and shoulders of the woman. These presents are of any kind that the donors choose to give, as articles of clothing, money, trinkets, ribbons, etc. As soon as thrown they are quickly snatched off by the woman's relatives and distributed among themselves. During all this time the couple sit very quietly and demurely, not a word spoken by either. When all the presents have been thrown and distributed, the couple, now man and wife, arise, the provisions from the bags are spread, and, just as in civilized life, the ceremony is rounded off with a festival. The festival over, the company disperse, and the gallant groom conducts his bride to his home, where they enter upon the toils and responsibilities of the future.—*Amer. Naturalist.*

Tornadoes and How to Avoid Them.

The Signal Service Bureau has in press a monograph, by Sergeant Finley, containing a review of the observations of six hundred tornadoes, with generalizations from the recorded facts and suggestions as to the methods which ought to be followed in the investigation of such storms.

The storm studies have occurred during the past 87 years in all parts of the country. From these it would appear that tornadoes occur most frequently in summer, and in the month of June. They have occurred, however, more frequently in April than in July, and in May and September than in August. Kansas is the State that has been most afflicted, and that notwithstanding the fact that the period during which tornadoes have visited it has been comparatively short. The State has had 62 tornadoes from 1859 to 1881; Illinois has had 54 from 1854 to 1881; Missouri has had 44 from 1814 to 1881; New York has had 35 from 1831 to 1881; Georgia 33 from 1804 to 1881; Iowa 31 from 1854 to 1881; Ohio 28 from 1823 to 1881, and Indiana 27 from 1852 to 1880. The States and Territories that have had only one each from 1794 to 1881 are: Colorado, California, Indian Territory, Nevada, New Mexico, Montana, Rhode Island, West Virginia, and Wyoming. The storms occur most frequently from five to six in the afternoon, although there is no hour of the day that has been entirely free from them.

The average width of the path of destruction is 1,085 feet, and the storm cloud runs with a velocity of from twelve to sixty miles. The wind within the vortex sometimes attains a velocity of 800 miles an hour, the average velocity being 392 miles.

Among the most valuable suggestions of the paper are those with reference to the peculiarity of the movements of tornado clouds, containing rules for arriving at their violence. A tornado cloud always has a center, and it always moves forward from west to east. It may, however, sway from side to side in its progressive movement. Changes in motion are sometimes very sudden. In the event of a sudden change the observer, who is east or south of east of the storm, should move quickly to the south. If he is north-east he should move to the north. If within a very short distance of the cloud the observer should run east, bearing to the south.

Woodpeckers and Bears Deceived by Telegraph.

At the Crystal Palace Electrical Exhibition, London, the Norwegian Telegraph Department exhibits two stuffed woodpeckers which have pierced a telegraph pole in search of food. The explanation of this phenomenon, which is by no means uncommon in Norway, is as follows: The woodpecker feeds on insects which it finds under the bark of decayed trees; and it is supposed that the bird is deceived by the humming sound emitted by the telegraph post into the belief that the sound proceeds from the insects concealed in the wood; and that he is not undeceived until the perforation is complete, and daylight, instead of insects, is disclosed to the astonished and disappointed bird. Mr. Nielson, the Chief Director of Telegraphs at Christiania, further states that bears are very troublesome to his department, as they not unfrequently scatter the heaps of stones which are used to support the posts. The bear's fondness for honey is supposed to explain this proceeding; and his operations are performed under the belief that the humming sound proceeds from a bees' nest buried in the earth.

Castrating Fish.

Attention has lately been called in Germany to an art that used to be secretly practiced in Germany and England by skilled carp breeders, but which seems to have been lost during the present century. It was claimed by experts a hundred years or so ago, that castrated fish were as much superior in flesh to the uncut as the capon is to the ordinary cock, or an ox to a bull. Recalling this practice, a writer in a German fishery paper (translated for the "Bulletin" of the U. S. Fish Commission) says: The nutritious matter which would otherwise have served for forming roe or milt will certainly cause a more rapid increase of flesh and fat, and therefore an equally rapid increase in the weight of the fish. For such experiments young, but full-grown, fish should be selected (perhaps two or three year old trout) whose generative matter has not yet been fully developed (the time for trout would, therefore, be April and May). None should engage in such experiments but those who possess the necessary leisure and knowledge.