Correspondence.

Sounds Heard at Great Distance.

To the Editor of the Scientific American:

Relating to long distances at which sounds have been heard, a gentleman states he has heard the cars crossing the bridge at the town of Wareham, Mass., sixteen miles away across Buzzard's Bay, he being at Falmouth, Cape Cod. This was on a cool autumn evening, with no wind. The sound was quite distinct and noticed by others.

Query: Are such sounds more readily transmitted than those of whistles, etc.?

H. W. HUBBARD.

New York, September 12, 1883.

The Inventor of the Screw Propeller.

To the Editor of the Scientific American:

Several articles upon the invention of the screw as a ship propeller induce me to remark that it is due neither to Ericsson nor to Griffith nor to Ressel. It is the well known *Wiebeking* who first used it during the last century, in a small screw propeller boat on the Rhine. It is true that his motive power consisted only in a few men, and that the screw found at that time no general application, owing to the want of a suitable power. Nevertheless the invention is in no way connected with the motive power used, and it is therefore *Wiebeking* to whom the navigating world is indebted for the important invention of the ship screw.

WERDUN.

Vienna, August 22, 1883.

"Storage of Wind Power."

To the Editor of the Scientific American:

Your remarks about the system of weights and springs in the issue of September 8, 1883, is just what I expected, nor do I come forward to solve the question; but I would suggest that it might be possible to secure some benefit from wind power by having the wind-wheels operate pumps to raise water into a higher reservoir, and then you are dealing with a commodity which can be much better controlled than a heavy system of weights.

If the supply of water is limited, the same water may be used over and over.

J. P. M.

The Storage of Wind Power.

To the Editor of the Scientific American:

In your issue of the 8th of September you seem to invite further discussion of the problem of storing the power of the wind. This is a question I have had occasion to consider frequently in the last thirty years. It is quite possible to store the power of the wind in locations where nature has already made the necessary preparations, or so nearly so that they may be completed without too great outlay of money.

The requirements are two large reservoirs or ponds of water nearly contiguous, one at a higher level than the other; a powerful pumping windmill, or a number of them, to raise the water from the lower to the higher reservoir; the power to be utilized to be obtained from turbines operated by the return of the water to the lower level.

A large surplus of wind power would have to be provided to make up for evaporation and probable leakage in practice. There are water mills which might be benefited by pumping windmills to raise the tail water to the forebay. As to the financial success of this plan, that is not considered in this article.

Whoever can produce a better device than this for the object in view would probably confer a benefit upon mankind by making it known, and on himself by obtaining a patent for the invention.

HENRY S. AKINS.

Speedsville, N. Y., September 9, 1883.

Peculiar Case of Spontaneous Combustion.

A case of spontaneous combustion came to my notice lately, occurring under such peculiar circumstances that I deem it my duty to communicate the facts. The circumstances of the case, briefly, are as follows:

On the 24th of August smoke was discovered in the scale department of the machine shop of Wm. Stormont, of Ottawa, and proved to proceed from a piece of timber being used in the construction of a wagon scale.

A 2 x 8 plank of pitch pine resting on supports about 8 inches from the floor was smoking, and inspection showed a knot about seven-eighths of an inch in diameter, on the under side of the plank, with the wood surrounding it, to be badly charred for a quarter of an inch in depth, while the plank in the vicinity of the knot was quite hot.

There was no fire in the room and apparently no chance for the wood to take fire by ordinary means, as the charred spot was on the *under* side of the plank, while the floor beneath showed no trace of fire. The plank was near a window on the west side of the room, and the fire was discovered about 5 P.M., so the sun had doubtless been shining on it, but there was nothing to concentrate its rays, and nothing on the floor beneath to reflect them upward, even if so concentrated.

The phenomenon was seen by a number of competent witnesses, and is the most remarkable of the kind I ever heard of. If a piece of pine may take fire of itself, many a mysterious fire might be accounted for, and builders would do well to exercise care in selecting their material.

J. A. GREEN.

Dayton, Ill., Sept. 3, 1883.

The Riverdale Steamboat Explosion.

To the Editor of the Scientific American:

I wish to make a few remarks in regard to the disaster on the steamboat Riverdale. Anything that would help to guard against such disasters should be interesting to the readers of your valuable paper. I was in New York city on the 6th inst., and went to see the boiler after it was in the dock. I do not propose to give my opinion as to the cause of the explosion, but to try and guard against such disasters. I would have the draught from the furnace return under the shell of the boiler before it went into the chimney, thereby securing a more uniform expansion of all parts of the boiler, and preserving the bottom of the boiler from rust caused by the dampness of the bilge water.

By the present way of setting up boilers there is no heat under the boiler, and of course the top of the boiler is expanded and contracted every time you get up steam, while the bottom remains comparatively cold. To do as I suggest, it will be said you will have to set the boiler up higher. I say no, for the work can be done with a smaller boiler and obtain the same heating surface, and thus economize in coal. I have been in care of steam boilers for the last thirty-seven years, and know something about the subject.

JOHN PETERS.

Haverstraw, N. Y., Sept. 8, 1883.

Liberian Sorghum.

To the Editor of the Scientific American:

Will you please allow me to add to the valuable information you have been giving on the subject of sorghum, the following items? The report of the United States Department of Agriculture shows that certain varieties of sorghum do not ripen in the latitude of Washington, D. C. At my request the Commissioner forwarded seed of one of these, the Liberian. Several patches were planted April 15; panicles were out in June, by July 1 some seeds were hard, by July 25 nearly all were quite hard.

One patch was planted June 10; panicles appeared in July, and some seed was hard by August 27. All is hard now, and the cane appears to be quite as sweet at the time of hardening of the seeds as the early planted canes were three weeks after hardening, the usual time of maximum sweetness; and further, this late planted, rapidly matured cane is much more juicy and tender than the ordinary crop, and it also has quite a different taste; it is pleasant, free from the usual gummy taste, and has none of the usual objectionable features of sorghum.

The first planted canes are also developing a feature that may be unusual.

Instead of suckering, shoots are sent out at the top joints, and when these shoots are about two feet in length, a cluster of roots forms at the base of the shoot, the connection with the old stalk constricts, and the young cane is so readily detached that probably it is dropped to shift for itself, so that this variety of sorghum, under favorable circumstances, appears to have two modes of reproduction—by the seed and by a detached rooted scion. These scions are produced in time for a second growth.

By late planting it appears to be probable that the development of sucrose is begun much earlier in the growth of the plant than when planted in earth at a much lower temperature, a difference probably of 20° F. at time of germination.

The study of sorghums suited to southern climates may be productive of economic results quite as important as that of those suited to northern climates has already been.

JOS. VOYLE.

Gainesville, Fla., Sept., 1883.

The Storage of Wind Power.

To the Editor of the Scientific American:

I have been greatly interested in the several articles published in the late issues of your paper on the above subject, and therefore wish to give you some thoughts which have occurred to me that have not been touched.

A correspondent has suggested the raising of weights by wind power, and by means of clockwork obtaining the required motion.

This can be done, but considerable power would be lost in converting the slow motion of a falling weight into the quick speed of modern machinery.

I think a better way of storing power by the raising of weights is by means of an accumulator.

Considerable machinery is now operated by hydraulic pressure, and much more may be.

My plan would be to force the water into accumulators at a pressure of say 500 pounds per square inch, and then conduct this water in mains to the machines to be operated upon. There a three cylinder engine would be used if a slow motion is desired, or a water motor if a quick speed is wanted.

This method would do away with shafting, belts, pulleys, and their attendant dangers, besides being more fully under the control of the operator.

Of course the same amount of weight would have to be raised as by the clockwork system to store a given power, but I think the machinery could be made more compact; there would be less loss from friction, and it would require less care.

I see no reason why compressed air may not be used as a medium for the storage of wind power.

If the reservoirs are too bulky, make them stronger, and compress the air to higher pressure.

For use in air locomotives it is compressed to 600 pounds per square inch in this country, and Col. Beaumont compresses it as high as 1,000 pounds per square inch for use on his engine. Why may not as high a pressure as this be used on a stationary engine?

I think the cost of coiled steel springs would exclude them from being used for this purpose.

An amateur who wishes for a small power for a short period each day might, however, use them with advantage.

Another method which may be used in certain locations with advantage is the storage of water in reservoirs at a high level and using the turbine to get the required motion.

There are large marshes near the seashore which might be dammed and then made into storage reservoirs at a small cost. In this case the tide might do its part in raising the water, and thus we could utilize the power of the moon as well as that of the sun.

Still another method would be to erect wind engines on high hills where the wind was strong and steady, and force compressed air in pipes to the factory. The reservoirs might in this case be located on the hill or at any convenient point where there was plenty of room. Water pressure might also be used in place of air if quite a large amount could be easily had.

But I think the best way to use the power of the wind is as a help to the user of water power in times of low water. Instead of putting in an engine let him erect one or more windmills, as circumstances require, and pump the water once used back into the mill-pond to be used over again.

In this way he may keep his ponds at nearly the same level, have a steadier power, and create no malaria by drawing down his ponds.

This method could be best used by those who have large ponds which cannot be drawn down appreciably in two or three days.

All these systems may be put into operation, perhaps a combination of two or more, each doing duty where best adapted, may prove the best in practice.

The question is, Will not the interest on the cost of so large a plant be greater than the cost of fuel to run an engine?

F. W. BLANCHARD.

Holbrook, Mass., September 3, 1883.

Improved Photo-Engraving Process by Capt. Biny.

1. Take some highly polished zinc, thickness No. 8 or No. 10; choose the smoothest sheets, free from streaks and defects.

2. Clean the plate in the water containing three per cent of hydrochloric acid, and get rid of all bubbles of hydrogen.

3. Render it hygroscopic in the bath of iodine, gallic acid, and phosphoric acid, indicated in the previous description of the process of photo-engraving in outline.

4. Next wash the zinc in running water, and dry carefully between blotting paper.

5. When quite dry, coat it with coal tar pitch, eight per cent dissolved in pure benzine; as soon as spread, it may be heated in the dark up to the temperature of 50° C., and allowed to dry until, upon cooling, it is no longer sticky.

6. Expose behind a positive plate having soft half tints.

7. Control the exposure with the help of slips coated with coal tar; it is more rapid than bitumen.

8. Develop as before with turpentine and benzine, and finish the process in petroleum and one-tenth its quantity of spirits of turpentine. This new bath by forming a light homogeneous varnish gives a chemical grain well suited to the half tints of the tar. Next cause the plate to rotate so that the mixture of petroleum and turpentine may be uniform in texture and almost entirely evaporated. Heat the plate again up to 50° or 60° C., and allow it to cool.

9. To engrave the image thus obtained on the zinc with all its half tints, make use of the following bath:

Pure water	100	grammes.
Water saturated with sulphate of copper	50	"
Sulphuric or hydrochloric acid	3	"

Bubbles of hydrogen will be disengaged from all the little points constituting the chemical grain of the plate, and at the same time particles of copper will be deposited in their place, forming a positive image, which must not be touched while in the bath. As soon as the image is well formed in copper, it can be removed and placed in water, frequently changed. It may next be wiped between blotting paper, and dried in the open air.

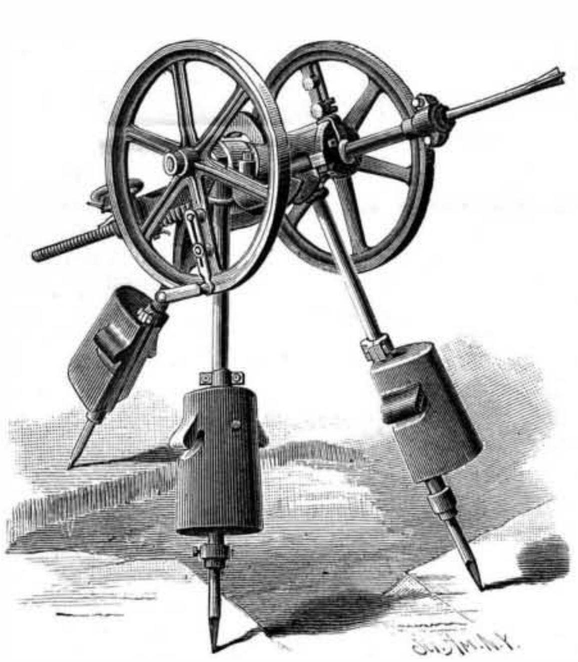
10. Remove the insoluble coal tar and non-adherent copper with a brush soaked in benzine. Rinse with clean benzine, and wipe well with a soft cloth so as not to scratch it.

11. To ink the plate, coat it with varnish or oil and fatty ink, so as to fill up the grain of the picture—heating it if necessary.

12. Rub the plate with a damp flannel to remove superfluous ink, and print off in a press for line engraving if the lines are deep, or in a lithographic press if but slightly indented. The depth of the lines in the plate depends on the thickness of the coal tar film. This process is most ingenious, and the various operations it admits of are more easy to execute than describe.—*Leon Vidal, in Photo. News.*

A Timber Worm.

A correspondent of the *N. W. Lumberman* says: It is not generally known, yet a fact, that extensive and valuable forests of yellow pine in the Southern States are destroyed by a worm, commonly called here at the South a "sawyer," or flat head. It is the opinion of a majority of the people in the South that the worm follows the death of the yellow pine, but close investigation has proved that although they never attack a forest or body of timber without first having a dead tree to start upon, they do not adhere to the rule after once getting a start. For instance, should a tree from any cause be felled or lodged against other timber, where the two are standing very close together, the worm will enter the adjacent timber though it be green and alive, and in this



HAND POWER ROCK DRILL

manner continue to spread till the entire forest is destroyed. Indeed, I have known instances where only a small sapling lodged against other timber caused considerable injury to the timber by souring, and thus attracting the parent worm or saw fly, and after accomplishing their work on the sapling they lose no time in removing their forces and attacking any of the timber that may be next closest; and in this way continue to spread until vast forests are denuded of their timber.

The parent fly, or rather bug, is one and a half inches long, and of an iron gray color. It has two feelers, or indicators, projecting from the head, from two to two and a half inches long, about the size of a very coarse horse hair. They are also provided with two teeth, operated by them similar to a pair of pincers, which are used in cutting through the pine bark to deposit their eggs. They attack the trunk of the tree first, and at any time during the summer season, but they seem to be more numerous and destructive during the months of June and July. The bug begins by eating numerous small holes through the bark, and very dexterously it deposits from four to six eggs in the edge of the sap, at the bottom of the hole thus made. From two to three days after the eggs are deposited in the sap, they hatch, and produce a worm one-fourth of an inch long, which immediately begins eating the sap, and steadily continues until the sap of the entire tree is consumed. A full grown worm is one and a half inches long, and is at any age a clear white color, excepting the head, which is dark red. They have no legs, but are seemingly jointed, and perfectly powerless to get about or travel, unless they are in their hole, where they utilize those joints ~~to answer them the~~ purpose of legs, and travel with astonishing rapidity.

As the worms become full grown, and the sap scarce, they enter the sappy portion of the timber, and cutting and forming a hole as they go of sufficient size to admit them, they thus wind about through it, and render it worthless, even before it has been damaged by decay. So prevalent and sure are they in the summer months, that the mill men of the South dare not keep a supply of logs longer than a few weeks in advance, unless they are provided with a boom or body of water of some sort to place them in, which is the only means of effectually preventing the logs from being eaten.

Vibration of Bridges.

At a recent meeting, in this city, of the American Society of Civil Engineers, a paper by James L. Randolph, member of the society, and Chief Engineer Baltimore and Ohio Railroad, upon "Vibration, or the Effect of Passing Trains on Iron Bridges, Masonry, and other Structures," was read. Mr. Randolph refers to the fact that double track bridges are moved in the direction of passing trains, and are consequently twisted, and strains are produced not provided for. Also that cattle-stops and open culverts, where built of rubble work, have the walls shaken to pieces by vibration.

The remedy he has supplied for these culverts and stops has been to build them of large stone as nearly the same size as possible The tall, thin bridge piers and abutments on which iron bridges rest have their stones so much disarranged by vibration as to make it necessary to secure them with timber and iron straps. Iron bridges resting on stone pedestals vibrate in this manner, and receive a return blow from the vibration of the pedestal, particularly if the pedestal is a light structure; but as the iron and the stone do not vibrate in the same period, there must be times when the result is a movement in the direction of the force. The effect of this vibration has been particularly noticeable at the Harper's Ferry bridge, where there was a movement of four inches in four years. After the insertion of planks between the stone and iron, this movement ceased. Where the masonry of piers has a platform of timber between its foundation and solid rock no displacement of stone has been noticed. Mr. Randolph contends that a monolith would be the best support for structures subject to vibration caused by strains, but that a monolith of the specific gravity of granite would give a damaging return blow. Timber would answer the purpose, but is perishable. The material which, in his opinion, is most serviceable is an artificial stone which is about two-thirds the weight of granite, is compact, durable, and with very little elasticity.

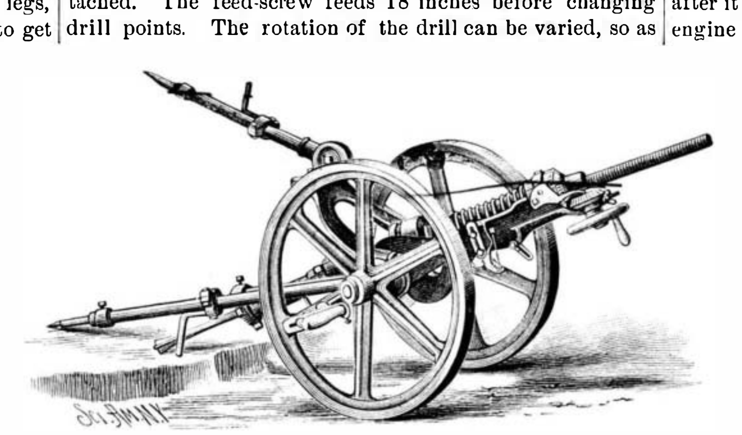
The English Skylark in America.

Two years ago eighty-four English skylarks were imported and loosed in Bergen County, New Jersey. This was in the spring, and it was ascertained afterward that about fifty of them paired and remained not far from where they first beat the free air of America with their wings. The lark is not a migratory bird, and it was feared that our northern winters would prove too severe for them, but during the next summer they were heard in Bergen and Passaic Counties. This, the third summer of their liberty, shows yet stronger proofs of their naturalization and ability to breed here. They have been heard in more places.

The New York *Sun* says that "one thing said to be much in favor of the increase of the lark in this country is its hardiness. It can endure cold and heat. It takes a long range of distribution, from the south of Europe as far north as Norway and Lapland, and American ornithologists lay claim to it as an American bird, from its being occasionally found in Greenland and in the Bermudas. Vigilance, it is thought, may be required to protect them from enemies, and to discover what are their worst enemies. From the fact that skylarks increase most rapidly in highly cultivated grounds, it is inferred that man is not his worst enemy, although large numbers are destroyed by man. As it sleeps and nests on the earth, it is thought probable that its worst enemies are small animals, such as minks, weasels, and skunks."

NEW HAND POWER ROCK DRILL.

This machine is designed to be run by two men, and it is so simple in its construction that any one, by a few minutes' observation, may fully understand how to operate it. The drill is self-contained, and can be moved as may be wanted from the tripod to a column, in a few minutes. It swings from a central bearing into any desired position. By revolving the balance wheels, the double cams come under a tappet on the drill bar, raising it five inches, twice every revolution of the wheels, at the same time compressing the spring to a pressure of about 400 lb., the pressure being variable at pleasure. The drill is rotated to round the hole as it moves back and forth, by ingenious and simple mechanism. The forward motion of the drill is regulated by an automatic feed-screw as the rock is cut away, the advance of the bar being more or less rapid, as, by the variation in the nature of the rock, the cutting is fast or slow. When the drill bar has been fed forward the entire length of the feed-screw, it may be easily run back and a longer drill attached. The feed-screw feeds 18 inches before changing drill points. The rotation of the drill can be varied, so as



HAND POWER ROCK DRILL.

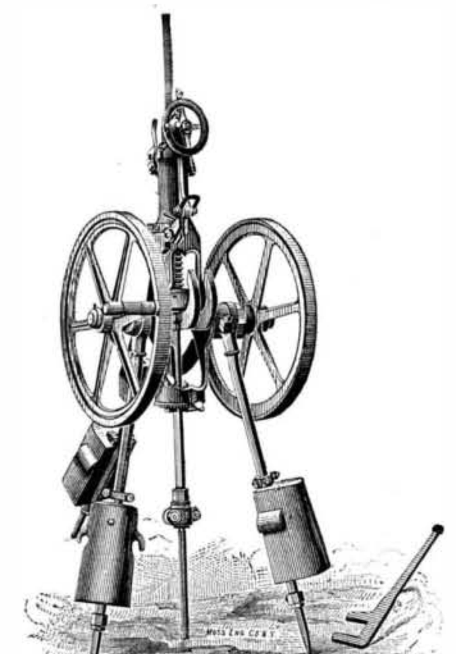
to cut 12ths or 16ths, according to the nature of the rock, and the regular rotation of the drill insures the delivery of each blow, so that each wing of the drill point strikes the rock just far enough in advance of the cut of the preceding blow to chip away the rock lying between.

As the chip yields, the drill point is allowed to react, saving the wings and edge of the drill point; and the cut from one blow is forced out of the hole when the drill descends for the next, thereby cutting the rock clean at each blow. By this arrangement the drill point may be advanced very much farther in the rock, without sharpening, than in hand drilling.

For quarrying, or any surface work, the drill is mounted on a tripod, having all the adjustibility required to adapt it to uneven surfaces, and it may be swung to any required angle.

For cutting marble, slate, or granite, it is often desirable to avoid blasting, and the consequent breaking of the rock. For this purpose this machine is invaluable, as holes from one to two inches in diameter can be drilled in a row two inches apart, then the connection between them broken out by simply taking off the rotating ratchet, and attaching a flat bar of steel in place of the drill point.

With these drills holes can be drilled from three-fourths of an inch to six inches in diameter, and to any depth. We are informed that in granite, one and one-fourth inch holes can be drilled at the rate of from one and a half to two and a half inches per minute.



HAND POWER ROCK DRILL.

The Biddeford *Journal*, of June 22, says: Twelve men, including Mayor Staples and Street Commissioner Strout, stood for an hour in the drizzling rain at Bragdon's granite quarry, Wednesday forenoon, watching the Champion Rock Drill bore its way through a ledge of solid granite. The drill is constructed of malleable iron and steel, stands about five feet high on three supporting iron legs, and is propelled by hand power. The principle is the same as that of a steam drill, cam and spiral spring, is simply constructed, and easily understood. There are three sets of springs, the lightest storing about 275 pounds of power, and the heaviest 475 pounds. By compressing these springs, however, 100 pounds additional power is obtained.

The exhibition was in every way a success, the drill doing all that was claimed for it.

The New England Rock Drill Company, Auburn, Me., are the manufacturers of this drill.

Wire Railway.

The following description has been given of a wire railway in connection with the coal mining industry established near the Hersteigg, the products of which it brings to the main line belonging to the Southern Railway of Austria. In its alternating rise and fall during its distance of 3,000 yards there is a useful excess of incline of about 142 yards, which, it is said, suffices to keep the line in self-acting working, after it has been started by means of the twelve horse power engine provided for that purpose. When there is no return load to be sent to the mine, the speed of the train can be regulated by a brake. Under these circumstances the cost of working the line is estimated at about 5½ cents per ton of coal. In its general arrangement the railway forms a straight line, and consists of two drawing ropes and the train... The line which is used for conveying the coal to the station is 1·10 inches thick, and is composed of nineteen steel wires, each 0·18 inch in diameter. The line on which the coal vessels are returned to the mine is only 0·66 inch thick, the nineteen steel wires of which it is composed being only 0·13 inch thick.

Both ropes consist of wires about 765 yards long, coupled to each other, and for the ropes a breaking strength of 73 tons per square inch section is guaranteed. At the ends of the ropes weights of five tons and three tons are applied in the usual way for obtaining the proper tension. The distance between the seventeen supports varies from 60 to 400 yards. The train rope is 0·6 inch thick, and consists of twelve soft steel wires of 0·07 inch in diameter, and runs at a speed of about 1⅝ yards per second. The vessels which convey the coal follow each at a distance of about 83 yards. Thus thirty-six are always on the way to and the same number coming from the station. Each vessel contains about ten bushels or about a quarter of a ton of brown coal, the total quantity carried per hour being about 17½ tons. The cost of the line was about £5,000.—*Engineer.*

THE fig is said to be a sure crop in most of the Southern States. The cost of cultivation is trifling.