resistance, aside from the buoys, which the chain would possess, and the tensile strain necessary to sever its links. It is no argument to say that the weight of the cable would militate against its usefulness: for there is no weight upon it, the same being sustained by the buoys. The practical reader can conceive in his own mind the effect that would follow upon the collision of a ship with this barrier; presenting as it does an area of 60,000 superficial feet to repulse the foe. A blow upon it would only cause it to recoil, one chain upon the other, until the impulse was lost among the several cables; and the futility of attempting any mechanical operations upon it is apparent when we consider the 180 guns of the revolving fortress, which it is intended to use in connection therewith, discharging once a minute. Without explaining further, every unbiased mind must see that there are few criticisms to be passed upon the principle of this obstruction; that the inventor may modify its arrangement is, of course, possible. The termini of the chains, where they enter the towers, is capable of being guarded efficiently, and no agency but a lawful one can slip its fastenings. In a case like the present, where time is all important, this raft is peculiarly applicable; as it can be made and stretched in comparatively short time, from materials all ready at hand in the navy yards: then in connection with the stone forts, even, and the *Monitors*, we shall present so threatening a front that the rebel vessels will not dare to enter or approach this port. Perhaps, at some future day, when the *Alabama*, or other inimical ship, appears off this harbor and demands tribute, we shall raise a sum to buy her goodwill that would have paid for two such rafts. But in the meanwhile the Government is taken up with issues of the gravest importance. Why should not the State act in this matter, and trust to remuneration from the central Government when the war is over?

THE MOTION OF THE MOON AMONG THE STARS.

The moon moves more rapidly among the fixed stars than any other of the heavenly bodies, with the exception of meteors and some of the comets. While she rolls around with the sky every day from east to west, she is moving in the opposite direction at the rate of a little more than 13 degrees a day, completing her revolution in about 27 days. This motion of the moon is so rapid that it may be easily observed without the aid of instruments. If we notice one evening what stars the moon is among, we shall find it the next evening among stars a considerable distance to the eastward. The moon does not follow the same track in the heavens as the sun, but it is sometimes about 5 degrees north of the ecliptic, and at others about 5 degrees south. In other words, the moon runs both higher and lower than the sun. This motion of the moon is interesting, as being the single case in all the phenomena of the heavens in which the real motion is the same as the apparent motion. The moon appears to revolve monthly around the earth—and it does so revolve. Its orbit is inclined about 5 degrees to the plane of the earth's orbit.

It is easy by direct observation to understand the causes of the changes of the moon. At the time of the new moon we can always see that the moon is nearly in line between us and the sun, so that only a crescent edge of the illuminated half is turned toward us; while the full moon is always upon the side of us opposite to the sun, rising as the sun sets, and thus turning toward us the whole of its illuminated half. As eclipses of the sun are caused by the moon coming between us and him, these can take place only at the new moon; while the eclipses of the moon being caused by the earth coming between the sun and moon, these can take place only at the full moon.

Dissolving Views.

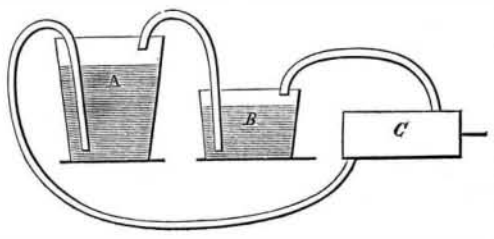
There is no more interesting optical illusion than dissolving views. You sit before a large canvas screen, on which there is a beautiful picture of the interior of a church, with the seats unoccupied; while you sit and watch the picture, the seats become filled with people. Or the church may at first be dark, and the lights silently and gradually come forth upon the picture. There are endless varieties of scenes, which may be changed in a similar manner. These wonderful results are all produced simply by means of two magic lanterns. One has a slide upon which is a picture of an empty church, and the other a slide with a picture of the same church filled with people; the light is first passed through the picture of the empty church, and is then gradually shut off from this and passed through the other—the shadows of both pictures being thrown upon precisely the same part of the screen.

A good subject for a dissolving view would be two aspects of the inhabitants of Charleston. The first picture representing that patriotic people at the time of the rebel capture of Fort Sumter—and the second showing the same boasters taking their departure for the interior counties, when the shells of General Gilmore began to fall among them.

PLANS FOR COOLING WATER.

There are three properties of matter which have been rendered available in cooling water.

The first and most common is latent heat, or the caloric of fluidity. When one pound of ice is put into 130 pounds of water, if the ice is at a temperature of 32°, it will, by simply melting, without having its own temperature raised at all, reduce the temperature of the water 1°. By the change in its state, from the solid to the fluid form, water absorbs 140° of heat; which heat is not perceptible to the feeling, or to the thermometer; it is hidden—latent. Then the pound of ice-cold water further reduces the temperature of the 140 pounds of water, and has its own temperature raised to an average or mean proportion between the two by mixture.



The second property of matter by which water is cooled is also latent heat, but in a different form—the caloric of evaporation. Water, in changing from the solid to the liquid state, absorbs 140° of heat; but in changing from the liquid to the gaseous state, it absorbs about 1,000° of heat. Consequently, one pound of water in changing into steam or vapor, will cool 1,000 pounds of water 1°; provided that all of the heat absorbed and made latent by the one is taken from the 1,000 pounds. In practice this can seldom if ever be done. But if a vessel of water is surrounded by a cloth jacket which is kept constantly wet, as the water in the jacket evaporates, it will take enough heat from the water in the vessel to cool the latter pretty rapidly. A still better plan is to have the vessel made of porous earthenware, so that the water may exude and evaporate from the surface. This is practically the best of all known modes of cooling water, where ice cannot be obtained. The vessel should be set in a current of air, when the evaporation will go on more rapidly.

A third property of matter which has been used for cooling water is the power of gases to absorb heat in proportion to their expansion. If air is allowed to expand by reducing the pressure upon it, a portion of its heat is rendered latent; and to bring its temperature to an equilibrium with surrounding bodies it will absorb a portion of their heat—thus cooling them. On the other hand if air is compressed, a portion of its latent heat is made sensible, and a share of this it will impart to surrounding bodies. In this way matches may be lighted, by means of a cylinder and piston. Now, if air is compressed in a cylinder and kept compressed till it has parted with its excess of sensible heat, and then is brought into contact with water and allowed to expand, it will absorb heat from the water, and the water will be cooled. We have known the case of an ingenious mechanician keeping a machine shop employed nearly all winter constructing apparatus for cooling water on this principle. But he did not take into account the difference between the intensity of heat and the quantity. He did not consider that it would take the same sixteen times longer to cool a pound of mercury than it would to cool an ounce, and thirty-three times longer to cool a pound of water than it would to cool a pound of mercury; owing to the fact that water has thirty-three times greater capacity for heat than mercury. He could lower the mercury in a thermometer 20 or 30 degrees in five minutes; but he could not cool a large vessel of water 3 degrees by active pumping for two hours.

Professor Seely has devised a plan for making water very cold, by evaporation. He proposes to force a quantity of air through a vessel, allowing it to become saturated with vapor; then to pass the air through some substance which has a strong attraction for water—the chloride of calcium, for instance—to take out the vapor; and then to force this cold and dry air again through the same vessel of water to carry off another load of vapor. The annexed diagram will explain the apparatus, A being the vessel of water, B the chloride of calcium, and C the force pump by which the circulation of the air is produced.

The efficiency of this apparatus would be greater were it not for the rapidly diminishing capacity of air for moisture as its temperature is reduced. While a cubic foot of air at 100° will absorb 25½ grains of water, the same volume of air at zero will hold but half a grain.

The Principal Defect in Our Monitor Turrets.

At the first bombardment of Fort Sumter, the *Monitors* had so many of the bolts in their turrets driven in, that a number of persons were disabled, and now Captain Rodgers, one of our most valuable officers, has been killed by a similar disaster.

As our readers are generally aware, these turrets are 11 inches in thickness, made of plates 1 inch thick, bolted together by numerous bolts. The terrible concussion of large shot breaks the bolts, and knocks off the nuts on the ends of them, which are very dangerous to all persons standing near. We know of no more promising field for the employment of inventive genius than improvements in the mode of building up these turrets. Inventors who may turn their attention to it will do well to bear in mind the inexpediency of forging and fashioning very large masses of wrought iron.

The Lesson of Fort Sumter.

The demolition of Fort Sumter by guns placed at a distance of two and five-eighths miles, has demonstrated the necessity of facing our forts with plates of wrought-iron. When Gen. Totten made his experiments some years since, it was found that plates 8 inches in thickness, when well backed by solid masonry, were practically impregnable by the artillery in use at the time; but the introduction of rifled cannon has so greatly increased the efficiency of ordnance that it may require two 8-inch plates to protect the walls of the forts. This would be enormously expensive, but in the end will be the best economy. Any money expended in building and maintaining an inefficient fort is simply wasted.

In this connection we will renew our suggestion to mount the upper tier of guns in revolving turrets.

Dull Black Color on Brass.

The *Practical Mechanic's Journal* (Glasgow) states that the dull black so frequently employed for brass optical instruments, may be produced as follows:—First rub the brass with tripoli, then wash it with a dilute solution of a mixture of one part of neutral nitrate of tin, and two parts of chloride of gold; allow the brass to remain without wiping for about ten minutes, after which wipe it off with a wet cloth. If there has been an excess of acid, the surface will have assumed a dull black appearance. The neutral nitrate of tin is prepared by decomposing perchloride of tin in ammonia, and dissolving the precipitated oxide thus obtained in nitric acid.

The Potato Rot.

Thomas Carpenter of Battle Creek, Mich., communicates the following, as his mode of fighting off the potato rot:—

Now I will tell you how I manage; premising that I never yet had potatoes rot in the ground, and that I am 63 years old. I plant my potatoes in the latter part of April or fore part of May, and in the old of the moon. When they get up six inches high, I

plaster and dress them out nicely. Now for the secret. When the sets show for blossoming, then is the time to take two parts plaster and one part fine salt; mix well together, and put one large spoonful of this compound on each hill; drop it as nearly in the center of the hill as possible. Just as soon as the potatoes are ripe, take them out of the ground; have them perfectly dry when put in the cellar, and keep them in a dry cool place. Some farmers let their potatoes remain in the ground, soaking through all the cold fall rains until the snow flies. The potatoes become diseased in this way more and more every year; hence the potato rot. With such management they should rot.

THE PHILOSOPHY OF A DRY NORTH-EASTER.

On the eastern coast of the United States the causes of meteorological phenomena are so numerous and complex that they must generally remain in mystery; but occasionally a few forces overpower all others, and thus produce results which we are able to explain. Such is the case with the dry north-east wind which is blowing as we write, and which forms an exception to the usual humid character of the winds from that quarter.

All rain, snow, hail and dew is formed simply by cooling the air. Warm air will hold a great deal more water than cold air; and when a portion of the atmosphere has been warmed and brought in contact with the ocean, lakes, rivers, or moist earth, until it has absorbed a large quantity of water, and is then cooled below the temperature at which it will hold all of the water that it contains, the surplus above the quantity sufficient to saturate it at its reduced temperature is deposited. A south-east wind comes from the tropics, across the warm water of the Gulf Stream, being warmed, and saturated with moisture at that high temperature. When it leaves the Gulf Stream it encounters the cold belt of water along the coast, and is rapidly cooled, so that it can no longer contain the whole of its moisture. Of all the weather signs in this region, there is no other so certain as that a south-east wind will bring rain.

Even a north-east wind usually passes over the waters of the Gulf Stream which spread away toward the coast of Ireland, and when it reaches the land it is cooled; producing rain or snow. But after a long spell of hot weather, when the earth has become much heated, the wind may be warmed instead of cooled by striking the land; and in this case it will not part with its moisture. It is still more likely to find the land warmer than the ocean, if the ocean is filled with icebergs, as at the present time.

If this view is correct, a north-east wind would be less likely to be dry in winter than in summer; and perhaps some of our readers who keep meteorological registers will inform us how the facts accord with the theory.

Flax in Illinois.

This year has witnessed everywhere in the north a largely increased crop of flax, raised, not as heretofore, for the seed alone, but for the fiber, to supply the wearing material deficiency created by the sad downfall of the braggart King Cotton. From Illinois, a correspondent writes to the *Ohio Farmer* that flax was "very generally sown, and in some sections largely, some putting in as much as one hundred acres. In Central Illinois the straw is short, but the seed is superior. In my travels I noticed that the little old spinning wheel is out, buzzing once more; that the baby again is trying to get its fingers in the flyers, and that the ladies are knitting linen summer stockings. I actually saw a piece of checked, white and blue, flax pocket handkerchiefs. I also saw several men wearing pantaloons made this spring from flax which has lain for years in the loft of the barn."

Serious Accident.—The splendid steamship *Golden City*, lately built for the Pacific Mail Steamship Company, met with an accident on her trip out to California, which obliged her to return to this port. When off the coast of Florida one of the boilers was so badly burned that the arches over the fire-box were almost completely inverted. It will take a long time to repair the damage. It is wonderful and most fortunate that the arches were not collapsed entirely.

Correspondence

Treatment of Engineers in the English Navy.

Messrs. Editors:—In late numbers of the Scientific American you notice a discussion in British scientific journals, on the Condition of Marine Engineers in the Royal Navy. As a late chief engineer of that service, I thank you heartily for the candid and just spirit in which you have brought the question before the public. I feel satisfied that a comparison between the condition of Marine Engineers in other countries and those of the English service, will result in improving the condition of the latter; especially in your journal, which is so generally read in England and the United States, and so well known for its efforts to improve the condition of the mechanical trades generally. The truth really very far exceeds what is stated as "Grievances to be brought before the English House of Commons." I have known many young men of talent and good education who found themselves in a manner compelled to leave the service; not so much on account of the pay (small as it is), as from inferior accommodation, and having no real position: for their nominal position goes for nothing; they are consequently consigned to evil companionship, or the alternative—perpetual solitude. The treatment received by Engineers at the hands of officers of the Navy, is too often unfeeling. They are looked upon as interlopers, and treated accordingly. Class distinctions (absurd as they are generally) are something very tolerable in England, in comparison with the length to which they are carried on board war steamers. In short, the treatment is such that no man of any spirit or self-respect could submit to. The result is such as might be expected—an inferior class of men to fill these very important situations. To my certain knowledge, railway drivers, stokers, &c., having got sufficiently "*crammed*" to pass a nominal examination as third-class Assistant Engineers, are often appointed, who frequently render the efforts of the Chief Engineer inadequate to maintain everything in proper working order when on a foreign station.

Clearly, then, the British Royal Navy is no place for educated or talented young men. This system is driving the best skilled workmen to foreign countries. The prejudices against the English Navy are so strong, and the advantages offered in other countries are so great by comparison, that even long after a better state of things is brought about, there will be great difficulty in persuading suitable men to serve their country in the capacity of Engineers.

John Ashurst.

Toronto, C. W., Sept. 5, 1863.

Launch of the "Re don Luigi di Portugallo."

The two splendid frigates—so long the object of admiration to all observers—which Mr. W. H. Webb has had upon the stocks for the past two years, are now safely launched. On Saturday, the 29th ult., the last one was sent down the ways precisely at 10 o'clock. The dimensions of this vessel are 294 feet in length, 50 feet beam, and 36 feet 6 inches deep. These figures convey a very slight idea of the imposing outlines of the grand hull as it stood upon the ways, and afford no conception whatever of the thoroughness of the work. The occasion of a launch is generally the signal for a simultaneous laudation of all concerned in the building of the ship, from the person who slushes the ways to the proprietor of the yard; but we could not bestow any encomiums on Mr. Webb other than he has already won, or in any way add to the world-wide fame he has achieved. The vessels just launched for the Italian Government will have two powerful engines of 84 inches cylinder and 45 inches stroke of piston, and are to drive a propeller 19 feet in diameter, with a pitch of 31 feet 6 inches: the wheel so arranged as to be hoisted when not under steam. The machinery has all the modern improvements, and is much the same as that fitted to the *Grand Admiral*—the Russian line-of-battle ship built some years since by Mr. Webb. The armor on the *Re don Luigi* will be four and a-half inches in thickness, and the ship will be completely clad from stem to stern; she has also a short ram at the bow. These two vessels, with the others now building abroad, are to form the nuclei of a powerful navy.

Antidote to Nux Vomica.

Messrs Editors:—In No. 10 of the Scientific American, I notice an article headed "Antidotes of Poisons." In it you say, "for Nux Vomica there is no antidote." About sixteen years since a friend of mine had a dog, which had been poisoned by Nux Vomica, and was nearly dead; I told him to give the animal strong coffee; my friend poured about a pint down the dog's throat, and in the space of half an hour it was well." C. Leavett.

Windsorville, Conn., Sept. 5, 1863.

Improved Printing Telegraph of David Hughes.

It seems many inventions are the result of accident. David Hughes, when he invented the printing telegraph improvement, was endeavoring to contrive a machine for copying extempore music, so that his melodious improvisations might not be lost. Boarding in the same house with him was the well-known musical composer and piano teacher, Louis Hast, and the very intelligent telegraph operator, Norbonne M. Booth; one supplied him with electro-magnetic instruments, the other gave him the use of a piano; a printing telegraph was the consequence.

Hughes is now living in Europe, enjoying the well-merited fortune which his genius has earned. At the time of his residence in Kentucky, he was twenty-two years of age: a beardless boy in face and stature, and apparently lacking in mental power. His features were careworn: when spoken to he had a constant grin and giggle, not calculated to impress his interlocutor favorably. His ear for music was so acute that he could tell you, to a semitone, the note of anything sounded, from a dry stick to a shovel. This has been suggested by an article on Caselli's Pantelegraphy, found in the July number of the Paris journal entitled *La Science pour tous*. We had lost sight of Hughes, till seeing this article.

The Dry Goods Trade.—The dry goods trade is very active at present in this city. The fall trade has set in under very favorable auspices. A large number of purchasers from distant places are in the city; money is plenty, and buyers are liberal. Domestic cotton goods are duller than any other class. Domestic woolens are active, however, and a large business is doing at satisfactory prices. Many articles are selling in advance of production, especially flannels and goods suitable for women's wear. An extensive manufacturer of goods for ladies' wear informed us last week that his orders and sales are larger than ever they have been before; and he has been in the business for nearly twenty years. The demand for shawls exceeds the supply. Foreign goods have been very active also, and a large amount of goods are now selling, both French and English, at full and satisfactory prices. Plain silks and worsted goods, delaines, alpacas, &c., are particularly active, and immense sales are made of all kinds

APPLICATIONS FOR THE EXTENSION OF PATENTS.

The following persons have applied to the Commissioner of Patents for the extension of their patents for a term of seven years:—

William E. Nichols, of East Haddam, Conn., for extension of a patent granted on Dec. 11, 1849, on a machine for making cord. It is ordered that this case be heard at the Patent Office, Washington, on Monday, Nov. 23, 1863. All persons are notified to appear, and show cause, if any, why said petition should not be granted. Also; John F. Rogers, of South Bend, Ind., for extension of patent granted Nov. 27, 1849, on an improvement in railroad trucks. Parties are required to appear on Nov. 9, 1863, at the Patent Office, and show cause why said petition should not be granted.

The Work goes on.—Notwithstanding the numerous vessels added to the navy within the past two years, the work of construction is to still go on. The Navy department has just decided to build another fleet of iron-clad vessels. They will be longer and more formidable than any now in the service of this or any other country—being, in fact, erfect copies of the great Ericsson oce n ships, *Puritan* and *Dictator*, which are now building in this city.