toes, with which, in addition to the leeches and ticks, they seem to be tormented the whole year round. They are excellent swimmers, taking to the water almost before they can walk; and they rely upon the sea for the principal supply of their food—turtles, oysters, and fish.

Correspondence

American Guns.

MESSRS. EDITORS:—In an editorial article in your last issue, under the caption of "American guns," you quote from the Pittsburgh *Chronicle* an item in reference to the 15-inch guns, containing a grave misstatement and a very absurb suggestion. The 15-inch guns have *not* been condemned by the Department, as failing to realize the results anticipated from their use; and the statement is founded on the most unreliable of sources—a Washington rumor. Some modification of the model is being made, but this would seem to prove that the guns have, in the main, proved satisfactory. In order to admit of their use in the monitor turrets, the first guns were made much shorter than the sea-coast 15-inch; those hereafter made will be at least eighteen inches longer than those now in the turrets, and will be reduced at the muzzle to an exterior diameter of about twenty-one inches—three inches of metal, only. Such of the short guns as had not been forwarded have been turned down at the muzzle to conform to this modification, and one has been severely tested in Washington, proving that it has not been weakened by the reduction of the muzzle. I presume it is generally known that the monitor ports will be slightly enlarged, and the muzzles of the guns protruded, hereafter, in firing. These facts do not seem to indicate any design on the part of the Government to abandon the new 15-inch guns.

The brilliancy of proposing to increase the efficiency of a gun, objected to on the score of being already too weak, by rifling it, needs no comment. It is sufficiently striking and must commend itself to the Department. PITT.

Pittsburgh, Pa., Oct. 6, 1863.

Gas from Petroleum Tar and Hard Wood.

MESSRS. EDITORS:—It is generally supposed that the gas oils and residuum or tar distilled from petroleum are not adapted to gas making. To correct this impression I send you the following statement. The Aubin Gas Works are now arranged to make gas from the above tar and hard wood. From 40 gallons of the one and 1,800 lbs. of the other, they make (in ordinary operations as now used by many village gas companies), 12,000 feet of rich gas. Much of this great yield of course, comes from the wood; but as the charcoal is worth what the wood costs, the entire yield is justly claimed from the tar. When I add that so exhaustive a process prevents clogging of either pipes or retorts, it is evident that whatever may be the objections to the use of petroleum and its distillates in coal and rosin gas-works, they apply to the works and not to the oils; which when treated according to their conditions, are the richest and cheapest gas-making materials known.

H. Q. HAWLEY.

Albany, N. Y., Oct. 2, 1863.

How to Conquer Belligerent Bees.

A correspondent sends us the following remedy for pugnacious bees. It would seem to be effective:—

MESSRS. EDITORS:—In your issue of 26th September you copy an extract from the *American Stock Journal*, entitled "Bees," giving a remedy to stop them from robbing each other of their honey, all of which may be very good, in the absence of a better method. But having positive knowledge of a much quicker and simpler plan, I beg to lay it before your readers:—

When it is discovered that two swarms of bees are at war with each other, by turning up the hive containing the attacking bees, thrusting a stick up into the honey, and fracturing the comb, you will at once stop all further aggression, and set the bees repairing the damage done to their own empire, instead of trying to conquer another. G. B. TURRELL.

INVENTIONS AND DISCOVERIES ABROAD.

Purifying Gas With Animal Charcoal.—The following interesting extracts are from a communication to the *Journal of Gas Lighting* (London), by George Smedley, of the Sleaford Gas Works. He says:—"Being engaged (with the assistance of another person) in manufacturing manures from the refuse of the works, we made use of animal carbon as a vehicle, and, on one occasion I had some gas-liquor filtered through a small quantity of the same, when I discovered that, after filtration, the liquor was deprived of nearly the whole of its ammonia. I repeated the operation several times, and each time obtained the same result. Then came the thought—I have neither scrubber nor washer; here is a material that has an affinity for ammonia in a liquid form; why not in a gaseous one? Try it. I did so, by filling one tray in each purifier with the carbon. On the following days I applied the turmeric test; and lo! the old nuisance had vanished. I afterward made a small purifier, charged it with carbon, and, on testing the gas with the crude apparatus at my disposal, discovered it had the power of intercepting sulphuretted hydrogen as well as ammonia, but only a small per centage of carbonic acid. Further, I believe gas purified by animal carbon, retains a greater per centage of hydrocarbons than by either lime or oxide of iron. I must confess to you that I have not the means of satisfying myself on these points; and shall only be too glad if any one in the gas world would solve these questions for me. My only idea at present is that it may be useful on small works where no means are provided of getting rid of the ammonia, by using it for that purpose, and afterward disposing of it at a profit. As the great question with us all is to have our gas as pure as possible, at the smallest cost, I submit this to you with the view that some one may take it up."

Transferring Photographic Pictures to Porcelain and Glass.—The *Photographic News* contains an interesting article on this subject, the inventor of the process being M. Grume, chemist, in Berlin, Prussia. The mode of conducting the operations is described as follows:—"The paper (resembling ordinary albumenized) is silvered as usual, but very much over-printed from the negative; in fact, till the lights are quite gone, and the print appears lost. It is then washed, to free it from silver, and toned, and then rinsed. While rinsing, the print may be observed to be covered with blisters. These gradually increase in size until finally the delicate film of gelatine upon which the picture is splits off and floats into the water. It is then very carefully placed in hypo-sulphate of soda and then well washed—every washing appearing to render it more tough, till at last it may be handled with impunity. The glass, or porcelain, upon which it is to be placed is then passed under the film, and both lifted out of the water together. When dry it is trimmed and covered with transparent hard varnish. We have also received from Messrs. Harvey, Reynolds, & Fowler, a sample of paper for producing these pictures. The instructions they forward contain one or two additional hints. Excite the paper as for albumenized paper. Dry. Print *very* deeply, you can scarcely print too deep. Tone as albumenized paper; more care will be required as the prints are over-printed, and the changes of tone are not so readily observed. Wash in water. A film now begins to leave the paper. Pass into the hypo-bath one part in five. The film now entirely separates from the paper, and the paper must be removed. Let the film remain in the hypo about ten minutes, and then carefully and thoroughly wash in water. The film is now very elastic. To transfer this film to any surface, clean the surface, and bring it under the film which is floating on pure water. Raise both out of the water together, pull the film into the desired position on the object, and let it dry. Then varnish with a clear varnish. If the film should not adhere as closely as desired on round surfaces, wash it (without removing it from the object) with a mixture of 1 part acetic acid 82°, and 6 of water. As soon as it becomes elastic, wash with water, and it will adhere well. As the manipulations thus described seem to present some difficulties, we were anxious, prior to bringing the process before our readers, to put it into practice. We have accordingly exposed half-a-dozen pictures and transferred them according to instructions. We have succeeded beyond our expectations, and have obtained, at the first attempt, some very pleasing transfers. The paper was excited on a sixty-grain bath, and a couple of pieces exposed under a portrait negative, until the highest lights were of a lavender tint. This we subsequently found was not quite deep enough. The prints were washed and toned as usual, reaching a deep purple in the gold bath, which was one made after Parkinson's formula. On being transferred to a dish of water, and washed well, we did not observe either blistering or entire separation of the film as expected. We then transferred them to the hypo bath, and allowed them to remain a quarter of an hour. A slight blistering was now apparent, which increased in the subsequent wash of water. But as the separation did not take place so speedily as we anticipated it, we added a trace of carbonate of soda to the water, and in a few minutes we saw the delicate transparent film separated from the paper, and floating in the water. After rinsing, we placed a piece of white enamel glass underneath the floating film, and by a little careful management lifted it from the water uninjured, and stretched flat upon the glass, where it dried, smooth, bright, and firm. We now exposed a couple more, and printed until the image was completely buried; after which, before toning, we trimmed the print to the shape we desired, as we found it was a difficult thing to shape the film when once detached from the paper. We toned this time in a bath containing a little carbonate of soda, and we observed in the subsequent rinsing that the blisters began to rise; these increased in the hypo bath, and in the course of the subsequent washings, the film readily separated and floated away from the paper. A subsequent couple were toned in the lime bath, washed, and fixed. These also separated in the subsequent washing without any trouble; but a longer time was necessary, some hours elapsing before the film of albumen was quite detached. The attenuated film, as delicate as the wing of the smallest fly, at first sight seems quite unmanageable, curling, twisting, and folding itself with the slightest disturbance of the water; and if the object on which it is to be placed be brought under it, and both lifted out of the water without proper precaution, it will probably be found to have run up together into a shapeless mass, apparently beyond remedy. If it be carefully returned to the water, the probability is that it will gradually float straight out again, and present itself quite uninjured. A little care and patience will be required. The variety of ornamental purposes for such transfers will readily suggest themselves. When transferred to plain white enamel glass, the pictures acquire not only a beauty as transparencies, but also as positives, which they did not possess before. The pure white and fine surface seems to impart a wondrous charm of delicacy and brilliancy altogether unexpected, which, for locket and brooch portraits, will possess especial value. It is probable that the film so transferred to ivory will be of value to the miniature painter. As ornaments for vases of opal glass, &c., many very beautiful effects may be produced. In the art of diaphanie, and as an adjunct to the now fashionable art of decalcomanie, it will probably be found useful; and in a variety of ways which do not now occur to us. At present, the only protection is a hard varnish, but it is possible that by the use of an enamel powder fusing at a low temperature, a vitreous surface might be secured."

Paint for Coal Tar Colors.—A patent has been granted to B. Dupy and Antoine Vibert, of Lyons, France, for making pigments to be employed in oil painting from the colors of coal tar, which have hitherto been chiefly used for dyeing silk and woolen fabrics. For obtaining cakes of red, blue, and violet, 15 grammes of white soap are used, dissolved in 100 grammes of hot water, and there is then mixed with the solution 6 decigrammes of color, previously dissolved in methylitic alcohol, or other solvent. To this mixture is added 25 grammes of alumina, in a gelatinous state, and the mixture is then filtered and dried. These proportions may be varied at discretion; for, instead of 6 decigrammes of color, a larger quantity may be used, in order to have a greater depth of color. Instead of white soap, glycerine and soaps made from oils or grease derived from animal matters may be employed; and, instead of alumina, sulphate of barytes or other metallic or earthy oxide may be used ; and in this way, all the colors derived from tar may be manufactured into pigments. Thus the color is dissolved in any of the known solvents, and then mixed in water both with vegetable or animal soaps, dissolved in the hot or cold state, and the colors precipitated by alumina, previously precipitated from alum, or sulphate of barytes, or any kind of salt or metallic or earthy oxide. By these means, and especially by the assistance of an animal matter in a soapy state, the colors are rendered solid and durable, and are applicable for painting. A fine yellow cake or product is obtained by employing picric acid in combination with an earthy compound and the picrates in general, particularly the picrate of lead. These aniline colors are mixed with animal or vegetable soaps for making the colors soluble in water. When the blue and yellow products are combined, a fine green is obtained, and the mixture of red and yellow produces an orange color ; and, by the mixture of the different colors, all varieties of tints can be procured. The richness of these colors is unequalled; and, as they maintain their tints when exposed to light, they are invaluable in the arts.

[A gramme is equal to 15 44 English grains ; and a decigramme 5 65 dr. avoirdupois.

SCIENTIFIC INFORMATION---BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

In a recent issue we gave some condensed extracts from the opening address of the Chairman of this Association—Sir William Armstrong—and now present condensed abstracts of practical papers read by the members. We have done this every year, because many of the papers read are of a very useful character ; there being a large number of mechanics and engineers members of the Association.

GUN COTTON.—Dr. Gladstone, member of a committee appointed to investigate this subject, read a paper relating to the chemistry of gun cotton. He stated that the Austrian gun cotton exhibited a marked degree of superiority over all other kinds. Among its advantages were, that it did not become ignited till it was raised to a temperature of 136° centigrade, that a gun was less injured by repeated discharges from it by gun cotton than by gunpowder, that gun cotton was not injured by damp like gunpowder, that no smoke arose from the explosion of the gun cotton, and that there was no residuum left in the gun to be got rid of before another charge could be introduced.

Mr. J. SCOTT RUSSELL read a report on gun cotton from the mechanical section. He stated that the committee found it difficult to believe that greater mechanical effect could be produced by gases generated from gunpowder. It seemed to the committee that gases once generated under a given pressure, expanded under the same law, must produce in the same chamber or shell effects nearly identical ; and it was only after long and careful examination that they were able to understand and reconcile themselves to the fact that greater mechanical effects were produced by the gases of gun cotton than by the gases of gunpowder. One hundred pounds of gun cotton produced, when exploded, 955 cubic feet of gas, while the same weight of gunpowder produced 308 feet of gas when exploded. As regarded bulk, 22 pounds of gun cotton go into one cubic foot, while from 56 to 60 pounds of gunpowder go into one cubic foot. The great waste of force in gunpowder constituted an important difference between it and the gun cotton, in which there was no waste. Gunpowder consisted of about 68 per cent solid matter and 32 per cent useful gases. It might be said, therefore, that one-third of the gunpowder was not directly useful in producing gases ; but the 68 per cent of solid matter in gunpowder was not only waste itself, but it used up a large portion of the mechanical force in the remaining 32 per cent of useful gases. Gun cotton can be exploded in any quantity instantaneously. This was once considered its great fault, but it was only a fault when we were ignorant of the means to make that velocity anything we pleased. General Lenk has discovered the means of giving gun cotton any velocity of explosion that is required, by merely the mechanical arrangements under which it is used. Gun cotton, in his hands, has any speed of explosion, from 1 foot per second to 40 feet per second, which is the velocity of gunpowder. The instantaneous explosion of a large quantity of gun cotton is made use of when it is required to produce destructive effects on the surrounding material. The slow combustion is made use of when it is required to produce manageable power, as in the case of gunnery. The temperature of ignition of gun cotton is between 277° and 338° Fah. One pound of gun cotton produces an effect exceeding three pounds of gunpowder, in artillery. It may be placed in store, and preserved with great safety. Danger from explosion does not arise until it is confined. It may become damp, and even perfectly wet, without injury, and may be dried by mere exposure to the air. This is of great value in ships of war and in case of fire the magazine may be submerged without injury. Gun cotton keeps the gun clean, and therefore performs much better in continuous firing. In gunpowder there is 68 per cent of refuse, while in gun cotton there is no residuum, and therefore no fouling. Experiments made by the Austrian Committee proved that 100 rounds could be fired with gun cotton against 30 rounds of gunpowder. Experiments showed that 100 rounds were fired with a 6-pounder in 34 minutes, and the temperature was raised by gun cotton to only 122° Fah ; while 100 rounds with gunpowder took 100 minutes, and raised the temperature to such a degree that water was instantly evaporated. The firing with the gunpowder was therefore discontinued ; but the rapid firing with the gun cotton was continued up to 100 rounds without any inconvenience. The absence of fouling allows all the mechanism of a gun to have much more exactness than where allowance is made for fouling. The comparative advantages of gun cotton and gunpowder for producing high velocities are shown in the following experiment with a Krupp's cast-steel gun, 6 pounder :—Ordinary charge, 30 ounces of powder, produced 1,338 feet per second ; charge of 13½ ounces of gun cotton produced 1,563 feet. The fact of the recoil being less in the ratio of two to three enables a less weight of gun to be employed, as well as a shorter gun. The fact that the action of gun cotton is violent and rapid in exact proportion to the resistance it encounters tells us the secret of the far higher efficiency of gun cotton in mining than gunpowder. The stronger the rock the less gun cotton comparatively with gunpowder is found necessary for the effect—so much so that while gun cotton is stronger than gunpowder, weight for weight, as three to one in artillery, it is stronger in the proportion of 6·274 to 1 in strong and solid rock, weight for weight. It is the hollow rope form which is used for blasting. Its power in splitting up the material is regulated exactly as you wish. It is a well-known fact that a bag of gunpowder nailed on the gates of a city will blow them open. A bag of gun cotton exploded in the same way produces no effect. To blow up the gates of a city with gun cotton it must be confined before explosion. Against the palisade of a fortification a small square box containing 25 pounds simply flung down close to it will open a passage for troops. In actual experience on palisades a foot in diameter and 8 feet high, piled on the ground, backed by a second row of 8 inches diameter, a box of 25 pounds cut a clean opening 9 feet wide. To this three times the weight of gunpowder produced no effect whatever, except to blacken the piles. A strong bridge of 22-inch oak, 24 feet span, was shattered to atoms by a small box containing 25 pounds of gun cotton laid on its center. The bridge was not broken ; it was shivered. Two tiers of piles were placed in water 13 feet deep, 10 inches wide, with stones between them, and a barrel of 100 pounds of gun cotton placed 3 feet from the face, and 8 feet under water, made a clean sweep through a radius of 15 feet, and raised the water 200 feet. In Venice a barrel of 400 pounds of gun cotton, placed near a slope, in 10 feet of water, at 18 feet distance, threw it in atoms to a hight of 400 feet.

Captain GALTON, R E., said the subject reported upon was exceedingly important, but it must be borne in mind, in connection with the subject, that the Austrians had within a recent period discontinued the use of this material for guns. He begged to suggest that a proposal be submitted to the committee to the effect that it be requested to continue its labors in this inquiry.

IRON SHIP BUILDING.—A paper was read upon this subject by C. M. Palmer, of the "Jarrow Works," near Newcastle—a most extensive establishment, where iron steamships are built complete, with all their machinery produced from iron manufactured on the premises. He said :—

"The principal advantages claimed for ships of iron, as compared with vessels of timber, are briefly these :—In vessels of 1,000 tuns the iron ship will weigh 35 per cent less than the timber vessel, the displacement of water being the same. The iron ship will, therefore, carry more weight, and as the sides are only about one-half of the thickness, there will, consequently, be more space for cargo. The additional strength obtainable, too, allows iron ships to be built much longer and with finer lines ; thus insuring higher sailing or steaming qualities, with greater carrying power. In wooden vessels repairs are frequently required, while the repairs in iron ships are generally of a lighter character, and are only needed at long intervals. An iron ship is not liable to strain in a heavy sea, whereas the straining of a timber vessel often damages a valuable cargo. Moreover, the use of iron masts, steelyards and wire rigging, effects a very large saving of weight, and affords the greatest facilities for the application of patent reefing sails, and other appliances by which economy of labor is attained. As to the form of building iron ships, and the manner of combining the iron, so as to obtain the requisite amount of strength with the least amount of material, much difference of opinion exists among practical men. The angle iron frame and plating of the iron vessel take respectively the places of the timbers and planking of the wooden ship : and it has been found by experience that plating one eighth of an inch thick is equivalent in effect to planking of oak one inch thick, while plating $\frac{11}{16}$ths of an inch thick is equal to planking of oak five inches thick. As in the largest American wooden vessels the plank is seldom more than five inches thick, so it may be argued on the above data that the plating of the largest iron ship need not be more than $\frac{11}{16}$ths thick ; and any strength required above that which such plating would give should be obtained by framework. Many practical men, however, advocate the system of light framework, and (in order to obtain the measure of strength necessary), the application of thicker plates. That the principle of strong framing and plating of moderate thickness is most advantageous may be shown by many facts. The strength of an iron ship, as in a girder, depends on its capability to resist the buckling and tensile strains that it is called on to bear. We have only to make a ship strong enough to resist the buckling strain. We have to make the parts of an iron ship, in principle, like a girder. A girder, however, is at rest, and the strains are always in some known direction ; but in a ship, the position of which is ever varying, it requires to be so conducted as to resist the strains in such varied positions. If the side of a ship could remain as in a girder, constantly vertical, then the advocates for the thick plates and small frames might be able to show that their system was the most economical way to obtain the requisite strength ; but, as such side, if laid over, as it is in a ship at sea, would, without support, bend or buckle of its own weight, it is evident that the framing is absolutely necessary to keep the plating firm in position, and consequently the strength of the ship depends in a very great degree on the strength of the framing. Another fact that shows the economy of strong frames is, that a plate with a piece of angle-iron attached to its edge, would bear much more before buckling than a similar plate increased in thickness so as to weigh the same as the plate and angle-iron.

DEEPEST COAL MINE IN THE WORLD.—The coal mine of Monkwearmouth was visited by a party of members of the British Association, among whom were four ladies. The depth of this mine from the surface is 1900 feet, and the workings of coal underneath extend to a distance of two miles from the shaft. About 300 persons are employed in it, and 600 tuns are mined daily. The heat at the bottom varies from 84° to 90° Fah., and the miners work in an almost nude state. Of all the pursuits by which men gain a living, there is none more toilsome, more dangerous, or more dreadful in all its circumstances and surroundings, than the life of him who wins coal from the mines.