The assumed "bending" of the turret shaft is purely imaginary, as the following explanation will show The deck ring which supports the base of the turret rests upon four bulkheads, all as deep as the vessel, two being placed transversely and two longitudinally. The tops of these bulkheads cannot be, and never have been, out of a true plane in our monitors with iron hulls. *Wooden* monitors, be it observed, are makeshifts, incompatible with the turret system.

As no constructor understands this better than Mr. Reed, why does he put before his readers, as a serious objection against the monitor turret, the statement of an inexperienced civil engineer concerning the settling of the deck of the wooden turret vessel *Miantonomoh?* And why does he advance as a point against the *system* the fact that the base of our wooden vessels had "coats round the turrets to keep them water-tight" while crossing the ocean? He knows that the turrets of the monitor fleet, exposed to the waves of the Atlantic during the war, were at all times ready for action. Those who saw the monitors during the gale off Fort Fisher, with their turrets half submerged, can estimate exactly the strength of the objection urged. In fine, the assumption that the joint between the base of the turret and the deck is liable to leak so as to endanger the safety of the vessel, is mere conjecture based on inferences drawn by those who are not correctly informed of the true cause of the foundering of the original *Monitor*—an accident wholly unconnected with any defects of construction.

Referring to the "breastwork monitors" *Thunderer* and *Devastation*, without masts and sails, we are of opinion that they will prove the most powerful ships in existence; but they are costly, first class iron ships, protected with solid armor, such as only England can produce at the present time, and they draw twenty-five feet of water. Our experienced naval officers well know that such vessels are not calculated for the defense of the several harbors, dock-yards, and maritime cities of this country; they know that the points to be defended are too numerous to admit of our employing such costly structures as the *Thunderer* and *Devastation;* and that the American monitor, with its impregnable turret, submerged hull, and light draft of water, is better adapted for our shallow waters.

The writer of the chapter on turret ships, apart from his erroneous views of the American monitor, appears to have forgotton what took place subsequently to Admiral Du Pont being relieved from his command at Charleston. The report of Du Pont that the monitors "are totally unfit for blockading duties" being quoted, it will be asked, why is the report of his successor, Admiral Dahlgren, omitted? The former was detached before he had time to become at all acquainted with the new system; while the latter, during two years, blockaded Charleston with the monitors so effectually that the Confederate stronghold was completely sealed. The report of the several commanders of the monitors during the first demonstration against Charleston, under Du Pont's command, is quoted as decisive against the monitor turret; but no reference whatever is made to the important fact that these officers were wholly inexperienced with them, and that the vessels were brought directly from the engine establishments to the enemy's batteries. Had the fleet not been brought into action again, the reference to the reports from the commanders during this their first essay would have been unavoidable; but what are the facts? Admiral Dahlgren afterward engaged the Confederate batteries, with these same monitors, nineteen times between July 18th and September 8th. The report of this experienced commander and accomplished naval artillerist concludes thus: "The battering received was without precedent. The *Montauk* had been struck two hundred and fourteen times, the *Weehawken* one hundred and eighty-seven times, and almost entirely with 10-in. shot."

New Railway Bridge.

The piers for the new railway bridge over the Connecticut river, at Saybrook, Conn., on the Shoreline railway, are now nearly completed. They are made in a rather novel manner, with a view to prevent damage to the wooden piles from insects.

A cluster of nine or twelve pilesare driven as near together as possible, and around this cluster are placed sections of cast iron cylinders of the required diameter, until they reach from the hard bottom of the river to ten feet above high water. After these are in position, the intervening space between the piles and the inside of the cylinders is filled with a concrete of water cement and sand, so that, when finished, the structure is made as solid as one can well imagine.

The center pier of thirteen cylinders—five, eight in diameter, and eight, five feet in diameter—is the one on which will revolve the balance draw, with two openings for the passage of vessels on either side. The draws will be 120 feet in the clear, affording ample room for any vessel that will ever pass up the river to go through the draw. The draw-bridge proper will be of iron, 288 feet in length, and will revolve on a pivot in the center of the large pier, and will be supported by a circular track railway, and so geared that it can be opened or closed by one man.

Another Card from an Advertiser.

The Lamb Knitting Machine Company, Chicopee Falls, Mass., in sending a new advertisement, state as follows: "Please insert this advertisement on last page of your paper for three months. We are happy to assure you that in all of our extensive advertising, no other paper brings so many applications for further knowledge of our machine as the SCIENTIFIC AMERICAN; and one good thing is, it does not cease with the issue of the paper, for we now often get our notice cut out and sent us which was inserted over a year ago."

THE EAGLE CARPET STRETCHER.

Our engraving represents a new carpet stretcher, which, we think, will commend itself to every intelligent upholsterer. It gives a powerful leverage, at the same time being simple in construction, quickly and easily applied, compact, and portable. It does not injure the face of the carpet in putting it down.

It is only a trifle larger than the tack hammer; but a carpet can be stretched better and more strongly by it than anything of the kind we have yet seen. The detail in the margin of the engraving gives a good idea of the construction of the implement. Thejaws, A, have goosenecks, pivoted at B. The points, C, engage with the floor when the implement is in use, and the power is applied at the handle, D.

The larger engraving shows the method of applying the tool. With ordinary stretchers the operator can only stretch the portion of the carpet between the point where he stands and the base boards. With this he may draw himself, furniture, or what not, along with it, as he has a good fulcrum on the floor, by the engagement of the points therewith.

In use the carpet is doubled back, as shown in the engraving. The jaws which are self-clutching, hold tighter and tighter as more power is applied to the lever or handle, D. The carpet being stretched is tacked temporarily back from the base board, and the edge being then released is turned down and permanently tacked to the floor. The temporary tacks are then withdrawn. The jaws thus come in contact only with the back of the carpet, and the face is not marred and torn as by the use of the old style of carpet stretcher.

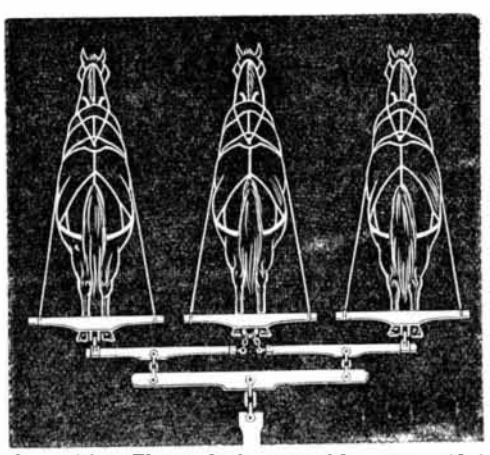
The instrument is excellently adapted for stretching canvas on the deck's of steamboats for painting, and for stretching webs on sofas.

The instrument has been in practical use about one year, and has, we are informed, given the most perfect satisfaction. The inventor, a practical upholsterer, states that those who use this tool, and thus become practically acquainted with its merits, will never exchange it for any carpet stretcher yet introduced to the public.

Patented, through the Scientific American Patent Agency, Feb. 8, 1869, by William Brown, New York city. Address for State or manufacturing rights The Whitlock Exposition Co., Nos. 35 and 37 Park Place, near Church street, New York.

HOW TO HITCH THREE HORSES TO ONE PLOW.

The diagram published in No. 2, current volume, showing how to hitch three horses to one plow, has received some severe criticism, which it doubtless deserves. It is stated that no equalized draft can be obtained by it, unless the horses draw equally, naturally. Nothing about the device compels



them to draw alike. The method proposed has, it is said, been tried in many portions of the country, and found of no value.

We have received several diagrams illustrative of ways in which draft may be equalized, one of which, as being the most practical, we give herewith. This will close the subject as we can give space to no more communications upon it.

The diagram explains itself sufficiently without description.

M. BOILLOT states that he filled jars with hydrogen and placed some sulphur in the same, and, having passed an electric spark through the latter, igniting and volatilizing it, that a perceptible quantity of sulphureted hydrogen was produced.

Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

Steam Engines at the American Institute.

MESSRS. EDITORS:—The steam engine trials at the late Fair of the American Institute, has resulted in an unfortunate controversy between the competitors, and, as it at present stands, between one of the competitors and the judges.

We propose not to continue the controversy in which we have no interest, and in which we think the public has none, but to look at and discuss the causes of dissatisfaction, that we may, in case another similar contest takes place, avoid all questions that have arisen in the trial alluded to.

The rules published for regulating the trial were for the scientific engineer satisfactory, inasmuch as he knows that the measure of the steam in the cylinder is the measure of the power exerted by the engine. He also knows the quantity of water due to the steam, from which he calculates the cost of the power.

The engineer also knows that the water pumped into the boiler is unreliable, either as a measure of steam at the end of the stroke or power evolved; inasmuch as more or less water goes over to the cylinder in suspension with the steam, which is not power to propel the piston, but, on the contrary, tends to obstruct it. This was fully illustrated during the trial when the steam was notably wet, with the exception of some six hours during the second day.

To the public—to users of steam engines, who are accustomed to rate the cost of their power from the coal consumed, the steam test is neither understood nor satisfactory. Hence, the fuel consumed should have been accurately weighed and reported, and such deductions made as the actual steam indicated. This would have satisfied both scientific and purely practical men.

From the acknowledged ability and experience of the superintendent, an able and impartial report was expected by the exhibitors and others interested. While we fully accord to him impartiality, we cannot but regret that the circumstances which surrounded him rendered it utterly impossible to do himself or the subject justice.

His duties as the general superintendent of the whole exhibition, precluded the possibility of giving the special subject of the trial of the engines that undivided attention which its importance imperiously demanded; and it surprises us that the report has attained the high grade of respectability it possesses, considering also that he was almost entirely unaided by the judges.

The non-attendance of the judges is to be severely reprehended. By accepting the office they accepted the duties thereof, and could no more do it by proxy than could the judges of a court in a capital trial. It is true that men's lives were not at stake; but there was what men often value next to it—mechanical and professional reputation.

We have nothing further to say of the judges, but would suggest to the Board of Managers with all due deference, if future trials should be had, to make it a condition that the judges shall be present and assist, that the number shall be not less than five, and that at least three of them be practical men in the business, and the balance scientific men whose attainments, through study and observation, have fitted them for the office; men of these attainments, we are happy to know, are members of the American Institute.

Another point of great importance remains to be mentioned. It is the short time that was allotted to the trial. Being the last week of the fair, there was not time, nor half time to give the superintendent, even if he had nothing else to do and had been properly aided by the judges, an opportunity to do justice to such an important trial. The exhibitors had not time, if any occult or accidental defect should manifest itself, to correct or repair it. The public, too, has a right to complain of being deprived of the instruction in the use of steam and the steam engine, which an extended and properly conducted set of experiments would have afforded.

The character and reputation of the Institute suffers by these half-way experimental trials.

While we would not make these expositions for the money they would put in our treasury, *per se*, yet we would make all the money we could to expend in diffusing knowledge and stimulating improvements; and if we may judge by the crowds collected in the machinery department during the late short trial, we may safely say it was the most attractive and paying part of the exposition. And, had the experiments been continued for four weeks, it would have shown well on the credit side of the ledger, and given better satisfaction to all concerned.

A MEMBER OF THE AMERICAN INSTITUTE.

Burning Bituminous Coal.

MESSRS. EDITORS:—In Illinois the consumption of bituminous coal (or as it is better known, Illinois soft coal) is immense, and anything calculated to do away with some of its inconveniences will be of benefit to hundreds of thousands.

This coal is found in abundance in nearly every section of the State and is a most economical and convenient fuel, but it has its "drawbacks." With a poor draft considerable smoke escapes when the fire is being replenished, and its action upon various substances seems to be not that of pure carbon. I have never analyzed it, which perhaps I should do before addressing you upon the subject.

This nuisance *inside* our dwellings is entirely abated by having a strong draft which will carry up and discharge from the top of the chimney the unconsumed flaky lampblack. But where is it to be deposited? On our roofs, of course, and here lies our great trouble—our somber hued "skeleton." Once settled upon the roof, its apparent destination is the cistern.

Some one says, "Use Mosher's rainwater cut-off, which will conduct the first washings of your roofs on to the ground, and then allow your clean water to enter your cistern." A very good suggestion if we governed the rainfall; but in a dry season, when a shower would just suffice to wash the roof nicely, how could we make it available?

In sparsely settled neighborhoods this coloring of the water is scarcely perceptible, but in the large towns and cities it becomes a serious matter, as such water is really unfit for laundry purposes; clothes washed in it always looking *dingy*, not to say *dirty*. You will say, "Filter it;" but how? We have never been able to obtain a filter which would give us *clean* water and not also give us *hard* water.

I notice in the SCIENTIFIC AMERICAN you recommend Kedzie's filter for general use; but I am informed by a gentleman who has used one, that although he is able to obtain from it clear water, the "sudzing" properties are wanting or greatly impaired.

From my own observations, I am led to believe that we separate with our filters, not the *mechanically* combined "soot," but something *chemically* combined with the useful constituents of rain-water.

If you do not agree with me, and are of the opinion that any form or kind of filter will answer the purpose, will you please indicate it? or if you agree with me that the trouble needs a chemical remedy, can you not suggest some agent which shall destroy the combination and precipitate the "soot" in its original form?

If you find this impossible in the absence of sufficient data, perhaps some of your scientific readers, more competent than myself, will feel enough interest in the matter to make analyses and report through your columns the remedy.

Aurora, Ill. M. L. BAXTER, M. D.

[We publish this letter in full that those who have experience in the same direction may contribute if they can to help our Illinois friends our of their troubles. We advise the trial of alum, say 1 oz. to twenty gallons, as we are informed it has been successfully used to purify water in other districts similarly troubled.—EDS.

Hardening and Tempering Steel.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of February 5, I find an article upon "Solutions for Hardening Steel," upon which subject I should like to make a few remarks.

When heated steel is plunged beneath the surface of a liquid, as in the process of tempering, chemical changes affecting both substances are not unfrequently produced. The nature of such changes often renders a particular liquid peculiarly favorable for the production of steel of a certain hardness and elasticity. When pure water is employed hydrogen gas is set free by the action of the heated metal, which, at the same time, becomes covered with a film of rust. The preparation of hydrogen by this reaction is a common lecture experiment, and a red-hot poker may be employed by way of illustration. These changes do not take place, at least to any considerable extent, below a red heat, and may not consequently be active where the metal is dipped when at a comparatively low temperature. If, however, the metal has been more strongly heated, this surface oxidation probably occasions a partial removal of carbon from the superficial layers of the metal, producing a mild or softer variety.

This decarburization takes place at a low red heat in the preparation of steel by the Sheffield process of cementation; and though I am not aware whether any analyses of steel, before and after tempering, have been made such as definitely to decide the question, several experiments by the well known metallurgist, Dr. Percy, F. R. S., which will be found in his "Manual of Metallurgy," show that, in the process of tempering, the state and probably also the quantity of the carbon is decidedly changed.

As, therefore, the tempering heat is greatest where the hardest varieties are required, the employment of water is probably undesirable, as being in such cases prejudicial to the quality of the metal. The various oils and fats frequently used for tempering would not be open to the same objection, as the chemical changes produced in them are not such as to decarburize the metal.

When irons or steels are heated with animal matter containing nitrogen, and yielding ammonia by distillation, a portion of that element is absorbed by the surface of the metal, and, entering into its composition, produces great changes in its hardness and other properties. Thus, in the operation known as "case-hardening," iron is heated with leather shavings, horns, hoofs, or other such animal refuse. By this means a hardened surface is obtained, and as the metal is found to contain nitrogen, the phenomenon is doubtless due to the introduction of that element. In Sweden the surfaces of iron pile-heads are hardened by the introduction of arsenic. The metal is coated to the thickness of one tenth of an inch with arsenious acid (dissolved in hydrochloric acid) mixed with organic matter containing nitrogen, and is then strongly heated. The surfaces so obtained are undoubtedly hardened, and are said, but with what truth I have been unable to ascertain, to resist the action of the atmosphere and of water better than the unprepared metal.

A similar introduction of nitrogen is effected when nitrogenous liquids, such as urine or leather parings, are used in the tempering of steel; and in all cases the preference of a practical workman will, if real and well grounded upon experience, admit of verification by the light of scientific research.

In conclusion I would remark that the changes taking place in the process of tempering have, as yet, been but imperfectly investigated, and there is no doubt that their further study would not be devoid of scientific interest as well as of practical utility.

GORDON BROOME, F.G.S.,
Associate of the Royal School of Mines, London, England.

Mechanics' Fairs.

MESSRS. EDITORS:—I notice that the subject of the judges' decisions at the late exhibition of the American Institute, in your city, has received considerable attention in the SCIENTIFIC AMERICAN of late.

Not being particularly interested, I have not followed the discussion closely, but from facts within my knowledge, touching the acts of judges at a similar exhibition in this vicinity, I have no doubt that your remarks on the report of the judges referred to, were not only right and just, but eminently proper. I think it is quite time that the transactions on such occasions were called by their right names, and the community at large be relieved from the impositions practiced upon it by so-called judges at these mechanics' fairs. In the early days of these exhibitions, the promotion of the mechanic arts, by enabling the mechanics and inventors of the country to exhibit their productions to the public, and submit them to the examination of competent and *honest* judges, who should decide upon the comparative merits of the same, was the true and laudable object held in view. Then, judges' decisions were of value to the proprietor of the manufacture, and to the public. But following in the wake of political and other organizations, the mechanics' fairs of the present day, in most cases if not in all, are such only in name. Mercenary considerations are now the governing principles of such exhibitions, and judges' decisions are not only worthless in the majority of cases, but positively injurious to all concerned. Corruption stalks through all their departments, and judges sell themselves, not, perhaps, to the extent practiced by the corrupt politician, body and soul, but barter their judgments for gain, where they should be rendered free and unbiased.

At the late exhibition of the Mass. Charitable Mechanics' Association, in this city, cases of this character were not wanting. A gold medal was awarded for a certain machine, and after the award was made, the chairman of the board of judges for that department called at the place of business of the proprietor, and received a machine of that make free of charge; while another person connected with the Association demanded one for his influence in procuring the award, but failed to convince the party of the value of his services.

This is one instance, probably there were many more of a similar nature. I will not occupy your space with further comments at the present time, but would suggest to future managers of this institution that the next time they hold a fair, they advertise for proposals for the prizes, and distribute them according to the bids; as securing to the exhibitors a more equitable distribution, giving them all an equal chance for the highest.

I may have a word to say at a future time, in regard to the *character* of the judgments rendered upon articles on exhibition, and other matters relating thereto. G. L. B.

Boston, Mass.

English and American Steam Boilers.

MESSRS. EDITORS:—English boilers are made of ½-inch and ⅝-inch plate. Here they are made of ¼-inch and ⅜-inch iron. The foreman in an English shop makes a templet for every new boiler, with the proper camber for the thickness and width of plate he is going to use; here a wooden strip saves that trouble, the camber is alike in all thicknesses and width of plates, and the warping of the old strip is inconsiderable!

It will be observed that in punching boiler iron the holes are rendered taper or wider at the under side than the top. In England, the wide side is put outside of the boiler, so that the rivet is partly countersunk. When the head is cut off, it is found to be tight in the hole. Here, the plates are bent so that the wide sides of the holes are outside; when the rivet-heads are cut off the rivets fall out.

In England the riveters always commence in the middle of the rings and work all the slack iron into the seams. Here the plates are riveted across the seams first, and all the slack iron which has to be left in the rings, to get them together, has to be puckered in as best it can.

In England, a man is placed inside a boiler to hold up the rivets and close the lap. Here a "lump" of iron holds up the rivets, and nobody closes the lap.

I have been shot at three times within the last twelve months, and wounded once, with these exploding tin-pot boilers, and I think it is getting time that a Christian community should ask for an investigation into these wholesale murders. A BOILER MAKER.

Indianapolis, Ind.

Electric Heat Applied to Industry.

MESSRS. EDITORS:—Through the means of a voltaic battery, a heat is produced in a metallic wire sufficient to bring it to a red heat, and even to a melting point.

I believe that this property could receive an application in industry. By having a metallic wire properly stretched, and heated by a regular or intermittent electrical current, a large log of wood might be divided. Some qualities of woods of South America, as the iron wood and nearly all the dye woods are cut into boards with the greatest difficulty; the saws or instruments have to be sharpened very often. With a set of wires all heated by the electrical current, the log would be divided into boards. As for the way of preventing the further combustion of the wood, I believe that very dry sand allowed to pass over the divided place as soon as the wire would have operated, would answer the purpose.

C. WIDEMANN.

Steam Rollers.

MESSRS. EDITORS:—It seems that New York and vicinity are having some experience in the use of the steam road-roller; and it appears from the facts we gather upon the subject that this machine is not yet out of the twilight of experiment.

We believe that there is now sufficient experimental knowledge upon the subject of steam machinery, as applied to locomotion, to produce a successful and standard machine for road rolling, as well as for general traction purposes.

One party condemns cog wheels and adopts the chain belt as the best method of applying the power to the traction wheel; another party rejects, with equal emphasis, the chain and adopts the cog wheel; another party rejects both chain and cog wheel, and is equally positive that a direct connection with the traction wheel, as in railway engines, is the best method. One adopts one cylinder with a fly wheel; another adopts two cylinders without a fly.

While we believe that much elaborate and costly experiment is unavoidable, in bringing such an important matter to a successful issue, we nevertheless believe that there is considerable needless floundering in the dark upon this subject.

It is quite evident that a steam locomotive, whether applied to road rolling or any other purpose, can never work very successfully with only one cylinder applied to a crank; it is equally evident that either of the methods we have just named, of applying the power from the piston to the traction wheel is the best for certain purposes, and that neither of them is, by any means, adapted to all.

For light and quick work on good level roads a direct connection with the traction wheel is the best. The two cylinders should be placed as closely together as possible. They may be cast in one piece, and be common to one steam chest or valve box. One traction wheel is sufficient. For indifferent roads and considerable elevations, and for light and medium purposes and quick motion, the chain, if properly made and applied, is preferable to cog wheels. The chain wheels should have the ratio of one to six, or more, according to the exigency.

Whichever differential device is used, whether chain or cog wheels, we believe in making considerable difference between the driver and the driven, reducing the cylinders to a minimum capacity, and working the pistons quite rapidly; in this way the framing and other parts may be much lighter, being subjected to less stress; and the whole movement is more equable and satisfactory. The teeth of the chain wheels should be large in the direction of their motion, and as thin in the other direction as is consistent with strength, and they should be cast in a "chill." The thimbles of the chain that act upon these teeth should also be cast in a "chill." The large chain wheel should be attached to the spokes or rim of the traction wheel, and so attached that it may be easily replaced by a new one. One permanent traction wheel will be sufficient in most cases; but the opposite wheel should be so fixed as to be engaged when necessary.

For such severe work as plowing, road rolling, or for draft purposes on common roads, we believe that cog wheels will prove, in the long run, far more economical and satisfactory than the chain, but the cogs should have less breadth and depth in proportion to their thickness than it has been customary to give them. There is hardly any danger of making the cogs too massive in the direction of their motion or thickness. The cogs should be cast on a "chill," and the large cog wheel should by all means, be fixed to the spokes or rim of the traction wheel or roller, instead of the shaft, and in such a manner that it may be easily replaced by a new one. We should make this wheel as near the size of the traction wheel as possible, and the pinion that drives it as small as is consistent with good service. This would bring the traction wheel more perfectly under control of the engine. Bevels and inside gears, or cogs, are more objectionable than the spur wheels for this kind of service. Z.

Damage to Trees from Borers.

MESSRS. EDITORS:—From what I have seen in this country, I have come to the conclusion that the borer will not trouble a healthy tree; but let any of our common fruit trees be neglected for a year or two and they will be full of these destructive insects. They don't attack the same part of the tree here that they do in the Eastern States. Here they go into the body, limbs, crotches, or any part exposed to the sun; in the East they go in near the ground where the tree has a bulge around it. What makes that bulge? Is it not the freezing and thawing, and the effort of the tree to heal the injured part? The trees here have no such bulge. Now it will not cost much for some of your fruit growers to experiment a little, by putting something around their trees to keep the frost from injuring them.

I think the borers serve a good purpose; for if the owner of a tree does not think enough of it to take care of it, let the worms have it.

If a pine or oak is cut down here and allowed to lie for six months or a year with the bark on, the borers will eat it half up. I don't know that they are the same kind that work in the fruit trees, but they have a family resemblance.

I. X. I.

Men of Progress.

MESSRS. MUNN & CO:—Please accept my best thanks for prize engraving, "Men of Progress," I am happy to announce its arrival in *good order*, and an ample repayment for procuring subscribers, whose papers come to hand promptly and regularly. And were it not for the tightness of the one thing needful in this mountainous district, I should sally forth and endeavor to procure another copy or two for complimen

tary presentation. May every success attend your widely spread journal, and may her wings never grow less.

I am, gentlemen, yours truly,

Whitehall, N. Y. ROBERT IRWIN.

A Voice from the South.

The following letter is from a distinguished citizen of Mississippi, for whom we have recently taken a number of patents in this country and abroad:

MESSRS. MUNN & CO.,—*Gentlemen:* I have received all my European patents. You must allow me toexpress my sincere thanks to you for the manner in which you have conducted the whole business. I do, and shall, most cordially recommend you to all persons wishing to take out patents.

Fayette, Miss. D. HARRISON.

[It is a noticeable fact that the inventions submitted to this office from the South, exhibit a degree of novelty and practicability not formerly evinced from this section of our country. Whether it was the war that had sharpened the native genius of the South, or that these inventions emanate from Northern men located there, we are unable to state; but the fact is patent that many good inventions are coming from the Southern States.—EDS.

Another Case in Point.

J. L. Alberger, Treasurer of the Ransom Siphon Condenser Company, Buffalo, N. Y., writes us as follows:

"We are under obligations for the clear and perfect manner you have illustrated our invention in your issue of Feb. 12th. Letters are pouring in from all parts of the country, and we conclude that everybody reads and appreciates the SCIENTIFIC AMERICAN.

A JOURNEY WITH A RAFT.

From the Building News.

The timber trade of Germany has often been described, but few persons have gone down the great and little rivers with a raft, encountering the various obstacles of this awkward navigation, and entering into the enthusiasm of the crew, who are neither landsmen nor seamen, neither engineers nor sailors, but pilots and steersmen exclusively, who build their cabins as they go, and make their craft larger as the water it floats in deepens. We will not pretend to have made the voyage from the Black Forest to Amsterdam without a good many breaks, or, indeed, on the same batch of timber; but, having joined a woodland company at various points, and followed the trees of the mountains from their fall under the ax to the mighty saw mills of the Lower Rhine, we think a few sketches of our broken journey may be interesting to those who frame for use these gatherings from the German forests.

And, to begin, the ax-bearing population, which hews, and barks, and splits, is one of the most simple, regular, and devout in the whole world. It was a pleasure to be among them and their quiet, primitive, humble manners, as, in a state of independence, suggestive rather of a newly cleared settlement than of a region with a history older than that of most Roman camps, they offered the hospitality, made rich by welcome, of their sylvan dwellings—huts scattered apart, and not in villages—to the stranger, whose systematic inquisitiveness they are quite intelligent enough to understand. This agreeable novelty have we enjoyed, and, in describing it, premise that we are making a whole from a series of fragments.

First, among the firs that grow in gloomy masses from the center of Wurtemberg, across a hundred and twenty miles, and right through South-western Germany. In the earliest light of the morning, stalwart men, book and pencil in hand, are perambulating beyond all trodden paths, knocking at lowly doors, notching particular trunks, leaving messages and marks with the women and children—unless the last are already out collecting beech nuts or resin, and indicating thus the felling which is to be authorized during the day. These "masters of the wood," or stewards are, in general, fellows of Herculean mold, with skins like leather that has been tanned in Canadian tincture. Anon, the forest is alive, and clamorous with its own peculiar industry. The silver fir, one hundred and fifteen years old, so nearly as the surveyor may calculate, is coming down with an echoing crash. It is only pine, but we have seen it 130 ft. high, and nearly 7 ft. in diameter. In about two hours an average stem gives way, and swoops in a dead weight to the earth,there to be stripped of branch, bark, and foliage, which are burned or cut up as fuel, or converted into charcoal, while the "log" itself is prepared for transit to the sea—that is. if it be of proportions sufficiently noble. To be "Holland Wood," worth transport down, it must be 72 ft. long, and 16 in. wide at the narrowest extremity; but, being of this size, how to move it, until the carrying water current be reached? We saw this process four miles off the Euz, which is a prodigy of a stream. Fir trees, in parallel lines of three, are split, barked, smoothed, and soaked; then laid, like immense rails, down and round the slopes of the hills, conducted from the hewing ground to the banks of a river. When the river is full, and they are wet with rain, the lumber is laid upon them, and, impelled by a sudden push, away it glides, accumulating force in going—perhaps several miles; now leaping a precipice, then, shifting its course, and snapping like a match midway; again, getting into the dry bed of a torrent, which the foresters flush from an artificial lake, creating a tremendous cataract in half an hour; finally, arrested by dams or gratings before it commences the seaward journey, for the purposes of sorting and identification. Hitherto it has traveled alone, henceforth it is under guidance; and here, for a time, we join it.

Now,in order to appreciate this sort of experience,you must remember what the Euz is.

The Euz is a small river, issuing from the mountains about fifteen miles above Wildbad, very rapid, very noisy, very irregular in its course, exceedingly shallow, crowded by enormous boulders, and interrupted by countless cascades. The problem, which would seem insoluble, were it not constantly solved, is, how to manage down this boisterous flood a raft several hundreds of feet in length, composed of tree trunks, each being enough for a sea clipper's mainmast, fastened together by osier twigs, which is to vandyke when the waters vandyke, stop when they fall, take leaps with them, shoot all the rapids, turn all the corners, and find its way, now to the Neckar, and next to the Rhine, and so into the general timber trade of Europe. We can testify that the adventure, for those who attempt accompanying the timber, is not luxurious. It is half swimming and half running. You feel as if riding, without being used to it, upon a tender behind a locomotive. The logs will not lie together; you are ankle-deep, if not knee-deep, in the stream; a false step may involve a merciless contusion; your upper clothing, although hung on a post, is liable to perpetual wetting, and every now and then your companions change. Let us confess that, in the good hamlet of Calmbach we quitted the raft, weary for a while of its romance,and suffered that portion, at any rate, of the summer tribute from the Black Forest to the carpenters' shops of Europe to go upon its voyage unblessed. But, with a courage worthy of a better cause, we found ourselves, two days later, upon a like slippery and inconstant platform, which gradually grew longer and wider, until a more generous channel opened, and we left again on an inland excursion, only to rejoin on the Upper Rhine. Here the spectacle becomes a wonder. The raft resembles one of Sinbad's impossibilities; morning and evening it expands; it stops at a landing station. and lo! you might fancy that a town was on a tour, paying a visit to the village! It is no longer a raft; it is an island which you inhabit. Men are erecting huts upon it. There is one for you, with a bed and a stove,and a locker full of provisions. You go aft: nothing except the gigantic logs, trailing with the stream; you go forward, and only twelve helmsmen, with oars of Grecian shape, silent and steady,who will answer no question, but keep their eyes intent upon the piers of bridges, the quick curves, the well-known shoals,and with very good reason. For,supposing a timber raft to strike a bridge, the bridge would float away with it. Supposing it struck by a steamer, so much the worse for the steamer. Yet everything is not propitious to the "rafting master." A saying is current about him, that he should, before venturing, possess £30,000—£10,000 in the forest, £10,000 on the water, and £10,000 at the bank, to cover disasters. But that is an exaggeration. The commerce in timber is at once gigantic and profitable. It not only built Amsterdam—it built the very foundations upon which Amsterdam is erected; it supplies nearly the entire home industry of Holland; it is a source of competence to the poor, and wealth to the rich. The great rafting companies of Calmbach, Gemsbach, Phorzheims, Wolfbach, and Illbach, employ their thousand, and the demand continually increases. It would not be an adequate supply,were it not that the forest culture of this region is about as ignorant and faulty as can be conceived. A scarcity is, from year to year, dreaded, while the land under protection increases.

But we must go on with our raft. It is now a populous territory; it contains human abodes, magazines, altars, a Calvary, a miniature market, a dairy, and an overseer, who holds a strict eye over his inventory. We count beneath our feet 190 trees,all proper length and girth, loaded with shaped deals. Two or three nights spent—not, we confess, on the raft, but, more comfortably, ashore—aggrandise our raft, and the logs are beyond reckoning. The head man assures us, however, that they number about 6,000. The aggregate value is, at this time, about £4,000. Fresh raftsmen are on board; more skilful pilots are engaged; you tread an unyielding deck; the floor seems sound as mother earth itself. And, all the while, not a stick has been brought down except from a single district. We accept, gratefully, the help of a learned German economist, whose works have been gracelessly robbed by the guide-book makers in estimating the importance of this trade for one year:

575	oaks at	30 florins each.
2,089	stems of Holland at	46 "
2,000	stems at	23 "
800	do.	15 "
1,500	do.	12 "
25,000	stems of measured wood at	9 "
121,935	of common wood at	3 "
4,696	sawing blocks	4 "
180,946	of deals at	1 "
2,497	cords of fir wood for fuel at	9 "
6,671	pieces of timber at	4 "

—in all, about £80,000 in round numbers. The prices of the year were for the cord of 144 cubic feet (firewood):—oak, 17s.; beach, 10s.; fir, 5s. For building:—4d.; 3½d., and 2d. a cubic foot. But in this estimate must be included the cost of the navigators, and, although they earn no more than sixteen pence a day, and this not all the year round, they are not to be lightly considered, arithmetically speaking. We have the bill of fare before us of a raft between the mountains and Dordrecht, and it reads like the *menu* of a city besieged. Cattle are actually kept and slaughtered on these mighty moving decks. Well, the company consumed in the interval we have mentioned, 5,000 lbs. weight of bread, 3,000 lbs. of meat, 2,000 lbs. of cheese, 50 sacks of dried vegetables,and 500 casks of beer. But then the voyage, only from Bingen to Dordrecht, though occasionally done in eight days, often lasts nearly as many weeks.

The timber in charge of these hungry pilots was worth £24,000. It was one parcel out of many, representing a yearly value of nearly half a million sterling. And there are reasons for calling this Holland wood. Holland has no forests worth speaking of, but it is a wooden country. Its cities—Amsterdam and Rotterdam especially—are built upon foundations of German timber; German timber is the mainstay of its dykes, and the material of its bridges; it has sunk whole forests in the bog, and the mystery is how they last so long without decaying. We were present, the other day, when, to facilitate an experiment in drainage, a shaft was attempted to be sunk through the rotten soil of the Zuyder Zee, and the workmen came upon a structure of piles that had been buried for upwards of two hundred years. They were nearly sound,and had simply been coated with pitch. Again, the Dutch build above ground, as under, with the oak and fir of the Hartz, and it is a proverbial saying among them that, in the course of time, they shall require every tree growing upon a German hill. But this is mere boasting. For every log floating down to Dordrecht,ten are chopped up and burned, or converted into scantlings, for use in the upper country. There it is wanted in immense quantities for barrel staves and boats,for house building and railway works, for endless miles of palisading, and a thousand forms of industry, from fortification to toys, in which the German artificer employs wood. This, however, is only by the way. Our principal purpose was to give a notion of what a voyage must be, and is, to judge from fragments, on a river raft. Up in the valleys it seems at first incredible that you should succeed in making any way at all. The load appears too ponderous for the slim stream of water to carry; every moment, while the force of the current continues strong, it threatens to get wedged in between the banks; now its tail hangs among tremendous boulder stones, while the foremost part is entangled in deviousness, out of which all methods of escape are invisible; then, after a few rainy hours, comes down a rush from the mountains, and the unwieldy mass, taking a fresh start, is guided along with indescribable dexterity, themen maneuvering with a perfect knowledge of every twist and shallow, every turn and obstruction, all the way. But, for any one unused to the navigation, it is a ridiculous series of small dangers and mischievous slips, there being no formidable depths, and the only real perils consisting in getting a fall with a weight so gigantic rushing down behind you, or in crossing the course of a rapid, and being dashed against the timber. On the Rhine, where the decks are, in a way, solid, there is no more difficulty in treading them than in pacing the *Great Eastern;* but here, on the Euz, the hold is like that on a greasy pole, and the transitions from one rate of speed to another are amazingly embarrassing. You might fancy yourself, for an hour, gliding through a trout pond; then the water is artificially raised by means of weirs and sluice-gates; suddenly, an escape is allowed, and masts enough for a dozen East Indiamen go tumbling away together with a furious clamor, the pilots never flinching or doubting; but the poor, daring passenger, of whom they make no account, staggering about, and clinging here and there in utter helplessness—for him it is bliss to enter on a broader and more regular stream. But for him, also, there are privileges. He can go ashore; he can follow the course of the raft at an easy distance; he can get together a few planks and make an unsteady and rising-and-falling floor for himself; and he may feel perfectly sure that, in the event of risk, there will be plenty of hands held out. But, for all that, it may not be the wisest thing for the Princess of Wales, coming to Wildbad for a cure, to float knee-deep on a raft, when rheumatism is her malady, and Wildbad exactly the place to exasperate it—on a raft.

Adventures of a Diamond.

The Sancy diamond is for sale at a jeweler's in Calcutta just now. Here is the account the jeweler gives of it: "This diamond is of an almond shape, and weighs 60¾ ruttie. The stone was found on the body of the Duke of Burgundy, and was afterwards, in 1470, bought by the King of Portugal. He afterwards sold it to Nicholas de Barly, Baron de Sancy, from whom it derives its name. Sancy sent it to the King as a present by the hand of a servant, who, being attacked by robbers, swallowed the stone, and after his death the stone was found in his body. It finally came into the hands of James II., of England, who sold it to Louis XIV. for 25,000*l.* Its almond form, completely facetted over (a mode quite unknown then or at any other time in Europe), indisputably proves that it was an Indian-cut stone. In the French revolution it disappeared for some time; some years later it was sold to Prince Paul Demidoff; and now, after a strange series of vicissitudes, finds its way to Calcutta.

MEN of genius have had so frequently to struggle under poverty, that certain individuals seem to think that in order to advance science it is necessary to keep the workers therein poor. We are told that the authorities of the South Kensington Museum, London—some of whom receive thousands of dollars annually for simply signing their names to papers they never even examine—are cutting down the emoluments of the science teachers. It is said that this course has caused great dissatisfaction among the teachers; but "dissatisfaction" we think is hardly the proper word; their pay was formerly so low that now they must be giving utterance to the last despairing groans of death from inanition.

THE rise of sap in trees and plants has been explained on the principle of capillary attraction, but M. Becquerel considers that electricity is an acting cause. A capillary tube that will not allow water to pass through it does so at once on being electrified, and he considers that electro-capillarity is the efficient cause of sap traveling in vegetable life.