time to one of the leading wires of the platinum spiral pyrometer, W. The current passes through the platinum spiral as well as through the constant resistance, C, and the two branches meet at the point, L, in order to return to the other pole of the battery. K is a "key" for making contact with the battery. As long as the electrical force at A and D is equal, the galvanometer needle will be at rest, but when it is unequal the needle is deflected. The balance may be restored and the needle brought back to zero by shifting the wheel, B; hence, when the electrical balance of forces is disturbed by the heating of the spiral, W, it may be restored by shifting the wheel, B, consequently the temperature is read off by noting the position of the wheel, B, upon the graduated arc, A D.

The plan of action is to expose the platinum spiral to the temperature to be be examined, and to connect the leading wires with the terminals; then the astatic needle of the galvanometer has to be adjusted, so that it points to the zero of ts small scale. When the contact key, K, is pressed down, the needle is deflected, and the movable contact wheel, B, is shifted until equilibrium is obtained. After this, a reading of the large scale on the arc, A D, is taken, and a calculated table attached to the instrument gives the real degrees in Centigrades of the heat of the platinum spiral in the furnace. Many of the instruments are made to register temperatures up to 1,000° Centigrade, and some have been made to register 2,000°, but in these instances, the end of the large tube was made of platinum.

For ordinary temperatures, or temperatures much below a red heat, a fine insulated iron wire, several miles in length is used, and it is inclosed in a hermetically closed tube, that it may be removed from the influences of moisture and rusting. Such thermometers are found to be very sensitive, and to give very accurate readings.

Some of these pyrometers are now in use in the Imperial Ironworks in Russia; they are also used for blast furnaces, and in gas works, for the temperature at which coal is distilled much influences the quality of the gas. Some of the instruments for testing low temperatures have gone to Turin for experimental purposes.

DR. DOREMUS ON THE TRIUMPHS OF SCIENCE.

THE LENS AND THE PRISM.

The first of a course of four lectures at the Hall of the Young Men's Christian Association, on "The Triumphs of Science," was delivered on the evening of December 1st by Professor Doremus.

The lecturer in opening his address alluded in strong terms to the feeble interest manifested by the wealthy citizens of New York in regard to scientific education and the want of pecuniary aid felt by colleges and scientific institutions in general, and made an earnest appeal to all public scientific lecturers to urge the claims of these institutions with greater confidence and energy as opportunity shall offer.

He then announced the subject of the lecture for the evening as the Lens and the Prism, as through these simple yet powerful instruments a very large proportion of "the triumphs of science" have been achieved.

He first briefly sketched the history of the development of knowledge with regard to celestial objects. Strange to say, although we had such perfect records of the workings of the human mind in other fields, we did not know the authors of some of the grandest achievements in connection with astronomy. Naturally, we should conclude, the first object of attention would be the sun, and the second the moon. These were evidently the means of indicating to us the hours of the day. "To every nation, tongue, and clime, each in its meridian, the eternal sun strikes twelve at noon, and the glorious stars, far up in the everlasting belfry of the sky, chime twelve at midnight." As a time measurer the sun was the first object of attention. It was then probably observed that the shadow of the sun lengthened and shortened, and thus we had two periods of the year—the period of the longest and the shortest day. Next came the observation of the moon, and then of the stars—their movements, magnitude, and grouping, especially those constellations through which the sun and moon passed.

The Professor then detailed the various discoveries made by Pythagoras, Copernicus, Galileo, and Kepler, saying in regard to the latter that astronomers of all lands had agreed in awarding him the proud and well-earned title of law-giver of the heavens. His discovery of the elliptical movement of the planets was one of the greatest achievements of science, In regard to Galileo the lecturer said: "Let us not forget the painful termination of his splendid career, and the extraordinary and infernal vice of the human brain to humiliate this great champion of truth, who, though assured of the reality of the revolution of the earth, was obliged, upon his knees, and with his hand upon the sacred Scriptures, to swear the earth did not move. I have never seen a more infernal vice in history."

The lecturer then advanced to the discoveries of Arago, and Leverrier, and gave several instances of the marvelous accuracy with which mathematics had been applied to astronomy. In 1846 Leverrier predicted the locality where the new planet that had been previously observed, and had then disappeared, ought to shine, and his friend in Berlin examined the firmament on the night announced, and lo! there the new world was found. Dr. Doremus concluded this portion of his lecture by showing how vividly the discovery that our whole solar system revolved round a sun (which some had supposed to be Hercules), which again in its turn, with its attendant systems, rotated round yet another central sun, impressed us with a sense of the boundlessness of the universe

His remarks on the prism consisted chiefly of a clear and interesting explanation of spectrum analysis. He said that probably the prism would prove even more fertile as a means of discovery than the lens. Several new metals had already been discovered by its aid, and we had now something like proof as to the real nature of the sun, which probably consisted of metals in a highly incandescent state.

The lecture was illustrated by many brilliant and interesting experiments. He gave among others the well-known experiment of a body of oil suspended in a globe of alcohol and water, which, upon being moved upon an axis, gradually threw off bodies of eccentric forms. The motions of the universe and the results of spectrum analysis were displayed by the aid of a series of dissolving views, which were of a highly entertaining and instructive character.

Correspondence.

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

Automatic Telegraphy.

MESSRS. EDITORS:—In your issue of November 5th, is an article upon the subject of "Automatic Telegraphy," by George B. Prescott, Esq., in which occurs this passage:

"In order to attain the exceptionally high rate of speed which has been experimentally obtained upon the Automatic line recently constructed between New York and Washington, the Company put up a steel and copper wire for which they paid more than three times the cost of a good iron wire, suitable for the use of the systems in general use. It is evident, therefore, that even the claim for greater economy in the construction of their lines, which has been so frequently made by the advocates of that system, is not well founded."

Let us see if this be so. The National Company, referred to by Mr. Prescott, have used the American compound telegraph wire, in the construction of their line to Washington. This wire is composed of 80 pounds of steel and 80 pounds of copper to the mile, its total weight per mile is therefore 160 pounds, but its conducting power is equal to that of an iron wire weighing 630 pounds per mile, and its cost per mile was $82. It is erected on an average of about 15 poles per mile, and is insulated by the Brooks insulator.

We will suppose that the posts cost, all set, on an average, $3 each, also that it cost $3 per mile for stringing the wire, and that the insulators cost 38 cents each.

These are among the principal items which go to make up the cost of a line of telegraph. Let us see how they sum up:

1.	Cost per mile of 15 posts set.....	$45·00
2.	" " " " 15 insulators.....	5·70
3.	" " " " wire	82·00
4.	" " " " stringing.....	3·00
	Total.....	$135·70

or less than one-half of Mr. Prescott's estimated cost of an ordinary line, call it $150·00 per mile, which will cover the cost of such materials and equipments over most of the length of such a line. Of course the expense of poles suitable for use in large cities, and the cost of setting them in cities would be consideraby above these figures, still the average cost will be less than Mr. Prescott's estimate for an "ordinary line suitable for the systems in ordinary use."

Don't they get the worth of their money?

The line is280 miles in length instead of 228, simply because they were obliged to go upon highways and byways, and it was under great difficulties that they secured a location at all.

Mr. Prescott admits (which is true) that they have attained a speed of 250 words per minute over the 280 miles of compound wire line, and he remarks (which is also true) "that the speed of automatic transmitting varies inversely as the square of the length of the line."

Suppose then that this line could be shortened to 250 miles by going alongside of the railroad for most of the distance, its speed then would be increased in the proportion of the square of $280 = 78{,}400$ to the square of $250 = 62{,}500$, or $\frac{78400}{62500} = 1{\cdot}25$, an increase of twenty-five per cent, thus making $1{\cdot}25 \times 250 = 312$ words per minute.

Mr. Prescott also admits that 100 words per minute were all he could obtain over 250 miles of No. 8 iron wire, in a series of carefully conducted experiments.

If now, with this superior compound wire, the National Company can transmit automatically three times as fast as upon a No. 8 iron wire for the same distance, are they not fully justified in paying three times as much for it? but is $82 three times as much as the cost of a No. 8 iron wire?

We must take into account also that this new compound wire can be put upon 15 poles per mile, and withstand the storms quite as well and better than the Western Union Company's wires do with 38 poles per mile.

Now when we realize that insulation improves inversely as the square root of the number of insulators, we see that the gain in insulation, by using 15 instead of 38 insulators per mile is $\sqrt{\frac{38}{15}} = 1{\cdot}59$, nearly 60 per cent, let alone the saving in cost of construction and maintenance, and by doubling the conductivity only one half of the battery is necessary. The conductivity of this compound wire per pound per mile. is three times that of an iron wire.

Again, since it is admited that the Phelps printer can transmit only about 50 or 60 words per minute, while it will be seen from the above that an automatic system can transmit five or six times as many, now why not employ some kind of an automatic system to transmit the messages, and employ the Phelps, House, or some other printer, to simply copy them, as I suggested to Mr. Craig and Mr. Little last summer, and to several other friends nearly two years since.

Boston, Mass. MOSES G. FARMER.

The Man who Built the Telegraph.

MESSRS. EDITORS:—On page 326, Nov. 19 issue of your paper, is an editorial notice of a late meeting of the Western Union Telegraph Company, which is headed "Honors to the Inventor of Telegraphy," containing an abstract from the very appropriate remarks of its President, Mr. William Orton, in which abstract, by an error of one letter (e), the meaning of the President in one sentence is entirely changed. It occurs in the eighth line of the second paragraph, in the word "men," which should have been "man," or as follows: "In the same presence sit to-day, in the annual services of the largest telegraphic organization in the world, the man who made its existence possible, and the man (men) who made it."

Now to whom did Mr. Orton refer as "the man who made it?"

Aside from Professor Morse and one other gentleman, there were none present who contributed either in making the telegraph, or by money for its development, or as an investment in its stocks, for years after its introduction into general use and its necessity as a business agent became apparent and generally acknowledged. By reading the above sentence as corrected and as pronounced by President Orton, it will be seen that it refers to Professor Morse as the man who invented the telegraph, and to Hon. Ezra Cornell, of Ithaca, as "the man who made it." It was Mr. Cornell who took the entire management of building the first line in this country, from Washington to Baltimore, to its completion, and put it into successful operation, after the Professors Morse and Gale, Doctor Fisher, and Messrs. Vail and Smith, had expende twenty-three thousand dollars of the Congressional approprd ation of thirty thousand dollars, and broken down at the Rei lay House ten miles from Baltimore in the winter of 1843 and 4, in their fruitless attempts to insulate the wires so as to make them work, inclosed in leaden tubes beneath the surface of the earth. As this allusion of President Orton is the first public recognition, small though it may be, of the important services of Mr. Cornell in rescuing the telegraph from the wreck of the failure which had been made by its inventors in their efforts to build their first line, which has ever come under the notice of the writer, he deems it but just and proper that this correction should be made, and asks its insertion in your columns. HORACE L. EMERY.

Albany, Dec. 5, 1870.

Spiritualism and Science.

MESSRS. EDITORS:—In your last issue appeared an article entitled "Spiritualism aad Science," which is a sort of review of a work by Dr. Hammond. I have not seen Dr. Hammond's work, but from the extracts which you give and the remarks you make—with all due respect to the learned doctor—I must say that he has not only been a partial but a prejudiced observer. My own experience teaches me this. He has endeavored, as many other scientific men have already done, to reconcile the observed facts with scientific laws, has failed, and therefore denounces them as hallucinations.

I do not intend to speak of spiritual visions, communications, and so forth, since these may readily be pronounced impositions, and attributed to diseased conditions of the brain; but it is to table movings and such manifestations, which Dr. Hammond states to be "due to hallucination, legerdemain, or actual fraud," that I intend to call your attention.

He also states that equally wonderful tricks can be performed by any professor of natural magic. Without denying the latter assertion, allow me to add that all such tricks can be detected by a thorough investigation, but I defy any man to detect the least deception in the phenomenon of table tipping. I have seen the experiments performed in private parlors, and under circumstances when I knew there could have been no deception; in fact, have myself been violently thrown to the floor, as a number of ladies and gentlemen who were present can testify, while attempting to prevent a table which was under this influence from moving.

The evidence which can be brought forward to support the existence of this occult science is too weighty to be overthrown by ridicule.

In conclusion let me state that I am not a spiritualist, nor am I in any way connected with any spiritual circle. I have studied the subject with an unprejudiced mind, and am convinced that there is a mystery about it which ought to be solved, and which lies within the scope of science to investigate.

I am aware that these things are in opposition to gravity; I am also aware that by writing this I expose myself to the ridicule of the greater part of the scientific world; but as I have devoted my life to the study of science and truth, I have seen these things and know them to be facts. I hope in this way to call the attention of scientific men to these things, which seem fatal to all the laws of nature. I hope to see them fairly investigated; discarded if they are deceptions, and if not, attributed to some mysterious power beyond our ken. R. H.

Ithaca, N.Y.

Sanity vs. Insanity.

MESSRS. EDITORS:—Over twenty-one years a regular reader of the SCIENTIFIC AMERICAN, I hope the Editors will allow me to be of age, and in sound mind, when I add, that I have every copy well bound, and not a number missing, and prize them next to the Year Book of "Scientific" (Annual) Discovery.

Having dabbled a little with the microscopic, magnetical, and electrical experiments, collected all sorts of weeds, and "livin'" things, and curious about spontaneous generation, surrounding ether, the egg-development, and all that sort of thing—and occasionally written articles for horticultural journals, folks here in this benighted quarter give me credit for

being a man of science; but, alas! although I have not only read Faraday, Huxley, Owen, and a host of other authors, and been put to heavy expense, as the shelves of my library will testify, to learn something, I have concluded, according to your judgment on these point, that I must be a dyspeptic reader, unable to *digest* what I have read. In your article on "Spiritualism and Science" (p. 360, current volume), you truly say spiritulism s a "subject that scientific men dislike to approach," and you might as well have given the subject a wide berth, and been silent—for your language is too strong—besides it is not true what you say—and your own instincts ought to teach you—when the "rush-light" of science fails to illuminate the chasm yet existing between mind and matter—body and soul—unless you consider the soul of man a myth.

I may say, in order to define my position, that, contrary to to my wishes, I have been chosen as an elder in the Presbyterian Church, I trust, owing to a consistent Christian walk and conversation. I dislike cant or a display of piety. Scientists and spiritualists both reject the atonement and sovereignty of Christ, and deny the necessity of faith in Him, and repudiate the entire Gospel scheme, which I do not.

So coupled, you are nearer akin to the spiritualist's belief than I am. You say "The whole business of spiritualism hasbeen the source of much mischief, and has brought insanity into many a family. OUR readers ought to know, that no man of science, no sane man of intelligence, has any faith in it. Before the light of science the whole thing is shown to be an imposition. 'But,' as Dr. Hammond says, 'Spiritualism is a religion.'" No doubt meaning just as much so as Presbyterians, Lutherans, Episcopalians, etc. Like in early gospel times, Paul had Sadducees and Pharisees to deal with. The Gospel of Christ differed from both.

But "facts are stubborn things;" and what a man, who is thoroughly posted in legerdemain or the hocus-pocus of scientific contrivances, of a cool judgment, and deliberate habit of investigation, sees in his own private dwelling—under full light—with no one present capable to mesmerize him, or possible opportunity of being misled—what such a man sees under such circumstances, require some other mode of explanation than the fancies of the hypochondriac, or that of hysteria, catalepsy, and ecstasy; that is, tables moved without any visible contact or invisible contrivance. I am very curious to read and add to my library, with other sapient authors, the small monogram entitled "The Physics and Physiology of Spiritualism," by William A. Hammond, M.D. If you had mentioned the price and place, I would order a copy at once.

But, my dear sirs, the animus of your remarks do not only bear on "Modern Spiritualism," but all that is not material. You say the consciousness of this great truth (Materialism) weighs like a nightmare upon many of the best minds of these days. These "best minds" watch the progress of "Materialism" in such fear and powerless anger as a savage feels "during an eclipse." "They are alarmed lest man's moral nature be debased by the increase of wisdom."

You altogether mistake at least one class of devout Christians, who take as great pains to increase their wisdom as you could possibly wish. Have you not discovered that there are things beyond the scalpel and analysis of matter to which names are given, that by no means explain these phenomena?

Now tell me, logically, why a common magnet will cause a needle to leap up to it, and will not disturb a pin? They are all inert metallic matter. To call it gravitation or attraction, mind you, will by no means explain it. If you will demonstrate this simple fact, then will I agree that you can explain the difference why a divine influx from the Author of our being can impress some minds, so that faith in a future state of existence is inspired as to lead him joyfully to anticipate that endless state of existence, built up of imperishable refined matter, unalloyed by the crudities of earthly ponderable elements. That mind, on the other hand, who sees that, scientifically, he is continually throwing off matter, which is again absorbed by vegetation, and again received into his physical organism, and all that, until he finally finds the machine worn out and himself "gone to grass"—what a pity—this aspiring mind of man, emblematic of its great author, to lose all individuality, and the substance turn to dust or into the herbage for the ox!

You know the celebrated chemist, Dr. Dalton, who thought the red gown in which he was installed as a Doctor of Civil Law, at Oxford, was a blue one; he was color-blind, could not tell when his blue stockings were exchanged for red ones; they simply seemed a little dirty, to his eye. I might learn some useful lessons in chemistry from such a man, but I would decline his instructions or judgment to discriminate in colors for me. The illustration respecting the introduction of the stereoscope to the *savants* of France (SCI. AMER. p. 322, current volume) is a very apt illustration. Another man's defects in his mental organization, or physical defects, cannot annul the legitimate functions of a proper development, and the cap of a hypochondriac fits one rather than the other.

I am now over sixty-two years of age. I have much to learn yet, no doubt, so have you, my worthy friends. Our mental organisms differ. I can truly believe that "angels could roll the rock from the sepulcher," or give to John a "revelation on the Isle of Patmos," and matters of that kind. Of course, to you such notions are hallucinations. But this so-called hallucination is so indelibly fixed that it makes me a happy, patient, cheerful old man. God be praised! The closet affords such *ecstatic* enjoyment, that the "poor rooters," however profound in a knowledge of organized matter, know nothing of it. The "Lord pity them!" and touch their latent functions, if not wholly dried up in their—heads, I suppose it ought to be, or—hearts, I shall not quarrel about the locality, it is the instinctive feeling that we are not Godless nor soulless creatures, place it where you please.

But all this by no means hinders me from such profound studies as geology, astronomy, and natural and mental philosophy; every fact revealed by these researches I duly appreciate. I do not shrink from perusing an author because he is styled an infidel, because I want to know how or whence he draws his knowledge. I am by no means a timorous Christian. Such is my confidence in Him in whom I believe, that if you were to tell me (beg pardon for mentioning such a personage to scientific ears) that the devil himself was in my back room, and desired an interview with me, I would deliberately "interview him," as politicians say. I hold that "truth is mighty and must prevail," because God is the author of truth, as the devil is said to be the father of lies. But, until this matter is settled what truth is, I beg you will be a little more modest, and not so hurt the feelings of well-disposed searchers after truth, as to consider those who, perhaps, have a "convolution" in their brain, which may be lacking in your own, through which they have a different experience, and come to different conclusions on matters of faith and spirit; allow them to be rational—please do.

Lancaster, Pa. JACOB STAUFFER.

Popular Errors Regarding the Watch.

MESSRS. EDITORS:—Most people suppose the regulator is put in the watch for the use of the watchmaker, when, the fact is, it is principally for the convenience of the owner. The watchmaker does not absolutely need it, some fine watches being entirely without one. It is well known that every individual watch has its own whims and caprices of action—an individuality by which it differs from another of precisely the same construction; some persons have gone so far as to assert that a watch partakes of the character of the wearer, that there is a kind of assimilation between the two; there is no doubt, however, but that the action of the watch is materially and sensibly affected by the habits of the wearer, which fact brings us face to face with the subject of regulation, which should be done entirely by the user of the watch.

This is quite contrary to the general opinion, which is, that it is especially the business of the watchmaker. A customer rushes panting into the shop, exclaiming, "Mr. Pivot, my watch is away behind time—I missed the train by the confounded thing being five minutes too slow this morning, and ever since you have had it, it goes too slow. Now I want you to keep it here till it is right," and he lays it down on the counter with a whack sufficiently hard to do it injury, and with an air which plainly says he is much offended, either with the negligence or want of skill of Mr. Pivot.

"Hold on! hold on!" shouts the watchmaker, as the indignant man is slamming the door after him, "How long is it since I set it?"

"I can't tell; it must have been ten or fifteen days—you ought to know—don't you remember—it was the day you mended my wife's gold spectacles."

"Now, my dear sir," says Mr. Pivot, "do be reasonable; don't you know that I can't exactly regulate your watch hanging here? Neither can I regulate it in your pocket unless I know how long it has been running since last set, so as to know its rate of going. You say ten or fifteen days, which is it? If ten days, it is half a minute per day; if fifteen days, it is only one third of a minute per day. Now how can I move the regulator intelligently on such uncertainty? or how can you expect me to remember when I set it, or when your wife's glasses were mended? for as soon as your watch was out of my hands some other one was in, and in the ten or fifteen days since I moved your regulator I have done the same thing to a hundred others; now don't you see what impossibilities you require of me?"

"Yes; I see how it is, but never thought of it before."

"I knew it," continues Mr. Pivot," and that's the reason I have given you such a plain talking to, and now take your watch, put it in your pocket, and make a memorandum of the date on which it was set; then when you have ascertained its rate of going, move the regulator yourself; the amount of movement it will require to affect it a certain quantity you will soon learn, and as that amount differs in every watch, it becomes necessary to know it in order to regulate it with the greatest nicety, this particular knowledge of every watch, no watchmaker can have. But should you prefer he should move it, never ask him to do it until you can tell him how much it gains or loses in a given time, for it is only troubling him and yourself needlessly, and he will be just as likely to keep your watch perpetually wrong as to ever get it right; that is why I say to you so bluntly, but honestly, if your sight be good and your hand steady, regulate it yourself, but be especially careful to avoid attempting to make your watch agree with every clock you chance to look at, or every watch the owner says will not vary a minute in a year."

Cleveland, O. R. COWLES.

Explanation Wanted.

MESSRS. EDITORS:—A short time since I was walking along the bank of the Morris and Essex canal in this city, when passing a telegraph pole, I was attracted by a queer buzzing noise which came from it. Pressing my ear close against the side, I could hear the sound very distinctly. It seemed to come in little pulsations like a battery. I then went to several other poles, at each of which I heard the same curious noise, though in some it was very faint; while at the first one I stopped at, it was so loud that, by listening acutely, I could hear it at a distance of five feet. By laying the hand on the pole the vibrations could be distinctly felt.

Perhaps some of your many readers can suggest an explanation. F. P. DODGE.

Jersey City, N. J.

Grindstones by the Ransome Process.

MESSRS. EDITORS:—In your issue of the 12th Nov., I notice under the heading of "Artificial Stone" an article by J. E. E. upon grindstones manufactured under the Ransome patents.

J. E. E. represents that though those experimented upon proved fully up to his expectations as a trial; some being "superior stones hard clear through, and doing excellent service," yet others lacked uniformity in hardness; containing spots where the sand had never united.

The tenor of his article is, that if these stones could be produced free from soft spots and of uniform hardness they would far surpass the natural stones in effective working.

My present object is to draw attention to the fact that stones can be, and are produced by the Ransome process free from soft spots, and of uniform hardness, and that, as he anticipates, they far surpass the natural stones in effective work.

The defects alluded to are not—as one would gather from his letter—inherent to the manufacture, but arise from ignorance of its details, or from want of due attention thereto.

The soft spots are occasioned by the imperfect admiture of the materials, and the want of uniformity is due either to the same cause, coupled with imperfect pressing, or to the latter point alone.

The Ransome process, when its details are thoroughly mastered, and correctly carried out, is certain in its effect, and invariably produces the expected results.

San Francisco, Cal. E. L. RANSOME.

The Thermantidote Again.

MESSRS. EDITORS:—I beg to make a few observations with respect to Thermantidote's letter, which appears in the SCIENTIFIC AMERICAN of the 26th ult.

"Thermantidote" appears to have a pretty correct idea of the details of the machine, the appellation of which he has used as his *nom de plume*. The construction of it is precisely similar to that of a fanning mill. The object is the same in both—viz., to produce a strong current of air. In the thermantidote this current is driven through a grass mat, which is kept saturated with water. By this means a great degree of evaporation is caused. Your correspondent is no doubt aware that a lowering of the temperature of the air is a result of evaporation. For the purpose of cooling a room the thermantidote is placed in a doorway with the back part directed inwards.

A common plan to cool houses in India is to open the doors in that side of the house on which the wind blows, and to hang up grass mats saturated with water in the doorways. The natural wind blowing through the mats produces evaporation. The degree of evaporation obtained in this manner is not, as may easily be conceived, equal to that attained by the thermantidote.

It may appear strange, but it is nevertheless true, that by the use of such appliances the warmer the air on the outside of the house the cooler it becomes in the inside of it. The reason is simply the increased evaporation.

I may add that the mat to which I have referred is called in India a "kuskus tatty," tatty being the Hindoostanee for mat, and kuskus that for the aromatic grass of which it is made. DEESA.

London, Canada.

Atmospheric Pressure.

MESSRS. EDITORS:—In the SCIENTIFIC AMERICAN of November 12, page 314, you notice approvingly the statement of a correspondent, A. M. T., that the entire weight of the atmosphere is not sustained by the earth, but is only equal to, or in the ratio of a column of air, one square inch of base, and extending to the outside limit of the atmosphere.

It is singular that, before coming to this conclusion, some disposition of the left out portion should not have been made. The relative amount of this neglected portion would vary with the hight assigned to the atmosphere; but instead of the inch parallelopiped, if we substitute the frustrum of the sector of a sphere, the interior end resting on the said square inch, and the exterior forming part of the atmospheric limit, whether of 10 or 1,000 miles in light, we should have a correct view of the case, and the entire pressure on the earth.

Pittsburgh, Pa. F. W. B.

Ivy Poisoning.

MESSRS. EDITORS:—I send you a prescription which I am satisfied, from ten years' experience, is the very best remedy for ivy poisoning. It is simply to bathe the parts affected freely with *spirit of niter*. If the blisters be broken, so as to allow the niter to penetrate the cuticle, more than a single application is rarely necessary, and even where it is only applied to the surface of the skin three or four times during the day, there is rarely a trace of the poison left the next morning. Having often, previous to the discovery of this antidote, been rendered helpless and blind by ivy poison, I know its worth to those effected thereby.

Port Jefferson, N. Y. H. MARKHAM.

Smoky Chimneys.

MESSRS. EDITORS:—I have had some experience similar to Y.'s (page 340 current volume of your paper) with smoky chimneys, and remedied them by the same means.

I think many flues are built too large, especially in cases where they are intended for stoves, as an ordinary stove cannot heat the whole volume of air, and by this means create a draft.

A stove flue ought to be very little larger in area than the pipe that goes into it—where the flue is perpendicular—where bends occur the area should be increased. A.

Freeport, Pa.

Improved Mode of Graining Wood.

The object of the improvement herein described, and of which our engraving gives a good representation, is to facilitate and cheapen the process of graining, so that instead of, as now, requiring for its adequate performance skill acquired by long practice, it may be performed by the comparatively inexperienced more rapidly than it can be done by the most skillful under the old process.

Hitherto the operation of graining has been tedious, laborious, and expensive. It is claimed, however, for this method that at least four times as much work can be performed by its use as could be done heretofore, while the quality of the work is fully equal to the best hand graining.

The operation is performed by the aid of stencil plates, shown at the right hand lower corner of the engraving. The engraving also shows the method of applying the plates, as described below.

These plates can be cut in any desired style of graining from natural woods, by taking off the exact pattern of the grain on tracing paper, transferring the same to the plate, and cutting the plate after the pattern thus traced. All the woods now used on account of their beautiful pattern of graining may be thus copied by the use of the plates. The whole is finished in quantity by the use of the steel fine comb, the teeth of which are covered with graining cloth, and then drawn over the plate several times while the latter is held by one hand firmly against the door or wainscot to be grained. Various portions of the plate may be used at intervals, to make variety of pattern, so that with one panel plate a number of doors may be made entirely different from each other. All the designs in the various plates are made to match each other at any section, and the entire plates also match, so that endless variety of pattern may be secured. Thus tame repetition is avoided.

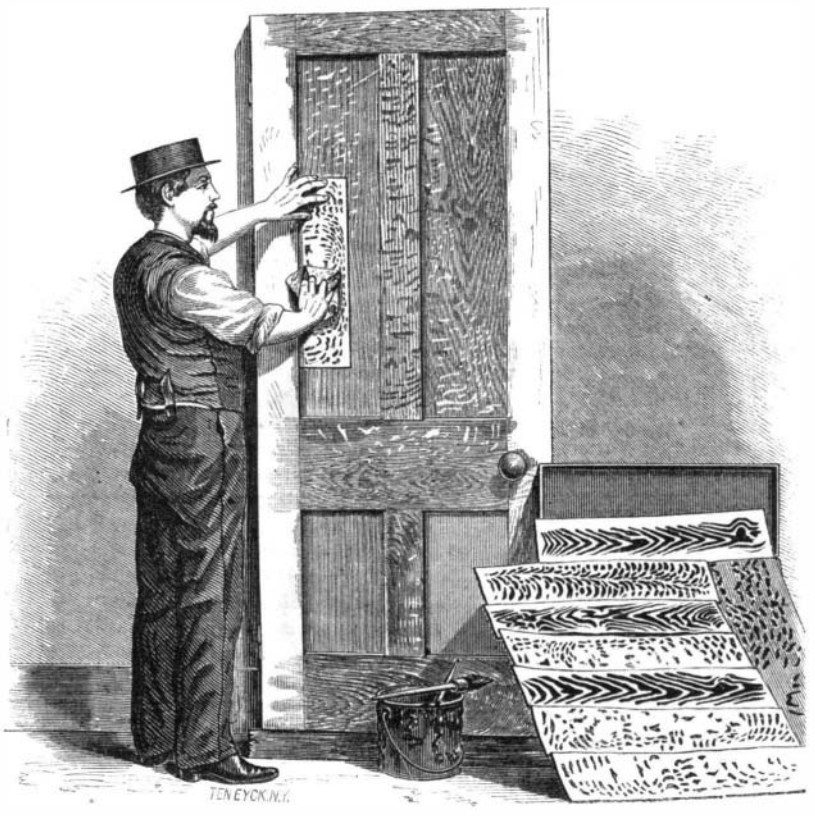
A full set of stencil plates for this purpose numbers ten or more in making the various patterns and to perform graining in any place large or small.

The stencil plates are made of brass, steel, or other suitable metal. In these plates the desired pattern is cut, and the surface is indented or covered with a series of small bosses, formed by indentations on the opposite side, so that when placed on the surface, and the plates are wiped or brushed, as hereinafter described, those portions of the paint not desired to be removed shall remain undisturbed for subsequent treatment.

These plates are held stationary during the operation by small steel pins at the corners. The operation is as follows: The desired graining color is first rubbed in. Then the proper plates are applied, and held by the pins, as above specified. The plate is then rubbed over with a rubber cloth, or other suitable pad, which penetrating the openings in the plate and removes the graining color lying underneath the cut pattern. The plate being then removed, the work is completed with the ordinary graining tools.

The inventor of this method informs us that he took the first premium at the Northern Ohio Fair, both for superiority of work and for the method of performing it.

Patented, through the Scientific American Patent Agency, July 5, 1870, by John J. Callow, of Cleveland, Ohio.



CALLOW'S METHOD OF GRAINING WITH STENCIL PLATES.

Improved Flexible Joint for Water Mains.

The accompanying engraving shows a flexible joint used in laying 789 feet of 10-in. cast-iron pipe, which has just been completed and laid on the bottom of the eastern branch of the Ohio River, at Wheeling, West Virginia.

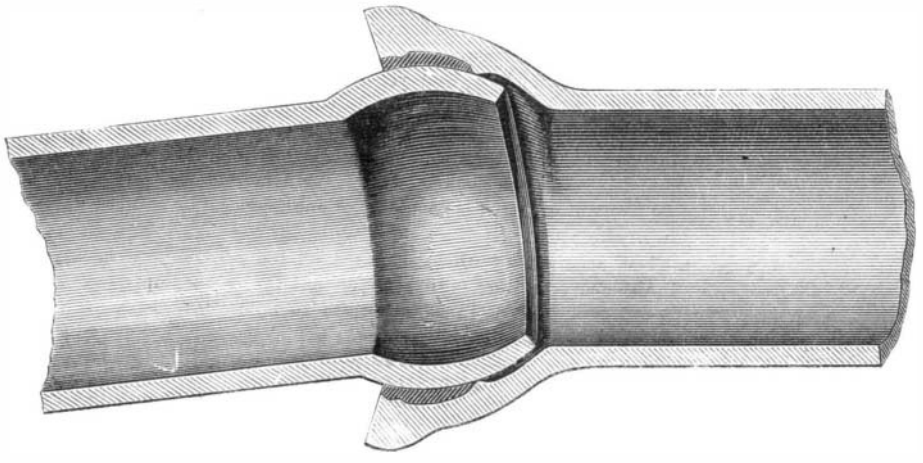
This joint was patented, through the Scientific American Patent Agency, March 15 and May 31, 1870, by Mr. Robert B. Coar, of the Jersey City Water Works, and is very simple in construction, employing neither bolts nor loose parts.

The spigot, or ball, is made of the exact size to enter the faucet or bell, the space for lead packing being formed when the center of the spigot passes through the mouth of the bell, and of a wedge shape which, when packed, cannot be drawn out or displaced.

This joint was run and calked in the ordinary manner to compensate for the shrinkage of the lead. The spigot being turned to the radius of a true circle will adjust itself to any unevenness. There was no difficulty in laying the pipe, although the current in the river was four miles per hour.

Each joint was made separately, inspected, and passed from the boat into the river to adjust itself on the bottom. When laid, the pipe was tested under a head of 200 feet by the Superintendent and Committee on Water Works of the city, and proved satisfactory in every respect.

In pipes of large diameter, Mr. Coar has provision for an inside joint by which a double joint can be made on all pipe under water. The laying of conduit pipe in this manner dispenses with viaducts in crossing rivers, and does not interfere with their navigation, which must be a great saving to water companies and corporations, who are obliged to cross streams and rivers in carrying out their plans of distribution. The principle may be extended to pipes of any diameter designed to be used as tunnels as well as water mains. Address for further information Robert B. Coar, Jersey City Water Works, Jersey City, N. J.



COAR'S FLEXIBLE JOINT FOR WATER MAINS.

Cyclones.

John M. Crady, Curator of the Museum of the College of Charleston, S. C., writes to *Nature* as follows:

Cyclones are commonly regarded as exceptional phenomena of the atmospheric circulation; and we see in text-books statements as to the seasons of the year at which they are most apt to occur, descriptions of the premonitory signs which herald their approach, and directions to aid ships in avoiding the most dangerous portion of the storm field. In short, each cyclone is regarded as an exceptional fact, an isolated burst of fury from the old storm-god, Hurakan.

The writer has lived all his life on the great highway of cyclones, at Charleston, S. C.; and from the observations of many years, has been led to conclude that this commonly-received view embraces only those cyclones which, on account of their rotatory violence, really do threaten destruction on land and sea; and that consequently it overlooks a most important series of phenomena, which, though they do not so forcibly arrest attention, are even perhaps more significant in a scientific point of view. Though destructive cyclones or hurricanes are fortunately rare, cyclones or grand rotary movements of the atmosphere are, at least on certain portions of the earth's surface, of every-day occurrence. In Charleston, Savannah, and along the coast of South Carolina generally, the writer knows from experience that very few, if any, changes of wind are to be observed, but such as are due to the cyclone which happens just then to be passing on its northward journey; and even the apparent exceptions are probably not difficult of explanation.

There is, in short, an atmospheric "Gulf Stream," whose course, beginning somewhere eastward of the Caribbean Sea, is nearly the same as that of the oceanic "Gulf Stream," and this atmospheric stream is composed of an endless succession of cyclones chasing each other ceaselessly up towards the polar regions, along the track recognized as that of great hurricanes.

These cyclones vary within very wide limits, both as to velocity of rotation and velocity of translation, as well as in diameter, and all the characters usually ascribed to such atmospheric movements. Many of them exhibit no wind stronger than a pleasant breeze in any part of their field; and a few have so gentle a motion, at least in some parts of their circuit, as will not agitate an ordinary vane; a few are almost wholly without clouds, and very many wholly without rain or lightning. Their effect upon the barometer, when appreciable, must generally be very slight; but in temperature they are usually divided into a warm and a cool semicircle by a line which, in Charleston, lies about S.W. and N.E.

Observations of the winds, during a voyage in a sailing vessel from Charleston to Liverpool, along the course of the Gulf Stream, has satisfied the writer that the stream continues unbroken between these two points, and this conclusion was strengthened by repeating these observations between Liverpool and New York. In the former voyage, hardly one of the cyclones which passed over gave more than a stiff breeze, while in the latter, from Cape Clear to Sandy Hook, every cyclone was a storm, and one of them was reported by the captain, on his arrival, as a "hurricane."

The causes of this aerial current, and its connection with the circulation of the whole terrestrial atmosphere, it is not the writer's purpose at present to discuss, though he considers the discussion one of almost cosmical importance. But the existence of such a stream is a fact of practical commercial value, in fixing the natural highways for sailing vessels between Liverpool and the Atlantic and Gulf ports of the Southern States. Obviously the short route from Northern Europe to those ports will be that southward along the coast of Europe until reaching the trade winds, then westward to strike the cyclone current in the neighborhood of the West Indies, and then, if bound to Atlantic ports, northwestward with that current. When bound, on the contrary, from the Southern ports to Northern Europe, the short route is obviously that along the Gulf Stream, which is also that with the current of the atmospheric stream. To reverse this practice, either way, is deliberately to sail "against wind and tide," if such a stream exist.

The flow of atmospheric waves which, in a recent work, has been described as setting from the coast of America towards Europe, though the writer has not seen that work, he believes cannot be other than the flow of cyclones in that portion of the atmospheric stream lying between the vicinity of New York and the English Channel. The cyclonic character is not always distinct, and sometimes is completely masked by the great distance of the observer from the center, and the consequent apparently rectilinear course of the wind; and the chances of mistake are still further increased when the observer is moving in a course parallel to the path of the center of the cyclone.

These observation have already been brought to the notice of the Smithsonian Institution, and the writer hopes that something will be done in America towards the comprehensive, precise, and detailed inquiry which the subject demands. But unless attention of the same kind be given in Great Britain, and in the voyages of the Atlantic steamships, the resulting information will remain incomplete.

Iron Steamboats for Rivers.

The Cincinnati *Gazette* says: "The recent launch of an iron river steamer is a notable event as one step of progress in what we believe will be a revolution in the water craft of the western rivers, which will greatly reduce the perils and the cost of transportation. Here is an iron boat, 180 feet long, 42 feet wide in the hull, 6½ feet deep, with an iron shell varying from three-eighths to five-eighths in thickness, according to the need, much stronger both in the shell and in the frame than a wooden hull, divided into eight water-tight compartments, with forty feet of the deck of iron, which draws, as launched, but fourteen inches. Such a boat is almost proof against sinking. One, and even two, of her sections may be pierced, and she will still float. Her compartments will greatly reduce the risk of the cargo by fire. There is no reason why she may not last forty years. And by the use of homogeneous steel in the place of iron, by an increase of about fifty per cent in the cost of the plates, a boat may be made of double the strength in the same weight. Iron steamboats and iron barges will carry the trade of these rivers. A new boat will be a thing to outlive the builder, instead of going out in seven or eight years. This city has taken the lead in this revolution, and will hold it. Give us a free river and the upper town will before long ring with the clatter of the hammers riveting the sides of iron boats for this and the Mississippi rivers. And in such extensions of the uses of iron, instead of in monopoly prices which dwarf its uses, will be found the sure foundation of the iron production."

AN ELASTIC PREPARATION OF GLUE.—Dr. Sonnenschein reports (*Polytechnisches Journal*) that when a thick solution of glue is mixed with tungstate of soda and hydrochloric acid, there is precipitated a compound of tungstic acid and glue, which, at from 30° to 40° C., is sufficiently elastic to admit of being drawn out into very thin sheets. On cooling it becomes solid and brittle, but when heated, it again becomes soft and plastic. It appears that this material has been successfully employed instead of albumen in calico-printing, in order to fix the aniline colors upon cotton; it is also used in tanning, but the leather becomes as hard and stiff as a plank of wood. It is recommended as a lute or cement.