Improved Pressure Recorder.

An instrument that will record the pressure in steam boilers, gasometers, etc., and indicate it so that such pressure may be referred to the exact time at which it occurs, is one that, in our opinion, ought to form an adjunct to every steam boiler in use. Such an instrument would definitely settle the disputes as to whether boilers explode under undue pressure, or not, and would furnish legal evidence, that in many cases would be invaluable, in determining the negligence of boiler attendants.

The instrument shown in our engraving, Fig. 1, is a recording pressure steam gage. The pressure is received upon a diaphragm in the chamber, *a*, through the inlet, *c*. The diaphragm transmits motion through a sliding rod to the index finger, *b*, which moves a pencil point to or from the center of an annular ruled disk or card, the inner edge of which is numbered like the dial of a clock.

The dark lines, curving from the center of the card outward, towards its perimeter, separate the surface into divisions corresponding to hours on the dial; and the lighter lines between them, running in the same direction, indicate ten minute divisions.

The concentric lines indicate pressure in pounds, from nothing at the outer edge of the card, toward the center.

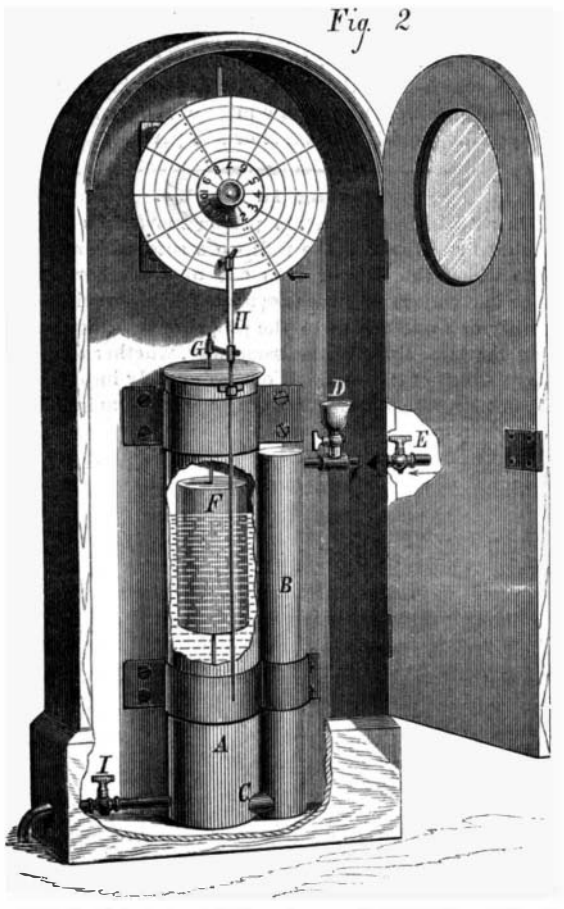
The card being revolved by clockwork, the pencil point, in the extremity of the index finger, makes a tracing on the card, showing the precise pressure indicated at any hour or minute of the day.

Fig. 2 is a modification of the instrument, designed to indicate the pressure of gas.

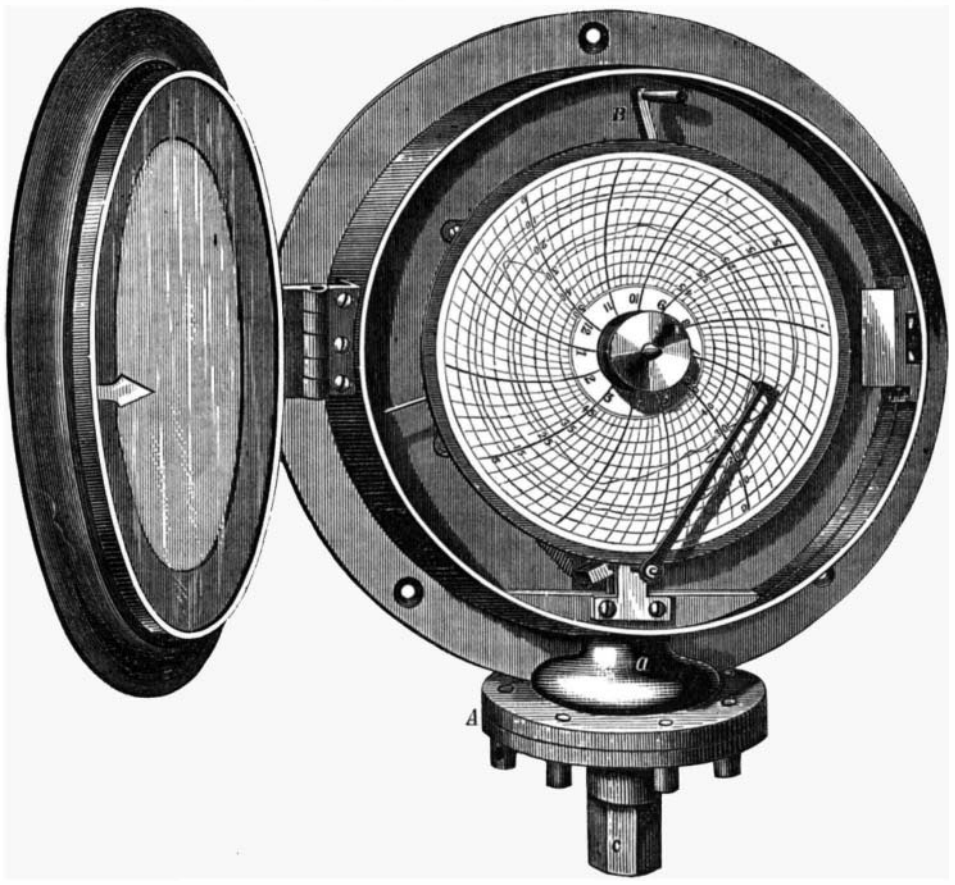
A cylinder, A, communicates with the cylinder, B, through a short pipe, C. Water is put into these cylinders through the funnel, D. The pressure of the gas is transmitted, through E, to the surface of the water in B, and causes the water in A to rise, carrying upward a float, F. From the top of a stem, attached to the float, F, projects an arm, G, which arm moves, upward or downward, the slender rod, H. The rod, H, carries a pencil point, which gives the tracing on the card.

The card is ruled with straight radial lines, instead of curved ones, as on the steam gage, Fig. 1, as the pencil point moves in a straight line instead of a curved one.

These instruments are simple, and are, no doubt, reliable. We consider their indications more valuable than those of instruments which simply trace a curve of pressure, without referring the variations from the established standard to the times at which they occurred.



For further information address D. P. Davis, 44 Courtland street, New York.



DAVIS' PRESSURE RECORDER.

Reconstructing Old Dwelling Houses.

It is a common remark with those who have repaired an old dwelling house, that it costs more to reconstruct an old house than to build a new one. In some instances the saying is true, while in others it is not. The expense will depend on the sound or unsound condition of the old structure, the alterations to be made, and the management of the proprietor and the builders. In some instances, the structure to be rejuvenated is so different from what is desired, that the most economical course will be to tear the old building down at once, or remove it and appropriate it to some other purpose. If, for example, the siding and roof are old and must be renewed; if the rooms are not of the desired hight and size; if some of the timber has decayed, and the studs and joists are so far apart that the laths will spring between the timbers to which they are nailed, and thus fail to make a strong wall,—the old dwelling had better be demolished, as a new edifice can be erected more economically than such a shell can be satisfactorily reconstructed. On the contrary, if the frame is sound and the rooms of the desired form, new siding, new windows, new doors, and new walls can be substituted for the old ones much more economically than the old frame can be demolished and a new structure erected.

There are two ways of repairing an old dwelling, one of which is expensive and unsatisfactory, and the other is satisfactory and economical. The expensive way is to let a builder take the job by contract, and agree in writing to do this and that as per contract. Of course, every professional builder knows enough to make an estimate that will cover all expenses and leave him a generous profit. Whenever a contract is drawn, builders are not always careful to note every minor item; and proprietors do not always think of every little job until it is too late to be noted in the contract. Such things cause difficulty. The builder of one of the college edifices of Cornell University was not obliged to make box window frames, and provide weights for the windows, as that particular item was not specified in the contract. So the building was finished without window-weights, as such appliances had not been thought of by the directors until the building was nearly finished.

The most economical way to repair an old dwelling is to employ a faithful and competent joiner to prepare a bill of such materials as will be required, and to do the work by the day. It may be well, also, to provide one or more assistants or helpers; but let the proprietor bear in mind, that, as the number of workmen is multiplied,—unless the superintendent is a judicious manager,—the expense will be augmented. As a rule, it is true that four men, working together at such labor as one man can do, will not acccomplish as much in one day as one man alone will do in four days. First, then, let a thorough examination be made of the structure, and let every alteration be plainly noted on paper, after which let a bill of items be carefully made out. For example, one or two sides of the dwelling will require residing. Estimate the number of feet, or the pieces required of a given length and width. If a box cornice or bracket-cornice is desired, let a correct estimate be made of every board, molding facia, bracket lintel, etc. If a verandah is to be erected, make a note of every piece of timber, cornice, flooring, and roofing; after which, let every article be brought on the ground, and the lumber stuck up or spread out in the sun to dry. One great fault in building is using lumber that is is only half seasoned. If lumber that has been sawn a year, or even four years, is spread out in the hot sun for a few weeks, it will shrink but little after being worked up in finishing a dwelling house. Floor boards in particular should be spread out at least four weeks on slabs or timber to keep to keep the ends off the damp ground; and every day they should be examined to see if they do not warp. The rounding or convex side should always be kept up. Clapboards should always be thoroughly seasoned before they are nailed in their places; as boards partially seasoned, when nailed at both edges as clapboards are secured will usually split during the seasoning process, and thus form damaging and unsightly cracks. As soon as the lumber is sufficiently dry, let every piece be dressed out ready for use; then strip one side of the structure, erect the verandah, put up the cornice, nail on the siding, and let the paint brush follow the hammer in close succession before newly dressed lumber will have a chance to get wet. By adopting such a plan,—"getting a good ready," and knowing what is to be done,—the expense, of repairing an old house, will be much lighter than if the various operations were conducted in a hap-hazard manner.—*Technologist*.

McKenzie's Improved Carriage Top.

In the construction of these improved mechanical arrangements applicable to carriage heads, which are made to open and close—such as the landau—the ordinary outside carriage head joint or jointed support is used, although in some cases dispensed with, this joint having, however, by preference, an action the reverse of that usually adopted; that is to say, the upper end is attached to a turning axis, which works on the pillar top or equivalent part of the carriage. To this axis lever teeth or other gearing is secured, which gearing is also connected to the cant rail, hoop stick, or equivalent, and likewise to a spiral or other convenient spring made of india rubber or other suitable material, the lower end of which spring is secured to the lower part of the pillar top. These parts can all be covered. The other end of the outside carriage head joint is provided with the same arrangement of gearing and spring, either in addition to or substitution for that at the top end.

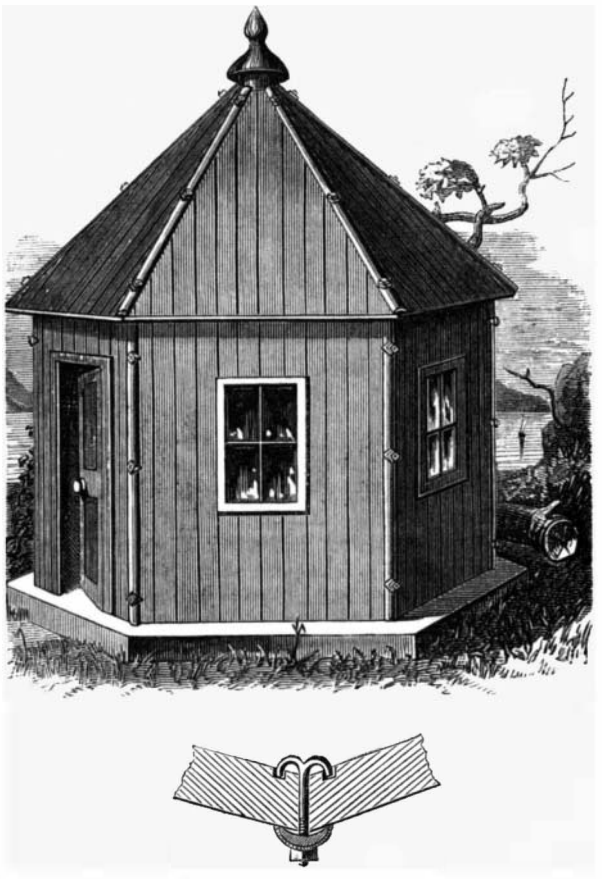
Ropes or chains and pulleys may be used to enable the head to be raised or lowered, or opened and closed, from the coachman's or traveler's seat. The opening and shutting or raising and lowering are effected without handling the jointed supports, as is necessary in the ordinary arrangements, by pushing or pulling the head in the usual way, except when the ropes and chains are used, when it may be effected by acting on them; but this will cause the carriage head joint or support to strike outward and not inward, as generally is the case; hence, when the carriage head has to be raised, it can be much more easily effected than by the ordinary arrangements.

Where carriage heads have side lights which can be slid along and dropped into the door, or otherwise removed out of the way when raising or lowering the head—such, for instance, as are sometimes adopted for the fore half of the carriage—modifications can be adapted and applied so as to dispense with the outside joint or jointed support, and, by covering all the mechanism, keep the same entirely out of view.

Mr. Alexander McKenzie, of Westminster, England, is the inventor of this improvement.

BAIN'S PORTABLE BUILDINGS.

The building shown in our engraving is intended for a



dwelling in the case of persons moving from one place to another not far distant—as laborers on railroad bridges, excavations, etc., are often required to remove. It is also intended for outbuildings for farmers, and especially tenants on farms. It is suitable for barns, stables, tool sheds, shops, granaries, smoke houses, and chicken coops; in short, for any purpose for which outbuildings are needed.

The buildings are constructed of boards or planks in side, and roof sections of any desired number, to suit the size of the building required. These sections are joined together to form the proper angles, and fastened in such manner as to obviate the necessity of framework or corner posts. The fastenings used are the same in the various sizes, and allow

the angles, formed by the joined sections, to be increased or decreased, so that a section of a side, and a corresponding roof section, may be added to or taken from, the building without impairing its efficiency or affecting the strength of the fastenings.

Curved weather strips are applied to the outer portion of the angles, their shape permitting their adjustment to the angles in altering the size of the building, while they completely exclude the wind and rain, and also operate in connection with peculiar shaped bolts, which fasten them to the building, as binders, to strengthen and support the structure. The roof sections may be carried to a point, or a cone of sheet metal may be fitted at the summit, as shown.

The cone may be used as a ventilator or flue, in which case it should be made with a circular shaft, in order to more readily fit the roof sections to it, their points being cut properly for this purpose.

The building may be set upon any kind of ordinary foundation. To secure it at the bottom, if thought necessary, a sill or rail can be used.

The roof can be covered, if desired, by canvas or other material, but the inventor prefers to strip the joints with tarred or painted canvas.

The advantages of this kind of building are cheapness, portability (the pieces being light and few), the ease and facility with which such houses can be put together or taken down, and the capability of enlargement or diminution, nothing being needed but duplicate sections to enlarge as much as desired.

Patented August 8, 1871, by Francis M. Bain, of Delaware, Ohio, who may be addressed for further information.

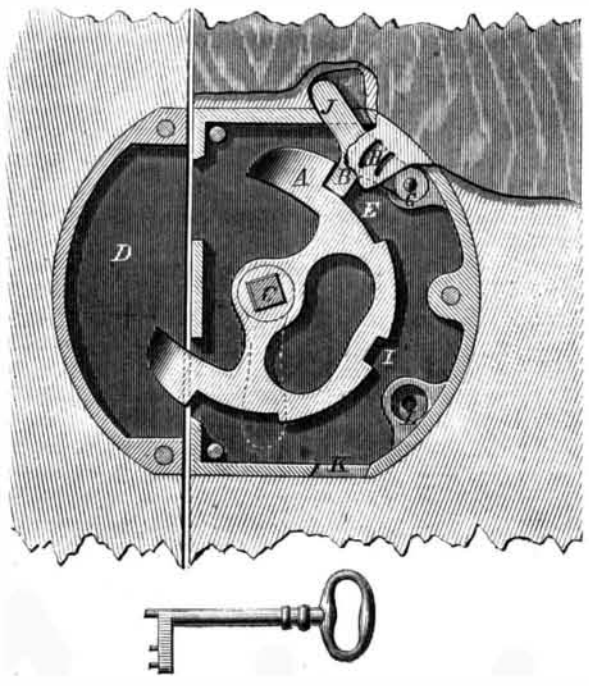
WARNER AND PAYNE'S DOOR LOCK.

This is a very simple lock, the bolt of which may be used either as a latch bolt, or as a lock bolt to securely fasten the door to which it is applied.

Besides the case, it consists of only two working parts, namely, the bolt, A, and the pawl, B, and the pivots on which they turn, all of which are cheaply made.

The bolt, A, which is in form something more than a semicircle, turning freely on its spindle, C, drops by its own gravity into the position shown in the engraving, and enters the keeper, D. In this position it may be turned by the knobs or handles on the spindle to a distance limited by the length of the notch, E, in which the pawl, B—also acting by gravity—enters, and with the shoulders of which notch the pawl engages.

This motion, however, is sufficient to release the bolt from the keeper, so that the knobs only are required to move the former when used in the manner described.



The pawl, b, turns upon a hollow pivot or cylinder, G, the opening in which coincides with a hole in the case of the lock. From the center of this opening, two segmental apertures, H, are cut through the case. The pod of the key enters the hollow pivot of the pawl, and the two wards enter holes in the pawl reached through the segmental openings, H. By turning the key thus applied, the pawl is raised, so that the bolt may be turned further round by the knobs on the spindle, and the pawl may enter the notch, I, the latter being made to fit, quite closely, the downward projection on the pawl. In this position, the bolt cannot be turned from the outside without the use of the key. The pawl, however, has a handle, J, from which projects a knob on the inside of the door, by the use of which the pawl may be raised and the bolt turned without the key. By making the bolt similar at both extremities and providing a second opening, K, for the handle of the pawl, and a proper pivot hole, L, for the pivot of the pawl, the lock is made reversible for right and left hand doors.

Patented through the Scientific American Patent Agency, Oct. 3, 1871, by Martin P. Warner and Edwin W. Payne, of Morrison, Ill.

Novel Uses of Electricity.

The efforts which have been made from time to time, with but poor encouragement, to engrave on metals by means of electricity, seem at last, says the *Iron Age*, to have resulted in the attainment of practical results. An ingenious French mechanic has produced an invention by which a metal plate, upon which a design is drawn with a chemical ink of some kind is slowly rotated with its face vertical, and several other similar plates, graded in size, are also slowly rotated by appropriate mechanism. The object of the invention is to engrave on the smaller plates the design traced upon the largest, on different scales of magnitude, which is accomplished by applying a cutting point to the face of each plate, and which is pressed against it by means of an electric current whenever a blunt point, applied to the large plate, encounters the ink in which the design is traced—the cutting points being at other times withdrawn. The point presented to the first plate is merely a "feeler," which determines by electrical agency whether the ink is beneath it or not. If it is, the points are pressed into the surface of the other plates; if not, they are withdrawn and prevented from cutting. The feeler and the bruns must, of course, all follow a spiral track. This is crude, and can be made applicable to the reproduction of certain kinds of designs only, but it is considered a long step in the direction of practical success.

Correspondence.

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

The Psychic Force.

To the Editor of the Scientific American:

An anonymous writer from Jersey City, signing himself B. D., remarks in your last number, that the unearthing of the jugglery which I maintain to underly the manifestations exhibited by Home, requires "far deeper plowing than Dr. Vander Weyde has done in his letter of August 12."

I say so myself; but how can B. D. expect that I would be able thoroughly to unearth tricks which not only I had no opportunities to investigate, but which I have even not seen, and of which I know nothing except by description, in which, no doubt, many most important details were left out, and only such particulars were mentioned as served to apologize for the apparent credulity of the reporter, Mr. Crookes? His whole report is evidently one sided. He overlooked little particulars, which would, to a more competent expert than he proves himself to be, have given the key to the mystery of the whole performance.

When, some years ago, the Emperor Napoleon III. had seen Home's exhibition, he was full of astonishment at the wonderful feats he had witnessed, and invited, the next day, the eminent savant Arago to the Tuileries; and, after giving him a detailed statement of the performances, asked an explanation on scientific principles. "Sire," said Arago, "it is utterly impossible for me to give a satisfactory explanation of phenomena which I have not seen myself." I think this is an excellent rule, and I have since followed this example, and do not pretend to give a satisfactory explanation. All that I did, and intended to do, was to suggest some ideas explaining how such tricks might be done, and to call attention to the infinite resources offered to the initiated in the field of physical sciences.

B. D. makes one strong point out of the fact that Mr. Crookes saw Mr. Home change his dress, and therefore knows that there was no machinery secreted about him. Well, this only proves that the tricks were performed by means of contrivances not concealed on Mr. Home's body; or, after all, perhaps there may have been some machinery concealed in the clothes he put on—a trick of which I myself have been guilty. Mr. Crookes, it appears, was not enough of an expert to examine carefully every article of dress put on by Home, otherwise he would surely have mentioned this also.

Another strong point made by B. D. is the statement that the apparatus was arranged without Home's supervision. I ask, therefore: Who arranged it? Evidently, Mr. Crookes did not do it alone; his assistant, who looked under the table during the performance, says he saw certain motions of the accordion, and Mr. Crookes inserts in his testimony the existence of these motions, which he did not see at all himself. This has no value, it is not even legal testimony, as before a court you may not swear as to facts you know only by hearsay. I have my strong suspicions that there was collusion between Home and Mr. Crookes' assistant; this is another trick of which I myself confess again to have been guilty often: but Mr. Crookes is too confiding and too innocent to cherish any such suspicions.

B. D. thinks I am "attributing to Mr. Crookes, and the two other gentlemen, an amount of obtuseness that is not characteristic of either of them." B. D. must profess little knowledge of human character not to know, or never to have observed, that many men, very intelligent and of sound judgment in almost all respects, are obtuse, and even stupid, in certain peculiar matters—for instance, in their religious tenets, or in their political convictions. It has even been asserted that most men are insane on some particular subject, and it is surely true of a great many I know; they rather believe in a mysterious supernatural agency, acting in an absurd, nonsensical manner, than in the well known natural laws and forces, acting always consistently and wisely, and of which those who are more acute than their fellow men take advantage to deceive them.

Certain men will profit by the general love for the mysterious, by the universal predilection for believing in what is liked best, without investigating what is strictly true, and by the general disgust of people in being told that they err in judgment. This last fact is the strong point which maintains the belief in supernatural agencies. Men, in general, are not ashamed to complain of their bodily defective constitution, and even their mental deficiences in regard to memory, etc., but never in regard to their judgment; this is infallible, in their own sight. Therefore, when you tell them that they erred in judging about the so called spiritual manifestations, and that they were totally mistaken in ascribing them to the mysterious agencies, the belief in which they so dearly cherish, you will find that there are very few who will ever forgive you.

I will only add, as a proof for the necessity of witnessing such performances in order to explain them, that I was at a total loss to explain the feats performed by the Davenport brothers, as long as I only had heard of them by report; but as soon as I saw their performance, at the Cooper Institute in 1864, it was not only all clear to me, but I performed myself all their feats, before many witnesses, when no public performances were taking place. As at that time I lived in the Cooper Institute building, I had access to the hall in which their box or closet remained, and in which they performed every evening. I had, therefore, for some two weeks, a good chance to practice, and soon became as expert in all their feats as the genuine original performers themselves, and must declare that I since have remained utterly astonished at the obtuseness of the audiences which nightly paid their money, and believed in supernatural agencies to account for so clumsy and stupid deceptions. The only way by which I can account at all for this fact, is the consideration that the very great majority of those who came there, are prejudiced in favor of the reality of supernatural agencies; they expect and they wish to see them, and therefore get what they wish. Luther gave proof of his deep knowledge of human nature when he said: "Just as you want your mental belief, so you will get it."

P. H. VANDER WEYDE.

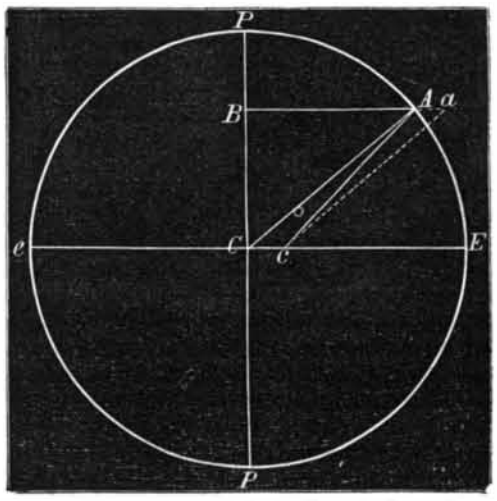
New York, Sept. 27, 1871.

Variation of a Plumb Line from the Perpendicular.

To the Editor of the Scientific American:

In looking over a file of the SCIENTIFIC AMERICAN, I find in your issue of January 14, 1871, a discussion relative to the tendency of a plumb line to vary from the true perpendicular, as is found to exist at the central shaft of the Hoosac tunnel. A mathematical demonstration by J. E. Hendricks, of Des Moines, Iowa, is there given, which I think can be shown to be incorrect both in principle and in the result.

Let P, E, P, e, be the earth; P, P, the axis; E, e, the equator. As the earth revolves upon its axis, every place on its surface, except at the two poles, describes a circle; thus a body, placed at A, will, in one revolution of the earth, describe a circle, the semidiameter of which will be A, B, perpendicular to the axis, P, P. In like manner; C, E, is the semidiameter of the circle described by the revolution of a place at the equator. But C, E, is the semidiameter of the earth, and A, B, the cosine of the latitude of the place, A. By the "Laws of Central Forces," when the periodic times of a revolution are equal, the centrifugal forces are as the radii. Whence a body at E has its centrifugal force as much greater than at A as the radius C, E, is greater than the radius A, B. Consequently we have this universal rule: The centrifugal force



at the equator, is to the centrifugal force at any other place, as the radius is to the cosine of the latitude of the place.

With the foregoing explanation, we come direct to the question at issue. Required the point toward which a falling body will tend, at the mouth of the central shaft of the Hoosac tunnel in 42° N. Lat., the centrifugal force at the equator being to the force of gravity as 1 is to 289. 1. As radius: to the cosine of 42° :: is 1, (the centrifugal force at the equator): the centrifugal force at 42° N. Lat. = 0·74314.

Hence the force of gravity at that point is to the centrifugal force in the ratio of 289 to 0·74314. To construct the problem geometrically, draw the dotted line, A, a, (representing the centrifugal force and its direction), so that it shall have a proportionate length to line A, C, (representing the force of gravity and its direction), as 0·74314 is to 289; draw the line, a, c, parallel to A, C, and c will be the point to which the falling body will tend, along the diagonal, A, c. c will be a point on a semidiameter at the equator, drawn parallel to a tangent at the equator, where it is intersected by a meridian of the place of experiment. 2. To find the angle of variation from a true perpendicular: The line, A, a, equals C, c, the angle A, C, c, equals the latitude of the place of experiment, 42°, therefore, as the logarithm of 289 is to the logarithm of 0·74314, so is the sine of 42° to the angle required, which = 5′,55·095″

To find the amount of deflection at the bottom of the shaft it being 1,030 feet deep. As radius is to the sine of 5′,55·095″, so is the logarithm of 1,030 to the distance, which = 1·7722 feet in the direction of the centrifugal force.

The foregoing demonstration is based on the supposition that the earth is a sphere, and the place of experiment at the