Improved Switch for Railroads.

The object of the steam switch is to use the locomotive as a general switchman on railroads. The hand and steam switch are both constructed and operated on the same plan of turntables. The turntables, D, are vibrating tables placed under the rails of the switching track, so as to move them either way as far as required, and limit their motion. There may be one or several of them used under each switching rail; and their centers of vibration on the crossties, on each side of the track, are on a common line between a right and left switch. Where only one turntable is used under each switching rail, it is placed where the rails in a right and left switch intersect, which is about one third of the length of the track from the switching end. Across the face of each turntable, there is a Λ-shaped recess for the rail to rest in and for limiting its motion. The narrow part of this recess is to be just wide enough to receive and hold the rail and allow its vibration, while the wider part is to be wide enough for a full left and right hand switch. The wider part of the recess must be governed by the movement of the track where it is placed, and the narrow part, by the width of the rails used. The turntables are made full, both on the upper and under sides, near their centers, so as to offer the least possible friction to their full vibration. They may be secured by bolts directly to the crossties or to small bed-plates attached to them, and in such a way as to prevent the access of water, and thus prevent their freezing fast in winter. An arm from each turntable, on each side of the switching track, projects outside of it so as to gear it to the disk, E, either horizontally or vertically, by teeth in both, or otherwise. If vertically, an additional post is required in the rear of each disk. Their centers and attachment to the crossties are the same as those of the turntables, and just outside of them, as both are secured to the same crosstie. The recesses across the faces of the turntables may be continuous and permanent, or adjustable, or confined to their circumference. The shoulders of these recesses between the rails must be low enough not to interfere with the flanges of the car wheels, while outside of the rails they may be nearly as

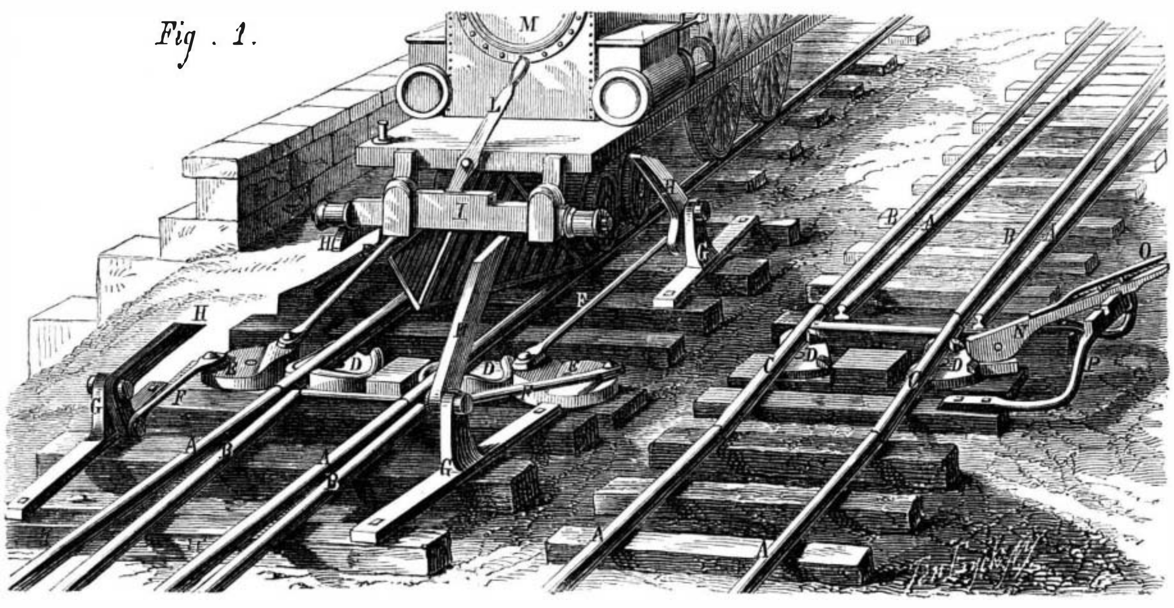


Fig. 1.

STRAIT'S TURN-TABLE AND HAND AND STEAM SWITCH FOR RAILROADS.

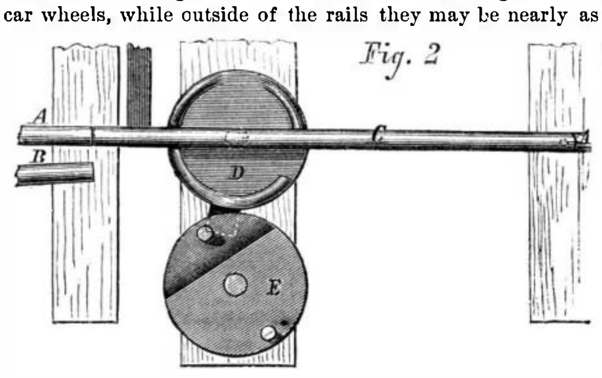


Fig. 2

high as the rails themselves. The wide or narrow ends of these recesses may be toward the switching end of the track, if preferred.

By hinging or otherwise attaching a lever, N, to either arm of the two turntables, so that its outward end will rise and fall a few inches, so as to fasten in a guard, P, just outside of the track, with two lever recesses on its top, one for a right and the other for a left hand switch, it can be used as a hand lock switch. The spring, O, attached to the top of the hand lever, is to hold the lever securely in its place. The turntables, D, may be of any size and shape, to vibrate the best, and between the rails may be either connected or disconnected.

The disks, E, are two tables of the same size as or a little larger than the turntables, secured on the same crossties by bolts through their centers, just outside of them, and so geared either horizontally or vertically, that both will have a similar vibration. At opposite points on their circumferences, the four connecting rods, F, are movably secured at one end, to give them their reciprocating motion. The four stationary posts, G, are placed just outside of the track and in its line either way, far enough from the switching track, either up or down it, to allow it to be fully switched before the foremost wheels in a train can mount it. The other ends of the four connecting rods, F, connect and fasten to the short arms of the vibrating levers, H, and alternately elevate and depress them on each side, as the shifting bar, I, is set.

When the operating roller on the shifting bar, I, in front of the foremost pair of wheels in a train, acts on the vibrating levers, K, on one side of the track, it depresses the levers to a horizontal line, and switches the track to that side, while the levers, H, on the opposite side, are correspondingly elevated. Both levers on the same side have a similar motion by the pressure of the operating roller on either. The lever on either side, when operated on by the corresponding roller on the shifting bar, I, communicate their motion to the rods, F, the rods to the disks, E, the disks to the turntables, D, and the turntables to the switching track, C. M represents a locomotive, truck, tender, or car, and L the lever, for shifting the roller bar, so as to act on either side, as may be required. By means of cords and pulleys the shifting bar, I, and its rollers are placed under the control of the engineer or an assistant, to regulate the switching of the track.

The recesses on the faces of the turntables to receive and hold the rails and regulate their motion, can be made by the insertion of four short bolts, at the proper points near their circumferences, so that their heads will be just above the rail flanges. The more these recesses are lengthened in the line of the track the more their vibration can be decreased; the lower the stationary posts may be made, the less may be the elevation of the vibrating levers.

The connecting rods, F, all have a pulling motion when acted on by the operating rollers; and the depression or elevation of one vibrating lever on one side of the track, insures the same motion to the others. These rods, by means of swivels or brackets, can be tightened or lowered so as to equalize their strains and motions. In switching forward, the operating rollers have to be attached in advance of the foremost pair of wheels in a train; and in front of the hindmost pair, in switching backwards or backing down.

There is generally a space of about thirty inches outside of the track on both sides, and between the bottoms of the cars and the crossties. The stationary posts and vibrating levers are located and operated in this space, but sufficiently outside not to be in the way of the tracks. The vibrating levers are intended to operate in a space of from twenty to twenty-four inches in hight, and the angle of the vibrating levers is about 110°, to equalize their motion on each side of their centers.

By this arrangement trains may pass and repass freely either way, either on the side or main track, A. Each of the four stationary posts and vibrating levers stands as a sentinel to shift the track as may be required. The turntables and disks may be from ten to sixteen inches in diameter; the posts, from ten to twelve inches high, and the vibrating levers, from thirty to fifty inches long. The posts may be set as far up and down the adjoining track, both ways, as may be necessary to insure a full switch before the foremost or hindmost pair of wheels mount the switching track. The rollers may be made of rubber, wood, iron, or a coil of steel springs. The vibrating levers may be made of cast or wrought iron, and if made of wrought iron may be tipped with spring steel, where a high speed is required. The operating rollers, instead of being attached to a common bar, I, may be separately attached, adjusted and operated.

As the motion of either of the levers, H, correspondingly changes the positions of all of the others, it makes no difference how they are left, or what are their positions when tampered with; for the rollers on either side, when they pass, bring all on one side, to a common level, and elevate those on the other side correspondingly. Each lever can be used also to switch the track by hand, when necessary.

Patented, May 9, 1871, to H. Strait, whom address, for further information, 66 Pearl street, Cincinnati, Ohio.

Convex and Concave Mirrors.

The manufacture of concave and convex mirrors has always been a work of great difficulty and expense; and it seems strange that hitherto the slight flexibility which all glass possesses, has never been taken advantage of for the purpose. Recently the task has been achieved by taking a disk of plate glass, nearly 40 inches in diameter (and of this size, glass three sixteenths of an inch thick is easily flexible), and cementing it into a cast iron dish, turned perfectly true all over its inside. The air chamber under the glass is exhausted through a tube passing through the dish, and so little vacuum pressure is required that, by inhausting the air with the mouth, the atmospheric pressure on the glass will give it a concavity of nearly three quarters of an inch in the center. This is, we believe, a greater deflection than is ever required for reflecting telescopes. By blowing in the chamber, the glass is, with similar ease, forced outwards.

This extremely simple and ingenious invention has been produced by Mr. Nasmyth, of Manchester, England. It seems that there can be no difficulty in fixing a ring of iron round the glass to secure its retaining the concave or convex form, and if so, some of our ingenious mechanics will soon be able to produce lenses of perfect and immaculate translucency of any required diameter. The lens made of glass surfaces, with a filling of bisulphide of carbon, has already been used in the spectroscope, and has so proved itself valuable for instruments requiring the most delicate transparency; and if, by Mr. Nasmyth's invention, we can build up lenses of any size, the revelations of the hitherto constructed telescopes will soon be thrown into the shade by the researches of instruments of unprecedented power.

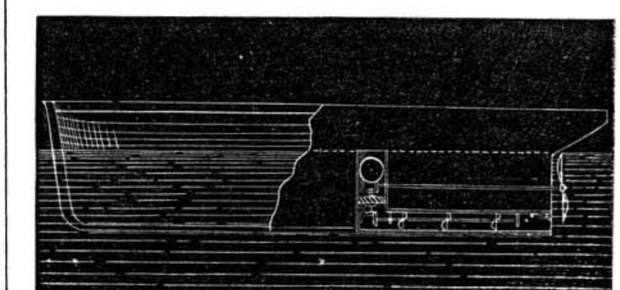
A SELF-MOVING SHIP.

One of our correspondents at Nashua, N. H., sends us the subjoined diagram of the mechanism of a new self-moving vessel, now building on the stocks at that place, and which is to be launched and tried on the 4th of July next.

It appears that much interest is felt at Nashua concerning the success of this novel ship, and public opinion is divided as to its merits. If it succeeds it will be the first self-moving vessel ever floated, Nashua will at once become renowned, orders for similar ships will come in from all parts of the world, and the coffers of the Nashuan shipbuilders will overflow with riches.

It is a little singular that two great enterprises, both of analagous character, both expected to culminate on the same glorious day, should, without any collusion, have been projected by two different individuals, both men of genius, in different parts of the country. There is Mr. Paine, in Newark, N.J., who expects to get an almost illimitable amount of power from the natural forces generated in a quart cup of acid and zinc; and here is Mr. Hamilton, in Nashua, N. H., who expects to accomplish the same thing by simple cold water. Truly, if these experiments should succeed, the 4th of July, 1871, will be a memorable day in the annals of science.

But all expectations based upon their success will result in disappointment. In the case of Mr. Hamilton's vessel, the water will rise within the wheel cistern to the level of the exterior water, and there remain. No current will flow through his flume; his wheel and screws will stand idle, and his ship will float powerless on the wave. Himself and worthy coadjutors will then be able to comprehend those simple but immutable laws of hydraulics which block their way, but with which at present they are evidently unacquainted.



The Nashua *Telegraph* thus describes the new vessel and its machinery:

"For some days public curiosity has been excited by the sudden appearance of a miniature shipyard on an open lot just north of the South Common. Within ten days the hull of a small ship has gradually assumed shape under the saw and hammer of two industrious workmen, who ply their tools with an earnestness that admits neither of flagging nor any interruption. At present the thing looks much like the skeleton of a fossil megatherium. The extreme length is thirty-two feet, beam six feet, and the depth of hold eight feet. The propeling power is to be a turbine wheel, set at the bottom of a flume rising five feet from the ship's bottom. The water enters the flume from the ship's sides just below the water line. This opening is provided with a valve to prevent the water from returning when the ship lurches in a rough sea.

"How is the water to leave the ship? asks every one. From the bottom of the flume, near the turbine wheel, a tunnel eighteen inches in diameter extends along the ship's bottom to the extreme stern. The tunnel is to be so constructed as to constitute a vacuum, and is to be supplied with a set of revolving fans to accelerate the egress of the water, and with valves to prevent the inflowing of the water from the stern. The water in the flume will have a head of five feet, furnishing a power of nine-horse. Now the inventor, who is one of the workmen, expects to secure one hundred revolutions of the screw before the outer valve in the tunnel is reached by the out-flowing current of water, or a rate of speed equal to five miles an hour. A moving vessel always makes a trough in the sea at the stern, and the faster the vessel moves the greater the trough. This trough will lessen, to a considerable extent, the pressure on the outer tunnel valve, and the remaining force necessary to overcome the pressure, open the valve, and release the water, is expected to be created by the movement of the vessel itself. The principle is that which will empty the bowl of a common clay pipe drawn rapidly through water. Once in motion, the ship is expected to attain a rate of speed only equalled by the power of the turbine.

"Of course a patent has been applied for. The inventor is James A. Hamilton, a Maine man, who has followed the sea for twenty or more years, seven of which were passed in the service of his country. With him are associated Isaac C. Richardson and John M. Buckley, of this city. They are very confident of success, and claim that their confidence is based on the success of an experiment with a small model on the Harbor Pond. The vessel will be ready for its machinery about the first of July. It will be launched in the Nashua, and the trial trip may come off about the 4th of July.

"Our mechanics are divided on the question of the success of the experiment. Some shake their heads very wisely, and say it is too big a thing to be a success. They evidently think that the experimenters will meet with a defeat as disastrous as Darius Green experienced with his famous flying machine. Others believe with the proprietors that the experiment will succeed, in which case the carrying trade of the world will be revolutionized, the use of steam knocked into a continental hat, and the cost of a trip to Europe reduced to the capacity of any man's pocket. The cost of the experiment will be about $2,000, which the men engaged in it can ill afford to lose, and we sincerely wish they may not lose it. The trial trip will be an interesting event, the date of which cannot yet be fixed, but which will be duly announced through the *Daily Telegraph*."

Correspondence.

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

Mental Emaciation.

MESSRS. EDITORS:—May I be permitted to make some remarks upon an article in a recent issue of your journal, and bearing the above caption?

Is it true that "the best and strongest minds are tugging at the mysteries of nature, and expending their energies in physical researches?" This assertion I connect with the following: "Ask nine out of any ten, selected at random, what is their religious belief, and you will find that they accept a creed they cannot comprehend or explain." This is given as an instance of mental weakness. I ask, is this true? Are there not grave errors deducible from the position you assume, notwithstanding the portion of truth underlying it? Does a man prove his mental strength by "tugging at the mysteries of nature" so that he may "explain and comprehend his religious belief?" Allow me respectfully to say, no; and therefore to ask whether in your article you have not confused mental corpulence with mental strength? I think it can be shown that a man who tugs at the mysteries of nature and expends his energies in physical research, becomes a storer up of facts; a gatherer of knowledge; an accumulator of absolute truths. He fills out his intellectual being, and so becomes what we justly call a learned man; such as are Tyndall, Darwin, Huxley, and others. This gives him intellectual corpulence (justly distinguished by you from intellectual emaciation); what we may term mental enlargement, but not necessarily mental strength. He is learned-but not consequently wise. A man who weighs 220 pounds is not necessarily stronger than one only 140 pounds, that is, in absolute power. He will be comparatively stronger, but not relatively. In fact, the taking on flesh, in all ordinery cases, renders one unwieldy and incapable of muscular effort. It is similar in mental condition. The profoundest attainments in scientific research do not, as a necessary consequence, render their possession strong, mentally; neither is the possession of the profoundest learning a guarantee of intellectual power.

This is the true distinction between the learned and the wise man. Learning, or the accumulation of material, is mental enlargement, that is, corpulence. Wisdom, as the development of self-acting vigor and power, is mental grasp, that is, strength. The wise man does not cultivate his intellectual being by merely taking in and comparing and storing up absolute facts; but by dynamic efforts of reason, thought, and philosophic deduction, he develops that strength of mind, enabling him to grasp those greater questions to which facts are mere stepping stones. Nature and the empirical school of knowledge come in as mere tools in his hand to enable the exercise of pure reason, intellectual thought, and the dealing with questions of moral and spiritual existence, which can no more be evolved from physical knowledge than can the wondrous deeds of the athlete be found in a Lambert. But, even if this were not so, and mental corpulence were really mental strength, and if, to tug at the mysteries of nature and find out and accumulate knowledge, really made a man stronger; is it true that to do this with the object of reaching an unattainable end, is its proof? Let us see. There are many persons who are tugging at the mysteries of nature, to discover the secret of perpetual motion. Is this a proof of their strength of mind? Ceaselessly do they study and toil to wring out of nature what they are convinced can be found in it. You say, and I say, it is folly; and how relentlessly have you striven to ridicule this folly! And yet, I ask, is the man who tugs at the mysteries of nature to explain his religious belief, one whit wiser than they? Do you conceive that Darwin, Huxley, and this class of naturalists generally, manifest any greater strength of mind in tugging at the mysteries of nature, to find out the hidden source of life, or demonstrate a material God? Here the old saw comes in—"The young folks think the old folks fools, but the old folks know the young folks to be fools." The perpetual motionist thinks you and I are fools, to doubt that he can discover his quest, even as the materialist thinks that the Christian philosopher is a fool to question his pursuit; but you and I know that the perpetual motionist is a fool to tug at the mysteries of nature in order to find out what is impossible, even as the Christian philosopher knows that the scientist is a fool, who is toiling, by the accumulation of knowledge, to discover the unknowable. Nothing less than this, in true philosophy, is the endeavor to "explain and comprehend a religious belief." Mental weakness alone prevents its evidence.

This is the preposterous position assumed, by many learned men of the day. Swelling in their mental corpulence, replete with the accumulation of all scientific knowledge, they venture to attack subjects which require for their treatment illimitable mental strength. They bid us accept their dicta upon topics with which their very acquirements disqualify them to cope. They tug at the mysteries of nature as the Rosicrucians toiled after the philosopher's stone, hoping to reach the origin of life, or attain that Utopian absurdity, expressed by you in a later issue, "When men strive to know, not in the sense of the passive acceptance of creeds or formulas, thought out by others, but each thought out by themselves, then will poverty, drunkenness, crime, and most of the diseases of the human race end."

Do you wonder that to a Christian philosopher such aim in knowledge stands, an unutterable folly, and that he, recognizing in man a fallen and sinful nature, shall say to him what you would to the perpetual motionist: "Do away with gravity and its laws, and you can obtain your quest; until then your toil is weakness, not strength." So he will say, "do away with a sinful nature and moral weakness, until then your toil is folly." R. W.

New Haven, Conn.

A Barometer Without Mercury.

MESSRS. EDITORS:—In 1856 or 7, I described in the SCIENTIFIC AMERICAN a "Cheap Barometer," which does not differ very essentially from that invented by Professor Heller, and described in your issue of June 10th. It consisted of an air tight tin can, suspended or fastened to the shorter end of a long and light balance beam, the longer end of the beam serving for an index to show the variations in the atmosphere by moving over a graduated arc. A correspondent pronounced it a hygrometer. According to him, the movement of the index was caused by the deposition of moisture upon the tin can. He was certainly wrong, for the index did not move, with the variations of the weather, in the right direction to satisfy his theory. But his criticism suggested an idea. I then constructed another barometer, consisting of two oy ter cans fastened to the ends of a balance beam, of equal arms, one of the cans being made air tight, the other left open, the latter one having been thoroughly washed to remove all remains of salt. The pivots are points of needles resting upon bits of glass. The whole is inclosed in a tight wooden box, to preserve it from currents of air, with the exception of the index which is outside of the box, and moves over a graduated arc of 6 inches radius. The open can serves no other purpose than to balance the tight one, and to furnish an equal and compensating surface for the deposition of moisture, dust, etc.

The nice adjustment of the center of gravity of the beam, to make the instrument effective to indicate small changes in the density of the atmosphere, creates the liability of one or other of the cans kicking the beam when great changes take place. To remedy this a small weight is attached to the index or pointer, which may be slipped one way or the other as the case may require.

My barometer shows the two daily variations very perceptibly, the index moving nearly ⅛ of an inch. I have not studied its movements much in connection with the weather, nor compared them with those of the mercurial barometer. It is little other than a plaything, as I suppose most fluid barometers to be in the hands of the unscientific.

J. H. PARSONS.

Doctoring Iron—The Bendell Process.

MESSRS. EDITORS.—We noticed with pleasure your article in the SCIENTIFIC AMERICAN, June 10, 1871, on "Doctoring Iron"

We agree with you in regard to failures accompanying previous experiments, and the fact that it is difficult to define the line where iron ends and steel begins.

The primary cause of failures is easily accounted for; the parties who have thus operated have invariably used a combination or compound of the elements.

We are not at liberty at the present time to fully explain our process, and throw it broadcast to the world; but we will do so in a short time, when we expect to meet with counter opinions and prejudices. Allow us to say this much to you in confidence, that we use not elements, but one of the primary principals which are the component parts of iron ore, which has an affinity for all the elements, and especially so for the superfluous gases that unite with iron, namely, phosphorus, sulphur, and silicon, thus discarding all compounds or mixtures of chemicals or metals. We take either red short or cold short iron alone, and produce a neutral iron, that is pronounced by all the iron merchants and best judges of iron in this vicinity (whose names we are at liberty to use), superior to any refined iron in the market, and some say, equal to Peru, Norway, or Sweden iron; it is unsurpassed by none for density, tenacity and ductility.

We send you samples per express that are rolled from the puddled billet, and made from No. 2 Hudson pig iron. Also, a sample of a railroad bar, the flange and standard being made from iron puddled in the ordinary way, the cap (composed of two 3 inch and two 4 inch puddled bars) by our process, made in the same furnace, worked by the same men, from the same pig iron as is used at the Lodi Rolling Mills, Syracuse, N. Y. BENDELL, THOMPSON & CO.

Syracuse, N. Y.

Steam on the Erie Canal.

MESSRS. EDITORS:—I applaud, with all my heart, the commendable interest you take, as journalists, in the all absorbing question of the hour, to wit: canal navigation by steam.

Permit me to suggest that the first thing to be done is to let a test be made, and that too at the very earliest practicable moment, of such inventions as have been made, to ascertain whether the bill, generously and wisely passed by the Legislature, with all of its severe exactions and restrictions, can or cannot be complied with. The suggestion of throwing away another year to wait for another Legislature to make amendments to it, plainly suggests that somebody, unable to face the stern requisitions of the present bill, wants the great canal's interests to languish another year, merely to enable him to slip in on some slipshod device shut out by the present bill.

The present bill, I grant you, is severe in its terms, but $100,000 ought not to be given away by the State on any other kind of terms, especially when there are from ten to twelve inventors now ready to enter the contest, firm in the conviction that they can take the prize.

Again: permit me to attract special attention to the fact that only one half of this prize is to be given upon the first report. The second half is not to be awarded until November, 1873, and not then unless the Commissioners find that the device to which the first prize has been awarded has been generally adopted, and promises to prove practical and profitable. This fact, you must perceive, renders the time which intervenes between the first award and the first of November, 1873, of incalculable value to the successful contestant. The sooner the contest comes off, and the sooner the first award is made, the longer must be the period that will intervene between the first trial and November 1st, 1873; and, of course, the greater will be the opportunity and facilities, afforded to the invention successful on the first trial, to take the last half of the premium, to work out the redemption of our sinking canal fortunes, and to convert the Erie canal into a source of revenue to the State.

Can any solid reason be given why this commission has not been organized, and a day fixed to put the inventions already made through a thorough test? If they do not intend to act, why do they not resign, and let his Excellency, Governor Hoffman, appoint others who will act? ERIE.

Kalsomining.

MESSRS. EDITORS:—Seeing an article in your paper of June 3, on kalsomining, I thought I would contradict some of the errors therein, in order to prevent some inexperienced reader from being deceived by it.

First, the article says, take nine ounces of glue to six pounds Paris white. This, in my experience, and I have had considerable, is not enough. One pound of good glue to ten pounds Paris white are the usual quantities. But a man must be guided by the condition of the ceiling; the quantities I have stated are for a ceiling clean and in good condition. If ceilings have some old stuff on them, they may sometimes be prepared by giving them a light coat, provided the old coat has glue enough to hold it from rubbing off. But this way can never be depended on to make smooth work.

Now, in regard to brushes, it is simply impossible for a person to make good work with the ordinary lime brush; you might just as well use a rag and expect to turn out a good job. Your directions as to thinning with warm water I think a grave mistake; house painters always endeavor to get it chilled before using. It works much easier, and makes a smoother finish.

In conclusion, I would like to ask some of your many readers if there is anything that they can recommend as a substitute for glue? Something that will not sour so quickly when mixed up, and as cheap as glue, is wanted.

Brooklyn, N. Y. W. J. DAVIS.

[It will be seen that Mr. Davis' formula varies from ours about six tenths of one per cent. The use of cold water to thin a mixture of which the stiffening is glue will not be approved by many practitioners.—EDS.

Tanning Leather.

MESSRS. EDITORS:—The increasing demand for leather is developing new processes for its production. The following is proposed as one among the experimental methods for attaining practical results:

Prepare a solution of animal and vegetable fibrin, gelatin, and analogous protein compounds which can be precipitated by chemical affinity on canvas and other fabrics of cotton, woolen, linen, silk, and other fibrous substances. Take the fabric thus prepared through a regular tanning process, rendering the precipitate insoluble in water, and capable of resisting absorption. The process promises, in the hands of a chemist, important results. FREDERICKSBURG.

Fredericksburg, Va.

Another Barometer Without Mercury.

MESSRS. EDITORS:—I notice in your issue of June 10, a description of a barometer without mercury. Several years ago, I constructed one upon the same principle, as follows: I made a light box of a capacity of about 50 inches. This I fastened to the end of an index about 28 inches in length. About 4 inches from the box I put through a pivot with knife edges, and balanced the index with a leaden weight, which was adjustable sidewise, and up and down, so that I could change the center of gravity at will till I had got the extremes of variation about equal from a horizontal, and the whole distance through which the index moved to correspond with the length of the arc. The index and box were varnished to keep them from being affected by moisture. The rest of the instrument was simply a piece of board with a standard on one end to support the index, and an arc of 40