HINTS TO THE YOUNG STEAM FITTER.

BY WILLIAM J. BALDWIN.

DRYING BY STEAM.

Three-fourths of all the manufacturing businesses outside of the metal trades, and many of them, use heat for drying purposes; and as various as are the businesses so also are the modes of drying, often the result of years of experiment.

No manufacturer of wooden articles can get along without a *drying kiln*. The laundry man or woman, the dyer, the hatter, the tobacconist, the piano and organ maker, the dried fruit manufacturer, the japanner, the tanner, all must have a means of drying faster and more conveniently than can be had by exposure out-of doors.

Usually steam is used in drying rooms and drying kilns because of its cleanliness, its even distribution, its safety from fire, its easy and quick management, and the cheapness of its maintenance.

The higher the temperature of a drying room the cheaper can the articles be dried. This may not appear plain at first to those who have studied the laws of equivalents, but nevertheless it is so, being caused by local conditions, which always prevent the utilization of all the heat. Thus, the greater the difference in temperature and the slower the movement of the air compatible with the amount of moisture to be carried off, the better the result in the laundry or dry kiln, or any place where rapid drying only is the object.

In no other place is the power of *radiant heat* (direct radiation) more manifest than in the drying room, and more failures can be traced to placing coils under skeleton floors, or flat on the floor, than any other cause, except, perhaps, an ignorance of the principles of piping, which so many consider can be done by any one who wears a pair of greasy overalls.

I have proved in many cases that the same amount of pipe or plate surface, distributed around and between the materials to be dried, will do the work in half the time it takes the heated air from an indirect coil to do it. This is no mistake; and further, wooden blocks can be dried lighter (proving there is more water driven off) by direct radiation than by indirect radiation, the *times* and *temperatures* being the same.

According to the above it is plain that in the construction of drying houses for most purposes the heating surfaces should be so placed and distributed that the direct *heat rays* from the iron could fall uninterrupted on the greatest surface possible of the materials to be dried.

Fig. 1 shows a perspective of a good arrangement of a *direct radiation laundry drying room coil*, utilizing all the radiant heat that is thrown off, and giving a thoroughly uniform heat throughout the room. A A′ are *headers* (often called manifolds), usually made of extra heavy pipe, to admit of tapping and threading, instead of using T's, the cost of the heavy pipe and the drilling and tapping being very much less as well as better and straighter than a header composed of many short pieces of large pipe and the necessary T's. (These remarks apply to all large coils.)

B B are the *spring pieces*, threaded right and left handed; C C, the *leaves* or *sections* of the coil; and D D, the *coil stands*. The stands are always in pairs, to admit of giving the necessary division and inclination to the pipes, and when viewed through the holes look like Fig. 2. The dotted lines are the centers of imaginary pipes to show the pitch. When coils are very wide in the direction of the length of the headers it is well to keep the coil stand 2 or 3 feet from the header at that end, to prevent the expansion from pulling the screws from the floor.

The distance between the holes in the standing coil header is usually about 12 inches, or as wide as the clothes-horses are from center to center.

The usual way to build these coils is to start at the bottom header, A′, Fig. 1, and to put each leaf, C, together continuously, working upward until you reach the elbow, E; then, when all the leaves are so far constructed, with all the elbows looking up, with their left-handed thread uppermost, *count in* and *mark* the right and left handed spring pieces, B, then apply the upper header, A, and screw the whole up as nearly alike as possible.

Do not be persuaded to do away with the spring pieces and the elbows through economy, so as to connect the upper headers straight, as in a box coil; if you do you will have trouble should you want to take down a single leaf for repairs.

Fig. 3 shows sectional perspective view through a laundry drying room, *a* being the coil, *b* the clothes horse, *c* the suspended rail from which the horses hang, *d* fresh air inlet duct, *e* its damper or regulator, *f* ventilator with regulator, usually governed by a cord and bell crank, and drawn back by a spring; and *g* the space into which the horses are drawn, which of necessity must be as long as the horses.

This style of drying room gives the direct radiation of both sides of the leaf of the coil to the fabrics to be dried, and also exposes both sides of a fabric to the direct radiation of a section or leaf.

For high pressure steam 1 inch pipe is generally used in the coil; but if exhaust steam is to be used the pipes should be no smaller than 1¼ inch, and the total length of any one leaf should not exceed 40 feet under a *back pressure* of 2 pounds at the engine.

For exhaust steam the upper header should be large, 3 inches for 12 leaves of 40 feet each, or about 500 feet in the coil, giving good results, to be increased in proportion to the increase in leaves, a 4 inch pipe header being enough for a coil of from 900 to 1,000 feet, composed of leaves of 40 feet each.

Unless the exhaust steam is carried a long distance horizontally, 50 feet or more, the pipe leading to the header may be one or two sizes smaller than the header, provided it is large enough for the engine.

With steam of high tension, small pipe headers with T fittings may be used; but where the pressure is variable, a large header insures an equal distribution of steam to all the leaves.

Sometimes *gridiron* or *floor* coils are used on account of being cheaper, but the same amount of pipe in this form will not dry clothes as fast as the *standing section coil*.

Figs. 4 and 5 show gridiron coils of easy construction, *a a* being the manifolds or headers, *b b* right and left elbows, *c c* coil pipes right handed, and *d d* right and left handed spring pieces.

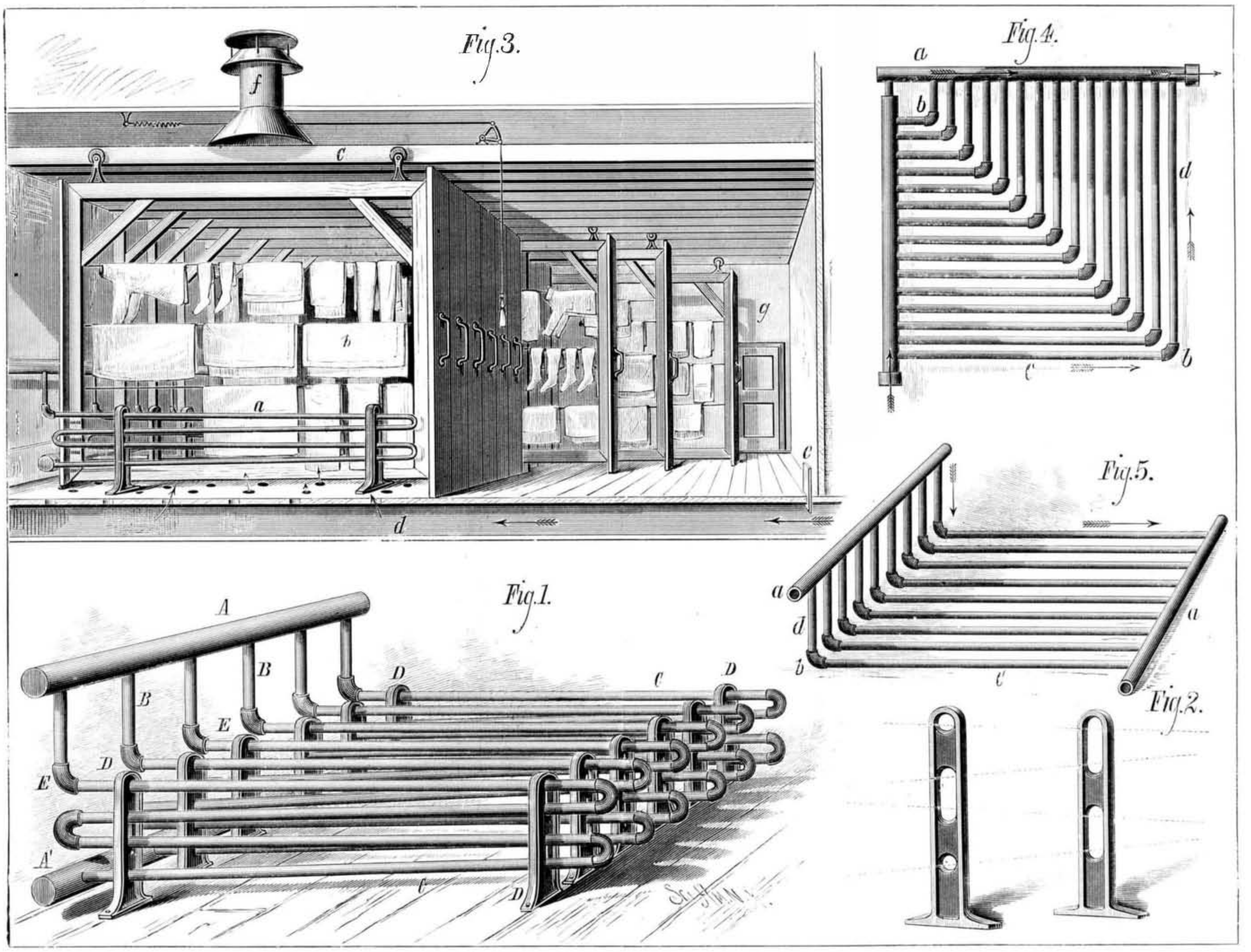
In Fig. 4 the pitch of the pipes and headers are in the direction of the arrows.

These coils are often used in lumber dry kilns, but the same amount of pipe arranged around the walls in miter or wall coils will give much the better result, and will not be a receptacle for dirt, as a floor coil is, which must have a skeleton floor over it to walk over and pile the lumber on.

In large dry kilns on the direct radiation principle, where pipe enough cannot be put on the walls, and for the better distribution of the heat, rows of stancheons should be put up to hang the coils on, in such a manner as not to interfere with the gangways.

The tobacconist prefers to dry without artificial heat, in a temperature of about 60°, with a rapid change of air through the windows. This appears to give dryness without brittleness, but at night and in damp weather they must close the windows, and to get their stock out in time recourse must be had to steam coils.

In experimenting for a well known tobacco manufacturer in fine cut, I found that radiators or box coils placed in the middle of the rooms gave the best result. Wall coils under the windows made the room warm, but did not dry quick, and the tobacco felt wet when brought into a cold room and allowed to remain for a short time. A strong ventilation with a temperature of 80° made it too crisp; but the



ARRANGEMENT OF PIPES FOR DRYING BY STEAM.

box coils placed in the middle of the rooms, with a temperature of 65°, with a small ventilation, with the currents of air in the room up at the center and down at the windows (contrary to the general principle of warming for comfort) gave a result which was declared good.

In piano-case manufactories, and where specialties in glued and veneered furniture of the best quality are made, the workmen are generally supplied with a drying cabinet of a size suitable to the pieces to be done, in which the work is heated before the glue is applied, and into which it is again placed to properly dry.

These cabinets are usually rectangular boxes, with holes in the bottom and top, to allow the air from the room to circulate through them so as to carry off the moisture. Their steam coils are usually of the gridiron pattern, flat on the bottom of the box, with the valves on the outside. Sometimes they are heated indirectly with the warmed air conveyed in tin pipes from a large coil placed in some favorable position.

Some manufacturers claim the quicker the work can be dried after gluing the better it will be.

It is not profitable to dry by forcing air, as with a fan or blower, in connection with a steam coil.

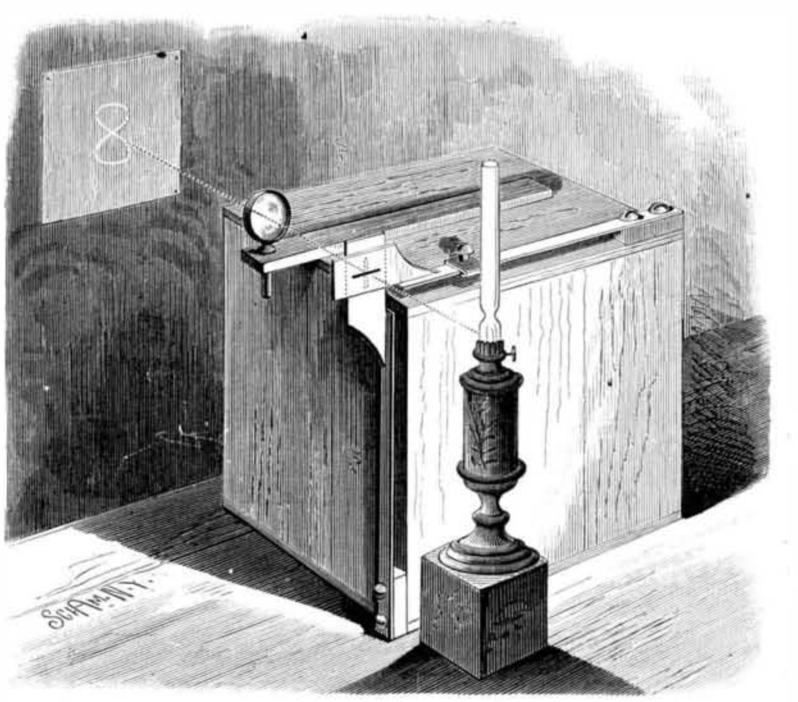
High pressure steam should be used in connection with a blower.

A temperature of 130° is considered good, and can be easily attained in a drying room.

The additional quantity of pipe necessary to raise the temperature of a drying room from 120° to 130°, if added again, will not raise it from 130° to 140°.

APPARATUS FOR COMBINING RECTANGULAR VIBRATIONS.

BY GEORGE M. HOPKINS.



APPARATUS FOR COMBINING RECTANGULAR VIBRATIONS.

There are several well known methods of combining rectangular vibrations to form the beautiful and instructive figures produced by M. Lissajous by means of two tuning forks carrying small mirrors and vibrating in planes at right angles to each other. The engraving shows still another method of accomplishing the same thing in a simple and inexpensive way; all the materials needed being a box about 24 inches square, two flat springs of wood, 1¼ inches wide, ⅛ inch thick, and 24 inches long; or two springs of metal $\frac{1}{16}$ inch thick, 1 inch wide, and the same length. These springs are secured to the sides of the box at diagonally opposite corners, by stout screws, a block 1 inch thick and 4 inches long being placed between the end of the spring and the box, to give space for the vibration of the spring.

Upon the free end of each spring, and in the plane of its vibration, is cemented a piece of thin cardboard, having a longitudinal slit ⅛ inch wide, parallel with the spring to which the card is attached. The slits in the two cards intersect each other at right angles, forming at their intersection a clear aperture ⅛ inch square. The two cards are placed as near each other as possible without touching. One of the springs carries an adjustable weight, the use of which is to change the period of the vibration of the spring by placing it in different positions. The weight is shown in the engraving on the horizontal spring, but it may be shifted to the vertical spring when a slow vibration is required.

If the two springs are set in motion by snapping them simultaneously with the thumb and finger, the square aperture formed by the intersection of the slits in the two cards will move so rapidly as to appear like a band of light, *i. e.*, supposing the operator to be looking through the aperture toward the light. If the two springs vibrate in unison the band will either be perfectly straight, bisecting the angle formed by the two springs, or it will be elliptical or circular. By changing the period of the vibration of one of the springs so that the periods of the two springs will be to each other as 1:2, the band of light will assume the form of the figure 8. Make the vibrations as 2:3, and the figure representing the fifth will be formed, and so on throughout the whole range of compound vibrations.

To project these figures on a screen all that is required is to place a lamp at one side of the slitted cards, and a magnifying glass of about six inches focus on the other side, as indicated in the engraving. An easy way to hold the magnifying glass in position is to place the handle in a hole in a board, the latter resting on the top of the box. This rude device admits of moving the lens forward or backward, and to the right or left, as may be required.

Arranged in this manner the figures may be made to occupy an area of 12 to 16 inches square on the screen. The same method applied to a lantern slide produces figures of any required size. Of course the construction of the apparatus is materially different in this case, and the workmanship necessarily finer.

If continuous action is desired electro-magnets may be applied as in the electrical diapason described by me in this journal some months since.

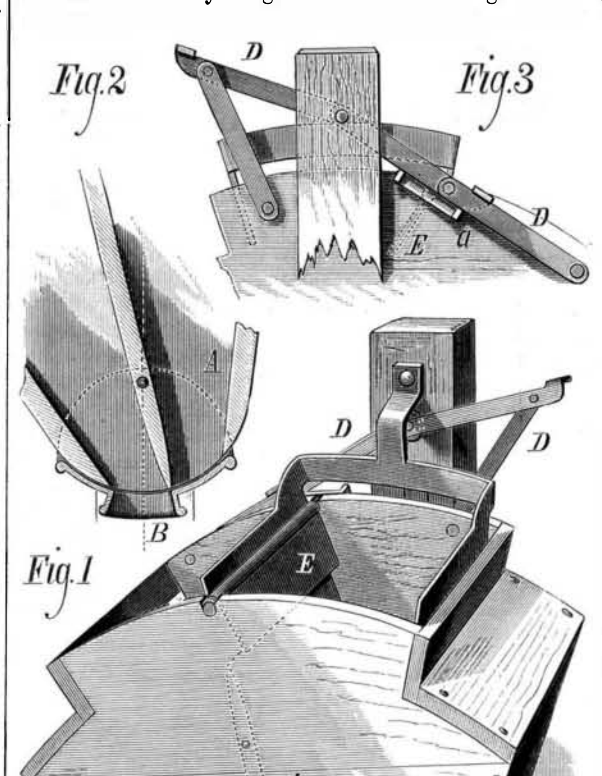
A Cæsarean Operation.

Twelve Philadelphia physicians lately assisted at the delivery of Mrs. William Burnell, by cæsarean operation. The mother is a dwarf, thirty-two years old, and forty-two inches high. Owing to a peculiar deformity it was seen that it would be impossible for her to give birth to the child in the usual manner. Porrow's method was adopted.

An incision was made on the median line of the abdomen, and the abdominal walls were cut through. The womb was removed, an incision made in it to correspond with those in the abdominal walls, and the infant released. After that the womb was restored to its bed and closed, and the other parts brought together. The clothing and all articles in the room were subjected to a solution of carbolic acid spray, according to Lyster's method, during the operation. The pulse of the woman remained excellent throughout the whole of this severe trial, and all her symptoms were favorable. At last reports both mother and child were doing well. Both would have died except for the heroic treatment adopted.

NEW GRAIN METER.

The grain meter shown in the engraving is designed to be used chiefly on thrashing machines, and can be readily attached to any separator, requiring no extra devices, except an elevator to carry the grain to it from the grain shute.



BARNARD'S GRAIN METER.

The weight of the grain does the work of measuring by simply oscillating the measuring box on its pivot. It will be seen that none of the power applied to the thrashing machine is consumed by the grain meter, which is entirely automatic and only requires to be supplied with empty sacks. The inventor informs us that actual use has proven that this meter is accurate and reliable and a great saver of labor.

In the engraving, Fig. 1 is a perspective view of the grain meter; Fig. 2 is a detail view of the locking mechanism; and Fig. 3 shows the valve at the bottom of the measuring box.

The box, A, is of quadrantal form, made convex at its lower end, and fitted to a concave valve, B, which is concentric with the pivot, C, upon which the box, A, oscillates. To the side of the box next its support are attached two jointed locking braces, D, which alternately lock the box in one or the other of its positions, and across the top of the box above the central partition which divides the box into two equal compartments, there is a wicket, E, whose pivot is extended beyond the side of the box and provided with two equal and opposite arms, *a a*, which are capable of touching the joints of the braces, D, and of unlocking them, so that the measuring box may swing and discharge one of the compartments, while the other is brought under the shute to be filled. The wicket, E, is operated by the pressure of grain when the compartment of the measuring box becomes filled. It will be noticed that the valve, B, having an opening of the same size as the opening of one of the compartments, only one side of the measuring box can be discharged at a time. Two strokers are attached to the standard supporting the measuring box, and brush the surplus grain from one compartment of the box, A, to the other. The speed with which the apparatus operates is controlled entirely by the quantity of grain flowing from the thrasher.

This useful invention was recently patented by Mr. George W. Barnard, of Economy, Wayne county, Ind.

The Color Blind Scare.

Connecticut is, we believe, the first State to pass a law prescribing certain regulations to be observed by railroad companies in regard to this subject. If all the other States should follow suit, and each of them enact a law as crude, vexatious, unjust, and annoying as this pioneer specimen, the skilled ophthalmic experts all over the land may safely count upon having a good time, however it may be with locomotive engineers and others who have rendered long and acceptable service upon our best managed roads. There is sure to be blundering, short-sighted work, when legislators who have no practical and scarcely any theoretical knowledge of railroad operation, undertake to remedy supposed defects in the system which in some unaccountable way have escaped the notice of the shrewdest and most capable managers; and the liability to blunder is none the less when the mercenary greed of a selected corps of professional experts is to be satiated at the rate of two dollars a head for the great army of railway employes whose duties require them to have anything to do with the form and code of signals. And so the companies must be taken in hand, and reliable and long-tried engineers, who have never had an accident on the road, driven from service because they can't read letters three-eighths of an inch long at a distance of 25 feet, or sort colored worsteds in a scientific manner, or see red and green precisely as some other people do, although they are able to discriminate just as sharply between the two, and be as little liable to confound or mistake one for the other. The logic of facts shows conclusively that the danger from color blindness, about which such a hue and cry has been raised, is greatly exaggerated, and that in no single one of the many careful and searching investigations that have been made in the past history of railroads, has the cause of an accident been traced to color blindness, nor has this particular cause even been suggested or suspected, so far as we have been able to ascertain from the record.—*National Car Builder.*

The Voice.

Dr. Ward, of New York, says on this subject, of the many agents which have more or less influence on the voice, the four principal are climate, dress, diet, and exercise. Change of climate may cause some slight deleterious effect on the larynx, but this influence is greatly overestimated. The present fashionable style of dress is decidedly unhealthy. The chest and abdomen are unnaturally confined, the lungs and other organs acting abnormally. All clothing should be loosely attached to the body, and the dress worn high. Avoid as much as possible appearing in full dress. The throat should not be wrapped in comforters, boas, etc. Chest protectors should not be worn, and the feet should be guarded against wet. The diet of the singer should be bland as well as nutritious. Of the different kinds of meat, venison, poultry, roast beef, and lamb are the easiest to digest, and due proportion of fat should be taken as a heat-supplying principle to the body. Cooked vegetables, unless too highly seasoned, are easily digested. Salads, cut cabbage, cucumbers, etc., should be avoided. Pastry should be invariably discarded. Dinner at noon, followed by a light tea at nightfall, is a rule which, if rigidly adhered to, will be a safeguard against all ordinary attacks of indigestion. In order that the act of singing be properly performed, it is absolutely necessary that the stomach be nearly