



A Weak Steam Boiler.

MESSRS. EDITORS:—You will confer on us a favor, and, no doubt, do many of your numerous readers a kindness, by explaining through your columns why a boiler should fail under circumstances like the following:—

We made last month a boiler of charcoal No. 1 iron, 16 feet long, 60-inch shell, 60 four-inch flues, shell five-sixteenths, and heads three-eighths inches thick, of the same iron we usually make such boilers, hung on brick-work of arch by three cast-iron legs riveted to the boiler. It was tested with cold water at a pressure of 100 lbs., and was in all respects, so far as we could judge, an A No. 1 boiler. After running finely about 15 days, it began to leak in three joints over the fire, under pressure of about 60 pounds, the sheets gradually bagging, and in two or three days had settled down more than an inch, leaking so badly that the owners were compelled to stop its use. Our attention being called, we looked at it and declared it the result of firing up without water in the boiler, the owners as strongly asserting the contrary.

We took out all the sheets injured, replacing them with new ones of best fire-box iron, five-sixteenths thick, tested by 100 pounds cold-water pressure. Steam was again applied, and in a little more than one day the joints over the fire began leaking and the sheets bagging as before.

The grates in the first place were about thirteen inches below the boiler, and on the second trial about twenty inches below, the fuel used in both cases being Ohio coal screenings, and lake water to feed the boiler. The chimney is about 75 feet high and the draft strong, and the pressure on second trial at no time over 70 pounds.

We have been for 15 years largely engaged in making steam boilers of this and other sizes, and have never before known such a case. We have seen several of our leading boiler makers and find two or three of them have had similar cases, and have no satisfactory solution of the matter.

[We suppress names purposely, as we presume our correspondent does not wish his failures advertised to the world.

The cause of the trouble is weakness of the boiler. It is not strong enough for its work. Bourne gives the following rule to ascertain the thickness of boiler plates to withstand a given pressure: "For a single riveted boiler, multiply the internal diameter of the boiler in inches by the pressure of steam in pounds above the atmosphere, and divide by the constant 8,900; the quotient is the proper thickness of the plate in inches."

From this rule it will be seen that the plates of the boiler are too thin for their work and they fail accordingly. Fairbairn gives a table of the strength of steam boilers, and the pressures they may be worked at; and for a boiler of 5 feet diameter and three-eighths plates (not five-sixteenths) he allows 70½ pounds per square inch, but Bourne states that these figures are too high, and that a boiler so worked is not safe. He says that for double-riveted boilers the margin is large enough, but for single riveted the pressure is too near the ultimate strength of the iron. For a boiler 5 feet diameter the plates according to Bourne, should be 0.416 of an inch or about seven-sixteenths of an inch, and for this he allows 60 pounds per square inch.

These authorities are, we take it, sufficient. If the boiler in question is only one of many that have been made and worked successfully, it goes to show that good iron and good workmanship will permit the habitual use of a pressure far in excess of the safe load, or the duty that a plate is capable of bearing as ascertained from the strength of materials.

The Manchester Boiler Association, of England, a body composed of practical men who examine and insure steam boilers, recommends that in all such cases as the one here given, the shell should be strengthened by angle-iron flanges all the way round, at intervals of from two to three feet, according to circumstances.

It is not impossible that there may be deposits on the plates, and if this be so, then they must be burned or over-heated, and any practical man can tell whether this has taken place or not. It is also possible that the boiler is strained from the settling of the brick arch on which it is hung by three legs. As the front is the hottest, it may have given way at that point. These are mere surmises and conjectures, however, and of little value compared to the naked fact that the plates are thinner for a given strength than the best makers put in.—EDS.

Circular Saws.

MESSRS. EDITORS:—Having been engaged for the past fifteen years in building and running circular saw mills, permit me to make some statements in relation thereto. I have sawed lumber in the Granite State, among the sapling pines and second growth, and also among the giant poplars, oaks and walnuts of the West; I have been conversant with the entire series of saw mills from the original Page down to the present time. My experience has taught me that, as with all other machines, the more completely the saw mill is divested of complicated appliances, especially if designed to meet imaginary difficulties, the more complete will be its success. That lateral motion for the saw, and throwing the saw from the log, in gigging back, are fallacies, is daily proven by thousands of mills that are successfully operated without; if a necessity ever existed for lateral motion it has disappeared in the present perfection attained in the manufacture of the saws.

When the saw has been hung upon a true mandrel, supported in solid bearings, and restricted, as is usual in all shafting, from any end motion (lateral to the saw) the inventor and manufacturers have performed their parts, the residue is within the province of the Sawyer.

The front edge of the saw must be pitched into the log so much that no other portion of the saw shall touch the face of the log that it has dressed. If the saw be quite true and flat on the side next the log, this pitch will not be more than one-sixteenth of an inch in the diameter of a sixty-inch saw, but if there are any bunches on the saw the pitch must be increased until they too are clear of the log. This "pitch" is an individual matter with each saw, and when once determined needs thereafter no change.

The back of the tooth must be filed square across, for it leads the saw, letting it fall off toward the next tooth, so that it shall fairly clear itself and no more, while the face of the tooth is dressed to that angle that experience shall determine best adapted to the material to be sawn. If the saw cuts a square kerf the nut and saw collar may be loosened, and the saw hanging on the pins will cut truly and will not scratch the log in gigging back.

I prefer setting as well as upsetting the saw, as a matter of economy, finding that the diameter of the saw is not reduced so rapidly if the teeth are sprung in alternate directions, and the upset used afterward merely to throw out a full corner than when the entire clearance of the saw is obtained by upsetting.

It is desirable that the management of the feed works and the "setting" of the head blocks be performed by one person, as they are intimately connected with each other, and in their expeditious and correct performance depend, in a great measure, the quality and quantity of the work to be done. The application of the feed, the gig-back, and the brake, must all be controlled by one lever, and the head blocks must be "set" accurately, simultaneously, and expeditiously by another lever, and they must be so situated that the Sawyer may reach both without moving from his place. The feed works must be simple and effective, substituting friction for gearing, as far as possible, as permitting a more rapid gig-back motion than is otherwise possible. It is also necessary that the head blocks be at all times capable of a convenient, independent motion, for that is indispensable in the preliminary adjustment of the log and for other purposes. They must be of adequate strength to withstand the turning down of heavy logs in frosty weather, and yet not so heavy but that they can be readily lifted in adjusting them for logs of different lengths, and in which case they must be readily detachable from, and attachable to, the apparatus for communicating the simultaneous motion. The requisite strength and lightness can be

only attained by the use of wrought iron as a material for the base of the head block.

I have endeavored to condense, into as few words as possible, the facts and rules that I am in the habit of using in teaching the use of the circular saw to those purchasing mills of the establishment with which I am connected, and I seldom fail to make a good sawyer of any intelligent man.

SAMUEL R. SMITH,

Millwright and Engineer, with Lane & Bodley,
Cincinnati, Ohio.



C. H., of S. C.—We prefer not to publish communications in regard to the treatment of cholera, unless they have been well tested and approved by physicians. In the hands of unskilled persons injury might result. Sugar of lead is a powerful astringent but it is not considered so safe a remedy as some others.

L. B. T., of Md.—On pages 294, and 431, Vol. X, you will find the proportions of key seats.

W. A. B., of N. C.—The number you send for is out of print but you can purchase a treatise on the art of brewing from D. Van Nostrand, of this city.

F. J. L.—of —.—There was undoubtedly some moisture in the dish when you poured the molten zinc in. It is not a property of zinc to explode when melted. Your brother's vision was defective.

J. C. K., of Pa.—We are much obliged for your article upon cipher writing, but in view of what has already appeared on the subject, we think enough has been published.

O. S., of Va.—A gold ring that has lost color may be renewed, according to the "Practical Metal Worker," by the following process: Make a paste with 3 parts nitrate of potash, 1½ alum, 1½ sulphate zinc, 1½ common salt, put this on the ring and set the latter on an iron plate over a fire until black hot, then plunge the ring into the cold water. After this it must be polished, which is easily done, with rouge or common chalk, on a woolen cloth. This gives a deep color.

D. S. B., of Wis.—The best recipe for hardening edge tools is to use hot fire and cold water. Fish glue is used by belt makers for joining the leather before riveting; possibly some use a different cement.

W. B. H., of Ohio.—The "Practical Draughtsman" will give you the desired information on isometrical drawing; to be had in all the large cities.

E. J. P., N. Y. City.—Wire springs, either coiled or spiral, can be expeditiously and evenly tempered by using a tub or tank of cold water, on which floats a stratum of whale or fish oil, of sufficient depth to immerse the spring before it reaches the water. If the heating is of the right temperature or color, this will be found an effectual method.

O. C., of Boston.—Your improvement can, we think, be patented.

F. S., of Ill.—We are not aware that alcohol is irregular in its rates of expansion by heat. Its expansion is always the same for equal increments of heat at ordinary temperatures. If we could freeze it, there would probably be found, as, in the case of water, an expansion by "old near the freezing point.

S., of Pa.—Melted gutta-percha makes an excellent coating for the parts of metals to be protected from the plating bath.

S., of Conn.—Vulcanized rubber which has been softened by heat, is made useful again by grinding it with raw rubber and sulphur, and subjecting the compound to heat as in the ordinary process of vulcanizing.

S. U., of Conn.—If you design to take out a patent for your invention, you had better not delay the application—provided you have completed your experiments—nothing is gained by delay and much is often hazarded.

R. W. C., of Troy.—The "Practical Draughtsman," published by H. C. Baird, 406 Chestnut street, Philadelphia, is probably the work you need for mechanical drawing.

J. S. Barre, desires to be informed if soaking shingles in lime water increases their durability. We cannot say whether it does or not, but it will make them nearly imbu-
stible.

E. C. H., of N. Y., says his well tastes strongly of kerosene at night and morning, a freak that has lasted for only three months, although the well has been used for forty years. If the well is, as stated, in limestone rock, this "freak" is not likely to be caused by the natural presence of petroleum, but is probably the result of surface drainage.

C. & Co., of Buffalo.—Sulphate of copper, commonly called blue vitriol, dissolved in water, will form a bath to copper iron castings. Immerse the articles for a short time, and then scour them in a tumbling barrel with sawdust and leather scraps.

O. C., of Mass.—It is well known that wood naphtha and concentrated alkaline solutions will cut gum shellac. You could not obtain a patent for the process.

Correspondents who write letters to us for information, are always required to sign their names to their letters. We insist upon the observance of this rule as an act of good faith.