THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill London, England, are the Agents to receive European subscriptions for advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

☞ "The American News Company," Agents, 121 Nassau street, New York.

VOL. XIII. NO. 7...[NEW SERIES.]....*Twentieth Year.*

NEW YORK, SATURDAY, AUGUST 12, 1865.

Contents:

(Illustrations are indicated by an asterisk.)

CAST STEEL FOR BOILERS.

A most intelligent and energetic mechanic, Mr. S. H. Roper, of Boston, Mass., has been for some time engaged in making steam carriages for experimental purposes, with a view to obtain the greatest efficiency for the least weight, and to render the steam carriage an independent, convenient and useful motive power. In these efforts he has been highly successful, and although he regards the carriage more as a plaything than for its general utility, he has pursued the subject thoroughly, and decided some questions which are interesting to the mechanical community. These relate chiefly to a reduction of weight for steam engines and boilers of a given power. This steam carriage weighs but 450 pounds in complete running order, with water for eight miles. The cylinders are double, direct-acting, $3\frac{3}{4}$ inches bore and 10 inches stroke.

The boiler is the most remarkable detail, and is a novelty worth seeing. The shell is 30 inches long and 15 inches diameter. It is a vertical, tubular boiler with an internal fire-box, and the tubes are 10 inches long by $\frac{9}{16}$ths diameter. The shell, as well as the tubes, is made of steel, and it is in the employment of this material that Mr. Roper has been able to reduce the weight, and not only maintain but increase the evaporative efficiency of his boiler. The shell is $\frac{1}{30}$th of an inch thick, while the tubes are only $\frac{1}{40}$th. With this boiler steam has been raised in eight or ten minutes, and it is capable of bearing a pressure of 90 pounds per square inch with entire safety. It supplies all the steam necessary for the two cylinders, and propels the carriage eight or nine miles an hour without any difficulty.

In this machine we have one of the most novel steam boilers ever made. And it is a matter for earnest consideration whether, in the employment of cast steel for steam boilers, we may not only greatly increase the strength and reduce the weight, but also add to the economy of the apparatus, by facilitating the transmission of heat. To use a homely illustration, a thin tea kettle boils more quickly than a thick one; and, for the same reason, steam boilers with unnecessarily heavy flues, flue sheets, fire-box walls and furnace crowns, transmit less heat than lighter ones. The only danger to be apprehended in departing from the established time-honored rules and precedents in this case, is in weakening the structure. An example of what a thin iron flue is capable of sustaining, was shown in Lee & Larned's steam fire-engine *Niagara*. This steamer had a large vertical boiler, the tubes in which were but $\frac{1}{30}$th of an inch in thickness and $1\frac{1}{2}$ inches diameter, by some four feet long. We have repeatedly seen 240 pounds to the square inch on this boiler, or others with tubes no larger or thicker. Some of the tubes were occasionally collapsed so flat, however, that neither steam nor water could pass through them. These were drawn iron tubes; but if steel had been employed they would not have failed, because the latter metal has a higher tensile strength.

Another lesson on the value of good workmanship is given by Roper's boiler. To bear the pressure required of them, the tubes must necessarily be small in diameter. They were, therefore, all drilled and turned, and were thus homogeneous throughout. Such a method of making a steam boiler is, of course, expensive; but if the evaporative efficiency is increased thereby, as it is, it is only a question of first cost, for the money returns in the future by the fuel saved.

The rapidity with which heat is transferred from one substance to another is directly in proportion to the difference of temperature between them.

The conducting power of steel is lower than that of iron; the former being, according to experiment made by Weideman and Franz, 224; while steel is but 218. But this difference is so small as to be of no moment, and is wholly nullified when the tensional strength of the two metals is considered; for, by taking advantage of the superior virtue of steel we can make a structure much lighter of it, for a given strength. Moreover, in a cast-steel boiler, the rapidity with which heat would be transmitted through the thin walls would be less likely to burn the exposed parts—the tube, sheet and fire-box crown—than in the comparatively slow action of thick iron plates.

Very many persons confound strength with weight, and suppose that, because a number of pounds of material are added to a certain part, a corresponding increase of strength is obtained, Nowhere do we find this more prominently illustrated than in steam boilers; too often the essential points of safety are neglected, while those which bear no strain are heavy in the extreme.

It is, therefore, with a view to promote the efficiency of steam apparatus and economy in its use that we suggest further experiments in this direction. Cast steel of fine texture, well riveted and annealed very low, would seem, from the experiment of Roper, capable of sustaining great pressure. We doubt if a boiler 30×15 inches was ever made which furnished so much steam, or was capable of evaporating so much water in proportion to its size, as this one. If, by a corresponding increase in the thickness of the plates and the external dimensions, boilers can be built of proportionate strength, a great economy of space would result in sea-going ships.

THE ART OF ADVERTISING.

The art of advertising consists chiefly in putting business before the world in such a manner that it will be novel and attractive. This seems a truism, but there are very few persons who are capable of understanding it. The large fortunes accumulated by individuals in a few months for the sale of simple articles to be found on every corner, prove there is some virtue in advertising, for these same people have covered dead walls, pavements, and every spot, remote or near, that the eye of man would be likely to fall on, with announcements of their glue, etc.

We have recently received through the politeness of a large manufacturing concern in England forty illustrated catalogues of different firms in Great Britain who are engaged in the manufacture of agricultural implements and other machinery, from a round pig's trough to a huge steam plow. These catalogues, collected for us at considerable trouble, are valuable additions to our library, and we intend to have them bound for reference. In looking over them we have been much impressed with the great variety and the ingenuity of the tools and machinery adapted to the agriculture of Great Britain. Several of the firms manufacture steam-cultivating machinery, and devote considerable attention to a discussion of its economic advantages.

On receipt of the catalogues mentioned we immediately wrote to all the parties here we could think of, requesting them to send us their trade circulars, which, on coming to hand, were carefully examined. It was with much regret that we found the American catalogues were far inferior in point of mechanical execution to those received from abroad. The English trade circulars are printed on clear white paper, with new type, excellent cuts—mostly wood, but often steel and lithographs—and they appear to so much better advantage than our own that we confess we blushed for our business men.

Eyes are precious, and it is more than a catalogue is worth to pore over it and scrutinize a cut with a magnifying glass in order to make out what it means.

Besides this, some of our trade circulars are of little value, or considered so by the publishers of them, for when one asks what a certain machine in one of them is, he is often told, "Oh, we don't build them like that now." Of what use is it to publish a cut of it, then?

We recently saw a work of art in the shape of a trade circular, issued by some French drug house. The book was a large octavo, and was certainly fit for any center table. The drugs were shown in their cases; the effect of the glass was beautifully given; the crystals were clearly shown; the powders were properly represented, and the natural colors of the several articles were all given with such accuracy and artistic effect that a chemist would have recognized any kind at a glance. A work of this description is a study, and costs immensely, but who shall say that it does not pay? The gentlemen of the firm where we examined the circular told us they were frequently ordering quantities of goods suggested by an examination of its pages.

Some of our lithographed cards of tobacco, of hair oils, of stove polish, and similar things, are exceedingly beautiful, as are also the cards of our large shipping houses, announcing the sailing of vessels. Bankers frequently issue cards of the finest bristol board, whereon their business is displayed in gold and colors. It is not from a lack of taste among us that we have such poor trade circulars in general, but rather from a want of appreciation of the advantages likely to spring from them. A good circular attracts every one, while a poor one is sure to repulse the most determined purchaser.

We shall be pleased to receive duplicates of all the trade catalogues which contain illustrations. We are frequently importuned to say where such and such a machine can be had, and the catalogue will prove useful to us for reference.

INDISPENSABLE TOOLS.

We always take pleasure in calling the attention of our readers to any improvement in machines or tools which are useful and necessary to economize time and labor. We have lately seen a scroll chuck, manufactured by Mr. A. F. Cushman, of Hartford, Conn., which is a most valuable tool. By the aid of it any piece of work can be held true in the center by simply screwing up one disk. This chuck has been used for a long time through the country, and it is not as a novelty, but as a standard article, that we call attention to it.

By an ingenious modification of the same principle, Mr. Cushman has constructed a neat little drill chuck, which has capacity for a wide range, from $\frac{3}{8}$ths to $\frac{1}{32}$d of an inch, and yet is compact and handsomely finished. We trust these goods will be widely adopted by mechanics, for they are all they are represented to be.

Examiner-in-Chief.

It is reported that Hon. Elisha Foote, of Saratoga, N. Y., has been appointed by the President an Examiner-in-Chief in the Patent Office, in place of Mr. Coombs, resigned. We have known Judge Foote for many years, and can speak in unqualified terms of his character and qualifications. For many years he has been employed as senior counsel for Burden, of Troy, in his famous spike suit against Corning, Winslow & Co.

AFTER two years of labor on the new defensive works near old Fort Hale, New Haven harbor, water has been let into the moat. The water gates are constructed in the solid rock, through which a distance of twenty feet has been blasted for the admission of the water.

W. C. DODGE, ESQ., of Washington, D. C., wishes to correspond with parties who are prepared to make a steam carriage for common roads.