

Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT  
40. 37 PARK ROW (PARK BUILDING), NEW YORK.

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

"The American News Company," Agents, 121 Nassau street, New York.  
"The New York News Company," 3 Spruce street, New York.  
Messrs. Sampson, Low, Son & Marston, Crown Building, 188 Fleet st.,  
Trubner & Co., 60 Paternoster Row, and Gordon & Gotch, 121 Holborn Hill,  
London, are the Agents to receive European subscriptions. Orders sent to  
them will be promptly attended to.  
A. Asher & Co., 20 Unter den Linden, Berlin, are Agents for the  
United States.

VOL. XXIII, No. 22 . . [NEW SERIES.] . . Twenty-fifth Year

NEW YORK, SATURDAY, NOVEMBER 26, 1870.

Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Independent Shuttle- Motion Loom..... 335	*Strong's Patent Fireplace..... 342
How to Save Peach Trees..... 335	*Pierced Cores in Metal Castings. 342
The Singer Sewing Machine Pat- ent..... 335	*Improved Breast-strap Protection for Trunks..... 342
Scientific Use of the Imagination..... 336	Perpetual Motion..... 342
Notes and Maxims upon Health..... 337	How to stop the leakage of Gas Taps..... 342
Military Chemistry..... 337	The SCIENTIFIC AMERICAN—What it has done and what it expects to do..... 343
*Steam Railroad Ferries between England and France..... 338	Beet-root Sugar—How the War is likely to affect the Manufac- ture in France..... 343
*Improved Friction Clutch..... 339	Shad vs. Black Bass..... 343
*Cleansing Boilers..... 339	The Principle of Bracing..... 343
*Securing Collars and Eccentrics to Shafts..... 339	Letter from the South..... 344
Prevention of Incrustation in Boilers..... 339	Application of Ruhmkorff's In- duction Coil to the Copying Drawings..... 344
A Cheap and Efficient Low-water Detector..... 339	Important to Manufacturers..... 344
Shoemaker's Measure..... 339	Female Type-setters..... 344
Welding Cast Steel..... 339	Letter from the South..... 344
To Pocket Chronometer Makers— A Challenge—A Bombshell in the British camp..... 340	American Silk and Steam Flow- ing..... 345
Smoky Chimneys..... 340	Tanning in Pennsylvania..... 345
Themantidote..... 340	Curious Phenomena..... 345
How much work a horse can do..... 340	Smoky Chimneys..... 345
Peter Cooper and the Cooper In- stitute..... 340	Applications for the Extension of Patents..... 345
A Wonderful Toy—An Automatic Masterpiece—Reducing Pictor- ial Arts to Machinery..... 340	Queries..... 346
California and Oregon Railroads..... 340	Answers to Correspondents..... 346
The Balloon as a Meteorological Aid to Research..... 341	Recent American and Foreign Pat- ents..... 346
Buhl and Resner Work..... 341	List of Patents..... 346
*The Wyckoff Pavement..... 342	Inventions Patented in England by Americans..... 346
Rating Steam Engines..... 342	New Books and Publications..... 346
Poisonous Chem. Icalized Wood..... 342	

THE "SCIENTIFIC AMERICAN"—WHAT IT HAS DONE AND WHAT IT EXPECTS TO DO.

What might seem egotistical in an individual—a talk solely about himself—is pardonable in a newspaper, in placing before the public its claims for support and patronage, and the proprietors and publishers of the SCIENTIFIC AMERICAN would certainly prove themselves far superior to the ordinary weaknesses of mankind could they suppress all expression of gratification at the splendid and growing success of their journal.

The increase in quantity and variety of its contents, secured by contributions from the most popular scientific writers of the day, has been amply repaid in increased popularity and enlarged circulation; and our promise to maintain our paper at the very head of all papers of its class published in the world, has been kept, not only to our own satisfaction, but to that of our readers, as our numerous correspondents daily testify.

It has been the aim of the publishers rather to lead the minds of readers into new, suggestive, and profitable channels of thought, and to open the way for new applications of useful discoveries in the arts, than to dwell, at the risk of self-repetition, upon worn-out and thread-bare topics. To this end the foreign and home scientific publications have been ransacked for additions to useful knowledge, and the condensed results of these researches are weekly laid before our readers.

Our mechanical descriptions and illustrations are highly valued at home and abroad, and the most important are constantly reproduced in foreign engineering and scientific publications, and full credit given to their source.

Wherever the English language is spoken or read, our paper finds its way; and our advertisers are constantly surprised by letters of inquiry from distant and out-of-the-way places, from which they had no thought of patronage.

Our correspondence columns have been ably sustained, and the discussion of the single topic of balancing cylinders, etc., in the present volume, is worth more to any mechanic than the price of subscription.

Of the editorial department, we need only say, that the extensive copying of its articles sufficiently indicates their practical and scientific value, while their suggestiveness is shown by the correspondence, inquiries, and inventions they call forth.

Thus much for what we have already done. A word now in regard to the future conduct of the paper.

We are approaching the end of the volume and the end of the year, and our subscribers may rest assured that our motto is still "Excelsior." There is to be no retrograde movement. We shall advance with the general advancement of the pe-

riod. And while we shall, in future, perhaps pay more attention to matters of general scientific interest, we shall do this in such a popular style, that all our readers shall be interested, and without lessening the practical character of our eminently practical journal.

While we are thus laboring to our utmost to make the SCIENTIFIC AMERICAN a necessity to every individual desirous of a reliable and thorough record of scientific and mechanical facts and progress, we are sure our legion of friends will continue their efforts to extend its influence and circulation. The best assurance that a subscriber can give of his satisfaction with our paper is the name of a new subscriber won by his solicitation. It is only by increase of circulation that we can increase our scope and variety of matter; and subscribers, who now get more for their money than any other paper in the world gives, will get still more for all the increase of our subscription list effected by their aid.

BEEET-ROOT SUGAR—HOW THE WAR IS LIKELY TO AFFECT THE MANUFACTURE IN FRANCE.

As we have anticipated, the production of beet-root sugar in Europe is likely to be very largely diminished. In view of this prospect prices are advancing, and as the proportion of beet-root sugar in the world's consumption is a very large percentage of the entire aggregate, it is probable that for some time to come high prices in all kinds of sugar will be the rule.

The recent terrific hurricane in Cuba has probably done serious injury to the cane-growing regions, and the news has at least temporarily stimulated the market.

The Department du Nord, in which the German forces are now operating is one of the richest of the beet-producing regions of the earth. The effect of the campaign upon the sugar industry is thus described by a resident of the North of France:

"What is the result to us? Why, ruin. In my pays no less than twenty-two beet-root mills were to have been set in motion this year. They are built—they are ready, but we have no workmen, and no coals. The young men who were exonerated, and who had drawn good numbers—who had, in short, settled to industrious lives, thinking that the State had no further military claims upon them—are drafted off absolutely like *les moutons de monsieur!*"

In England the effect of this has been to stimulate efforts to introduce the beet-root sugar manufacture into that country, and the English journals are at the present moment discussing the subject with vigor. A prominent journal, hitherto of decided free-trade proclivities and antecedents, admits that but for a rigid protective policy there would never have been a beet-root sugar industry anywhere. The admission, however, is salved over by the expression of a doubt as to whether, after all, the "game was worth the candle," and this concession to a protectionist policy is made with ill grace and wry faces.

How the war will affect, if it affect at all, this infant industry with us, it is hard to say. If prices should be greatly stimulated it may temporarily assist in the development and prosperity of the establishments already in operation, but can we think, not permanently influence the manufacture one way or the other.

SHAD VS. BLACK BASS.

An important and interesting discussion has recently been conducted in *Forney's Weekly Press*, in which all pisciculturists, sportsmen, and even the general reader ought to be interested, since it intimately relates to the stocking of our rivers with fish. The controversy may be said to be that of Shad vs. Black Bass, in which Black Bass has been called upon to show cause why he should not be laid under perpetual injunction not to enter the waters of the Delaware.

The plaintiff in the case brought numerous witnesses on the stand to prove the ruffianly and predatory character of the defendant, and to show that his entrance into the peaceful waters of the Delaware, would result ultimately in the extinction of that branch of the Shad family now inhabiting and holding peaceable possession of the said Delaware River, as the powerful Black Bass race were known to be of so warlike a disposition, and so prone to kill and devour the infants of the Shad family, as also the infants of all other honest, peaceable, and innocent fishes; that the two races could not live together in the same waters, consistently with the welfare and peace of the commonwealth; and that the superior prowess of the said Black Bass, his heirs, and assigns would enable him and his descendants to drive out and destroy all members of the house of Shad from their present habitation.

The principal witness on the part of the plaintiff was Dr. Slack, of Troutdale, the extensive and well-known pisciculturist, who testified as follows:

"The black bass is one of the most voracious of our fresh-water fishes. Breeding rapidly, and, it is said, guarding the nest in the manner of our common sunfish, it can bid defiance to any other denizen of our waters. Even the pike will disappear in waters in which the black bass has been introduced. It frequents the upper portion of rivers above tide water, and its food is almost entirely young fishes, of which one bass will destroy an immense number.

"Now, what will be the effect of the introduction of this fish in the Delaware river? Certainly our young shad have already too many enemies without our having recourse to a new and extremely dangerous one. Frequenting, as I have said, the upper portion of our river, they will certainly en-

counter the young shad in their descent toward the ocean. It has been asserted that they will not inhabit the same waters as other valuable fishes.

"In opposition to this statement, I would say that on the evening of October 10, 1870, Mr. Williams, of Upper Black Eddy, while seining the river for rock-fish, captured a bass of two pounds weight, which had probably escaped from the Schuylkill. At that date, as is well known, the river was filled with young shad on their downward trip. I must therefore state that I oppose in toto, as do many of our oldest and most experienced fishermen, the introduction of black bass or any other carnivorous fishes into the Delaware, believing that such introduction would seriously affect, if not totally destroy, the shad fisheries of that river."

The Commissioners of the State of New Jersey concur in the opinion of Dr. Slack, who is himself one of the Commissioners. They say:

"We decidedly object to the introduction of black bass into the Delaware river, believing it will be detrimental to the shad fishing interests. This is our honest, unbiased opinion, and as such we have never hesitated to express it."

On the other hand, a man who signs himself "Fisherman," believes the bass will not interfere with the shad to their detriment. He says, in addition to this opinion, that the principal cause of the fall off in shad is the unrestrained pouring in of refuse and filth from the drains of coal oil refineries and the like into the creeks, and thence to the rivers. Whenever a freshet has occurred in the Schuylkill the river is poisoned to such a degree as to kill the shad and other fish in great numbers. Stop the filth and you need not fear the bass. On the other hand, he has fished considerably on the Potomac river where bass and other fish, even more voracious are abundant, and yet the shad fail not to increase in that river ten times as fast; perch and rock-fish are at the same time a hundred times more abundant, millions upon millions of eels swarm its waters (than whom no fish in inland waters is more predatory), and catfish are considered refuse at the fisheries on account of their great numbers. They predatory, and yet they all thrive. Let the proper authorities prevent the cause of the disease and all will go well enough, but until then all will be in vain."

Notwithstanding the facts stated by "Fisherman" go to show that various kinds of predatory fishes may inhabit the same waters in company with those less formidable, and without the total extinction of the latter, and notwithstanding the facts he states are familiar to all sportsmen, it is nevertheless a fact, that numerous instances are on record of the extinction in streams of weaker fishes by the introduction of more powerful ones, and the great diminution of the numbers of certain fishes from this cause is a fact of which every neighborhood almost has its legend. If the authorities are wise the bass will be excluded from the fair waters of the Delaware, as in point of value to man they are incomparably inferior to the shad, although their being "game fish" renders them more desirable to those who fish only for amusement.

THE PRINCIPLE OF BRACING.

Very few mechanics understand the true principle of bracing, but they may readily discover it by performing a very simple experiment. If four bars of wood be joined together by pins in the form of a square, each corner being joined by a single pin, it will be found that the square thus formed may be altered to the form of a rhombus, by an exertion of force only sufficient to overcome the friction of the pins and the inertia of the bars. If three bars be joined by pins at the corners to form a triangle, it will be found that not the slightest change in form can be produced except by the rupture of the bars or pins, or such as is due to the elasticity of the materials.

If any number of bars more than three be joined in a similar manner to inclose an area, no matter what may be its shape, that shape may be altered without rupturing the pins or bars. The triangle is then the only figure, the shape of which cannot be altered without breaking or stretching the sides. For the alteration of the form of a triangle involves the lengthening or shortening of at least one of its sides, while the alteration of form in any figure having more than three sides may be made without any change in their length.

To secure the greatest possible rigidity then, the sides should, if made of homogeneous material, be equal in length and size, for, as elasticity will always admit some flexure, that side will stretch most which has the greater length. But an equilateral triangle cannot have a right angle, and hence is not practical in bracing under ordinary circumstances of construction where the corners to be braced are mostly right angled.

The next most rigid form would be to have the two legs of the triangle terminated by the brace equal, but this involves, in calculating the length of the brace, the use of the square root of 2 as a multiplier—a cumbersome decimal. Carpenters, for the most part, adopt the plan of laying out the legs of the right angle in the ratio of three to four, then the proportional length of brace will be five of the same denomination of length. This is a very convenient rule, depending upon the fact that the square root of the sum of the squares of three and four is five, and another fact that the hypotenuse of a right-angled triangle is equal to the square root of the sum of the squares of the other two sides. This gives sufficient stiffness for ordinary purposes, but where very heavy strains are to be sustained it is better to make the brace cut off equal distances on the post and beam.

The principle of bracing might be advantageously employed in many cases where it is not at present used. We were once much pleased with a very light, yet strong, ladder, which owed its strength in great measure to a series of wire