

Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 261 BROADWAY, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year postage included \$3 20
One copy, six months postage included 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, \$5 00 a year, postage paid, to subscribers Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 261 Broadway, corner of Warren street, New York.

NEW YORK, SATURDAY, FEBRUARY 9, 1884.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Amber Industry, Art study, Bell, woodcraft, Bones, architecture, Bug, chinch, Building in winter, etc.

TABLE OF CONTENTS OF THE SCIENTIFIC AMERICAN SUPPLEMENT No. 428, For the Week ending February 9, 1884.

Price 10 cents. For sale by all newsdealers

Table listing sections I through IX, including Engineering, Technology, Architecture, Electricity, Astronomy, Archeology, Natural History, Horticulture, and Miscellaneous.

AN INQUIRY INTO THE ORIGIN OF INVENTION.

In an interesting paper read before the Anthropological Society of Washington, Mr. Franklin A. Seely gave the results of an investigation, the object of which, he stated, was to consider the nature of the first steps in mechanical invention, far back of history, of tradition, and of the revelations of archæological research.

He then asks the question, What were the expedients of primitive man? and replies that the mechanical expedients possessed by the earliest human beings were such, and such only, as they possessed in common with the brutes.

THE STANDARD SCREW THREADS.

Our United States, or Sellers, standard of screw threads and diameters has been now many years before the mechanics of the country, and yet it is far from being generally adopted and used.

But beyond special needs, the standard is objected to by many mechanics because of the lack of proper relation (so they say) between the diameter and the pitch, particularly on diameters below one inch.

Our standard is very similar to the English, or Whitworth, standard, having twenty-one pitches for twenty-nine diameters, while the Whitworth has eighteen pitches to the same number of diameters.

U. S. STANDARD.

Table showing diameters and pitches for U.S. Standard, with columns for diameters (3/4, 7/8, 1, 1 1/8, 1 1/4, 1 1/2, 1 3/4, 2) and pitches (10, 11, 12, 13, 14, 15, 16, 17, 18).

TO DRILL HOLES IN LINE.

In large castings where holes are to be finished in parallel projections, as the two spindle holes in the uprights of a lathe head, the boring bar, passing through both holes, insures perfect line.

There is, however, a simple method that may not be generally known, which will insure accuracy. Drill one hole in one of the rings, either by chucking the piece or by suspend-

ing it on the lathe center. Then fit an arbor nicely to the drilled hole, making a fit sufficient to hold the piece while rotating. Dog the arbor to the live center of the lathe, and support its other end by a center rest close up to the casting, having the arbor, of course, in line with the lathe centers.

MANUFACTURE OF SILVER SPOONS.

Probably there is no article of table or of other household use in the production of which so little of machine working is employed. Almost all the work on solid silver spoons is handwork; the exceptions are the rolling of the ingot into plates and the production of spoons with ornamentation in relief, which is produced by recessed patterns on the rolls.

The material for spoons is coin silver obtained from the government mints in ingots, or from trade for old silver, or from the use of current coin. This is melted over a charcoal fire in plumbago crucibles to a certain heat, known to the adept by the appearance of the surface of the molten metal.

These bars are heated over a forge fire of charcoal and worked on the anvil by hammer and sledge, precisely as iron or steel is worked, or are rolled into plates or ribbons. Occasional annealings are necessary to prevent cracking, the annealing being heating red hot and quenching in cold water.

To form the bowl of the tea spoon the bar, of three-eighths of an inch wide and less than three thirty-seconds of an inch thick, is hammered flat on an anvil with a crowning face until the workman has spread it into an oval, which is much thinner in the middle than at the edges, as the edges are to receive the bulk of the wear.

The curvature of the bowl is produced by repeated "coaxing" blows by a steel punch and a die of cast composition of lead and tin. No file dressing is employed on the faces of the spoon; only the edges are file-dressed to form.

"Grits" is a peculiar material found in several places, the best in Wallingford, Conn., that has some of the qualities of tripoli, but appears to be an argillaceous deposit with calcareous particles too fine to be palpable.

SETTING-UP WITH THE WRENCH.

It is possible that ultimate fracture of otherwise sound bolts is sometimes induced by injudicious setting-up with the wrench. Few mechanics stop to consider the possible power they exert through the medium of the wrench.

A little consideration would teach the workman that the power exerted through a lever, as a wrench, is enormous for the force applied. Take a nut on a three-quarters of an inch bolt for an example. The bolt has a thread of ten to the inch, and a wrench of twelve inches long is ample to bring the nut to bearing.

The Magnetic Balance.

In a paper read recently before the Royal Society, Prof. Hughes gives an account of some experimental researches made with a magnetic balance, from which he concludes that we can find the electric conductivity of iron or steel from a simple reading of its magnetic capacity.