

sprats, mackerel, and other common species. A syndicate has lately been established in France to watch exports in the future, and prevent the sale of such fish as are not genuine and of marketable quality. The ordinary yearly production of sardines in France now reaches 500,000 cases.

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT
NO. 37 PARK ROW, NEW YORK.

O. D. MUNN.

A. E. BEACH.

TERMS.

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

Club Rates.

Ten copies, one year, each \$2 70, postage included.....\$27 00
Over ten copies, same rate each, postage included..... 2 70

By the new law, postage is payable in advance by the publishers, and the subscriber then receives the paper free of charge.

NOTE.—Persons subscribing will please to give their full names, and Post Office and State address, plainly written, and also state at which time they wish their subscriptions to commence, otherwise the paper will be sent from the receipt of the order. When requested, the numbers can be supplied from January 1st, when the volume commenced. In case of changing residence, state former address, as well as give the new one. No changes can be made unless the former address is given.

If any of our readers fail to receive their numbers regularly; if the direction is not plainly written; if premiums are not received; or if there is fault of any sort at this office, we will thank our friends to send us postal card complaints, and repeat the same, if need be, until the remedy is effected. Do not hesitate to complain. We desire to keep all matters between ourselves and patrons right and satisfactory.

VOLUME XXXIV., No. 10. [NEW SERIES.] Thirty-first Year.

NEW YORK, SATURDAY, MARCH 4 1876.

Contents.

(Illustrated articles are marked with an asterisk.)

American steel trade, the.....	145	Lions and tigers, strength of.....	145
Answers to correspondents.....	154	Lithotomy instruments.....	152
Band saw pulleys (42).....	155	Magical lantern lenses, etc. (1).....	154
Barometer, proposed optical.....	155	Magnets, action of (48).....	155
Belts, twisting of (31).....	155	Magnets, the Gramme (40).....	155
Boat, a successful (34).....	155	Malaria.....	149
Boats, building steam (32).....	155	Manie sukar.....	151
Boats, engines, etc., for (23).....	154	Medical instruments.....	152
Boilers and pipes, packing (26).....	154	Microscope detecting crime, the.....	153
Boilers, firing (25).....	155	Patent decisions, recent.....	153
Boilers, leaks in (30).....	155	Parents, American and foreign.....	153
Brazed articles, cleaning (50).....	155	Parents, list of Canadian.....	156
Business and personal.....	154	Patents, official list of.....	155
Butter, grease, in England.....	150	Peabody dwelling houses, the.....	143
Cane tops, etc., for manure (13).....	154	Peat.....	152
Case postponed, the.....	149	Penguins.....	149
Cement, lumps (46).....	154	Philosophical instruments.....	152
Centennial bill passed, the.....	145	Phosphides of silver, new.....	152
Chroms, watercolor, the.....	151	Pigeons, life-preserving.....	150
Conservatories, construction of.....	146	Planets, velocities of (16).....	150
Cooking by cold.....	153	Plaster, the use of.....	150
Crabs, Mr. Buckland on.....	151	Plumes, borrowed.....	151
Crane, portable, for mining.....	151	Pluviometer, registering.....	151
Crows, the education of.....	141	Power for mining machinery (36).....	152
Crystals, imitation, etc. (11).....	154	Prize awarded to M. P. Bert.....	152
Cupping devices.....	152	Railroad on the Eastern continent.....	144
Dendrometer, the.....	152	Railroad rails, breakage of.....	148
Dissecting instruments.....	152	Rams, fighting.....	145
Drills, oil for (38).....	152	Rock-drilling by hand power.....	150
Edison's experiments, Mr. (37).....	154	Rubber, coloring (4).....	154
Electric currents, power of (47).....	155	Rubber, dissolving (1).....	154
Engineers, examining (28).....	154	Sal soda, making (12).....	154
Engine power and crank (18).....	154	Sardine trade, the.....	143
Engine throttle valves (41).....	154	Sawing iron and steel (20).....	154
Explosion in a steel mill (21).....	154	Saws, circular, speed of (49).....	154
Fermented drinks, Chinese.....	149	Screws in casings.....	149
Filter, centrifugal.....	147	Shafts, dimensions of (45).....	154
Fire-extinguishing apparatus.....	146	Sled runners, wooden (22).....	154
Fish, a new.....	149	Soap, dangerous.....	147
Flour reels, temperature of (15).....	154	Soldering blocks, metal (6).....	151
Glass, measuring refraction of (10).....	154	Solder silk.....	150
Graphite (3).....	154	Steamer, a well made.....	149
Hay tedder, improved.....	154	Stencils, plates, straightening (37).....	155
Heat in glazing, etc. (2).....	154	Telephone, the invention of the.....	145
Heat, non conductors of (43).....	154	Timber, measuring (27).....	154
Heliometer, the.....	152	Tinning iron castings (17).....	154
Heliometer, the.....	152	Tire-heating oven (19).....	153
Hydrometer, the.....	152	Toy-making, Parisian.....	154
Ice machines, chance for.....	151	Turbin, the.....	147
Ice, medicated.....	151	Ventilation of ships.....	149
Ice, preserving (6).....	154	War ship, an Australian.....	143
Industrial art at the Centennial.....	144	Wasp.....	146
Ink eraser.....	154	Water in pipes, force of (30).....	154
Law suits, delays in.....	148	Water, weight of (29).....	154
Lighting, effects of.....	148	Waves, the effect of.....	146
Lighting protectors, constructing.....	149	Wetherite (14).....	154
Light, practical uses of.....	149	Wood in wells (3).....	154
		Yellow fever, disinfection for.....	146

THE SCIENTIFIC AMERICAN SUPPLEMENT. No. 10.

For the Week ending March 4, 1876.

TABLE OF CONTENTS.

- THE INTERNATIONAL EXHIBITION OF 1876. With 3 engravings.—The Pennsylvania State Building, 1 cut.—The Photographic Hall, 2 cuts.—Hydraulic Features of the Exhibition.—Horticulture at the Exhibition.—The Allotment of Space in Memorial Hall.—Table of Concessions and Prices at the Exhibition.—Exhibition Notes.
- ELECTRICITY, LIGHT, HEAT, SOUND, ETC. With 5 engravings.—Present the South Ocean Cables, 2 engravings.—La Cour's Musical Telegraph, 2 engravings.—Interior Constitution of Magnets.—New Thermic Researches.—New Color Thermoscope.—Refraction of Sound, by PROFESSOR O. REYNOLDS.
- TECHNOLOGY. With 11 illustrations.—Apparatus for Climbing Chimneys, 2 figs.—The Thompson Internal Machine, 2 figs.—Tool-Grinding Machine, 1 fig.—Novel Brick-Laying Machine, 1 fig.—Photo-Emulsions, Washed and Unwashed.—Aniline Black.—Preservative Action of Ozone.—Imitation of Inlaid Wood, 1 fig.—Elevator for Dwellings, 1 fig.—Base Ball Base, 1 fig.—New Thermometer, 2 figs.—Homes in American Cities.—Robbing's New Process of Treating Wood.—Atmospheric Exchanges of Ammonia.
- ENGINEERING AND MECHANICS, with 32 figures.—The Victoria Bridge at Brisbane, with two pages of illustrations.—Improved Universal Lathe, 15 figs.—Alteration in the Form of Machine Work during its Manipulation, by JOSHUA ROSE.—Fireproof Construction, by N. H. Hutton.—Roof Construction.
- ASTRONOMY.—New Observations on the Sun.—Re-observations of the Moon.—Mars.—The Minor Planets.—Jupiter, its Mass.—Saturn.—Study of Uranus with the Great Refractor.—Observatories and Instruments.—New Observatory at Vienna.
- MEDICINE, HYGIENE, ETC.—Unhealthy Trades, by Dr. B. W. Richardson.—School Hygiene, by Dr. D. F. Lincoln.—Medicine to the Infant.
- AGRICULTURE, HORTICULTURE, ETC.—Horticultural Frauds.—New Plants.
- PROCEEDINGS OF SOCIETIES.—French Academy of Sciences.—American Social Science Association.—Royal Society, London.
- NATURAL HISTORY, with 5 figures.—The Glow Worm.—Coral Reefs and Islands.—Mirage in North Carolina.—Cameron's Journey across Africa.—Termites or White Ants of Africa, 3 figures.—Stanley's Sectional Boat and Life Raft in Africa, 2 figures.—Explorations in South America.

The SCIENTIFIC AMERICAN SUPPLEMENT is uniform in size with the 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 SCIENTIFIC AMERICAN SUPPLEMENT will be sent together for one year, postage free to subscribers, on receipt of \$7.00.

Remit by postal order. Address
MUNN & CO., PUBLISHERS,
37 Park Row, New York.

Single copies of any desired number of the SUPPLEMENT sent to any address on receipt of 10 cents.

INDUSTRIAL ART.—SOME THOUGHTS FOR THE CENTENNIAL.

A correspondent, referring to our recent editorial on what working men might contribute to the Centennial, in which we deprecated nickel or silver plating on handmade metal articles, and suggested file, polishing as a more workmanlike finish, asks whether we are not opposed to ornamentation of machinery or tools, and whether we do not think that artistic design is superfluous in implements or materials meant for "solid work." To this, we reply emphatically in the negative; and we have a few remarks to offer relating to the subject, which may be timely in their bearing upon the approaching exposition of our industries. It may be laid down as an unfailing rule that, when any person is given the choice of two articles, identical in every respect save that of grace of form or beauty of decoration, the handsomer will certainly be selected. This appears to be a simple enough proposition; but when it comes to be applied to great classes of manufactured products, those who make the latter seem to forget it, or at most to accord to it but very little attention. The majority of mankind even go further in their predilection for the tasteful, and in nine cases out of ten will prefer an inferior article of beautiful design, to a really superior object of homelier appearance, the gain in beauty compensating for the lack of usefulness. Several times a year dry goods dealers heap their counters with fabrics of elegant patterns; out of a variety of styles perhaps half a dozen may be "the rage," simply because of their beauty. As a result the resources of the manufacturer are taxed to the utmost to produce the particular kinds of goods demanded, and both manufacturer and dealer gain large profits on the favored fabrics. And yet these very goods may be identical, in every thing but dye or mere pattern, with whole bales of material which the dealer can scarcely get rid of at any price. The same is true of carpets, of wall paper, of crockery and glassware, of any of the varied products into which artistic design may enter. People will pay for beauty, pay for it on a scale which cannot be measured by any standard. They may examine their purchases for other qualities never so closely, may gage durability or strength or efficiency or internal composition to hairbreadth accuracy; but artistic finish and tasteful form defy us to judge how much money is commensurable with a given amount of elegance.

Not long ago a very wealthy merchant of this city paid \$60,000 for a single painting about four feet in length by less than 3 feet in height. From a purely utilitarian point of view, the picture was a mere bit of painted canvas, useless even as a fire screen; from an æsthetic standpoint it represented a fortune. The same merchant lately paid \$9,000 for a block of marble. As a hitching post, that block would have been worth its cartage to the place where it was needed; as a sculptor's masterpiece, possessing exquisite beauty, its value exceeded even the large sum paid for it. We can proceed a step further, and glance at the amounts which, as a nation, we pay out for mere beauty. During the three months ending September 30, 1875, we imported \$1,749,655 worth of fancy goods, such as Vienna trinkets, Swiss carvings, etc., \$310,429 worth of paintings, statuary, and photographic pictures; and to this perhaps should be added \$181,665 worth of jewelry and precious metal work. In the year 1875, we imported fancy goods worth \$6,005,940, figures indicating nearly threefold the value of the similar imports of 1865. So much for the beauty we buy of other nations. Let us now compare these figures with those representing the artistic articles that we sell. For the three months above mentioned our domestic exports of fancy goods amounted to \$90,250, of jewelry \$19,307, and of paintings, including engravings, \$46,079. Fancy articles we do not find quoted at all on the yearly tables; nor have we any such industry as their exclusive manufacture. For the quarter of 1875, however, we imported \$2,241,759 worth of articles valuable principally for their beauty, and exported the same to the value of only \$155,636.

To carry out our examination of this subject still further, we give here a list of the numbers of all persons engaged in artistic pursuits or callings which have for their end the decoration of raw products. There are 775 painters, 250 sculptors, and 2,949 general artists, 108 teachers of drawing and painting, 2,017 architects, 1,169 artificial flower makers, 208 bone and ivory workers, 79 bronze workers, 7,558 photographers, 4,226 engravers, 569 galleon and tassel makers, 1,534 gilders, 18,508 gold and silver workers, 970 mirror and picture frame makers, 85,123 painters and varnishers, and 223 plaster molders. Total 126,265. This aggregate is a little larger than that of all the teamsters and dairymen in the country; it is very much less than that of the blacksmiths, and it about equals that of the teachers. In fact, adding together the number of teachers who educate us, and the aggregate of those whose labor involves our artistic culture and refinement, we have a sum which just about equals the total number of tailors and milliners, and is 40,000 less than the total number of clerks.

Abundant evidence, similar to the above, can easily be adduced, first, to show that we import a very much larger quantity of artistic productions than we export, and that but a very small portion of our population is devoted to pursuits of an artistic or semi-artistic nature. What is true of individuals is equally true of nations. France, pre-eminent as the designer of beautiful wares, buys of us \$50,000,000 worth of iron, and machinery, and provisions, and sends us \$63,000,000 worth of articles, most of which find their way to the stores of the jewelers, the china dealers, and the picture sellers. Italy sends us \$2,000,000 worth of art work in excess of the \$7,000,000 in staples which we send to her shores. With the exception of these two countries, which for ages have led the world in tasteful and ar-

tistic productions, our exports to every other European nation are far in excess of our imports.

In face of all this, it is difficult for any one to see how the country can be otherwise than benefited by the fostering of art culture to its full extent among our workmen. The old world is tributary to us for rough and raw products, and for new means of manufacturing them. We are tributary to the old world for the means of gratifying artistic tastes which cultivate and refine. Let us develop the artistic ability which lies in us, and we are tributary no longer. Let us make our manufactured productions as elegant in shape, as graceful in design, as those of France, and then, and not until then, will we enter in fair competition with that country or any other artistic nation in foreign markets. Nor should we imitate. Copying is but servile work; originality in design the world seeks, praises, and pays for.

The above views we commend to the careful consideration of exhibitors at the Centennial. Many people, we have heard, propose showing machines taken straight from stock without further embellishment or ornamentation; others intend to send samples of their goods irrespective of pattern or design, trusting in the intrinsic excellence of the articles to secure notice and future custom. We think this is a mistake. It costs little to ornament a machine tastefully, and discrimination in selecting the handsomest patterns is easily exercised. The advantage gained will, in a collection of such entries, be twofold: first, we will show the world that we are able to produce tasteful and artistic designs, and, second, we shall have prepared a collection of models of industrial art which will be of the greatest value as an educator and in exciting the emulation of our own people.

A RAILROAD ACROSS THE EASTERN CONTINENT.

The great feat accomplished by the United States in connecting the Atlantic and Pacific Oceans, by a railroad across the United States, is stimulating enterprise in Europe; and it is now proposed—indeed the plan is matured—to connect the Atlantic and Pacific Oceans by a railroad through Central Asia. At a conference of the geographers recently held, Colonel Bogdanowicz explained some of the details of the road, which, it is expected, will overcome one of the great obstacles to the extension of civilization, namely, the separation of a large part of Asia from Europe by vast deserts, in which no means of transit but a railroad could be of any use. A railroad alone can develop the resources of the many lands through which it would pass; and as the mineral wealth of Siberia and the Ural Mountains is well known, the exploration and mining of these regions would be encouraged, and their resources developed.

It is proposed that the road shall start from Nijni-Novgorod, in Russia, where is now the extreme eastern station in the network of European railroads; it will run along the Volga to Kazan, then up the tributary of the Volga, the Kama, to Ekaterinbourg, on the Asiatic side of the Ural Mountains, then enter Asia, proceed in the direction of Troumen and Omsk at the Irish, cross that river, and proceed by way of Kainsk to Tomsk on the Tom, a branch of the Obi, and cross that river. Tomsk is the principal center of commerce of Western Siberia; and thence the road will run directly to Irkutsk at Lake Baikal. Thence the road is to pass to the frontier of China, and then it is no longer an exclusively Russian, but an international undertaking. And here, also, the only serious engineering difficulties commence, at the mountain range of Kinghan, which, in its northern part, is crossed by the Amoor river. This range is the greatest obstacle: and it will be necessary to pass by the Mautchooria, and to lay the road from Baikal to Verhnéoudinsk through the valley of the Selenga. Then the best route by which to reach Pekin, the capital of China, near the Yellow Sea (a bay of the Northern Pacific Ocean) has been found to be that of Tchita and Dolounor. At the southern end, the famous great wall will be crossed; it already lies in ruins in many places. The whole distance from Nijni-Novgorod to Pekin will be 4,500 miles, of which 3,800 run through Russian territory.

When this plan is closely examined, according to known topographical data, the apparent difficulties dwindle down to nothing when compared to those encountered in the western section of our Pacific Railroad. The first section, from Nijni-Novgorod to Tomsk, runs on perfectly level land (the so-called steppes), similar to our prairies. In the second section, from Tomsk to Lake Baikal, the country is rolling, and interspersed with rivers and streams; but the greatest height is only 3,500 feet, and the largest rivers are but of very moderate width and depth. The only serious difficulties, as we have said, lie at the Chinese frontier, and they are inferior to those overcome in the Rocky Mountains and the Sierra Nevada by the American engineers.

Russia has raised in 15 years more than \$1,000,000,000 with which to construct 15,000 miles of railroad, and can easily find \$300,000,000 or \$400,000,000 to construct a line of such value to all the civilized world.

THE EDUCATION OF CROWS.

In the battle of wits between the gamekeepers and the crows of Germany, the latter are said to have acquired the ability to count as high as six—rather more than some tribes of human savages, if travelers' tales are to be trusted.

To protect the young broods of pheasants, the gamekeepers wage unsparing war against the crows, which have consequently become exceedingly wary and good judges of the range of ordinary guns. Various stratagems are resorted to by the keepers, one of them being to erect shelters near the gathering places of the crows, from which to shoot them when they unwittingly approach. The crows suspiciously keep aloof except when they are sure of safety; but the