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**Contents.**

(Illustrated articles are marked with an asterisk.)


Back for piano stools*..... 228
Battery, a cheap*..... 230
Bricks, glass sand..... 227
Business and personal..... 233
Cholera, pepper and salt for..... 225
Commissioner, the new..... 232
Construction from nature, suggestions for..... 227
Construction of vessels, improved*..... 230
Cow Mollie Garfield*..... 231
Cutting things under water..... 226
Dividers and calipers, improved..... 226
Engineer, locomotive, oldest..... 229
Exhibition, New Orleans..... 228
Fight for life*..... 231
Fire, extinguishing, mode of..... 232
Flower pot holder, wire*..... 228
Freight depot, a London..... 225
Gas, water, ruled out of Massachusetts..... 225
Gnat, buffalo, the..... 231
Gun, Maxim, the..... 227
Gun, 110-ton..... 229
Hair, gray..... 231
Hat as a camera obscura*..... 227
Hydraulic machinery, Worthington, at New Orleans Exposition*..... 223, 229
Inventions, agricultural..... 233
Inventions, engineering..... 233
Inventions, index of..... 235
Inventions, miscellaneous..... 235
Jack of all trades, the..... 224
Lead gaskets..... 232
Mechanics, artistic..... 224
New books and publications..... 233
Notes and queries..... 234, 235
Patentees fail to realize, why..... 225
Pencil marks, fixing..... 232
Pipe line across the Egyptian desert..... 229
Postmastership, New York..... 226
Powder, insect, toxic effect of..... 232
Power, transmission of, electrical 225
Protector for water pipes against freezing*..... 226
Pulleys, loose, improved..... 224
Rudder of the Alaska*..... 232
"Sun" column designed for lighting Paris*..... 230
Tempering process..... 225
Thill holder, improved*..... 226
Time check system, new..... 228
Time, decimal system of..... 228
Valve, reversing, for hoists, elevators, etc.*..... 227
Varnishes, colored, for tin..... 226
Vivisection, experiments in, recent..... 224
Waterworks on a small scale..... 226
Well, air, intermittent..... 232


TABLE OF CONTENTS OF

**THE SCIENTIFIC AMERICAN SUPPLEMENT,**

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PAGE

I. ENGINEERING AND MECHANICS.—Bridge over the Blaauw Krantz Ravine, Cape Colony.—2 engravings..... 7719
Torpedo Ships..... 7719
The Gas Engine.—By DUGALD CLERK.—Combustion engines.—First cylinder and piston engine.—Watt's experiments.—First gas engine.—Principles of the gas engine..... 7720
Rapid Construction of the Canadian Pacific Railway.—By E. T. ABBOTT..... 7721
The Osgood Mammoth Excavator.—3 figures..... 7722
Capstan Navigation on the Volga.—4 figures..... 7722
Steamboat Equipment of War Vessels.—With engraving of winch for raising and lowering torpedo boats..... 7723
Improved Steam Trap.—1 engraving..... 7723

II. TECHNOLOGY.—Critical Methods of Detecting Errors in Plane Surfaces.—By JOHN A. BRASHEAR.—11 figures..... 7724
Photometric Standards.—9 figures..... 7726
Bleaching or Dyeing Yarns and Goods in Vacuo.—1 figure..... 7726
On the Moulding of Porcelain.—By CHAS. LAUTH.—Moulding by pressure of the air.—Moulding by vacuum.—Drying the moulded pieces.—2 figures..... 7726
Photo-Tricycle Apparatus.—1 figure..... 7727
A Photo Printing Light.—1 figure..... 7727
A New Actinometer..... 7727
Astronomical Photography..... 7728
Electricity as a Preventive of Scale in Boilers..... 7728

III. DECORATIVE ART.—Alphabet designed by Godfrey Sykes.—An engraving..... 7728
Old Wrought Iron Gate.—An engraving..... 7729

IV. GEOLOGY.—The Organization and Plan of the United States Geological Survey.—By J. W. POWELL.—A topographic map of the United States.—Paleontology.—Chemistry.—Physical researches.—Statistics.—Library.—Publications.—General geology.—Economic geology.—Relation of the general survey to the State survey..... 7732

V. BOTANY, ETC.—The Sunflowers.—Annuals, perennials, etc.—11 engravings..... 7732
Lye's Fuchsias.—1 engraving..... 7734

VI. HYGIENE, ETC.—Brief Sanitary Matters in Connection with Isolated Country Houses.—By E. W. BOWDITCH..... 7729
Sanitary Cooking.—By V. L. OPPENHEIMER..... 7730
Time required to digest Different Foods..... 7730


## IMPROVED LOOSE PULLEYS.

Visiting the shop of a wideawake machinist, a short time ago, attention was attracted to a singular arrangement of pulleys. A special tool was driven by a belt from an overhead shaft on to a fast pulley of 10 inches diameter, by the side of which was a pulley of 9 inches diameter in the position of what would be the loose pulley. This smaller pulley was, indeed, the loose pulley, but it was not on the same shaft or arbor with the fast pulley. It was secured to a stud that had two bearings or journals on independent studs, so that the loose pulley and its stud had no connection with the fast pulley and its arbor. Its position in regard to the fast pulley was such that its rim and that of the fast pulley were exactly coincident at the point where the driving side of the belt "took" on the pulley face. Mechanics will readily understand the situation; of course, the opposite edge of the smaller or loose pulley's rim fell within that of the larger or fast pulley's rim by the difference in their respective diameters. Now, if the belt is shipped from the larger (fast) pulley to the smaller (loose) pulley, its tension is at once slackened, and the belt runs on the loose pulley with the least possible friction. And, when the belt is shipped from the small pulley to the larger pulley, the coincidence of the rims at the point of belt driving and the gradually increasing diameter of the running side of the pulleys induce the belt to climb up the larger diameter, just as a belt on the crowning faced pulley will seek the largest diameter.

It was surprising to notice this "encouraging" or "inviting" action when the belt was shipped from the small loose pulley to the fast larger pulley; the least impinging of the edge of the belt on the edge of the fast pulley sent it whirling across the face, so that the belt was seated apparently with a single revolution, starting the machine fully as quickly as it could have been done by a friction clutch, and without any shock or jar. The converse action of shifting to the smaller loose pulley appears to be just as easy as when the two pulleys are of the same diameter, the release or slackening of the belt being probably an inducing element.

The contriver of this arrangement claims that something of the readiness of the belt to engage the larger fast pulley is because of the higher velocity of the smaller loose pulley; but this seems hardly tenable, as the velocity of the belt is independent of the diameter of the receiving pulley. Yet there are advantages in this peculiar adaptation of the pulleys one to the other; the smaller loose pulley eases the tension on the belt, and its enforced independence of the other pulley is a good method to use in all cases where it is feasible; all loose pulleys should run on their own axes, and not loosely on a shaft, that is, loose pulleys should, when practicable, be mounted on journaled spindles—keyed on—so that the spindles turn with them. This better practice is gradually being adopted by enterprising machinists to replace the present rattling, squeaking, and oil-consuming arrangement.

## RECENT EXPERIMENTS IN VIVISECTION.

Those who are familiar with the work performed by that estimable gentleman and philanthropist, Mr. Henry Bergh, cannot help listening attentively to what he has to say, and generally agreeing with him; but, at times, it seems as if his sympathy for the brute creation carried him to unwarranted excesses. To this latter category would seem to belong his action regarding the very valuable, and in no sense cruel, experiments in osteotomy recently made with an etherized sheep at the New York Post-Graduate College and Hospital. Suffering humanity has some claims that cannot be overlooked; and if investigations made by experts with living subjects will seem to lessen the pain or shorten the list of maladies that human flesh is heir to, it would appear unreasonable to demand their discontinuance.

The experiments referred to were made with a purpose of ascertaining whether or no bone may be removed in diseases of the joints without entailing permanent stiffness in the affected parts. The theory upon which Dr. Roberts' operation was based is that the first indications of disease in bone may be removed in much the same manner as that employed by dentists with decayed teeth, and that the well known property of bone to throw out new tissue would do for the part removed what the dentist's artificial filling does for the cavity that is left in the tooth.

When the sheep had been rendered insensible by the application of ether, Dr. Roberts removed the wool between the thigh and the shank, and then laid bare that portion of the bone which lies adjacent to the articulation of the joint. A small electric battery served to operate a drill and burr, and by means of these he made a small excavation in the bone, pausing from time to time to examine by the aid of a miniature incandescence electric light the progress of his work. When the operation was completed, a cavity was left in the bone large enough to admit a small thimble, but the articulation of the joint remained uninjured. After a drainage pipe was affixed to the cavity, the parts were carefully sewed together. Six weeks hence, when the cavity shall have had ample time to fill up with new bone, the animal will be killed, in order that the result of the operation may be accurately determined. Should the theory upon which this operation is based prove well founded, the most important results may be expected in the future treatment of diseases of the hip, knee, and ankle where the spongy interior of the bone is the seat of the trouble, and the slow and trying system of absorbing the diseased bone, of removing the joint and thus shortening the leg, and the other and various means employed, all of which leave a stiffened joint as a result, will be superseded.

It does not require unusual perception to distinguish between operations such as that described, related directly and specifically to the art of healing, and those with no more specific aim than the advancement of knowledge or, worse still, to illustrate the living organism or satisfy idle curiosity. Such practices as these latter have furnished good cause for complaint, and moved even those less sensitive than Mr. Bergh to protest in indignant tones against them. But there is a higher cause to which vivisection may be made to appeal—the cause of suffering humanity; and when so directed by competent hands, objections on the plea of cruelty seem to be at once unjust and illogical.

## ARTISTIC MECHANICS.

A recent notice of a mechanic in Massachusetts who is an expert in that department of natural history of which the butterfly is the chief representative, suggests other and similar instances. It may be that the exactness required in mechanical work develops a taste for close study, or it may be that natural history and pure science become pleasant foils to the monotony of mechanical work; but it is the fact that some practical, day-working mechanics stand high in some scientific specialties.

There is a machinist—a fine tool maker—who is well known, and widely known, as an amateur astronomer. He has contributed importantly to the science, and is not surpassed in nicety and preciseness in designing astronomical mechanism.

Another is an expert steel engraver by choice and as a pastime, and yet, incredible as it may appear, he is a smith or forger, handling steel and iron in bars and the heavy hammer of the blacksmith all day, and doing delicate steel engraving at night or on "off hours." He has nearly finished designing and engraving a series of plates representing the childish legend of the "Death of Cock Robin," the proofs of which are really fine.

One left the machine shop three years ago, and set up as an engraver on jewelry, plate, and similar articles. He originates all his designs, and rarely makes a second drawing. He is a wonderful producer of elegant and legible monograms. A set of six silver buttons for a vest, all uniform in general design and no two alike in particulars, is very artistic, and yet he designed and engraved the six while the customer waited—perhaps an hour. These two instances show that the bent of the authors was naturally artistic rather than mechanical.

There is a young man, thirty years old, a joiner, who is better authority on the flora of New England than some of the authors of accepted text books. The fields, pastures, woods, and by-ways are his haunts when he has an hour "in the season." He is not surpassed as a herbalist, and is quoted as authority where he is known.

A surgeon was spoiled when another man, a machinist, went into the shop. He acts at call in setting bones and reducing sprains. He is so successful that he is in the confidence of the professionals, who are not ashamed to profit by his suggestions.

This mechanic, however, only carries to its ultimate a faculty and a practice that is not uncommon in the shops. It is rare, indeed, that in case of an ordinary accident in the shop there is necessity for outside aid. When the writer was a youngster, he lodged a piece of the sharp, hammer hardened head of a cold chisel in one eye. The "shop surgeon" applied a powerful magnet without avail. Then he cut out the obtrusive particle with a keen penknife blade, making an incision just as he might in a finger. A professional surgeon who afterward examined the eye said that it was a "very creditable job."

## THE JACK OF ALL TRADES.

In the shop of one of these men was noticed, recently, some articles sent for repair; curiosity prompted a list of some of them. There were two parasols, the handles of which were broken, one requiring inlaying with gold and silver in plates and wires; several clocks, one an antique musical timepiece marked "Jans Heerch, Haarlaem 1692;" a musical box with a capacity of eight tunes; a seated statuette of Clio, the muse of history, one of whose legs had been broken off. This figure was made of cast zinc, externally bronzed, as most of our foreign "bronze" statuettes are made, and the shell was very thin—not more than one-sixteenth of an inch thick. For this job the mechanic scraped enough of the metal from the interior to determine its quality, and then made a solder to correspond. As