

## ENGINEERING INVENTION.

A station indicator has been patented by Messrs. James W. Duffee and Charles Weston, of Washington Court House, Ohio. The invention provides for placing an indicator at each end of each car of a train, all the indicators being connected by pipes with a reservoir on the locomotive or tender, from which compressed air or other fluid is made to operate the indicators simultaneously at the will of the engineer.

## MECHANICAL INVENTIONS.

A machine for cutting metal has been patented by Mr. Loring L. Hazen, of Arcola, Ill. It is made mainly of cast iron, with a working or cutting lever operated by an eccentric, and is mainly designed for use in blacksmiths' shops, and to be secured to a bench or post for operation by hand, having also a peculiarly fitted and operating punch.

A ratchet drill has been patented by Mr. Charles Davy, of Sheffield, York County, Eng. It consists of a friction clutch for transmitting motion from the handle to the spindle, consisting of a screw thread of rapid pitch upon the spindle, a nut screwing thereon and of conical form externally, an eye attached to the handle and fitting on the nut and free to rotate, with a spring to force the nut more tightly into the eye.

## AGRICULTURAL INVENTIONS.

A lime distributor has been patented by Mr. John Hotham, of Hillside, Pa. Combined with a hopper are two independently geared distributing wheels and a double inclined apron, with other novel features, the machine being calculated to evenly and widely distribute lime or other fertilizer, either fine or lumpy, and to hold a large load.

A harvester cutter bar has been patented by Mr. Daniel B. Detweiler, of Berlin, Ontario, Canada. This invention provides a construction in which the ledger plates of a cutting apparatus are so mounted that they may all be removed at once, without removing the guard fingers or loosening any of their connections or fastenings on the finger bar whereto the guard fingers are secured.

A band cutter and feeder for thrashing machines has been patented by Mr. John H. Spurgin, of Carthage, Mo. It is so constructed that as the bound bundles are fed they are guided beneath knives which cut the bands and then spread by a novel arrangement of tines as delivered to the thrasher, the construction being applicable for use in connection with any of the ordinary forms of thrashing machines and increasing their general utility.

## MISCELLANEOUS INVENTIONS.

A stirrup has been patented by Mr. William S. Cardell, of Fred, Chickasaw Nation, Indian Ter. The foot portion has holes formed through its sides in which are incased springs, capable of yielding to the weight of the horseman, and thus take up part of the jarring and jolting caused in riding.

A flying toy has been patented by Mr. John M. Richard, of Newark, N. J. It consists of a bladed wheel and pendent guiding shaft, a handle for the shaft being made with an adjustable spindle, the toy being caused to rise in the air by pulling a string, effecting a rapid rotation of the shaft and its blades.

A bed room sanitary closet has been patented by Mr. Charles Memmert, of Washington, D. C. It is designed to set in the fire board or wall, to extend into and communicate with the chimney or flue, thus forming such a receptacle for the chamber vessel that it will be out of sight, and all odors therefrom will pass up the chimney.

A fifth wheel has been patented by Mr. William C. Engel, of Ashland, Pa. This invention consists mainly in a ball having a connected head or flange plate to which the vehicle spring may be clipped, and a socket connected to a base plate or bar clipped to the axle, the ball fitting in the socket after the manner of a ball and socket joint.

A stump puller has been patented by Mr. John H. Schindly, of Luthersburg, Pa. It has three posts held together at their upper ends, in connection with links, wedge, clevises, and a pulling lever, arranged in such relation to each other that a powerful pull may be effected, and which may be readily regulated according to the resistance offered.

A bean cutter has been patented by Henry A. Grotholtman, of Fort Wayne, Ind. It is for slicing beans for pickling and other purposes, and has a cutting disk revolved by a crank arm and bevel gear, with cutter blades revolving parallel and closely to the lower ends of inclined guide tubes, which receive the beans fed through openings in a circular head.

A washing machine has been patented by Mr. Martin V. B. Watson, of Altamont, Kansas. It has rubbing bars in the bottom of the tub, in which a hollow corrugated cylinder is journaled, the clothes being placed in the cylinder and attached thereto from loops on the outside, when they will be washed by the revolution of the cylinder and by rubbing on the bars.

A device for operating awnings has been patented by Mr. Theophile Charron, of Kankakee, Ill. This invention provides a construction whereby an awning may be readily raised and lowered, and when raised will be wound upon a suitable roller, and thereby protected from the weather and prevented from creasing, while it will be securely held in open position.

A speculum syringe has been patented by Mr. John P. Schenck, of Matteawan, N. Y. The invention consists of movable fingers each carrying a perforated tube, the object being to combine a syringe with a speculum.

A hat wire has been patented by Mr. Herman H. Kellner, of Danbury, Conn. It is of a peculiar triangular shape in cross section, with two straight or flat diverging sides and one convex side uniting the straight sides at the points of their greatest divergency, whereby it will possess considerable strength in the hat rim, and not tend to jump out of place.

A collar stud and necktie holder has been patented by Mr. David Stone, of New York City. It is a stud or button proper provided with a folding shank or back, so arranged that it is designed to facilitate the operation of dressing, and at the same time be comfortable and prevent all chance of the shifting of the cravat.

A frame for pocket books, satchels, etc., has been patented by Mr. Louis B. Prahar, of New York City. It is composed of two jaws, each struck from a single piece of sheet metal, with a narrow portion at one half and a flange at the other half made flush or on the same curve with the narrow portion of the jaw, the jaws being pivoted to brace and protect each other.

A nutshell cutting machine has been patented by Mr. Charles Pecht, of Austin, Texas. It is principally for the use of bakers, confectioners, and others, to release the kernels better than by cracking, and consists in a metallic ring with a series of cutters extending inward radially, and easily adjustable, with a follower adapted to push the nuts through between the cutters.

A curtain pole and fixtures have been patented by Mr. Frank C. Schastey, of New York City. The construction is such that the curtains are opened and closed, and the curtain rings moved along the pole, by the contact of the cord tubes with each other, these tubes being fixed in the lower part of each curtain ring, whereby the curtains will be moved with very little noise and friction.

The construction of vessels forms the subject of a patent issued to Mr. Thomas J. Hanlen, of Macon, Ga. The hull of the vessel is broad, but with a central U-shaped bottom, making a channel from stem to stern for free passage of water, this channel having a casing extending up into the hull, and the propeller shaft and propellers being located therein and operated after a novel manner.

A vehicle wheel lock has been patented by Mr. George N. Adams, of Olean, N. Y. It is more particularly designed for children's carriages, and is of the kind where a bolt or catch is combined with the axle, engaging with a plate on the inner face of the hub of the wheel, which, when free, turns loosely on the axle, the invention covering novel features and combinations of parts.

A combination lock has been patented by Mr. Joseph G. O'Neill, of Nevada City, Cal. The invention consists of a sliding bolt frame operated by a lever, a locking frame actuated by the outside knob and the lever, and pivoted tumblers operated by spring keys, the construction being simple and durable, and the lock being adapted to be changed to any desired combination for unlocking.

A station indicator and calendar has been patented by Mr. Francis C. Jones, of Ouachita Parish, La. Combined with an apertured casing are rollers, a belt or band, knobs with notches in their hubs connected to the rollers, and certain other novel features, whereby, when the operator turns the proper roller, the name of the next station will be made to appear, the device carrying also a calendar.

A folding tracing slate has been patented by Mr. William D. Heyer, of Elizabeth, N. J. By this invention a translucent slate is held between hinged opaque slates, whereby a slate pencil may be used upon the roughened surface of the translucent slate and the white lines made will be rendered clearly visible by the dark background, making a desirable surface for tracing and copying.

A ratchet brace has been patented by Mr. George M. Laforge, of Billings, Montana Ter. The invention provides means for converting the device into a double or single armed brace, for locking the ratchet and thus making the brace rigid, and for adjusting the jaws to fit angular portions of different sizes, being generally adapted for use with augers and drills, or as a nut wrench, and for other purposes.

A process of making bread has been patented by Mr. Joseph D. Cox, of Rochester, N. Y. The mixing pan has a cover of some height, whose down projecting rim sits in an annular trough containing water, preventing access of air to the dough, but allowing the escape of gases generated by the dough through the water, whereby the fermentation process in the raising of the bread will be facilitated.

A dust trunk cleaner for cotton openers has been patented by Mr. Horatio W. Fairbanks, of Atlanta, Ga. It is for use with the trunks through which cotton is drawn before delivery to the opener, the invention providing the trunk with cross slats, doors carrying segmental toothed racks, and endless chains having teeth and carrying brushes, to relieve the trunk of sand, dirt, dust, etc.

A manual motor has been patented by Mr. Adam M. Friend, of Rawlins, Wyoming Ter. Combined with a freely vibrating hand lever and a treadle with paws and toothed wheel is a rotatable shaft on which the toothed wheel is fixed, with other novel features, whereby the weight and strength of the operator may be utilized for propulsive effect in driving machinery and propelling vehicles.

A heat regulator has been patented by Mr. Edward Zickwolf, of Saarbrücken, Germany. It is an apparatus in which a volatile liquid vaporizing at the ordinary temperature is used, the vapors, expanding under a higher temperature, acting upon a column of mercury to operate a device for opening and closing the inlet valve for the heat, thus automatically regulating the admission of heat to a room.

A clothes washer has been patented by Mr. John J. Turner, of Hunter's Point, Long Island City, N. Y. It has a perforated plunger and a mechanism for imparting a reciprocating motion thereto, a central cylinder within which the plunger is reciprocated being entirely or partially surrounded by auxiliary washing chambers, whereby the water will be thoroughly forced through all the interstices of the fabric.

A glass tube cutter has been patented by Mr. Laurence P. Lindgren, of Doniphan, Neb. It consists of a tube cut away upon one side, stopped in one end, and having a central rod supported axially, carrying near its free end a roller glass cutter capable of engaging the inner surface of the tube to be cut, being particularly designed for cutting water gauge tubes of steam boilers to adapt them to their fittings.

An adjustable bulletin board has been patented by Messrs. Hugh C. Cannon and Arthur E. McGrath, of McArthur, O. It consists of a pivotal post and rotary adjustable shaft mounted therein, with guide strips, in combination with a bulletin having interchangeable letters and a drum with ratchet, pulley, and rope for raising and lowering the bulletin, whereby the bulletin may be easily adjusted to any point desired on its post.

A combined land roller and clod crusher has been patented by Mr. Friedrich Twick, of Sheboygan, Wis. This invention covers an improvement on a former patented invention of the same inventor, whereby the scrapers can be more readily adjusted, the colters readily raised and lowered and their bearings oiled, with other novel features, the machine being thus made more convenient in use and reliable in operation.

Waxing paper forms the subject of a patent issued to Mr. Charles A. Wilkinson, of East Somerville, Mass. A box provided with steam pipes has an upper depressed and corrugated surface, with gutters fed by a funnel, in connection with a perforated plate, felt sheets, and a roller; the felt is first thoroughly saturated with melted wax or paraffine, the temperature raised, and the paper waxed by placing the sheets simply on the felt bed, and passing the roller over.

SCIENTIFIC AMERICAN  
BUILDING EDITION.

## JULY NUMBER.

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3. Page drawing in perspective of an Elegant Stone Residence, corner 119th Street and Sixth Avenue, New York City.
4. An Attractive Residence at Providence, Rhode Island, with perspective and plans. Cost, Five Thousand Five Hundred Dollars.
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13. The Manchester Royal Jubilee Exhibition, with nine large engravings, covering four pages, including specimens of "Old Manchester and Salford."
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## Special.

THE FOE OF QUACKS AND FRAUDS.  
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Amid luxurious surroundings, L. Lum Smith, editor and proprietor of *The Philadelphia Public Herald*, sat in his office, No. 706 Chestnut Street, when the reporter of a city journal called upon him. Mr. Smith is one of the best known men in the country, for he has devoted years to the exposure of commercial and literary frauds. Nothing intimidates him—neither libel suits by the dozen nor attempts upon his life. A typical Southerner of the best class, Lum Smith is genial in manners and cosmopolitan in mind.

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For full information about Compound Oxygen and what it has done for others, address Drs. Starkey & Palen, 1529 Arch Street, Philadelphia, Pa.

## Business and Personal.

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Send for new and complete catalogue of Scientific Books for sale by Munn & Co., 361 Broadway, N. Y. Free on application.

## NEW BOOKS AND PUBLICATIONS.

**THE MECHANICS OF MACHINERY.** By Alex. B. W. Kennedy. London and New York: Macmillan & Co.

The author, Professor of Engineering and Mechanical Technology in University College, London, has sought herein to make a book specially adapted to the wants, requirements and difficulties of young engineers and students of engineering. It is far from being an elementary work, but rather such a one as would form an excellent aid for the more ambitious students of our technological schools, such as Cornell, the Rensselaer Polytechnic, the Massachusetts Institute of Technology, or the Stevens Institute. This treatise is not as wide in its scope, and does not involve such complicated mathematical formulae, as the great work of Dr. Weisbach, but it will be found to require diligent application and close thought in the student—a necessity which the young mechanic, be he ever so industrious, generally finds extremely irksome until he acquires the mental habit which comes only of steadily pursued intellectual work. The strong logic, clear analysis, and smooth style of Dr. Kennedy's work will be great help to such young learners, so far as possible making an ordinarily very dry study attractive in itself.



## HINTS TO CORRESPONDENTS.

**Names and Address** must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

**References** to former articles or answers should give date of paper and page or number of question. **Inquiries** not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and though we endeavor to reply to all, either by letter or in this department, each must take his turn.

**Special Written Information** on matters of personal rather than general interest cannot be expected without remuneration.

**Scientific American Supplements** referred to may be had at the office. Price 10 cents each.

**Books** referred to promptly supplied on receipt of price.

**Minerals** sent for examination should be distinctly marked or labeled.

(1) D. E. M. asks: In a stick of timber 40 feet long, 24 inches square at one end, and 12 inches square at the other end, how many feet of lumber are there? It is also stated that the proposition has been given to several lumbermen in the Chicago Exchange building, who have found various results; among others, the following: 60 feet, 600 feet, 720 feet, 876 feet, 1,080 feet, 1,200 feet, and 2,400 feet; that if the cubical contents of the timber in feet is what is wanted, 1,200 would be the correct answer; but if a lumberman were buying the stick, and desired to find how many feet of board measure there was in it, and put his rule at work, he would find but 1,080 feet, an allowance being made for sawing, or the "kerf." A. For obtaining the solid contents, the rule in Haswell's is for the frustum of a pyramid. Add together areas of the two ends and the square root of their product; multiply sum by height, and take one-third of product. Thus: 4 sq. ft. + 1 sq. ft. = 5 sq. ft. +  $\sqrt{1 \times 4} = 7 \times 40 = 280 = 93\frac{1}{3}$  cb. ft. which  $\times 12 = 1,120$  feet board measure without allowing for kerfs and waste. Considering the taper of the timber and allowing for kerf, you cannot make more than 10 feet of lumber to a cubic foot. Then  $93\frac{1}{3} \times 10 = 933$  feet merchantable lumber 1 inch thick that could possibly be obtained from the piece.

(2) G. H. B. and others: For answers to your questions, apply rule as above.

(3) Reader.—For description and illustration of the "boomerang" see SCIENTIFIC AMERICAN of January 29, 1887, which we can send you for 10 cents.—The periodicity of fermentative action would depend upon the life history and course of development

(4) D. W. asks the meaning of the word "pitch" when used in connection with screw propellers. A. The distance that the screw would travel in one revolution without slip, or as an ordinary screw follows in the nut.

(5) E. W. writes: Can automatic engines be worked by the heat of the kitchen fire so as to supply electric light by night and to pump water and do other domestic work by day? A. There are devices for utilizing the kitchen fire for raising water. An electric light would probably require too much power for a kitchen appliance.

(6) J. S. G. asks: Do you know of a wash of any kind to prevent sun's rays from shining through stained roll cathedral glass? A church I built seems to be troubled with the sun's glaring rays. If you can give me either a recipe to make or a name by which it can be bought, I will be greatly obliged. A. Try photographers' "ground glass varnish or substitute." This may be too opaque.

(7) H. L., C. G., H. O., and T. L. write: 1. There are four of us making four galvanometers from your paper, December 4, 1886. How can we test it after it is done? A. Place the coil exactly in a central position between the poles of the magnet. Adjust the torsional wire so that the plane of the coil is parallel with the face of the permanent magnet. Adjust the mirror so that it will be in a plane parallel with that of the coil. Project a beam of light from the mirror on to the scale. Arrange the scale so that the light spot will fall on 0° of the scale. Send a weak current through the coil. Note the deflection of the light spot. Now reverse the current and note the deflection. If the two deflections are equal, the instrument is correct and needs no further adjustment. If the deflections are unequal, the correction may be made either by turning the mirror slightly on its support or by swinging the scale. 2. What instrument does it require, if we use the Daniell battery? All we know is the coil gives 150 ohms resistance, as stated in your book. A. You will need to place enough resistance in the circuit to reduce the deflections to the limit of the scale. It is immaterial what the resistance is. 3. What does a volt mean? A. A volt is the unit of electromotive force. It is about equal to the electromotive force of one Daniell cell. 4. What does an ampere mean? A. A current delivered over the resistance of one ohm, by the electromotive force of one volt, is an ampere. 5. I cannot find any book that will guide us. We have made a splendid instrument according to SCIENTIFIC AMERICAN, December 4, 1886. Can you tell me name of book we can get? We have lots of books, but it seems they are too high a grade. We want to make them correct. We have improved on the one with a mirror. A. Thompson's Elementary Lessons in Electricity and Ganot's Popular Natural Philosophy.

(8) Dr. G. L. T. asks the best composition for blacking leather used in tannery. A. The composition and application of the black are largely controlled by the kind of leather, and more depends on its manner of use. It is a trade in itself. A good harness and grain leather blacking is made as follows: Take nine pounds of copperas, a quarter of a pound Epsom salts, and six ounces of acetic acid; thoroughly dissolve together in 1 gallon of boiling water. Take a vinegar or kerosene oil barrel, knock out one head, and put within 40 gallons of cool, soft water (condensed steam is much preferred), then add the above ingredients. Stir well, and it is ready for immediate use, at a cost not exceeding one cent per gallon.

(9) C. B. N. asks the cause of, and a remedy for, ringing in the ears. A. It is frequently caused by the use of quinine, which produces hyperemia of the tympanum. In any case it is an abnormal condition, which may if it increases produce paralysis, though in its commencement usually light and transitory. If continued, you should consult a physician.

(10) R. F. L. desires (1) a receipt for making polish suitable for polishing pianos. A. A fine varnish is made as follows: Take 700 parts of alcohol, 15 parts of copal, 7 parts of gum arabic, and 30 parts of shellac. The resins are first pulverized and bolted through a piece of muslin. The powder is placed in a flask, the alcohol poured over it, and the flask corked. By putting the flask in a moderately warm place, the solution will be accomplished in two or three days. It is then strained through a piece of muslin, and kept in hermetically sealed bottles. 2. A preparation for whitening ivory? A. Use hydrogen peroxide. See article on this subject in SCIENTIFIC AMERICAN SUPPLEMENT, No. 339.

(11) C. F. M. asks (1) the method of obtaining extracts of flowers. A. Take of the flowers 3 to 5 pounds, proof spirit 2 gallons. Digest for a few days, and then draw over by distillation 1 gallon of essence. For those flowers that are not strongly fragrant, the product may be distilled a second and a third time, or even oftener from fresh flowers. These should be picked to pieces, or crushed or bruised, as their nature may indicate, and should always be selected when in their state of highest fragrance. 2. Is this extract diluted with alcohol before fit to use? A. They are generally diluted with alcohol, depending largely upon what purpose they are to be put to. See Plessee, Cristiani, and others on perfumery, etc.

(12) E. F. R. asks: What is used in laundries in washing clothing to make it so white, kinds of indigo, etc.? Also what is used in getting that beautiful gloss on collars and cuffs which some laundries are used to get? A. See "Laundry Hints," on page 388 in the SCIENTIFIC AMERICAN for December 18, 1886, also "Starch and the Starching Process as used in Laundries," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 577. A solution of gum arabic in water is used to stiffen and impart a gloss to linen.

(13) I. V. M. writes: I wish to glue white holly silhouettes on black walnut, and then oil the walnut. Is there any preparation which I can put on the holly to prevent the oil from soaking into and discoloring, or rather coloring, the holly? A. Give both walnut and holly a thin coating of shellac in alcohol over those surfaces which come in contact before you apply the glue.

(14) G. C. R. asks: When was the first electric street railroad put into practical use in the United States? A. In Baltimore, Md., in 1885; it runs two miles, operates five cars, and last year carried 200,000 passengers. There are about a dozen others now in operation, and as many more under contract, in this country, and about a dozen operating in Europe.

(15) S. I. D. asks how to make water ices. A. Flavor water with the proper extracts, and freeze with agitation as you do ice cream.

(16) W. H. writes: 1. I have a valuable work ready for binding, but through accident one number got stained with linseed oil; how can I remove the stain? A. Apply a little pipe clay, powdered and mixed with water to the thickness of cream, on the spot. Leave it on for about four hours, and then scrape away. 2. How can powder be removed from the skin? A. Grains of powder in the skin must be removed by a surgeon, but will sometimes gradually disappear with new growth. 3. Which is the best journal on electricity? A.

There are so many journals now making this subject a specialty that we would not like to decide, unless it were in favor of the SCIENTIFIC AMERICAN and SUPPLEMENT.

(17) J. S. asks how to make the mineral water that is drawn from fountains in the drug stores. A. It generally consists of water charged with the proper salts and with carbonic acid, and requires special apparatus to charge the fountains under pressure. The special mineral waters desired are made by dissolving the ingredients known to exist in the natural water.

(18) L. F. B. asks: 1. How can I clean a number of Carter, Stafford, and Arnold ink bottles, so they would be perfectly wholesome for catsup and such like use? A. For cleaning ink bottles, the best and quickest agent is oxalic acid, but it is a violent poison. Try shaking small nails, with water or vinegar, in them, and if this does not answer, use muriatic acid (also poisonous), carefully washing out two or three times after its application. 2. Will you tell me whether I have made on correct principles an induction coil which I describe as follows: Core of soft iron wires No. 16, core 1 inch in diameter, wound tightly with a layer of fish line, whole thickly covered with hot sealing wax about  $\frac{1}{8}$  to  $\frac{1}{4}$  thick, then wrapped twice with No. 16 Edison electric light wire, which has a very good, durable insulation, the whole varnished several times, and covered with several turns of waterproof packing, case lining, and brown Manila paper, and then wrapped, and not very evenly, by hand, with a pound or a pound and a quarter of No. 36 cotton-covered copper wire. I should judge there to be 25 or 30 feet of No. 16 in first coil, wound on core (primary)? A. With regard to your induction coil, you do not give the length. You have apparently used an unnecessary thickness of insulating material. Otherwise it should work quite well. For description of induction coil see SCIENTIFIC AMERICAN SUPPLEMENT, No. 160. 3. How many cells Leclanche battery would be necessary for the above coil? A. Three Leclanche cells would answer for your coil, but they of course would rapidly polarize. 4. How and what to use, to produce a good wax or other polish for cabinet work? A. For wax-polishing woodwork, many receipts are given. We give the following: 1. Dissolve beeswax in cold alcohol to the consistency of butter, and polish by rubbing this on the wood, finishing by rubbing with a clean linen cloth. 2. 8 parts white wax, 2 parts resin,  $\frac{1}{2}$  part Venetian turpentine, are heated over a moderate fire, and 6 parts of rectified oil of turpentine are stirred in. After 24 hours' standing, when it should have the consistency of butter, it may be used. The wood should be perfectly clean, and after this is rubbed in, a second rubbing may be given after one-half hour. If necessary, the wood should be cleaned with soap and water and dried perfectly.

(19) F. T. asks: What will remove oil stains from marble statuary? A. Make a paste with fuller's earth and hot water, cover the spots therewith, let it dry on, and the next day scour it off with soft or yellow soap.

(20) J. F. G. asks: Is there any way to generate gas under a high pressure and maintain the pressure while the supply is being exhausted, the same as steam in a boiler? If so, what is the cheapest and best way to do it? How many cubic feet of such gas does it take to equal a ton of coal for heating purposes? What does it cost per 1,000 cubic feet? How much coal does it take an hour per horse power to run a steam engine? A. You can generate gas in a retort under pressure by igniting coal therein, but better results are attained with lower pressure. About forty thousand feet would be required to equal in heating power a ton of coal. It will cost about 75 cents a thousand. For running a steam engine  $1\frac{1}{2}$  to 5 or more pounds of coal are required per horse power per hour.

## TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequalled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broadway, New York.

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