L. P. S. says: In a factory a ⅝ inch pipe was placed against the wall, and above a tank in which acids were kept for dipping the bronze work. The pipe was covered with the finer portions of the boxwood sawdust used for drying the work after being dipped. On removing some woodwork, I found the dust on the pipe at a bright red heat. I questioned the workmen to ascertain whether there had been a lamp or fire in any form used there, and found there had been nothing of the kind; but the men had found fire there before. I then brushed the burning dust from the pipe, and soon after, on a blow being struck on the woodwork, more dust fell; and lodging on the pipe, it ignited immediately and became incandescent. I thought that perhaps the fumes of the acids affected this dust and converted it into xyloidin, but the very slow combustion rather precludes such a theory. The gages at the time alluded to indicated between 60 and 65 lbs. pressure, and the steam must have passed through 20 or 30 feet of pipe after leaving the boiler. A. The supposition that there was a gradual conversion of the woody fiber into nitrocellulose, by the continued action of the acid fumes, under the circumstances narrated, is a conjecture both ingenious and probable.

C. Y.—Your boat seems to be well proportioned. Your engine should make from 250 to 300 revolutions per minute, giving a speed of from 8 to 10 miles an hour.

G. B. M. asks: 1. How can oxygen gas be generated, and can it be kept for inhalation? A. There are several methods of preparing oxygen. The safest way for an amateur is to heat good commercial binoxide of manganese to redness in an iron retort. 2. Is there any way to produce and keep up a succession of electrical sparks? A. A good electrical machine will give a succession of sparks to the knuckle or a metallic object held near the prime conductor, so long as the plate or cylinder is kept in motion. 3. How is aqua ammonia made? A. On the small scale by heating a mixture of sal ammoniac and lime and receiving the gas into cold water. 4. What is carbolic acid? Is it poisonous? A. Carbolic is made from coal tar and is poisonous. Its chemical formula is $C_{12}H_5O.HO$.

A. S. asks: In testing milk, what is the relative proportion of cream and milk? If I pour 5 inches of milk into a test tube and let it remain in a moderately warm place till the cream all rises to the top, how thick ought the cream to be? From the thickness of cream in a watered sample of milk, how am I to draw correct conclusions as to the amount of water added by the milkman who sells it? A. The thickness of the cream would depend somewhat on the length of time the milk had stood in the milkman's can, and whether it was taken from the top or bottom of the can, also on the diet of the cattle and the condition when yielded. You must determine the thickness of cream from milk you know to be good, and then compare with the unknown sample. No rule expressed in fractions of an inch can be given.

J. P. H. asks: If a siphon whose vertex is 50 feet above the level of a reservoir be closed at each arm with a stopcock, and both branches be then filled with water at its vertex, after which it be made airtight and both ends be opened, will the water flow through the siphon, or will the formation of a vacuum be made of its vertex? A. The siphon will not work.

G. R. J. says: 1. When a light is applied to a perforated cork in a bottle containing oxygen and hydrogen gases, an explosion takes place, driving the cork with great force out of the bottle. When the two gases form water, is there not a vacuum in the bottle? A. If no air be allowed to enter after the explosion, a partial vacuum will be left. 2. If a vacuum is produced in the bottle, why does not the external air force the cork in? A. It would, if the cork could be prevented from blowing out. 3. What forces the cork out? A. The great expansion of the gases, due to the heat generated from chemical combination of the hydrogen and oxygen.

H. C., H. E. W. and others: You need entertain no doubt as to the possibility of making sugar and sirup from sawdust, rags, and paper. In order to effect this change, shreds of linen, paper, or sawdust are submitted to the action of strong sulphuric acid in the cold. After a certain time the acid is diluted with water and boiled for some hours, and the free acid finally neutralized with chalk. The flue is then filtered, evaporated to a sirup, and set aside to crystalize. Sugar sirup is now made on the large scale in Europe from starch and dilute sulphuric acid. But this chemical sugar is glucose; it is not so sweet, nor does it crystalize so readily as the sweet natural cane sugar. Nevertheless it is imported into this country and used more extensively perhaps than many suppose. But if it be properly made and purified, there need be no alarm in using it, as it is identical in composition with the sweet principle of fruits. Chemists have not yet discovered how to manufacture cane sugar artificially. A cheap process that would convert grape sugar or glucose, which we have been considering, into cane sugar would be of great value. There is little doubt that considerable quantities of artificial glucose or grape sugar are used in the shape of sirup, either alone or mixed with natural sirup. The dark stain sometimes seen is caused by iron, which may have arisen in the manufacture. The correspondent who speaks of feeding a decoction of muriatic acid and old rags to his children is under a misapprehension. No muriatic acid is used; and if old rags are employed, they are no longer rags when converted into sugar

E. C. H. asks: 1. Which has the greatest driving power, a balance wheel 3 feet in diameter or one 4 feet in diameter, the weight being the same in each wheel? A. Precisely alike, other things being the same. 2. Did the trilobite have feet or legs? A. No traces of limbs have been discovered. 3. How are codfish and cocoa nuts desiccated? A. The water is exhausted from them, and they are then pressed.

C. says: Will carbonic acid gas completely extinguish fire when it exists at a dead red heat, or are its virtues confined simply to a blaze? A. We once tried some experiments with carbonic acid gas as a fire extinguisher with the following results: The gas used was compressed in an iron reservoir, to from 200 to 300 lbs. per square inch, so that a stream of gas of any desired force could be obtained. When a current of carbonic acid gas was directed upon burning shavings at the bottom of a barrel, the flame was instantly extinguished, but was rekindled after a few minutes. The shavings had been saturated with kerosene and allowed to burn some time before applying the gas. A series of experiments in this way showed that carbonic acid gas will instantly extinguish flame. When the shavings had become a mass of incandescent fuel, the gas, directed against it, destroyed combustion at the surface, but the interior heat of the mass soon rekindled the blackened surface. The interior fire and heat were not removed, though an atmosphere of carbonic acid lay above the fuel for some time. When a strong current of gas under high pressure was directed upon flame at distance of 5 or 6 feet, the effect was lost, the fuel burning more fiercely than before, from the fact of the stream of gas spreading and carrying with it so much oxygen from the air.

H. S. asks: 1. What will force the beard to grow? A. Nature and time are the most powerful auxiliaries. Frequent shaving seems to stimulate the growth to some extent. 2. How can I make nitrate of ammonia? A. Saturate nitric acid diluted with three or four times its weight of water with sesquicarbonate of ammonia, evaporate by a gentle heat and crystallize. When not required crystallized, the salt is evaporated to dryness at 212° Fah.; and the heat being then carefully raised to about 250° Fah., the melted salt is poured upon a polished slab of iron or stone, and when solidified taken up and put into bottles. 3. How can I make Greek fire? A. The ancient Greek fire was a compound of sulphur, bitumen, and pitch. The name has also been given to substances that will ignite on the surface of or under water. If a glass bottle containing benzole and a small piece of potassium be broken on the surface of water, the benzole will take fire. 4. How can I combine phosphorus and chlorate of potash? A. The phosphorus is made into an emulsion with warm glue or gum and the fine chlorate afterwards incorporated by stirring. 5. What danger is there in making phosphide of calcium? A. Phosphorus requires to be handled with great caution, therefore there is danger in inexperienced hands in experimenting with it, owing to its ready inflammability. 6. How can I make a cheap galvanic battery? A. Insulate a cylinder of zinc in a copper vessel containing a solution of sulphate of copper. The zinc is one pole and the copper the other. 7. How can I make from 5 to 10 lbs. of ice at one time at a cost of from ½ to 1 cent per lb.? A. Small machines are made in France for this purpose, invented by Carré.

W. H. S. asks: 1. At what cut-off does an engine give the most power? A. At full stroke. 2. Which gives the most power, a short or a long stroke engine, both using the same amount of steam? A. Theoretically both give the same, with similar piston speed. 3. How do engineers tell how large to make steam pipes? A. There are definite rules, depending upon piston speed, length, and form of connection, etc. 4. If I have a column of water above a boiler and the weight of water is greater than the pressure of steam, will the steam escape up through the water? A. Yes, if there is no valve between.

T. C. O'B. asks: How can a straight avenue of fifteen yards wide and two hundred yards long best be lighted up brightly? We have tried some glass reflectors, but they are entirely inadequate. Would a lens of the Fresnel kind answer the purpose? What is the best manner to adjust a lens? We have gas on the premises. A. The best lens will be of little use, if you do not have a good light. By forcing air into the flame of your gas, and directing the jet upon chalk, you can obtain quite a brilliant light.

M. E. D. says, in reply to our correspondents who asked as to washing flannels: Take soft water, as warm as you can bear your hands in. Make a strong suds, well blued. In washing fine flannels, wet but one piece at a time; soap the dirty spots and rub with the hands, as washboards full the flannels. When half clean, add three times as much blue as for cotton clothes. Use plenty of soap. When clean, have ready a rinse of the same temperature as the suds, rinse well, wring tight, shake briskly for a few minutes, hang out in a gentle breeze. When nearly dry, roll smooth and tight for an hour or two. Press with a moderately hot iron. If embroidered, press on the wrong side. Flannels washed in this way will look white and clean when worn out, and the quality will look better than when new.

L. M. R. says, in answer to J. B. V., who asks how he may remove green moss from his brown stone stoop: Carbolic acid will effectually accomplish it. A solution containing one per cent of the acid in water should be applied to the plants, which will kill them, although it will not alter their appearance. After a few hours they may be washed off clean from the brick or stone.

C. W. Y. says, in reply to F. O. C. H., who asked as to patching a boiler: Take off all warped and twisted parts of the boiler plate; have your patch large enough to cover the hole nicely, then bolt it on firmly with boiler bolts, bevel the patch on the outer corner, or, in other words, thin the patch; then, with a calking tool, upset the iron all around the patch close to the boiler. This, if properly done, will make a perfectly water and steam tight joint without cement of any kind. I have calked up leaky rivets in boilers with a calking tool, so that they were tight under any pressure.

A. W. W. says: C. W. B. asks, on p. 202, if there is any better way to make a house warmer than the usual weatherboarding and plastering, except to fill in with brick between the boarding and plastering: Let me give him my ideas of how a frame house should be built. After the frame is up, cover the outside with rough one inch boards, then put on a covering of tar roofing felt (which will not cost over twelve or fifteen dollars for a medium sized house) and put the clapboards on top of that, then go inside and lay a course of brick on the underpinning up to a level with the top of the sills; this will make the cellar much warmer; now take some strips about one inch square and saw them off to a length of the distance between the studs, nail them on to the outside boarding between the studs, lath on to them, letting the lath run up and down, then put on a good thick rough coat of plaster; then lath and plaster the inner wall as usual. The plastering between the studs will only add a trifle to the cost of the house, probably not more than 60 or 75 dollars to a medium sized house. The rooms will be very much warmer in winter and cooler in summer, and the walls will always be dry, for the wind, frost, or dampness will never get beyond the first coat of plaster.

J. H. W. says, in answer to M. V. D.'s question as to condensation: I will say that a worm 4 feet in diameter, 8 coils deep, and 2½ inches diameter of pipe, if kept cool by a continuous stream of cold water, will condense easily 2,000 gallons of proof spirit per day. A worm of ½ inch pipe and coiled 1 foot in diameter, 8 coils deep, will condense 1¼ gallons proof spirit per hour, if the coil of pipe or worm is kept cool as above stated. This would make the latter condenser (worm) 24 feet long; the former one would be 96 feet.

H. W. G. replies to W. P. S. P.'s query as to the area visible from an elevation of 400 feet: The hight you mention gives a range of 20·25 miles all around giving a surface of, in round numbers, 1,280 square miles.

H. W. G. replies to R. H. D.'s query as to the sinking of the 1,000 feet tower: A sinking of ¾ inch on one side would throw it out of perpendicular 4·90 inches at top. Settling ¾ inch on one side and raising ¾ on the other would throw it 9·98 inches away at top.

G. W. says, in answer to C. W. B., who asked for a cheap and efficient method of building a house, which will make it warmer and drier than any other plan in use: Put the studs one foot apart, and board perpendicularly (outside and inside) with 12 inch stock boards, making the joints on the center of the studs. Then put siding or battens on the outside, and fur with lath over the cracks on the inside, before lathing and plastering. Blocks should be nailed between the studs on a level with the chamber floor to prevent the upward escape of warm air, and it is better if a course of bricks is laid on these before the inside sheathing is put on. A tall house should never be battened, for it will make it look out of proportion; for a similar reason, a low house appears better with perpendicular battens.

M. G. P. asks: How can I render a pair of buckskin gauntlets impervious to water?—A. D. asks: How can I prepare gelatin for molds to cast plaster of Paris undercut work?—A. B. asks for a formula for obtaining the force of the wind at different velocities.—F. H. S. asks: Of what metal can I make rivets for leather, which can be coated with a black color?—C. L. C. asks: How can I make a cheap barometer or instrument of any kind to foretell a storm by pressure? "I think those influenced by moisture are worthless, as often a damp night will change them as much as a storm."

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges, with much pleasure, the receipt of original papers and contributions upon the following subjects:

On the Regulation of Patent Monopolies. By G. H. K.

On a Mathematical Problem. By H. M.

On Polishing a Parabolic Mirror. By W. B. C.

On Reclaiming the Colorado Desert. By R. d'H.

On Steam Engines and Turbine Wheels. By J. H.

On Drying Lumber by Steam. By H. G. B.

Also enquiries and answers from the following:

A. W. M.—F. G. H.—F. R.—E. B. W.—C. J. T.—N. A. W.—J. P. F.

Correspondents in different parts of the country ask: Who makes milking apparatus? Who sells leather splitting machines? Makers of the above articles will probably promote their interests by advertising, in reply, in the SCIENTIFIC AMERICAN.

Several correspondents request us to publish replies to their enquiries about the patentability of their inventions, etc. Such enquiries will only be answered by letter, and the parties should give their addresses.

Correspondents who write to ask the address of certain manufacturers, or where specified articles are to be had, also those having goods for sale, or who want to find partners, should send with their communications an amount sufficient to cover the cost of publication under the head of "Business and Personal," which is specially devoted to such enquiries.

[OFFICIAL.]

Index of Inventions

FOR WHICH

Letters Patent of the United States

WERE GRANTED IN THE WEEK ENDING

March 24, 1874,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

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APPLICATIONS FOR EXTENSION.

Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications are appointed for the days hereinafter mentioned:

28,852.—PEGGING MACHINE.—J. J. Greenough. June 10.
28,874.—POST HOLE DIGGER.—J. Lee. June 10.
28,941.—SKELETON SKIET.—S. S. Sherwood. June 10.

EXTENSIONS GRANTED.

27,609.—WRINGING MACHINE.—S. A. Bailey.
27,627.—CULTIVATOR.—C. M. Hall *et al.*
27,641.—HARVESTER.—F. T. Lomont *et al.*
27,656.—HORSESHOE MACHINE.—W. Tallman.

DESIGNS PATENTED.

7,251.—CLOCK CASE SASH.—G. Blakesley *et al.*, Bristol, Ct.
7,252 & 7,253.—TYPE.—J. M. Conner, Greenville, N. J.
7,254.—JEWELRY BASE.—S. Cottle, New York city.
7,255.—CARPET.—J. C. Johnson, Scarborough, N. Y.
7,256.—GLASSWARE.—T. C. Pears, Pittsburgh, Pa.
7,257.—GATE HINGE.—A. B. Tanner, New Haven, Conn.
7,258.—CADDY.—G. B. Wheeler, Brooklyn, N. Y., *et al.*
7,259.—COOK STOVE.—R. Wheeler, Utica, N. Y.
7,260.—ORGAN CASE.—J. R. Lomas, New Haven, Conn.

TRADE MARKS REGISTERED.

1,682.—FLOUR BAGS.—L. D. Benner, Boston, Mass.
1,683.—UMBRELLA STRETCHERS.—Dawes *et al.*, N. Y. city.
1,684.—MOTH POWDER.—G. F. Gantz & Co., N. Y. city.
1,685.—ALE.—T. McMullen, New York city.
1,686.—GINGER ALE.—A. S. Miles & Co., Baltimore, Md.
1,687.—BUTTONS.—N. Y. Button Co., New York city.
1,688.—STOVES, ETC.—J. Reynolds & Son, Philadelphia, Pa.
1,689.—WIRE CLOTH.—Wood & Co., Lowell, Mass.
1,690.—PERFUMERY.—Young & Co., New York city.
1,691.—SHIRTS.—Marr Bros., Boston, Mass.
1,692.—YARNS.—Thames Worsted Co., Norwich, Conn.
1,693.—NEEDLE THREADER, ETC.—H. Weels, Woburn, Ms.

SCHEDULE OF PATENT FEES.

On each Caveat	$10
On each Trade Mark	$25
On filing each application for a Patent (17 years)	$15
On issuing each original Patent	$20
On appeal to Examiners-in-Chief	$10
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
On an application for Design (3½ years)	$10
On application for Design (7 years)	$15
On application for Design (14 years)	$30

CANADIAN PATENTS.

LIST OF PATENTS GRANTED IN CANADA, MARCH 27, 1874.

3,228.—William Sharp, Portland, Cumberland county, Me., U. S. Improvements in preparing and preserving fish, called "Sharp's Improvements in Preparing and Preserving Fish." March 27, 1874.
3,229.—I. D. Spang, Dayton, Montgomery county, O., U.S. Improvements on portable toy race track for field and parlor amusement, called "Spang's Toy Race Track." March 27, 1874.
3,230.—A. R. Thomas and L. C. Thomas, assignees of E. G. Thomas, Huntington, Huntington county, Ind. Improvements on cut-off valves and link motions, called "Thomas's Cut-off Valve and Link Motion." March 27, 1874.
3,231.—W. F. Barnes, Rockford, Winnebago county, Ill. Improvements on mechanical combinations for converting motion, called "Barnes' Mechanical Movement." March 27, 1874.
3,232.—H. J. P. Whipple, Meriden, New Haven county, Conn. Improvements on attaching knobs to spindles, called "Whipple's Improved Knob Fastening." March 27, 1874.
3,233.—T. Whitwell, Thornaby Iron Works, Stockton-on-Tees, Durhamcounty, England. Improvements on fireplaces and stoves, called "Whitwell's Ventilating Stove." March 27, 1874.
3,234.—Jas. T. Bustin, St. John, St. John county, N. B. Machine for putting the paste on room or wall paper, called "Bustin's Self-acting Wall Paper Paster." March 27, 1874.
3,235.—S. P. Barnum, Thurlow, Hastings county, Ont.—Improvements on a machine for fastening cords and ropes, called "Barnum's Cord and Rope Fastener." March 27, 1874.
3,236.—A. J. Somerville, Toronto, York county, Ont. Improvements in paint cans, called "Somerville's improved Paint Can." March 27, 1874.
3,237.—T. Hall, Florence, township of Northampton, Hampshire county, Mass. Mechanical device for a bench vise or clamp, called "Hall's Improved Bench Vise or Clamp." March 27, 1874.
3,238.—H. A. White, Hamilton, Wentworth county, Ont. Improvements in dampers for stove pipes and furnaces, called "The Excelsior Compression Damper." March 27, 1874.
3,239.—B. G. Devoe and W. L. Walker, Kenton, Hardin county, O. Improvements on iron fences, called Walker & Devoe's Iron Fence." March 27, 1874.
3,240.—L. Miller, Jarvis, Haldimand county, Ont. Improvements on moldboards for plows, called "Miller's Improved Moldboard," March 27, 1874.
3,241.—H. E. Wells, Van Wert, Van Wert county, O. Improvements on lumber-drying houses, called "Wells's Lumber Dryer." March 27, 1874.
3,242.—G. A. Kittson, Quebec, P. Q. Improvements on overshoe and boot fastenings, called "Kittson's Overshoe Fastener." March 27, 1874.
3,243.—H. W. Carr and M. Turnbull, Hamilton, Wentworth county, Ont. Improvement in tool boxes and cutters, called "Carr & Turnbull's Improved Tool Box for Iron Planers." March 27, 1874.
3,244.—R. Smith, Sherbrooke, P. Q. Improvements on air furnaces, called "Smith's Improved Hot Air Furnace." March 27, 1874.
3,245.—F. Tarrant and I. P. Conkling, Saratoga Springs, Saratoga county, N. Y. Improvements on stove pipe thimbles, called "Tarrant's Stove Pipe Thimble." March 27, 1874.
3,246.—J. H. Thorp, Chicago, Cook county, Ill., assignee of J. P. Thorp, Southington, Hartford county, Conn. Improvements on thill couplings, called "Thorp's Thill Coupling." March 27, 1874.
3,247.—A. Ungerer, Simmering, Vienna, Austria. Improvements on the process for preparing paper pulp, etc., called "Ungerer's Paper Pulp-making Process." March 27, 1874.
3,248.—W. Glen and W. H. Lynch, Shipton Township, P. Q. Machine for grinding, polishing, and finishing slate or other stone, called "Glen's Slate or Stone Finisher." March 27, 1874.
3,249.—L. A. Canteau, Borough of Léonville, France. Improvements in self-acting machinery for sowing potatoes, called "Canteau's Potato Sowing Machine." March 27, 1874.
3,250.—S. P. Willeby, Philadelphia, Philadelphia county, Pa. Improvements on keels for vessels, called "Willeby's Safety Keels." March 27, 1874.
3,251.—T. A. Davies, New York city, U. S. Improvements on signal hand lanterns, called "Davies' Signal Lantern." March 27, 1874.
3,252.—G. H. Davis, Boston, Mass. Improvement on upright pianofortes, called "The Soprano." March 27, 1874.
3,253.—R. Smith, Sherbrooke, P. Q. Improvement on the art or process of reducing wood or other kindred substances to fibrous pulp, called "Smith's Patent Superheater." March 27, 1874.
3,254.—W. C. Hobs, London, Ont. Improvement in metallic pipe bedsteads, called "Hob's Folding Pipe Bedstead." March 27, 1874.
3,255.—T. H. Carroll, Erie, Pa., U. S. Improvements on a machine for sawing lumber into strips, called "Carroll's Improved Sawing Machine." March 27, 1874.
3,256.—T. Alexander, Glenwilliams Village, Ont. Improvement on wagons, called "Alexander's Improvements on Wagons." March 27, 1874.