

### The Rapid Decline of Geyser Activity in Yellowstone Park.\*

BY PROF. E. H. BARBOUR, OF THE UNIVERSITY OF NEBRASKA.

We would avoid posing as alarmists respecting the decline of geyser activity in the Yellowstone National Park, but nevertheless, if the present apparent rate of decline continues, it seems likely that within a decade many of the scenes which attract us most will have disappeared. The naturalist should visit this spot at once. It was my privilege to visit the National Park on August 5, 1895, and again August 5, 1899, and certainly the evidence of change during these short years seems startling. To the geologist the change is serious and impressive. It may be said in a general way that there is an apparent decline of geyser phenomena everywhere throughout the Park.

Or such is the impression of myself and others, if impressions are reliable. Furthermore, it is the impression of frequenters of the Park, especially those who visit it annually, that the decline of geyser phenomena there is greater than is realized by the people at large. So much for a general statement.

To be more specific, without entering into many details, it may be stated that around the splendid terraces at the Mammoth Hot Springs, buildings now stand where there was steaming water in 1885. Spots which we photographed in 1895, standing shoe soles in water, are now either dry or nearly so. Minerva Terrace, which was boiling and which presented a fine array of geyserite in 1895, is falling into decay. Large blocks of the "formation" are falling from the rims and sides of the basins. To the eye the amount of water which flows over Pulpit Terrace and Jupiter Terrace is noticeably less.

We should say not one-half what it was four years before. The lattice work, constructed for the purpose of spraying and incrusting curios, was changed to a new spot where water was still flowing. The narrow gage, which may be called a fissure vent, though still showing life, is extinct as compared with conditions four years ago. Roaring Mountain is still steaming, though silent. In the Norris Geyser basin the most obvious change is in the Black Growler, which formerly emitted volumes of steam from an oblique vent by the

\* An address delivered August 25, 1899, at the Ohio State University, Columbus, O., before the Geological Section of the American Association for the Advancement of Science. Revised by the author especially for the SCIENTIFIC AMERICAN.

roadside. The steam jet is now divided and the volume of steam and its roar and display of energy greatly diminished. The Fountain Geyser, which was such a favorite that the Fountain Hotel was located at that spot, is now wholly extinct, and tourists are complaining because they must waste time stopping at this hotel. The Fountain has been replaced by a new but very inferior substitute named the Dewey Geyser. Tourists do not care to wait to see it in eruption. The giant paint pots are now so contracted in size that one can walk over what was a short time ago boiling mud. The red half is extinct; the white half active, though reduced in area. In the Upper Basin there is evidence on all sides of activity, but with many changes since 1895. Then the Splendid Geyser was attracting attention. Now it is silent and considered extinct. It is replaced by the Daisy Geyser, an interesting but vastly inferior substitute. The Cascade Geyser, another favorite because of the frequency of its eruptions (about every 15 minutes), has dropped to an eruption interval of once every 24 hours.

The Grand Geyser, which used to erupt once a day, has been active but three or four times the past season, according to all accounts. The Beehive Geyser, active in 1895, is supposed to be wholly extinct. Old Faithful seems as fine as ever, but the interval of eruption is now about 75 or 80 minutes instead of once an hour. If it is possible to judge fairly of such matters, there seems to be increasing activity in the ebullition of the water in that greatest of geysers, the Excelsior, which leads to a feeble hope that it may possibly be rejuvenated yet once again. In this connection may be mentioned the apparent increase in the activity of the Mud Geyser, by the thumb. The mud, which in 1895 was thick, and thrown up in large masses but a few feet, is now thinned and ejected as far as the road, a distance probably not far from 200 feet. At first thought it seems like increased activity, yet it may possibly be accounted for on the ground that the mud is in a condition making more active ejection possible. A great quantity of mud has been thrown out recently, as much as 8 to 10 feet thick, and the trunks and boughs of the neighboring pines are loaded and weighed down with mud. Trunks were noted where the coating of mud, half way up to top, exceeded 6 inches. The front half of the crater is now built up symmetrically with the other side, making a very regular funnel-shaped crater about 100 feet across,

and some 25 or 30 feet deep. Below, the mud is in a state of constant and active ebullition. Possibly this case may be construed as a case of increasing activity; however, on the whole it is only too obvious that there is a serious decline, as one can see by observation, and can learn by consultation with the drivers, guides, tourists and officers at the barracks. It was the testimony of all that the changes were much more rapid than is understood, and our closing admonition is, visit the National Park at once.

### The Current Supplement.

The current SUPPLEMENT, No. 1256, is of great interest. "Mechanical Traction on Canals" is the title of an important article, and "Towing Canal Boats by Electricity" describes a curious trolley system in which the motor runs on rails along the tow-path and receives its current from a trolley. "The New Smokeless-Powder Guns of the United States Navy" gives important tables. "Homemade Windmills of Nebraska" is concluded, and the Holland mill, the stationary turbines, vaneless turbines and mock turbines are described. It is accompanied by thirteen interesting engravings showing in detail the construction of these important windmills. "Competition for the Best Life-Saving Device in Cases of Disaster at Sea" gives the official regulations which have been adopted in regard to the Anthony Pollok Memorial Prize. "The Pan-American Exposition of 1901" is accompanied by four large illustrations, and there is also an article on the buildings. The Exposition is going to be an important one, and will doubtless be visited by hundreds of thousands from all over the country.

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### RECENTLY PATENTED INVENTIONS.

#### Bicycle Appliances.

**DEVICE FOR MENDING PNEUMATIC TIRES.**—EDMOND ISBILLS, Bayonne, N. J. The device comprises practically three parts: a guide-cup, a fixing-needle, and a cementing-needle. The fixing-needle is employed for securing the guide-cup in the tire; and cement is introduced by means of the cementing-needle. When the device is withdrawn from the tire, the puncture will be immediately filled with cement, the body of which will be left in the form of a cap or head adhering to the inner surface of the tire around and over the puncture. The tire can be inflated immediately after the cement has been placed in position, the air drying the cement and forcing it into better contact with the tire.

#### Agricultural Implements.

**CHURN.**—JOHN J. JONES, Braman, Oklahoma Territory. The inventor supports the cream receptacle or body of the churn in a light frame hung from a crank-shaft, which, being rotated, imparts a reciprocating and oscillatory movement to the body and thus quickly separates the butter from the other constituents of the cream.

**CULTIVATOR.**—HENRY C. BOTHWELL, McArthur, Ohio. This manually-operated cultivator comprises a frame carrying cultivating devices, a draft-bar secured to the frame and having points for a draft, which points extend rearwardly of the front cultivating devices and at an oblique angle to the face of the frame. The resistance to be overcome at the points of the teeth being greater than the gravity of the implement at these points, the implement will have a tendency to rise at the rear and revolve forward on its front teeth. The operator overcomes this tendency to revolve by lightly bearing downward on the handles, thus embedding the teeth the required depth. As the implement is drawn ahead, the teeth will regularly act upon the soil; and the draft will be exceedingly light.

#### Engineering Improvements.

**SLIDE-VALVE.**—JLA N. MOORE, Battle Creek, Mich. Often when a steam-pump is doing heavy work, the piston and valve travel are shorter than when the pump is doing light work. Hence less steam is admitted at a time when more steam is required. But when the load is reduced, the stroke increases and more steam is admitted than is necessary. To overcome this difficulty and to admit a proper amount of steam, the inventor uses a slide-valve provided with extended wings for covering at all times the admission-ports to the cylinder. The wings are provided with ports designed to register with the admission-ports on either a short or a long stroke of the valve, the ports on one of the wings being of a different area from those on the other wing.

**WATER TUBE BOILER.**—TOM FRENCH, Andover, Me. The boiler comprises spaced mud-drums above which are spaced steam-drums. A set of transverse water-circulating pipes lead from a mud drum on one side to the steam drum on the opposite side. The pipes of the sets alternate and are arranged close together at their point of crossing to form a solid roof for the fire-box. A very large heating-surface is provided to insure a quick generation of steam, especially as the circulation of the

water from the mud to the steam drums is comparatively quick; and the heat from the fuel in the fire-box is caused to circulate in the shell to give off its heat, before it finally passes to the smokestack.

#### Mechanical Devices.

**COFFEE OR MALT DRIER.**—FRITZ E. R. OKRASSA, Antigua, Guatemala. This drying-machine comprises a rotary drum provided with means for the admission and escape of the drying agent. Stirrers are held to rotate with the drum and are provided with apertures for the introduction of the material. Slides or doors close the apertures. By the improved construction of drying-compartments, and particularly by the specific arrangement of the stirrers, the drying-compartments can be filled about four-fifths, thus securing an exceedingly thorough utilization of the available space.

**COTTON-ELEVATOR.**—GEORGE W. WILLIAMS, Waco, Tex. The cotton-elevator is pneumatically-operated and is composed of an air-circulating apparatus and a number of boxes each having an air-conduit and a cotton-conduit. The cotton-conduit communicates directly with the main portion of the box into which the cotton is discharged. The air-conduit has a lateral extension at each end, communicating with the box directly adjacent to the cotton-conduit. The air drawn into the air-conduit passes from both ends of the cotton-conduit, thereby establishing cross-currents to deliver the cotton into the body of the box.

**CORSET-FASTENER.**—MARY O. KOSS, Carlisle, Ill. The Ross Corset Fastener is made very thin, with a smooth surface, and will not show through the dress, or catch upon or wear through the most delicate undergarment. When the corset is once fastened it will not open in any position or under any strain, until the ear of the fastener is pressed for that purpose. The fastener is hence especially adapted to the needs of girls in schools and factories, and to the wants of all other women whose occupations require freedom of the body, but who still desire the support of a corset. Being firmly fastened, the unpleasant snapping which characterizes the old style of fasteners is entirely obviated.

**MAGAZINE PENCIL.**—GEORGE W. RICE and GUSTAV ZERRMANN, Brooklyn, New York city. Within a suitable casing is placed a magazine which may be adapted for holding any number of leads. The magazine may be turned to bring any one of the leads desired into registry with an opening near one side of the casing. The end of the casing is beveled toward this opening, so that a larger blunt end of the casing is not brought near the point to interfere with the use of the pencil.

#### Miscellaneous Inventions.

**PUMP.**—ALVA L. REYNOLDS, Santa Ana, Cal. The object of the invention is to provide a well pump which acts on the vacuum principle and which after once being started will continue in operation without further attention. The pump comprises a vacuum-cylinder having a valve-controlled inlet and outlet. A float is arranged in the cylinder and likewise an oil-pump operatively connected with the float. An oil-receiver in the cylinder contains gasoline which can be ignited electrically, the successive explosions of which discharge the air, creating a vacuum and causing the water to rise.

**COMBINATION STEP-LADDER.**—WALTER L. SKELLEY, Cahool, Mo. The invention provides a combination long and step ladder, the sides of which when used as a long or extended ladder constitute each a truss and the hinges central struts, rendering the extended ladder exceedingly stable. The platform and connected parts may be utilized to lock and brace the sections when these sections are brought end to end to form a continuous or long ladder. The ladder can be quickly converted from one form to the other.

**HAT-FASTENER.**—GEORGES SCHMITT, Manhattan, New York city. This fastener is a simple and efficient device comprising a pin of novel construction which is adapted to be engaged with the hair of the wearer. When the pin is forced in position, loops are pushed into the hair so that the hat cannot be blown off.

**BOX.**—JOSEPH V. ORTEN, Iola, Kans. The inventor's purpose has been to provide a cover with a simple means for attachment to and detachment from a box designed to hold carbonated beverages. The cover consists of two sections, the inner or adjacent ends of which are connected by springs. Lugs on the outer end of the section engage perforations formed in upright portions of the box. When the sections of the cover are in horizontal position, the springs will cause them to remain in this position, because the tendency of the springs is to force the inner ends of the cover sections downward.

**COMPOSITION FOR CLEARING SUGAR.**—EDWIN L. McTYRE, Thomasville, Ga. The composition for clarifying brown or crude cane-sugar consists, of clay, chopped corn-husks, and water. A spongy batter is formed which retains its moisture long enough to extract the impurities from the sugar and leaves the sugar clear in the trough. The batter can be very cheaply manufactured and applied without danger of the clay's intermingling with the sugar in the trough.

**CONVERTIBLE TUB.**—MRS. NELLIE F. HURDEL, Manhattan, New York city. This is an ingenious invention for converting a bath-tub into a laundry-tub. Removable partitions are employed, provided with a pneumatic packing which not only makes a tight connection between the partition and the tub, but is self-sustained on the partition, so that no wires or screws are required to hold it in place. Should the lower stretch of the packing become worn, it may be turned upon the partition to bring the upper stretch across the lower portion of the partition.

**DEVICE FOR CONNECTING SHAFTS WITH OTHER PARTS.**—FRANK E. HAWKSWORTH, Helena, Mont. The purpose of the present invention is to provide a device for attaching a cam or pulley to a shaft, which device is so constructed that when the cam or pulley is driven in a proper direction it will remain fast on the shaft, and when driven in a reverse direction may be quickly loosened from the shaft. The device supercedes the pins commonly employed, which are so liable to fall out or be sheared off.

**MOTOR-CYCLE FRAME.**—TOM FRENCH, Andover, Me. Reaches have hall-and-socket connections with the front and rear axles, and a frame has ball-and-socket connection with the rear axle and a longitudinal sliding connection with the front axle. The frame, therefore, yields, when the vehicle-wheels pass over rough roads, to insure easy riding to the occupants of the vehicle and to allow the driving gear to work properly and true at all times.

**SHIRT.**—SIMON ELBAUM, Wilkes-Barre, Penn. The shirt or like garment is provided with a reinforce or yoke extended over the shoulders both back and front and also extended entirely around the sleeves for a portion of their length.

**DEVICE FOR FASTENING SHOES.**—MICHAEL M. DOOLEY, Logansport, Ind. The object of the invention is to provide a means for fastening shoes or for uniting the front sections of the uppers without using a lace or means liable to break. The shoes can be secured upon the feet more quickly than by the ordinary means and the front opening better protected.

**FILLING-CAN.**—WILLIAM L. CLAYTON and NEWTON R. PERSINGER, Central City, Neb. This device for filling lamps with oil from an oil-can or from a barrel comprises a screw-cap in which a delivery-pipe is secured, projecting above and below the cap. A spout is mounted to turn on the outer end of the pipe. An extension-pipe slides on the inner end of the delivery-pipe; and a T-shaped air-pipe is secured in the cap alongside the delivery-pipe, with its horizontal member above the cap. An air-bulb or bellows is connected with one end of the horizontal member of the air-pipe; and a removable cap is provided for the other end.

**COMBINED ASH-BOX AND SHOVEL.**—WILLIAM S. ANDERSON, Jasper, Tenn. This combined ash-box and shovel consists of a box having one side hinged to drop downward and adapted to act as a shovel. The side edges of this side have integral, up-turned flanges. Pivoted links connect the box and shovel and limit the outward swing of the shovel.

**TOBACCO-BASKET.**—GEORGE P. SUGG, St. Lewis, N. C. This basket is of rectangular shape and comprises a flexible bag or body portion and diagonally-arranged and pivoted spring-bars anchored at their ends to the angular corners of the bag, whereby the folding of the basket will cause the spring-bars to move radially to a less distance from the center than they occupied when distending the corners of the body portion or bag.

**SHIPPING CRATE FOR EGGS, BOTTLES, ETC.**—ROBERT I. STEWART, Xenia, Ohio. The inventor provides a cushioning body of stiff paper or pasteboard, having its folds so bent or lapped as to give unusual elasticity to protect the contents of the casing, package, or box. No special means are required to hold the folds down. The laps have an abutment or seat-portion bearing to receive the edges of the fillers or division seats forming the compartments of the crate and thereby render the whole structure stable in character.

**ACETYLENE-GENERATOR.**—WILLIAM F. COOPER, Meriden, Conn. This acetylene-generator has a water-reservoir in the base with a contracted mouth having a screw connection. A carbide-holder in the top has a correspondingly-contracted lower end with screw connection and is covered by a gasometer and connected therewith by a flexible fabric. A valve is mounted in the water-chamber below the bottom of the carbide-holder; and an adjustable rod fixed eccentrically to the gasometer, passes through the carbide-holder, and is adapted to open the valve and feed a fresh supply of carbide upon depression of the gasometer.

**SHELVING.**—JAMES M. LIPPINCOTT, Oakland, Ill. The improved shelving devised by this inventor comprises a shelving-section movable vertically to a height above the ordinary fixed shelving. The section is then

adjusted laterally back above the fixed shelving, thus utilizing the space above the fixed shelving and permitting the movable shelving-section to be conveniently brought within reach.

TOOL-HOLDER.—GEORGE R. SHERWOOD, Kearney, Neb. A suitable framing, clamping devices acting in conjunction with a base-block and a crown-block, the outer surfaces of which are convex and the inner surfaces flat, permit the adjustment of the tool to any angle and enable it to be clamped between the block surfaces in any desired position.

GRAIN-CLEANER.—GEORGE L. BEADELL, Chicago, Ill. The cleaner comprises a box having a hopper at its upper end and containing a swinging binged rougher extending in an inclined position and discharging the coarse material through an opening in the casing to the outside. A swinging binged separator below the rougher and inclined in an opposite direction receives the material passing through the rougher.

Designs.

GAS-COCK.—ANDREW J. WIEGAND, Baltimore, Md. The design patent granted to Mr. Wiegand is for a self-lighting gas burner of novel design, having a main passage for the gas to the burner-tip, a perforated holder for platinum-sponge adjacent to the burner-tip, and a valve which controls the passage of gas to the main burner-tip or to the platinum-sponge so the gas may be ignited at the main tip from the platinum sponge and the passage of gas to the platinum-sponge will be cut off after the gas has been ignited at the burner-tip.

VIOLIN-BODY.—ELIZA A. R. KITCHEN, Monroe, Ohio. The violin has a body partly heart-shaped, partly star-shaped, and an anchor-shaped head.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

NEW BOOKS ETC

PENROSE'S PICTORIAL ANNUAL. THE PROCESS YEAR BOOK FOR 1899. Edited by William Gamble. London: Penrose & Company. 1899. 8vo. Pp. 108.

Process reproductions have almost entirely displaced all other methods of reproducing pictures, and while much has been lost, much has also been gained. At present there does not seem to be any limitation to process work, and the results as outlined in this Annual are wonderful. Some of the half-tones are very remarkable, and the color work is scarcely less so.

AMERICAN ANNUAL OF PHOTOGRAPHY AND PHOTOGRAPHIC TIMES ALMANAC FOR 1900. New York: The Scoville & Adams Company. 1899. 8vo. Pp. 370. Illustrated. Paper 75 cents.

The present volume is ably edited by Mr. Walter E. Woodbury and is the fourteenth of the series. It is filled with valuable articles and it is profusely illustrated. It strikes us as being the best annual we have seen and no photographer can afford to be without it.

METAL AND PLATE WORK. Its Patterns and Their Geometry; also Notes on Metals and Rules of Mensuration for the Use of Tin, Iron and Zinc Plate Workers, Coppermiths, etc. By Charles Millis, M.I.M.E. London and New York: Spon & Chamberlain. 1899. 12mo. Pp. 456. Price \$3.50.

This is an excellent book upon an eminently practical subject. Probably no trade requires such a comprehensive knowledge of geometry as metal plate work, and this book is calculated to give exactly the information which is needed by practical men. The methodical part of it is not neglected, but it is merged in the practical. It is an admirable book and is a complete treatise upon the subject.

STAR NAMES AND THEIR MEANINGS. By Richard Hinckley Allen. New York: G. E. Stechert. 1899. 8vo. Pp. 563. Price \$5.

This list of star names is published in the endeavor to fill an acknowledged vacancy in our astronomical literature. It is not intended for the professional astronomer, who, as a rule, cares little about the old designations of the objects of his study, yet great scholars have thought this nomenclature not unworthy of their attention. The author has accomplished a most difficult task with rare discrimination and success. The work is most scholarly and reflects the highest possible credit upon the learning of its author. Very few men could have written this book, which is most beautifully printed by the DeVinne Press. It will certainly tend to foster a more intelligent interest in the nomenclature of practical astronomy, and the author should be well pleased with the result of his arduous labors.

MATHEMATICS. New York: Doubleday & McClure Company. 1899. 12mo. Pp. 340. Price \$1 net.

This book is essentially practical, and is intended for young men and others who wish to obtain such a knowledge of mathematics as should be of service to them in their business as mechanics or engineers, and to obtain it by study at home. The bulk of the material was issued in The Chicago Record, and proved to be of the utmost interest and value. After a careful examination of the book, we are inclined to believe that the problems proposed are much more practical than in the stereotyped text-books of mathematics.

Business and Personal.

The charge for insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in the following week's issue.

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Notes & Queries

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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.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

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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.

(7815) A. J. W. asks: Can you give me the formula for government whitewash? A. The following coating for rough brick walls is used by the United States government for painting lighthouses, and it effectually prevents moisture from striking through.

Take of fresh Rosendale cement, 3 parts, and of clean fine sand, 1 part; mix with fresh water thoroughly. This gives a gray or granite color, dark or light, according to the color of the cement. If brick color is desired, add enough Venetian red to the mixture to produce the color. If a very light color is desired, lime may be used with the cement and sand. Care must be taken to have all the ingredients well mixed together. In applying the wash, the wall must be wet with clean fresh water; then follow immediately with the cement wash. This prevents the bricks from absorbing the water from the wash too rapidly, and gives time for the cement to set. The wash must be well stirred during the application. The mixture is to be made as thick as can be applied conveniently with a whitewash brush. It is admirably suited for brickwork, fences, etc., but it cannot be used to advantage over paint or whitewash.

(7816) J. K. asks: 1. How much wire and what size would be sufficient to wind the voltmeter described in SUPPLEMENT, No. 1215, to register no higher than 75 volts? A. The same winding may be used for reading to 75 volts as to 110 volts. The scale will be shorter for 75 volts. 2. How many gallons of nickel solution will the plating dynamo described in "Experimental Science" plate? A. The machine is not to be rated by gallons. It will plate small articles, whether in much or little liquid. 3. What is a receipt for nickel solution or how is it made? A. For solutions to be used in plating see Van Horne's Electro-Plating. Price \$1, by mail.

(7817) M. P. asks: What size wire should be wound on a dynamo, the armature of which is 2 inches in diameter and 4 inches long? The F. M. is 6 1/2 inches high and 4 inches wide? A. No definite answer can be given to a question of this sort. To answer it one should have measurements so that a correct and complete drawing of the machine could be made from them, not simply one or two dimensions. The best we can say is, use any number between 24 and 30. You will get something.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Issued for the Week Ending

JANUARY 16, 1900.

AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing inventions such as Acetylene generator, Adding machine, Agitator, Amalgamator, Animal power, etc., with corresponding patent numbers.

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