and if the front side of one ball comes in contact with the hind side of another, both rolling in the same direction, the kinetic friction between them is double that between either ball sliding without rotating and the cone on which it slides. With which explanation of the reasons pro and con we must leave you to judge whether or not it is better in your case to oil or not.

(11005) T. L. G. says: You will do me a favor to decide in your Notes and Queries the following: A holds that centuries are marked at their termination, and cites Gladstone for authority. B holds that centuries are marked at their beginning, and derides the intellectual Gladstone as guilty of this preposterous statement. Who has the better of the argument? A. The last year of each hundred gives the name to the century in which it is counted. We are now living in the 20th century. The last year of the 19th century was the year 1900. The first century began with the year 1 and ended with the year 100, and each century has followed the numbering of the first. This is exactly the same as counting other things. If you counted books, for example, you would count from one to one hundred, and the hundredth book would complete the first hundred books. A is right, although B calls his statement "preposterous."

(11006) G. M. says: Is the weight of the earth always the same, or is it getting lighter or heavier and what is the cause? A. The meteors which fall upon the earth in vast numbers every year add their weight to the earth. Thus the earth is increasing a minute quantity in weight each year, but not enough to be perceptible in thousands of years. Except for the escape of light gases from the atmosphere there is no known way in which the earth can lose weight.

(11007) G. W. M. says: Some time ago you published in the SCIENTIFIC AMERICAN a receipt for making gas from some kind of acids and aluminium; the paper I had has been lost and I would like to get it again if you can get it for me; find inclosed price for the paper. The gas I mean is so it can be lighted and made in a bottle. A. You can obtain hydrogen by means of aluminium in a variety of ways. The simplest method is to put chips of aluminium into sodic or potassic hydrate, using a rather dilute hydrate for the purpose. The mixture should be heated somewhat at first to start the action, but when the gas begins to come off the heat should be withdrawn or the action will be too violent. Another way is to pour hydrochloric acid upon the aluminium chips. This requires no heat. The chemical action will produce a great deal of heat. The acids of fruit will dissolve aluminium in the same way. For this reason aluminium cannot be used for cooking utensils. At one time it was thought that the metal would be of great service in the kitchen, but it had to be abandoned because the compounds formed from the acids of the food were harmful.

(11008) M. E. P. asks: 1. Give colors which have been adopted to indicate what a pipe is carrying. Ammonia pipes are painted one color and steam another, etc. A. There has been, to our knowledge, no sort of standardization of coloring of pipe lines to indicate their contents, and such standardization does not seem to us readily possible, as, if a list were made of all possible pipe contents of different plants, the colors most readily distinguishable from each other would be exhausted long before each content was designated. For instance, one plant may have steam, high and low voltage electric wires, and high and low pressure hydraulic; another may have steam, fire pressure, compressed air, electric wires, and gas, and one system of coloring to cover only those two plants will have already used up white, black, red, yellow, blue, and three other colors less readily distinguishable from the latter. A system must therefore be adopted to suit each particular plant, and the only important feature to be considered is that no two colors which may be mistaken for each other (as blue and green may be by lamplight) be used on adjacent lines, the accidental opening of one of which by mistake for the other in emergency would be dangerous (e. g., if a gas line were disconnected by mistake in looking for a short circuit in electric wires). For your case we would suggest black for steam, white for water, red for fire pressure, blue for ammonia, and yellow for brine circulation, or if there is no object in distinguishing fire from other water lines, red might be reserved for electric wire tubing, but in the light of the foregoing you can probably invent a better system for your special conditions than we can in ignorance of them. 2. What is the wind pressure per square foot at a velocity of 10, 20, 30 40, 50 miles per hour, respectively? A. The following are the pressures per square foot corresponding to the speeds in miles per hour given first:

10 miles per hour = 0.492 lbs. per sq. ft.
20 miles per hour = 1.968 lbs. per sq. ft.
30 miles per hour = 4.429 lbs. per sq. ft.
40 miles per hour = 7.873 lbs. per sq. ft.
50 miles per hour = 12.30 lbs. per sq. ft.

3. How can I determine how much angle to give the blades of a propeller in order to get a certain pitch? A. The pitch of a propeller blade is exactly the same as that of any other screw, a propeller blade being only a section of the surface of a helix, that is to say, the pitch of the propeller is the amount by which any point upon it moves forward (in a direction parallel with the shaft) in one revolution of the propeller. Lay off a helix with the required pitch and the angle which its edge makes with a plane at right angles to its axis will be the angle at which the blades of your propeller must be set to a plane at right angles to the shaft to give the propeller the required pitch.

(11009) G. L. asks: What makes the earth move---not in regard to her three kinds of movements but simply what makes her to move, or in other words, what makes the matter move in the universe? A. The force which causes the earth to move is called gravitation. What its nature is is not known. It acts as if the earth had at some time been hurled into space in a line not directly toward the sun, but to one side of it, and had therefore moved around the sun ever since. Of course we do not think the earth was hurled in this way, but the effect of the attraction of gravitation is such as would have been the result if the earth had been thrown into space by a giant hand. Books of astronomy treat of these matters. One of the most recent is "Moulton's Astronomy," which we will send for $1.75 postpaid.

(11010) H. L. W. asks: In the issue of the SCIENTIFIC AMERICAN for October 3, 1908, in replying to "M. M." (Notes and Queries No. 10872), you say: "We do not know any reason why a person should be affected by lightning striking the water in which he is swimming." Some years ago I was swimming in Lake Luinrigamond, near Worcester, Mass., during a heavy thunderstorm. A very vivid flash of lightning occurred, the thunder being heard at practically the instant of the flash. Simultaneously with the flash, all my limbs contracted strongly, somewhat after the manner of a frog in Galvani's experiment, and I was conscious of a distinct shock comparable to that given by a strongly-charged Leyden jar. The shock was not painful, but was distinctly startling, so much so that I at once made my way back to the float. A friend sitting in bathing trunks on the wet float also said he felt the shock. We afterward found that the lightning had struck on the shore of the lake about a quarter of a mile distant. My knowledge of electricity is quite limited and I should quickly "get over my head" in a technical discussion, but the following explanation of the above facts seems tenable: While, as you state, "the earth is at 2,250 potential and of infinite capacity," would it not be true that at the instant of discharge that point of the earth which is struck by lightning is at a higher potential than the surrounding points? The potential is immediately equalized by the dissipation over the surface of the condenser (the earth) of the charge of electricity, the effects of the dissipation becoming weaker and weaker as the distance from the point of discharge is increased. Now a person submerged in a lake is in very intimate contact with the earth, and the discharge current, if I may use the expression, would pass through his body, as it would through all bodies of equal resistance, not insulated from the earth's surface, and if the current at this point were sufficiently strong, an effect would be produced in the swimmer's body, evidenced in my case by muscular contraction. There is nothing in this explanation except that you do not take cognizance of my assumption that at the instant of a discharge of electricity from a cloud to the earth, the zero potential of the earth is disturbed for an infinitesimal fraction of time, during which time a current is flowing from the point of discharge to be dissipated over the surface of the earth. A. We have read with interest your description of what happened to you when the lightning struck the water near where you were bathing. It would not appear that you experienced much of a shock from the electric discharge. Had you done so, you could not at once have made your way back to the float. It seems to us that your jumping in the water was as likely due to the suddenness of the flash and the sound of the thunder as to any other cause. Still we cannot say that it was so. If one did not experience more shock than from a discharge of a Leyden jar, the lightning was very weak. We entirely agree with your discussion of the conditions of the earth beneath a cloud at the instant of a lightning flash, but do not see that this alters what we said in the query referred to. That a certain degree of electrification should be dissipated from one would not give much of a shock. This is always experienced when lightning strikes in one's vicinity.

(11011) H. W. says: Why is it that, using the same effort and force, a long screw driver will remove a screw nail that cannot be moved by a short screw driver? A. The mechanical advantage gained is entirely and only due to the fact that the longer screw driver has the larger head, and consequently the greater leverage, i. e., the greater difference between the "arm of the power" as represented by the radius of the head and the "arm of the weight" as represented by the radius of the screw head (or half the width of the screw driver point). The only other advantages of the longer screw driver are the usual possibility of assuming with it a more comfortable position, using two hands instead of one, or throwing more weight against the screw driver to prevent the point jumping out of the screw head slot.

NEW BOOKS, ETC.

THE BOY'S BOOK OF STEAMSHIPS. By J. R. Howden. New York: The McClure Company, 1908. 12mo.; pp. 285. Price, $2.

The author has proceeded along very practical lines in the preparation of this admirable book, which will be welcomed not only by boys but by their elders. There is something fascinating about the modern steamship, and the admirable frontispiece, showing the "Adriatic" at Cherbourg, will bring back pleasant memories to many. Of all the works of man's hand and brain, nothing is quite so impressive or fascinating as a ship. Imposing as she may appear when in port, her hull is such a tiny thing when compared to the great and wide sea across which she ventures, that it seems almost impossible that any fabric put together by men's hands could possibly endure the great force of the ocean waves, still less make its way as unerringly as a ferryboat across them to a purposed destination. The author has tried to unveil to his readers the secret which lies behind it all, the secret, namely, of "freedom within the bounds of law"; that man is only permitted to control natural forces for his own ends by obedience to the laws which control them. A recapitulation of the chapters gives an admirable idea of the scope of the book. After an introductory chapter, we come to "Principles of Ship Design," "The Coming of Steam," "Down in the Stokehold," "The Engines," "Propelling Machinery," "The Development of Type," "The Comfort of the Passenger," "Navigating and Engineering Departments," "Steward's Department," "River Steamboats," "Lake and Coasting Steamers," "Ocean Steamships." There are many exceedingly valuable tables scattered through the book. These tables are so valuable, that one almost wishes that the author had called it "The Man's Book of Steamships."

BIOLOGY AND ITS MAKERS. By William A. Locy, Ph.D. New York: Henry Holt & Co., 1908. 8vo.; pp. 439. Price, $2.75.

The author has been frequently in receipt of letters from students, teachers, ministers, medical men and others, asking for information on topics in general biology, and for reference to the best reading on the subject. The increasing frequency of such inquiries and the wide range of topics covered have created the impression that an untechnical account of the rise and progress of biology would be of interest to a considerable audience. This the author gives as his reason for writing this book. This admirably fills a comparatively empty niche in the literature of science. The author has attempted to bring under one view the broad features of the biological progress, and to increase the human interest by writing the story around the lives of the great leaders, naturally the practical execution in the past resolving itself largely into the question of what to omit. The aim has been to keep in mind a picture sufficiently diagrammatic not to confuse the general reader. The book is divided into two sections. In the first are considered the sources of the ideas—except those of organic evolution—that dominate biology, and the steps by which they have been molded into a unified science. The doctrine of organic evolution, on account of its importance, is reserved for special consideration in the second section. The portraits with which the text is illustrated embrace nearly all the founders of biology.

THE STRUGGLE FOR AMERICAN INDEPENDENCE. By Sydney George Fisher. Philadelphia: J. B. Lippincott Company, 1908. 2 vols. 8vo.; pp. 573-585. Price, $4.

The present work is a continuation and an enlargement of "The True History of the American Revolution," published some years ago in one volume. That work, while being a brief general account of the contest, dwelt more particularly on certain phases of the struggle which have been omitted or ignored by historians. It soon became obvious that it did not go far enough, that the original plan should be extended and carried out in more detail, and that the whole mass of original evidence in libraries and historical societies should be made accessible, revealed to the public in as complete and ample form as possible. Our people have little or no conception of what the Revolution really was, no conception of the nature of the original evidence; and the unwillingness of our writers of general history to set forth that evidence keeps it a sealed book to the people. Our national feeling is bound up in the Revolution; the extreme importance of such an event, which was the foundation of our nationality and of the political and social principles by which we are still guided, seems to deserve all the light that it is possible to obtain. Although our Revolution is said to have changed the thought of the world, like the epochs of Socrates, of Christ, of the Reformation, yet no complete history of it has ever been written upon the plan of dealing frankly with all the contemporary evidence and withholding nothing of importance that is found in the original records. Our histories are able rhetorical efforts, enlarged Fourth of July orations, or pleasing literary essays on selected phases of the contest; there has been no serious attempt to delve in the original sources of information and reveal them to the reader, as has been done with the history of England, of France, and of other countries. In view of these facts, Dr. Fisher has written the admirable history which we are now reviewing. There is no one better qualified as a sound and accurate historian than Dr. Fisher, whose writings have been received with respect by all the reading community.

HOW IT IS DONE, OR VICTORIES OF THE ENGINEER. By Archibald Williams. New York: Nelson & Sons, 1908. 12mo.; pp. 484. Price, $1.25.

In these pages the reader will find an account of the great bridges built and in course of construction, and other great railway enterprises during the past few years, including tunnels and car ferries; also the story of the Florida East Coast Railway built over the sea. Ample space is given to the description of the new Croton dam and the Panama canal. The book is excellently illustrated by numerous well-executed engravings, a number of which have already appeared in the SCIENTIFIC AMERICAN.

IN VIKING LAND. Norway, Its Peoples, Its Fjords, and Its Fjelds. By W. S. Monroe. Boston: L. C. Page & Co., 1908. 12mo.; pp. 332. Price, $3.

The present work is the result of two vacation trips to Norway and rather wide reading of the extensive literature of the country. The author's aim has been to give prospective tourists some notion of the benefits to be derived from a visit to Norway, and to inform readers who prefer to travel within the covers of a book. The author also trusts that this book may serve to refresh the memories of those who have already traveled in Norway. In any country so rich in mountains, ice fields, and waterfalls and fjords, it is altogether easy to devote the chief part of a book to those forms and forces. This is precisely what most writers on Norway have done. The present volume, on the other hand, gives prominence to matters of human interest—the people, their habits, customs, and traditions, to the developed and developing civilization of the country. The Viking age appeals strikingly to the imagination of readers and travelers, and the author has endeavored to draw from the chronicles of the old Norse sagas and the existing historic objects which have visible connection with the past such facts as may aid in the construction of a fairly vivid picture of this stirring period. The author has produced a most interesting volume, which has been beautifully illustrated, printed, and bound by the publishers.

BRIDGE ENGINEERING. ROOF TRUSSES. A Manual of Practical Instruction in the Calculation and Design of Structural Steel Truss and Girder Bridges for Railroads and Highways. Including also the Analysis and Design of Roof Trusses and Other Details of Mill Building Construction. By Frank O. Dufour, C.E. Chicago: Published by the American School of Correspondence, 1908. 8vo.; pp. 384; 340 illustrations; half morocco; marbled edges. Price, $3.

The fact that this work by Prof. Dufour has been officially adopted as a textbook at the University of Illinois, is in itself convincing evidence of its value as a contribution to the literature of structural engineering. It is admirably adapted for the general practical use of the engineer. The problems involved in the calculation and design of modern steel structures are complicated, yet are adequately compassed here in a handy volume of moderate proportions. The treatment is exceedingly clear and concise, and free from the abstruse mathematics that ordinarily overburden other works in this difficult field. The section on Bridge Engineering treats fully both Bridge Analysis and Bridge Design, embracing the various types of truss and girder bridges, bridge piers and abutments, bearings, and other details, for railroads, country highways, etc. Every detail is clearly explained by the aid of diagrams, while graphical methods are chiefly used in the computations. The same practical and concise treatment marks the section on Roof Trusses, which covers all details of the analysis, calculation, and design of the various types of roof trusses used for buildings of various spans, the methods of securing good light and ventilation, the layout and other details of mills, shops, etc. Photographs of typical modern structures are shown, with full explanation of the methods followed in their design, and in some cases statements of cost.

A TEXTBOOK ON ROADS AND PAVEMENTS. By Frederick P. Spalding. New York: John Wiley & Sons, 1908. 12mo.; Pp. 340; 51 figures. Price, $2 net.

The methods employed in the construction and maintenance of highways have changed so greatly since the first publication of this book, that in the preparation of this edition it has been found necessary to practically rewrite the entire book. An effort has been made to briefly represent the best recent practice in highway work, and the book has necessarily expanded considerably beyond its former limits. The book contains chapters on "Road Economics and Management," "Drainage of Streets and Roads," "Location of Country Roads," "Improvement and Maintenance of Country Roads," "Broken-Stone Roads," "Foundations for Pavements," "Brick Pavements," "Bituminous Pavements," "Wood-Block Pavements," "Stone-Block Pavements," and "City Streets."

THE CAMPAIGN AGAINST TUBERCULOSIS IN THE UNITED STATES. Including a Directory Dealing with Tuberculosis in the United States and Canada. Compiled under the Direction of the National Association for the Study and Prevention of Tuberculosis by Philip P. Jacobs. New York: Charities Publication Committee of the National Association for the Study and Prevention of Tuberculosis. 8vo.; pp. 467. Price, $1.

This book has been made possible by the generous co-operation of the Russell Sage Foundation, which has supplied the necessary funds for its preparation and publication.

CENTENNIAL OF RELIGIOUS JOURNALISM. Edited by the Rev. J. Pressley Barrett, D.D. Dayton, Ohio: Christian Publishing Association, 1908. 12mo.; pp. 656.

CONSTRUCTIVE DRAWING. A Textbook for Home Instruction, High Schools, Manual Training High Schools, Technical Schools, and Universities. Arranged and published by Herman Hastein. Chicago, 1908. Oblong 4to.; pp. 33; 33 plates. Price, $1.

The author, who is a practical instructor in drawing, has applied an excellent series of problems, which will be found a great help for home instruction. This work represents the first year's course that has been followed the past twenty-five years in Chicago high schools and in the drawing departments of the Chicago Mechanics' Institute. A practical experience of seventeen years in the office and shop, and his occupation as teacher during the past thirty years, has given the author such judgment as to select only problems of practical importance to those who follow architectural, mechanical, and engineering vocations, as well as problems which are indispensable to manufacturing and industrial pursuits. The book is worthy of a good sale.

SECRETS OF THE ROCKS, OR THE STORY OF HILLS AND GULCHES. A Manual of Hints and Helps for the Prospector and Miner. By S. M. Frazier. Denver: Hall & Williams, 1908. 12mo.; Pp. 491. Price, $2.15.

There are prospectors' handbooks by the score, and scientific treatises on miners and mining by the hundreds, but have you ever seen a book which contained all the facts of the one and the theories of the other, and yet which was truly a story of the hills and gulches, told in such a way as to be full of the most intense interest, even to those who are not prospectors and miners? Such a book is "Secrets of the Rocks." Its author has been a practical prospector in the mountains of the far West for more than three decades, and during all that time he has been striving to learn the "secrets of the rocks" by personal observation and exhaustive study of the researches of others. He has embodied the results of his work in this book. The facts can be relied upon, for they are gleaned from actual experience.

GRAPHICAL DETERMINATION OF EARTH SLOPES, RETAINING WALLS AND DAMS. By Charles Prelini. New York: D. Van Nostrand Company, 1908. 8vo.; pp. 129. Price, $2.

A large part of this work consists of graphical methods of solving problems concerning the slopes of earth embankments, lateral pressure, earth against the wall, and the thickness of retaining walls and dams. These pages are intended for students, and not for professional engineers. Simplicity and clearness have been the main objects in view, and the experience of the classroom makes the author believe that this little work will be of use to students and teachers, while at the same time it may be of some help to the practical engineer.

AUDEL'S GAS ENGINE MANUAL. New York: Theo. Audel & Co., 1908. 12mo.; pp. 469. Price, $2.

A practical work dealing with all phases of the subject. There are 156 engravings. Among the interesting chapters are Gas Producer Systems, Ignition and Igniters, Installation and Operation of Marine Engines, Instruments Used in Testing, Nature and Use of Lubricants, Hints on Management and Suggestions for Emergencies, The Automobile, and Useful Rules and Tables.

VERZEICHNIS SAEMTLICHER PUBLIKATIONEN. Von Prof. Dr. Otto Lehmann. Frankfort-on-the-Main: C. Naumann's Druckerei, 1908. Pp. 13.

ZUR GESCHICHTE DER FLÜSSIGEN KRISTALLE. Von O. Lehmann. Leipzig: Johann Ambrosius Barth, 1908. Pp. 852-860.

KÜNSTLICHE ZELLEN. Mit Flüssig-kristallinischen Wänden. Von O. Lehmann. Braunschweig: Druck von Friedrich Vieweg und Sohn, 1908. Pp. 407-410.

FLÜSSIGE KRISTALLE. Ihre Entdeckung Bedeutung und Ahnlichkeit mit Lebewesen. Von Prof. Dr. O. Lehmann. Frankfort-on-the-Main: C. Naumann's Druckerei, 1908. Pp. 35.

DIE WICHTIGSTEN BEGRIFFE UND GESETZE DER PHYSIK. Von Dr. O. Lehmann. Berlin: Verlag von Julius Springer, 1907. Pp. 58.

PATENT CAUSES

INVENTORS are invited to communicate with **Munn & Co., 361 Broadway, New York,** or **625 F Street, Washington, D. C.,** in regard to securing valid patent protection for their **inventions. Trade-Marks** and **Copyrights** registered. **Design Patents** and **Foreign Patents** secured.

We undertake all **Patent, Trade-Mark** and **Copyright Practice,** both before the **Patent Office** and the **Courts,** and we have special facilities for handling **Infringement** and other suits in State and Federal jurisdictions.

A Free Opinion as to the probable patentability of an invention will be readily given to any inventor furnishing us with a model or sketch, and a brief description of the device in question. All communications are strictly confidential. Our **Hand-Book** on Patents will be sent free on request.

Ours is the **Oldest** agency for securing patents; it was established over sixty years ago.

MUNN & CO.
361 Broadway, New York City

INDEX OF INVENTIONS

For which Let ers Patent of the United States were Issued for the Week Ending November 17, 1908.

AND EACH BEARING THAT DATE

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

Acid, manufacture of sulfuric, H. Petersen ... 904,147
Adjusting jack, C. S. Ehrhart ... 903,849
Agricultural implement, J. Pierson, Jr.... 904,498
Agricultural products and the like, drying apparatus for, H. von Schutz ... 904,020
Air compressor, H. E. Bailey ... 904,294
Air compressor, etc., I. Patrick ... 904,219
Air of living rooms, apparatus for therapeutic treatment of the, F. Batter.... 904,172
Air or other gases, treating materials by the action of, J. E. Greenawalt.... 904,060
Alloy, Clamer & Hendrickson, reissue.... 12,880
Anchor, drive, J. C. Hasse ... 904,198
Animal hoof protector, F. R. Ahlers.... 903,943
Animal trap, J. H. Sprague ... 904,024
Animal trap and chicken coop, combined, H. A. Moore ... 904,348
Anode, R. J. Wisonom ... 903,939
Armor piercing projectile fuse, R. Imperiali ... 903,980
Atomizer for scent and other sprays, H. Rachmann ... 904,149
Automatic switch, F. Williams ... 903,932
Automobile draft attachment, C. J. Zillgitt ... 903,942
Automobile hood, E. T. Robinson ... 904,151
Automobile steering mechanism, J. M. Mack 904,137
Automobiles, garment, umbrella, and cane rack for, E. T. Robinson ... 904,150
Awning, Buschemeyer & Caspari ... 904,305
Bag support, feed, E. J. Colgan.... 904,046
Bar fixture, O. Forster ... 904,253
Bar lock, drop, P. J. Pauly, Jr.... 903,880
Base board and ground strip, combined, K. L. Hyller ... 904,261
Basket, A. A. Styers ... 904,026
Basket and hamper, D. P. Moore.... 904,142
Bat former, R. B. Lumpkin ... 903,876
Bath cabinet, wardrobe, J. C. Kimsey.... 904,488
Bath tub attachment, W. E. Kennedy.... 904,133
Battery, storage, R. N. Chamberlain.... 904,115
Bearing, roller, W. H. Makutchan.... 904,343
Bearing, shaft, J. T. Lagergren.... 903,872
Bed slat holder, R. H. Bishop.... 904,01
Belts and the like, built up material for, J. Muller ... 904,350
Binder, J. R. Barrett ... 903,947
Binder, loose leaf, R. M. Havens.... 904,478
Binder, package, C. R. Dreese ... 904,184
Binders and the like, attachment for, J. B. Hughes ... 904,130
Block molding machine, building, J. Soss. 903,908
Boat, A. B. Otis ... 904,357
Boat, life, J. H. Stoelt ... 904,372
Boat, mechanically operated, K. J. Seck... 904,154
Boat propulsion, I. B. Rolka ... 904,454
Boiler and steam apparatus, household, N. W. Tharp ... 904,376
Boiler furnace, O. B. Dawson ... 904,051
Boiler superheater, steam, Horsey & Vaughan ... 904,129
Boiler, tubular steam, H. E. Ward.... 904,385
Book, J. D. Mets ... 904,076
Boot, R. Fox ... 904,254
Boot and shoe last corn and bunion easing attachment, J. O. Stivers, reissue.... 12,881
Border calculator, C. E. Schindler.... 904,456
Bottle, aseptic, J. J. Shea.... 904,095
Bottle packing, R. A. Badger.... 903,827
Bowling alley, C. B. Brenneman.... 904,400
Box covering machine, F. R. Harris.... 904,426
Brake beam safety hanger, T. E. Buck.... 90,954
Brick, interlocking, J. Soss ... 903,906
Brush, fountain, J. B. Fesler ... 904,190
Brush, pigtail, L. C. Hawley ... 903,972
Buckle, C. S. Comstock ... 904,048
Buggy top support, Martin & Miller.... 904,345
Building brick or block, J. Soss ... 903,907
Bullet mold, A. J. Mundt ... 904,273
Burglar alarm, E. L. Rycraft ... 903,888
Butter cutter, J. N. Jacobsen.... 903,981
Butter mold, J. N. Jacobsen ... 903,982
Butter mold and cutter, A. P. Griffen.... 904,421
Butterin, manufacturing, H. H. & E. Schou ... 904,231
Button blanks from shells, machine for cutting, A. P. Wallace ... 904,103
Button, collar, L. Heynemann.... 904,437
Camera, vest pocket, M. Niell ... 904,005
Candelabrum, M. V. Anderson ... 904,111
Cap, J. N. Weikly ... 903,924
Car, A. Becker ... 904,040
Car chock, railway, S. Otis ... 904,218
Car door operating mechanism, dump, J. O. Neikirk ... 904,213
Car, dump, J. O. Neikirk ... 904,004
Car, dumping, Treadwell & Astrom.... 903,921
Car fender, T. F. Gallagher ... 94,124
Car fender, automatic, J. A. Byers ... 904,471
Car, plow, J. O. Neikirk ... 904,214
Car railway, J. Giczewski.... 904,256
Car vestibule diaphragm, H. H. Schroyer. 903,893
Car wheel, F. K. Vial ... 904,162
Car wheel broken flange detector, W. R. Coglan ... 904,180
Carnation holder, E. G. & H. Klahn.... 903,986
Carrier, A. K. Lee ... 904,337
Carrier system, pneumatic, W. H. Earl.. 904,414
Cash register, T. Carroll ... 903,837, 903,838
Caster, ball, J. H. Fenney.... 903,850
Caterer's cup, G. O. Crawford ... 904,050
Cattle guard, G. W. Cline ... 904,045
Cement packer, E. P. Kleppinger.... 904,334
Chair arm brace cutter, W. Kraedemann.. 903,990
Chamber pot, S. D. Allen.... 904,293
Chamfer gage, A. E. Naldrett ... 904,003
Change delivering means, E. B. Gallaher... 904,475
Chemical action in gases, effecting, D. R. Lovejoy ... 904,070
Christmas trees, etc., stand for, E. E. Rice ... 904,227
Cigarette manufacturing machine, D. Weil. 903,925
Circuit controller, drawbridge, F. A. Wendler ... 903,927
Circuits of electrostatic reaction currents, method of and apparatus for relieving wire, N. G. Warth ... 903,923
Claw coupling, central buffer, L. Scheib, Sr., and L., Jr. ... 904,153
Clock, alarm, G. Kern ... 904,333
Clock, electric, R. D. Hickok ... 904,128
Clock, electric secondary, H. B. McCabe.. 904,001
Closet seat, Eastburn & Reeves ... 904,053
Clothes drier, L. Duncan ... 904,319
Clothes peg, O. Ehlers ... 904,249
Clothes washer, G. B. Wilson ... 904,242
Clock or watch indicator, A. E. Aeschlimann ... 904,291
Clutch, C. T. Painter ... 904,358
Clutch, H H. Taylor ... 904,463
Clutch and operating means therefor, A. E. Holcomb ... 903,858
Clutch, electromagnetic, H. Ast ... 903,945
Clutch for windlasses and hoisting machines, automatic safety, J. B. Pruden. 904,226
Cock, adjustable regulating, W. N. Best... 904,299
Coffee urn, J. P. Blocker ... 904,113
Coin holder, pocket, Birch & Cameron.... 904,244
Coins and the like, counter for, A. U. Westfelt ... 903,929
Collar tipper, W. Bartholomew ... 904,398
Combination lock, W. H. Taylor ... 904,236
Combustion engine, O. G. Simmons ... 903,902
Commutator neck or lead, A. P. Peck.... 903,881
Compressor, thermo, C. Prache ... 904,276
Computing machine, A. F. Johnson ... 903,984
Concrete construction form, C. M. Markham ... 903,996
Concrete construction, reinforced, C. R. Steiner ... 903,909
Concrete form holder and adjuster, J. G. Hosmer ... 904,433
Concrete mold, W. B. Weldon ... 904,033
Concrete slab making machine, O. D. Tegarden ... 903,916
Concrete structure reinforcing device, J. T. Simpson ... 903,903, 904,283
Connector, M. O. Spring ... 904,097
Contact device, R. B. Klopf.... 903,987
Cooking utensil, H. S. Van Patten.... 904,382
Cooling rooms, apparatus for, P. Grayson.. 904,420
Cork, composition, J. A. Jones ... 903,865
Corn, method and apparatus for popping, H. G. Eckstein ... 904,186
Corn planter and marker, W. H. Lucan.... 904,271
Cot, folding, P. J. Oberg.... 904,006
Cotton chopper, F. Trawick ... 904,379
Cotton chopper, C. E. Hedgepeth ... 904,427
Cotton chopper and cultivator, combined, J. L. Agee ... 904,038
Cotton or other fibers, machine for opening and cleaning, R. & J. Greenhalgh. 903,969
Cotton scraper and cultivator, combined, G. W. Randolph ... 904,447
Couch, H. C. Henderson ... 904,327
Couch, cot, and davenport, combined, J. L. Tandy ... 904,373
Crib, corn, Z. E. Williamson ... 903,934
Crockery handle, detachable, H. H. Cowles. 904,417
Crossing, movable point, W. M. Henderson ... 903,974
Crutch, H. A. Hood ... 904,481
Cultivator, G. A. Plank ... 903,882
Cultivator trip mechanism, C. J. Kalkhurst ... 903,867
Cup handle, C. Thessen ... 904,237
Curtain frame, sash, D. M. Sarkisian.... 904,091
Cut off, safety, R. H. Cowdrey ... 904,497
Cutting bones and other materials, machine for, R. H. O'Neill ... 904,274
Cylinder, governor, C. R. Cude.... 904,118
Dampening and stretching machine, L. H. Carleton ... 904,406
Deposit box, automatic, H. G. Dorsey.... 904,318
Derrick swinging mechanism, O. J. Martinson ... 903,997
Detonator casings, charge for, L. Wohler. 904,289
Developing apparatus, G. O. Beidler 904,399
Dial, L. B. Ferguson ... 903,964
Die finishing machine, G. H. Webb.... 904,288
Dish receiver, R. R. Parry ... 904,010
Disinfection, A. Gartner ... 903,853
Display and card rack, M. J. Orin.... 904,080
Display box for fruits and vegetables, F. E. Cabanis ... 904,404
Display case and binder, portable, A. M. Knauber ... 903,988
Distilling apparatus, wood, G. Walker 904,165
Diving apparatus, J. L. Watson 904,241
Door and window fastener, R. R. Bulger.. 904,304
Door hanger, E. G. Worden ... 904,393
Door lock, D. Hileman ... 903,857
Draft attachment, D. W. Davis ... 904,473
Drawing rolls, top roll clearer for, J. F. Reed ... 903,885
Drilling apparatus, core, C. A. Terry.... 904,161
Drilling machine chuck, rock, L. C. Bayles. 903,948
Dyeing apparatus, R. Diederichs ... 904,315
Dyeing machines, hoisting and agitating apparatus for, J. Hussong ... 904,260
Dyes, making black sulfur, A. F. Poirrier. 904,224
Dynamometer, transmission, Hopkinson & Thring ... 904,432
Egg tester, E. C. Waldorf ... 904,238
Electric lighting device, C. Wheeler.... 904,467
Electric machine, dynamo, B. A. Behrend. 903,829
Electric telegraphy, I. Kitsee ... 903,871
Electric waves, oscillation detecting means for receiving intelligence communicated by, G. W. Pickard ... 904,222
Electrical insulation, system of, F. M. Locke ... 903,875
Electricity removing means, static, W. H. Chapman ... 904,248
Elevator safety appliance, E. Hardesty.... 904,424
Engine electric igniter, explosive, G. A. Goodson ... 904,196
Engine fuel heater, explosive, Hertzberg & Low ... 904,203
Engine stuffing box, gas, A. Wefing 904,386
Engine valve mechanism, gasoline, C. J. Gustafson ... 904,197
Engine vaporizing device, internal combustion, J. S. de Roos ... 904,455
Envelop, W. C. Jones ... 904,262
Envelop, novelty surprise, A. V. Donahey.. 904,052
Exerciser, physical, J. Lievre ... 904,339
Exhaust head, G. C. Rittenhouse ... 903,887
Expansion wheel, R. R. Stein ... 904,025
Explosion petroleum engine, Korting & Kritzler ... 904,267
Eyeglasses, G. J. Lowres ... 904,074
Fabric slitting machine, J. A. Cameron.... 904,247
Fabrics and other material, producing glossy or silky effects on, L. Lilienfeld..... 904,269
Fastener, J. E. Wallis ... 904,384
Faucet, W. H. Kilbourn ... 904,134
Faucet, G. R. Hohman ... 904,329
Feeding machine attachment, J. Kleidmann 904,266
Fence and hitching post, W. H. Kessler.. 904,487
Fence post, iron, B. P. Andersen ... 903,944
Fertilizer distributer, L. G. Herrick..... 904,127
Fibrous material, mordanting, F. Blumenthal ... 903,833
Filaments for ligting and heating, making, Michaud & Delasson ... 904,139
Filter, J. P. White ... 904,389
Finishing and lustering machine, X. Bossart ... 904,173
Fire extinguisher, J. Richard ... 904,013
Fire kindler, automatic, S. F. Bates..... 903,828
Firearm, R. T. Torkelson ... 903,919
Fireplace frame wiring device, W. G. Taylor ... 904,374
Fishing reel, V. R. Roberts ... 904,016
Flash light device, A. Robbins ... 904,362
Floor scraper, J. F. Bradbury ... 904,303
Flue cleaner, boiler, R. W. Hamann..... 903,971
Flue cutter, Zilligitt & Stebbins..... 903,941
Flue scraper, A. B. Heimann ... 904,429
Fluid drawer, T. G. Strater..... 903,913
Fluid pressure system, W. F. Schneider... 903,892
Fluid recorder, E. S. Cole ... 904,310
Fly escape, A. W. Salokar ... 904,090
Folding machine, G. J. Dormandy ... 904,317
Food product, L. Coltrin..... 904,047
Forging apparatus, axle, J. H. Baker..... 904,295
Fruits, vegetables, etc., receptacle for holding, A. J. Thrower ... 903,918
Fur for felting, machine for carroting or otherwise preparing, J. Langley 903,992
Furnace arc, locomotive, C. B. Moore.... 904,494
Furnaces, regulation of polyphase, R. Fleming ... 904,194
Garment fastener, D. J. Wickers..... 903,930
Gas burner, F. E. Buddington..... 904,246
Gas, manufacture of, J. Bueb ... 904,043
Gas mixer, L. M. Simmons ... 904,368
Gas mixtures, blowpipe for burning, Roberts & Sullivan ... 904,452
Gas valve, pressure, F. O. H. Fincke..... 904,057
Gases, apparatus for chemically combining, D. R. Lovejoy ... 904,071, 904,072
Gases, apparatus for effecting chemical action in, D. R. Lovejoy ... 904,073
Gases, effecting chemical action in, D. R. Lovejoy ... 904,070
Gases, filling mass for receivers for storing explosive, G. Dalen ... 904,183
Gearing, transmission, W. K. Blackburn.... 903,952
Generator, J. Harleman ... 903,856
Glass gathering machine, R. D. Brown.... 904,402
Glass, making plate or sheet, T. Spillane... 904,158
Grain drill, D. A. Schutt.... 903,896, 904,232
Grain drill, E. H. Collins ... 904,410
Grain elevator, J. C. Tobias ... 904,378
Graphophone attachment, W. S. Rodenberger ... 904,453
Graphophones and records therefor, cabinet for, W. C. Hills ... 903,977
Grip, tramway bucket, C. A. Case..... 904,178
Guncotton charges, manufacture of compressed, J. A. Carter ... 903,840
Gun cleaner, E. F. Fletcher ... 904,122
Hair roll, R. H. Damon ... 904,411
Halter, W. S. Farrar ... 904,321
Hame, C. E. Cameron ... 904,306
Hammer, power, J. O'Brien ... 904,216
Harvesting machine, potato, C. Keibel.... 904,264
Hat holder, G. Aubuchon ... 903,946
Hatch fastening device, O. P. Peckham.... 904,275
Heat interchanging apparatus, Cramer & Diederich ... 904,181
Heating and ventilating appliance, J. L. Waterbury ... 904,240
Heating apparatus, water, G. W. Mason.. 904,138
Heating apparatus, water, J. B. Beauvais. 904,297
Heating plant for buildings, hot water, C. Obrebowicz ... 904,215
Heating system, A. J. Van Doren ... 904,381
Hem or seam for sewed articles, J. G. Lewis ... 903,995
Hides or skins, machine for treating, D. P. O'Brien ... 904,079
Hoist, hay rack, I. Lester ... 903,874
Hook eye, A. C. Carl ... 904,405
Hooks and eyes to cards, machine for attaching, W. M. Corthell ... 904,049
Hoop lock cutting machine, barrel, Holmes & Beugler ... 904,480
Hoop roller, S. G. Petterson ... 904,220
Horse calk, emergency, C. Berg ... 903,830
Horse collar, pneumatic, A. J. & C. M. Fike ... 904,322
Horse detacher, J. Zimmer ... 904,395
Horse trappings, C. L. Warner..... 904,031
Horseshoe, H. J. Filliez ... 904,193
Hose coupling, T. Withrow ... 904,036
Hose reel, L. Vader ... 904,380
Hose supporter, H. Allen ... 904,292
Hot air furnace, J. H. Sangree ... 904,230
Immersion regulator for submarines and torpedoes, automatic, E. Schneider.... 904,093
Incandescent burner, H. M. Reichenbach.. 904,448
Index and pad, combined, C. H. Young... 903,940
Index tray, card, F. W. Gerhard ... 903,855
Insulating bushing, L. Steinberger..... 904,369
Insulator, W. H. Kempton ... 904,069
Insulator, disk strain, L. Steinberger..... 904,370
Insulator, heat, H. Mock ... 903,878
Intermittently driven mechanism adapted for constant driving, H. H. Taylor.... 904,462
International combustion engine, D. Roberts.... 904,086
Iron or steel sheets, manufacture of plated or coated, J. W. Paton ... 904,444
Journal bearing, car, D. M. Watson..... 904,104
Journal box, T. H. Symington..... 904,460
Junction box, J. N. Scism ... 904,458
Knife sections, means for joining sectional, G. J. Mayer ... 904,442
Knitting machine, W. D. & L. C. Huse.... 904,484
Knitting machines, automatic measuring attachment for circular, J. B. Hipwell... 904,204
Lacing device, R. J. Evans ... 904,416
Lacing hook, F. A. Herrick ... 904,479
Lag indicator, W. H. Freedman..... 903,966
Lamp, arc, C. C. Hughes..... 903,861
Lamp, arc, E. O. Dworak ... 904,185
Lamp, incandescent, J. W. Howell, 903,860, 904,482
Lamp socket attachment, incandescent, H. H. Ham ... 904,476
Lamp, vapor, A. A. Warner..... 904,239
Lamps, manufacture of metal filament, W. C. Arsem ... 903,826
Leather rounding machine, R. A. Pfeifer... 904,445
Leather working machine, Stimpson & Bradford ... 904,160
Level, plumb, T. N. Roach ... 904,014
Lid lifter, J. J. Meehan ... 904,346
Liquid filling tube, A. Schneider..... 904,092
Liquids, electrolysis of, J. Billiter..... 903,951
Lock, W. J. Carroll ... 903,839
Lock, W. J. Teese ... 904,375
Lock strike, adjustable, D. W. Tower..... 903,920
Locking bolt, C. H. Wheary ... 904,466
Locomotive engines and tenders, draft gear for, H. M. Pflager ... 904,221
Locomotive furnaces, front arch for narrow, C. B. Moore ... 904,211
Locomotive tender, Ryan & Johnson..... 904,017
Loom, automatic weft replenishing, H. Wyman ... 904,290
Loom, automatic weft replenishing mechanism, W. R. Stitt ... 903,912
Loom, narrow ware, O. W. Schaum..... 904,281
Loom pattern mechanism, O. L. Owen..... 904,495
Loom starting and stopping mechanism, A. E. Rhoades ... 904,450
Looms, shuttle positioner for weft replenishing, W. R. Stitt ... 903,911
Lubricator, H. A. Sedgwick ... 903,897
Lubricator, H. C. Woodbridge ... 904,107
Lubricator, E. J. McGuire ... 904,353
Lunch case, L. M. Justice ... 904,440
Magnetic separator, M. Ruthenburg..... 904,280
Mail bag catching and delivering mechanism, L. B. Futer ... 904,058
Mail box, C. W. Palmer ... 904,081
Mail transferring apparatus, R. H. Page.. 904,443
Mandrel, W. Evans ... 904,252
Manure loader, J. B. Schuman ... 904,457
Marine propulsion, W. P. Thompson, 904,285, 904,464, 904,465
Match packing machine, Young & Weaver.. 904,394
Measuring machine, cloth, R. G. Nicholas. 904,078
Meat hook, E. Miller..... 904,140
Metal culvert, B. W. Harris..... 904,199, 904,200
Metal strips into washers, machine for bending flat, A. W. Herbert..... 903,976
Metals from their ores, obtaining, K. Kaiser ... 904,263
Mica, treating, J. P. W. Beckman..... 903,949
Micrometer indicator, liquid, F. G. Purinton ... 904,277
Mine door, Dinwiddie & Braun ... 903,846
Mining, M. Schwerin ... 904,021
Miter box, S. W. Shue ... 903,901
Mixing chamber, L. Rosenbaum..... 904,087
Motor oiling system, K. G. Johnston..... 904,132
Music sheet perforating device, T. M. Farley ... 903,963
Musical instrument, I. F. Gilmore ... 903,968
Musical instrument, enharmonic, J. Heffernan ... 904,325
Napkin, sanitary, O. C. Schulz ... 903,895
Nest for hens, trap, M. J. Whitty..... 904,390
Nozzle, spray, E. C. Brown ... 903,953
Nut lock, C. H. Price ... 904,360
Oil burner, J. Harleman ... 904,063
Oil cup, W. McLain ... 904,354
Oil tank automatic cut off, H. C. Weitzel.. 903,926
Ores, mattes, and metals for armor plate, rails, etc., smelting, W. E. Everette.. 904,054
Outlet box, E. L. Pierce ... 904,011
Oven, I. A. Boeddener ... 903,834
Oven, coking, E. Ledoux ... 904,268
Oven heat retainer, C. Crossan ... 904,311
Oyster opener, A. G. Molnar, Jr..... 904,000
Package tier, J. C. Pickens ... 904,223
Padlock, permutation, Crein & Loy..... 904,182
Paint and varnish remover, C. Ellis 904,250
Paper bag, H. G. Widmer ... 904,167
Paper cutting machine, G. Fomm 904,474
Paper package, O. L. Parmenter..... 904,083
Pavement or vault construction, H. C. Seipp ... 903,899
Pencil, J. D. R. Lamson ... 903,873
Penholder, W. L. Gordon ... 904,059
Perch, chicken, W. H. Cole ... 904,472
Permutation lock, E. J. Bossert ... 904,302
Photographer's form and print holder, M. B. Harlow ... 904,064
Piano action, A. B. Cross ... 904,117
Piano player, automatic, S. A. Swanson.... 904,284
Piano repetition action, L. Charpiat..... 904,308
Picture and looking glass frame, F. J. & H. G. Carl ... 903,955
Picture machine, moving, C. A. Moran.... 904,212
Piling, J. J. Walther ... 904,030
Pillow, pine needle, R. F. Warham..... 904,287
Pin holder, scarf, H. Hartmann ... 904,065
Pin safety lock, W. A. Olsen..... 904,356
Pipe stem, sanitary, Gottschalk & Phelps.. 904,323
Pipe trap, waste, O. Walbel ... 904,286
Pipe wrench, G. E. Woodbury ... 904,108